



**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 covering the essential requirements
of article 3.1(b) of Directive 2014/53/EU**

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Foreword

This final 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 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.15] 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.1].

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 has been produced to rationalize the current ETSI EN 301 489 series [i.9] of EMC standards by collating the EMC requirements for Digital Cellular Communication Base Station (BS), repeater and ancillary Equipment into a single standard, there are no technical changes to product EMC Test requirements. The present document has been produced to replace ETSI EN 301 489-8 [i.9] (GSM/EDGE), ETSI EN 301 489-23 [i.9] (WCDMA and LTE, UTRA/E-UTRA), ETSI EN 301 489-26 [i.9] CDMA, 2000 1x and those parts of ETSI EN 301 489-4 [i.9] which pertain to OFDMA WMAN BS and to incorporate MSR and OFDMA WMAN.

The present document is part 50 of a multi-part deliverable. Full details of the entire series can be found in part [1].

Proposed national transposition dates	
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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).

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1 Scope

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

- 1) digital cellular base station equipment;
- 2) repeaters;
- 3) 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)
- GSM (IMT-2000 SC, Technology GSM/EDGE)
- MSR (IMT-2000 and IMT advanced, combination of technologies above)
- OFDMA WMAN (IMT-2000 OFDMA, OFDMA WMAN)
- CDMA (CDMA2000 – IMT MC, CDMA2000 1X)

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.

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 ETSI 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 ETSI EN 301 489-1 [1], except for any special conditions included in the present document.

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

Technical specifications related to the antenna port of radio equipment and radiated emissions from the enclosure port of radio equipment and combinations of radio and associated ancillary equipment are given in the harmonised product standards ETSI EN 301 908-1 [28] or ETSI EN 301 502 [8] for the effective and efficient use of the radio spectrum.

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.

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- [1] ETSI EN 301 489-1 (V2.1.1) (11-2016): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Harmonised Standard covering the essential requirements of article 3.1(b) of the Directive 2014/53/EU and the essential requirements of article 6 of the Directive 2014/30/EU; Part 1: Common technical requirements".
- [2] ETSI TS 125 141 (V12.6.0) (01-2015): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 12.6.0 Release 12)".
- [3] ETSI TS 125 142 (V12.1.0) (01-2015): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (TDD) (3GPP TS 25.142 version 12.1.0 Release 12)".
- [4] ETSI TS 125 143 (V12.1.0) (01-2015): "Universal Mobile Telecommunications System (UMTS); UTRA repeater conformance testing (3GPP TS 25.143 version 12.1.0 Release 12)".
- [5] ETSI TS 136 104 (V12.8.0) (07-2015): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 12.8.0 Release 12)".
- [6] ETSI TS 136 141 (V12.8.0) (07-2015): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141 version 12.8.0 Release 12)".
- [7] ETSI TS 145 008 (V12.4.0) (01-2015): "Digital cellular telecommunications system (Phase 2+); Radio subsystem link control (3GPP TS 45.008 version 12.4.0 Release 12)".
- [8] ETSI EN 301 502 (V12.1.6) (01-2016): "Global System for Mobile communications (GSM); Base Station (BS) equipment; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
- [9] ETSI TS 151 021 (V12.3.0) (01-2015): "Digital cellular telecommunications system (Phase 2+); Base Station System (BSS) equipment specification; Radio aspects (3GPP TS 51.021 version 12.3.0 Release 12)".
- [10] Void.
- [11] ETSI TS 137 104 (V12.8.0) (07-2015): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) radio transmission and reception (3GPP TS 37.104 version 12.8.0 Release 12)".
- [12] ETSI TS 137 141 (V12.8.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) conformance testing (3GPP TS 37.141 version 12.8.0 Release 12)".
- [13] ETSI EN 301 908-5 (V5.2.1) (09-2011): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 5: CDMA Multi-Carrier (cdma2000) Base Stations (BS)".
- [14] ETSI EN 301 908-7 (V4.2.1) (03-2010): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 7: Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD and E-UTRA TDD) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive".
- [15] ETSI EN 301 908-20 (V6.3.1) (05-2016): "IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 20: OFDMA TDD WMAN (Mobile WiMAX™) TDD Base Stations (BS)".

