3GPP TSG-RAN WG4 Meeting #111 revision of R4-2409557

Fukuoka City, Fukuoka, Japan, 20th – 24th May, 2024

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** | **0025** | **rev** | **1** | **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 | **X** | Core Network |  |

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| ***Title:*** | CR to TS 38.181: test condition corrections | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Huawei, HiSilicon | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_NTN\_solutions-Perf | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***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 can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | In relation to the Ka band related discussion on SAN test conditions, in this CR we provide improvements to the specification of environmental requirements for the SAN equipment. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Introduction of missing declarations in table 4.6-1. * Simplified and clarified Annex B structure, based on declarations added to clause 4.6. * Correction of the wording in the Informative annex (shall 🡪 can) | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The environmental requirements framework for SAN would remain ambiguous due to inconsistent declarations specification. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 4.6, annex B | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*------------------------------ Modified section ------------------------------*

## 4.6 Manufacturer declarations

The following SAN declarations listed in table 4.6-1, when applicable to the SAN under test, are required to be provided by the manufacturer for the conducted requirements testing of the *SAN type 1-H*, and radiated requirements testing of *SAN type 1-H* and *SAN type 1-O*.

Table 4.6-1 Manufacturers declarations for *SAN type 1-H* conducted test requirements, and for *SAN type 1-H and SAN type 1-O* radiated test requirements

