

**TSG RAN Meeting #18**  
**New Orleans, US, 3 - 6 December, 2002**

**RP-020792**

**Title** CRs (Rel-4 and Rel-5 Category A) to TS 25.113 & TS 34.124 "New exclusion bands, interpretation of measurement results"  
**Source** TSG RAN WG4  
**Agenda Item** 7.4.4

RAN4 Tdoc	Spec	CR	R	Cat	Rel	Curr Ver	Title	Work Item
R4-021656	25.113	018	1	F	Rel-4	4.3.0	New exclusion bands, requirements for telecommunication port and interpretation of measurement results	TEI4
R4-021657	25.113	019	1	A	Rel-5	5.2.0	New exclusion bands, requirements for telecommunication port and interpretation of measurement results	TEI4
R4-021456	34.124	009		F	Rel-4	4.0.0	New exclusion bands and interpretation of measurement results	TEI4
R4-021457	34.124	010		A	Rel-5	5.1.0	New exclusion bands and interpretation of measurement results	TEI4

## CHANGE REQUEST

⌘ **25.113 CR 018** ⌘ rev **1** ⌘ Current version: **4.3.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘	New exclusion bands, requirements for telecommunication port and interpretation of measurement results	
<b>Source:</b>	⌘	RAN WG4	
<b>Work item code:</b>	⌘	TEI4	<b>Date:</b> ⌘ 26/11/2002
<b>Category:</b>	⌘	<b>F</b>	<b>Release:</b> ⌘ Rel-4
		Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
		<b>F</b> (correction)	2 (GSM Phase 2)
		<b>A</b> (corresponds to a correction in an earlier release)	R96 (Release 1996)
		<b>B</b> (addition of feature),	R97 (Release 1997)
		<b>C</b> (functional modification of feature)	R98 (Release 1998)
		<b>D</b> (editorial modification)	R99 (Release 1999)
		Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

<b>Reason for change:</b>	⌘	This CR proposes to update the current 3GPP EMC specification according to the changes in respective basic EMC standards.
<b>Summary of change:</b>	⌘	The updates are to: <ol style="list-style-type: none"> <li>1. The normative requirements are moved from Annex A to the specification body itself as clauses 8 and 9 to enable better usability. Annex A is deleted.</li> <li>2. Introduce a clause about the exclusion bands and extend the frequency range for radiated immunity.</li> <li>3. Include the limit and test for conducted emissions from telecommunication ports.</li> <li>4. Modify measurement uncertainty for radiated emissions test.</li> <li>5. Some corrections updating references are also made.</li> </ol>
<b>Consequences if not approved:</b>	⌘	The EMC specification would not be aligned with the basic EMC standards. <u>Isolated impact analysis:</u> Would not affect a BS that meets the basic EMC standards.

<b>Clauses affected:</b>	⌘	2, 3.3, 4.5, 7, 8, 9, Annex A								
<b>Other specs affected:</b>	⌘	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N		X		X		X
Y	N									
	X									
	X									
	X									
<b>Other comments:</b>	⌘	Changes from the already approved CR 15 for Rel-5 have also been incorporated into this CR. Those changes correspond to points 1 and 5 in the								

"Summary of change".

Equivalent CRs in other Releases: CR019r1 cat. A to 25.113 v5.2.0

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## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 25.104: "UTRA (BS) FDD; Radio transmission and reception".
- [2] 3GPP TS 25.105: "UTRA (BS) TDD; Radio transmission and reception".
- [3] 3GPP TS 25.141: "UTRA (BS) FDD; Base station conformance testing (FDD)".
- [4] 3GPP TS 25.142: "UTRA (BS) TDD; Base station conformance testing (TDD)".
- [5] IEC 61000-6-1: 1997; "Electromagnetic compatibility (EMC) – Part 6: Generic standards – Section 1: Immunity for residential, commercial and light-industrial environments".
- [6] IEC 61000-6-3: 1996; "Electromagnetic compatibility (EMC) – Part 6: Generic standards – Section 3: mission standard for residential, commercial and light industrial environments".
- [7] IEC 60050(161):~~1998~~; "International Electrotechnical Vocabulary - Chapter 161: Electromagnetic compatibility".
- [8] 3GPP TS 25.101: "UTRA (UE) FDD; UE Radio transmission and reception (FDD)".
- [9] 3GPP TS 25.102: "UTRA (UE) TDD; UE Radio transmission and reception (TDD)".
- [10] 3GPP TS 25.106: "UTRA Repeater; Radio Transmission and Reception".
- [11] 3GPP TS 25.143: "UTRA Repeater conformance testing".
- [12] [ITU-R Rec. SM.329-9: "Spurious emissions"](#)
- [13] [CISPR 22 : "Limits and methods of measurement of radio disturbance characteristics of information technology equipment"](#).
- [14] [CISPR 16-1 : "Specification for radio disturbance and immunity measuring apparatus and methods"](#).
- [15] [IEC 61000-3-2 \(2000\): "Electromagnetic compatibility \(EMC\) - Part 3: Limits – Section 2: Limits for harmonic current emissions \(equipment input current ≤ 16 A\) "](#).
- [16] [IEC 61000-3-3 \(1995\): "Electromagnetic compatibility \(EMC\) - Part 3: Limits – Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A"](#)
- [17] [IEC 61000-4-2: " Electromagnetic compatibility \(EMC\) - Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test"](#).
- [18] [IEC 61000-4-3: " Electromagnetic compatibility \(EMC\) - Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency electromagnetic field immunity test"](#).
- [19] [IEC 61000-4-4: " Electromagnetic compatibility \(EMC\) - Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test"](#).

- [20] [IEC 61000-4-5: " Electromagnetic compatibility \(EMC\) - Part 4: Testing and measurement techniques – Section 5: Surge immunity test"](#).
- [21] [IEC 61000-4-6: " Electromagnetic compatibility \(EMC\) - Part 4: Testing and measurement techniques – Section 6: Immunity to contacted disturbances, induced by radio frequency fields"](#).
- [22] [IEC 61000-4-11 : " Electromagnetic compatibility \(EMC\) - Part 4: Testing and measurement techniques – Section 11: Voltage dips, short interruptions and voltage variations. Immunity tests"](#).
- [23] [ITU-R Recommendation SM.1539 \(2001\): "Variation of the boundary between the out-of-band and spurious domains required for the application of Recommendations ITU-R SM.1541 and ITU-R SM.329"](#).
- [24] [3GPP TR 21.905: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Vocabulary for 3GPP Specifications"](#).

~~Note: — Other references relating only to annex A are given in that annex.~~

### 3.3 Abbreviations

For the purposes of the present document, the ~~following~~ abbreviations [given in TR 25.905 \[24\]](#) and the [following](#) apply:

AC	Alternating Current
<a href="#">AMN</a>	<a href="#">Artificial Mains Network</a>
DC	Direct Current
EMC	Electromagnetic Compatibility
ESD	Electrostatic discharge
EUT	Equipment Under Test
<del>AMN</del>	<del>Artificial Mains Network</del>
<a href="#">RF</a>	<a href="#">Radio frequency</a>
rms	root mean square
<a href="#">UTRA</a>	<a href="#">Universal Terrestrial Radio Access</a>

## 4.5 Exclusion bands

### 4.5.1 Transmitter exclusion band

In the frequency bands including in band emissions and out of band emissions are covered by the RF spectral mask specification and need no further consideration:

For the purpose of EMC specifications this shall be the transmitter exclusion band from:

For UTRA FDD and 3,84 Mcps TDD option:

Lower carrier frequency - 12,5 MHz. to upper carrier frequency + 12,5 MHz.

For 1,28 Mcps TDD option:

Lower carrier frequency - 4 MHz to upper carrier frequency + 4 MHz.

### 4.5.2 Receiver exclusion band

The receiver exclusion band for base stations extends from the lower frequency of the allocated receiver band minus 20 MHz to the upper frequency of the allocated receiver band plus 20 MHz. The exclusion bands are as set out below:

#### UTRA/FDD

(a) 1900 MHz to 2000 MHz (Band I)

(b) 1830 MHz to 1930 MHz (Band II)

(b) 1690 MHz to 1805 MHz (Band III)

#### UTRA/TDD

(a) 1880 MHz to 1940 MHz

1990 MHz to 2045 MHz

(b) 1830 MHz to 2010 MHz (ITU-R, Region 2)

(c) 1890 MHz to 1950 MHz (ITU-R, Region 2)

## 7 Applicability overview

### 7.1 Emission

**Table 3: Emission applicability**

Phenomenon	Application	Equipment test requirement			Reference subclause in the present document	Reference Standard
		Base station equipment	Ancillary equipment	Repeater		
Radiated emission	Enclosure	applicable		applicable	<del>A.48.3.1</del>	ITU-R SM.329-89 [412]
Radiated emission	Enclosure		applicable		<del>A.48.3.2</del>	CISPR 22 [413]
Conducted emission	DC power input/output port	applicable	applicable	applicable	<del>A.48.4</del>	CISPR 22 [413], CISPR 16-1 [514]
Conducted emission	AC mains input/output port	applicable	applicable	applicable	<del>A.48.5</del>	CISPR 22 [413]
Harmonic current emissions	AC mains input port	applicable	applicable	applicable	<del>A.48.6</del>	IEC 61000-3-2 [615]
Voltage fluctuations and flicker	AC mains input port	applicable	applicable	applicable	<del>A.48.7</del>	IEC 61000-3-3 [716]
<u>Conducted emission</u>	<u>Telecommunication port</u>	<u>applicable</u>	<u>applicable</u>	<u>applicable</u>	<u>8.8</u>	<u>CISPR 22 [13]</u>

NOTE: spurious emissions from antenna connector shall be measured according to TS 25.141 [3] and TS 25.142 [4] and TS 25.143 [11].



## 7.2 Immunity

**Table 4: Immunity applicability**

Phenomenon	Application	Equipment test requirement			Reference subclause in the present document	Reference standard
		Base station equipment	Ancillary equipment	Repeater		
RF electro-magnetic field (80 - <del>4</del> 2000 MHz)	Enclosure	applicable	applicable	applicable	<del>A.29.3</del>	IEC 61000-4-3 [ <del>9</del> 18]
Electrostatic discharge	Enclosure	applicable	applicable	applicable	<del>A.29.4</del>	IEC 61000-4-2 [ <del>8</del> 17]
Fast transients common mode	Signal, telecommunications and control ports, DC and AC power input ports	applicable	applicable	applicable	<del>A.29.5</del>	IEC 61000-4-4 [ <del>40</del> 19]
RF common mode 0,15 - 80 MHz	Signal, telecommunications and control ports, DC and AC power input ports	applicable	applicable	applicable	<del>A.29.6</del>	IEC 61000-4-6 [ <del>42</del> 21]
Voltage dips and interruptions	AC mains power input ports	applicable	applicable	applicable	<del>A.29.7</del>	IEC 61000-4-11 [ <del>43</del> 22 ]
Surges, common and differential mode	AC power input ports and telecommunications port	applicable	applicable	applicable	<del>A.29.8</del>	IEC 61000-4-5 [ <del>44</del> 20]

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## ~~Annex A (normative):~~ ~~Methods of measurement~~

~~Note: —References cited in this annex relate to those listed in in clause A.3 of this annex, and not to the main references given in clause 2 above.~~

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### ~~A.18~~ Emission

#### ~~A.18.1~~ Methods of measurement and limits for EMC emissions

#### ~~A.18.2~~ Test configurations

This subclause defines the configurations for emission tests as follows:

- the equipment shall be tested under normal test conditions as specified in the functional standards;
- the test configuration shall be as close to normal intended use as possible;
- if the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- if the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are tested;
- the test conditions, test configuration and mode of operation shall be recorded in the test report;
- ports which in normal operation are connected shall be connected to an ancillary equipment or to a representative piece of cable correctly terminated to simulate the input/output characteristics of the ancillary equipment, Radio Frequency (RF) input/output ports shall be correctly terminated;
- ports which are not connected to cables during normal operation, e.g. service connectors, programming connectors, temporary connectors etc. shall not be connected to any cables for the purpose of EMC testing. Where cables have to be connected to these ports, or interconnecting cables have to be extended in length in order to exercise the EUT, precautions shall be taken to ensure that the evaluation of the EUT is not affected by the addition or extension of these cables;
- the test arrangements for transmitter and receiver sections of the transceiver are described separately for the sake of clarity. However, where possible the test of the transmitter section and receiver section of the EUT may be carried out simultaneously to reduce test time.

