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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 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**

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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 [i.2] 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 [i.2] are given in annex A.

The present document is part 7 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".

National transposition dates	
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Date of latest announcement of this EN (doa):	31 May 2010
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 2010
Date of withdrawal of any conflicting National Standard (dow):	30 November 2011

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 [i.2]. The modular structure is shown in EG 201 399 [i.3].

1 Scope

The present document applies to the following radio equipment type:

- Base stations for IMT-2000 CDMA TDD (UTRA TDD and E-UTRA TDD).

This radio equipment type is capable of operating in all or any part of the frequency bands given in table 1-1.

Table 1-1: CDMA TDD Base Station frequency bands

UTRA TDD Band	Direction of transmission	IMT-2000 CDMA TDD service operating bands
a	Transmit and Receive	1 900 MHz to 1 920 MHz
	Transmit and Receive	2 010 MHz to 2 025 MHz
d	Transmit and Receive	2 570 MHz to 2 620 MHz

The requirements in the present document apply to both Wide Area Base Stations and Local Area Base Stations unless otherwise stated.

The UTRA TDD component of IMT-2000 CDMA TDD supports three options of the TDD mode with the chip rates of 3,84 Mchip/s, 1,28 Mchip/s and 7,68 Mchip/s. These three options are called the 3,84 Mcps TDD option, the 1,28 Mchip/s TDD option and the 7,68 Mcps TDD option respectively. The requirements are listed in different clauses only if the parameters deviate.

The present document covers requirements for:

- 3,84 Mcps TDD option Base Station for Releases 99, 4, 5, 6, 7 and 8;
- 1,28 Mcps TDD option Base Stations for Releases 4, 5, 6, 7 and 8;
- 7,68 Mcps TDD option Base Stations for Releases 7 and 8;
- E-UTRA TDD Base Stations for Release 8.

For general purpose Base Stations of Releases 99 and 4 only the requirements for Wide Area Base Stations shall apply.

The present document is intended to cover the provisions of Directive 1999/5/EC [i.2] (R&TTE Directive) 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 [i.2] 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] Void.
- [2] ETSI TS 125 105 (V8.5.0): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (TDD) (3GPP TS 25.105 version 8.5.0 Release 8)".
- [3] ETSI TS 125 142 (V8.4.0): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (TDD) (3GPP TS 25.142 version 8.4.0 Release 8)".
- [4] ITU-R Recommendation SM.329-10 (2003): "Unwanted emissions in the spurious domain".
- [5] 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".
- [6] ETSI EN 301 908-14 (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 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".

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] 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).
- [i.3] 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.4] ETSI TR 100 028 (V1.4.1) (all parts): "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:

ancillary RF amplifier: piece of equipment, which when connected by RF coaxial cables to the BS, has the primary function to provide amplification between the transmit and/or receive antenna connector of a BS and an antenna without requiring any control signal to fulfil its amplifying function

B: appropriate frequency in the Bottom of the operating frequency band of the BS: "RF channel"

Base Station class: wide area Base Station or local area Base Station, as declared by the manufacturer

chip rate: rate of "chips" (modulated symbols after spreading) per second

DPCHo: mechanism used to simulate an individual intracell interferer in the cell with one code and a spreading factor of 16

environmental profile: range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

F_{uw}: frequency offset of the unwanted interfering signal from the assigned channel frequency of the wanted signal

local area Base Station: Base Station, characterized by requirements derived from Pico Cell scenarios with a BS to UE coupling loss equals to 45 dB

M: appropriate frequency in the Middle of the operating frequency band of the BS: "RF channel"

maximum output power (P_{max}): mean power level per carrier of the Base Station measured at the antenna connector in a specific reference condition, where the period of measurement shall be a transmit timeslot excluding the guard period

mean power: when applied to a CDMA modulated signal this is the power (transmitted or received) in a bandwidth of at least $(1 + \alpha)$ times the chip rate of the radio access mode, where the period of measurement shall be a transmit timeslot excluding the guard period unless otherwise stated

output power: mean power of one carrier of the Base Station, delivered to a load with resistance equal to the nominal load impedance of the transmitter