| Declaration identifier | Declaration | Description | Applicability  (Note 1) | |
| --- | --- | --- | --- | --- |
| SAN type 1-H  (Note 2) | SAN type 1-O |
| D.1 | Coordinate system reference point | Location of coordinated system reference point in reference to an identifiable physical feature of the SAN enclosure. | x | x |
| D.2 | Coordinate system orientation | Orientation of the coordinate system in reference to an identifiable physical feature of the SAN enclosure. | x | x |
| D.3 | Beam identifier | A unique title to identify a beam, e.g. a, b, c or 1, 2, 3. The vendor may declare any number of beams with unique identifiers. The minimum set to declare for conformance, corresponds to the beams at the reference beam direction with the highest intended EIRP, and covering the properties listed below:  1) A beam with the narrowest intended BeWθ and narrowest intended BeWϕ possible when narrowest intended BeWθ is used.  2) A beam with the narrowest intended BeWϕ and narrowest intended BeWθ possible when narrowest intended BeWϕ is used.  3) A beam with the widest intended BeWθ and widest intended BeWϕ possible when widest intended BeWθ is used.  4) A beam with the widest intended BeWϕ and widest intended BeWθ possible when widest intended BeWϕ is used.  5) A beam which provides the highest intended EIRP of all possible beams.  When selecting the above five beam widths for declaration, all beams that the SAN is intended to produce shall be considered, including beams that during operation may be identified by any kind of cell or UE specific reference signals, with the exception of any type of beam that is created from a group of transmitters that are not all phase synchronised.  (Note 3) | x | x |
| D.4 | *Operating bands* and frequency ranges | List of NR *operating band(s)* supported by the SAN and if applicable, frequency range(s) within the *operating band(s)* that the SAN can operate in.  Supported bands declared for every beam for *SAN type 1-O* (D.3), or every *TAB connector* for *SAN type 1-H*.  (Note 4) | c | x |
| D.5 | SAN requirements set | Declaration of one of the NR satellite access node *requirement*'*s set* as defined for *SAN type 1-H*, or *SAN type 1-O*. | c | x |
| D.6 | SAN class | Declared as GEO SAN, or LEO SAN. | c | x |
| D.7 | SAN channel band width and SCS support | SAN supported SCS and channel bandwidth per supported SCS. Declared for each beam for *SAN type 1-O* (D.3) or each *TAB connector* for *SAN type 1-H*, and each *operating band* (D.4). | c | x |
| D.8 | *OTA peak directions set* reference beam direction pair | The beam direction pair, describing the reference beam peak direction and the reference beam centre direction. Declared for every beam (D.3). | x | x |
| D.9 | OTA peak directions set | The OTA peak directions set for each beam. Declared for every beam (D.3). | x | x |
| D.10 | *OTA peak directions set* maximum steering direction(s) | The *beam direction pair(s)* corresponding to the following points:  1) The beam peak direction corresponding to the maximum steering from the reference beam centre direction in the positive Φ direction, while the θ value being the closest possible to the reference beam centre direction.  2) The beam peak direction corresponding to the maximum steering from the reference beam centre direction in the negative *Φ* direction, while the *θ value being the closest possible to the* reference beam centre direction*.*  3) The beam peak direction corresponding to the maximum steering from the reference beam centre direction in the positive *θ* direction, while the *Φ value being the closest possible to the* reference beam centre direction.  4) The beam peak direction corresponding to the maximum steering from the reference beam centre direction in the negative *θ* direction, while the *Φ value being the closest possible to the* reference beam centre direction*.*  The maximum steering direction(s) may coincide with *the reference beam centre direction*.  Declared for every beam (D.3). | x | x |
| D.11 | Rated beam EIRP (Prated,c,EIRP) | The rated EIRP level per carrier (Prated,c,EIRP) at the *beam peak direction* associated with a particular *beam direction pair* for each of the declared maximum steering directions (D.10), as well as the reference *beam direction pair* (D.8). Declared for every beam (D.3).  (Note 11) | x | x |
| D.12 | Beamwidth | The *beamwidth* for the reference *beam direction pair* and the four maximum steering directions. Declared for every beam (D.3). | x | x |
| D.13 | Equivalent beams | List of beams which are declared to be equivalent.  Equivalent beams imply that the beams are expected to have identical *OTA peak directions sets* and intended to have identical spatial properties at all steering directions within the *OTA peak directions set* when presented with identical signals. All declarations (D.4 – D.12) made for the beams are identical and the transmitter unit*,* RDN and antenna array responsible for generating the beam are of identical design. | x | x |
| D.14 | Parallel beams | List of beams which have been declared equivalent (D.13) and can be generated in parallel using independent RF power resources.  Independent power resources mean that the beams are transmitted from mutually exclusive transmitter units. | x | x |
| D.15 | Number of carriers at maximum TRP | The number of carriers per operating band the SAN is capable of generating at maximum TRP declared for every beam (D.3). | n/a | x |
| D.16 | Maximum Satellite Access Node RF Bandwidth | Maximum *Satellite Access Node RF Bandwidth* in the *operating band*, declared for each supported operating band for each beam for SAN type 1-O, or for each TAB connector for SAN type 1-H (D.4).  (Note 10) | c | x |
| D.17 | Total RF bandwidth (BWtot) | Total RF bandwidth BWtot of transmitter and receiver, declared per the band combinations (D.42). | c | x |
| D.18 | Contiguous spectrum operation support | Ability of SAN to support contiguous frequency distribution of carriers when operating multi-carrier in an operating band.  Declared for each *single-band RIB* for *SAN type 1-O* or each *single-band connector* for *SAN type 1-H*, for each *operating band*. | c | x |
| D.19 | OSDD identifier | A unique identifier for the OSDD. | x | x |
| D.20 | OSDD operating band support | Operating band supported by the OSDD, declared for every OSDD (D.19).  (Note 5) | x | x |
| D.21 | OTA sensitivity supported SAN channel bandwidth and SCS | The SANsupported SCS and channel bandwidth per supported SCS by each OSDD. | x | x |
