**3GPP TSG-RAN WG4 Meeting # 97-e *R4-201xxxx***

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **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 | **X** | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | to TS 38.101-3 to introduce Power Class 2 for DC\_1A\_n78A and DC\_8A\_n78A | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | ENDC\_UE\_PC2\_R17\_NR\_TDD | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | |  |
|  | *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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introducing Power Class 2 for DC\_1A\_n78A and DC\_8A\_n78A | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introduction of PC2 for following EN-DC combinations:  DC\_1A\_n78A  DC\_8A\_n78A | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The operators cannot have PC2 for the above mentioned EN-DC combinations | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.2B.1.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521 series | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## << Start of changes >>

6.2B.1.3 Inter-band EN-DC within FR1

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.1.3-1: 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\_n5A |  |  | 23 | +2/-3 |
| DC\_1A\_n7A |  |  | 23 | +2/-3 |
| DC\_1A\_n8A |  |  | 23 | +2/-3 |
| DC\_1A\_n20A |  |  | 23 | +2/-3 |
| DC\_1A\_n28A |  |  | 23 | +2/-3 |
| DC\_1A\_n38A |  |  | 23 | +2/-3 |
| DC\_1A\_n40A |  |  | 23 | +2/-3 |
| DC\_1A\_n41A |  |  | 23 | +2/-3 |
| DC\_1A\_n50A |  |  | 23 | +2/-3 |
| DC\_1A\_n51A |  |  | 23 | +2/-3 |
| DC\_1A\_n71A |  |  | 23 | +2/-3 |
| DC\_1A\_n77A  DC\_1A\_n84A\_ULSUP-TDM\_n77A |  |  | 23 | +2/-3 |
| DC\_1A\_n78A  DC\_1A\_n84A\_ULSUP-TDM\_n78A | 266 | +2/-31 | 23 | +2/-3 |
| DC\_1A\_n79A  DC\_1A\_n84A\_ULSUP-TDM\_n79A |  |  | 23 | +2/-3 |
| DC\_1A\_n80A |  |  | 23 | +2/-3 |
| DC\_2A\_n5A |  |  | 23 | +2/-31 |
| DC\_2A\_n7A |  |  | 23 | +2/-3 |
| DC\_2A\_n12A |  |  | 23 | +2/-3 |
| DC\_2A\_n38A |  |  | 23 | +2/-3 |
| DC\_2A\_n41A |  |  | 23 | +2/-3 |
| DC\_2A\_n48A |  |  | 23 | +2/-3 |
| DC\_2A\_n66A |  |  | 23 | +2/-31 |
| DC\_2A\_n71A |  |  | 23 | +2/-3 |
| DC\_2A\_n78A |  |  | 23 | +2/-3 |
| DC\_3A\_n1A |  |  | 23 | +2/-3 |
| DC\_3A\_n5A  DC\_3C\_n5A |  |  | 23 | +2/-3 |
| DC\_3A\_n7A |  |  | 23 | +2/-31 |
| DC\_3A\_n8A |  |  | 23 | +2/-3 |
| DC\_3A\_n20A |  |  | 23 | +2/-3 |
| DC\_3A\_n28A |  |  | 23 | +2/-31 |
| DC\_3A\_n34A |  |  | 23 | +2/-31 |
| DC\_3A\_n38A |  |  | 23 | +2/-3 |
| DC\_3A\_n40A |  |  | 23 | +2/-31 |
| DC\_3A\_n41A,  DC\_3C\_n41A,  DC\_3C\_n41A, | 266 | +2/-3 | 23 | +2/-3 |
| DC\_3A\_n50A |  |  | 23 | +2/-3 |
| DC\_3A\_n51A |  |  | 23 | +2/-31 |
| DC\_3A\_n71A |  |  | 23 | +2/-3 |
| DC\_3A\_n77A |  |  | 23 | +2/-31 |
| DC\_3A\_n78A | 266 | +2/-31 | 23 | +2/-31 |
| DC\_3A\_n79A  DC\_3C\_n79A |  |  | 23 | +2/-31 |
| DC\_3A\_n80A\_ULSUP-TDM\_n41  DC\_3C\_n80A\_ULSUP-TDM\_n41 |  |  | 23 | +2/-3 |
| DC\_3A\_n80A\_ULSUP-TDM\_n77A |  |  | 23 | +2/-31 |
| DC\_3A\_n80A\_ULSUP-TDM\_n78A |  |  | 23 | +2/-31 |
| DC\_3A\_n80A\_ULSUP-TDM\_n79A |  |  | 23 | +2/-31 |
