**3GPP TSG-RAN5 Meeting #94-e *draft\_v1\_R5-220782r2***

**Electronic Meeting, 21 Feb– 4 Mar 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.903** | **CR** | **0292** | **rev** | **-** | **Current version:** | **16.10.1** |  |
|  | | | | | | | | |
| *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:*** | Addition of summary table for MU factors | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GS\_NR\_LTE-UEConTest | | | | |  | ***Date:*** | | | 2022-01-30 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed e?planations 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. The measurement uncertainty of each RF test case is decided by combination of multiple MU factors. The uncertainty of each MU factor may vary depending on SNR, power class or temperature. It’s difficult to dinstinguish the variation pattern at the moment since the uncertainty value scatters across all the test cases. This document provides a summary table for each MU factor for better readability. 2. In B.8, the ‘Uncertainty of the Network Analyzer’ is not the same between OFF power EIRP and OFF power TRP. 3. In B.17.2, the measurement of ACLR is relative measurement therefore several MU factors could be cancelled out. These MU factors remain in the MU budget table with value 0. However in the relative power tolerance, the MU factors are removed completely. To achive consistent style the MU factors shall be removed for ACLR as well. 4. In B.18, for additional spurious emission, NS\_202 would not apply to above 66GHz. The frequency range is redundantly captured in Table B.18.2-19. 5. In B.25, the ‘Influence of the XPD’ is 0.0071 in Receiver spurious emissions, which is differen from 0.00 in other test cases. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Adding a summary table for each MU factor for better readability. 2. In B.8, change the ‘Uncertainty of the Network Analyzer’ for OFF TRP to the value same as OFF EIRP. 3. In B.17.2, remove MU factors to be cancelled out by relative measurement. 4. In B.18, remove frequency range >66GHz for NS\_202 in Table B.18.2-19. 5. In B.25, change the ‘Influence of the XPD’ to 0.00 to align with other test cases. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The readability of specification is not improved.  Some inconsistency remain in the specificaion. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | B.2.1, B.8, B.17, B.18, B.25 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | R1:  Moving summary tables to IFF section.  Removing the FFS items. Only confirmed values are kept.  Removing company names in B.2.2.27-1.  Removing change in B.9a.1 for absolute power tolerance.  For B.17 ACLR, revisiting cancelled MU factors.  Influence of ETC on EIRP/EIS is void in B.2.2.34 for IFF to keep alignment with DFF.  R2:  In B.2.2.14, updating MU value for OFF TRP  Draft\_v1:  The table of B.2.2.27 is further updated based on comments. | | | | | | | | |

### <Unchanged Text Skipped>

### B.2.1.33 Modulated Interferer uncertainty

Modulated Interferer is used to drive a signal to the horn antenna (via multiple external components such as a switch box, an amplifier and a circulator, etc.) in ACS and In-band Blocking tests either as an absolute level or as a relative level. Receiving device used is typically a UE/phablet/tablet/FWA. Generally, there occurs uncertainty contribution from absolute level accuracy, non-linearity and frequency characteristic of the interferer generator.

For practical reasons, in a case that a VNA is used as calibration equipment, Modulated Interferer is connected to the system after the calibration measurement (Stage 2) is performed by the VNA. Hence, the uncertainty on the absolute level of Modulated Interferer (transmitter device) cannot be assumed as systematic. This uncertainty should be calculated from the manufacturer’s data in logs with a rectangular distribution, unless otherwise informed. Furthermore, the uncertainty of the non-linearity is included in the absolute level uncertainty.

### B.2.1.34 Void

### B.2.1.35 Influence of offset antenna for blocker signal

This MU term describes the additional uncertainty caused by using offset antenna for blocker signal for FR2 blocking test cases. The cause of additional MU using offset antenna is the difference of UE antenna’s gain between beam peak direction and offset beam peak direction, which will cause the error for the ACS or IBB performance requirement which is given by the power ratio of the wanted signal power and blocker signal power. Such difference of the UE antenna gain can be compensated by increasing the blocker signal power by the measured EIS difference at beam peak direction and at offset beam peak. Despite this compensation, there still is a residual error corresponding to the antenna gain difference due to different frequency of wanted and blocker signal. Table B.2.1.35-1 summarizes the residual error after compensation for various offset angle assumption.

### <Unchanged Text Skipped>

## B.2.2 Measurement error contribution descriptions for IFF

### B.2.2.1 Positioning misalignment

See B.2.1.1.

The uncertainty value of positioning misalignment is estimated as below table and used across clause B.

Table B.2.2.1-1: Uncertainty value for positioning misalignment for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC1 | 0.02 | Normal | 2.00 | 0.01 |
| PC3 | 0.00 | Normal | 2.00 | 0.00 |

### B.2.2.2 Measure distance uncertainty

See B.2.1.2. For IFF1 this can be considered to be zero.

The uncertainty value of measure distance uncertainty is estimated as below table and used across clause B.

Table B.2.2.2-1: Uncertainty value for measure distance uncertainty for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.00 | Rectangular | 1.73 | 0.00 |

### B.2.2.3 Quality of Quiet Zone

See B.2.1.3.

The uncertainty value of quality of quiet zone is estimated as below table and used across clause B.

Table B.2.2.3-1: Uncertainty value for quality of quiet zone for IFF

| QZ size | Power class | Condition | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- | --- | --- |
| <= 30cm | PC3 | NC | NOTE1 | 0.6 | Actual | 1.00 | 0.6 |
| ACLR (relative measurement) | 0.52 | Actual | 1.00 | 0.52 |
| SE (6GHz to 12.75GHz) | 0.7 | Actual | 1.00 | 0.7 |
| SE (12.75GHz to 23.45GHz) | 0.6 | Actual | 1.00 | 0.6 |
| SE (23.45GHz to 40.8GHz) | 0.6 | Actual | 1.00 | 0.6 |
| SE (40.8GHz to 66GHz) | 0.6 | Actual | 1.00 | 0.6 |
| SE (66GHz to 80GHz) | 0.6 | Actual | 1.00 | 0.6 |
| ETC | NOTE1 | 0.9 | Actual | 1.00 | 0.9 |
| ACLR (relative measurement) | 0.52 | Actual | 1.00 | 0.52 |
| NOTE 1: The uncertainty in current row applies to maximum output power with EIRP and TRP, EIRP spherical coverage, MPR, minimum output power, transmit OFF power, spectrum emission mask, reference sensitivity, adjacent selectivity, in-band blocking. | | | | | | | |

### B.2.2.4 Mismatch

See B.2.1.4.

The uncertainty value of mismatch is estimated as below table and used across clause B.

Table B.2.2.4-2: Uncertainty value for mismatch for IFF

| QZ size | Power class | Condition | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Stage 2: DUT measurement | | | | | | | |
| <= 30cm | PC3 | NC | Default | 1.30 | Actual | 1.00 | 1.30 |
| ACLR (relative measurement) | 1.84 | Actual | 1.00 | 1.84 |
| Tx SE (6GHz to 12.75GHz) | 1.5 | Actual | 1.00 | 1.5 |
| Tx SE (12.75GHz to 23.45GHz) | 1.5 | Actual | 1.00 | 1.5 |
| Tx SE (23.45GHz to 40.8GHz) | 1.4 | Actual | 1.00 | 1.4 |
| Tx SE (40.8GHz to 66GHz) | 2.3 | Actual | 1.00 | 2.3 |
| Tx SE (66GHz to 80GHz) | 2.3 | Actual | 1.00 | 2.3 |
| Rx SE (6GHz to 12.75GHz) | 1.6 | Actual | 1.00 | 1.6 |
| Rx SE (12.75GHz to 23.45GHz) | 1.6 | Actual | 1.00 | 1.6 |
| Rx SE (23.45GHz to 40.8GHz) | 1.5 | Actual | 1.00 | 1.5 |
| Rx SE (40.8GHz to 66GHz) | 2.3 | Actual | 1.00 | 2.3 |
| Rx SE (66GHz to 80GHz) | 2.3 | Actual | 1.00 | 2.3 |
| ETC | Default | 1.30 | Actual | 1.00 | 1.30 |
| ACLR (relative measurement) | 1.84 | Actual | 1.00 | 1.84 |
| SE |  |  |  |  |
| Stage 1: Calibration measurement | | | | | | | |
| <= 30cm | PC3 | NC | All | 0.00 | U-shaped | 1.41 | 0.00 |
| ETC | All | 0.00 | U-shaped | 1.41 | 0.00 |

### B.2.2.5 Standing wave between DUT and measurement antenna

See B.2.1.5.