#### ~~A.18.3~~ Radiated ~~spurious~~-emission from Base station, Repeater and ancillary equipment

##### ~~A.18.3.1~~ Radiated ~~spurious~~-emission, Base stations and Repeater

This test is applicable to Base station and Repeater. This test shall be performed on a representative configuration of the Base station or Repeater.

##### ~~A.18.3.1.1~~ Definition

This test assesses the ability of BS and Repeater to limit unwanted emission from the enclosure port.

### A.48.3.1.2 Test method

#### A.48.3.1.2.1 FDD and 3,84 Mcps TDD option

- a) A test site fulfilling the requirements of ITU-R SM. 329-89 [412] shall be used. The BS or Repeater shall be placed on a non-conducting support and shall be operated from a power source via a RF filter to avoid radiation from the power leads.

Average power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser). At each frequency at which a component is detected, the BS or Repeater shall be rotated and the height of the test antenna adjusted to obtain maximum response, and the effective radiated power (e.r.p.) of that component determined by a substitution measurement. The measurement shall be repeated with the test antenna in the orthogonal polarization plane.

NOTE: Effective radiated power (e.r.p.) refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2,15 dB between e.i.r.p. and e.r.p.

$$\text{e.r.p. (dBm)} = \text{e.i.r.p. (dBm)} - 2,15 \text{Ref: ITU-R SM.329-89 ANNEX 1 [412].}$$

- b) The BS shall transmit with maximum power declared by the manufacturer with all transmitters active. Set the base station to transmit a signal as stated for measurement of spurious emission for FDD in the TS25.141 [23] and for 3.84 Mcps TDD option in the TS25.142 [34].

In case of a Repeater the gain and the output power shall be set to the maximum value as declared by the manufacturer.

- c) The received power shall be measured over the frequency range 30 MHz to 12.75 GHz, excluding 12.5MHz below the first carrier frequency to 12.5 MHz above the last carrier frequency used. The measurement bandwidth shall be 100 kHz between 30 MHz and 1 GHz and 1 MHz above 1 GHz as given in ITU-R SM.329-89 [412]. The video bandwidth shall be approximately three times the resolution bandwidth. If this video bandwidth is not available on the measuring receiver, it shall be the maximum available and at least 1 MHz.

#### A.48.3.1.2.2 1,28 Mcps TDD option

- a) A test site fulfilling the requirements of ITU-R SM. 329-89 [412] shall be used. The BS shall be placed on a non-conducting support and shall be operated from a power source via a RF filter to avoid radiation from the power leads.

Radiated power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser). At each frequency at which a component is detected, the BS shall be rotated and the height of the test antenna adjusted to obtain maximum response, and the effective radiated power (e.r.p.) of that component determined by a substitution measurement. The measurement shall be repeated with the test antenna in the orthogonal polarisation plane.

NOTE: Effective radiated power (e.r.p.) refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2,15 dB between e.i.r.p. and e.r.p.

$$\text{e.r.p. (dBm)} = \text{e.i.r.p. (dBm)} - 2,15 \text{Ref: ITU-R SM.329-89 ANNEX 1 [412].}$$

- b) The BS shall transmit with maximum power declared by the manufacturer with all transmitters active. Set the base station to transmit a signal as stated for measurement of spurious emission for 1.28 Mcps TDD in the TS25.142 [34].
- c) The received power shall be measured over the frequency range 30 MHz to 12.75 GHz, excluding 4MHz below the first carrier frequency to 4 MHz above the last carrier frequency used. The measurement bandwidth shall be 100 kHz between 30 MHz and 1 GHz and 1 MHz above 1 GHz as given in ITU-R SM.329-89 [412]. The video bandwidth shall be approximately three times the resolution bandwidth. If this video bandwidth is not available on the measuring receiver, it shall be the maximum available and at least 1 MHz.

### A.48.3.1.3 Limits

[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 Recommendations SM.329-9 \[12\] and SM.1539 \[23\].](#)

**A.4.8.3.1.3.1** FDD and 3,84 Mcps TDD option

The BS or the Repeater shall meet the limits below:

**Table 5: Limits for radiated emissions from BS and repeater**

Frequency range	Minimum requirement (e.r.p.)/Reference Bandwidth
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	-36 dBm/100 kHz
$1 \text{ GHz} \leq f < 12,75 \text{ GHz}$	-30 dBm/ 1MHz
$Fc1 - 12,5 \text{ MHz} < f < Fc2 + 12,5 \text{ MHz}$	Not defined

Key:

Fc1: Center frequency of first carrier frequency used by the BS [and repeater](#).

Fc2: Center frequency of last carrier frequency used by the BS [and repeater](#).

**A.4.8.3.1.3.2** 1,28 Mcps TDD option

The BS shall meet the limits below:

**Table 5A: Limits for radiated emissions from BS**

Frequency range	Minimum requirement (e.r.p.)/Reference Bandwidth
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	-36 dBm/100 kHz
$1 \text{ GHz} \leq f < 12,75 \text{ GHz}$	-30 dBm/ 1MHz
$Fc1 - 4 \text{ MHz} < f < Fc2 + 4 \text{ MHz}$	Not defined

Key:

Fc1: Center frequency of first carrier frequency used by the BS.

Fc2: Center frequency of last carrier frequency used by the BS.

**8.3.1.4 Interpretation of the measurement results**

The interpretation of the results recorded in a test report for the radiated emission measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 5B for BS and repeater.

Table 5B specifies the Maximum measurement uncertainty of the Test System. The Test System shall enable the equipment under test to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

**Table 5B: Maximum measurement uncertainty (BS, and Repeater)**

<u>Parameter</u>	<u>Uncertainty for EUT dimension <math>\leq</math> 1 m</u>	<u>Uncertainty for EUT dimension <math>&gt;</math> 1 m</u>
<u>Effective radiated RF power between 30 MHz to 180 MHz</u>	<u><math>\pm 6</math> dB</u>	<u><math>\pm 6</math> dB</u>
<u>Effective radiated RF power between 180 MHz to 4 GHz</u>	<u><math>\pm 4</math> dB</u>	<u><math>\pm 6</math> dB</u>
<u>Effective radiated RF power between 4 GHz to 12,75 GHz</u>	<u><math>\pm 6</math> dB</u>	<u><math>\pm 9^*</math> dB</u>
<u>*Note: This value may be reduced to <math>\pm 6</math> dB when further information on the potential radiation characteristic of the EUT is available.</u>		

NOTE: If the Test System for a test is known to have a measurement uncertainty greater than that specified in table 5B, this equipment can still be used, provided that an adjustment is made follows:

Any additional uncertainty in the Test System over and above that specified in table 5B is used to tighten the Test Requirements - making the test harder to pass. This procedure will ensure that a Test System not compliant with table 5B does not increase the probability of passing an EUT that would otherwise have failed a test if a Test System compliant with table 5B had been used.

### **A.18.3.2 Radiated ~~spurious~~ emission, Ancillary equipment**

This test is applicable to ancillary equipment. This test shall be performed on a representative configuration of the ancillary equipment.

#### **A.18.3.2.1 Definition**

This test assesses the ability of ancillary equipment to limit unwanted emission from the enclosure port.

#### **A.18.3.2.2 Test method**

The test method shall be in accordance with CISPR 22 [413]

#### **A.18.3.2.3 Limits**

The ancillary equipment shall meet the limits according to CISPR 22 [413] (10 m measuring distance) shown in table 2:

**Table 6: Limits for radiated emissions from ancillary equipment, measured on a stand alone basis**

<b>Frequency range</b>	<b>Quasi-peak</b>
30 MHz-230 MHz	30 dB $\mu$ V/m
230 MHz-1000 MHz	37 dB $\mu$ V/m

### **A.18.4 Conducted emission DC power input/output port**

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

If the DC power cable of the radio 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 subclause A.18.5.

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

#### **A.18.4.1 Definition**

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

### A.18.4.2 Test method

The test method shall be in accordance with CISPR 22 [413] and the Artificial Mains Network (AMN) shall be connected to a DC power source.

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

A measuring receiver shall be connected to each AMN measurement port in turn and the conducted emission recorded. The AMN measurement ports not being used for measurement shall be terminated with a 50  $\Omega$ /50  $\mu$ H load.

The equipment shall be installed with a ground plane as defined in CISPR 22 [413]. The reference earth point of the AMNs shall be connected to the reference ground plane with a conductor as short as possible.

The measurement receiver shall be in accordance with the requirements of section one of CISPR 16-1 [514].

### A.18.4.3 Limits

The equipment shall meet the limits below (including the average limit and the quasi-peak limit) when using, respectively, an average detector receiver and a quasi-peak detector receiver and measured in accordance with the method described in subclause A.18.4.2 above. If the average limit is met when using a quasi-peak detector, the equipment shall be deemed to meet both limits and measurement with the average detector receiver is not necessary.

The equipment shall meet the limits given in table 7.

**Table 7: Limits for conducted emissions**

Frequency range	Quasi-peak	Average
>0,15-0,5MHz	79dB $\mu$ V	66dB $\mu$ V
>0,5-30 MHz	73dB $\mu$ V	60dB $\mu$ V

## A.18.5 Conducted emissions, AC mains power input/output port

This test is applicable to equipment powered by the AC mains.

This test is not applicable to AC output ports which are connected directly (or via a circuit breaker) to the AC power port of the EUT.

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

### A.18.5.1 Definition

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

### A.18.5.2 Test method

The test method shall be in accordance with CISPR 22 [413].

Mains connected ancillary equipment which is not part of the EUT shall be connected to the mains via a separate AMN. According to clause 11.9 of CISPR 16-1 [514], the Protective Earth (PE) conductor shall also be terminated by a 50  $\Omega$ /50  $\mu$ H common mode RF impedance.

### A.18.5.3 Limits

The equipment shall meet the limits below (including the average limit and the quasi-peak limit) when using, respectively, an average detector receiver and a quasi-peak detector receiver and measured in accordance with the method described in subclause A.18.5.2 above. If the average limit is met when using a quasi-peak detector, the equipment shall be deemed to meet both limits and measurement with the average detector receiver is not necessary.

**Table 8: Limits for conducted emissions**

Frequency range	Quasi-peak	Average
> 0,15-0,5 MHz	66 - 56 dB $\mu$ V	56 - 46 dB $\mu$ V
> 0,5- 5 MHz	56 dB $\mu$ V	46 dB $\mu$ V
> 5-30 MHz	60 dB $\mu$ V	50 dB $\mu$ V
NOTE:	The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.	

Alternatively, for equipment intended to be used in telecommunication centres the limits given in table 409 shall be used.

**Table 9: Limits for conducted emissions**

Frequency range	Quasi-peak	Average
>0,15-0,5MHz	79dB $\mu$ V	66dB $\mu$ V
>0,5-30 MHz	73dB $\mu$ V	60dB $\mu$ V

## A.18.6 Harmonic Current emissions (AC mains input port)

The requirements of IEC 61000-3-2 [615] for harmonic current emission apply for equipment covered by the scope of the present document.