| DC\_3A\_n82A |  |  | 23 | +2/-31 |
| DC\_3A\_n84A |  |  | 23 | +2/-31 |
| DC\_4A\_n38A |  |  | 23 | +2/-3 |
| DC\_4A\_n41A |  |  | 23 | +2/-3 |
| DC\_4A\_n78A |  |  | 23 | +2/-3 |
| DC\_5A\_n2A |  |  | 23 | +2/-3 |
| DC\_5A\_n7A |  |  | 23 | +2/-3 |
| DC\_5A\_n12A |  |  | 23 | +2/-3 |
| DC\_5A\_n38A |  |  | 23 | +2/-3 |
| DC\_5A\_n40A |  |  | 23 | +2/-31 |
| DC\_5A\_n48A |  |  | 23 | +2/-3 |
| DC\_5A\_n66A |  |  | 23 | +2/-31 |
| DC\_5A\_n71A |  |  | 23 | +2/-3 |
| DC\_5A\_n78A |  |  | 23 | +2/-3 |
| DC\_5A\_n79A |  |  | 23 | +2/-3 |
| DC\_7A\_n1A |  |  | 23 | +2/-3 |
| DC\_7A\_n3A |  |  | 23 | +2/-3 |
| DC\_7A\_n5A  DC\_7C\_n5A |  |  | 23 | +2/-3 |
| DC\_7A\_n8A |  |  | 23 | +2/-3 |
| DC\_7A\_n20A |  |  | 23 | +2/-3 |
| DC\_7A\_n28A |  |  | 23 | +2/-31 |
| DC\_7A\_n40A |  |  | 23 | +2/-3 |
| DC\_7A\_n51A |  |  | 23 | +2/-31 |
| DC\_7A\_n66A |  |  | 23 | +2/-31 |
| DC\_7A\_n71A |  |  | 23 | +2/-3 |
| DC\_7A\_n77A |  |  | 23 | +2/-3 |
| DC\_7A\_n78A  DC\_7C\_n78A |  |  | 23 | +2/-3 |
| DC\_7A\_n80A |  |  | 23 | +2/-3 |
| DC\_8A\_n1A |  |  | 23 | +2/-3 |
| DC\_8A\_n3A |  |  | 23 | +2/-3 |
| DC\_8A\_n20A |  |  | 23 | +2/-3 |
| DC\_8A\_n28A |  |  | 23 | +2/-3 |
| DC\_8A\_n34A |  |  | 23 | +2/-31 |
| DC\_8A\_n39A |  |  | 23 | +2/-3 |
| DC\_8A\_n40A |  |  | 23 | +2/-31 |
| DC\_8A\_n41A, |  |  | 23 | +2/-3 |
| DC\_8A\_n77A |  |  | 23 | +2/-3 |
| DC\_8A\_n78A | 266 | +2/-31 | 23 | +2/-3 |
| DC\_8A\_n79A  DC\_8A\_n79C |  |  | 23 | +2/-3 |
| DC\_8A\_n80A |  |  | 23 | +2/-3 |
| DC\_8A\_n81A\_ULSUP-TDM\_n41 |  |  | 23 | +2/-3 |
| DC\_8A\_n81A\_ULSUP-TDM\_n78A |  |  | 23 | +2/-3 |
| DC\_8A\_n81A\_ULSUP-TDM\_n79A |  |  | 23 | +2/-3 |
| DC\_11A\_n3A |  |  | 23 | +2/-3 |
| DC\_11A\_n28A |  |  | 23 | +2/-3 |
| DC\_11A\_n77A |  |  | 23 | +2/-3 |
| DC\_11A\_n78A |  |  | 23 | +2/-3 |
| DC\_11A\_n79A |  |  | 23 | +2/-3 |
| DC\_12A\_n2A |  |  | 23 | +2/-3 |
| DC\_12A\_n5A |  |  | 23 | +2/-3 |
| DC\_12A\_n7A |  |  | 23 | +2/-3 |
| DC\_12A\_n25A |  |  | 23 | +2/-3 |
| DC\_12A\_n38A |  |  | 23 | +2/-3 |
| DC\_12A\_n41A |  |  | 23 | +2/-3 |
| DC\_12A\_n66A |  |  | 23 | +2/-3 |
| DC\_12A\_n78A |  |  | 23 | +2/-3 |
| DC\_13A\_n2A |  |  | 23 | +2/-3 |
| DC\_13A\_n5A |  |  | 23 | +2/-3 |
| DC\_13A\_n7A |  |  | 23 | +2/-3 |
| DC\_13A\_n48A |  |  | 23 | +2/-3 |
| DC\_13A\_n66A |  |  | 23 | +2/-3 |
| DC\_13A\_n71A |  |  | 23 | +2/-3 |
| DC\_13A\_n78A |  |  | 23 | +2/-3 |
| DC\_14A\_n2A |  |  | 23 | +2/-3 |
| DC\_14A\_n66A |  |  | 23 | +2/-3 |
| DC\_18A\_n3A |  |  | 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\_n7A |  |  | 23 | +2/-3 |
| DC\_20A\_n8A |  |  | 23 | +2/-3 |
| DC\_20A\_n38A |  |  | 23 | +2/-3 |
| DC\_20A\_n28A |  |  | 23 | +2/-3 |
| DC\_20A\_n41A |  |  | 23 | +2/-3 |
| DC\_20A\_n50A |  |  | 23 | +2/-3 |
| DC\_20A\_n51A |  |  | 23 | +2/-3 |
| DC\_20A\_n77A |  |  | 23 | +2/-3 |
| DC\_20A\_n80A |  |  | 23 | +2/-3 |
| DC\_20A\_n78A |  |  | 23 | +2/-3 |
| DC\_20A\_n82A\_ULSUP-TDM\_n78A |  |  | 23 | +2/-3 |
| DC\_20A\_n83A |  |  | 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\_n25A |  |  | 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\_n5A |  |  | 23 | +2/-3 |