| D.22 | Redirection of receiver target support | Ability to redirect the receiver target related to the OSDD. | x | x |
| D.23 | Minimum EIS for FR1 (EISminSENS) | The minimum EISminSENS requirement (i.e. maximum allowable EIS value) applicable to all sensitivity RoAoA per OSDD.  Declared per NR supported channel BW for the OSDD (D.19).  The lowest EIS value for all the declared OSDD's is called minSENS, while its related range of angles of arrival is called *minSENS RoAoA*.  (Note 6) | x | x |
| D.24 | Receiver target reference direction Sensitivity Range of Angle of Arrival | The sensitivity RoAoA associated with the receiver target reference direction (D.26) for each OSDD. | x | x |
| D.25 | Receiver target redirection range | For each OSDD the associated union of all the sensitivity RoAoA achievable through redirecting the receiver target related to the OSDD. | x | x |
| D.26 | Receiver target reference direction | For each OSDD an associated direction inside the receiver target redirection range (D.25).  (Note 7) | x | x |
| D.27 | Conformance test directions sensitivity RoAoA | For each OSDD that includes a receiver target redirection range, four sensitivity RoAoA comprising the conformance test directions (D.28). | x | x |
| D.28 | Conformance test directions | For each OSDD four conformance test directions.  If the OSDD includes a receiver target redirection range the following four directions shall be declared:  1) The direction determined by the maximum φ value achievable inside the receiver target redirection range, while θ value being the closest possible to the receiver target reference direction.  2) The direction determined by the minimum φ value achievable inside the receiver target redirection range, while θ value being the closest possible to the receiver target reference direction.  3) The direction determined by the maximum θ value achievable inside the receiver target redirection range, while φ value being the closest possible to the receiver target reference direction.  4) The direction determined by the minimum θ value achievable inside the receiver target redirection range, while φ value being the closest possible to the receiver target reference direction.  If an OSDD does not include a receiver target redirection range the following 4 directions shall be declared:  1) The direction determined by the maximum φ value achievable inside the sensitivity RoAoA, while θ value being the closest possible to the receiver target reference direction.  2) The direction determined by the minimum φ value achievable inside the sensitivity RoAoA, while θ value being the closest possible to the receiver target reference direction.  3) The direction determined by the maximum θ value achievable inside the sensitivity RoAoA, while φ value being the closest possible to the receiver target reference direction.  4) The direction determined by the minimum θ value achievable inside the sensitivity RoAoA, while φ value being the closest possible to the receiver target reference direction. | x | x |
| D.29 | OTA coverage range | Declared as a single range of directions within which selected TX OTA requirements are intended to be met.  (Note 8) | x | x |
| D.30 | *OTA coverage range* reference direction | The direction describing the reference direction of the *OTA converge range* (D.29).  (Note 9) | x | x |
| D.31 | OTA coverage range maximum directions | The directions corresponding to the following points:  1) The direction determined by the maximum φ value achievable inside the *OTA coverage range*, while θ value being the closest possible to the *OTA coverage range* reference direction.  2) The direction determined by the minimum φ value achievable inside the *OTA coverage range*, while θ value being the closest possible to the *OTA coverage range* reference direction.  3) The direction determined by the maximum θ value achievable inside the *OTA coverage range*, while φ value being the closest possible to the *OTA coverage range* reference direction.  4) The direction determined by the minimum θ value achievable inside the OTA coverage range, while φ value being the closest possible to the OTA coverage range reference direction. | x | x |
| D.32 | The rated carrier OTA SAN power, Prated,c,TRP | Prated,c,TRP is declared as TRP OTA power per carrier, declared per supported operating band.  (Note 11) | n/a | x |
| D.33 | Rated transmitter TRP, Prated,t,TRP | Rated total radiated output power*.*  Declared per supported *operating band*.  (Note 11) | n/a | x |
| D.34 | Rated carrier output power(Prated,c,TABC) | Conducted rated carrier output power, per *single band connector.*  Declared per supported *operating band*, per *TAB connector* for *SAN type 1-H*.  (Note 11) | c | n/a |
| D.35 | Rated total output power(Prated,t,TABC) | Conducted total rated output power*.*  Declared per supported *operating band*, per *TAB connector* for *SAN type 1-H.*  (Note 11) | c | n/a |
| D.36 | Single band connector | List of single-band connector for the supported operating bands (D.4). | c | n/a |
| D.37 | Equivalent connectors | List of *TAB connector* of *SAN type 1-H*, which have been declared equivalent.  Equivalent connectors imply that the *TAB connector* of *SAN type 1-H*, are expected to behave in the same way when presented with identical signals under the same operating conditions. All declarations made for the *TAB connector* of *SAN type 1-H* are identical and the transmitter unit and/or receiver unit driving *TAB connector* of *SAN type 1-H* are of identical design. | c | n/a |
| D.38 | Single-band RIB | List of single-band RIB for the supported operating bands (D.4). | n/a | x |
| D.39 | Single or multiple carrier | SAN capability to operate with a single carrier (only) or multiple carriers. Declared per supported *operating band*, per *RIB* for *SAN type 1-O* or per *TAB connector* for *SAN type 1-H*. | c | x |
| D.40 | Maximum number of supported carriers per *operating band* | Maximum number of supported carriers. Declared per supported *operating band*, per *RIB* for *SAN type 1-O* or per *TAB connector* for *SAN type 1-H*.  (Note 10) | c | x |
| D.41 | Maximum supported power difference between carriers | Maximum supported power difference between carriers in each supported *operating band*. Declared per *operating band* (D.4), per *RIB* for *SAN type 1-O* or per *TAB connector* for *SAN type 1-H*. | c | x |
| D.42 | Operating band combination support | List of *operating bands* combinations supported by *single-band RIB(s)* of *SAN type 1-O*, or *single-band connector*(s) of *SAN type 1-H*. | c | x |
