



**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
ElectroMagnetic Compatibility (EMC) standard
for radio equipment and services;
Part 23: Specific conditions for IMT-2000 CDMA,
Direct Spread (UTRA and E-UTRA) Base Station (BS) radio,
repeater and ancillary equipment**

Reference

REN/ERM-EMC-277

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Foreword

This Harmonized European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Directive 98/34/EC [i.7] as amended by Directive 98/48/EC [i.8].

The title and reference to the present document are intended to be included in the publication in the Official Journal of the European Union of titles and references of Harmonized Standard under the Directive 1999/5/EC [i.6].

See article 5.1 of Directive 1999/5/EC [i.6] for information on presumption of conformity and Harmonised Standards or parts thereof the references of which have been published in the Official Journal of the European Union.

The present document is part 23 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

| National transposition dates | |
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1 Scope

The present document, together with EN 301 489-1 [1], covers the assessment of "3rd generation" digital cellular (IMT-2000 CDMA Direct Spread) (UTRA and E-UTRA) base station equipment, repeaters and associated ancillary equipment in respect of ElectroMagnetic Compatibility (EMC).

Technical specifications related to the antenna port and emissions from the enclosure port of radio equipment (base station (BS), and repeaters) are not included in the present document. Such technical specifications are found in the relevant product standards for the effective use of the radio spectrum.

The present document specifies the applicable test conditions, performance assessment and performance criteria of "3rd generation" digital cellular (IMT-2000 CDMA Direct Spread) (UTRA and E-UTRA) base station radio equipment and associated ancillary equipment.

Examples of base station equipment covered by the present document are given in annex A.

In case of differences (for instance concerning special conditions, definitions, abbreviations) between the present document and EN 301 489-1 [1], the provisions of the present document take precedence.

The environmental classification and the emission and immunity requirements used in the present document are as stated in EN 301 489-1 [1], except for any special conditions included in the present document.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 301 489-1 (V1.8.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements".
- [2] ETSI TS 125 141 (V7.5.0): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 7.5.0 Release 7)".
- [3] ETSI TS 125 142 (V7.3.0): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (TDD) (3GPP TS 25.142 version 7.3.0 Release 7)".
- [4] ETSI TS 125 101 (V7.5.0): "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (FDD) (3GPP TS 25.101 version 7.5.0 Release 7)".
- [5] ETSI TS 125 102 (V7.4.0): "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (TDD) (3GPP TS 25.102 version 7.4.0 Release 7)".
- [6] ETSI TS 125 143 (V7.2.0): "Universal Mobile Telecommunications System (UMTS); UTRA repeater conformance testing (3GPP TS 25.143 version 7.2.0 Release 7)".

- [7] ETSI TS 136 101: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101 version 9.3.0 Release 9)".
- [8] ETSI TS 136 104 (V9.3.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 9.3.0 Release 9)".
- [9] ETSI TS 136 141 (V9.3.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141 version 9.3.0 Release 9)".

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TS 136 106: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); FDD repeater radio transmission and reception (3GPP TS 36.106)".
- [i.2] ETSI TS 136 143: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); FDD repeater conformance testing (3GPP TS 36.143)".
- [i.3] ETSI TS 125 104: "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104)".
- [i.4] ETSI TS 125 105: "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (TDD) (3GPP TS 25.105)".
- [i.5] ETSI TS 125 106: "Universal Mobile Telecommunications System (UMTS); UTRA repeater radio transmission and reception (3GPP TS 25.106)".
- [i.6] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [i.7] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.
- [i.8] Directive 98/48/EC of the European Parliament and of the Council of 20 July 1998 amending Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulations.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 301 489-1 [1] and the following apply:

bearer: information transmission path of defined characteristics for transfer of user data or predefined test data

channel bandwidth: RF bandwidth supporting a single E-UTRA RF carrier with the transmission bandwidth configured in the uplink or downlink of a cell

NOTE: The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

International Mobile Telecommunications-2000 (IMT-2000): third generation mobile systems which provide access, by means of one or more radio links, to a wide range of telecommunications services supported by the fixed telecommunication networks (e.g. PSTN, ISDN or IP), and to other services which are specific to mobile users

maximum throughput: maximum achievable throughput for a reference measurement channel

throughput: number of payload bits successfully received per second for a reference measurement channel in a specified reference condition

radio communications equipment: telecommunications equipment which includes one or more transmitters and/or receivers and/or parts thereof for use in a fixed, mobile or portable application