- [16] ETSI EN 301 908-22 (V6.1.0) (05-2016): "IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 22: OFDMA TDD WMAN (Mobile WiMAX™) FDD Base Stations (BS)".
- [17] ETSI EN 302 544-1 (V1.1.2) (01-2010): "Broadband Data Transmission Systems operating in the 2 500 MHz to 2 690 MHz frequency band; Part 1: TDD Base Stations; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".
- [18] TIA-97 (2014): "Recommended Minimum Performance Standard for cdma2000 Spread Spectrum Base Stations".
- [19] TIA-2000 Series, Revision F: "Introduction to CDMA2000 spread spectrum systems **Includes TIA-2000.1 (2013), TIA-2000.2 (2014), TIA-2000.3 (2014), TIA-2000.4 (2014), and TIA-2000.5 (2014)**".
- [20] ETSI EN 301 449 (V1.1.1) (07-2006): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Harmonized EN for CDMA spread spectrum base stations operating in the 450 MHz cellular band (CDMA 450) and 410, 450 and 870 MHz PAMR bands (CDMA-PAMR) covering essential requirements of article 3.2 of the R&TTE Directive".
- [21] ETSI EN 302 426 (V1.1.1) (09-2006): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Harmonized EN for CDMA spread spectrum Repeaters operating in the 450 MHz cellular band (CDMA450) and the 410 MHz, 450 MHz and 870 MHz PAMR bands (CDMA-PAMR) covering essential requirements of article 3.2 of the R&TTE Directive".
- [22] ETSI TS 125 101 (V12.8.0) (07-2015): "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (FDD) (3GPP TS 25.101 version 12.8.0 Release 12)".
- [23] ETSI TS 125 102 (V12.0.0) (10-2014): "Universal Mobile Telecommunications System (UMTS); User Equipment (UE) radio transmission and reception (TDD) (3GPP TS 25.102 version 12.0.0 Release 12)".
- [24] ETSI TS 136 101 (V12.8.0) (09-2015): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception (3GPP TS 36.101 version 12.8.0 Release 12)".
- [25] ETSI TS 136 143 (V12.1.0) (02-2015): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); FDD repeater conformance testing (3GPP TS 36.143 version 12.1.0 Release 12)".
- [26] ETSI TS 151 010-1 (V12.4.0) (06-2015): "Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP TS 51.010-1 version 12.4.0 Release 12)".
- [27] ETSI TS 137 113 (V12.3.0) (02-2015): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) Electromagnetic Compatibility (EMC) (3GPP TS 37.113 version 12.3.0 Release 12)".
- [28] ETSI EN 301 908-1 (V11.0.1) (01-2016): "IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements".

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.

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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] 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.2] Void.
- [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] ETSI TS 136 106: "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); FDD repeater radio transmission and reception (3GPP TS 36.106)".
- [i.7] Void.
- [i.8] Void.
- [i.9] ETSI EN 301 489 (all parts): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".
- [i.10] Void.
- [i.11] Void.
- [i.12] Void.
- [i.13] Void.
- [i.14] Recommendation ITU-R SM.329-12: "Unwanted emissions in the spurious domain".
- [i.15] 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:

abis interface: logical interface between a BTS and a BSC

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

CDMA 1x Spread Spectrum: wireless air interface standard for spread-spectrum technology with a spreading rate 1

CDMA-PAMR: Public Access Mobile Radio system based on TIA-2000 [19] Spreading Rate 1 specifications

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.

forward CDMA channel: CDMA channel from a base station to mobile stations

NOTE: The forward CDMA channel contains one or more code channels that are transmitted on a CDMA frequency assignment using a particular pilot PN offset.