RATed output Power (PRAT): mean power level per carrier that the manufacturer has declared to be available at the antenna connector

RRC filtered mean power: mean power as measured through a root raised cosine filter with roll-off factor α and a bandwidth equal to the chip rate of the radio access mode

T: appropriate frequency in the Top of the operating frequency band of the BS: "RF channel"

wide area Base Stations: Base Station, characterized by requirements derived from macrocell and microcell scenarios with BS to UE coupling losses equal to 70 dB and 53 dB

3.2 Symbols

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

α	roll-off factor, $\alpha = 0,22$
Ω	electrical impedance
$\frac{DPCH_o - E_c}{I_{or}}$	ratio of the average transmits energy per PN chip for the DPCH _o to the total transmit power spectral density in one time slot

F	Frequency (of the assigned channel frequency of the wanted signal)
F_{uw}	the frequency offset of the unwanted interfering signal from the assigned channel frequency of the wanted signal
P_i	power of the signal at antenna connector i
P_s	sum of the power for all antenna connectors

3.3 Abbreviations

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

16QAM	16 - Quadrature Amplitude Modulation
3GPP	3 rd Generation Partnership Project
ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
BER	Bit Error Ratio
BS	Base Station
BTS	Base Transceiver Station
CDMA	Code Division Multiple Access
CW	Continuous Wave

NOTE: Unmodulated signal.

dB	deciBel
dBm	deciBel relative to 1 milliwatt
DC	Direct Current
DCS	Digital Cellular System
DL	Down Link (forward link)
DPCH	Dedicated Physical CHannel
DUT	Device Under Test
EUT	Equipment Under Test
E-UTRA	Evolved Universal Terrestrial Radio Access
FDD	Frequency Division Duplexing
GSM	Global System for Mobile
HS-PDSCH	High Speed Physical Downlink Shared CHannel
IMT-2000	International Mobile Telecommunications 2000
MS	Mobile Station
P	output Power
P_{max}	Maximum output power of the Base Station
PRAT	RATed output Power of the Base Station
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
RMS	Root-Mean Square
RRC	Root-Raised Cosine
Rx	Receiver
SCH	Synchronization CHannel
TDD	Time Division Duplexing
TRX	Transmitter-Receiver
TS	Time Slot
Tx	Transmitter
UARFCN	UTRA Absolute Radio Frequency Channel Number
UE	User Equipment
UL	Up Link (reverse link)
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 required operational environmental profile.

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

4.2 Conformance requirements

This clause describes the conformance requirements for UTRA TDD. E-UTRA Base Station conformance requirements are given in EN 301 908-14 [6].

4.2.1 Introduction

To meet the essential requirement under article 3.2 of the R&TTE Directive [i.2] for IMT-2000 Base Stations (BS) seven essential parameters in addition to those in EN 301 908-1 [5] have been identified. Table 4.2.1-1 provides a cross reference between these seven essential parameters and the corresponding nine technical requirements for equipment within the scope of the present document.

To fulfil an essential parameter the compliance with all the corresponding technical requirements in table 4.2.1-1 must be verified.

Table 4.2.1-1: Cross references

Essential parameter	Corresponding technical requirements
Spectrum emissions mask	4.2.2 Spectrum emission mask
	4.2.3 Transmitter Adjacent Channel Leakage power Ratio (ACLR)
Conducted spurious emissions from the transmitter antenna connector	4.2.4 Transmitter spurious emissions
Accuracy of maximum output power	4.2.5 Base station maximum output power
Intermodulation attenuation of the transmitter	4.2.6 Transmit intermodulation
Conducted spurious emissions from the receiver antenna connector	4.2.7 Receiver spurious emissions
Impact of interference on receiver performance	4.2.8 Receiver blocking characteristics
	4.2.9 Receiver intermodulation characteristics
Receiver adjacent channel selectivity	4.2.10 Receiver Adjacent Channel Selectivity (ACS)

The technical requirements in the present document apply for Base Stations supporting UTRA TDD. Base stations supporting E-UTRA TDD shall fulfil requirements in EN 301 908-14 [6]. The technical requirements also apply to the BS configurations described in annex B.