NOTE: It can be operated with ancillary equipment but if so, is not dependent on it for basic functionality.

radio digital unit: equipment which contains base band and functionality for controlling Radio unit

radio equipment: equipment which contains Radio digital unit and Radio unit

radio unit: equipment which contains transmitter and receiver

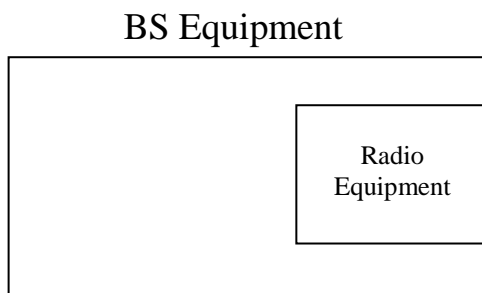


Figure 1a: BS with single enclosure solution

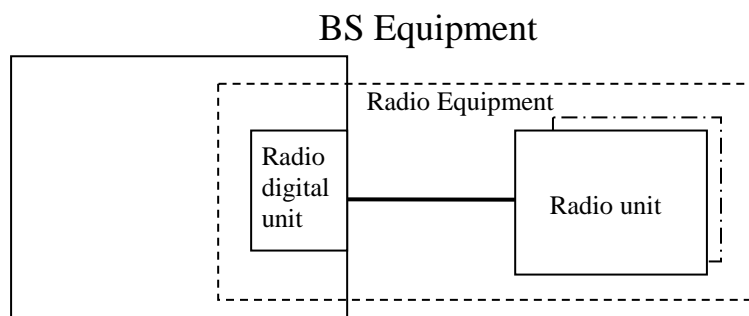


Figure 1b: BS with multiple enclosure solution

3.2 Abbreviations

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

| | |
|-----------|------------------------------------------------|
| BLER | Block Error Ratio |
| BS | Base Station |
| BWChannel | Channel bandwidth |
| CDMA | Code Division Multiple Access |
| CRC | Cyclic Redundancy Check |
| EARFCN | E-UTRA Absolute Radio Frequency Channel Number |
| EMC | ElectroMagnetic Compatibility |
| EPC | Evolved Packet Core |
| EUT | Equipment Under Test |
| E-UTRA | Evolved Universal Terrestrial Radio Access |
| FDD | Frequency Division Duplex |
| FRC | Fixed Reference Channel |
| IF | Intermediate Frequency |
| IMT-2000 | International Mobile Telecommunications 2000 |
| IP | Internet Protocol |
| ISDN | Integrated Services Digital Network |

| | |
|--------|----------------------------------------------|
| Iub | Interface between RNC and BS |
| PSTN | Public Switched Telephone Network |
| RF | Radio Frequency |
| RNC | Radio Network Controller |
| TDD | Time Division Duplex |
| UARFCN | UTRA Absolute Radio Frequency Channel Number |
| UTRA | Universal Terrestrial Radio Access |

4 Test conditions

For the purpose of the present document, the test conditions of EN 301 489-1 [1], clause 4, shall apply as appropriate. Further product related test conditions for base station equipment are specified in the present document.

4.1 General

The equipment shall be tested in the normal test environment defined in the appropriate conformance testing specification as specified below:

- UTRA (FDD) base station TS 125 141 [2];
- UTRA (TDD) base station TS 125 142 [3];
- E-UTRA base station TS 136 141 [9];
- UTRA repeater conformance testing specification TS 125 143 [6];
- E-UTRA repeater conformance testing specification TS 136 143 [i.2].

The test conditions shall be recorded in the test report.

For emission and immunity tests the test arrangements, etc., as specified in the present document, clauses 4.2 to 4.5, shall apply.

For an EUT which contains more than one BS, it is sufficient to perform tests relating to connectors of each representative type of port forming part of the EUT.

4.2 Arrangements for test signals

The provisions of EN 301 489-1 [1], clause 4.2 shall apply, with the following modifications.

UTRA the wanted RF signal nominal frequency shall be selected by setting the UTRA Absolute Radio Frequency Channel Number (UARFCN).

E-UTRA the wanted RF signal nominal frequency shall be selected by setting the E-UTRA Absolute Radio Frequency Channel Number (EARFCN) to an appropriate number.

UTRA a communication link shall be set up with a suitable test system capable of evaluating the EUT using the specified performance criteria at the air interface and/or the Iub interface.