The uncertainty value of standing wave between the DUT and measurement antenna is estimated as below table and used across clause B.

Table B.2.2.5-1: Uncertainty value for standing wave between the DUT and measurement antenna for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.00 | U-shaped | 1.41 | 0.00 |

### B.2.2.6 Uncertainty of the RF power measurement equipment

See B.2.1.6.

The uncertainty value of RF power measurement equipment is estimated as below table and used across clause B.

Table B.2.2.6-1: Uncertainty value for RF power measurement equipment for IFF

| Power class | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| PC3 | MOP, MPR, SEM, ACLR | 2.16 | Normal | 2.00 | 1.08 |
| Minimum output power, OFF power | 2.50 | Normal | 2.00 | 1.25 |
| SE (6GHz to 12.75GHz) | 2.00 | Normal | 2.00 | 1.00 |
| SE (12.75GHz to 23.45GHz) | 2.16 | Normal | 2.00 | 1.08 |
| SE (23.45GHz to 40.8GHz) | 2.73 | Normal | 2.00 | 1.37 |
| SE (40.8GHz to 66GHz) | 4.00 | Normal | 2.00 | 2.00 |
| SE (66GHz to 80GHz) | 4.00 | Normal | 2.00 | 2.00 |

### B.2.2.7 Phase Curvature

See B.2.1.7. For IFF1 this can be considered to be zero.

The uncertainty value of phase curvature is estimated as below table and used across clause B.

Table B.2.2.7-1: Uncertainty value for phase curvature for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.00 | U-shaped | 1.41 | 0.00 |

### B.2.2.8 Amplifier Uncertainties

See B.2.1.8.

The uncertainty value of amplifier uncertainties is estimated as below table and used across clause B.

Table B.2.2.8-1: Uncertainty value for amplifier uncertainties for IFF

| Power class | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| Stage 2: DUT measurement | | | | | |
| PC3 | Default | 2.10 | Normal | 2.00 | 1.05 |
| Relative power tolerance | 0.5 | Rectangular | 1.73 | 0.29 |
| SE (66GHz to 80GHz) | 3.0 | Normal | 2.00 | 1.50 |
| Stage 1: Calibration measurement | | | | | |
| PC3 | Default | 0.00 | Normal | 2.00 | 0.00 |

### B.2.2.9 Random uncertainty

See B.2.1.9.

The uncertainty value of random uncertainty is estimated as below table and used across clause B.

Table B.2.2.9-1: Uncertainty value for random uncertainty for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.5 | Normal | 2.00 | 0.25 |

### B.2.2.10 Influence of XPD

See B.2.1.10.

The uncertainty value of influence of the XPD is estimated as below table and used across clause B.

Table B.2.2.10-2: Uncertainty value for influence of the XPD for IFF

| Power class | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| PC3 | Default | 0.01 | U-shaped | 1.41 | 0.00 |
| ACLR | 0.00 | U-shaped | 1.41 | 0.00 |
| SE (6GHz to 12.75GHz) | 0.09 | U-shaped | 1.41 | 0.064 |
| SE (12.75GHz to 23.45GHz) | 0.09 | U-shaped | 1.41 | 0.064 |
| SE (23.45GHz to 40.8GHz) | 0.01 | U-shaped | 1.41 | 0.00 |
| SE (40.8GHz to 66GHz) | 0.09 | U-shaped | 1.41 | 0.064 |
| SE (66GHz to 80GHz) | 0.09 | U-shaped | 1.41 | 0.064 |

### B.2.2.11 Insertion Loss Variation

See B.2.1.11.

The uncertainty value of insertion loss variantion is estimated as below table and used across clause B.

Table B.2.2.11-1: Uncertainty value for insertion loss variantion for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| Stage 2: DUT measurement | | | | |
| PC3 | 0.00 | Rectangular | 1.73 | 0.00 |
| Stage 1: Calibration measurement | | | | |
| PC3 | 0.00 | Rectangular | 1.73 | 0.00 |

### B.2.2.12 RF leakage (from measurement antenna to receiver/transmitter)

See B.2.1.12.

The uncertainty value of RF leakage is estimated as below table and used across clause B.

Table B.2.2.12-1: Uncertainty value for RF leakage for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.00 | Actual | 1.00 | 0.00 |

### B.2.2.13 Misalignment of positioning system

See B.2.1.13.

The uncertainty value of misalignment of positioning system is estimated as below table and used across clause B.

Table B.2.2.13-1: Uncertainty value for misalignment of positioning system for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.00 | Normal | 2.00 | 0.00 |

### B.2.2.14 Uncertainty of the Network Analyzer

See B.2.1.14.

The uncertainty value of uncertainty of the network analyzer is estimated as below table and used across clause B.

Table B.2.2.14-1: Uncertainty value for uncertainty of the network analyser for IFF

| Power class | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| PC3 | Default | 0.73 | Normal | 2.00 | 0.37 |
| Minimum output power, OFF power (EIRP, TRP), ACLR | 1.50 | Normal | 2.00 | 0.75 |
| SE (6GHz to 12.75GHz) | 0.90 | Normal | 2.00 | 0.45 |
| SE (12.75GHz to 23.45GHz) | 0.90 | Normal | 2.00 | 0.45 |
| SE (23.45GHz to 40.8GHz) | 1.50 | Normal | 2.00 | 0.75 |
| SE (40.8GHz to 66GHz) | 1.70 | Normal | 2.00 | 0.85 |
| SE (66GHz to 80GHz) | 1.70 | Normal | 2.00 | 0.85 |

### B.2.2.15 Uncertainty of the absolute gain of the calibration antenna

See B.2.1.15.

The uncertainty value of uncertainty of the absolute gain of the calibration antenna is estimated as below table and used across clause B.

Table B.2.2.15-1: Uncertainty value for uncertainty of the absolute gain of the calibration antenna for IFF

| Power class | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| PC3 | Default | 0.60 | Normal | 2.00 | 0.30 |
| SE (40.8GHz to 66GHz) | 1.70 | Normal | 2.00 | 0.85 |
| SE (66GHz to 80GHz) | 1.70 | Normal | 2.00 | 0.85 |

### B.2.2.16 Positioning and pointing misalignment between the reference antenna and the measurement antenna

See B.2.1.16.

The uncertainty value of positioning and pointing misalignment between the reference antenna and the measurement antenna is estimated as below table and used across clause B.

Table B.2.2.16-1: Uncertainty value for positioning and pointing misalignment between the reference antenna and the measurement antenna for IFF

| Power class | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| PC3 | Default | 0.01 | Rectangular | 1.73 | 0.00 |
| ACLR | 0.00 | Rectangular | 1.73 | 0.00 |
| SE | 0.05 | Rectangular | 1.73 | 0.03 |

### B.2.2.17 gNB emulator uncertainty

See B.2.1.17.

