

ETSI EN 301 908-11 V4.2.1 (2010-03)

Harmonized European Standard (Telecommunications series)

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Base Stations (BS), Repeaters and User Equipment (UE)
for IMT-2000 Third-Generation cellular networks;
Part 11: Harmonized EN for IMT-2000,
CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (Repeaters)
covering the essential requirements
of article 3.2 of the R&TTE Directive**

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Contents

Intellectual Property Rights	5
Foreword.....	5
Introduction	6
1 Scope	7
2 References	7
2.1 Normative references	8
2.2 Informative references.....	8
3 Definitions, symbols and abbreviations	9
3.1 Definitions	9
3.2 Symbols.....	9
3.3 Abbreviations	9
4 Technical requirements specifications	10
4.1 Environmental profile.....	10
4.2 Conformance requirements	10
4.2.1 Introduction.....	10
4.2.2 Operating band unwanted emissions	11
4.2.2.1 Definition	11
4.2.2.2 Limit.....	11
4.2.2.2.1 General operating band unwanted emission requirements	11
4.2.2.2.2 Operating band emission mask requirements	11
4.2.2.2.3 Protection of the BS receiver in the operating band.....	13
4.2.2.3 Conformance.....	13
4.2.3 Spurious emissions	13
4.2.3.1 Definition	13
4.2.3.2 Limit.....	14
4.2.3.2.1 Spurious emissions	14
4.2.3.2.2 Co-existence with other systems	14
4.2.3.3 Conformance.....	15
4.2.4 Maximum output power.....	15
4.2.4.1 Definition	15
4.2.4.2 Limit.....	15
4.2.4.3 Conformance.....	16
4.2.5 Input intermodulation	16
4.2.5.1 Definition	16
4.2.5.2 Limit.....	16
4.2.5.2.1 General input intermodulation requirement.....	16
4.2.5.2.2 Co-existence with other systems	17
4.2.5.3 Conformance.....	17
4.2.6 Out of band gain	17
4.2.6.1 Definition	17
4.2.6.2 Limits	18
4.2.6.3 Conformance.....	18
4.2.7 Adjacent Channel Rejection Ratio.....	18
4.2.7.1 Definition	18
4.2.7.2 Limit.....	18
4.2.7.3 Conformance.....	19
4.2.8 Output intermodulation.....	19
4.2.8.1 Definition	19
4.2.8.2 Limit.....	19
4.2.8.3 Conformance.....	19
5 Testing for compliance with technical requirements.....	19
5.1 Environmental conditions for testing	19
5.2 Interpretation of the measurement results	20

5.3	Essential radio test suites.....	21
5.3.1	Operating band unwanted emission	21
5.3.1.1	Initial conditions	21
5.3.1.2	Procedures.....	22
5.3.2	Spurious emissions	22
5.3.2.1	Initial conditions	22
5.3.2.2	Procedure	22
5.3.3	Maximum output power.....	23
5.3.3.1	Initial conditions	23
5.3.3.2	Procedure	23
5.3.4	Input intermodulation	23
5.3.4.1	Initial conditions	23
5.3.4.2	Procedures.....	23
5.3.5	Out of band gain	24
5.3.5.1	Initial conditions	24
5.3.5.2	Procedure	24
5.3.6	Adjacent Channel Rejection Ratio.....	24
5.3.6.1	Initial conditions	24
5.3.6.2	Procedures.....	24
5.3.7	Output intermodulation.....	25
5.3.7.1	Initial conditions	25
5.3.7.2	Procedures.....	25
Annex A (normative):	HS Requirements and conformance Test specifications Table (HS-RTT).....	26
Annex B (normative):	Repeater configurations	28
B.1	Power supply	28
B.2	Power supply options	28
B.3	Combining of Repeaters.....	28
Annex C (informative):	Environmental profile specification	29
Annex D (informative):	The EN title in the official languages	30
Annex E (informative):	Bibliography.....	31
History	32

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Foreword

This 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 [i.1] (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 Directive 1999/5/EC [1] 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").

Technical specifications relevant to Directive 1999/5/EC [1] are given in annex A.

The present document is part 11 of a multi-part deliverable covering the Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks, as identified below:

- Part 1: "Harmonized EN for IMT-2000, introduction and common requirements, covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 2: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 3: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 4: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) and Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 5: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) and Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 6: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD and E-UTRA TDD) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- 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";
- Part 8: "Harmonized EN for IMT-2000, TDMA Single-Carrier (UWC 136) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 9: "Harmonized EN for IMT-2000, TDMA Single-Carrier (UWC 136) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

- Part 10: "Harmonized EN for IMT-2000, FDMA/TDMA (DECT) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 11: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive";**
- Part 12: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 13: "Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 14: "Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 15: "Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (FDD Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 16: "Harmonized EN for IMT-2000, Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 17: "Harmonized EN for IMT-2000, Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive".