E-UTRA a communication link shall be set up with a suitable test system capable of evaluating the EUT using the specified performance criteria at the air interface and/or the SI interface.

For both UTRA and E-UTRA 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.

4.2.1 Multiple enclosure BS solution

For a BS with multiple enclosures, the BS part with Radio digital unit and the Radio unit may be tested separately. Communication link shall be set up in the same way as if they are in single BS enclosure. The Radio Digital unit and the Radio unit shall communicate over an interface enabling establishment of a communication link.

4.2.2 Arrangements for test signals at the input of transmitters

The provisions of EN 301 489-1 [1], clause 4.2.1 shall apply.

4.2.3 Arrangements for test signals at the output of transmitters

The provisions of EN 301 489-1 [1], clause 4.2.2 shall apply.

4.2.4 Arrangements for test signals at the input of receivers

The provisions of EN 301 489-1 [1], clause 4.2.3 shall apply with the following modification.

The wanted input signal level shall be set to a level to provide a stable communication link where the performance is not limited by the receiver noise floor or strong signal effects e.g. 15 dB above the reference sensitivity level as defined in:

- UTRA TS 125 141 [2] (for FDD), TS 125 142 [3] (for TDD);
- E-UTRA TS 136 141 [9].

4.2.5 Arrangements for test signals at the output of receivers

The provisions of EN 301 489-1 [1], clause 4.2.4 shall apply.

4.2.6 Arrangements for test signals for repeaters

For immunity tests of repeaters, the wanted RF input signal shall be coupled to one antenna port at a level which will result, when measured, in the maximum rated RF output power per channel, as declared by the manufacturer. The test shall either be repeated with a wanted signal coupled to the other antenna port, or a single test shall be performed with the specified input signals being simultaneously coupled to both antenna ports.

4.3 Exclusion bands

4.3.1 Receiver exclusion band

The receiver exclusion band 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.

Except for UTRA-FDD Band VIII, where the exclusion band ends 10 MHz above the receiver band edge; UTRA-TDD band 1 900 MHz to 1 920 MHz, where the exclusion band ends 60 MHz above the receiver band edge; and UTRA-TDD band 2 570 MHz to 2 620 MHz, where the exclusion band ends 70 MHz above the receiver band edge.

The exclusion bands are as set out below:

- UTRA/FDD [2]:
 - Band I 1 900 MHz to 2 000 MHz
 - Band III 1 690 MHz to 1 805 MHz
 - Band VII 2 480 MHz to 2 590 MHz
 - Band VIII 860 MHz to 925 MHz

- UTRA/TDD [3] 3,84 Mcps, 1,28 Mcps, 7,68 Mcps options:
 - 1 880 MHz to 1 980 MHz
 - 1 990 MHz to 2 045 MHz
 - 2 550 MHz to 2 690 MHz
- E-UTRA [9]:
 - FDD:
 - 1 900 MHz to 2 000 MHz (Band 1)
 - 1 690 MHz to 1 805 MHz (Band 3)
 - 2 480 MHz to 2 590 MHz (Band 7)
 - 860 MHz to 925 MHz (Band 8)
 - TDD:
 - 1 880 MHz to 1 940 MHz (Band 33) 1 990 MHz to 2 045 MHz (Band 34)
 - 2 550 MHz to 2 640 MHz (Band 38) 2 280 MHz to 2 420 MHz (Band 40)

4.4 Narrow band responses of receivers

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

For UTRA:

- If during an immunity test the quantity being monitored goes outside the specified tolerances (see clause 6.1), 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 Δf :

| | |
|------------------------------------------------------|-------------------------------|
| FDD bands I, III, VII, VIII and TDD option 3,84 Mcps | $\Delta f = 10,0 \text{ MHz}$ |
| TDD option 1,28 Mcps | $\Delta f = 3,2 \text{ MHz}$ |
| TDD option 7,68 Mcps | $\Delta f = 20,0 \text{ MHz}$ |

- If the deviation disappears in either or both of the above Δf 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 Δf_1 :

| | |
|------------------------------------------------------|---------------------------------|
| FDD bands I, III, VII, VIII and TDD option 3,84 Mcps | $\Delta f_1 = 12,5 \text{ MHz}$ |
| TDD option 1,28 Mcps | $\Delta f_1 = 4,0 \text{ MHz}$ |
| TDD option 7,68 Mcps | $\Delta f_1 = 25,0 \text{ MHz}$ |

- 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.