The uncertainty value of gNB emulator uncertainty is estimated as below table and used across clause B.

Table B.2.2.17-1: Uncertainty value for gNB emulator uncertainty for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 2.9 | Normal | 2.00 | 1.45 |

### B.2.2.18 Phase centre offset of calibration

See B.2.1.18. For IFF1 this can be considered to be zero.

The uncertainty value of phase centre offset of calibration is estimated as below table and used across clause B.

Table B.2.2.18-1: Uncertainty value for phase centre offset of calibration for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.00 | Rectangular | 1.73 | 0.00 |

### B.2.2.19 Quality of the Quiet Zone for Calibration Process

See B.2.1.19.

The uncertainty value of quality of quiet zone for calibration process is estimated as below table and used across clause B.

Table B.2.2.19-1: Uncertainty value for quiet zone for calibration process for IFF

| QZ size | Power class | Condition | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- | --- | --- |
| <= 30cm | PC3 | NC | NOTE1 | 0.4 | Actual | 1.00 | 0.4 |
| ACLR (relative measurement) | 0.32 | Actual | 1.00 | 0.32 |
| SE (6GHz to 12.75GHz) | 0.7 | Actual | 1.00 | 0.7 |
| SE (12.75GHz to 23.45GHz) | 0.6 | Actual | 1.00 | 0.6 |
| SE (23.45GHz to 40.8GHz) | 0.6 | Actual | 1.00 | 0.6 |
| SE (40.8GHz to 66GHz) | 0.6 | Actual | 1.00 | 0.6 |
| SE (66GHz to 80GHz) | 0.6 | Actual | 1.00 | 0.6 |
| ETC | NOTE1 | 0.6 | Actual | 1.00 | 0.6 |
| ACLR (relative measurement) | 0.32 | Actual | 1.00 | 0.32 |
| NOTE 1: The uncertainty in current row applies to maximum output power with EIRP and TRP, EIRP spherical coverage, MPR, minimum output power, transmit OFF power, spectrum emission mask, reference sensitivity, adjacent selectivity, in-band blocking. | | | | | | | |

### B.2.2.20 Standing wave between reference calibration antenna and measurement antenna

See B.2.1.20.

The uncertainty value of standing wave between reference calibration antenna and measurement antenna is estimated as below table and used across clause B.

Table B.2.2.20-1: Uncertainty value for standing wave between reference calibration antenna and measurement antenna for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.00 | U-shaped | 1.41 | 0.00 |

### B.2.2.21 Influence of the calibration antenna feed cable (Flexing cables, adapters, attenuators, connector repeatability)

See B.2.1.21.

The uncertainty value of influence of the calibration antenna feed cable is estimated as below table and used across clause B.

Table B.2.2.21-1: Uncertainty value for influence of the calibration antenna feed cable for IFF

| Power class | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| PC3 | Default | 0.14 | Normal | 2.00 | 0.07 |
| SE (40.8GHz to 66GHz) | 0.28 | Normal | 2.00 | 0.14 |
| SE (66GHz to 80GHz) | 0.28 | Normal | 2.00 | 0.14 |

### B.2.2.22 Influence of TRP measurement grid

See B.2.1.22.

The uncertainty value of influence of TRP measurement grid is estimated as below table and used across clause B.

Table B.2.2.22-1: Uncertainty value for influence of TRP measurement grid for IFF

| Power class | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| PC3 | Default | 0.25 | Actual | 1.00 | 0.25 |
| SE | 0.32 | Actual | 1.00 | 0.32 |

### B.2.2.23 Influence of beam peak search grid

See B.2.1.23.

The uncertainty value of influence of beam peak search grid is estimated as below table and used across clause B.

Table B.2.2.23-1: Uncertainty value for influence of beam peak search grid for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.00 | Actual | 1.00 | 0.00 |

### B.2.2.24 Systematic error due to TRP calculation/quadrature

See B.2.1.24.

The uncertainty value of systematic error due to TRP calculation/quadrature is estimated as below table and used across clause B.

Table B.2.2.24-1: Uncertainty value for systematic error due to TRP calculation/quadrature for IFF

| Power class | Uncertainty value |
| --- | --- |
| PC3 | 0.00 |

### B.2.2.25 Multiple measurement antenna uncertainty

See B.2.1.25.

The uncertainty value of multiple measurement antenna uncertainty is estimated as below table and used across clause B.

Table B.2.2.25-1: Uncertainty value for multiple measurement antenna uncertainty for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.15 | Actual | 1.00 | 0.15 |

### B.2.2.26 DUT repositioning

See B.2.1.26.

The uncertainty value of DUT repositioning is estimated as below table and used across clause B.

Table B.2.2.26-1: Uncertainty value for DUT repositioning for IFF

| Power class | Test case | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| PC1 | TRP, spherical coverage | 0.00 | Rectangular | 1.73 | 0.00 |
| EIRP, EIS | 0.35 | Rectangular | 1.73 | 0.20 |
| PC3 | TRP, spherical coverage | 0.00 | Rectangular | 1.73 | 0.00 |
| EIRP, EIS | 0.08 | Rectangular | 1.73 | 0.05 |

### B.2.2.27 Influence of noise

See B.2.1.27.

The uncertainty value of influence of noise is estimated as below table and used across clause B.

