TS 25.113 V2.0.1 (1999-12)

Technical Specification

3rd Generation Partnership Project; Technical Specification Group (TSG) RAN WG4; Base station EMC

Reference
DTS/TSG<name abbv>-0<WG no><spec no> U

Keywords
<keyword[, keyword]>

3GPP

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Contents

Foreword

This Technical Specification has been produced by the 3GPP.

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where:

- x the first digit:
  - 1 presented to TSG for information;
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  - 3 Indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the specification;

1 Scope

The present document covers the assessment of base stations and associated ancillary equipment in respect of ElectroMagnetic Compatibility (EMC).

The present document specifies the applicable test conditions, performance assessment and performance criteria for base stations and associated ancillary equipment in one of the following categories:

- base stations for the FDD mode of UTRA meeting the requirements of TS 25.104 [1], with conformance demonstrated by compliance to TS 25.141 [3].

- base stations for the TDD mode of UTRA meeting the requirements of TS 25.105 [2], with conformance demonstrated by compliance to TS 25.142 [4].

Technical requirements related to the antenna port of base stations are not included in the present document. These are found in the relevant product standards [1], [2], [3], [4].

The environment classification used in the present document refers to the environment classification used in IEC 61000-6-1 [5] and IEC 61000-6-3 [6].

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

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] TS 25.104; 3rd Generation Partnership Project; TSG RAN WG4; UTRA (BS) FDD; Radio transmission and reception

[2] TS 25.105; 3rd Generation Partnership Project; TSG RAN WG4; UTRA (BS) TDD; Radio transmission and reception

[3] TS 25.141; 3rd Generation Partnership Project; TSG RAN WG4; UTRA (BS) FDD; Base station conformance testing (FDD)

[4] TS 25.142; 3rd Generation Partnership Project; TSG RAN WG4; 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".

3 Definitions, symbols 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 receiver, transmitter or transceiver is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a receiver, transmitter or transceiver to provide additional operational and/or control features to the radio equipment, (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 receiver, transmitter or transceiver; and
- the receiver, transmitter or transceiver 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).

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 [7]).

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 [7])

3.2 Symbols

For the purposes of the present document, the following symbols apply:

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AC	Alternating Current
DC	Direct Current
EMC	ElectroMagnetic Compatibility
ESD	Electrostatic discharge
EUT	Equipment Under Test
LISN	Line Impedance Stabilizing Networks
rms	root mean square

4 Test conditions

4.1 General

The equipment shall be tested in normal test environment defined in base station conformance testing specification TS 25.141 [3] or TS 25.142 [4]. The test conditions shall be recorded in the test report.

4.2 Arrangements for establishing a communication link

The wanted RF input signal nominal frequency shall be selected by setting the Absolute Radio Frequency Channel Number (ARFCN) to an appropriate number.

A communication link shall be set up with a suitable air interface test system capable of measuring RF performance criteria (hereafter called "the test system"). The test system shall be located outside of the test environment.

When the EUT is required to be in the transmit/receive mode, the following conditions shall be met:

- the EUT shall be commanded to operate at maximum rated transmit power;
- Adequate measures shall be taken to avoid the effect of the unwanted signal on the measuring equipment;
- The wanted input signal level shall be set to 15 dB above the reference sensitivity level as defined in TS 25.141 (for FDD) [3] or TS 25.142 (for TDD) [4], to provide a stable communication link.

For immunity tests subclause 4.3 shall apply and the conditions shall be as follows:

4.3 Narrow band responses on receivers

Responses on receivers or duplex transceivers occurring during the test at discrete frequencies which are narrow band responses (spurious responses), are identified by the following method:

- if during an immunity test the quantity being monitored goes outside the specified tolerances, it is necessary to establish whether the deviation is due to a narrow band response or to a wide band (EMC) phenomenon. Therefore, the test shall be repeated with the unwanted signal frequency increased, and then decreased by 10 MHz;
- if the deviation disappears in either or both of the above 10 MHz offset cases, then the response is considered as a narrow band response;
- if the deviation does not disappear, this may be due to the fact that the offset has made the frequency of the unwanted signal correspond to the frequency of another narrow band response. Under these circumstances the procedure is repeated with the increase and decrease of the frequency of the unwanted signal set to 12,5 MHz;
- if the deviation does not disappear with the increased and/or decreased frequency, the phenomenon is considered wide band and therefore an EMC problem and the equipment fails the test.

Narrow band responses are disregarded.