For E-UTRA:

- If during an immunity test the quantity being monitored goes outside the specified tolerances (clause 6.1), 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 $2 \times BW_{\text{Channel}}$ MHz, where BW_{Channel} is the channel bandwidth as defined in TS 136 104 [8].

- If the deviation disappears in either or both of the above $2 \times BW_{\text{Channel}}$ 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 $2,5 \times BW_{\text{Channel}}$ 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.

4.5 Normal test modulation

A communication link shall be set up with a suitable base station system test equipment.

For UTRA

The normal test modulation should be a bearer with the characteristics of data rate shown in table 1.

If the test is not performed using one of these bearers, (for example none of them are supported by the BS), the characteristics of the bearer used shall be declared by the manufacturer and recorded in the test report.

Table 1: Bearer information data rate

| Bearer Information Data Rate |
|-------------------------------------|
| 12,2 kbit/s |
| 64 kbit/s |
| 144 kbit/s |
| 384 kbit/s |

For E-UTRA

The normal test modulation should be a bearer with the characteristics of data rate shown in table 2.

If the test is not performed using one of these bearers, (for example none of them are supported by the BS), the characteristics of the bearer used shall be declared by the manufacturer and recorded in the test report.

Table 2: Bearer information data rate

| E-UTRA Channel Bandwidth [MHz] | Bearer Information Data Rate |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| 1,4 | FRC A1-1 in clause A.1 in TS 136 104 [8] |
| 3 | FRC A1-2 in clause A.1 in TS 136 104 [8] |
| 5 | FRC A1-3 in clause A.1 in TS 136 104 [8] |
| 10 | FRC A1-3 in clause A.1 in TS 136 104 [8] (see note) |
| 15 | FRC A1-3 in clause A.1 in TS 136 104 [8] (see note) |
| 20 | FRC A1-3 in clause A.1 in TS 136 104 [8] (see note) |
| NOTE: This is the information data rate of a single instance of the bearer mapped to 25 resource blocks. The performance criteria shall be met for each consecutive application of a single instance of the bearer mapped to disjoint frequency ranges with a width of 25 resource blocks each. | |

5 Performance assessment

5.1 General

The provision of EN 301 489-1 [1], clause 5.1 shall apply with the following modifications:

The information about the bandwidth of the IF amplifier immediately preceding the demodulator as set out in EN 301 489-1 [1], clause 5.1 is not applicable for radio equipment in the scope of the present document.

5.2 Equipment which can provide a continuous communication link

The provision of EN 301 489-1 [1], clause 5.2 shall apply.

5.2.1 Assessment of BLER/Throughput in Downlink

For UTRA (BLER):

In order to assess the BLER of the bearer used during the immunity tests, the output of the transmitter shall be connected to an equipment which meets the requirements for the BLER assessment of TS 125 101 [4] in case of FDD and TS 125 102 [5] in case of TDD.

The level of the signal supplied to the equipment should be within the range for which the assessment of BLER is not impaired. Power control shall be off during the immunity testing.

For E-UTRA (Throughput):

The output of the transmitter shall be connected to an equipment which meet the requirements for the throughput assessment of TS 136 101 [7] for the bearer used in the immunity tests. The level of the signal supplied to the equipment should be within the range for which the assessment of throughput is not impaired. Power control shall be off during the immunity testing.

5.2.2 Assessment of BLER/Throughput in Uplink

For UTRA (BLER):

The value of the BLER at the output of the receiver reported by the BS shall be monitored at the Iub interface by using a suitable test equipment.

For E-UTRA (Throughput):

The value of the throughput at the output of the receiver shall be monitored at S1 interface by using suitable test equipment.

5.2.3 Assessment of RF gain variations of repeaters

The parameter used for the performance assessment of a repeater is the RF gain within the operating frequency band.

5.3 Equipment which does not provide a continuous communication link

The provision of EN 301 489-1 [1], clause 5.3 shall apply.

5.4 Ancillary equipment

The provision of EN 301 489-1 [1], clause 5.4 shall apply.

5.5 Equipment classification

The provision of EN 301 489-1 [1], clause 5.5 shall apply.

6 Performance criteria

6.1 Performance criteria for continuous phenomena applied to Base Stations and Repeaters

6.1.1 Base Stations (BS)

For UTRA:

The BLER calculation shall be based on evaluating the CRC on each transport block.

