**3GPP TSG-RAN5 Meeting #101 *R5-236647***

**Chicago, United States, Nov 13 - 17, 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **Text Proposal** | | | | | | | | |
|  | | | | | | | | |
|  | **36.521-4** | **CR** | **n/a** | **rev** | **-** | **Current version:** | **0.3.0** |  |
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| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm" \l "_blank)*** *on using this form: comprehensive instructions can be found at  <http://www.3gpp.org/Change-Requests>.* | | | | | | | | |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Update of Annex F Test Tolerances | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | CMCC, MediaTek, Keysight Technologies UK Ltd | | | | | | | | | |
| ***Source to TSG:*** | R5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_NBIOT\_eMTC\_NTN\_req-UEConTest | | | | |  | ***Date:*** | | | 2023-08-31 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1. Test Tolerances in Annex F.3.2, F.3.3 and F.3.4 in TS 36.521-4 are missing and need to be added. As per R5-235184, legacy eMTC category M1 and NB-IoT categories NB1 and NB2 MU and TT in TS 36.521-1 can be reused. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Test Tolerances in Annex F.3.2, F.3.3 and F.3.4 in TS 36.521-4 have been added. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | TCs are missing and uncompleted. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | F.3.2, F.3.3, F.3.4 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 >>>

## F.3.2 Measurement of transmitter

Table F.3.2-1: Derivation of Test Requirements (Transmitter tests)