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Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive [1]. The modular structure is shown in EG 201 399 [i.2].

1 Scope

The present document applies to the following radio equipment type:

- Repeaters for IMT-2000 CDMA Direct Spread (UTRA FDD and E-UTRA FDD).

This radio equipment type is capable of operating in all or any part of the frequency bands given below.

Table 1-1: UTRA Repeater operating bands

UTRA FDD Band	Direction of transmission	UTRA Repeater operating bands
I	Downlink	2 110 MHz to 2 170 MHz
	Uplink	1 920 MHz to 1 980 MHz
III	Downlink	1 805 MHz to 1 880 MHz
	Uplink	1 710 MHz to 1 785 MHz
VII	Downlink	2 620 MHz to 2 690 MHz
	Uplink	2 500 MHz to 2 570 MHz
VIII	Downlink	925 MHz to 960 MHz
	Uplink	880 MHz to 915 MHz

The present document covers requirements for UTRA FDD Repeater for Release 4, 5, 6, 7 and 8 and E-UTRA FDD Repeater for Release 8.

The present document is intended to cover the provisions of Directive 1999/5/EC [1] article 3.2, which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of Article 3 of the R&TTE Directive [1] may apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the web site <http://www.newapproach.org>

2 References

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.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

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 indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] 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).
- [2] Void.
- [3] ETSI TS 125 143 (V8.3.0): "Universal Mobile Telecommunications System (UMTS); UTRA repeater conformance testing (3GPP TS 25.143 version 8.3.0 Release 8)".
- [4] ITU-R Recommendation SM.329-10 (2003): "Unwanted emissions in the spurious domain".
- [5] ETSI TS 125 141 (V8.8.0): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 8.8.0 Release 8)".
- [6] IEC 60068-2-1 (2007): "Environmental testing - Part 2-1: Tests - Test A: Cold".
- [7] IEC 60068-2-2 (2007): "Environmental testing - Part 2-2: Tests - Test B: Dry heat".
- [8] ETSI EN 301 908-1 (V4.1.2): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 1: Harmonized EN for IMT-2000, introduction and common requirements, covering the essential requirements of article 3.2 of the R&TTE Directive".
- [9] ETSI EN 301 908-15 (V4.1.2): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 15: Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (FDD Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] 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.2] ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive".
- [i.3] ETSI TR 102 215: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Recommended approach, and possible limits for measurement uncertainty for the measurement of radiated electromagnetic fields above 1 GHz".
- [i.4] ETSI TR 100 028 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

donor coupling loss: coupling loss between the Repeater and the donor Base Station

downlink: signal path where Base Station transmits and mobile receives

downlink operating band: part of the operating band designated for downlink (BS transmit)

maximum output power (P_{max}): mean power level per carrier measured at the antenna connector of the Repeater in specified reference condition

maximum rated output power: maximum rated output power of the repeater is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector

operating band: frequency range that is defined with a specific set of technical requirements, in which UTRA FDD operates

NOTE: The operating band(s) for an UTRA FDD repeater is declared by the manufacturer according to the designations in table 1-1.

pass band: frequency range that the Repeater operates in with operational configuration

NOTE 1: This frequency range can correspond to one or several consecutive nominal 5 MHz channels. If they are not consecutive each subset of channels has to be considered as an individual pass band.

NOTE 2: The Repeater can have one or several pass bands.

repeater: device that receives, amplifies and transmits the radiated or conducted RF carrier both in the downlink direction (from the Base Station to the mobile area) and in the uplink direction (from the mobile to the Base Station)

uplink: signal path where mobile transmits and Base Station receives

uplink operating band: part of the operating band designated for downlink (BS transmit)

3.2 Symbols

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

Δf	The separation between the centre frequency of first or last 5 MHz channel used in the pass band and the nominal -3 dB point of the measuring filter closest to the carrier frequency
Δf_{\max}	The largest value of Δf used for defining the requirement
P _{max}	Maximum output power
P _{out}	Output power

3.3 Abbreviations

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

ACLR	Adjacent Channel Leakage power Ratio
ACRR	Adjacent Channel Rejection Ratio
BS	Base Station
BTS	Base Transceiver Station
CW	Continuous Wave

NOTE: Unmodulated signal.

