TSG-RAN Working Group 4 (Radio) meeting #8
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R4-99636

Agenda item:

Source: Ericsson, Nokia

Title: Text changes to Annex A of the EMC specification TS 25.113 to cover also ancillary equipment

Document for: Discussion, approval

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1. Introduction

This document proposes text changes to Annex A of specification TS 25.113 to cover ancillary equipment.

2. Text proposal for the chapter 7: Applicability overview

- The proposed text changes are attached.

3. Conclusion

The text including ancillary equipment to Annex A of TS 25.113 has been proposed.

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 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.1.4

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.1.3.1 Definition

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

A.1.3.2 Test met

The test method shall be in accordance with CISPR 22 Stabilizing Networks (LISN) shall be connected to a DC power 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.

22 [1]. The reference earth point of the

The measurement receiver shall be in accordance with the requirements of section one of CISPR -1 [2].

Limits

The equipment shall meet the limits below (including the average limit and the quasi
respectively, an average detector receiver and a quasi-peak detector r
method described in subclause A.1.3.2 above. If the average limit is met when using a quasi-peak detector, the

The equipment shall meet the limits given in table 1 .

Table 1: Limits for conducted emissions

Frequency range	Quasi-peak	
> 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 2 shall be used.

Table 2: Limits for conducted emissions

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

A.1.4 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.1.4.1 Definition

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

A.1.4.2 Test method

The test method shall be in accordance with CISPSR 22 [1].

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 [-2], the Protective Earth (PE) wire shall also be terminated by a 50 Ω/50 µH common mode RF impedance.

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.

Table 3: 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 4 shall be used.

Table 4: Limits for conducted emissions

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

A.1.5 Harmonic Current emissions (AC mains input port)

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

A.1.6 Voltage fluctuations and flicker (AC mains input port)

The requirements of IEC 61000-3-3 [4] 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 - 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.2.3.1 Definition

This test assesses the ability of radio equipment ~~transmitters, receivers~~ and ancillary equipment ~~transceivers~~ 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 [6]:

- 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 and 1,4 GHz – 2 GHz with the exception of an exclusion bands for transmitters and receivers , see subclause [4.3]~~x..x~~ and [4.4]~~x.x~~;
- 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 [4.5]~~x.x~~;
- the frequencies selected during the test shall be recorded in the test report.

A.2.3.3 Performance criteria

The performance criteria of subclause ~~4~~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.

kV, see IEC 61000-4-2 [5];

- electrostatic discharge shall be applied to all exposed surfaces of the EUT except where the user documentation specially indicates a requirement for approriate 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 ~~4~~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 ~~transmitters, receivers,~~and ancillary equipment ~~transceivers~~ 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 [7]:

- the test level for signal and control ports shall be 0,5 kV open circuit voltage as given in IEC 61000-4-4 [7];
- the test level for DC power input/output ports shall be 1 kV open circuit voltage as given in IEC 61000-4-4 [7];
- the test level for AC mains power input ports shall be 2 kV open circuit voltage as given in IEC 61000-4-4 [7].

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 ~~4~~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 [9].

A.2.6.1 Definition

This test assesses the ability of radio equipment ~~transmitters, receivers~~ and ancillary equipment ~~transceivers~~ 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 [9]:

- 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 [9] 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 [4.5]~~x.x~~;
- 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 ~~4~~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 ~~transmitters, receivers~~ and ancillary equipment ~~transceivers~~ 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 [10].

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~~4~~.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~~4~~.2 shall apply with following exception:

- i~~I~~n 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 ~~transmitters, receivers~~ and ancillary equipment ~~transceiver~~s 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 [8].

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 [8];
- the test generator shall provide the 1,2/50 µsec pulse as defined in IEC 61000-4-5 [8].

A.2.8.3 Performance criteria

The performance criteria of subclause 6~~4~~.2 shall apply.