## A.18.7 Voltage fluctuations and flicker (AC mains input port)

The requirements of IEC 61000-3-3 [716] for voltage fluctuations and flicker apply for equipment covered by the scope of the present document.

## 8.8 Telecommunication ports

This test is applicable for radio equipment and/or ancillary equipment for fixed use which have telecommunication ports.

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

### 8.8.1 Definition

This test assesses the EUT unwanted emission present at the telecommunication ports.

### 8.8.2 Test method

The test method shall be in accordance with CISPR 22 [13]

The measurement frequency range extends from 150 kHz to 30 MHz. When the EUT is a transmitter operating at frequencies below 30 MHz, then the exclusion band for transmitters applies (see subclause 4.5) for measurements in the transmit mode of operation.

## 8.8.3 Limits

The telecommunication ports shall meet the limits according to CISPR 22 [13] shown in table 10.

**Table 10: Limits for conducted emissions from telecommunication ports**

Frequency range MHz	Voltage limits dB (µV)		Current limits dB (µA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.5	84 to 74	74 to 64	40 to 30	30 to 20
0.5 to 30	74	64	30	20

NOTE 1: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.  
NOTE 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is  $20 \log_{10} 150/I = 44$  dB).

Alternatively, for equipment intended to be used in telecommunication centres only, the limits given in table 11 may be used.

**Table 11: Limits for conducted emissions from telecommunication ports of equipment intended for use in telecommunication centres only**

Frequency range MHz	Voltage limits dB (µV)		Current limits dB (µA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.5	97 to 87	84 to 74	53 to 43	40 to 30
0.5 to 30	87	74	43	30

NOTE 1: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.  
NOTE 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN), which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is  $20 \log_{10} 150/I = 44$  dB).

## A.29 Immunity

### A.29.1 Test methods and levels for immunity tests

### A.29.2 Test configurations

This subclause defines the configurations for immunity tests as follows:

- the equipment shall be tested under normal test conditions as specified in the functional standards;
- the test configuration shall be as close to normal intended use as possible;
- if the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- if the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are tested;
- the test conditions, test configuration and mode of operation shall be recorded in the test report;
- ports which in normal operation are connected shall be connected to an ancillary equipment or to a representative piece of cable correctly terminated to simulate the input/output characteristics of the ancillary equipment, Radio Frequency (RF) input/output ports shall be correctly terminated;



- ports which are not connected to cables during normal operation, e.g. service connectors, programming connectors, temporary connectors etc. shall not be connected to any cables for the purpose of EMC testing. Where cables have to be connected to these ports, or interconnecting cables have to be extended in length in order to exercise the EUT, precautions shall be taken to ensure that the evaluation of the EUT is not affected by the addition or extension of these cables;
- Immunity tests on the entire base station shall be performed by establishing communication links at the air-interface (e.g. with the mobile simulator) and the Iub-interface (e.g. with an RNC simulator) and evaluating the BLER (see figure A.42);
- Immunity tests shall be performed on both the Uplink and Downlink paths. The tests shall also include both the air-interface and Iub-interface. BLER evaluation may be carried out at either interface, where appropriate, and the measurements for the Uplink and Downlink paths may be carried out as a single path looped at either the air-interface or Iub-interface. In case of looping is used care have to be taken that the BLER information doesn't change due to looping. The BLER evaluation shall be based on the number of transmitted blocks i.e including possible deleted blocks.

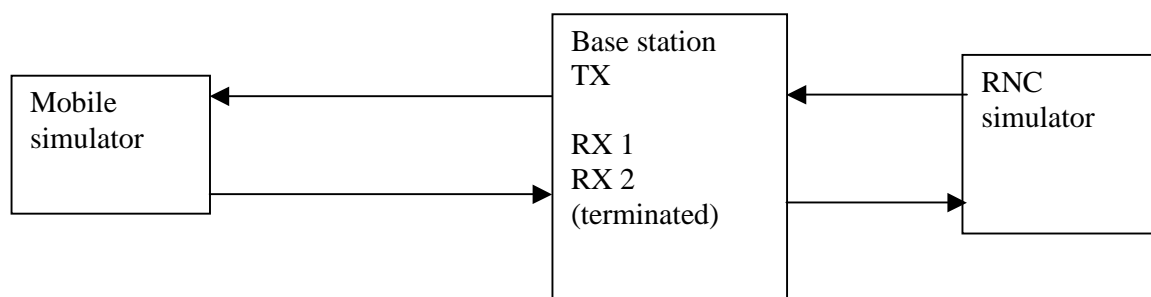


Figure A.42: Communication link set up for BS immunity measurement

### A.29.3 RF electromagnetic field (80 MHz - 1000 MHz, 1400 MHz to 2000 MHz)

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

#### A.29.3.1 Definition

This test assesses the ability of radio equipment and ancillary equipment to operate as intended in the presence of a radio frequency electromagnetic field disturbance at the enclosure.

#### A.29.3.2 Test method and level

The test method shall be in accordance with IEC 61000-4-3 [918]:

- for transmitters, receivers and transceivers the following requirements shall apply:
- the test level shall be 3 V/m amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 kHz;
- the stepped frequency increments shall be 1 % of the momentary frequency;
- the test shall be performed over the frequency range 80 MHz - 1 000 MHz; and 1400 MHz - 2000 MHz;
- responses in stand alone receivers or receivers which are part of transceivers occurring at discrete frequencies which are narrow band responses, shall be disregarded, see subclause 4.3;
- the frequencies selected during the test shall be recorded in the test report.

### A.29.3.3 Performance criteria

**Base station:**

The performance criteria of subclause 6.1 shall apply.

**Ancillary equipment:**

The performance criteria of subclause 6.4 shall apply.

**Repeater:**

The performance criteria of subclause 6.7 shall apply.

### A.29.4 Electrostatic discharge

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

#### A.29.4.1 Definition

This test assesses the ability of radio equipment and ancillary equipment to operate as intended in the event of an electrostatic discharge.

#### A.29.4.2 Test method and level

The test method shall be in accordance with IEC 61000-4-2 [817]:

- for contact discharge, the equipment shall pass at  $\pm 2$  kV and  $\pm 4$  kV;
- for air discharge shall pass at  $\pm 2$  kV,  $\pm 4$  kV and  $\pm 8$  kV;
- electrostatic discharge shall be applied to all exposed surfaces of the EUT except where the user documentation specially indicates a requirement for appropriate protective measures.

NOTE: Ensure that the EUT is fully discharged between each ESD exposure.

#### A.29.4.3 Performance criteria

**Base station:**

The performance criteria of subclause 6.2 shall apply.

**Ancillary equipment:**

The performance criteria of subclause 6.5 shall apply.

**Repeater:**

The performance criteria of subclause 6.8 shall apply.

### A.29.5 Fast transients common mode

The test shall be performed on AC mains power input ports.

This test shall be performed on signal ports, telecommunication ports, control ports and DC power input/output ports if the cables may be longer than 3 m.

Where this test is not carried out on a port or any other ports because the manufacturer declares that it is not intended to be used with cables longer than 3 m, a list of ports which were not tested for this reason shall be included in the test report.

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

### A.29.5.1 Definition

This test assesses the ability of radio equipment and ancillary equipment to operate as intended in the event of fast transients present on one of the input/output ports.

### A.29.5.2 Test method and level

The test method shall be in accordance with IEC 61000-4-4 [4019]:

- the test level for signal ports, telecommunication ports and control ports shall be 0,5 kV open circuit voltage as given in IEC 61000-4-4 [4019];
- the test level for DC power input/output ports shall be 0.5 kV open circuit voltage as given in IEC 61000-4-4 [4019];
- the test level for AC mains power input ports shall be 1 kV open circuit voltage as given in IEC 61000-4-4 [4019].

For AC and DC power input ports the transients shall be applied (in parallel) to all the conductors in the cable with reference to the cabinet reference earth (true common mode) and the source impedance shall be 50  $\Omega$ .

### A.29.5.3 Performance criteria

#### Base station:

The performance criteria of subclause 6.2 shall apply.

#### Ancillary equipment:

The performance criteria of subclause 6.5 shall apply.

#### Repeater:

The performance criteria of subclause 6.8 shall apply.

## A.29.6 RF common mode (0,15 MHz - 80 MHz)

The test shall be performed on AC mains power input/output ports.

This test shall be performed on signal ports, telecommunication ports, control and DC power input/output ports, which may have cables longer than 3 m.

Where this test is not carried out on a port or any other ports because the manufacturer declares that it is not intended to be used with cables longer than stated above, a list of ports which were not tested shall be included in the test report.

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

NOTE: This test can also be performed using the intrusive method, where appropriate, see IEC 61000-4-6 [4221].

### A.29.6.1 Definition

This test assesses the ability of radio equipment and ancillary equipment to operate as intended in the presence of a radio frequency electromagnetic disturbance.

### A.29.6.2 Test method and level

The test method shall be in accordance with IEC 61000-4-6 [4221]:

- 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 50 kHz in the frequency range 150 kHz to 5 MHz and 1% frequency increment of the momentary frequency in the frequency range 5 MHz to 80 MHz.
- the test level shall be severity level 2 as given in IEC 61000-4-6 [~~42~~21] corresponding to 3 V rms, at a transfer impedance of 150 Ω;
- the test shall be performed over the frequency range 150 kHz - 80 MHz;
- the injection method to be used shall be selected according to the basic standard IEC 61000-4-6 [~~42~~21];
- 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 subclause 4.3;
- the frequencies of the immunity test signal selected and used during the test shall be recorded in the test report.

### A.29.6.3 Performance criteria

#### Base station:

The performance criteria of subclause 6.1 shall apply.

#### Ancillary equipment:

The performance criteria of subclause 6.4 shall apply.

#### Repeater:

The performance criteria of subclause 6.7 shall apply.

## A.29.7 Voltage dips and interruptions

The tests shall be performed on AC mains power input ports.

These tests shall be performed on a representative configuration of the equipment, the associated ancillary equipment, or representative configuration of the combination of radio and ancillary equipment.

### A.29.7.1 Definition

These tests assess the ability of radio equipment and ancillary equipment to operate as intended in the event of voltage dips and interruptions present on the AC mains power input ports.

### A.29.7.2 Test method and level

The following requirements shall apply.

The test method shall be in accordance with IEC 61000-4-11 [~~43~~22].

The test levels shall be:

- a voltage dip corresponding to a reduction of the supply voltage of 30 % for 10 ms;
- a voltage dip corresponding to a reduction of the supply voltage of 60 % for 100 ms;
- a voltage interruption corresponding to a reduction of the supply voltage of > 95 % for 5 000 ms.

### A.29.7.3 Performance criteria

For a voltage dip corresponding to a reduction of the supply voltage of 30 % for 10 ms the performance criteria of subclause 6.2 shall apply for base station and performance criteria of subclause 6.5 for ancillary equipment and performance criteria of subclause 6.8 for repeater.

For a voltage dip corresponding to a reduction of the supply voltage of 60 % for 100 ms and/or a voltage interruption corresponding to a reduction of the supply voltage of > 95 % for 5 000 ms the performance criteria of subclause 6.3 shall apply for base station, performance criteria of subclause 6.6 for ancillary equipment and performance criteria of subclause 6.9 for repeater with following exception:

- in the case where the equipment is powered solely from the AC mains supply (without the use of a parallel battery back-up the communications link need not be maintained and may have to be re-established and volatile user data may have been lost.

In the event of loss of the communications link or in the event of loss of user data, this fact shall be recorded in the test report, the product description and the user documentation.

## A.29.8 Surges, common and differential mode

The tests shall be performed on AC mains power input ports.

This test shall be additionally performed on telecommunication ports.

