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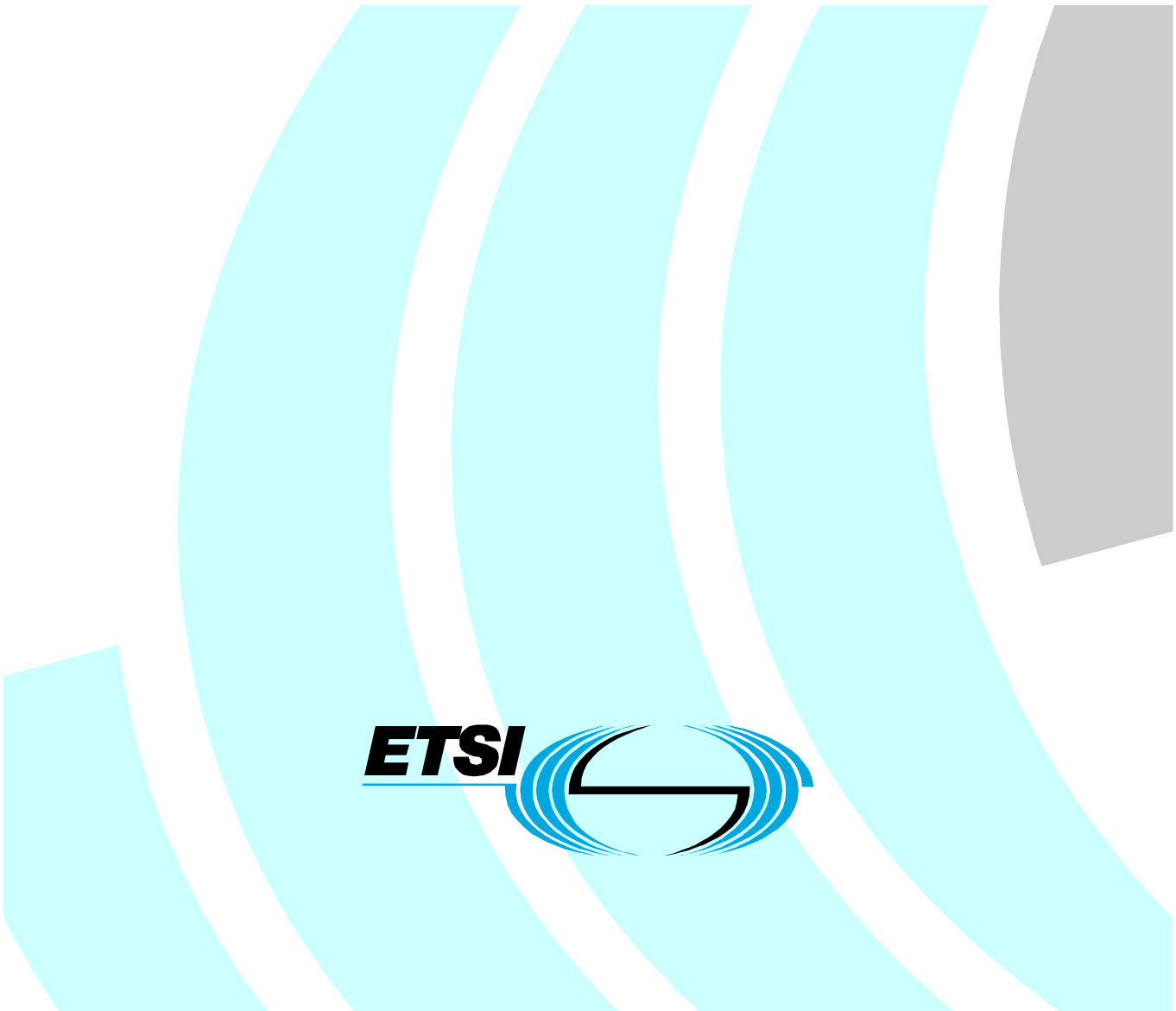
Candidate Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 8: Specific conditions for GSM base stations



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Foreword

This Candidate Harmonized European Standard (Telecommunications series) 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 Council Directive 98/34/EC [10] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (89/336/EEC [3] as amended) and 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 ("the R&TTE Directive" [2]).