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

MB Base Station: Multi-Band Base Station characterized by the ability of its transmitter and/or receiver to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s)

MSR Base Station: Base Station characterized by the ability of its receiver and transmitter to process two or more carriers in common active RF components simultaneously in a declared RF bandwidth, where at least one carrier is of a different RAT than the other carrier(s)

necessary bandwidth: As defined in Recommendation ITU-R SM.329-12 [i.14].

Radio Configuration (RC): set of Forward Traffic Channel and Reverse Traffic Channel transmission formats that are characterized by physical layer parameters such as transmission rates, modulation characteristics, and spreading rate

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

NOTE: See figures 1a and 1b.

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

NOTE: See figures 1a and 1b.

radio unit: equipment which contains transmitter and receiver

NOTE: See figures 1a and 1b.

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

reverse CDMA channel: CDMA channel from the mobile station to the base station

NOTE: From the base station's perspective, the Reverse CDMA Channel is the sum of all mobile station transmissions on a CDMA frequency assignment.

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

NOTE: The characteristics and requirements are specified in ETSI TS 145 008 [7], clause 8.2.

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

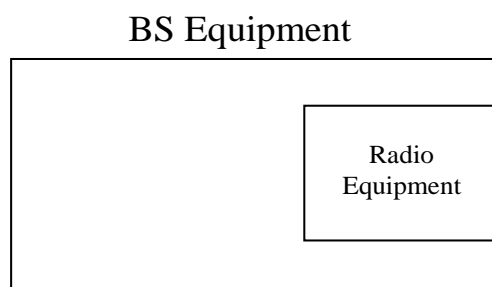


Figure 1a: BS with single enclosure solution

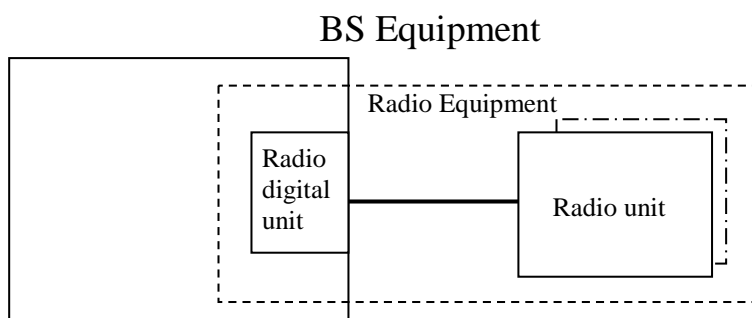


Figure 1b: BS with multiple enclosure solution

3.2 Abbreviations

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

AC	Alternating Current
ARFCN	Absolute Radio Frequency Channel Number
BER	Bit Error Ratio
BLER	Block Error Ratio
BS	Base Station
BSC	Base Station Controller
BSS	Base Station System
BTS	Base Transceiver Station
BW _{Channel}	Channel bandwidth
CDMA	Code Division Multiple Access
CNC	Contiguous and Non-Contiguous operation
CRC	Cyclic Redundancy Check
CS	Capability Set
DC	Direct Current
DCS	Digital Cellular System
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
FER	Frame Error Rate
FRC	Fixed Reference Channel
GSM	Global System for Mobile communication
HW	HardWare
IF	Intermediate Frequency
IMT	International Mobile Telecommunications
IMT-2000	International Mobile Telecommunications 2000
IP	Internet Protocol
ISDN	Integrated Services Digital Network
Iub	Interface between RNC and BS
LTE	Long Term Evolution
MB	Multi-band
MC	Multi-Carrier
MSR	Multi Standard Radio
NC	Non-Contiguous operation
OFDMA	Orthogonal Frequency-Division Multiple Access
PAMR	Public Access Mobile Radio
PN	Pseudorandom Number
PSTN	Public Switched Telephone Network
RAT	Radio Access Technology
RC	Radio Configuration
RF	Radio Frequency