These tests shall be performed on a representative configuration of the equipment, the associated ancillary equipment, or representative configuration of the combination of radio and ancillary equipment.

### A.29.8.1 Definition

These tests assess the ability of radio equipment and ancillary equipment to operate as intended in the event of surges being present at the AC mains power input ports.

### A.29.8.2 Test method and level

The test method shall be in accordance with IEC 61000-4-5 [~~+~~20].

The following requirements and evaluation of test results shall apply:

- the test levels for telecommunication ports, intended to be directly connected to a telecommunication network, shall be 0,5 kV line to ground as given in IEC 61000-4-5. In this case the total output impedance of the surge generator shall be in accordance with the basic standard IEC 61000-4-5.
- the test level for ac mains power input ports shall be 1 kV line to earth and 0,5 kV line to line with the output impedance of the surge generator as given in the IEC61000-4-5 [~~+~~20];
- the test generator shall provide the 1,2/50 (8/20) $\mu$ sec pulse as defined in IEC 61000-4-5 [~~+~~20].

### A.29.8.3 Performance criteria

#### Base station:

The performance criteria of subclause 6.2 shall apply.

#### Ancillary equipment:

The performance criteria of subclause 6.5 shall apply.

#### Repeater:

The performance criteria of subclause 6.8 shall apply.

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## A.3 ~~References~~

~~This Annex incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text of annex A and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this specification only when~~

incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] ~~ITU R Rec. SM.329-8: "Spurious emissions"~~
- [2] ~~(see reference [3] of clause 2 above)~~
- [3] ~~(see reference [4] of clause 2 above)~~
- [4] ~~CISPR 22 (1997): "Limits and methods of measurement of radio disturbance characteristics of information technology equipment".~~
- [5] ~~CISPR 16-1 (1993): "Specification for radio disturbance and immunity measuring apparatus and methods".~~
- [6] ~~IEC 61000-3-2 (1995): "Electromagnetic compatibility (EMC) - Part 3: Limits - Section 2: Limits for harmonic current emissions (equipment input current  $\leq 16$  A)".~~
- [7] ~~IEC 61000-3-3 (1995): "Electromagnetic compatibility (EMC) - Part 3: Limits - Section 3: Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current  $\leq 16$  A".~~
- [8] ~~IEC 61000-4-2 (1995): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test".~~
- [9] ~~IEC 61000-4-3 (1995): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3: Radiated, radio frequency electromagnetic field immunity test".~~
- [10] ~~IEC 61000-4-4 (1995): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test".~~
- [11] ~~IEC 61000-4-5 (1995): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test".~~
- [12] ~~IEC 61000-4-6 (1996): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to contacted disturbances, induced by radio frequency fields".~~
- [13] ~~IEC 61000-4-11 (1994): "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 11: Voltage dips, short interruptions and voltage variations. Immunity tests".~~

## CHANGE REQUEST

⌘ **25.113 CR 019** ⌘ rev **1** ⌘ Current version: **5.2.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘	New exclusion bands, requirements for telecommunication port and interpretation of measurement results	
<b>Source:</b>	⌘	RAN WG4	
<b>Work item code:</b>	⌘	TEI4	<b>Date:</b> ⌘ 26/11/2002
<b>Category:</b>	⌘	<b>A</b>	<b>Release:</b> ⌘ Rel-5
		Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
		<b>F</b> (correction)	2 (GSM Phase 2)
		<b>A</b> (corresponds to a correction in an earlier release)	R96 (Release 1996)
		<b>B</b> (addition of feature),	R97 (Release 1997)
		<b>C</b> (functional modification of feature)	R98 (Release 1998)
		<b>D</b> (editorial modification)	R99 (Release 1999)
		Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

<b>Reason for change:</b>	⌘	This CR proposes to update the current 3GPP EMC specification according to the changes in respective basic EMC standards.
<b>Summary of change:</b>	⌘	The updates are to: <ol style="list-style-type: none"> <li>1. Introduce a clause about the exclusion bands and extend the frequency range for radiated immunity.</li> <li>2. Include the limit and test for conducted emissions from telecommunication ports.</li> <li>3. Modify measurement uncertainty for radiated emissions test.</li> </ol>
<b>Consequences if not approved:</b>	⌘	The EMC specification would not be aligned with the basic EMC standards.  <u>Isolated impact analysis:</u> Would not affect a BS that meets the basic EMC standards.

<b>Clauses affected:</b>	⌘	2, 4.5, 7, 8.3.1.3, 8.3.1.4, 8.8, 9.2, 9.3								
<b>Other specs affected:</b>	⌘	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N		X		X		X
Y	N									
	X									
	X									
	X									
<b>Other comments:</b>	⌘	Equivalent CRs in other Releases: CR018r1 cat. F to 25.113 v4.3.0								

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## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 25.104: "UTRA (BS) FDD; Radio transmission and reception".
- [2] 3GPP TS 25.105: "UTRA (BS) TDD; Radio transmission and reception".
- [3] 3GPP TS 25.141: "UTRA (BS) FDD; Base station conformance testing (FDD)".
- [4] 3GPP TS 25.142: "UTRA (BS) TDD; Base station conformance testing (TDD)".
- [5] IEC 61000-6-1: 1997; "Electromagnetic compatibility (EMC) – Part 6: Generic standards – Section 1: Immunity for residential, commercial and light-industrial environments".
- [6] IEC 61000-6-3: 1996; "Electromagnetic compatibility (EMC) – Part 6: Generic standards – Section 3: mission standard for residential, commercial and light industrial environments".
- [7] IEC 60050(161): "International Electrotechnical Vocabulary - Chapter 161: Electromagnetic compatibility".
- [8] 3GPP TS 25.101: "UTRA (UE) FDD; UE Radio transmission and reception (FDD)".
- [9] 3GPP TS 25.102: "UTRA (UE) TDD; UE Radio transmission and reception (TDD)".
- [10] 3GPP TS 25.106: "UTRA Repeater; Radio Transmission and Reception".
- [11] 3GPP TS 25.143: "UTRA Repeater conformance testing".
- [12] ITU-R Rec. SM.329-9: "Spurious emissions".
- [13] CISPR 22 (~~1997~~): "Limits and methods of measurement of radio disturbance characteristics of information technology equipment".
- [14] CISPR 16-1 (~~1993~~): "Specification for radio disturbance and immunity measuring apparatus and methods".
- [15] IEC 61000-3-2 (2000): "Electromagnetic compatibility (EMC) - Part 3: Limits – Section 2: Limits for harmonic current emissions (equipment input current  $\leq 16$  A)".
- [16] IEC 61000-3-3 (1995): "Electromagnetic compatibility (EMC) - Part 3: Limits – Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current  $\leq 16$  A".
- [17] IEC 61000-4-2: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test".
- [18] IEC 61000-4-3: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency electromagnetic field immunity test".
- [19] IEC 61000-4-4: "Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques – Section 4: Electrical fast transient/burst immunity test".



- [20] IEC 61000-4-5: " Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques – Section 5: Surge immunity test".
- [21] IEC 61000-4-6: " Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques – Section 6: Immunity to contacted disturbances, induced by radio frequency fields".
- [22] IEC 61000-4-11 : " Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques – Section 11: Voltage dips, short interruptions and voltage variations. Immunity tests".
- [23] [ITU-R Recommendation SM.1539 \(2001\): "Variation of the boundary between the out-of-band and spurious domains required for the application of Recommendations ITU-R SM.1541 and ITU-R SM.329"](#).
- [24] [3GPP TR 21,905: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Vocabulary for 3GPP Specifications"](#).

### 3.3 Abbreviations

For the purposes of the present document, the following abbreviations [given in TR 25.905 \[24\]](#) and the following apply:

AC	Alternating Current
AMN	Artificial Mains Network
DC	Direct Current
EMC	Electromagnetic Compatibility
ESD	Electrostatic discharge
EUT	Equipment Under Test
RF	Radio frequency
rms	root mean square
UTRA	Universal Terrestrial Radio Access

## 4.5 Exclusion bands

### 4.5.1 Transmitter exclusion band

In the frequency bands including in band emissions and out of band emissions are covered by the RF spectral mask specification and need no further consideration:

For the purpose of EMC specifications this shall be the transmitter exclusion band from:

For UTRA FDD and 3,84 Mcps TDD option:

Lower carrier frequency - 12,5 MHz. to upper carrier frequency + 12,5 MHz.

For 1,28 Mcps TDD option:

Lower carrier frequency - 4 MHz to upper carrier frequency + 4 MHz.

### 4.5.2 Receiver exclusion band

The receiver exclusion band for base stations extends from the lower frequency of the allocated receiver band minus 20 MHz to the upper frequency of the allocated receiver band plus 20 MHz. The exclusion bands are as set out below:

#### UTRA/FDD

(a) 1900 MHz to 2000 MHz (Band I)

(b) 1830 MHz to 1930 MHz (Band II)

(b) 1690 MHz to 1805 MHz (Band III)

#### UTRA/TDD

(a) 1880 MHz to 1940 MHz

1990 MHz to 2045 MHz

(b) 1830 MHz to 2010 MHz (ITU-R, Region 2)

(c) 1890 MHz to 1950 MHz (ITU-R, Region 2)

## 7 Applicability overview

### 7.1 Emission

Table 3: Emission applicability

Phenomenon	Application	Equipment test requirement			Reference subclause in the present document	Reference Standard
		BS equipment	Ancillary equipment	Repeater		
Radiated emission	Enclosure	applicable		applicable	8.3.1	ITU-R SM.329-9 [12]
Radiated emission	Enclosure		applicable		8.3.2	CISPR 22 [13]
Conducted emission	DC power input/output port	applicable	applicable	applicable	8.4	CISPR 22 [13], CISPR 16-1 [14]
Conducted emission	AC mains input/output port	applicable	applicable	applicable	8.5	CISPR 22 [13]
Harmonic current emissions	AC mains input port	applicable	applicable	applicable	8.6	IEC 61000-3-2 [15]
Voltage fluctuations and flicker	AC mains input port	applicable	applicable	applicable	8.7	IEC 61000-3-3 [16]
<a href="#">Conducted emission</a>	<a href="#">Telecommunication port</a>	<a href="#">applicable</a>	<a href="#">applicable</a>	<a href="#">applicable</a>	<a href="#">8.8</a>	<a href="#">CISPR 22 [13]</a>

NOTE: spurious emissions from antenna connector shall be measured according to TS 25.141 [3] and TS 25.142 [4] and TS 25.143 [11].

### 7.2 Immunity

Table 4: Immunity applicability

Phenomenon	Application	Equipment test requirement			Reference subclause in the present document	Reference standard
		BS equipment	Ancillary equipment	Repeater		
RF electromagnetic field (80 - 42000 MHz)	Enclosure	applicable	applicable	applicable	<a href="#">9.3</a>	IEC 61000-4-3 [18]
Electrostatic discharge	Enclosure	applicable	applicable	applicable	<a href="#">9.4</a>	IEC 61000-4-2 [17]
Fast transients common mode	Signal, telecommunications and control ports, DC and AC power input ports	applicable	applicable	applicable	9.5	IEC 61000-4-4 [19]
RF common mode 0,15 - 80 MHz	Signal, telecommunications and control ports, DC and AC power input ports	applicable	applicable	applicable	<a href="#">9.6</a>	IEC 61000-4-6 [21]
Voltage dips and interruptions	AC mains power input ports	applicable	applicable	applicable	<a href="#">9.7</a>	IEC 61000-4-11
Surges, common and differential mode	AC power input ports and telecommunications port	applicable	applicable	applicable	<a href="#">9.8</a>	IEC 61000-4-5 [20]

### 8.3.1.3 Limits

[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 Recommendations SM.329-9 \[12\] and SM.1539 \[23\].](#)

#### 8.3.1.3.1 FDD and 3,84 Mcps TDD option

The BS or the Repeater shall meet the limits below:

**Table 5: Limits for radiated emissions from BS and repeater**

Frequency range	Minimum requirement (e.r.p.)/Reference Bandwidth
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	-36 dBm/100 kHz
$1 \text{ GHz} \leq f < 12,75 \text{ GHz}$	-30 dBm/ 1MHz
$Fc1 - 12,5 \text{ MHz} < f < Fc2 + 12,5 \text{ MHz}$	Not defined

Key:

Fc1: Center frequency of first carrier frequency used by the BS [and repeater](#).