| D.43 | OTA REFSENS RoAoA | Range of angles of arrival associated with the OTA REFSENS. | n/a | x |
| D.44 | OTA REFSENS receiver target reference direction | Reference direction inside the OTA REFSENS RoAoA (D.43). | n/a | x |
| D.45 | OTA REFSENS conformance test directions | The following four OTA REFSENS conformance test directions shall be declared:  1) The direction determined by the maximum φ value achievable inside the OTA REFSENS RoAoA, while θ value being the closest possible to the OTA REFSENS receiver target reference direction.  2) The direction determined by the minimum φ value achievable inside the OTA REFSENS RoAoA, while θ value being the closest possible to the OTA REFSENS receiver target reference direction.  3) The direction determined by the maximum θ value achievable inside the OTA REFSENS RoAoA, while φ value being the closest possible to the OTA REFSENS receiver target reference direction.  4) The direction determined by the minimum θ value achievable inside the OTA REFSENS RoAoA, while φ value being the closest possible to the OTA REFSENS receiver target reference direction. | n/a | x |
| D.46 | Relation between supported maximum RF bandwidth, number of carriers and Rated maximum TRP | If the rated transmitter TRP and total number of supported carriers are not simultaneously supported, the manufacturer shall declare the following additional parameters:  - The reduced number of supported carriers at the rated transmitter TRP;  - The reduced total output power at the maximum number of supported carriers. | n/a | x |
| D.47 | Relation between supported maximum RF bandwidth, number of carriers and Rated total output power | If the rated total output power and total number of supported carriers are not simultaneously supported, the manufacturer shall declare the following additional parameters:  - The reduced number of supported carriers at the rated total output power;  - The reduced total output power at the maximum number of supported carriers. | c | n/a |
| D.48 | *TAB connectors* used for performance requirement testing | To reduce test complexity, declaration of a representative (sub)set of *TAB connectors* to be used for performance requirement test purposes. At least one *TAB connector* mapped to each *demodulation branch* is declared. | c | n/a |
| D.49 | **Prated,c,sys,GEO** | The sum of Prated,c,TABC for all *TAB connectors* for a single carrier of the SAN GEO class. | c | n/a |
| D.50 | **Prated,c,TABC,GEO** | The *rated carrier output power per TAB connector* of the SAN GEO class*.* | c | n/a |
| D.51 | **Prated,c,sys,LEO** | The sum of Prated,c,TABC for all *TAB connectors* for a single carrier of the SAN LEO class. | c | n/a |
| D.52 | **Prated,c,TABC,LEO** | The *rated carrier output power per TAB connector* of the SAN LEO class*.* | c | n/a |
| D.100 | PUSCH mapping type | Declaration of the supported PUSCH mapping type as specified in TS 38.211 [8], i.e., type A, type B or both. | c | x |
| D.101 | PUCCH format | Declaration of the supported PUCCH format(s) as specified in TS 38.211 [8], i.e., format 0, format 1, format 2, format 3, format 4. | c | x |
| D.102 | PRACH format and SCS | Declaration of the supported PRACH format(s) as specified in TS 38.211 [8], i.e., format: 0, 2, B4, C2.  Declaration of the supported SCS(s) per supported PRACH format with short sequence, as specified in TS 38.211 [8], i.e., 15 kHz, 30 kHz or both. | c | x |
| D.103 | Additional DM-RS for PUCCH format 3 | Declaration of the supported additional DM-RS for PUCCH format 3: without additional DM-RS, with additional DM-RS or both. | c | x |
| D.104 | Additional DM-RS for PUCCH format 4 | Declaration of the supported additional DM-RS for PUCCH format 4: without additional DM-RS, with additional DM-RS or both. | c | x |
| D.105 | PUCCH multi-slot | Declaration of multi-slot PUCCH support. | c | x |
| D.106 | SAN test conditions: Barometric pressure | Range of barometric pressure values for the Satellite Payload RF (SPRF) testing. | x | x |
| D.107 | SAN test conditions: Temperature | Range of temperature values for SPRF testing. | x | x |
| D.108 | SAN Test conditions: Relative humidity | Range of relative humidity values for SPRF testing. | x | x |
| D.109 | SAN Test conditions: Vibration | Range of vibration values for SPRF testing. | x | x |
| D.110 | SAN Test conditions: Additional conditions | Additional (e.g. mission-specific) conditions for the SPRF testing. | X | x |
| D.111 | SAN Test conditions: power supply | Manufacturer declaration related to the power supply. | x | x |
| NOTE 1: Manufacturer declarations applicable per SAN *requirement set* were marked as "x" or "c". Manufacturer declarations not applicable per SAN *requirement set* were marked as "n/a".  NOTE 2: For *SAN type 1-H*, the only radiated declarations are related to EIRP and EIS requirements. For declarations marked as 'c', related conducted declarations apply, and for declarations marked as 'x', related radiated declarations apply.  NOTE 3: Depending on the capability of the system some of these beams may be the same. For those same beams, testing is not repeated.  NOTE 4: These *operating bands* are related to their respective single‑band RIBs, or single-band TAB connectors.  NOTE 5: As each identified OSDD has a declared minimum EIS value (D.23), multiple operating band can only be declared if they have the same minimum EIS declaration.  NOTE 6: If the *SAN type 1-H* or *SAN type 1-O* is not capable of redirecting the receiver target related to the OSDD then there is only one RoAoA applicable to the OSDD.  NOTE 7: For an OSDD without receiver target redirection range, this is a direction inside the sensitivity RoAoA.  NOTE 8: *OTA coverage range* is used for conformance testing of such TX OTA requirements as occupied bandwidth, frequency error or EVM.  NOTE 9: The *OTA coverage reference* direction may be the same as the Reference beam direction pair (D.8) but does not have to be.  NOTE 10: Parameters for contiguous spectrum operation in the operating band are assumed to be the same unless they are separately declared. When separately declared, they shall still use the same declaration identifier.  NOTE 11: If a SAN is capable of 64QAM DL operation then up to two rated output power declarations may be made. One declaration is applicable when configured for 64QAM transmissions, and the other declaration is applicable when not configured for 64QAM transmissions. | | | | |