The present document is part 8 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

National transposition dates	
Date of adoption of this EN:	9 August 2002
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1 Scope

The present document, together with EN 301 489-1 [1], covers the assessment of equipment meeting Phase 2, and Phase 2+ requirements of the GSM and DCS digital cellular radio telecommunications systems and 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 (BTS), ancillary RF amplifiers and GSM 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 for GSM and DCS digital cellular radio equipment forming part of the Base Station System (BSS), ancillary RF amplifiers, for transmission and/or reception, GSM repeaters and associated ancillary equipment.

Examples of Base station radio, ancillary RF amplifiers and repeaters covered by the present document are given in annex A.

The present document is not applicable to equipment, which forms part of the GSM Network Subsystem (NSS), including Mobile services Switching Centres (MSC), Echo Cancellers (EC) and Operations and Maintenance Centres (OMC).

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 environment 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

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] ETSI EN 301 489-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements".

[2] 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).

[3] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).

[4] ETSI ETR 350: "Digital cellular telecommunications system (Phase 2+) (GSM); Abbreviations and acronyms (GSM 01.04)".

[5] ETSI ETS 300 578: "Digital cellular telecommunications system (Phase 2) (GSM); Radio subsystem link control (GSM 05.08)".

[6] ETSI TS 100 607-1: "Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (GSM 11.10-1)".

[7] ETSI I-ETS 300 020-1: "European digital cellular telecommunications system (Phase 1); Mobile station conformance test system; Part 1: Mobile station conformity specification".

[8] ETSI EN 300 609-4: "Digital cellular telecommunications system (Phase 2 and Phase 2+) (GSM); Base Station System (BSS) equipment specification; Part 4: Repeaters (GSM 11.26)".

[9] ETSI TS 101 087: "Digital cellular telecommunications system (Phase 2 and Phase 2+) (GSM); Base Station System (BSS) equipment specification; Radio aspects (GSM 11.21)".

[10] 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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 301 489-1 [1], clause 3, TS 101 087 [9] and the following apply:

A interface: logical interface between a BSC and an MSC

Abis interface: logical interface between a BTS and a BSC

ancillary equipment: equipment (apparatus), used in connection with a base station, ancillary RF amplifier or repeater, is considered as an ancillary equipment if:

- the equipment is intended for use in conjunction with a base station, ancillary RF amplifier or repeater to provide additional operational and/or control features (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 base station, ancillary RF amplifier or repeater; and
- the base station, ancillary RF amplifier or repeater to which it is connected, is capable of providing some intended operation in accordance with GSM specifications without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions); and
- there is a physical connection between the base station, ancillary RF amplifier or repeater and the ancillary equipment (i.e. a repeater is not considered to be an ancillary equipment to a base station); and
- the primary function of the equipment is not to provide amplification between the transmit and/or receive antenna connector of a base station and an antenna.

ancillary RF amplifier: equipment (apparatus), used in connection with a base station, is considered as an ancillary RF amplifier if:

- the primary function of the equipment is to provide amplification between the transmit and/or receive antenna connector of a base station and an antenna; and
- the RF connection between the equipment and the base station uses co-axial cable; and
- the equipment is capable of meeting its specified performance without requiring any control signal which defines the characteristics of the signal being amplified (e.g. the timing of the GSM timeslots or the commanded transmit power); and
- if the equipment is dedicated to operate only with certain specified types of base station, these base stations are capable of meeting GSM specifications separately from the ancillary RF amplifier.

NOTE: If an ancillary RF amplifier is dedicated to operate only with certain specified types of base station, and these base stations are only capable of meeting GSM specifications in conjunction with the ancillary RF amplifier, the ancillary RF amplifier is considered to be part of the base station.

base station: equipment under test which includes at least one BTS, integrated BSS, or BSC

maintenance port: external interface used for maintenance, testing or configuration, but not connected during normal operation

repeater: device with two RF ports, both of which are intended to be connected to antennas, which is capable of receiving, amplifying and transmitting simultaneously in one direction a signal in a BSS transmit band and in the other direction a signal in the corresponding BSS receive band

RXQUAL: measure of the received signal quality, which is generated by the base station for use as a criterion in the RF power control and handover processes. The characteristics and requirements are specified in ETS 300 578 [5], clause 8.2

signal and control port: port which carries information or control signals, excluding antenna ports