Fc2: Center frequency of last carrier frequency used by the BS [and repeater](#).

#### 8.3.1.3.2 1,28 Mcps TDD option

The BS shall meet the limits below:

**Table 5A: Limits for radiated emissions from BS**

Frequency range	Minimum requirement (e.r.p.)/Reference Bandwidth
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	-36 dBm/100 kHz
$1 \text{ GHz} \leq f < 12,75 \text{ GHz}$	-30 dBm/ 1MHz
$Fc1 - 4 \text{ MHz} < f < Fc2 + 4 \text{ MHz}$	Not defined

Key:

Fc1: Center frequency of first carrier frequency used by the BS.

Fc2: Center frequency of last carrier frequency used by the BS.

### [8.3.1.4 Interpretation of the measurement results](#)

[The interpretation of the results recorded in a test report for the radiated emission measurements described in the present document shall be as follows:](#)

- [the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;](#)
- [the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;](#)
- [the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 5B for BS and repeater.](#)

[Table 5B specifies the Maximum measurement uncertainty of the Test System. The Test System shall enable the equipment under test to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.](#)

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

**Table 5B: Maximum measurement uncertainty (BS, and Repeater)**

<u>Parameter</u>	<u>Uncertainty for EUT dimension <math>\leq</math> 1 m</u>	<u>Uncertainty for EUT dimension <math>&gt;</math>1 m</u>
<u>Effective radiated RF power between 30 MHz to 180 MHz</u>	<u><math>\pm</math>6 dB</u>	<u><math>\pm</math>6 dB</u>
<u>Effective radiated RF power between 180 MHz to 4 GHz</u>	<u><math>\pm</math>4 dB</u>	<u><math>\pm</math>6 dB</u>
<u>Effective radiated RF power between 4 GHz to 12,75 GHz</u>	<u><math>\pm</math>6 dB</u>	<u><math>\pm</math>9* dB</u>
<u>*Note: This value may be reduced to <math>\pm</math>6 dB when further information on the potential radiation characteristic of the EUT is available.</u>		

NOTE: If the Test System for a test is known to have a measurement uncertainty greater than that specified in table 5B, this equipment can still be used, provided that an adjustment is made follows:

Any additional uncertainty in the Test System over and above that specified in table 5B is used to tighten the Test Requirements - making the test harder to pass. This procedure will ensure that a Test System not compliant with table 5B does not increase the probability of passing an EUT that would otherwise have failed a test if a Test System compliant with table 5B had been used.

## 8.8 Telecommunication ports

This test is applicable for radio equipment and/or ancillary equipment for fixed use which have telecommunication ports.

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

### 8.8.1 Definition

This test assesses the EUT unwanted emission present at the telecommunication ports.

### 8.8.2 Test method

The test method shall be in accordance with CISPR 22 [13]

The measurement frequency range extends from 150 kHz to 30 MHz. When the EUT is a transmitter operating at frequencies below 30 MHz, then the exclusion band for transmitters applies (see subclause 4.5.3) for measurements in the transmit mode of operation.

### 8.8.3 Limits

The telecommunication ports shall meet the limits according to CISPR 22 [13] shown in table 10.

**Table 10: Limits for conducted emissions from telecommunication ports**

Frequency range MHz	Voltage limits dB (µV)		Current limits dB (µA)	
	Quasi-peak	Average	Quasi-peak	Average
0,15 to 0,5	84 to 74	74 to 64	40 to 30	30 to 20
0,5 to 30	74	64	30	20

NOTE 1: The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz.  
NOTE 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN) which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is  $20 \log_{10} 150/I = 44$  dB).

Alternatively, for equipment intended to be used in telecommunication centres only, the limits given in table 11 may be used.

**Table 11: Limits for conducted emissions from telecommunication ports of equipment intended for use in telecommunication centres only**

Frequency range MHz	Voltage limits dB (µV)		Current limits dB (µA)	
	Quasi-peak	Average	Quasi-peak	Average
0,15 to 0,5	97 to 87	84 to 74	53 to 43	40 to 30
0,5 to 30	87	74	43	30

NOTE 1: The limits decrease linearly with the logarithm of the frequency in the range 0,15 MHz to 0,5 MHz.  
NOTE 2: The current and voltage disturbance limits are derived for use with an impedance stabilization network (ISN), which presents a common mode (asymmetric mode) impedance of 150 Ω to the telecommunication port under test (conversion factor is  $20 \log_{10} 150/I = 44$  dB).

## 9.2 Test configurations

This subclause defines the configurations for immunity tests as follows:

- the equipment shall be tested under normal test conditions as specified in the functional standards;
- the test configuration shall be as close to normal intended use as possible;
- if the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- if the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are tested;
- the test conditions, test configuration and mode of operation shall be recorded in the test report;
- ports which in normal operation are connected shall be connected to an ancillary equipment or to a representative piece of cable correctly terminated to simulate the input/output characteristics of the ancillary equipment, Radio Frequency (RF) input/output ports shall be correctly terminated;
- ports which are not connected to cables during normal operation, e.g. service connectors, programming connectors, temporary connectors etc. shall not be connected to any cables for the purpose of EMC testing. Where cables have to be connected to these ports, or interconnecting cables have to be extended in length in order to exercise the EUT, precautions shall be taken to ensure that the evaluation of the EUT is not affected by the addition or extension of these cables;
- Immunity tests on the entire base station shall be performed by establishing communication links at the air-interface (e.g. with the mobile simulator) and the Iub-interface (e.g. with an RNC simulator) and evaluating the BLER (see figure 42);
- Immunity tests shall be performed on both the Uplink and Downlink paths. The tests shall also include both the air-interface and Iub-interface. BLER evaluation may be carried out at either interface, where appropriate, and the measurements for the Uplink and Downlink paths may be carried out as a single path looped at either the air-interface or Iub-interface. In case of looping is used care have to be taken that the BLER information doesn't change due to looping. The BLER evaluation shall be based on the number of transmitted blocks i.e including possible deleted blocks.

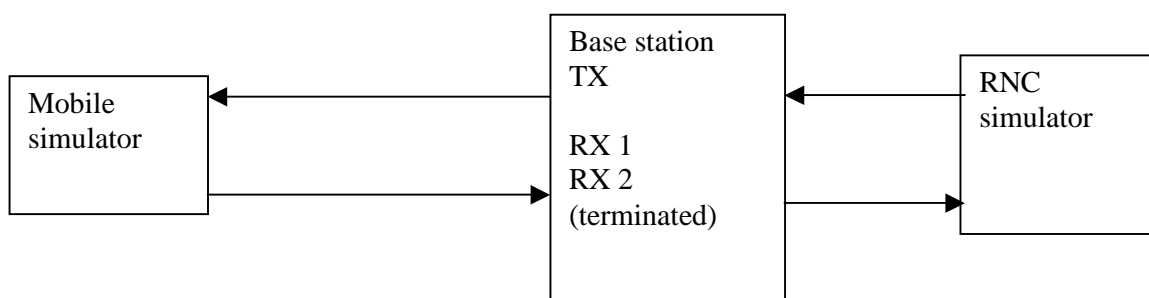


Figure 2: Communication link set up for BS immunity measurement

## 9.3 RF electromagnetic field (80 MHz - 1000 MHz, [1400 MHz to 2000 MHz](#))

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



### 9.3.1 Definition

This test assesses the ability of radio equipment and ancillary equipment to operate as intended in the presence of a radio frequency electromagnetic field disturbance at the enclosure.

### 9.3.2 Test method and level

The test method shall be in accordance with IEC 61000-4-3 [18]:

- for transmitters, receivers and transceivers the following requirements shall apply:
- the test level shall be 3 V/m amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 kHz;
- the stepped frequency increments shall be 1 % of the momentary frequency;
- the test shall be performed over the frequency range 80 MHz - 1 000 MHz and 1400 MHz - 2000 MHz;
- responses in stand alone receivers or receivers which are part of transceivers occurring at discrete frequencies which are narrow band responses, shall be disregarded, see subclause 4.3;
- the frequencies selected during the test shall be recorded in the test report.

## CHANGE REQUEST

⌘ **34.124 CR 009** ⌘ rev ⌘ Current version: **4.0.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘	New exclusion bands and interpretation of measurement results
<b>Source:</b>	⌘	RAN WG4
<b>Work item code:</b>	⌘	TEI4
		<b>Date:</b> ⌘ 26/11/2002
<b>Category:</b>	⌘	<b>F</b>
		Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.
		<b>Release:</b> ⌘ Rel-4
		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

<b>Reason for change:</b>	⌘	This CR proposes to update the current 3GPP EMC specification according to the changes in respective basic EMC standards.
<b>Summary of change:</b>	⌘	The updates are to: 1. Introduce a clause about the exclusion bands and extend the frequency range for radiated immunity. 2. Modify measurement uncertainty for radiated emissions test. 3. References are updated
<b>Consequences if not approved:</b>	⌘	The EMC specification would not be aligned with the basic EMC standards.  <u>Isolated impact analysis:</u> Would not affect a UE that meets the basic EMC standards.

<b>Clauses affected:</b>	⌘	2, 3, 4.4, 7, 8.2.2, 8.2.3, 8.2.4, 9.2								
<b>Other specs affected:</b>	⌘	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px;">Y</td> <td style="width: 20px;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N		X		X		X
Y	N									
	X									
	X									
	X									
<b>Other comments:</b>	⌘	Changes from the already approved CR 8 for Rel-5 have also been incorporated into this CR. Those changes correspond to point 3 in the "Summary of change". Equivalent CRs in other Releases: CR010 cat. A to 34.124 v5.1.0								

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## 2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific;
- for a specific reference, subsequent revisions do not apply;
- for a non-specific reference, subsequent revisions do apply. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 25.113: "3<sup>rd</sup> Generation Partnership Project; Technical Specification Group (TSG) RAN WG4; Base station EMC".
- [2] 3GPP TS 34.121: "3<sup>rd</sup> Generation Partnership Project; Technical Specification Group (TSG) T WG1; Terminal Conformance Specification; Radio transmission and reception (FDD)".
- [3] 3GPP TS 34.122: "3<sup>rd</sup> Generation Partnership Project; Technical Specification Group (TSG) T WG1; Terminal Conformance Specification; Radio transmission and reception (TDD)".
- [4] IEC 61000-6-1 (1997): "Electromagnetic compatibility (EMC) – Part 6: Generic standards - Section 1: Immunity standard for residential, commercial and light-industrial environments".
- [5] IEC 61000-6-3 (1996): "Electromagnetic compatibility (EMC) – Part 6: Generic standards - Section 3: Emission standard for residential, commercial and light-industrial environments".
- [6] ISO 7637-1 (1990): "Road vehicles - Electrical disturbance by conduction and coupling - Part 1: Passenger cars and light commercial vehicles with nominal 12 V supply voltage - Electrical transient conduction along supply lines only".
- [7] ISO 7637-2 (1990): "Road vehicles - Electrical disturbance by conduction and coupling - Part 2: Commercial vehicles with nominal 24 V supply voltage - Electrical transient conduction along supply lines only".
- [8] 3GPP TR 25.990; 3<sup>rd</sup> Generation Partnership Project; Technical Specification Group Radio Access Network (RAN); Vocabulary  
3GPP TR 21 905: "3<sup>rd</sup> Generation Partnership Project; Technical Specification Group Services and System Aspects; Vocabulary for 3GPP specifications".
- [9] IEC 60050(161)-~~(1998)~~: "International Electrotechnical Vocabulary - Chapter 161: Electromagnetic compatibility".
- [10] 3GPP TS 34.108: "3<sup>rd</sup> Generation Partnership Project (3GPP); Technical Specification Group (TSG) Terminal; Common test environments for user equipment (UE). Conformance Testing".
- [11] ITU-R Recommendation SM.329-89: "Spurious emissions".
- [12] 3GPP TS 25.101: "3<sup>rd</sup> Generation Partnership Project (3GPP); Technical Specification Group (TSG) RAN WG4; UTRA (UE) FDD; Radio transmission and Reception".
- [13] 3GPP TS 25.102: "3<sup>rd</sup> Generation Partnership Project (3GPP); Technical Specification Group (TSG) RAN WG4; UTRA (UE) TDD; Radio transmission and Reception".
- [14] IEC CISPR publication 22; ~~3<sup>rd</sup> edition (1997-11)~~: "Information technology equipment; Radio disturbance characteristics – Limits and methods of measurement".
- [15] 3GPP TS 34.109: "3<sup>rd</sup> Generation Partnership Project (3GPP); Technical Specification Group (TSG) Terminal. Terminal Logical Test Interface; Special conformance testing functions".