| DC\_28A\_n7A  DC\_28A\_n7B |  |  | 23 | +2/-3 |
| DC\_28A\_n8A |  |  | 23 | +2/-3 |
| DC\_28A\_n40A |  |  | 23 | +2/-3 |
| DC\_28A\_n41A |  |  | 23 | +2/-3 |
| DC\_28A\_n50A |  |  | 23 | +2/-3 |
| DC\_28A\_n51A |  |  | 23 | +2/-3 |
| DC\_28A\_n77A |  |  | 23 | +2/-3 |
| DC\_28A\_n78A |  |  | 23 | +2/-3 |
| DC\_28A\_n79A |  |  | 23 | +2/-3 |
| DC\_28A\_n83A\_ULSUP-TDM\_n78A |  |  | 23 | +2/-3 |
| DC\_30A\_n2A |  |  | 23 | +2/-3 |
| DC\_30A\_n5A |  |  | 23 | +2/-3 |
| DC\_30A\_n66A |  |  | 23 | +2/-3 |
| DC\_38A\_n78A |  |  | N/A | N/A |
| DC\_39A\_n40A |  |  | 23 | +2/-3 |
| DC\_39A\_n41A  DC\_39C\_n41A | 265 | +2/-31 | 23 | +2/-3 |
| DC\_39A\_n78A |  |  | 23 | +2/-31 |
| DC\_39A\_n79A | 265 | +2/-31 | 23 | +2/-31 |
| DC\_40A\_n1A |  |  | 23 | +2/-3 |
| DC\_40A\_n41A  DC\_40C\_n41A |  |  | 23 | +2/-3 |
| DC\_40A\_n77A |  |  | N/A | N/A |
| DC\_40A\_n78A |  |  | 23 | +2/-3 |
| DC\_40A\_n79A |  |  | 23 | +2/-3 |
| DC\_41A\_n3A  DC\_41C\_n3A |  |  | 23 | +2/-3 |
| DC\_41A\_n28A  DC\_41C\_n28A |  |  | 23 | +2/-3 |
| DC\_41A\_n77A  DC\_41C\_n77A |  |  | 23 | +2/-31 |
| DC\_41A\_n78A  DC\_41C\_n78A |  |  | 23 | +2/-31 |
| DC\_41A\_n79A  DC\_41C\_n79A | 265 | +2/-31 | 23 | +2/-31 |
| DC\_42A\_n28A  DC\_42C\_n28A |  |  | 23 | +2/-3 |
| 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\_n12A |  |  | 23 | +2/-3 |
| DC\_48A\_n66A |  |  | 23 | +2/-3 |
| DC\_48A\_n71A |  |  | 23 | +2/-3 |
| DC\_66A\_n2A |  |  | 23 | +2/-3 |
| DC\_66A\_n5A |  |  | 23 | +2/-31 |
| DC\_66A\_n7A |  |  | 23 | +2/-3 |
| DC\_66A\_n12A |  |  | 23 | +2/-3 |
| DC\_66A\_n25A |  |  | 23 | +2/-3 |
| DC\_66A\_n38A |  |  | 23 | +2/-3 |
| DC\_66A\_n41A |  |  | 23 | +2/-3 |
| DC\_66A\_n48A |  |  | 23 | +2/-3 |
| DC\_66A\_n71A |  |  | 23 | +2/-3 |
| DC\_66A\_n78A  DC\_66A-66A\_n78A |  |  | 23 | +2/-3 |
| DC\_66A\_n86A\_ULSUP-TDM\_n78A |  |  | 23 | +2/-3 |
| DC\_71A\_n5A |  |  | 23 | +2/-3 |
| DC\_71A\_n38A |  |  | 23 | +2/-3 |
| DC\_71A\_n48A |  |  | 23 | +2/-3 |
| DC\_71A\_n66A |  |  | 23 | +2/-3 |
| DC\_71A\_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 E-UTRA TDD and NR TDD Inter-band 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-interBandENDC-TDD-PC2-r16* 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-interBandENDC-TDD-PC2-r16* is not absent and the percentage of NR uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-interBandENDC-TDD-PC2-r16* 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 sub-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 NR uplink symbols transmitted in a certain evaluation period is less than or equal t*o maxUplinkDutyCycle-interBandENDC-TDD-PC2-r16* 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-interBandENDC-TDD-PC2-r16* 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 sub-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-EN-DC\_FDDTDD\_1 and maxUplinkDutyCycle-EN-DC\_FDDTDD\_2:

– 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-EN-DC\_FDDTDD\_1* 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-EN-DC\_FDDTDD\_2* 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;

## << End of changes >>