|  |  |  |  |
| --- | --- | --- | --- |
| **Test** | **Minimum Requirement in TS 36.102** | **Test Tolerance (TT)** | **Test Requirement in TS 36.521-1** |
| 6.2A.1 UE maximum output power for category M1 | Same as clause 6.2.2EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz, Power class 3” and “f ≤ 3.0GHz, Power class 5”. | Same as clause 6.2.2EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz, Power class 3” and “f ≤ 3.0GHz, Power class 5”. | Same as clause 6.2.2EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz, Power class 3” and “f ≤ 3.0GHz, Power class 5”. |
| 6.2A.2 UE maximum output power reduction for category M1 | Same as clause 6.2.3EA in TS 36.521-1 [14] for FDD band with “Power class 3, f ≤ 3.0GHz” and “Power class 5, f ≤ 3.0GHz”. | Same as clause 6.2.3EA in TS 36.521-1 [14] for FDD band with “Power class 3, f ≤ 3.0GHz” and “Power class 5, f ≤ 3.0GHz”. | Same as clause 6.2.3EA in TS 36.521-1 [14] for FDD band with “Power class 3, f ≤ 3.0GHz” and “Power class 5, f ≤ 3.0GHz”. |
| 6.2A.3 UE additional maximum output power reduction for category M1 UE | Same as clause 6.2.4EA in TS 36.521-1 [14] | Same as clause 6.2.4EA in TS 36.521-1 [14]] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.2.4EA in TS 36.521-1 [14] |
| 6.2A.4 Configured transmitted Power for category M1 | Same as clause 6.2.5EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.2.5EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.2.5EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.2B.1 UE maximum output power for category NB1 and NB2 | Same as clause 6.2.2F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz, Power class 3” and “f ≤ 3.0GHz, Power class 5” | Same as clause 6.2.2F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.2.2F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.2B.2 UE maximum output power reduction for category NB1 and NB2 | Same as clause 6.2.3F in TS 36.521-1 [14] for FDD band with “Power class 3, f ≤ 3.0GHz” and “Power class 5, f ≤ 3.0GHz”. | Same as clause 6.2.3F in TS 36.521-1 [14] for FDD band with “Power class 3, f ≤ 3.0GHz” and “Power class 5, f ≤ 3.0GHz”. | Same as clause 6.2.3F in TS 36.521-1 [14] for FDD band with “Power class 3, f ≤ 3.0GHz” and “Power class 5, f ≤ 3.0GHz”. |
| 6.2B.3 UE additional maximum output power reduction for category NB1 and NB2 UE | Same as clause 6.2.3F in TS 36.521-1[14] for FDD band with “f ≤ 3.0GHz” | Same as clause 6.2.3F in TS 36.521-1[14] for FDD band with “f ≤ 3.0GHz” | Same as clause 6.2.3F in TS 36.521-1[14] for FDD band with “f ≤ 3.0GHz” |
| 6.2B.4 Configured transmitted Power for category NB1 and NB2 | Same as clause 6.2.5F in TS 36.521-1 [14] | Same as clause 6.2.5F in TS 36.521-1 [14] | Same as clause 6.2.5F in TS 36.521-1 [14] |
| 6.3A.1 UE Minimum output power for category M1 | Same as clause 6.3.2EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.2EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.2EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3A.2 Transmit OFF power for category M1 | Same as clause 6.3.3EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.3EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.3EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3A.3.1 General ON/OFF time mask for category M1 | Same as clause 6.3.4EA.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4EA.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4EA.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3A.3.2.1 PRACH time mask for UE category M1 | Same as clause 6.3.4EA.2 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4EA.2 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4EA.2 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3A.3.2.2 SRS time mask for UE category M1 | Same as clause 6.3.4EA.2 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4EA.2 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4EA.2 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3A.4.1 Power Control Absolute power tolerance for UE category M1 | Same as clause 6.3.5EA.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.5EA.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.5EA.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3A.4.2 Power Control Relative power tolerance for UE category M1 | Same as clause 6.3.5EA.2 in TS 36.521-1 [14]. | Same as clause 6.3.5EA.2 in TS 36.521-1 [14]. | Same as clause 6.3.5EA.2 in TS 36.521-1 [14]. |
| 6.3A.4.3 Aggregate power control tolerance for UE category M1 | Same as clause 6.3.5EA.3 in TS 36.521-1 [14]. | Same as clause 6.3.5EA.3 in TS 36.521-1 [14]. | Same as clause 6.3.5EA.3 in TS 36.521-1 [14]. |
| 6.3B.1 UE Minimum output power for category NB1 and NB2 | Same as clause 6.3.2F in TS 36.521-1 [14] | Same as clause 6.3.2F in TS 36.521-1 [14] | Same as clause 6.3.2F in TS 36.521-1 [14] |
| 6.3B.2 Transmit OFF power for category NB1 and NB2 | Same as clause 6.3.3F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.3F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.3F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3B.3.1 General ON/OFF time mask for category NB1 and NB2 | Same as clause 6.3.4F.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4F.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4F.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3B.3.2 NPRACH time mask for category NB1 and NB2 | Same as clause 6.3.4F.2 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4F.2 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.4F.2 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3B.4.1 Power Control Absolute power tolerance for category NB1 and NB2 | Same as clause 6.3.5F.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.5F.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.3.5F.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 6.3B.4.2 Power Control Relative power tolerance for category NB1 and NB2 | Same as clause 6.3.5F.2 in TS 36.521-1 [14] | Same as clause 6.3.5F.2 in TS 36.521-1 [14] | Same as clause 6.3.5F.2 in TS 36.521-1 [14] |