During immunity tests of the BS Uplink and Downlink paths the observed BLER shall be less than 1×10^{-2} and the BS shall operate as intended. If the Uplink and Downlink paths are evaluated as one loop then the criteria is less than 2×10^{-2} .

After each test case the BS shall operate as intended with no loss of user control functions or stored data, the communications link shall be maintained.

For E-UTRA:

The test should, where possible, be performed using a bearer with the characteristics of data rate and throughput defined in table 3. If the test is not performed using one of these bearers (for, example, if none of them are supported by the BS), the characteristics of the bearer used shall be recorded in the test report.

The throughput in table 3 is stated relative to the maximum throughput of the FRC. The maximum throughput for an FRC is equal to the payload size \times the number of uplink subframes per second.

The BS Uplink and Downlink paths shall each meet the performance criteria defined in table 3 during the test. If the Uplink and Downlink paths are evaluated as a one loop then the criteria is two times the throughput reduction shown in table 3. 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.

Table 3: BS Performance Criteria for continuous phenomena for BS

| E-UTRA Channel Bandwidth [MHz] | Bearer Information Data Rate | Performance Criteria (see notes 1 and 2) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------|
| 1,4 | FRC A1-1 in clause A.1 in TS 136 104 [8] | Throughput > 95 % No loss of service |
| 3 | FRC A1-2 in clause A.1 in TS 136 104 [8] | Throughput > 95 % No loss of service |
| 5 | FRC A1-3 in clause A.1 in TS 136 104 [8] | Throughput > 95 % No loss of service |
| 10 | FRC A1-3 in clause A.1 in TS 136 104 [8] (see note 3) | Throughput > 95 % No loss of service |
| 15 | FRC A1-3 in clause A.1 in TS 136 104 [8] (see note 3) | Throughput > 95 % No loss of service |
| 20 | FRC A1-3 in clause A.1 in TS 136 104 [8] (see note 3) | Throughput > 95 % No loss of service |
| <p>NOTE 1: The performance criteria, Throughput > 95 % / No loss of service, applies also if a bearer with another characteristics is used in the test.</p> <p>NOTE 2: The performance criteria, Throughput > 90 % / No loss of service, applies instead if the Uplink and Downlink paths are evaluated as a one loop.</p> <p>NOTE 3: This is the information data rate of a single instance of the bearer mapped to 25 resource blocks. The performance criteria shall be met for each consecutive application of a single instance of the bearer mapped to disjoint frequency ranges with a width of 25 resource blocks each.</p> | | |

After each test case the BS shall operate as intended with no loss of user control functions or stored data, the communications link shall be maintained.

6.1.2 Repeaters

The RF gain of the EUT shall be measured throughout the period of exposure to the phenomenon. The RF gain measured during the test shall not deviate from the gain measured before the test by more than ± 1 dB.

At the conclusion of the test the EUT shall operate as intended with no loss of user control functions or stored data.

6.2 Performance criteria for transient phenomena for Base Station and Repeaters

6.2.1 Base stations (BS)

For UTRA:

During immunity tests of the BS Uplink and Downlink paths, the observed BLER may be greater than 1×10^{-2} . If the Uplink and Downlink paths are evaluated as one loop then the observed BLER may be greater than 2×10^{-2} .

After each test case the BS shall operate as intended with no loss of user control functions or stored data, the communications link shall be maintained.

For E-UTRA:

The test should, where possible, be performed using a bearer with the characteristics of data rate and throughput defined in table 4. If the test is not performed using one of these bearers (for, example, if none of them are supported by the BS), the characteristics of the bearer used shall be recorded in the test report.

The throughput in table 4 is stated relative to the maximum throughput of the FRC. The maximum throughput for an FRC is equal to the payload size \times the number of uplink subframes per second.

The BS Uplink and Downlink paths shall each meet the performance criteria defined in table 4 during the test. If the Uplink and Downlink paths are evaluated as a one loop then the criteria is two times the throughput reduction shown in table 4.