*------------------------------ Next modified section ------------------------------*

Annex B (informative):  
Environmental requirements for the SAN equipment

# B.1 General

For each test in the present document, the environmental conditions under which the SAN is to be tested are defined.

For OTA requirements where it is not possible to environmentally control the entire calibrated OTA chamber either localised control of the SAN hardware or alternative OTA measurements which are then related to the original specification are acceptable, see annex B.6.

SAN involves two categories of equipment, differentiated by the operation environment:

- Equipment deployed in space as part of Satellite Payload RF (SPRF)

- Equipment deployed on the ground (SAN terrestrial equipment).

# B.2 SAN test environment

## B.2.1 Test environment for SPRF

SPRF shall be tested within the minimum and maximum limits of the conditions stated in table B.2.1-1.

Additional environmental parameters specific to space operation might be considered and included in test report.

Table B.2.1.-1: Limits of conditions for normal test environment for SPRF

|  |  |  |
| --- | --- | --- |
| Condition |  |  |
| Barometric pressure | Range of values as declared in D.106 |  |
| Temperature | Range of values as declared in D.107 |  |
| Relative humidity | Range of values as declared in D.108 |  |
| Power supply | Nominal, as declared by the manufacturer in D.111. | |
| Vibration | As declared by manufacturer in D.109. | |
| Other additional parameters | As declared by manufacturer in D.110. | |
| NOTE: Space operation conditions are defined outside 3GPP and are depending on characteristics of each application. | | |

## B.2.2 Test environment for SAN terrestrial equipment

SAN terrestrial equipment shall be tested within the minimum and maximum limits of the conditions stated in table B.2.2-1.

Table B.2.2.-1: Limits of conditions for normal test environment for SAN terrestrial equipment

|  |  |  |
| --- | --- | --- |
| Condition | Minimum | Maximum |
| Barometric pressure | 86 kPa | 106 kPa |
| Temperature | 15 °C | 30 °C |
| Relative humidity | 20 % | 85 % |
| Power supply | Nominal, as declared by the manufacturer | |
| Vibration | Negligible | |

The ranges of barometric pressure, temperature and humidity represent the maximum variation expected in the uncontrolled environment of a test laboratory. If it is not possible to maintain these parameters within the specified limits, the actual values shall be recorded in the test report.

# B.3 Void



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Annex C (informative):  
Test tolerances and derivation of test requirements

The test requirements explicitly defined in this specification have been calculated by relaxing the minimum requirements of the core specification TS 38.108 [2] using the test tolerances (TT) defined here. When the TT value is zero, the test requirement will be the same as the minimum requirement. When the TT value is non-zero, the test requirements will differ from the minimum requirements, and the formula used for this relaxation is given in the following tables.