DCS	Digital Cellular System
-----	-------------------------

DUT	Device Under Test
E-UTRA	Evolved Universal Terrestrial Radio Access
EUT	Equipment Under Test
FDD	Frequency Division Duplexing
GSM	Global System for Mobile Communications
IMT-2000	International Mobile Telecommunications 2000
MS	Mobile Station
PCCPCH	Primary Common Control Physical CHannel
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
RMS	Root Mean Square
RRC	Root Raised Cosine
RSS	Root Sum Square
SCCPCH	Secondary Common Control Physical CHannel
TDD	Time Division Duplexing
UARFCN	UTRA Absolute Radio Frequency Channel Number
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UTRA	Universal Terrestrial Radio Access
WCDMA	Wideband Code Division Multiple Access

4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the supplier. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

For guidance on how a supplier can declare the environmental profile see annex C.

4.2 Conformance requirements

The requirements in the present document are based on the assumption that the operating band (e.g. band I, III, VII and VIII) is shared between systems of the IMT-2000 family (for band III and VIII also GSM) or systems having compatible characteristics. Requirements for E-UTRA FDD Repeater are given in EN 301 908-15 [9].

4.2.1 Introduction

To meet the essential requirement under article 3.2 of Directive 1999/5/EC [1] (R&TTE Directive) for IMT-2000 Repeater five essential parameters in addition to those in EN 301 908-1 [8] have been identified. Table 4.2.1-1 provides a cross reference between these five essential parameters and the corresponding seven technical requirements for equipment within the scope of the present document.

Table 4.2.1-1: Cross references

Essential parameter	Corresponding technical requirements
Spectrum emissions mask	4.2.2 Operating band unwanted emissions
Conducted spurious emissions from the antenna connector	4.2.3 Spurious emissions
Accuracy of maximum output power	4.2.4 Maximum output power
Receiver immunity	4.2.5 Input intermodulation
	4.2.6 Out of band gain
	4.2.7 Adjacent Channel Rejection Ratio
Intermodulation attenuation of the output	4.2.8 Output intermodulation

The supplier shall declare operating band(s) for the Repeater. The technical requirements apply for the declared operating band(s) as outlined for each requirement. For a Repeater supporting more than one operating band, conformance testing for each technical requirement in clause 5 shall be performed. For each operating band, Repeater supporting E-UTRA FDD shall fulfil requirements in EN 301 908-15 [9].

The technical requirements also apply to Repeater configurations described in annex B.

4.2.2 Operating band unwanted emissions

4.2.2.1 Definition

Unwanted emissions consist of out-of-band emissions and spurious emissions [4]. Out of band emissions are emissions immediately outside the pass band bandwidth resulting from the modulation process and non-linearity in the transmitter, but excluding spurious emissions. Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions.

The out-of-band emissions requirement for repeater is specified both in terms operating band unwanted emissions and protection of the BS receiver in the operating band. The Operating band unwanted emissions define all unwanted emissions in the repeater operating band plus the frequency ranges 10 MHz above and 10 MHz below that band. Unwanted emissions outside of this frequency range are limited by a spurious emissions requirement.

Operating band unwanted emissions comprise an emission mask applied outside the repeater passband and a general requirement applied outside the mask but inside the frequency range of the operating band unwanted emissions.

4.2.2.2 Limit

4.2.2.2.1 General operating band unwanted emission requirements

The general operating band unwanted emissions limits are given in table 4.2.2.2.1-1.

Table 4.2.2.2.1-1: General operating band unwanted emissions requirements

Frequency range of operating band	Maximum level	Measurement bandwidth	Notes
≤ 1 GHz	-16 dBm	100 kHz	1,2
≥ 1 GHz	-15 dBm	1 MHz	2,3
NOTE 1: Bandwidth as in ITU-R Recommendation SM.329-10 [4], section 4.1.			
NOTE 2: Limit based on ITU-R Recommendation SM.329-10 [4], section 4.3 and annex 7.			
NOTE 3: Bandwidth as in ITU-R Recommendation SM.329-10 [4], section 4.1. Upper frequency as in ITU-R Recommendation SM.329-10 [4], section 2.5 table 1.			

4.2.2.2.2 Operating band emission mask requirements

The requirement shall be met by a Repeater's RF-signal output at maximum gain with WCDMA signals in the pass band of the Repeater, at levels that produce the maximum rated output power per channel, configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified in tables 4.2.2.2.2-1, 4.2.2.2.2-2, 4.2.2.2.2-3 and 4.2.2.2.2-4 for the appropriate Repeater maximum output power, in the frequency range from $\Delta f = 2,5$ MHz to Δf_{\max} from the 5 MHz channel, where:

- Δf is the separation between the centre frequency of first or last 5 MHz channel used in the pass band and the nominal -3 dB point of the measuring filter closest to the carrier frequency;
- f_{offset} is the separation between the centre frequency of first or last 5 MHz channel in the pass band and the centre of the measuring filter;
- $f_{\text{offset}_{\max}}$ is 12,5 MHz;
- Δf_{\max} is equal to $f_{\text{offset}_{\max}}$ minus half of the bandwidth of the measurement filter.