Table B.2.2.27-1: Uncertainty value for influence of noise for PC3 for IFF

| Test case | Frequency range | Noise floor | Minimum requirement | Estimated SNRtotal [dB/400MHz] | Relaxation | Influence of noise |
| --- | --- | --- | --- | --- | --- | --- |
| MOP-EIRP | FR2a | N/A | 20.7dBm/ChBW  (22.4-1.7) | 16.33 (NOTE 1) | 0 | 0.1 |
| FR2b | N/A | 18.9dBm/ChBW  (20.6-1.7) | 11.45 (NOTE 1) | 0 | 0.3 |
| MOP-TRP | FR2a | N/A | 23dBm/ChBW | 16.33 (NOTE 1) | 0 | 0.1 |
| FR2b | N/A | 23dBm/ChBW | 11.45 (NOTE 1) | 0 | 0.3 |
| MOP-Spherical  MOP-TRP | FR2a | N/A | 9.75dBm/ChBW  (Spherical – MBR= 11.5-1.75) | 11.45 (NOTE 1) | 0 | 0.3 |
| FR2b | N/A | 7.6dBm/ChBW  (Spherical – MBR=8-0.4) | 6.37 (NOTE 1) | 0 | 0.9 |
| MPR | FR2a | -7.6dBm/400MHz | 7.65dBm/ChBW  (EIRP-MPB-MPR-T(MPR)=22.4-0.75-9-5) | 15.25 | 0 | 0.13 |
| FR2b | -5.5dBm/400MHz | 5.85dBm/ChBW  (EIRP-MPB-MPR-T(MPR)=20.6-0.75-9-5) | 11.35 | 0 | 0.31 |
| Minimum output power | FR2a | -10.6dBm/400MHz | -13dBm | -2.4 | 8.4 | 1.0  (with relaxation) |
| FR2b | -5.5dBm/400MHz | -13dBm | -7.5 | 13.5 | 1.0  (with relaxatino) |
| OFF power – TRP | FR2a | N/A | -35dBm/ChBW | -24.54 (NOTE 2) | 30.4 | 1.0  (with relaxation) |
| FR2b | N/A | -25~-29.5 | N/A | Propose not to test |
| OFF power – EIRP | FR2a | -7.6dBm/400MHz | -30dBm/ChBW | -22.4 | 28.4 | 1.0  (with relaxation) |
| FR2b | -5.5dBm/400MHz | -24.5 | 30.5 | 1.0  (with relaxation) |
| Absolute power tolerance | Same as Minimum output power | | | | | |
| Relative power tolerance | FR2a | -13.6dBm/100MHz | -7.6dBm/100MHz | 6 | 0 | 1.0 |
| FR2b | -11.5dBm/100MHz | -5.5dBm/100MHz | 6 | 0 | 1.0 |
| Aggregate power tolerance | Same as Relative power tolerance | | | | | |
| Aggregate power tolerance | FR2a | -13.6dBm/100MHz | -7.6dBm/100MHz | 6 | 0 | 1.0 |
| FR2b | -11.5dBm/100MHz | -5.5dBm/100MHz | 6 | 0 | 1.0 |
| SEM | FR2a | N/A | -13dBm/1MHz | 8.14 (NOTE 1) | 0 | 0.62 |
| FR2b | N/A | 5.86 (NOTE 1) | 0 | 1.0 |
| ACLR (CP) | FR2a | -7.6dBm/400MHz | Highest testable MPR for 400MHz: 3dB  16.65dBm/ChBW  (EIRP-MPB-MPR-T(MPR) =22.4-0.75-3-2)  Actual lowest:  7.65dBm/ChBW  (EIRP-MPB-MPR-T(MPR)=22.4-0.75-9-5) | 24.25dB (with 3dB MPR) | 0 | N/A |
| FR2b | -5.5dBm/400MHz | Highest testable MPR for 400MHz: 2dB  16.35dBm/ChBW  (EIRP-MPB-MPR-T(MPR) =20.6-0.75-2-1.5)  Actual lowest:  5.85dBm/ChBW  (EIRP-MPB-MPR-T(MPR)=20.6-0.75-9-5) | 21.85dB (with 2dB MPR) | 0 | N/A |
| ACLR (ACP) | FR2a | -7.6dBm/400MHz | Highest testable MPR for 400MHz: 3dB  -0.35dBm/ChBW  (EIRP-MPB-MPR-T(MPR)-ACLR=22.4-0.75-3-2-17)  Actual lowest:  -9.35 dBm/ChBW  (EIRP-MPB-MPR-T(MPR)-ACLR=22.4-0.75-9-5-17) | 5.86 dB (NOTE 1) | 0 | 1.0 |
| FR2b | -5.5dBm/400MHz | Highest testable MPR for 400MHz: 2dB  0.35dBm/ChBW  (EIRP-MPB-MPR-T(MPR)-ACLR=20.6-0.75-2-1.5-16)  Actual lowest:  -10.15 dBm/ChBW  (EIRP-MPB-MPR-T(MPR)=20.6-0.75-9-5-16) | 5.85 (with 2dB MPR) | 0 | 1.0 |
| General Tx spurious | 6GHz <=f<=23.45GHz | N/A | -13dBm/1MHz | 10.0 (NOTE 1) | 0 | 0.41 |
| 23.45GHz<=f<=40GHz | N/A | -13dBm/1MHz | 10.0 (NOTE 1) | 0 |
| 40GHz<=f<=80GHz | N/A | -13dBm/1MHz | 10.0 (NOTE 1) | 0 |
| Tx spurious Co-existence | n260  (Aggressor band : n257, n261) | -23 | -2dBm/100MHz  (-22dBm/MHz) | 1.0 | 5 | 1.0  (with relaxation) |
| n257, n261  (Aggressor band : n260) | -27.7 | -5dBm/100MHz  (-25dBm/MHz) | 2.7 | 3.3 | 1.0  (with relaxation) |
| 23.6 GHz ≤ f ≤ 24.0GHz | -27.7 | 1dBm/200MHz  (-22 dBm/MHz) | 5.7 | 0.3 |  |
| 36 GHz ≤ f ≤ 37GHz | -23dBm/MHz | 7dBm/1000MHz  (-23dBm/MHz) | 0 | 6 | 1.0  (with relaxation) |
| 57 GHz ≤ f ≤ 66GHz | N/A | 2dBm/100MHz  (-18dBm/MHz) | 5.86 (NOTE 1) | 0 | 1.0 |
| Additional spurious emission | NS\_202  (7.25GHz <=f <=12.75GHz) | -40 dBm/MHz | -10dBm/100MHz  (-30 dBm/MHz) | 10 | 0 | 0.41 |
| NS\_202  (12.75GHz <=f <=23.45GHz) | -23 dBm/MHz | -10dBm/100MHz  (-30 dBm/MHz) | -7 | 13 | 1.0  (with relaxation) |
| NS\_202  (23.6GHz <=f <=24.0GHz) | -27.7 dBm/MHz | 1dBm/200MHz  (-22 dBm/MHz) | 5.7 | 0.3 | 1.0  (with relaxation) |
| NS\_202  (23.45GHz <=f <=40.8GHz) | -23 dBm/MHz | -10dBm/100MHz  (-30 dBm/MHz) | -7 | 13 | 1.0  (with relaxation) |
| NS\_202  (40.8GHz <=f <=66GHz) | -23 dBm/MHz | -10dBm/100MHz  (-30 dBm/MHz) | -7 | 13 | 1.0  (with relaxation) |
| NS\_203  (23.6GHz <=f <=24.0GHz) | -27.7 dBm/MHz | +1dBm/200MHz  (-22dBm/MHz) | 5.7 | 0.3 | 1.0  (with relaxation) |
| Rx spurious | 6GHz <=f<=20GHz |  | -47dBm/1MHz | -4.34 (NOTE 2) | 10.2 | 1.0 dB for 23.45~40.8GHz, 0.64dB for 6~23.45 and 40.8~80 GHz. |
| 20GHz<=f<=40GHz |  | -47dBm/1MHz | -11.34 (NOTE 2) | 17.2 |
| 40GHz<=f<=80GHz |  | -47dBm/1MHz | -27.24 (NOTE 2) | 33.1 |
| NOTE 1: Estimated SNR is calculated based on agreed influence of noise.  NOTE 2: Estimated SNR is calculated based on agreed relaxation value: Estimated SNR = 6dB - relaxation. | | | | | | |

Table B.2.2.27-1: Uncertainty value for influence of noise for PC1 for IFF

FFS.

### B.2.2.28 Systematic error related to beam peak search

See B.2.1.28.

The uncertainty value of systematic error related to beam peak search is estimated as below table and used across clause B.

Table B.2.2.28-1: Uncertainty value for systematic error related to beam peak search for IFF

| Power class | Uncertainty value |
| --- | --- |
| PC1 | 0.7 |
| PC3 | 0.5 |

### B.2.2.29 Influence of spherical coverage grid

See B.2.1.29.

The uncertainty value of influence of spherical coverage grid is estimated as below table and used across clause B.

Table B.2.2.29-1: Uncertainty value for influence of spherical coverage grid for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC1 | 0.13 | Actual | 1.00 | 0.13 |
| PC3 | 0.12 | Actual | 1.00 | 0.12 |

### B.2.2.30 Systematic error related to EIS spherical coverage

See B.2.1.30.

The uncertainty value of systematic error related to EIS spherical coverage is estimated as below table and used across clause B.

Table B.2.2.30-1: Uncertainty value for systematic error related to EIS spherical coverage for IFF

| Power class | Uncertainty value |
| --- | --- |
| PC1 | DL power step size, 0.2 |
| PC3 | DL power step size, 0.2 |

### B.2.2.31 Misalignment of DUT due to change of DUT orientation

See B.2.1.31.