The TTOTA values are derived from OTA Test System uncertainties, regulatory requirements and criticality to system performance. As a result, the TTOTA values may sometimes be set to zero.

The TTOTA values should not be modified for any reason e.g. to take account of commonly known OTA Test System errors (such as mismatch, cable loss, etc.).

Note that a formula for applying TTOTA values is provided for all OTA tests, even those with a test tolerance of zero. This is necessary in the case where the OTA Test System uncertainty is greater than that allowed in clause 4.1.2. In this event, the excess error can be subtracted from the defined TTOTA value in order to generate the correct tightened test requirements as defined in this annex.

# C.1 Measurement of transmitter

Table C.1-1: Derivation of test requirements for conducted transmitter tests

| Test | Minimum requirement in TS 38.108 [2] | Test Tolerance (TT) | Test requirement in the present document |
| --- | --- | --- | --- |
| 6.2 SAN output power | clause 6.2 | 0.7 dB | Formula:  Upper limit + TT, Lower limit - TT |
| 6.3 Output power dynamics | clause 6.3 | 0.4 dB | Formula:  Total power dynamic range – TT (dB) |
| 6.5.1 Frequency error | clause 6.5.1 | 12 Hz | Formula:  Frequency Error limit + TT |
| 6.5.2 Modulation quality (EVM) | clause 6.5.2 | 1% | Formula:  EVM limit + TT |
| 6.6.2 Occupied bandwidth | clause 6.6.2 | 0 Hz | Formula:  Minimum Requirement + TT |
| 6.6.3 Adjacent Channel Leakage Power Ratio (ACLR) | clause 6.6.3 | ACLR:  BW ≤ 20MHz:  0.8dB | Formula:  ACLR Minimum Requirement - TT |
| 6.6.4 Out-of-band emissions | clause 6.6.4 | 0dB | Formula:  Minimum Requirement + TT |
| 6.6.5 Transmitter spurious emissions | clause 6.6.5 | 0dB | Formula:  Minimum Requirement + TT |
| NOTE 1: Void | | | |

Table C.1-2: Derivation of test requirements for OTA transmitter tests

|  |  |  |  |
| --- | --- | --- | --- |
| Test | Minimum requirement in TS 38.108 [2] | Test Tolerance (TTOTA) | Test requirement in the present document |
| 9.2 Radiated transmit power | clause 9.2 | 1.1 dB | Formula:  Upper limit + TT, Lower limit – TT |
| 9.3 OTA SAN output power | clause 9.3 | 1.4 dB | Formula:  Upper limit + TT, Lower limit – TT |
| 9.4 OTA output power dynamics | clause 9.4 | 0.4 dB | Formula:  Total power dynamic range – TT |
| 9.6.1 OTA frequency Error | clause 9.6.1 | 12 Hz | Formula:  Frequency Error limit + TT |
| 9.6.2 OTA Modulation quality (EVM) | clause 9.6.2 | 1% | Formula:  EVM limit + TT |
| 9.7.2 OTA occupied bandwidth | clause 9.7.2 | 0 Hz | Formula:  Minimum Requirement + TT |
| 9.7.3 OTA Adjacent Channel Leakage Power Ratio (ACLR) | clause 9.7.3 | Relative:1 dB | Formula:  Relative limit - TT |
| 9.7.4 OTA out-of-band emissions | clause 9.7.4 | 0 dB | Formula:  Minimum Requirement + TT |
| 9.7.5.2 General transmitter spurious emissions | clause 9.7.5.2.2 | 0 dB | Formula:  Minimum Requirement + TT |
| NOTE: Void | | | |

# C.2 Measurement of receiver

Table C.2-1: Derivation of test requirements for conducted receiver tests

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| Test | Minimum requirement in TS 38.108 [2] | Test Tolerance  (TT) | Test requirement in the present document |
| 7.2 Reference sensitivity level | clause 7.2 | 0.7 dB | Formula: Reference sensitivity power level + TT |
| 7.3 Dynamic range | clause 7.3 | 0.3 dB | Formula: Wanted signal power + TT |
| 7.4 In-band selectivity and blocking | clause 7.4 | 0dB | Formula: Wanted signal power + TT |
| 7.5 Out-of-band blocking | clause 7.5 | 0dB | Formula: Wanted signal power + TT |
| 7.8 In-channel selectivity | clause 7.8 | 1.4 dB | Formula: Wanted signal power + TT |
| NOTE: Void | | | |

*------------------------------ End of modified section -------------------------*