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Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.4] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.2].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

The present document is part 52 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document specifies technical characteristics and methods of measurements for equipment the following equipment types:

1) digital cellular User Equipment (UE);
2) associated ancillary equipment.

Including individually and combinations of:

- UTRA, WCDMA (IMT-2000 Direct Spread, W-CDMA, UMTS)
- E-UTRA, LTE (IMT-2000 and IMT advanced) (see annex D)
- GSM (IMT-2000 SC, Technology GSM/EDGE) (see annex D)

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

Technical specifications related to the antenna port and emissions from the enclosure port of radio equipment 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 environmental classification and the emission and immunity requirements used in the present document are as stated in ETSI EN 301 489-1 [1], except for any special conditions included in the present document.

Base station (BS) equipment operating within network infrastructure is outside the scope of the present document. However, the present document does cover mobile and portable equipment that is intended to be operated in a fixed location while connected to the AC mains (see clause 5.5).

The present document covers the essential requirements of article 3.1(b) of Directive 2014/53/EU under the conditions identified in annex A.

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2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://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.

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

[1] ETSI EN 301 489-1 (V2.1.1) (11-2016): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements: Harmonised Standard covering the essential requirements of article 3.1(b) of the Directive 2014/53/EU and Harmonised Standard covering the essential requirements of article 6 of the Directive 2014/30/EU".

[2] ETSI TS 134 108 (V6.4.0) (10-2006): "Universal Mobile Telecommunications System (UMTS); Common test environments for User Equipment (UE); Conformance testing (3GPP TS 34.108 version 6.4.0 Release 6)".

[3] ETSI TS 125 101(V7.5.0) (10-2006): "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (FDD) (3GPP TS 25.101 version 7.5.0 Release 7)".

[4] ETSI TS 134 109 (V6.2.0) (09-2006): "Universal Mobile Telecommunications System (UMTS); Terminal logical test interface; Special conformance testing functions (3GPP TS 34.109 version 6.2.0 Release 6)".

[5] ETSI EN 300 296-1 (V1.4.1) (2013): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment using integral antennas intended primarily for analogue speech; Part 1: Technical characteristics and methods of measurement".

[6] Recommendation ITU-T P.64 (1999): "Determination of sensitivity/frequency characteristics of local telephone systems".

[7] Recommendation ITU-T P.76 (1988): "Determination of loudness ratings; fundamental principles".

[8] ETSI TS 125 102 (V7.4.0) (10-2006): "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (TDD) (3GPP TS 25.102 version 7.4.0 Release 7)".

[9] ETSI TS 136 101 (V8.4.0) (01-2009): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101 version 8.4.0 Release 8)".

[10] ETSI TS 136 508 (V8.1.0) (04-2009): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Common test environments for User Equipment (UE) conformance testing (3GPP TS 36.508 version 8.1.0 Release 8)".

[11] ETSI TS 136 509 (V8.0.1) (01-2009): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Special conformance testing function for User Equipment (UE) (3GPP TS 36.509 version 8.0.1 Release 8)".

[12] ETSI I-ETS 300 034-1 (Edition 1) (10-1993): "European digital cellular telecommunications system (Phase 1); Radio subsystem link control (GSM 05.08)".

[13] ETSI I-ETS 300 034-2 (Edition 1) (09-1993): "European digital cellular telecommunications system (Phase 1); Radio subsystem link control; Part 2: DCS extension (GSM 05.08-DCS)".

[14] ETSI ETS 300 578 (Edition 13) (03-1999): "Digital cellular telecommunications system (Phase 2) (GSM); Radio subsystem link control (GSM 05.08 V4.22.0)".

[15] ETSI TS 100 911 (V8.23.0) (11-2005): "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control (3GPP TS 05.08 version 8.23.0 Release 1999)".

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2.2 Informative 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 referenced document (including any amendments) applies.

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

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 TR 121 905 (V8.7.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Vocabulary for 3GPP Specifications (3GPP TR 21.905 version 8.7.0 Release 8)".

[i.2] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

[i.3] ETSI TR 125 990 (V3.0.0): "Universal Mobile Telecommunications System (UMTS); Vocabulary (3G TR 25.990 version 3.0.0 Release 1999)".

[i.4] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI 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

camped on a cell: UE is in idle mode and has completed the cell selection/reselection process and has chosen a cell

NOTE 1: The UE monitors system information and (in most cases) paging information.

NOTE 2: The services may be limited, and the PLMN may not be aware of the existence of the UE within the chosen cell.

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.

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

end-user data: manufacturer defined data patterns for data transfer testing

NOTE: Represents EUT's typical user application data pattern (e.g. photo, video, text file, message) in its characteristics.

idle mode:

- For UTRA/EUTRA equipment: state of User Equipment (UE) when switched on but with no Radio Resource Control (RRC) connection.
- For GSM: mode of operation of a receiver or a transceiver, where the Equipment Under Test (EUT) is powered, available for service and available to respond to a request to set up a call.