The uncertainty value of misalignment of DUT due to change of DUT orientation is estimated as below table and used across clause B.

Table B.2.2.31-1: Uncertainty value for misalignment of DUT due to change of DUT orientation for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 0.10 | Actual | 1.00 | 0.10 |

### B.2.2.32 Additional Impact of Interferer ACLR

See B.2.1.32.

The uncertainty value of additional Impact of Interferer ACLR is estimated as below table and used across clause B.

Table B.2.2.32-1: Uncertainty value for additional Impact of Interferer ACLR for IFF

| Power class | Uncertainty value |
| --- | --- |
| PC3 | 0.7 |

### B.2.2.33 Modulated Interferer uncertainty

See B.2.1.33.

The uncertainty value of modulated Interferer uncertainty is estimated as below table and used across clause B.

Table B.2.2.31-1: Uncertainty value for modulated Interferer uncertainty for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | 2.9 | Normal | 2 | 1.45 |

### B.2.2.34 Void

### B.2.2.35 Influence of offset antenna for blocker signal

See B.2.1.35.

### B.2.2.36 Uncertainty of the RF relative power measurement equipment

See B.2.1.36.

The uncertainty value of uncertainty of the RF relative power measurement equipment is estimated as below table and used across clause B.

Table B.2.2.36-1: Uncertainty value for uncertainty of the RF relative power measurement equipment for IFF

| Power class | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- |
| PC3 | [0.4] | Normal | 2 | [0.2] |

### <Unchanged Text Skipped>

# B.8 Transmit OFF power

Following tables summarize the MU threshold for TRP and EIRP measurements for Transmit OFF power. The origin MU values for different test setups can be found in following clauses.

Table B.8-1: MU threshold for TRP measurement for Transmit OFF power

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Power  Class | Frequency | MBW | Power | Threshold MU value (NOTE1) |
| PC3 | 23.45GHz <= f <= 32.125GHz | BW <= 400MHz | P = Off Power | 5.67 |
|  |  |  |
| 32.125GHz < f <= 40.8GHz |  |  | N/A |
|  |  |  |  |
| NOTE 1: Total TRP Expanded MU for IFF for Quiet Zone size ≤ 30cm in Table B.8.2-2 for PC3 UEs | | | | |

Table B.8-2: MU threshold for EIRP measurement for Transmit OFF power

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Frequency | CBW | Power | Threshold MU value for NTC [dB] (NOTE1) | Threshold MU value for ETC [dB] (NOTE1) |
| 23.45GHz <= f <= 32.125GHz | 50MHz | P = Off Power | 6.15 | 6.41 |
| 100MHz |
| 200MHz |
|  | 400MHz |  |
| 32.125GHz < f <= 40.8GHz | 50MHz | P = Off Power | 6.15 | 6.41 |
| 100MHz |
| 200MHz |
|  | 400MHz |  |
| NOTE 1: Total Expanded MU for IFF for Quiet Zone size ≤ 30cm in Table B.8.2-4 for PC3 UEs | | | |  |

<Unchanged Text Skipped>

## B.8.2 Uncertainty budget format and assessment for IFF

The uncertainty contributions that may impact the overall MU value are listed in Table B.8.2-1.

Table B.8.2-1: Uncertainty contributions for TRP and EIRP measurement

| UID | Description of uncertainty contribution | Details in annex |
| --- | --- | --- |
| Stage 2: DUT measurement | | |
| 1 | Positioning misalignment | B.2.2.1 |
| 2 | Measure distance uncertainty | B.2.2.2 |
| 3 | Quality of Quiet Zone | B.2.2.3 |
| 4 | Mismatch | B.2.2.4 |
| 5 | Standing wave between the DUT and measurement antenna | B.2.2.5 |
| 6 | Uncertainty of the RF power measurement equipment | B.2.2.6 |
| 7 | Phase curvature | B.2.2.7 |
| 8 | Amplifier uncertainties | B.2.2.8 |
| 9 | Random uncertainty | B.2.2.9 |
| 10 | Influence of the XPD | B.2.2.10 |
| 11 | Insertion Loss Variation | B.2.2.11 |
| 12 | RF leakage (from measurement antenna to the receiver/transmitter) | B.2.2.12 |
| 13 | Influence of TRP measurement grid | B.2.2.22 |
| 14 | Influence of beam peak search grid | B.2.2.23 |
| 15 | Multiple measurement antenna uncertainty | B.2.2.25 |
| 16 | DUT repositioning | B.2.2.26 |
| Stage 1: Calibration measurement | | |
| 17 | Mismatch | B.2.2.4 |
| 18 | Amplifier Uncertainties | B.2.2.8 |
| 19 | Misalignment of positioning System | B.2.2.13 |
| 20 | Uncertainty of the Network Analyzer | B.2.2.14 |
| 21 | Uncertainty of the absolute gain of the calibration antenna | B.2.2.15 |
| 22 | Positioning and pointing misalignment between the reference antenna and the measurement antenna | B.2.2.16 |
| 23 | Phase centre offset of calibration antenna | B.2.2.18 |
| 24 | Quality of quiet zone for calibration process | B.2.2.19 |
| 25 | Standing wave between reference calibration antenna and measurement antenna | B.2.2.20 |
| 26 | Influence of the calibration antenna feed cable | B.2.2.21 |
| 27 | Insertion Loss Variation | B.2.2.11 |
| Systematic uncertainties | | |
| 28 | Systematic error due to TRP calculation/quadrature | B.2.2.24 |
| 29 | Influence of noise | B.2.2.27 |

The uncertainty assessment tables are organized as follows:

- For the purpose of uncertainty assessment, the radiating antenna aperture of the DUT is denoted as D

- The uncertainty assessment has been derived for the case of Quiet Zone size ≤ 30 cm, f = {23.45GHz, 32.125GHz, 40.8GHz}, P = Off power.

- The uncertainty assessment for TRP is provided in Table B.8.2-2.

Table B.8.2-2: Uncertainty assessment for TRP measurement (f=23.45GHz, 32.125GHz, 40.8GHz, Quiet Zone size ≤ 30 cm) for PC3 UEs