- [16] IEC CISPR publication 16-1; ~~(1993); Radio disturbance and immunity measuring apparatus"; Am.1 (1997);~~ "Specification for radio disturbance and immunity measuring apparatus and methods".
- [17] IEC 61000-3-2; ~~(1995-03-2000);~~ "Electromagnetic compatibility; Part 3 - Limits; section 2 – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)"; Am.1 (1997-09)".
- [18] IEC 61000-3-3; ~~(1994-12-1995);~~ "Electromagnetic compatibility; Part 3 - Limits; section 2 – Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current  $\leq 16$  A"
- [19] IEC 61000-4-2: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 2: Electrostatic discharge immunity test – Basic EMC publication".
- [20] IEC 61000-4-3: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 3: Radiated, radio-frequency electromagnetic field immunity test".
- [21] IEC 61000-4-4: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 4: Electrical fast transient/burst immunity test – Basic EMC publication".
- [22] IEC 61000-4-5: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 5: Surge immunity test".
- [23] IEC 61000-4-6: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 6: immunity to conducted disturbances induced by radio frequency fields".
- [24] IEC 61000-4-11: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 11: Voltage dips, short interruptions, and voltage variations immunity test".
- [25] ETR 027 (1991): "Radio Equipment and Systems (RES); Methods of measurement for private mobile radio equipment".
- [26] ITU-T Recommendation P.64: "Telephone transmission quality, Telephone installations, Local line networks, Objective electro-acoustical measurements. Determination of sensitivity/frequency characteristics of local telephone systems".
- [27] ITU-T Recommendation P.76: "Telephone transmission quality, Measurements related to speech loudness, Determination of loudness ratings; Fundamental principles, Annex A".
- [28] ITU-R Recommendation SM.1539 (2001): "Variation of the boundary between the out-of-band and spurious domains required for the application of Recommendations ITU-R SM.1541 and ITU-R SM.329".

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

**Ancillary equipment:** Equipment (apparatus), used in connection with a user equipment (UE) is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a UE to provide additional operational and/or control features to the UE, (e.g. to extend control to another position or location); and
- the equipment cannot be used on a stand alone basis to provide user functions independently of a UE; and
- the UE to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

**BLER (Block Error Ratio):** BLER is block error ratio. The BLER calculation shall be based on evaluating the CRC on each transport block .

**Camped on a cell:** The UE is in idle mode and has completed the cell selection/reselection process and has chosen a cell. The UE monitors system information and (in most cases) paging information. Note that the services may be limited, and that the PLMN may not be aware of the existence of the UE within the chosen cell.

**Continuous phenomena (continuous disturbance):** Electromagnetic disturbance, the effects of which on a particular device or equipment cannot be resolved into a succession of distinct effects (IEC 60050-161 [9]).

**Data application ancillary:** ancillary which provides send and/or receive data access to UMTS services via UE

**Enclosure port:** physical boundary of the apparatus through which electromagnetic fields may radiate or impinge. In the case of integral antenna equipment, this port is inseparable from the antenna port.

**End- User data:** Manufacturer defined data patterns for data transfer testing. Represents EUT's typical user application (eg. photo, video, textfile, message) in its characteristics.

**Idle mode:** Idle mode is the state of User Equipment (UE) when switched on but with no Radio Resource Control (RRC) connection.

**Integral antenna:** antenna designed to be connected directly to the equipment with or without the use of an external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

**Average power:** The average transmitter output power obtained over any specified time interval, including periods with no transmission, when the transmit time slots are at the maximum power setting.

**Necessary bandwidth:** For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

**Out of band emissions:** Emission on a frequency or frequencies immediately outside the necessary bandwidth, which results from, the modulation process, but excluding spurious emissions.

NOTE: Any unwanted emission which falls at frequencies separated from the centre frequency of the emission by less than 250% of the necessary bandwidth of the emission will generally be considered out-of-band emission.

**Port:** particular interface, of the specified equipment (apparatus), with the electromagnetic environment. For example, any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see figure 1).

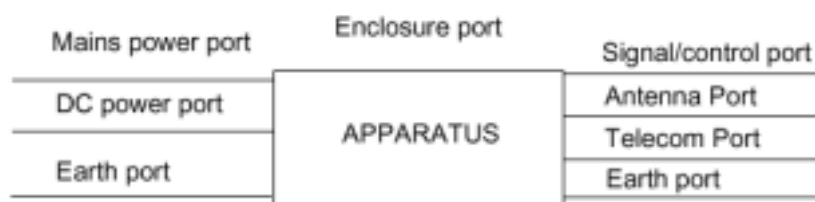


Figure 1: Examples of ports

**Spurious emission from ITU-R SM 329-82 [11]:** Emission on a frequency, or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions.

NOTE: For the purpose of this Recommendation all emissions, including intermodulation products, conversion products and parasitic emissions, which fall at frequencies separated from the centre frequency of the emission by 250% or more of the necessary bandwidth of the emission will generally be considered spurious emissions.

**Telecommunication port:** ports which are intended to be connected to telecommunication networks (e.g. public switched telecommunication networks, integrated services digital networks), local area networks (e.g. Ethernet, Token Ring) and similar networks (see CISPR 22 [14]).

**Transient phenomena:** Pertaining to or designating a phenomena or a quantity which varies between two consecutive steady states during a time interval short compared with the time-scale of interest (IEC 60050-161 [9])

**Traffic mode:** is the state of User Equipment (UE) when switched on and with Radio Resource Control (RRC) connection established.

**Universal mobile telecommunications system (UMTS):** The telecommunications system, incorporating mobile cellular and other functionality, that is the subject of specifications produced by 3GPP

**User equipment (UE):** is a "Mobile Station" (MS) which is an entity capable of accessing a set of UMTS services via one or more radio interfaces. This entity may be stationary or in motion within the UMTS service area while accessing the UMTS services, and may simultaneously serve one or more users.

## 4.4 Receiver exclusion band

The receiver exclusion band for terminals extends from the lower frequency of the allocated receiver band minus 85 MHz to the upper frequency of the allocated receiver band plus 85 MHz. The exclusions bands are as set out below:

### UTRA/FDD

- (a) 2025 MHz to 2255 MHz (Band I)
- (b) 1845 MHz to 2075 MHz (Band II)
- (c) 1720 MHz to 1965 MHz (Band III)

### UTRA/TDD

- (a) 1815 MHz to 2005 MHz  
1925 MHz to 2110 MHz
- (b) 1765 MHz to 2075 MHz (ITU-R, Region 2)
- (c) 1825 MHz to 2015 MHz (ITU-R, Region 2)

## 7 Applicability overview tables

### 7.1 Emission

**Table 1: Emission applicability**

Phenomenon	Application	Equipment test requirement			Reference subclause in the present document	Reference Standard
		Equipment connected to fixed AC or DC power installations	Equipment connected to vehicular DC supplies	Equipment powered by integral battery		
Radiated emission	Enclosure	applicable	applicable	applicable	8.2	ITU-R SM.329-89 4997 [11] TS25.101 [12]
Conducted emission	DC power input/output port	applicable	applicable	not applicable	8.3	CISPR 22 [14], CISPR 16-1 [16]
Conducted emission	AC mains input/output port	applicable	not applicable	not applicable	8.4	CISPR 22 [14],
Harmonic current emissions	AC mains input port	applicable	not applicable	not applicable	8.5	IEC 61000-3-2 [17]
Voltage fluctuations and flicker	AC mains input port	applicable	not applicable	not applicable	8.6	IEC 61000-3-3 [18]



## 7.2 Immunity

**Table 2: Immunity applicability**

Phenomenon	Application	Equipment test requirement			Reference subclause in the present document	Reference standard
		Equipment connected to fixed AC or DC power installations	Equipment connected to vehicular DC supplies	Equipment powered by integral battery		
RF electro-magnetic field (80 MHz to <del>4000-2000</del> 2000 MHz)	Enclosure	applicable	applicable	applicable	9.2	IEC 61000-4-3 [20]
Electrostatic discharge	Enclosure	applicable	applicable	applicable	9.3	IEC 61000-4-2 [19]
Fast transients common mode	Signal and control ports, DC and AC power input ports	applicable	not applicable	not applicable	9.4	IEC 61000-4-4 [21]
RF common mode 0,15 MHz to 80 MHz	Signal and control ports, DC and AC power input ports	applicable	applicable	applicable	9.5	IEC 61000-4-6 [23]
Transients and surges, vehicular environment	DC power input ports	not applicable	applicable	not applicable	9.6	ISO 7637 Part 1 [6] And ISO 7637 Part 2 [7]
Voltage dips and interruptions	AC mains power input ports	applicable	not applicable	not applicable	9.7	IEC 61000-4-11 [24]
Surges, common and differential mode	DC and AC power input ports	applicable	not applicable	not applicable	9.8	IEC 61000-4-5 [22]

## 8.2.2 Test method

Whenever possible the site shall be a fully anechoic chamber (FAC) simulating the free-space conditions. EUT shall be placed on a non-conducting support. ~~Maximum~~ Average power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser).

At each frequency at which a component is detected, the EUT shall be rotated to obtain maximum response, and the effective radiated power (e.r.p.) of that component determined by a substitution measurement, which shall be the reference method. The measurement shall be repeated with the test antenna in the orthogonal polarization plane.

NOTE: Effective radiated power e.r.p. refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2.15 dB between e.i.r.p. and e.r.p.

$$\text{e.r.p. (dBm)} = \text{e.i.r.p. (dBm)} - 2.15 \quad \text{Ref. ITU-R SM. 329-89 ANNEX 1 [11]}$$

Measurements are made with a tuned dipole antenna or a reference antenna with a known gain referenced to an isotropic antenna.

If a different test site or method is used, this shall be stated in the test report. The results shall be converted to the reference method values and the validity of the conversion shall be demonstrated.

## 8.2.3 Limits

The references for these requirements are ITU-R SM 329-89 [11], SM.1539 [28] and TS 25.101 subclauses 6.6.3.1. and 7.9.1. [12] and TS 25.102 subclauses 6.6.3 and 7.9. [13] respectively.

### 8.2.3.1 FDD and 3,84 Mcps TDD option

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 329-89 [11].

