

# ETSI EN 301 489-52 V1.3.1 (2024-11)



**ElectroMagnetic Compatibility (EMC)  
standard for radio equipment and services;  
Part 52: Specific conditions for Cellular Communication  
User Equipment (UE) radio and ancillary equipment;  
Harmonised Standard for ElectroMagnetic Compatibility**

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## Foreword

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

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].

National transposition dates	
Date of adoption of this EN:	6 November 2024
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## Modal verbs terminology

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# 1 Scope

The present document specifies the applicable test conditions, performance assessment, and performance criteria for Cellular Communication User Equipment (UE), including Customer Premise Equipment (CPE), Set Top Box (STB) containing cellular communication technologies, and the associated ancillary equipment in respect of ElectroMagnetic Compatibility (EMC) for equipment utilizing the technologies in table 1.

**Table 1: Technologies User Equipment (UE) radio and ancillary equipment Cellular Communication**

Cellular Mobile Communication Technology	Technology Generation	Standard Set	ETSI Deliverable
Global System for Mobile communications (GSM)	2G/3G	IMT-2000 SC single carrier	ETSI EN 301 511 [i.9]
CDMA Multi-Carrier (cdma2000)	2G/3G	IS-95/CDMA2000 - IMT-MC multi-carrier	ETSI EN 301 908-4 [i.10]
CDMA Direct Spread (UTRA FDD)	3G	IMT-2000 Direct Spread	ETSI EN 301 908-2 [i.11]
Evolved Universal Terrestrial Radio Access (E-UTRA)	4G	IMT-advanced	ETSI EN 301 908-13 [i.12]
New Radio (NR)	5G	IMT-2020	ETSI TS 138 521-1 [15] ETSI TS 138 521-2 [19] ETSI TS 138 521-3 [16]

Technical specifications related to the antenna port of radio equipment, radiated emissions from the enclosure port of radio equipment, and combinations of radio and associated ancillary equipment are not included in the present document. Such technical specifications are normally found in the relevant product standards for the effective use of the radio spectrum.

NOTE 1: The relationship between the present document and the essential requirements of article 3.1(b) of Directive 2014/53/EU [i.2] is given in annex A.

NOTE 2: The present document does not cover the radio base stations as specified in ETSI EN 301 489-50 [i.13].

Technical specifications related to conducted emission EMC requirements below 9 kHz on the AC mains port of radio equipment are not included in the present document.

NOTE 3: Such technical specifications are normally found in the relevant product family standards for AC mains powered equipment (e.g. EN 61000-3-2 [i.14] and EN 61000-3-3 [i.15]).

## 2 References

### 2.1 Normative references

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

- [1] [ETSI EN 301 489-1 \(V2.2.3\) \(11-2019\)](#): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility".

- [2] [ETSI TS 134 108 \(V15.2.0\) \(10-2019\)](#): "Universal Mobile Telecommunications System (UMTS); LTE; Common test environments for User Equipment (UE); Conformance testing (3GPP TS 34.108 version 15.2.0 Release 15)".
- [3] Void.
- [4] [ETSI TS 134 109 \(V17.0.0\) \(05-2022\)](#): "Universal Mobile Telecommunications System (UMTS); Terminal logical test interface; Special conformance testing functions (3GPP TS 34.109 version 17.0.0 Release 17)".
- [5] [ETSI EN 300 296-1 \(V1.4.1\) \(08-2013\)](#): "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 \(07/2022\)](#): "Determination of sensitivity/frequency characteristics of local telephone systems".
- [7] Void.
- [8] Void.
- [9] [ETSI TS 136 101 \(V17.11.0\) \(10-2023\)](#): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101 version 17.8.0 Release 17)".
- [10] [ETSI TS 136 508 \(V17.5.0\) \(05-2023\)](#): "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 17.4.0 Release 17)".
- [11] [ETSI TS 136 509 \(V17.4.0\) \(10-2023\)](#): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); Special conformance testing functions for User Equipment (UE) (3GPP TS 36.509 version 17.2.0 Release 17)".
- [12] [ETSI TS 136 521-1 \(V17.6.1\) \(07-2023\)](#): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Conformance testing (3GPP TS 36.521-1 version 17.5.0 Release 17)".
- [13] [ETSI TS 138 508-1 \(V17.10.0\) \(10-2023\)](#): "5G; 5GS; User Equipment (UE) conformance specification; Part 1: Common test environment (3GPP TS 38.508-1 version 17.7.0 Release 17)".
- [14] [ETSI TS 138 101-1 \(V17.11.0\) \(01-2023\)](#): "5G; NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone (3GPP TS 38.101-1 version 17.8.0 Release 17)".
- [15] [ETSI TS 138 521-1 \(V17.10.0\) \(10-2023\)](#): "5G; NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 1: Range 1 standalone (3GPP TS 38.521-1 version 17.7.0 Release 17)".
- [16] [ETSI TS 138 521-3 \(V17.10.0\) \(10-2023\)](#): "5G; NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios (3GPP TS 38.521-3 version 17.7.0 Release 17)".
- [17] [EN 55035:2017 + A11:2020](#): "Electromagnetic compatibility of multimedia equipment - Immunity requirements" (produced by CENELEC).
- [18] Void.
- [19] [ETSI TS 138 521-2 \(V17.4.0\) \(10-2023\)](#): "5G; NR; User Equipment (UE) conformance specification; Radio transmission and reception; Part 2: Range 2 standalone (3GPP TS 38.521-2 version 17.1.0 Release 17)".
- [20] [ETSI TS 138 101-2 \(V17.11.0\) \(10-2023\)](#): "5G; NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone (3GPP TS 38.101-2 version 17.8.0 Release 17)".