| UID | Uncertainty source | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| Stage 2: DUT measurement | | | | | |
| 1 | Positioning misalignment | 0.00 | Normal | 2.00 | 0.00 |
| 2 | Measure distance uncertainty | 0.00 | Rectangular | 1.73 | 0.00 |
| 3 | Quality of Quiet Zone (NOTE 8) | 0.6 | Actual | 1.00 | 0.6 |
| 4 | Mismatch (NOTE 1) | 1.30 | Actual | 1.00 | 1.30 |
| 5 | Standing wave between the DUT and measurement antenna | 0.00 | U-shaped | 1.41 | 0.00 |
| 6 | Uncertainty of the RF power measurement equipment (NOTE 2) | 2.50 | Normal | 2.00 | 1.25 |
| 7 | Phase curvature | 0.00 | U-shaped | 1.41 | 0.00 |
| 8 | Amplifier uncertainties | 2.10 | Normal | 2.00 | 1.05 |
| 9 | Random uncertainty | 0.50 | Normal | 2.00 | 0.25 |
| 10 | Influence of the XPD | 0.01 | U-shaped | 1.41 | 0.00 |
| 11 | Insertion Loss Variation | 0.00 | Rectangular | 1.73 | 0.00 |
| 12 | RF leakage (from measurement antenna to the receiver/transmitter) | 0.00 | Actual | 1.00 | 0.00 |
| 13 | Influence of TRP measurement grid (NOTE 3) | 0.25 | Actual | 1 | 0.25 |
| 14 | Influence of beam peak search grid | 0.00 | Actual | 1 | 0.00 |
| 15 | Multiple measurement antenna uncertainty (NOTE 9) | 0.15 | Actual | 1 | 0.15 |
| 16 | DUT repositioning | 0.00 | Rectangular | 1.73 | 0.00 |
| Stage 1: Calibration measurement | | | | | |
| 17 | Mismatch | 0.00 | U-shaped | 1.41 | 0.00 |
| 18 | Amplifier Uncertainties | 0.00 | Normal | 2.00 | 0.00 |
| 19 | Misalignment of positioning System | 0.00 | Normal | 2.00 | 0.00 |
| 20 | Uncertainty of the Network Analyzer | 1.5 | Normal | 2.00 | 0.75 |
| 21 | Uncertainty of the absolute gain of the calibration antenna | 0.60 | Normal | 2.00 | 0.30 |
| 22 | Positioning and pointing misalignment between the reference antenna and the measurement antenna | 0.01 | Rectangular | 1.73 | 0.00 |
| 23 | Phase centre offset of calibration antenna | 0.00 | Rectangular | 1.73 | 0.00 |
| 24 | Quality of quiet zone for calibration process (NOTE 8) | 0.4 | Actual | 1.00 | 0.4 |
| 25 | Standing wave between reference calibration antenna and measurement antenna | 0.00 | U-shaped | 1.41 | 0.00 |
| 26 | Influence of the calibration antenna feed cable | 0.14 | Normal | 2.00 | 0.07 |
| 27 | Insertion Loss Variation | 0.00 | Rectangular | 1.73 | 0.00 |
|  | Systematic uncertainties (NOTE 5) | | | | Value |
| 28 | Systematic error due to TRP calculation/quadrature (NOTE 3) | | | | 0.0 |
| 29 | Influence of noise (23.45GHz <= f <= 32.125GHz) | | | | 1.0 |
| 30 | Influence of noise (32.125GHz < f <= 40.8GHz) | | | | N/A |
| Total measurement uncertainty | | | | | Value |
| TRP Expanded uncertainty (23.45GHz <= f <= 32.125GHz) (1.96σ - confidence interval of 95 %) [dB] | | | | | 5.67 |
| TRP Expanded uncertainty (32.125GHz < f <= 40.8GHz) (1.96σ - confidence interval of 95 %) [dB] | | | | | N/A |
| NOTE 1: The analysis was done only for the case of operating at TX OFF power, in-band, non-CA.  NOTE 2: The assessment assumes DUT Off power.  NOTE 3: This contributor shall only be considered for TRP measurements.  NOTE 4: Void  NOTE 5: In order to obtain the total measurement uncertainty, systematic uncertainties have to be added to the expanded root sum square of the standard deviations of the Stage 1 and Stage 2 contributors.  NOTE 6: Void.  NOTE 7: Void  NOTE 8: Value based on procedure defined in Annex D.2 of TR 38.810 for Quiet Zone size less or equal to 30 cm.  NOTE 9: Applies to the system which has a structure of mechanical feed antenna positioning. | | | | | |

NOTE: MU assessment in Table B.8.2-2 for FR2a is based on the relaxation of 30.4dB for 400MHz BW.

Table B.8.2-3: Void

### <Unchanged Text Skipped>

# B.9a Power control

## B.9a.1 Absolute power tolerance

## B.9a.2 Relative power control tolerance

### <Unchanged Text Skipped>

# B.17 Adjacent Channel Leakage Ratio

<Unchanged Text Skipped>

## B.17.2 Uncertainty budget format and assessment for IFF

The uncertainty contributions that may impact the overall MU value are listed in Table B.17.2-1.

Table B.17.2-1: Uncertainty contributions for EIRP measurement

| UID | Description of uncertainty contribution | Details in clause |
| --- | --- | --- |
| Stage 2: DUT measurement | | |
| 1 | Quality of Quiet Zone | B.2.2.3 |
| 2 | Mismatch | B.2.2.4 |
| 3 | Standing wave between the DUT and measurement antenna | B.2.2.5 |
| 4 | Uncertainty of the RF power measurement equipment | B.2.2.6 |
| 5 | Phase curvature | B.2.2.7 |
| 6 | Amplifier uncertainties | B.2.2.8 |
| 7 | Random uncertainty | B.2.2.9 |
| 8 | Influence of the XPD | B.2.2.10 |
| 9 | RF leakage (from measurement antenna to the receiver/transmitter) | B.2.2.12 |
| 10 | Multiple measurement antenna uncertainty | B.2.2.25 |
| Stage 1: Calibration measurement | | |
| 11 | Mismatch | B.2.2.4 |
| 12 | Amplifier Uncertainties | B.2.2.8 |
| 13 | Misalignment of positioning System | B.2.2.13 |
| 14 | Uncertainty of the Network Analyzer | B.2.2.14 |
| 15 | Uncertainty of the absolute gain of the calibration antenna | B.2.2.15 |
| 16 | Phase centre offset of calibration antenna | B.2.2.18 |
| 17 | Quality of quiet zone for calibration process | B.2.2.19 |
| 18 | Standing wave between reference calibration antenna and measurement antenna | B.2.2.20 |
| 19 | Influence of the calibration antenna feed cable | B.2.2.21 |
| 20 | Insertion Loss Variation | B.2.2.11 |
| Systematic uncertainties | | |
| 21 | Influence of noise | B.2.2.27 |

The uncertainty assessment tables are organized as follows:

- For the purpose of uncertainty assessment, the radiating antenna aperture of the DUT is denoted as D

- The uncertainty assessment has been derived for the case of Quiet Zone size ≤ 30 cm, f = {23.45GHz, 32.125GHz, 40.8GHz}, P = Maximum output power - MPR – MBR(Multi-band relaxation).

- The uncertainty assessment for EIRP is provided in Table B.17.2-2 for PC3 UEs and Table B.17.2-3 for PC1 UEs.

Table B.17.2-2: Uncertainty assessment for EIRP measurement (f=23.45GHz, 32.125GHz, 40.8GHz, Quiet Zone size ≤ 30 cm) for PC3 UEs and normal and extreme temperature condition