Table 4: BS Performance Criteria for transient phenomena for BS

| E-UTRA Channel Bandwidth [MHz] | Bearer Information Data Rate | Performance Criteria (see notes 1 and 2) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------------------------------------------|
| 1,4 | FRC A1-1 in clause A.1 in TS 136 104 [8] | Throughput < 95 % temporarily, however the communication link shall be maintained |
| 3 | FRC A1-2 in clause A.1 in TS 136 104 [8] | Throughput < 95 % temporarily, however the communication link shall be maintained |
| 5 | FRC A1-3 in clause A.1 in TS 136 104 [8] | Throughput < 95 % temporarily, however the communication link shall be maintained |
| 10 | FRC A1-3 in clause A.1 in TS 136 104 [8] (see note 3) | Throughput < 95 % temporarily, however the communication link shall be maintained |
| 15 | FRC A1-3 in clause A.1 in TS 136 104 [8] (see note 3) | Throughput < 95 % temporarily, however the communication link shall be maintained |
| 20 | FRC A1-3 in clause A.1 in TS 136 104 [8] (see note 3) | Throughput < 95 % temporarily, however the communication link shall be maintained |
| <p>NOTE 1: The performance criteria, Throughput < 95 % temporarily / however the communication link shall be maintained, applies also if a bearer with another characteristics is used in the test.</p> <p>NOTE 2: The performance criteria, Throughput < 90 % temporarily / however the communication link shall be maintained, applies instead if the Uplink and Downlink paths are evaluated as a one loop.</p> <p>NOTE 3: This is the information data rate of a single instance of the bearer mapped to 25 resource blocks. The performance criteria shall be met for each consecutive application of a single instance of the bearer mapped to disjoint frequency ranges with a width of 25 resource blocks each.</p> | | |

After each test case the BS shall operate as intended with no loss of user control functions or stored data, the communications link shall be maintained.

6.2.2 Repeaters

The RF gain of the EUT shall be measured before the test and after each exposure. At the conclusion of each exposure the gain of the EUT shall not have changed by more than ± 1 dB. At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the gain of the EUT shall not have changed by more than ± 1 dB.

6.2.2.1 Repeaters, Performance criteria for voltage dips (> 60 %) and interruptions

Temporary loss of function is allowed, provided that the function is self-recoverable or can be restored by the operation of controls.

6.3 Performance criteria for ancillary equipment tested on a standalone basis

The provision of EN 301 489-1 [1], clause 6.4 shall apply. In addition, the provisions of clauses 6.3.1 and 6.3.2 of the present document shall apply.

6.3.1 Performance criteria for continuous phenomena for ancillary equipment

The EUT shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below the performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible performance loss. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

6.3.2 Performance criteria for transient phenomena for ancillary equipment

The EUT shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below the performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible performance loss. During the test, degradation of performance is however allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

7 Applicability overview tables

7.1 Emission

7.1.1 General

EN 301 489-1 [1], table 1 contains the applicability of EMC emission measurements to the relevant ports of radio and/or associated ancillary equipment.

7.1.2 Special conditions

The following special conditions set out in table 5, relate to the emission test methods used in the EN 301 489-1 [1], clause 8.

Table 5: Special conditions for EMC emission measurements

| Reference to clauses in EN 301 489-1 [1] | | Special product-related conditions, additional to or modifying the test conditions in EN 301 489-1 [1], clause 8 | | |
|-------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------|-------------------|----------------|
| 8.3 DC power input/output ports 8.3.3 Limits | | For this type of equipment the limits below apply. | | |
| | | Frequency range | Quasi-peak | Average |
| | | 0,15 MHz to 0,5 MHz | 79 dBµV | 66 dBµV |
| | | > 0,5 MHz to 30 MHz | 73 dBµV | 60 dBµV |