These requirements are only applicable for frequencies in the spurious domain, ~~which are greater than 12.5 MHz away from the UE centre carrier frequency~~

**Table 3: Radiated Spurious emissions requirements**

Frequency	Minimum requirement (e.r.p.)/ Reference Bandwidth Idle mode	Minimum requirement (e.r.p.) / Reference Bandwidth Traffic mode
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	-57dBm / 100 kHz	-36 dBm / 100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-47dBm / 1MHz	-30 dBm / 100 kHz
<del><math>f_c - 12.5 \text{ MHz} &lt; f &lt; f_c + 12.5 \text{ MHz}</math></del>	<del>Not defined</del>	<del>Not defined</del>
$f_c - 12.5 \text{ MHz} < f < f_c + 12.5 \text{ MH}$	Not defined	Not defined

NOTE:  $f_c$  is the centre frequency of the TCH. The frequency range  $f_c \pm 12.5 \text{ MHz}$  are covered by the "Out of Band" emission requirements of TS 34.121[2] and TS 34.122 [3].

### 8.2.3.2 1,28 Mcps TDD option

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 329-89 [11].

These requirements are only applicable for frequencies, which are greater than 4 MHz away from the UE centre carrier frequency

**Table 3.1: Radiated Spurious emissions requirements**

Frequency	Minimum requirement (e.r.p.)/ Reference Bandwidth Idle mode	Minimum requirement (e.r.p.) / Reference Bandwidth Traffic mode
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	-57dBm / 100 kHz	-36 dBm / 100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$ $f_c - 4 \text{ MHz} < f < f_c + 4 \text{ MHz}$	-47dBm / 1MHz Not defined	-30 dBm / 1 MHz Not defined

NOTE:  $f_c$  is the centre frequency of the TCH. The frequency range  $f_c \pm 4 \text{ MHz}$  are covered by the "Out of Band" emission requirements of TS 34.121[2] and TS 34.122 [3] .

## 8.2.4 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the radiated emission measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figure in table 3B.

Table 3B specifies the Maximum measurement uncertainty of the Test System. The Test System shall enable the equipment under test to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

**Table 3B: Maximum measurement uncertainty**

Parameter	Uncertainty
Effective radiated RF power between 30 MHz and 180 MHz	$\pm 6 \text{ dB}$
Effective radiated RF power between 180 MHz and 12.75 GHz	$\pm 3 \text{ dB}$

NOTE: If the Test System for a test is known to have a measurement uncertainty greater than that specified in table 3B, this equipment can still be used, provided that an adjustment is made follows:

Any additional uncertainty in the Test System over and above that specified in table 3B is used to tighten the Test Requirements - making the test harder to pass. This procedure will ensure that a Test System not compliant with table 3B does not increase the probability of passing an EUT that would otherwise have failed a test if a Test System compliant with table 3B had been used.

## 9.2 RF electromagnetic field (80 MHz - 1000 MHz and 1400 MHz to 2000 MHz)

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

### 9.2.1 Definition

This test assesses the ability of UE and ancillary equipment to operate as intended in the presence of a radio frequency electromagnetic field disturbance at the enclosure.

### 9.2.2 Test method and level

The test method shall be in accordance with IEC 61000-4-3 [20]

- for UE and ancillary equipment the following requirements shall apply;
- the test level shall be 3 V/m amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 kHz;
- the stepped frequency increments shall be 1 % of the momentary frequency;
- when using the max hold detector method (see ANNEX A) at each test frequency step initially an unmodulated test signal shall be applied. Then the test modulation shall be applied;
- the test shall be performed over the frequency range 80 MHz to 1 000 MHz and 1400 MHz to 2000 MHz;
- responses in stand alone receivers or receivers which are part of transceivers occurring at discrete frequencies which are narrow band responses, shall be disregarded, see subclause 4.3;
- the frequencies selected during the test shall be recorded in the test report.

### 9.2.3 Performance criteria

The performance criteria of subclause 6.1 shall apply.

## CHANGE REQUEST

⌘ **34.124 CR 010** ⌘ rev ⌘ Current version: **5.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

**Proposed change affects:** UICC apps  ME  Radio Access Network  Core Network

<b>Title:</b>	⌘	New exclusion bands and interpretation of measurement results		
<b>Source:</b>	⌘	RAN WG4		
<b>Work item code:</b>	⌘	TEI4	<b>Date:</b>	⌘ 26/11/2002
<b>Category:</b>	⌘	<b>A</b>	<b>Release:</b>	⌘ Rel-5
		Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
		<b>F</b> (correction)	2	(GSM Phase 2)
		<b>A</b> (corresponds to a correction in an earlier release)	R96	(Release 1996)
		<b>B</b> (addition of feature),	R97	(Release 1997)
		<b>C</b> (functional modification of feature)	R98	(Release 1998)
		<b>D</b> (editorial modification)	R99	(Release 1999)
		Detailed explanations of the above categories can be found in 3GPP TR 21.900.	Rel-4	(Release 4)
			Rel-5	(Release 5)
			Rel-6	(Release 6)

<b>Reason for change:</b>	⌘	This CR proposes to update the current 3GPP EMC specification according to the changes in respective basic EMC standards.		
<b>Summary of change:</b>	⌘	The updates are to: 1. Introduce a clause about the exclusion bands and extend the frequency range for radiated immunity. 2. Modify measurement uncertainty for radiated emissions test.		
<b>Consequences if not approved:</b>	⌘	The EMC specification would not be aligned with the basic EMC standards.  <u>Isolated impact analysis:</u> Would not affect a BS that meets the basic EMC standards.		

<b>Clauses affected:</b>	⌘	2, 3, 4.4, 7, 8.2.2, 8.2.3, 8.2.4, 9.2,										
<b>Other specs affected:</b>	⌘	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications	Y	N		X		X		X	⌘	
Y	N											
	X											
	X											
	X											
		Test specifications										
		O&M Specifications										
<b>Other comments:</b>	⌘	Equivalent CRs in other Releases: CR009 cat. F to 34.124 v4.0.0										

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## 2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific;
- for a specific reference, subsequent revisions do not apply;
- for a non-specific reference, subsequent revisions do apply. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TS 25.113: "3<sup>rd</sup> Generation Partnership Project; Technical Specification Group (TSG) RAN WG4; Base station EMC".
- [2] 3GPP TS 34.121: "3<sup>rd</sup> Generation Partnership Project; Technical Specification Group (TSG) T WG1; Terminal Conformance Specification; Radio transmission and reception (FDD)".
- [3] 3GPP TS 34.122: "3<sup>rd</sup> Generation Partnership Project; Technical Specification Group (TSG) T WG1; Terminal Conformance Specification; Radio transmission and reception (TDD)".
- [4] IEC 61000-6-1 (1997): "Electromagnetic compatibility (EMC) – Part 6: Generic standards - Section 1: Immunity standard for residential, commercial and light-industrial environments".
- [5] IEC 61000-6-3 (1996): "Electromagnetic compatibility (EMC) – Part 6: Generic standards - Section 3: Emission standard for residential, commercial and light-industrial environments".
- [6] ISO 7637-1 (1990): "Road vehicles - Electrical disturbance by conduction and coupling - Part 1: Passenger cars and light commercial vehicles with nominal 12 V supply voltage - Electrical transient conduction along supply lines only".
- [7] ISO 7637-2 (1990): "Road vehicles - Electrical disturbance by conduction and coupling - Part 2: Commercial vehicles with nominal 24 V supply voltage - Electrical transient conduction along supply lines only".
- [8] 3GPP TR 25.990; 3<sup>rd</sup> Generation Partnership Project; Technical Specification Group Radio Access Network (RAN); Vocabulary  
3GPP TR 21 905: "3<sup>rd</sup> Generation Partnership Project; Technical Specification Group Services and System Aspects; Vocabulary for 3GPP specifications".
- [9] IEC 60050(161) (~~1998~~): "International Electrotechnical Vocabulary - Chapter 161: Electromagnetic compatibility".
- [10] 3GPP TS 34.108: "3<sup>rd</sup> Generation Partnership Project (3GPP); Technical Specification Group (TSG) Terminal; Common test environments for user equipment (UE). Conformance Testing".
- [11] ITU-R Recommendation SM.329-9: "Spurious emissions".
- [12] 3GPP TS 25.101: "3<sup>rd</sup> Generation Partnership Project (3GPP); Technical Specification Group (TSG) RAN WG4; UTRA (UE) FDD; Radio transmission and Reception".
- [13] 3GPP TS 25.102: "3<sup>rd</sup> Generation Partnership Project (3GPP); Technical Specification Group (TSG) RAN WG4; UTRA (UE) TDD; Radio transmission and Reception".
- [14] IEC CISPR publication 22; ~~3<sup>rd</sup> edition (1997-11)~~: "Information technology equipment; Radio disturbance characteristics – Limits and methods of measurement".
- [15] 3GPP TS 34.109: "3<sup>rd</sup> Generation Partnership Project (3GPP); Technical Specification Group (TSG) Terminal. Terminal Logical Test Interface; Special conformance testing functions".

- [16] IEC CISPR publication 16-1; ~~(1993); Radio disturbance and immunity measuring apparatus"; Am.1 (1997);~~ "Specification for radio disturbance and immunity measuring apparatus and methods".
- [17] IEC 61000-3-2; ~~(1995-03-2000)~~: "Electromagnetic compatibility; Part 3 - Limits; section 2 – Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)"; Am.1 (1997-09)".
- [18] IEC 61000-3-3; ~~(1995-04-12)~~: "Electromagnetic compatibility; Part 3 - Limits; section 2 – Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current  $\leq 16$  A"
- [19] IEC 61000-4-2: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 2: Electrostatic discharge immunity test – Basic EMC publication".
- [20] IEC 61000-4-3: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 3: Radiated, radio-frequency electromagnetic field immunity test".
- [21] IEC 61000-4-4: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 4: Electrical fast transient/burst immunity test – Basic EMC publication".
- [22] IEC 61000-4-5: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 5: Surge immunity test".
- [23] IEC 61000-4-6: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 6: immunity to conducted disturbances induced by radio frequency fields".
- [24] IEC 61000-4-11: "Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – section 11: Voltage dips, short interruptions, and voltage variations immunity test".
- [25] ETR 027 (1991): "Radio Equipment and Systems (RES); Methods of measurement for private mobile radio equipment".
- [26] ITU-T Recommendation P.64: "Telephone transmission quality, Telephone installations, Local line networks, Objective electro-acoustical measurements. Determination of sensitivity/frequency characteristics of local telephone systems".
- [27] ITU-T Recommendation P.76: "Telephone transmission quality, Measurements related to speech loudness, Determination of loudness ratings; Fundamental principles, Annex A".
- [28] ITU-R Recommendation SM.1539 (2001): "Variation of the boundary between the out-of-band and spurious domains required for the application of Recommendations ITU-R SM.1541 and ITU-R SM.329".

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

**Ancillary equipment:** Equipment (apparatus), used in connection with a user equipment (UE) is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a UE to provide additional operational and/or control features to the UE, (e.g. to extend control to another position or location); and
- the equipment cannot be used on a stand alone basis to provide user functions independently of a UE; and
- the UE to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

**BLER (Block Error Ratio):** BLER is block error ratio. The BLER calculation shall be based on evaluating the CRC on each transport block .

**Camped on a cell:** The UE is in idle mode and has completed the cell selection/reselection process and has chosen a cell. The UE monitors system information and (in most cases) paging information. Note that the services may be limited, and that the PLMN may not be aware of the existence of the UE within the chosen cell.

**Continuous phenomena (continuous disturbance):** Electromagnetic disturbance, the effects of which on a particular device or equipment cannot be resolved into a succession of distinct effects (IEC 60050-161 [9]).