| 6.3B.4.3 Aggregate power control tolerance for category NB1 and NB2 | Same as clause 6.3.5F.3 in TS 36.521-1 [14] | Same as clause 6.3.5F.3 in TS 36.521-1 [14] | Same as clause 6.3.5F.3 in TS 36.521-1 [14] |
| 6.4A.2.1 Error Vector Magnitude (EVM) for category M1 | Same as clause 6.5.2.1EA.1 in TS 36.521-1 [14] | Same as clause 6.5.2.1EA.1 in TS 36.521-1 [14] | Same as clause 6.5.2.1EA.1 in TS 36.521-1 [14] |
| 6.4A.2.2 Carrier leakage for category M1 | Same as clause 6.5.2.2EA in TS 36.521-1 [14] | Same as clause 6.5.2.2EA in TS 36.521-1 [14] | Same as clause 6.5.2.2EA in TS 36.521-1 [14] |
| 6.4A.2.3 In-band emissions for non allocated RB for category M1 | Same as clause 6.5.2.3EA in TS 36.521-1 [14] | Same as clause 6.5.2.3EA in TS 36.521-1 [14] | Same as clause 6.5.2.3EA in TS 36.521-1 [14] |
| 6.4A.2.4 EVM equalizer spectrum flatness for category M1 | Same as clause 6.5.2.4EA in TS 36.521-1 [14] | Same as clause 6.5.2.4EA in TS 36.521-1 [14] | Same as clause 6.5.2.4EA in TS 36.521-1 [14] |
| 6.4B.2.1 Error Vector Magnitude (EVM) for Category NB1 and NB2 | Same as clause 6.5.2.1F.1 in TS 36.521-1 [14] | Same as clause 6.5.2.1F.1 in TS 36.521-1 [14] | Same as clause 6.5.2.1F.1 in TS 36.521-1 [14] |
| 6.4B.2.2 Carrier leakage for Category NB1 and NB2 | Same as clause 6.5.2.2F in TS 36.521-1 [14] | Same as clause 6.5.2.2F in TS 36.521-1 [14] | Same as clause 6.5.2.2F in TS 36.521-1 [14] |
| 6.4B.2.3 In-band emissions for Category NB1 and NB2 | Same as clause 6.5.2.3F in TS 36.521-1 [14] | Same as clause 6.5.2.3F in TS 36.521-1 [14] | Same as clause 6.5.2.3F in TS 36.521-1 [14] |
| 6.5A.2 Occupied bandwidth for category M1 | Same as clause 6.6.1EA in TS 36.521-1 [14] for FDD band with “channel bandwidth = 1.4MHz”. | Same as clause 6.6.1EA in TS 36.521-1 [14] | Same as clause 6.6.1EA in TS 36.521-1 [14] |
| 6.5A.3.2 Spectrum emission mask for category M1 | Same as clause 6.6.2.1EA in TS 36.521-1 [14] for FDD band with “channel bandwidth = 1.4MHz”. | Same as clause 6.6.2.1EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.6.2.1EA in TS 36.521-1 [14] |
| 6.5A.3.4 Adjacent Channel Leakage Ratio for category M1 | Same as clause 6.6.2.3EA in TS 36.521-1 [14] | Same as clause 6.6.2.3EA in TS 36.521-1 [14] | Same as clause 6.6.2.3EA in TS 36.521-1 [14] |
| 6.5A.4.2 Transmitter Spurious emissions for category M1 | Same as clause 6.6.3EA.1 in TS 36.521-1 [14] for FDD band for spurious frequencies up to 12.75 GHz. | Same as clause 6.6.3EA.1 in TS 36.521-1 [14] | Same as clause 6.6.3EA.1 in TS 36.521-1 [14] |
| 6.5A.4.3 Spurious emission band UE co-existence for category M1 | Same as clause 6.6.3EA.2 in TS 36.521-1 [14] | Same as clause 6.6.3EA.2 in TS 36.521-1 [14] | Same as clause 6.6.3EA.2 in TS 36.521-1 [14] |
| 6.5A.4.4 Additional spurious emissions for category M1 | -26 dBm / 700kHz  -50 dBm / 700kHz  -2 dBm / 4kHz  -5 dBm / 4kHz  -12 dBm / 4kHz  -13 dBm / 4kHz  -15 dBm / 4kHz  -16 dBm / 1MHz  -40 dBm / 1MHz  Frequencies as detailed in core requirement | 0 dB | Formula:  Minimum Requirement + TT |
| 6.5B.2 Occupied bandwidth for category NB1 and NB2 | Same as clause 6.6.1F in TS 36.521-1 [14] | Same as clause 6.6.1F in TS 36.521-1 [14] | Same as clause 6.6.1F in TS 36.521-1 [14] |
| 6.5B.3.2 Spectrum emission mask for category NB1 and NB2 | Same as clause 6.6.2.1F in TS 36.521-1 [14] | Same as clause 6.6.2.1F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 6.6.2.1F in TS 36.521-1 [14] |
| 6.5B.3.4 Adjacent Channel Leakage Ratio for category NB1 and NB2 | Same as clause 6.6.2.3F in TS 36.521-1 [14] | Same as clause 6.6.2.3F in TS 36.521-1 [14] | Same as clause 6.6.2.3F in TS 36.521-1 [14] |
| 6.5B.4.2 Transmitter Spurious emissions for category NB1 and NB2 | Same as clause 6.6.3F.1 in TS 36.521-1[14] for f < 5th harmonic of the upper frequency edge of the UL operating band in GHz | Same as clause 6.6.3F in TS 36.521-1[14] for f < 5th harmonic of the upper frequency edge of the UL operating band in GHz | Same as clause 6.6.3F in TS 36.521-1[14] for f < 5th harmonic of the upper frequency edge of the UL operating band in GHz |
| 6.5B.4.3 Spurious emission band UE co-existence for category NB1 and NB2 | Same as 6.6.3F.2 in TS 36.521-1 [14] | Same as 6.6.3F.2 in TS 36.521-1 [14] | Same as 6.6.3F.2 in TS 36.521-1 [14] |
| 6.5B.4.4 Additional spurious emissions for category NB1 and NB2 | -26 dBm / 700kHz  -50 dBm / 700kHz  -2 dBm / 4kHz  -5 dBm / 4kHz  -12 dBm / 4kHz  -13 dBm / 4kHz  -15 dBm / 4kHz  -16 dBm / 1MHz  -40 dBm / 1MHz  Frequencies as detailed in core requirement | 0 dB | Formula:  Minimum Requirement + TT |
| 6.6B Transmit intermodulation for category NB1 and NB2 | Same as clause 6.7F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz” | Same as clause 6.7F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz” | Same as clause 6.7F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz” |