| UID | Uncertainty source | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| Stage 2: DUT measurement | | | | | |
| 1 | Quality of Quiet Zone (NOTE 10) | 0.52 | Actual | 1.00 | 0.52 |
| 2 | Mismatch (NOTE 2) | 1.84 | Actual | 1.00 | 1.84 |
| 3 | Standing wave between the DUT and measurement antenna | 0.00 | U-shaped | 1.41 | 0.00 |
| 4 | Uncertainty of the RF power measurement equipment (NOTE 3, 7) | 2.16 | Normal | 2.00 | 1.08 |
| 5 | Phase curvature | 0.00 | U-shaped | 1.41 | 0.00 |
| 6 | Amplifier uncertainties | 2.1 | Normal | 2.00 | 1.05 |
| 7 | Random uncertainty | 0.50 | Normal | 2.00 | 0.25 |
| 8 | Influence of the XPD | 0.00 | U-shaped | 1.41 | 0.00 |
| 9 | RF leakage (from measurement antenna to the receiver/transmitter) | 0.00 | Actual | 1.00 | 0.00 |
| 10 | Multiple measurement antenna uncertainty (NOTE 9) | 0.0 | Actual | 1 | 0.0 |
| Stage 1: Calibration measurement | | | | | |
| 11 | Mismatch | 0.00 | U-shaped | 1.41 | 0.00 |
| 12 | Amplifier Uncertainties | 0.00 | Normal | 2.00 | 0.00 |
| 13 | Misalignment of positioning System | 0.00 | Normal | 2.00 | 0.00 |
| 14 | Uncertainty of the Network Analyzer | 1.5 | Normal | 2.00 | 0.75 |
| 15 | Uncertainty of the absolute gain of the calibration antenna | 0.60 | Normal | 2.00 | 0.30 |
| 16 | Phase centre offset of calibration antenna | 0.00 | Rectangular | 1.73 | 0.00 |
| 17 | Quality of quiet zone for calibration process (NOTE 10) | 0.32 | Actual | 1.00 | 0.32 |
| 18 | Standing wave between reference calibration antenna and measurement antenna | 0.00 | U-shaped | 1.41 | 0.00 |
| 19 | Influence of the calibration antenna feed cable | 0.00 | Normal | 2.00 | 0.00 |
| 20 | Insertion Loss Variation | 0.00 | Rectangular | 1.73 | 0.00 |
| EIRP Expanded uncertainty (1.96σ - confidence interval of 95 %) [dB] | | | | | 5.09 |
|  | Systematic uncertainties (NOTE 6) | | | | Value |
| 21 | Influence of noise | | | | Table B.17.2-4 |
| Total measurement uncertainty | | | | | Value |
| EIRP total measurement uncertainty [dB] | | | | | 5.09 + Influence of Noise |
| NOTE 1: Void  NOTE 2: The analysis was done only for the case of operating at max output power – MPR – MBR(Multi-band relaxation)., in-band, non-CA.  NOTE 3: The assessment assumes maximum DUT output power – MPR – MBR(Multi-band relaxation).  NOTE 4: Void.  NOTE 5: Void  NOTE 6: In order to obtain the total measurement uncertainty, systematic uncertainties have to be added to the expanded root sum square of the standard deviations of the Stage 1 and Stage 2 contributors.  NOTE 7: Void  NOTE 8: Void  NOTE 9: Void.  NOTE 10: Defined as fixed value MU contributor. | | | | | |

Table B.17.2-3: Uncertainty assessment for EIRP measurement (f=23.45GHz, 32.125GHz, 40.8GHz, Quiet Zone size ≤ 30 cm) for PC1 UEs

| UID | Uncertainty source | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| Stage 2: DUT measurement | | | | | |
| 1 | Quality of Quiet Zone (NOTE 10) | FFS | Actual | 1.00 | FFS |
| 2 | Mismatch (NOTE 2, NOTE 7) | FFS | Actual | 1.00 | FFS |
| 3 | Standing wave between the DUT and measurement antenna | FFS | U-shaped | 1.41 | FFS |
| 4 | Uncertainty of the RF power measurement equipment (NOTE 3, 7) | FFS | Normal | 2.00 | FFS |
| 5 | Phase curvature | FFS | U-shaped | 1.41 | FFS |
| 6 | Amplifier uncertainties | FFS | Normal | 2.00 | FFS |
| 7 | Random uncertainty | FFS | Normal | 2.00 | FFS |
| 8 | Influence of the XPD | FFS | U-shaped | 1.41 | FFS |
| 9 | RF leakage (from measurement antenna to the receiver/transmitter) | FFS | Actual | 1.00 | FFS |
| 10 | Multiple measurement antenna uncertainty (NOTE 9) | FFS | Actual | 1 | FFS |
| Stage 1: Calibration measurement | | | | | |
| 11 | Mismatch | FFS | U-shaped | 1.41 | FFS |
| 12 | Amplifier Uncertainties | FFS | Normal | 2.00 | FFS |
| 13 | Misalignment of positioning System | FFS | Normal | 2.00 | FFS |
| 14 | Uncertainty of the Network Analyzer | FFS | Normal | 2.00 | FFS |
| 15 | Uncertainty of the absolute gain of the calibration antenna | FFS | Normal | 2.00 | FFS |
| 16 | Phase centre offset of calibration antenna | FFS | Rectangular | 1.73 | FFS |
| 17 | Quality of quiet zone for calibration process (NOTE 10) | FFS | Actual | 1.00 | FFS |
| 18 | Standing wave between reference calibration antenna and measurement antenna | FFS | U-shaped | 1.41 | FFS |
| 19 | Influence of the calibration antenna feed cable | FFS | Normal | 2.00 | FFS |
| 20 | Insertion Loss Variation | FFS | Rectangular | 1.73 | FFS |
| TRP Expanded uncertainty (1.96σ - confidence interval of 95 %) [dB] | | | | | FFS |
|  | Systematic uncertainties (NOTE 6) | | | | Value |
| 21 | Influence of noise | | | | FFS |
| Total measurement uncertainty | | | | | Value |
| TRP total measurement uncertainty [dB] | | | | | FFS |
| NOTE 1: Void  NOTE 2: The analysis was done only for the case of operating at max output power, in-band, non-CA.  NOTE 3: The assessment assumes maximum DUT output power.  NOTE 4: Void  NOTE 5: Void  NOTE 6: In order to obtain the total measurement uncertainty, systematic uncertainties have to be added to the expanded root sum square of the standard deviations of the Stage 1 and Stage 2 contributors.  NOTE 7: Values extracted from TR 38.810 v2.6.1 in square brackets pending for further analysis.  NOTE 8: Void.  NOTE 9: Void  NOTE 10: Defined as fixed value MU contributor. | | | | | |

Table B.17.2-4: Influence of noise measurement (f=23.45GHz, 32.125GHz, 40.8GHz, Quiet Zone size ≤ 30 cm) for PC3 UEs

|  |  |  |
| --- | --- | --- |
|  | **FR2a** | **FR2b** |
| ChBW (50MHz) | 0.54 | 1.0 (NOTE 6) |
| ChBW (100MHz) | 1.0 | 1.0 (NOTE 5) |
| ChBW (200MHz) | 1.0 (NOTE 4) | 1.0 (NOTE 2) |
| ChBW (400MHz) | 1.0 (NOTE 1) | 1.0 (NOTE 3) |
| NOTE 1: This value is based on the relaxation of (MPR – 3.0) dB for MPR > 3.0dB.  NOTE 2: Not applicable for MPR > 3.5dB  NOTE 3: Not applicable for MPR > 2.0dB  NOTE 4: This value is based on the relaxation of (MPR – 5.0) dB for MPR > 5.0dB.  NOTE 5: Not applicable for MPR > 5.0dB  NOTE 6: Not applicable for MPR >7. 5 dB | | |

### <Unchanged Text Skipped>

# B.18 Spurious emissions

Editor’s Note:

- MU value analysis and offset value analysis for PC1, 2 and 4 are not complete.

- MU value analysis for various test setups in clause B.18.x is not complete for above 80 GHz.

- Offset value analysis is not complete as it is derived from MU value analysis for above 80 GHz.

Test procedure of general spurious emission comprises 2 stages: coarse TRP measurement and fine TRP measurement BW. Coarse TRP measurement is introduced to reduce the measurement time by applying sparser grids and/or wider measurement BW than fine TRP measurement while having offset dB more stringent test requirement in order not to cause additional misjudgement risk. For the frequency ranges for which coarse TRP measurement does not PASS, the measurement is continued with fine TRP measurement procedure.