**Data application ancillary:** ancillary which provides send and/or receive data access to UMTS services via UE

**Enclosure port:** physical boundary of the apparatus through which electromagnetic fields may radiate or impinge. In the case of integral antenna equipment, this port is inseparable from the antenna port.

**End- User data:** Manufacturer defined data patterns for data transfer testing. Represents EUT's typical user application (eg. photo, video, textfile, message) in its characteristics.

**Idle mode:** Idle mode is the state of User Equipment (UE) when switched on but with no Radio Resource Control (RRC) connection.

**Integral antenna:** antenna designed to be connected directly to the equipment with or without the use of an external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

**Average power:** The average transmitter output power obtained over any specified time interval, including periods with no transmission, when the transmit time slots are at the maximum power setting.

**Necessary bandwidth:** For a given class of emission, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions.

**Out of band emissions:** Emission on a frequency or frequencies immediately outside the necessary bandwidth, which results from, the modulation process, but excluding spurious emissions.

NOTE: Any unwanted emission which falls at frequencies separated from the centre frequency of the emission by less than 250% of the necessary bandwidth of the emission will generally be considered out-of-band emission.

**Port:** particular interface, of the specified equipment (apparatus), with the electromagnetic environment. For example, any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see figure 1).



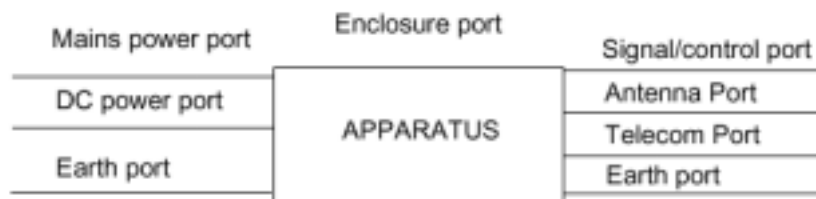


Figure 1: Examples of ports

**Spurious emission from ITU-R SM 329-9 [11]:** Emission on a frequency, or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions.

**NOTE:** For the purpose of this Recommendation all emissions, including intermodulation products, conversion products and parasitic emissions, which fall at frequencies separated from the centre frequency of the emission by 250% or more of the necessary bandwidth of the emission will generally be considered spurious emissions.

**Telecommunication port:** ports which are intended to be connected to telecommunication networks (e.g. public switched telecommunication networks, integrated services digital networks), local area networks (e.g. Ethernet, Token Ring) and similar networks (see CISPR 22 [14]).

**Transient phenomena:** Pertaining to or designating a phenomena or a quantity which varies between two consecutive steady states during a time interval short compared with the time-scale of interest (IEC 60050-161 [9])

**Traffic mode:** is the state of User Equipment (UE) when switched on and with Radio Resource Control (RRC) connection established.

**Universal mobile telecommunications system (UMTS):** The telecommunications system, incorporating mobile cellular and other functionality, that is the subject of specifications produced by 3GPP

**User equipment (UE):** is a "Mobile Station" (MS) which is an entity capable of accessing a set of UMTS services via one or more radio interfaces. This entity may be stationary or in motion within the UMTS service area while accessing the UMTS services, and may simultaneously serve one or more users.

## 4.4 Receiver exclusion band

The receiver exclusion band for terminals extends from the lower frequency of the allocated receiver band minus 85 MHz to the upper frequency of the allocated receiver band plus 85 MHz. The exclusions bands are as set out below:

### UTRA/FDD

- (a) 2025 MHz to 2255 MHz (Band I)
- (b) 1845 MHz to 2075 MHz (Band II)
- (c) 1720 MHz to 1965 MHz (Band III)

### UTRA/TDD

- (a) 1815 MHz to 2005 MHz  
1925 MHz to 2110 MHz
- (b) 1765 MHz to 2075 MHz (ITU-R, Region 2)
- (c) 1825 MHz to 2015 MHz (ITU-R, Region 2)

## 7 Applicability overview tables

### 7.1 Emission

**Table 1: Emission applicability**

Phenomenon	Application	Equipment test requirement			Reference subclause in the present document	Reference Standard
		Equipment connected to fixed AC or DC power installations	Equipment connected to vehicular DC supplies	Equipment powered by integral battery		
Radiated emission	Enclosure	applicable	applicable	applicable	8.2	ITU-R SM.329-9 1997 [11] TS25.101 [12]
Conducted emission	DC power input/output port	applicable	applicable	not applicable	8.3	CISPR 22 [14], CISPR 16-1 [16]
Conducted emission	AC mains input/output port	applicable	not applicable	not applicable	8.4	CISPR 22 [14],
Harmonic current emissions	AC mains input port	applicable	not applicable	not applicable	8.5	IEC 61000-3-2 [17]
Voltage fluctuations and flicker	AC mains input port	applicable	not applicable	not applicable	8.6	IEC 61000-3-3 [18]

## 7.2 Immunity

**Table 2: Immunity applicability**

Phenomenon	Application	Equipment test requirement			Reference subclause in the present document	Reference standard
		Equipment connected to fixed AC or DC power installations	Equipment connected to vehicular DC supplies	Equipment powered by integral battery		
RF electro-magnetic field (80 MHz to 20004000 MHz )	Enclosure	applicable	applicable	applicable	9.2	IEC 61000-4-3 [20]
Electrostatic discharge	Enclosure	applicable	applicable	applicable	9.3	IEC 61000-4-2 [19]
Fast transients common mode	Signal and control ports, DC and AC power input ports	applicable	not applicable	not applicable	9.4	IEC 61000-4-4 [21]
RF common mode 0,15 MHz to 80 MHz	Signal and control ports, DC and AC power input ports	applicable	applicable	applicable	9.5	IEC 61000-4-6 [23]
Transients and surges, vehicular environment	DC power input ports	not applicable	applicable	not applicable	9.6	ISO 7637 Part 1 [6] And ISO 7637 Part 2 [7]
Voltage dips and interruptions	AC mains power input ports	applicable	not applicable	not applicable	9.7	IEC 61000-4-11 [24]
Surges, common and differential mode	DC and AC power input ports	applicable	not applicable	not applicable	9.8	IEC 61000-4-5 [22]

## 8.2.2 Test method

Whenever possible the site shall be a fully anechoic chamber (FAC) simulating the free-space conditions. EUT shall be placed on a non-conducting support. ~~Maximum~~ Average power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser).

At each frequency at which a component is detected, the EUT shall be rotated to obtain maximum response, and the effective radiated power (e.r.p.) of that component determined by a substitution measurement, which shall be the reference method. The measurement shall be repeated with the test antenna in the orthogonal polarization plane.

NOTE: Effective radiated power e.r.p. refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2.15 dB between e.i.r.p. and e.r.p.

$$\text{e.r.p. (dBm)} = \text{e.i.r.p. (dBm)} - 2.15 \quad \text{Ref. ITU-R SM. 329-9 ANNEX 1 [11]}$$

Measurements are made with a tuned dipole antenna or a reference antenna with a known gain referenced to an isotropic antenna.

If a different test site or method is used, this shall be stated in the test report. The results shall be converted to the reference method values and the validity of the conversion shall be demonstrated.

## 8.2.3 Limits

The references for these requirements are ITU-R SM 329-9 [11], SM.1539 [28] and TS 25.101 subclauses 6.6.3.1. and 7.9.1. [12] and TS 25.102 subclauses 6.6.3 and 7.9. [13] respectively.

### 8.2.3.1 FDD and 3,84 Mcps TDD option

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 329-9 [11].

These requirements are only applicable for frequencies in the spurious domain, ~~which are greater than 12.5 MHz away from the UE centre carrier frequency~~

**Table 3: Radiated Spurious emissions requirements**

Frequency	Minimum requirement (e.r.p.)/ Reference Bandwidth Idle mode	Minimum requirement (e.r.p.) / Reference Bandwidth Traffic mode
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	-57dBm / 100 kHz	-36 dBm / 100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$	-47dBm / 1MHz	-30 dBm / 100 kHz
$f_c - 12.5 \text{ MHz} < f < f_c + 12.5 \text{ MHz}$	Not defined	Not defined
$f_c - 12.5 \text{ MHz} < f < f_c + 12.5 \text{ MH}$	Not defined	Not defined

NOTE:  $f_c$  is the centre frequency of the TCH. The frequency range  $f_c \pm 12.5 \text{ MHz}$  are covered by the "Out of Band" emission requirements of TS 34.121[2] and TS 34.122 [3].

### 8.2.3.2 1,28 Mcps TDD option

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 329-9 [11].

These requirements are only applicable for frequencies, which are greater than 4 MHz away from the UE centre carrier frequency

**Table 3.1: Radiated Spurious emissions requirements**

Frequency	Minimum requirement (e.r.p.)/ Reference Bandwidth Idle mode	Minimum requirement (e.r.p.) / Reference Bandwidth Traffic mode
$30 \text{ MHz} \leq f < 1000 \text{ MHz}$	-57dBm / 100 kHz	-36 dBm / 100 kHz
$1 \text{ GHz} \leq f < 12.75 \text{ GHz}$ $f_c - 4 \text{ MHz} < f < f_c + 4 \text{ MHz}$	-47dBm / 1MHz Not defined	-30 dBm / 1 MHz Not defined

NOTE:  $f_c$  is the centre frequency of the TCH. The frequency range  $f_c \pm 4 \text{ MHz}$  are covered by the "Out of Band" emission requirements of TS 34.121[2] and TS 34.122 [3] .

## 8.2.4 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the radiated emission measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figure in table 3B.

Table 3B specifies the Maximum measurement uncertainty of the Test System. The Test System shall enable the equipment under test to be measured with an uncertainty not exceeding the specified values. All tolerances and uncertainties are absolute values, and are valid for a confidence level of 95 %, unless otherwise stated.

A confidence level of 95% is the measurement uncertainty tolerance interval for a specific measurement that contains 95% of the performance of a population of test equipment.

**Table 3B: Maximum measurement uncertainty**

Parameter	Uncertainty
Effective radiated RF power between 30 MHz and 180 MHz	$\pm 6 \text{ dB}$
Effective radiated RF power between 180 MHz and 12.75 GHz	$\pm 3 \text{ dB}$

NOTE: If the Test System for a test is known to have a measurement uncertainty greater than that specified in table 3B, this equipment can still be used, provided that an adjustment is made follows:

Any additional uncertainty in the Test System over and above that specified in table 3B is used to tighten the Test Requirements - making the test harder to pass. This procedure will ensure that a Test System not compliant with table 3B does not increase the probability of passing an EUT that would otherwise have failed a test if a Test System compliant with table 3B had been used.

## 9.2 RF electromagnetic field (80 MHz - 1000 MHz and 1400 MHz to 2000 MHz)

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

### 9.2.1 Definition

This test assesses the ability of UE and ancillary equipment to operate as intended in the presence of a radio frequency electromagnetic field disturbance at the enclosure.

### 9.2.2 Test method and level

The test method shall be in accordance with IEC 61000-4-3 [20]

- for UE and ancillary equipment the following requirements shall apply;
- the test level shall be 3 V/m amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1 kHz;
- the stepped frequency increments shall be 1 % of the momentary frequency;
- when using the max hold detector method (see ANNEX A) at each test frequency step initially an unmodulated test signal shall be applied. Then the test modulation shall be applied;
- the test shall be performed over the frequency range 80 MHz to 1 000 MHz and 1400 MHz to 2000 MHz;
- responses in stand alone receivers or receivers which are part of transceivers occurring at discrete frequencies which are narrow band responses, shall be disregarded, see subclause 4.3;
- the frequencies selected during the test shall be recorded in the test report.

### 9.2.3 Performance criteria

The performance criteria of subclause 6.1 shall apply.