5 Performance assessment

5.1 General

Following information shall be recorded in or annexed to the test report:

- the primary functions of the radio equipment to be tested during and after the EMC testing;
- the intended functions of the radio equipment which shall be in accordance with the documentation accompanying the equipment;
- the method to be used to verify that a communications link is established and maintained
- the user-control functions and stored data that are required for normal operation and the method to be used to assess whether these have been lost after EMC stress;
- the ancillary equipment to be combined with the radio equipment for testing (where applicable);
- the information about ancillary equipment intended to be used with the radio equipment;
- an exhaustive list of ports, classified as either power or signal/control. Power ports shall further be classified as AC or DC power.

5.2 Ancillary equipment

At the manufacturer's discretion the test may be performed on the ancillary equipment separately or a representative configuration of the combination of radio and ancillary equipment. In each case EUT is tested against all applicable immunity and emission clauses of the present document and in each case, compliance enables the ancillary equipment to be used with different radio equipment.

6 Performance Criteria

6.1 Performance criteria for continuous phenomena

The test should, where possible, be performed using a bearer with the characteristics of data rate and BLER defined in Table 1. If the test is not performed using one of these bearers (for, example, of none of them are supported by the BS), the characteristics of the bearer used shall be recorded.

A test signal shall be input to the BS at a level where the performance is not limited by the receiver noise floor or strong signal effects.

The test method for reference sensitivity level in TS 25.141 (for FDD) [3] or TS 25.142 (for TDD) [4] is a suitable test configuration for assessment of performance criteria, with the difference that the test signal shall be set 15 dB above the reference sensitivity level.

The BS shall meet the performance criteria defined in Table 1 during the test. After each test case BS shall operate as intended with no loss of user control function, stored data and the communication link shall be maintained.

Bearer Information Data Rate	*Performance Criteria*
12.2 kbps	BLER < 10^{-2} No loss of service
64 kbps	BLER < 10^{-2} No loss of service
144 kbps	BLER < 10^{-2} No loss of service
384 kbps	BLER < 10^{-2} No loss of service

Table 1, BS Performance Criteria for continuous phenomena

6.2 Performance criteria for transient phenomena

The test should be, where possible, be performed using a bearer with the characteristics of data rate and BLER defined in Table 2. If the test is not performed using one of these bearers (for, example, of none of them are supported by the BS), the characteristics of the bearer used shall be recorded.

A test signal shall be input to the BS at a level where the performance is not limited by the receiver noise floor or strong signal effects. The test method for reference sensitivity level in TS 25.141 (for FDD) [3] or TS 25.142 (for TDD) [4] is suitable test configuration for the assessment of performance criteria, with the difference that the test signal shall be set to 15 dB above the reference sensitivity level. The BS shall meet the performance criteria defined in table 2 during the test. After each test case BS shall operate as intended with no loss of user control function, stored data and the communication link shall be maintained.

Bearer Information Data Rate	*Performance Criteria*
12.2 kbps	BLER > 10^{-2} temporarily, however the communication link shall be maintained
64 kbps	BLER > 10^{-2} temporarily, however the communication link shall be maintained
144 kbps	BLER > 10^{-2} temporarily, however the communication link shall be maintained
384 kbps	BLER > 10^{-2} temporarily, however the communication link shall be maintained

Table 2, BS Performance Criteria for transient phenomena

7 Applicability overview

7.1 Emission

Phenomenon	Application	Equipment test requirement		Reference subclause in the present document	Reference Standard
		Base station equipment	Ancillary equipment		
Radiated emission	Enclosure	applicable	applicable	A.1.3.1 A.1.3.2	ITU-R SM.329-7 [1] CISPR 22 [4]
Conducted emission	DC power input/output port	applicable	applicable	A.1.4	CISPR 22 [4], CISPR 16-1 [5]
Conducted emission	AC mains input/output port	applicable	applicable	A.1.5	CISPR 22 [4]
Harmonic current emissions	AC mains input port	applicable	applicable	A.1.6	IEC 61000-3-2 [6]
Voltage fluctuations and flicker	AC mains input port	applicable	applicable	A.1.7	IEC 61000-3-3 [7]

Table 3, Emission applicability

7.2 Immunity

Phenomenon	Application	Equipment test requirement		Reference subclause in the present document	Reference standard
		Base station equipment	Ancillary equipment		
RF electromagnetic field (80 - 1000 MHz)	Enclosure	applicable	applicable	A.2.3	IEC 61000-4-3 [6]
Electrostatic discharge	Enclosure	applicable	applicable	A.2.4	IEC 61000-4-2 [5]
Fast transients common mode	Signal and control ports, DC and AC power input ports	applicable	applicable	A.2.5	IEC 61000-4-4 [7]
RF common mode 0,15 - 80 MHz	Signal and control ports, DC and AC power input ports	applicable	applicable	A.2.6	IEC 61000-4-6 [9]
Voltage dips and interruptions	AC mains power input ports	applicable	applicable	A.2.7	IEC 61000-4-11 [10]
Surges, common and differential mode	AC power input ports	applicable	applicable	A.2.8	IEC 61000-4-5 [8]