<Unchanged Text Skipped>

Table B.18.2-18: Spurious emissions band UE co-existence relaxation considered in MU assessment (Quiet Zone size ≤ 30 cm)

|  |  |  |
| --- | --- | --- |
| Power Class | Frequency | Relaxation |
| PC1 | 23.45GHz <= f <= 40.8GHz | FFS |
| 40.8 GHz < f <= 66 GHz | FFS |
| PC2 | 23.45GHz <= f <= 40.8GHz | FFS |
| 40.8 GHz < f <= 66 GHz | FFS |
| PC3 | 23.45GHz <= f <= 40.8GHz | 3.3 dB (for protected bands n257, n261)  5 dB (for protected band n260)  0.3 dB (for 23.6 GHz ≤ f ≤ 24.0 GHz) |
| 40.8 GHz < f <= 66 GHz | 6 dB (for 36.0 GHz ≤ f ≤ 37.0 GHz)  0 dB (for 57.0 GHz ≤ f ≤ 66.0 GHz) |
| PC4 | 23.45GHz <= f <= 40.8GHz | FFS |
| 40.8 GHz < f <= 66 GHz | FFS |

Table B.18.2-19: Additional Spurious emissions relaxation considered in MU assessment (Quiet Zone size ≤ 30 cm)

|  |  |  |
| --- | --- | --- |
| Power Class | Frequency | Relaxation |
| PC1 | 6 GHz < f <= 12.75 GHz | FFS |
| 12.75 GHz < f <= 23.45 GHz | FFS |
| 23.45GHz <= f <= 40.8GHz | FFS |
| 40.8 GHz < f <= 66 GHz | FFS |
| 66 GHz < f <= 80 GHz | FFS |
| PC2 | 6 GHz < f <= 12.75 GHz | FFS |
| 12.75 GHz < f <= 23.45 GHz | FFS |
| 23.45GHz <= f <= 40.8GHz | FFS |
| 40.8 GHz < f <= 66 GHz | FFS |
| 66 GHz < f <= 80 GHz | FFS |
| PC3 | 6 GHz < f <= 12.75 GHz | 0 dB (NS\_202) |
| 12.75 GHz < f <= 23.45 GHz | 13 dB (NS\_202) |
| 23.45GHz <= f <= 40.8GHz | 13 dB (whole frequency range for NS\_202)  0.3 dB (for 23.6 GHz ≤ f ≤ 24.0 GHz for NS\_202 & NS\_203) |
| 40.8 GHz < f <= 66 GHz | 13 dB (NS\_202) |
| PC4 | 6 GHz < f <= 12.75 GHz | FFS |
| 12.75 GHz < f <= 23.45 GHz | FFS |
| 23.45GHz <= f <= 40.8GHz | FFS |
| 40.8 GHz < f <= 66 GHz | FFS |
| 66 GHz < f <= 80 GHz | FFS |

### <Unchanged Text Skipped>

# B.25 Receiver spurious emissions

Editor’s Note:

- MU value analysis and offset value analysis for PC1, 2 and 4 are not complete.

- MU value analysis for various test setups in subsection B.25.x is not complete for above 80 GHz for PC3

- Offset value analysis is not complete as it is derived from MU value analysis for above 80 GHz for PC3

### <Unchanged Text Skipped>

Table B.25.2-6: Void

Table B.25.2-7: Uncertainty assessment for TRP measurement (f=23.45 GHz to 40.8 GHz, Quiet Zone size ≤ 30 cm) for PC3 UEs

| UID | Uncertainty source | Uncertainty value | Distribution of the probability | Divisor | Standard uncertainty (σ) [dB] |
| --- | --- | --- | --- | --- | --- |
| Stage 2: DUT measurement | | | | | |
| 1 | Positioning misalignment | 0.00 | Normal | 2.00 | 0.00 |
| 2 | Measure distance uncertainty | 0.00 | Rectangular | 1.73 | 0.00 |
| 3 | Quality of Quiet Zone (NOTE 4) | 0.6 | Actual | 1.00 | 0.6 |
| 4 | Mismatch | 1.50 | Actual | 1.00 | 1.50 |
| 5 | Standing wave between the DUT and measurement antenna | 0.00 | U-shaped | 1.41 | 0.00 |
| 6 | Uncertainty of the RF power measurement equipment | 2.73 | Normal | 2.00 | 1.37 |
| 7 | Phase curvature | 0.00 | U-shaped | 1.41 | 0.00 |
| 8 | Amplifier uncertainties | 2.1 | Normal | 2.00 | 1.05 |
| 9 | Random uncertainty | 0.5 | Normal | 2.00 | 0.25 |
| 10 | Influence of the XPD | 0.01 | U-shaped | 1.41 | 0.00 |
| 11 | Insertion Loss Variation | 0.00 | Rectangular | 1.73 | 0.00 |
| 12 | RF leakage (from measurement antenna to the receiver/transmitter) | 0.00 | Actual | 1.00 | 0.00 |
| 13 | Influence of TRP measurement grid (NOTE 1) | 0.32 | Actual | 1 | 0.32 |
| 14 | Influence of beam peak search grid (NOTE 2) | N/A | Actual | 1 | N/A |
| 15 | Multiple measurement antenna uncertainty (NOTE 5) | 0.15 | Actual | 1 | 0.15 |
| 16 | DUT repositioning | 0.00 | Rectangular | 1.73 | 0.00 |
| 17 | Misalignment of DUT due to change of DUT orientation | 0.10 | Actual | 1 | 0.10 |
| Stage 1: Calibration measurement | | | | | |
| 18 | Mismatch | 0.00 | U-shaped | 1.41 | 0.00 |
| 19 | Amplifier Uncertainties | 0.00 | Normal | 2.00 | 0.00 |
| 20 | Misalignment of positioning System | 0.00 | Normal | 2.00 | 0.00 |
| 21 | Uncertainty of the Network Analyzer | 1.5 | Normal | 2.00 | 0.75 |
| 22 | Uncertainty of the absolute gain of the calibration antenna | 0.6 | Normal | 2.00 | 0.3 |
| 23 | Positioning and pointing misalignment between the reference antenna and the measurement antenna | 0.05 | Rectangular | 1.73 | 0.03 |
| 24 | Phase centre offset of calibration antenna | 0.00 | Rectangular | 1.73 | 0.00 |
| 25 | Quality of quiet zone for calibration process (NOTE 4) | 0.6 | Actual | 1.00 | 0.6 |
| 26 | Standing wave between reference calibration antenna and measurement antenna | 0.00 | U-shaped | 1.41 | 0.00 |
| 27 | Influence of the calibration antenna feed cable | 0.14 | Normal | 2.00 | 0.07 |
| 28 | Insertion Loss Variation | 0.00 | Rectangular | 1.73 | 0.00 |
|  | **Expanded uncertainty (1.96σ - confidence interval of 95 %)** | | | | Value |
|  | TRP Expanded uncertainty (23.45 GHz < f <= 40.8 GHz) [dB] (a) | | | | 5.11 |
|  | Systematic uncertainties (NOTE 3) | | | | Value |
| 29 | Systematic error due to TRP calculation/quadrature (NOTE 1) (b) | | | | 0.0 |
| 30 | Influence of noise (23.45 GHz < f <= 40.8 GHz) (c) | | | | 1.0 |
| 31 | Systematic error related to beam peak search (NOTE 2) | | | | N/A |
| Total measurement uncertainty | | | | | Value |
| Total measurement uncertainty (a)+(b)+(c) [dB] | | | | | 6.11 |
| NOTE 1: This contributor shall only be considered for TRP measurements.  NOTE 2: This contributor shall only be considered for EIRP measurements.  NOTE 3: In order to obtain the total measurement uncertainty, systematic uncertainties have to be added to the expanded root sum square of the standard deviations of the Stage 1 and Stage 2 contributors.  NOTE 4: Value based on procedure defined in clause D.2 of TR 38.810 for Quiet Zone size of less or equal to 30 cm.  NOTE 5: Applies to the system which has a structure of mechanical feed antenna positioning. | | | | | |

Table B.25.2-8: Void

### <End of Changes >