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETR 350 [4] and the following apply:

ARFCN	Absolute Radio Frequency Channel Number
BER	Bit Error Ratio
BSC	Base Station Controller
BSS	Base Station System
BSSTE	Base Station System Test Equipment
BTS	Base Transceiver Station
CRptr	performance criteria for Continuous phenomena applied to Repeaters and ancillary RF amplifiers
CRx	performance criteria for Continuous phenomena applied to Receivers
CT	performance criteria for Continuous phenomena applied to Transmitters
DCS	Digital Cellular System
EC	Echo Canceller
EUT	Equipment Under Test
GSM	Global System for Mobile communication
MSC	Mobile services Switching Centre
NSS	Network Sub System
RXQUAL	Received Signal Quality
TRptr	performance criteria for Transient phenomena applied to Repeaters and Ancillary RF Amplifiers
TRx	performance criteria for Transient phenomena applied to Receivers
TT	performance criteria for Transient phenomena applied to Transmitters

4 Test conditions

For the purposes 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 GSM base stations are specified in the present document.

4.1 General

For emission and immunity tests the test modulation, 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 BTS, it is sufficient to perform tests relating to connectors of each representative type of the BTS forming part of the EUT.

For test purposes, any integral antenna shall be disconnected from the BTS, and any antenna connector shall be correctly terminated, either by connection to the test equipment or to an appropriate non-radiating load.

Precautions should be taken to ensure that the cables connecting antenna connectors to test equipment or termination do not influence the test results.

4.2 Arrangements for test signals

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

4.2.1 Arrangements for test signals at the input of transmitters

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

A communication link shall be set up between the EUT and the test system using the A or Abis interface, or an equivalent interface which carries the information to be transmitted by the air interface.

4.2.2 Arrangements for test signals at the output of transmitters

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

The wanted RF output signal nominal frequency shall be selected by setting the ARFCN to an appropriate number, e.g. channel M as defined in TS 101 087 [9].

All transmitters in the EUT shall be operated at the maximum rated output power, modulated with normal test modulation (see clause 4.5). A communication link shall be established.

4.2.3 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 source of the wanted RF input signal shall be at a nominal value of -47 dBm.

4.2.4 Arrangements for test signals at the output of receivers

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

A communication link shall be set up between the EUT and the test system using the A or Abis interface, or an equivalent interface which carries the information to be transmitted by the air interface.

4.2.5 Arrangements for testing transmitter and receiver together (as a system)

For the immunity tests of base stations including duplex filters, the wanted input signal, coupled to the receiver, shall be modulated with normal test modulation (see clause 4.5). The transmitter(s) shall be operated at the maximum rated output power. A communication link shall be established.

4.2.6 Arrangements for testing repeaters

For the 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 band of radio communications equipment

The provisions of EN 301 489-1 [1], clause 4.3 shall apply.

4.3.1 Base station receiver exclusion band

The BSS receiver exclusion band is the band of frequencies over which no tests of radiated immunity of a receiver are made.

The lower frequency of the exclusion band is the lower frequency of the BSS receive band of the EUT minus 6 %.

The upper frequency of the exclusion band is the upper frequency of the BSS receive band of the EUT plus 5 %.

4.3.2 Base station transmitter exclusion band

The BSS transmitter exclusion band is the band of frequencies over which no tests of radiated immunity of a transmitter are made.

The exclusion band for transmitters extends ±200 kHz from the carrier frequency of each activated transmitter.

4.3.3 Repeater and ancillary RF amplifier exclusion band

The exclusion band for repeaters and ancillary RF amplifiers is the band of frequencies over which no tests of radiated immunity of the EUT are made.

The exclusion band for a repeater or ancillary RF amplifier is the range (or ranges) of frequencies for which at least one of the following conditions are met:

- the gain (measured in either direction between two RF ports) is greater than 25 dB;
- the gain (measured in either direction between two RF ports) is no more than 25 dB below the gain measured at the centre of a manufacturers declared operating band.

A range of frequencies is only considered to be an operating band if the measured gain at the centre of this band is greater than 0 dB.