## F.3.3 Measurement of receiver

Table F.3.3-1: Derivation of Test Requirements (Receiver tests)

|  |  |  |  |
| --- | --- | --- | --- |
| **Test** | **Minimum Requirement in TS 36.102** | **Test Tolerance (TT)** | **Test Requirement in TS 36.521-1** |
| 7.3B Reference sensitivity power level for UE category NB1 and NB2 | Same as clause 7.3F.1 in TS 36.521-1 [14] | Same as clause 7.3F.1 in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 7.3F.1 in TS 36.521-1 [14] |
| 7.4A Maximum input level for category M1 | Same as clause 7.4EA in TS 36.521-1 [14] | Same as clause 7.4EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 7.4EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 7.4B Maximum input level for category NB1 and NB2 | Same as clause 7.4F in TS 36.521-1 [14] | Same as clause 7.4F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause 7.4F in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. |
| 7.5A Adjacent Channel Selectivity for category M1 | Same as clause 7.5EA in TS 36.521-1 [14] for FDD band with “Case 1, channel bandwidth=1.4MHz” and “Case 2, channel bandwidth=1.4MHz”. | Same as clause7.5EA in TS 36.521-1 [14] for FDD band with “f ≤ 3.0GHz”. | Same as clause7.5EA in TS 36.521-1 [14] |
| 7.5B Adjacent Channel Selectivity for category NB1 and NB2 | Same as clause 7.5F in TS 36.521-1 [14] | Same as clause 7.5F in TS 36.521-1 [14] | Same as clause 7.5F in TS 36.521-1 [14] |

## F.3.4 Measurement of performance requirements

Table F.3.4-1: Derivation of Test Requirements (performance tests)

|  |  |  |  |
| --- | --- | --- | --- |
| Test | Minimum Requirement in TS 36.102 | Test Tolerance (TT) | Test Requirement in TS 36.521-1 |
| 8.2.1.1.1 PDSCH in standalone mode for UE category M1 under NTN fading conditions | SNRs as specified in clause 8.2.1.1.1 | 0.8 dB | Formula: SNR + TT  T-put limit unchanged |
| 8.3.1.1.1 Demodulation of NPDSCH (Cell-Specific Reference Symbols) in standalone mode for category NB1 and NB2 under NTN fading conditions | Same as clause 8.3.1.1.1. | Same as clause 8.12.1.1.2 in TS 36.521-1 [14]. | Same as clause 8.12.1.1.2 in TS 36.521-1 [14]. |
| 8.3.1.1.2 Demodulation of NPDSCH (Cell-Specific Reference Symbols) in standalone mode for category NB1 and NB2 | SNRs as specified in clause 8.12.1.1.2 in TS 36.521-1 [14] | Same as clause 8.12.1.1.2 in TS 36.521-1 [14] | Same as clause 8.12.1.1.2 in TS 36.521-1 [14] |
| 8.3.1.1.3 Demodulation of NPDSCH (Cell-Specific Reference Symbols) in standalone for NB2 | SNRs as specified in clause 8.12.1.1.3 in TS 36.521-1 [14] | Same as clause 8.12.1.1.3 in TS 36.521-1 [14] | Same as clause 8.12.1.1.3 in TS 36.521-1 [14] |
| 8.3.1.2.1 Demodulation of NPDCCH single-antenna performance for category NB1 and NB2 | SNRs as specified in clause 8.12.2.1.1 in TS 36.521-1 [14] | Same as clause 8.12.2.1.1 in TS 36.521-1 [14] | Same as clause 8.12.2.1.1 in TS 36.521-1 [14] |

<< END OF CHANGES >>