## 2.2 Informative references

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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 (V17.1.0) (05-2022): "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; 5G; Vocabulary for 3GPP Specifications (3GPP TR 21.905 version 17.1.0 Release 17)".
  - [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.
  - [i.5] ETSI GTS 05.08 (V3.8.0) (01-1995): "European digital cellular telecommunications system (Phase 1); Radio Subsystem Link Control (GSM 05.08)".
- NOTE: The technical content of ETSI I-ETS 300 034-1 has been transferred into ETSI GTS 05.08 (V3.8.0).
- [i.6] ETSI GTS 05.08-DCS (V3.0.0) (01-1995): "European digital cellular telecommunications system (Phase 1); Radio Subsystem Link Control; (GSM 05.08 - DCS-1800)".
- NOTE: The technical content of ETSI I-ETS 300 034-2 has been transferred into ETSI GTS 05.08-DCS (V3.0.0).
- [i.7] ETSI ETS 300 578 (Edition 13) (03-1999): "Digital cellular telecommunications system (Phase 2) (GSM); Radio subsystem link control (GSM 05.08 version 4.22.1)".
  - [i.8] Void.
  - [i.9] ETSI EN 301 511 (V12.5.1) (03-2017): "Global System for Mobile communications (GSM); Mobile Stations (MS) equipment; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".
  - [i.10] ETSI EN 301 908-4 (V6.2.1) (06-2013): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 4: CDMA Multi-Carrier (cdma2000) User Equipment (UE)".
  - [i.11] [ETSI EN 301 908-2 \(V13.1.1\) \(06-2020\)](#): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)".
  - [i.12] [ETSI EN 301 908-13 \(V13.2.1\) \(02-2022\)](#): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)".
  - [i.13] ETSI EN 301 489-50 (V2.3.1) (03-2021): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 50: Specific conditions for Cellular Communication Base Station (BS), repeater and ancillary equipment; Harmonised Standard for ElectroMagnetic Compatibility".

- [i.14] EN 61000-3-2 (2019) + A1(2021): "ELECTROMAGNETIC COMPATIBILITY (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current  $\leq 16$  A per phase)".
- [i.15] EN 61000-3-3 (2013) + A2 (2021): "Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current  $\leq 16$  A per phase and not subject to conditional connection".
- [i.16] ETSI TS 100 910 (V8.20.0) (11-2005): "Digital cellular telecommunications system (Phase 2+); Radio Transmission and Reception (3GPP TS 05.05 version 8.20.0 Release 1999)".
- [i.17] [Recommendation ITU-T P.76 \(11/1988\)](#): "Determination of loudness ratings; fundamental principles".

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## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

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

**ancillary equipment:** electrical or electronic equipment that is intended to be used with a receiver or transmitter

NOTE 1: It is considered as an ancillary equipment if:

- the equipment is intended for use with a receiver or transmitter to provide additional operational and/or control features to the radio equipment (e.g. to extend control to another position or location);
- the ancillary equipment cannot be used without being connected to radio equipment to provide user functions independently of a receiver or transmitter; and
- the receiver or transmitter, to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

NOTE 2: An example of ancillary equipment would be a docking station for radio equipment whose interface is dedicated to a particular product or range of products.

**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.

**critical stored data:** data that is essential for an EUT to perform a primary function in accordance with that EUT's specification

NOTE: This may include data previously stored by the user.

**data application ancillary:** ancillary which provides, sends and/or receives 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.

**fixed equipment:** equipment intended for use in a fixed location and fitted with one or more antennas

NOTE: The equipment may be fitted with either antenna socket(s) or, integral antenna(s) or both.

**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.
- For NR equipment: state of User Equipment (UE) when switched on but with no Radio Resource Control (RRC) connection.

**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

**License Assisted Access (LAA):** LTE based base station operating in unlicensed frequency spectrum

**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

**NB-IoT guard band operation:** operation of NB-IoT guard band utilizing the unused resource block(s) within an E-UTRA carrier's guard-band

**NB-IoT in-band operation:** operation of NB-IoT in-band utilizing the resource block(s) within a normal E-UTRA carrier

**NB-IoT standalone operation:** operation of NB-IoT standalone utilizing its own spectrum, for example the spectrum currently being used by GERAN systems as a replacement of one or more GSM carriers, as well as scattered spectrum for potential IoT deployment

**necessary bandwidth:** for a given class of emission, 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

**portable equipment:** radio equipment intended for portable use and powered by integral batteries or battery

NOTE: Devices will typically be handheld.

**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 GTS 05.08 [i.5], clause 8.2 for Phase 1 GSM 900 equipment;
- ETSI GTS 05.08-DCS [i.6], clause 8.2 for Phase 1 GSM 1800 equipment;
- ETSI ETS 300 578 [i.7], clause 8.2 for Phase 2 GSM 900 or Phase 2 GSM 1800 equipment;
- ETSI TS 100 910 [i.16], clause 8.2 for Phase 2+ GSM 900 or Phase 2+ GSM 1800 equipment.

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

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