4.4 Narrowband responses of 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 RXQUAL or BER being monitored goes outside the specified limit, it is necessary to establish whether the RXQUAL or BER increase is due to a narrow band response or to a wideband phenomenon. Therefore, the test shall be repeated with the unwanted signal frequency increased, and then decreased by 400 kHz;
- if the RXQUAL or BER meets the conformance requirement in either or both of the above 400 kHz offset cases, then the response is considered as a narrow band response;
- if the RXQUAL or BER continues not to meet the conformance requirement, 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 500 kHz;
- if the RXQUAL or BER still continues not to meet the conformance requirement with the increased and/or decreased frequency, the phenomenon is considered wideband and the equipment therefore fails the test.

Narrow band responses are disregarded.

4.5 Normal test modulation

The normal test modulation shall be delivered by a suitable mobile station or base station system test equipment (BSSTE) (hereafter called "the test system").

5 Performance assessment

5.1 General

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

The manufacturer shall supply at the time of submission of the equipment for test, the information required in EN 301 489-1 [1], clause 5.1 and the following which shall be recorded in the test report:

- any primary functions of the radio communications equipment additional to those specified in clause 6, as requested by the manufacturer, to be tested during and after the EMC testing;
- the maximum rated RF output power of the BSS, BTS, repeater, and ancillary RF amplifiers, as appropriate.

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

For the immunity tests of ancillary equipment, without a separate pass/fail criteria, the receiver, transmitter or transceiver coupled to the fixed ancillary equipment shall be used to judge whether the ancillary equipment passes or fails.

If the ancillary equipment is intended for use at a remote location, the equipment shall meet the requirements of all applicable immunity clauses and emission clauses of the present document.

In the case of ancillary equipment tested on a stand alone basis and/or radio communications equipment of a specialized nature (see clause 6) the manufacturer shall define the method of test to determine the acceptable level of performance or degradation of performance during and/or after the test. Under these circumstances the manufacturer shall also provide the following information:

- the pass/fail criteria for the EUT;
- the method of observing a degradation of performance of the equipment.

The assessment of degradation of performance which shall be carried out during and/or at the conclusion of the tests, shall be simple, but at the same time give adequate proof that the essential functions of the equipment are operational

5.2 Assessment of BER at the output of a transmitter

The BER at the output of the transmitter may be assessed using either of the techniques described below.

5.2.1 Assessment of BER using static layer 1 functions

The transmitter under test shall be operated according to the test case of TS 101 087 [9], clause 6.1.2.

The bit sequence from the output of the transmitter shall be monitored by the test system according to the test case of TS 101 087 [9], clause 7.1.2, and the BER of the class 2 bits for TCH/FS assessed. The BER shall not exceed the values specified in clause 6.1 of the present document.

If the EUT does not support TCH/FS, the manufacturer shall declare the logical channel for which the performance shall be assessed, and the corresponding performance criteria.

5.2.2 Assessment of BER using RXQUAL

The output of the transmitter shall be connected to an equipment which meets the requirements of either I-ETS 300 020-1 [7], or TS 100 607-1 [6] for the assessment of RXQUAL. The level of the signal supplied to the equipment should be within the range for which the assessment of RXQUAL is not impaired. The RXQUAL shall be monitored during the test. The RXQUAL shall not exceed the values specified in clause 6.1 of the present document.

NOTE: This equipment can be a GSM mobile station with suitable provision for the monitoring of RXQUAL.

5.3 Assessment of BER at the output of a receiver

The BER at the output of the receiver may be assessed using either of the techniques described below.

5.3.1 Assessment of BER using RXQUAL

The value of the RXQUAL reported by the BTS or BSS shall be monitored using suitable test equipment.

5.3.2 Assessment of BER using reported BER

The BER of the class 2 bits at the output of the receiver shall be assessed using suitable test equipment.

If the EUT does not support TCH/FS, the manufacturer shall declare the logical channel for which the performance shall be assessed, and the corresponding performance criteria.

NOTE: This can be performed by a "test loopback" which uses the transmitter of the BTS to return the data which has been decoded by the receiver back to the test equipment which generated the bit sequence. For immunity tests of signal ports, the "test loopback" includes an external connection between signal ports.

5.4 Performance assessment of repeaters and ancillary RF amplifiers

The parameter used for assessment of performance of a repeater or ancillary RF amplifier is the gain within the operating band. The assessment shall be performed using the method of annex B or annex C of the present document.