Table 4, Immunity applicability

Annex A (normative): Methods of measurement

A.1 Emission

A.1.1 Methods of measurement and limits for EMC emissions

A.1.2 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.1.3 Radiated spurious emission from Base station and ancillary equipment

A.1.3.1 Radiated spurious emission, Base stations

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

A.1.3.1.1 Definition

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

A.1.3.1.2 Test method

a) A test site fulfilling the requirements of ITU-R SM. 329-7 [1] 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.

Radiation of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyzer). 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 of that component determined by a substitution measurement. The measurement shall be repeated with the test antenna in the orthogonal polarization plane.

b) The BS shall be configured with all transmitters active, at its maximum output power. Set the base station to transmit a signal as stated in table [6.2-1] (Test model 1) in the TS25.141 [2] and table [6.2.4.1.1] in the TS25.142 [3]. Total power at the RF output port shall be the nominal power as specified by the manufacturer.

c) The measuring receiver shall be configured as defined in table [6.5-10] (BS Mandatory spurious emissions limits, Category B) in the TS25.141 [2] and table [6.6.3.1.3.2.1] (BS Mandatory spurious emissions limits. Category B) in the TS25.142 [3]. 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. 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. At each frequency at which a component is detected, the maximum effective radiated power of that component shall be determined, as described in step a.

A.1.3.1.3 Limits

The equipment shall meet the limits below:

-36 dBm for frequencies up to 1 GHz

-30 dBm for frequencies above 1 GHz.

A.1.3.2 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.1.3.2.1 Definition

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

A.1.3.2.2 Test method

The test method shall be in accordance with CISPR 22 [4]

A.1.3.2.3 Limits

The ancillary equipment shall meet the limits according to CISPR 22 [4] (10 m measuring distance) shown in table 1:

Table 1: Limits for radiated emissions from ancillary equipment,

Measured on a stand alone basis

Frequency range	Quasi-peak
30 MHz-230 MHz	30 dBµV/m
230 MHz-1000 MHz	37 dBµV/m

A.1.4 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.1.5

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.1.4.1 Definition

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

A.1.4.2 Test method

The test method shall be in accordance with CISPR 22 [4] and the Line Impedance Stabilizing Networks (LISN) shall be connected to a DC power source.

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

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

The equipment shall be installed with a ground plane as defined in CISPR 22 [4]. The reference earth point of the LISNs 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 [5].

A.1.4.3 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.1.4.2 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 2.

Table 2: Limits for conducted emissions

Frequency range	Quasi-peak	Average
> 0,15-0,5 MHz	66 - 56 dBµV	56 - 46 dBµV
> 0,5- 5 MHz	56 dBµV	46 dBµV
> 5-30 MHz	60 dBµV	50 dBµV
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 3 shall be used.

Table 3: Limits for conducted emissions

Frequency range	Quasi-peak	Average
>0,15-0,5MHz	79dBµV	66dBµV
>0,5-30 MHz	73dBµV	60dBµV

A.1.5 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.1.5.1 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.1.5.2 Test method

The test method shall be in accordance with CISPSR 22 [4].

Mains connected ancillary equipment which is not part of the EUT shall be connected to the mains via a separate LISN. According to clause 11.9 of CISPR 16-1 [5], the Protective Earth (PE) wire shall also be terminated by a 50 Ω/50 µH common mode RF impedance.

A.1.5.3 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.1.5.2 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 4: Limits for conducted emissions

Frequency range	Quasi-peak	Average
> 0,15-0,5 MHz	66 - 56 dBµV	56 - 46 dBµV
> 0.5- 5 MHz	56 dBµV	46 dBµV
> 5-30 MHz	60 dBµV	50 dBµV
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 5 shall be used.

Table 5: Limits for conducted emissions

Frequency range	Quasi-peak	Average
>0,15-0,5MHz	79dBµV	66dBµV
>0,5-30 MHz	73dBµV	60dBµV

A.1.6 Harmonic Current emissions (AC mains input port)

The requirements of IEC 61000-3-2 [6] for harmonic current emission apply for equipment covered by the scope of the present document.

A.1.7 Voltage fluctuations and flicker (AC mains input port)

The requirements of IEC 61000-3-3 [7] for voltage fluctuations and flicker apply for equipment covered by the scope of the present document.

A.2 Immunity

A.2.1 Test methods and levels for immunity tests

A.2.2 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;
- 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.
- Immunity tests shall be performed with a communication link established (call mode).