4.2.2 Spectrum emission mask

4.2.2.1 Definition

Spectrum emission mask defines an out of band emission requirement for the Base Station transmitter. These out of band emissions are emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions.

4.2.2.1.1 3,84 Mcps TDD option

The spectrum emission mask specifies the limit of the transmitter out of band emissions at frequency offsets from the assigned channel frequency of the wanted signal between 2,5 MHz and 12,5 MHz.

4.2.2.1.2 1,28 Mcps TDD option

The spectrum emission mask specifies the limit of the transmitter out of band emissions at frequency offsets from the assigned channel frequency of the wanted signal between 0,8 MHz and 4 MHz.

4.2.2.1.3 7,68 Mcps TDD option

The spectrum emission mask specifies the limit of the transmitter out of band emissions at frequency offsets from the assigned channel frequency of the wanted signal between 5 MHz and 25 MHz.

4.2.2.2 Limits

4.2.2.2.1 3,84 Mcps TDD option

The requirement shall apply to both Wide Area BS and Local Area BS. The requirement shall be met by a Base Station transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified in tables 4.2.2.2.1-1 to 4.2.2.2.1-4 in the frequency range of f_{offset} from 2 515 MHz to f_{offset} from the carrier frequency, where:

- f_{offset} is the separation between the carrier frequency and the centre frequency of the measuring filter;
- $f_{\text{offset}_{\text{max}}}$ is either 12,5 MHz or the offset to the UMTS Tx band edge (DL transmission in the following bands: 1 900 MHz to 1 920 MHz, 2 010 MHz to 2 025 MHz and 2 570 MHz to 2 620 MHz), whichever is the greater.

The spectrum emissions measured according to clause 5.3.1.1.2 shall not exceed the maximum level specified in tables 4.2.2.2.1-1 to 4.2.2.2.1-4 for the appropriate BS maximum output power.

Table 4.2.2.2.1-1: Test requirements for spectrum emission mask values, BS maximum output power $P \geq 43$ dBm (3,84 Mcps TDD option)

Frequency offset of measurement filter centre frequency, f_{offset}	Maximum level	Measurement bandwidth
$2,515 \text{ MHz} \leq f_{\text{offset}} < 2,715 \text{ MHz}$	-12,5 dBm	30 kHz
$2,715 \text{ MHz} \leq f_{\text{offset}} < 3,515 \text{ MHz}$	$-12,5 \text{ dBm} - 15 \left(\frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
$3,515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	-24,5 dBm	30 kHz
$4,0 \text{ MHz} \leq f_{\text{offset}} < 8,0 \text{ MHz}$	-11,5 dBm	1 MHz
$8,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	-11,5 dBm	1 MHz

Table 4.2.2.2.1-2: Test requirements for spectrum emission mask values, BS maximum output power $39 \text{ dBm} \leq P < 43 \text{ dBm}$ (3,84 Mcps TDD option)

Frequency offset of measurement filter centre frequency, f_{offset}	Maximum level	Measurement bandwidth
$2,515 \text{ MHz} \leq f_{\text{offset}} < 2,715 \text{ MHz}$	-12,5 dBm	30 kHz
$2,715 \text{ MHz} \leq f_{\text{offset}} < 3,515 \text{ MHz}$	$-12,5 \text{ dBm} - 15 \left(\frac{f_{\text{offset}}}{\text{MHz}} - 2,715 \right) \text{ dB}$	30 kHz
$3,515 \text{ MHz} \leq f_{\text{offset}} < 4,0 \text{ MHz}$	-24,5 dBm	30 kHz
$4,0 \text{ MHz} \leq f_{\text{offset}} < 8,0 \text{ MHz}$	-11,5 dBm	1 MHz
$8,0 \text{ MHz} \leq f_{\text{offset}} < f_{\text{offset}_{\text{max}}}$	$P - 54,5 \text{ dB}$	1 MHz