5.5 Ancillary equipment

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

For emission measurements on transmitters performed in conjunction with associated ancillary equipment, the radiated emissions (spurious and wanted components) from the transmitter shall be ignored.

5.6 Equipment classification

Radio and ancillary equipment in the scope of the present document shall meet the requirements for base station equipment.

6 Performance criteria

The establishment and maintenance of a communications link, and the assessment of RXQUAL or BER are used as the performance criteria to ensure that all the primary functions of the transmitter and receiver of a BTS are evaluated during the immunity tests. The parameter used as performance criteria for repeaters and ancillary RF amplifiers is the gain.

The equipment shall meet the performance criteria as specified in the following clauses as appropriate.

If an equipment is of a specialized nature, such that the performance criteria described in the following clauses are not appropriate, then the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after testing. The performance specification shall be included in the product description and documentation. The performance criteria specified by the manufacturer shall, however, give the same degree of immunity protection as called for in the following clauses.

6.1 Performance criteria for Continuous phenomena applied to Transmitters (CT)

A communications link shall be established at the start of the test, and maintained during the test.

The BER of the downlink shall be assessed during the test according to one of the test methods of clause 5.2.

If the test method of clause 5.2.1 is used, the measured BER of the class 2 bits of TCH/FS shall not exceed 1,6 % during the test.

NOTE: This BER is the upper limit in ETS 300 578 [5] for RXQUAL = 3.

If the test method of clause 5.2.2 is used, the value of RXQUAL shall not exceed 3 during the test.

At the conclusion of the test the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained.

6.2 Performance criteria for Transient phenomena applied to Transmitters (TT)

A communications link shall be established at the start of the test.

At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link.

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 communication link shall have been maintained.

6.3 Performance criteria for Continuous phenomena applied to Receivers (CRx)

A communications link (see clause 4.5) shall be established at the start of the test, and maintained during the test.

The BER of the uplink shall be assessed during the test according to one of the test methods of clause 5.3.

If the test method of clause 5.3.1 is used, the value of RXQUAL shall not exceed 3 during the test.

If the test method of clause 5.3.2 is used, the measured BER of the class 2 bits of TCH/FS shall not exceed 1,6 % during the test.

NOTE: This BER is the upper limit in ETS 300 578 [5] for RXQUAL = 3.

For a base station the RXQUAL of the uplink shall not exceed three (3) measured during the test sequence.

At the conclusion of the test the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained.

6.4 Performance criteria for Transient phenomena applied to Receivers (TRx)

A communications link shall be established at the start of the test.

At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link.

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 communication link shall have been maintained.

6.5 Performance criteria for Continuous phenomena applied to Repeaters and Ancillary RF Amplifiers (CRptr)

The gain of the EUT shall be measured throughout the period of exposure to the phenomenon. The gain shall be measured using the method of annex B.

The gain measured during the test shall not change 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.

6.6 Performance criteria for Transient phenomena applied to Repeaters and Ancillary RF Amplifiers (TRptr)

The gain shall be measured before the test, and after each exposure. The gain shall be measured using the method of annex C.

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.

7 Applicability overview tables

7.1 Emission

7.1.1 General

EN 301 489-1 [1], table 2, 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 1, relate to the emission test methods and limit used in EN 301 489-1 [1], clause 8.

Table 1: 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	For this type of equipment the limits below apply.		
8.3.3 Limits	**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 3, 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 2, relate to the immunity test methods and performance criteria used in EN 301 489-1 [1], clause 9.

Table 2: Special conditions for EMC immunity tests

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 9
9.7.3 Performance criteria; Voltage dips and interruptions	**Special performance criteria for voltage dips and interruptions:** For a voltage dip corresponding to a reduction of the supply voltage of **30 % for 10 ms** the following performance criteria shall apply: - for repeaters and ancillary RF amplifiers, the performance criteria **TRptr**; 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 following performance criteria shall apply: - for repeaters, ancillary RF amplifiers and associated ancillary equipment, the performance criterion **TRptr** shall apply following a period for stabilization of the EUT after the supply voltage is restored to its nominal value. This period shall be as declared by the manufacturer or, if no value is declared, 1 min.