A.2.3 RF electromagnetic field (80 MHz - 1000 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.2.3.1 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.2.3.2 Test method and level

The test method shall be in accordance with IEC 61000-4-3 [9]:

- 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;
- when using the max hold detector method 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 - 1 000 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.2.3.3 Performance criteria

The performance criteria of subclause 6.1 shall apply.

A.2.4 Electrostatic discharge

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.2.4.1 Definition

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

A.2.4.2 Test method and level

The test method shall be in accordance with IEC 61000-4-2 [8]:

- for contact discharge, the equipment shall pass at ±2 kV and ±4 kV;
- for air discharge shall pass at ±2 kV, ±4 kV and ±8 kV, see IEC 61000-4-2 [8];
- 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.2.4.3 Performance criteria

The performance criteria of subclause 6.2 shall apply.

A.2.5 Fast transients common mode

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

This test shall be performed on signal 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.2.5.1 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.2.5.2 Test method and level

The test method shall be in accordance with IEC 61000-4-4 [10]:

- the test level for signal and control ports shall be 0,5 kV open circuit voltage as given in IEC 61000-4-4 [10];
- the test level for DC power input/output ports shall be 1 kV open circuit voltage as given in IEC 61000-4-4 [10];
- the test level for AC mains power input ports shall be 2 kV open circuit voltage as given in IEC 61000-4-4 [10].

For AC and DC power input ports the transients shall be applied (in parallel) to all the wires in the cable with reference to the cabinet reference ground (true common mode) and the source impedance shall be 50 Ω.

A.2.5.3 Performance criteria

The performance criteria of subclause 6.2 shall apply.

A.2.6 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, control and DC power input/output ports, which may have cables longer than 1 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 [12].

A.2.6.1 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.2.6.2 Test method and level

The test method shall be in accordance with IEC 61000-4-6 [12]:

- 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 and 1 % frequency increment of the momentary frequency in the frequency range 5 MHz - 80 MHz;
- the test level shall be severity level 2 as given in IEC 61000-4-6 [12] 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;
- 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 selected during the test and the test method used shall be recorded in the test report.

A.2.6.3 Performance criteria

The performance criteria of subclause 6.1 shall apply.

A.2.7 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.2.7.1 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.2.7.2 Test method and level

The following requirements shall apply.

The test method shall be in accordance with IEC 61000-4-11 [13].

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.2.7.3 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 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 6.2 shall apply 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.2.8 Surges, common and differential mode

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.2.8.1 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.2.8.2 Test method and level

The test method shall be in accordance with IEC 61000-4-5 [11].

The following requirements and evaluation of test results shall apply:

- the test level for ac mains power input ports shall be 1 kV line to ground and 0,5 kV line to line with the output impedance of the surge generator as given in the IEC61000-4-5 [11];
- the test generator shall provide the 1,2/50 µsec pulse as defined in IEC 61000-4-5 [11].

A.2.8.3 Performance criteria

The performance criteria of subclause 6.2 shall apply.

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 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.329-7: "Spurious emissions"

[2] TS 25.141; 3rd Generation Partnership Project; TSG RAN WG4; UTRA (BS) FDD; Base station conformance testing (FDD)

[3] TS 25.142; 3rd Generation Partnership Project; TSG RAN WG4; Base station conformance testing (TDD)

[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: "Electromagnetic compatibility (EMC) - Part 3: Limits – Section 2: Limits for harmonic current emissions (equipment input current 16 A) ".

[7] IEC 61000-3-3: "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"

[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".

History

Document history		
V 0.1.0	1999-07-28	First version presented to RAN WG4 #6. Technical content taken from R4-99307
V 0.1.1	1999-07-29	Editorial corrections made. Open issues added to annex B,
V1.0.0	1999-08-03	Revision marks accepted. Re-issued as version 1.0.0 as agreed at RAN WG4 #6.
V1.1.0	1999-09-17	Changes agreed at WG4 #7 incorporated: R4-99547 and R4-99562
V1.1.1	1999-09-21	Editorial correction to references [5] and [6] in sections 1 and 2.
V1.2.0	1999-09-30	Revision marks accepted. New text added in section 5
V1.2.0	1999-10-07	Noted by TSG-RAN
V1.3.0	1999-11-11	Changes agreed at WG4#8 incorporated: R4-99632, R4-99634, R4-99635 and R4-99636
V1.4.0	1999-12-4	Content for section 4 added
V.2.0.0	1999-12-08	Changes agreed at WG4#9 incorporated: R4-826, R4-88871and R4-99880. Editorial corrections made.

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This document is written in Microsoft Word 97