3GPP TSG-RAN WG4 Meeting # 99-e R4-2108470

Electronic Meeting, May. 19-27, 2021

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **38.124** | **CR** | **0035** | **rev** | **1** | **Current version:** | **15.5.0** |  |
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| *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 38.124: Correction of the radiated spurious emissions requirements applicability, Rel-15 |
|  |  |
| ***Source to WG:*** | Huawei  |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_newRAT-Core |  | ***Date:*** | 2021-04-28 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-15 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | Correction of the radiated spurious emissions requirements applicability, as it is not supposed to be limited to FR1 only.  |
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| ***Summary of change:*** | * 1: Clarifiaction correction of the scope text.
* 3.3: Adding missing abbreviations,
* 8.2.4: correction of the table heading to clarify that those requirements could also apply to a UE which supports both FR1 and FR2
* Editorial corrections
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| ***Consequences if not approved:*** | Radiated spurious emissions requirement table applicability would indicate incorrect applicability.  |
|  |  |
| ***Clauses affected:*** | 1, 3.3, 8.2.4, 8.3.2, 9.3.2, 9.5.2 |
|  |  |
|  | **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 ------------------------------*

# 1 Scope

The present document establishes the essential EMC requirements for "3rd generation" digital cellular mobile terminal equipment and ancillary accessories in combination with a 3GPP NR user equipment (UE).

The equipment conforming to the requirements laid out in the present document and used in its intended electromagnetic environment in accordance with the manufacturer's instructions

- shall not generate electromagnetic disturbances at a level which may interfere with the intended operation of other equipment;

- has an adequate level of intrinsic immunity to electromagnetic disturbances to operate as intended;

The present document specifies the applicable EMC tests, methods of measurement, frequency ranges, applicable limits and minimum performance criteria for all types of NR UE(s) and their accessories. NR base station equipment operating within network infrastructure is outside the scope of the present document. However, the present document does cover mobile and portable equipment that is intended to be operated in a fixed location while connected to the AC mains. NR base station equipment operating within network infrastructure is covered by the technical specification TS 38.113 [2].

Requirements for the radiated emission from the enclosure port of integral antenna equipment and ancillaries are included in the present document. Technical specifications for conducted emissions from the antenna connector are found in the 3GPP specifications for the radio interface of NR UE, e.g. TS 38.101-1 [3], for the effective use of the radio spectrum.

Requirements for the radiated emissions from the enclosure port and ancillaries cover the following case:

- UE equipment supporting operations in a frequency range for which antenna connectors are available (i.e. for operations in FR1 as defined in e.g. TS 38.101-1 [3] for the radio interface).

The immunity requirements are selected to ensure an adequate level of compatibility for apparatus in residential, commercial, light industrial and vehicular environments. The levels however, do not cover extreme cases, which may occur in any location but with low probability of occurrence.

Compliance of radio equipment to the requirements of the present document does not signify compliance to any requirement related to the use of the equipment (i.e. licensing requirements).

Compliance to the requirements of the present document does not signify compliance to any safety requirement. However, any temporary or permanent unsafe condition caused by EMC is considered as non-compliance.

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## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

AC Alternating Current

CA Carrier Aggregation

DC Direct Current

ESD Electrostatic Discharge

EUT Equipment Under Test

FAC Fully Anechoic Chamber

FR Frequency Range

HCP Horizontal Coupling Plane

LISN Line Impedance Stabilising Networks

NR New Radio

RF Radio Frequency

RMS Root Mean Square (value)

UE User Equipment

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

### 8.2.4 Limits

Unless otherwise stated, the radiated spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) in table 8.2.4-0 from the edge of the channel bandwidth. The radiated spurious emission limits in table 8.2.4-1 apply for all transmitter band configurations (NRB) and channel bandwidths.

The references for these requirements are ITU-R SM 329 [5], SM.1539 [18] and TS 38.101-1 [3] for FR1.

The frequency boundary and reference bandwidths for the detailed transitions of the limits between the requirements for out of band emissions and spurious emissions are based on ITU-R SM 329 [5].