Annex A (informative): Examples of GSM and DCS radio equipment in the scope of the present document

The present document covers types of GSM and DCS radio telecommunications equipment as set out below.

A.1 GSM base station, ancillary RF amplifiers, and GSM repeaters meeting Phase 2 and 2+

The present document applies to GSM base stations, ancillary RF amplifiers, and GSM repeaters meeting Phase 2 and 2+ requirements of the GSM digital cellular telecommunications system, and operating in the P-GSM 900 MHz, E-GSM 900 MHz or DCS 1 800 MHz bands.

A.2 Other types of GSM base station, ancillary RF amplifiers, and GSM repeaters

The present document is also applicable to:

- equipment which operates in other frequency bands, provided that the performance requirements (other than operating frequency) are the same as the Phase 2 or 2+ GSM requirements;
- equipment which is designed to meet Phase 1 GSM requirements, provided that it also meets the Phase 2 or 2+ GSM requirements.

NOTE: This provision is particularly intended for equipment, which is designed to meet either the Phase 1 or the Phase 2 or 2+ GSM requirements by a change of software.

Annex B (normative): Method of assessment of Performance for Continuous phenomena applied to Repeaters and Ancillary RF Amplifiers (CRptr)

B.1 Test purpose

The purpose of this test is to identify the degradation of performance for tests of immunity to continuous EMC phenomena.

B.2 Test method

An unmodulated RF signal shall be input to an RF connector which is the input to an amplifier within the EUT. The frequency shall be within the operating band of the EUT. The signal shall be monitored at an RF connector which is an output from the amplifier under test. The level of the RF signal shall be increased until the level at the output RF connector equals the manufacturers declared maximum RF output power for a single RF carrier.

The gain of the RF amplifier is the ratio, expressed in dB of the output power to the input power.

The gain shall be measured throughout the period of exposure to the phenomenon.

This test shall be performed for each RF connector which is the input to an RF amplifier. In each case, the gain of the amplifier shall be determined by measurement at an antenna connector which is one representative output from the amplifier. This may be achieved by performing one test for which the gain of all the amplifiers in the EUT is measured, or by repeating the test for each amplifier to be tested.

Care should be taken to ensure that the gain of an amplifier does not change due to any reason other than the phenomenon being applied. In particular:

- the ambient temperature should be stable;
- the power supply voltage should be stable;
- power should be applied for sufficient time before the start of testing for the internal temperature of the EUT to stabilize.

B.3 Performance assessment

The gain of the EUT shall be measured during the test.

Annex C (normative): Method of assessment of performance for Transient phenomena applied to Repeaters and ancillary RF amplifiers (TRptr)

C.1 Test purpose

The purpose of this test is to identify the degradation of performance for tests of immunity to transient EMC phenomena.

C.2 Test method

An unmodulated RF signal shall be input to an RF connector which is the input to an amplifier within the EUT. The frequency shall be within the operating band of the EUT. The signal shall be monitored at an RF connector which is an output from the amplifier under test. The level of the RF signal shall be increased until the level at the output RF connector equals the manufacturers declared maximum RF output power for a single RF carrier.

The gain of the RF amplifier is the ratio, expressed in dB of the output power to the input power.

The gain shall be measured before the test, and after each exposure.

This test shall be performed for each RF connector which is the input to an RF amplifier. In each case, the gain of the amplifier shall be determined by measurement at an antenna connector which is one representative output from the amplifier. This may be achieved by performing one test for which the gain of all the amplifiers in the EUT is measured, or by repeating the test for each amplifier to be tested.

Care should be taken to ensure that the gain of an amplifier does not change due to any reason other than the phenomenon being applied. In particular:

- the ambient temperature should be stable;
- the power supply voltage should be stable;
- power should be applied for sufficient time before the start of testing for the internal temperature of the EUT to stabilize.

C.3 Performance assessment

At the conclusion of each exposure the change in gain of the EUT shall be measured.

At the conclusion of the total test comprising the series of individual exposures, the change in gain of the EUT shall be measured.

History

Document history		
V1.1.1	September 2000	Publication
V1.2.1	April 2002	One-step Approval Procedure OAP 20020809: 2002-04-10 to 2002-08-09
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