7.2 Immunity

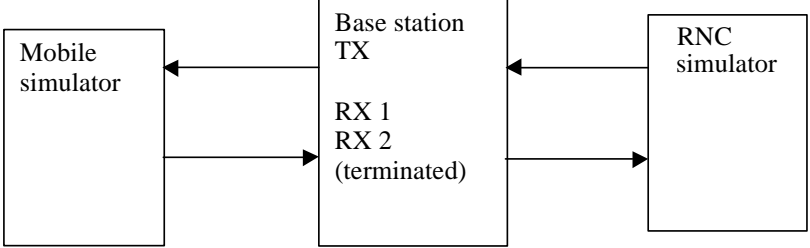
7.2.1 General

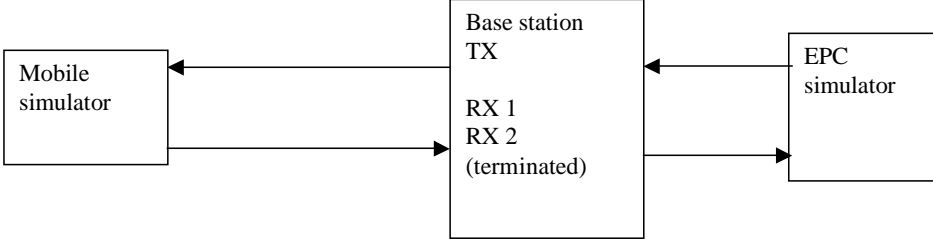
EN 301 489-1 [1], table 2, contains the applicability of EMC immunity measurements to the relevant ports of radio and/or associated ancillary equipment.

7.2.2 Special conditions

The following special conditions set out in table 6 relate to the immunity test configurations set out in EN 301 489-1 [1], clause 9.1.

Table 6: Special conditions for EMC immunity measurements

| Reference to clauses in EN 301 489-1 [1] | Special product-related conditions, additional to or modifying the test configuration in EN 301 489-1 [1], clause 9.1 |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.1 UTRA Test configuration | <p>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 lub-interface, e.g. with an RNC simulator, and evaluating the BLER. Immunity tests shall be performed on both the Uplink and Downlink paths. The tests shall also include both the air-interface and lub-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 lub-interface. In case of looping is used care has to be taken that the BLER information does not change due to looping. The BLER evaluation shall be based on the number of transmitted blocks i.e. including possible deleted blocks.</p>  <pre> graph LR MS[Mobile simulator] --> BS[Base station TX RX 1 RX 2 (terminated)] BS --> MS BS --> RNC[RNC simulator] RNC --> BS </pre> |

| Reference to clauses in EN 301 489-1 [1] | Special product-related conditions, additional to or modifying the test configuration in EN 301 489-1 [1], clause 9.1 |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.1 E-UTRA Test configuration | <ul style="list-style-type: none"> - 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 S1 interface (e.g. with an EPC simulator) and evaluating the throughput (see figure 9.2.1). - Immunity tests shall be performed on both the Uplink and Downlink paths. The tests shall also include both the air interface and S1 interface. Throughput 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 S1 interface. In case of looping is used care have to be taken that the throughput information does not change due to looping.  <pre> graph LR MS[Mobile simulator] --> BS[Base station TX RX 1 RX 2 (terminated)] BS --> MS BS --> EPC[EPC simulator] EPC --> BS </pre> |

Annex A (informative):

Examples of base station radio equipment for digital cellular radio telecommunications systems within the scope of the present document

The present document covers types of base station digital cellular radio telecommunications equipment as set out below.

A.1 Base station equipment for IMT-2000 CDMA Direct Spread (UTRA)

The present document applies to 3rd Generation Partnership Project (UTRA) radio equipment intended for use in digital cellular mobile radio services. Definitions for base station equipment within the scope of the present document are found in the following functional radio specifications:

- TS 125 104 [i.3];
- TS 125 105 [i.4];
- TS 125 106 [i.5].

A.2 Base station equipment for Evolved Universal Terrestrial Radio Access(E-UTRA)

The present document applies to 3rd Generation Partnership Project (UTRA) radio equipment intended for use in digital cellular mobile radio services. Definitions for base station equipment within the scope of the present document are found in the following functional radio specifications:

- base stations of E-UTRA meeting the requirements of TS 136 104 [8], with conformance demonstrated by compliance to TS 136 141 [9];
- repeaters of E-UTRA meeting the requirements of TS 136 106 [i.1], with conformance demonstrated by compliance to TS 136 143 [i.2].

Annex B (informative): The EN title in the official languages

The enlargement of the European Union (EU) resulted in a requirement from the EU for a larger number of languages for the translation of the titles of Harmonized Standards and mandated ENs that are to be listed in the Official Journal to support the implementation of this legislation.

For this reason the title translation concerning the present document can be consulted via the [e-approval](#) application.

History

| Document history | | |
|------------------|----------------|--------------------------------------------------------------------|
| V1.1.1 | September 2001 | Publication |
| V1.2.1 | November 2002 | Publication |
| V1.3.1 | August 2007 | Publication |
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| V1.5.1 | July 2011 | One-step Approval Procedure OAP 20111110: 2011-07-13 to 2011-11-10 |
| V1.5.1 | November 2011 | Publication |