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

maximum throughput: maximum achievable throughput for a reference measurement channel

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

RXQUAL: measure of the received signal quality, which is generated by the mobile or portable equipment, for use as a criterion in the Radio Frequency (RF) power control and handover processes

NOTE: For more information see:

- ETSI I-ETSI ETS 300 034-1 [12] clause 8.2 for Phase 1 GSM 900 equipment;
- ETSI I-ETSI ETS 300 034-2 [13] clause 8.2 for Phase 1 DCS 1800 equipment; or

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- ETSI ETS 300 578 [14] clause 8.2 for Phase 2 GSM 900 or Phase 2 DCS 1800 equipment;
- ETSI TS 100 911 [15] clause 8.2 for Phase 2+ GSM 900 or Phase 2+ DCS 1800 equipment.

traffic mode: state of User Equipment (UE) when switched on and with Radio Resource Control (RRC) connection established

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

Universal Terrestrial Radio Access (UTRA): radio access network of the telecommunications system, incorporating mobile cellular and other functionality, that is the subject of specifications produced by 3GPP

User Equipment (UE): entity capable of accessing a set of cellular services via one or more radio interfaces

NOTE: This entity may be stationary or in motion within the cellular service area while accessing the Cellular services, and may simultaneously serve one or more users.

3.2 Abbreviations

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

NOTE: Refer to Terminology specifications ETSI TR 121 905 [i.1] and ETSI TR 125 990 [i.3] for further details.

AC Alternating Current
ARFCN Absolute Radio Frequency CHannel Number (see note)
BCCH Broadcast Control Channel (see note)
BER Bit Error Ratio
BLER BLock Error Ratio
BPF Band Pass Filter
BTS Base Transceiver Station
BS Base Station
BSS Base Station System
BW BandWidth
CCCH Common Control CHannel (see note)
CDMA Code Division Multiple Access
CF Centre Frequency
CR Continuous phenomena applied to Receivers (see clause 6.1.3)
CRC Cyclic Redundancy Check
CT Continuous phenomena applied to Transmitters (see clause 6.1.1)
DL Down Link (from BS to UE)
DRX Discontinuous Reception
DTX Discontinuous Transmission (see note)
EARFCN E-UTRA Absolute Radio Frequency Channel Number
EMC ElectroMagnetic Compatibility
EUT Equipment Under Test
E-UTRA Evolved Universal Terrestrial Radio Access
FDD Frequency Division Duplex
IMT-2000 International Mobile Telecommunications 2000
LR Location Registration
MRP Mouth Reference Point (artificial head)
MS Mobile Station
PC Personal Computer
PLMN Public Land Mobile Network
RF Radio Frequency
RRC Radio Resource Control
RXQUAL Receiver QUALity (see note)
SPL Sound Pressure Level
TDD Time Division Duplex
TR Transient phenomena applied to Receivers
TT Transient phenomena applied to Transmitters
UARFCN UTRA Absolute Radio Frequency Channel Number

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UE	User Equipment
UL	Up Link (From UE to BS)
UTRA	Universal Terrestrial Radio Access

4 Test conditions

4.1 General

For the purpose of the present document, the test conditions of ETSI EN 301 489-1 [1], clause 4, shall apply as appropriate. Further product related test conditions for digital cellular mobile and portable radio equipment are specified in the present document.

Whenever the EUT is provided with a detachable antenna, the EUT shall be tested with the antenna fitted in a manner typical of normal intended use, unless specified otherwise.

4.2 Arrangements for test signals

4.2.1 Arrangements for test signals for GSM and DCS

4.2.1.1 General for GSM and DCS

The provisions of ETSI EN 301 489-1 [1], clause 4.2 shall apply with the following modifications given in clauses 4.2.1.2 to 4.2.1.4.

4.2.1.2 GSM and DCS Arrangements for establishing a communications link

The nominal frequency of the wanted RF input signal (for the receivers) shall be selected by setting the Absolute Radio Frequency Channel Number (ARFCN) to an appropriate number (e.g. in case of GSM 900 MHz this is 60 to 65, and in case of GSM 1 800 MHz this is 690 to 706).

A communication link shall be set up with a suitable base station simulator (hereafter called "the test system").

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 transmit power;
- the downlink RXQUAL shall be monitored.

4.2.1.3 GSM and DCS Calibration of the overall audio link performance

Prior to the test sequence, the reference level of the speech output signal on both the downlink and uplink shall be recorded on the test instrumentation, as shown in figure 1.

If the equipment does not include acoustical transducers (e.g. a microphone or loudspeaker) the equivalent electrical reference levels shall be specified by the manufacturer.

The voice processor may often apply noise and echo cancellation algorithms which attempt to eliminate or reduce steady state audio signals as e.g. the 1 kHz calibration signals.

The calibration should be carried out with the noise and echo cancellation algorithms disabled. (Specific test software may be required).

If the noise and echo cancellation algorithms cannot be disabled then the reference level of the speech output signal should be measured using a max-hold detection on the audio level meter in order to determine the level before the noise and echo cancellation algorithms become effective.

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