These requirements are only applicable for frequencies in the spurious domain. The limits are specified in table 8.2.4-1 for UE equipment supporting operations in FR1 only.

Table 8.2.4-0: Boundary between NR out of band and general spurious emission domain

|  |  |
| --- | --- |
| Channel bandwidth | OOB boundary FOOB (MHz)  |
| BWChannel  | BWChannel + 5 |

Table 8.2.4-1: Radiated spurious emissions requirements for UE equipment supporting operations in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency range | Maximum level (dBm) | Measurement bandwidth | Notes |
| 30 MHz ≤ f < 1000 MHz | -36 | 100 kHz |  |
| 1 GHz ≤ f < 12.75 GHz | -30 | 1 MHz | 4 |
|  | -25 | 1 MHz | 3 |
| 12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz | -30 | 1 MHz | 1 |
| 12.75 GHz < f < 26 GHz | -30 | 1 MHz | 2 |
| NOTE 1: Applies for Band that the upper frequency edge of the UL Band more than 2.69 GHz.NOTE 2: Applies for Band that the upper frequency edge of the UL Band more than 5.2 GHz.NOTE 3: As specified in TS 38.101-1 [3]: Applies for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in clause 5.2B of TS 38.101-3 [3] when NS\_04 is signalled.NOTE 4: As specified in TS 38.101-1 [3]: Does not apply for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in clause 5.2B of TS 38.101-3 [3] when NS\_04 is signalled. |

NOTE: Void.

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## 8.3 Conducted emission DC power input/output port

This test is applicable to all equipment, which may have DC cables longer than 3 m.

If the DC power cable of the UE and/or the ancillary equipment is intended to be less than 3 m in length, and intended only for direct connection to a dedicated AC to DC power supply, then the measurement shall be performed only on the AC power input of that power supply as specified in clause 8.4.

This test shall be performed on a representative configuration of the radio equipment or a representative configuration of the combination of radio and ancillary equipment.

### 8.3.1 Definition

This test assesses the ability of radio equipment and ancillary equipment to limit internal noise from the DC power input/output ports.

### 8.3.2 Test method

The test method shall be in accordance with CISPR 32 [20], and the Line Impedance Stabilising Networks (LISN) shall be connected to a DC power source.

In the case of DC output ports, the ports shall be connected via a LISN to a load drawing the rated current of the source.

A measuring receiver shall be connected to each LISN measurement port in turn and the conducted emission recorded. The LISN measurement ports not being used for measurement shall be terminated with a 50 W load.

The equipment shall be installed with a ground plane as defined in CISPR 32 [20]. The reference earth point of the LISNs shall be connected to the reference ground plane with a conductor as short as possible.

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### 9.3.2 Test method and level

The test method shall be in accordance with IEC 61000‑4‑2 [11]:

- for contact discharge, the equipment shall pass at ±2 kV and ±4 kV;

- for air discharge the equipment shall pass at ±2 kV, ±4 kV and ±8 kV (only for non-conducting surfaces, see IEC 61000‑4‑2 [11]).

NOTE: The EUT shall be fully discharged between each ESD exposure by connecting its ground point (where applicable) to the HCP by a resistive wire with a 470 kΩ resistor in either end.

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### 9.5.2 Test method and level

The test method shall be in accordance with IEC 61000‑4‑6 [13]:

- the test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 kHz;

- the stepped frequency increments shall be either 50 kHz or 1 % frequency increment of the momentary frequency in the frequency range 150 kHz - 5 MHz and 1 % frequency increment of the momentary frequency in the frequency range 5 MHz - 80 MHz;

- the test level shall be severity level 2 as given in IEC 61000‑4‑6 [13] corresponding to 3 V RMS, at a transfer impedance of 150 W;

- the test shall be performed over the frequency range 150 kHz - 80 MHz;

- responses of stand alone receivers or receivers which are part of transceivers occurring at discrete frequencies which are narrow band responses, shall be disregarded, see clause 4.3;

- the frequencies selected during the test and the test method used shall be recorded in the test report.

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