

Final draft **ETSI EN 301 908-16** V4.1.2 (2009-12)

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 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**

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<https://standards.iteh.ai/catalog/standards/sist/042d238c-d21f-4b77-bee7-e511f4382e6d/etsi-en-301-908-16-v4.2.1-2010-03>



Reference

DEN/ERM-TFES-002-16

Keywords

3G, 3GPP2, cdma2000, cellular, digital,
IMT-2000, mobile, radio, regulation, UMTS

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Association à but non lucratif enregistrée à la
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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	8
3.1 Definitions	8
3.2 Symbols	10
3.3 Abbreviations	11
4 Technical requirements specifications	11
4.1 Environmental profile.....	11
4.2 Conformance requirements	12
4.2.1 Introduction.....	12
4.2.2 Conducted spurious emissions when transmitting	12
4.2.2.1 Definition	12
4.2.2.2 Limits	12
4.2.2.3 Conformance.....	14
4.2.3 Transmitter maximum output power.....	14
4.2.3.1 Definition	14
4.2.3.2 Limits	14
4.2.3.3 Conformance.....	14
4.2.4 Minimum controlled output power.....	14
4.2.4.1 Definition	14
4.2.4.2 Limits	14
4.2.4.3 Conformance.....	14
4.2.5 Conducted spurious emissions when not transmitting	14
4.2.5.1 Definition	14
4.2.5.2 Limits	15
4.2.5.3 Conformance.....	15
4.2.6 Receiver Blocking characteristics.....	15
4.2.6.1 Definition	15
4.2.6.2 Limits	16
4.2.6.3 Conformance.....	17
4.2.7 Intermodulation spurious response attenuation.....	17
4.2.7.1 Definition	17
4.2.7.2 Limits	17
4.2.7.3 Conformance.....	18
4.2.8 Receiver Adjacent Channel Selectivity (ACS)	18
4.2.8.1 Definition	18
4.2.8.2 Limits	18
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	19
5.3 Essential radio test suites.....	20
5.3.1 Conducted spurious emissions when transmitting	20
5.3.2 Transmitter maximum output power.....	20
5.3.3 Minimum controlled output power	21
5.3.4 Conducted spurious emissions when not transmitting	21
5.3.5 Receiver Blocking characteristics.....	21
5.3.6 Intermodulation spurious response attenuation.....	22

5.3.7	Receiver Adjacent Channel Selectivity (ACS)	22
Annex A (normative):	HS Requirements and conformance Test specifications Table (HS-RTT).....	24
Annex B (normative):	Mobile Station configurations.....	26
B.1	Transmission configurations	26
B.2	Common Procedures	26
B.2.1	MAC and Physical Layer Configuration	26
B.2.2	Forward and Reverse Channels and Link Assignment Block (LAB) Assignments	26
B.2.2.1	Forward Link PER Measurement Test.....	26
B.2.2.2	Emissions Test	27
B.2.3	Session and Test Application Configurations.....	27
B.2.3.1	Forward Link PER Measurement	27
B.2.3.2	Emissions Test	27
Annex C (normative):	Environmental profile	28
C.1	Introduction	28
C.2	Temperature and Power Supply Voltage.....	28
C.3	High Humidity.....	28
C.4	Vibration Stability	28
C.5	Shock Stability	28
Annex D (normative):	Standard Test Conditions	29
D.1	Standard Equipment	29
D.1.1	Basic Equipment	29
D.1.2	Associated Equipment	29
D.2	Standard Environmental Test Conditions.....	29
D.3	Standard Conditions for the Primary Power Supply	29
D.3.1	General	29
D.3.2	Standard DC Test Voltage from Accumulator Batteries	29
D.3.3	Standard AC Voltage and Frequency	30
D.4	Standard Test Equipment	30
D.4.1	Access Network Simulator	30
D.4.2	AWGN Generator.....	30
D.4.3	CW Generator	30
D.4.4	Spectrum Analyzer	31
D.4.5	Average Power Meter.....	32
D.5	Functional System Setups	32
D.5.1	Functional Block Diagrams	32
D.6	Error Rates Measurement	34
D.6.1	Forward Traffic Channel PER.....	34
D.7	Confidence Interval	35
D.7.1	Confidence Level of Error Rate	35
D.7.2	Confidence level of Detection Time.....	37
Annex E (informative):	The EN title in the official languages	38
Annex F (informative):	Bibliography.....	39
History	40

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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), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

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 16 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".

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

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 types:

- User Equipment (also denoted as Mobile Stations or Access Terminals) for Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) compliant with TIA-1121.001 [3].

These radio equipment types are capable of operating in all or any part of the frequency bands given in table 1-1.

Table 1-1: UMB mobile station operating bands

Band Class (BC)	Direction of transmission	UMB mobile station operating bands
6	Transmit	1 920 MHz to 1 980 MHz
	Receive	2 110 MHz to 2 170 MHz
8	Transmit	1 710 MHz to 1 785 MHz
	Receive	1 805 MHz to 1 880 MHz
9	Transmit	880 MHz to 915 MHz
	Receive	925 MHz to 960 MHz
13	Transmit	2 500 MHz to 2 570 MHz
	Receive	2 620 MHz to 2 690 MHz

The present document covers requirements for UMB User Equipment.

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] 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".
- [2] 3GPP2 C.S0089-0 Version 1.0, (March 2009): "Recommended Minimum Performance Standards for cdma2000 Ultra Mobile Broadband Access Terminal" (to be published as TIA-1171).

NOTE: Available at http://www.3gpp2.org/Public_html/specs/C.S0089_v1.0_AT_MPS_for_UMB-090402.pdf.

- [3] TIA-1121.001 (December 2007): "Physical Layer for Ultra Mobile Broadband (UMB) Air Interface Specification".
- [4] 3GPP2 C.S0090-0 Version 1.0, (March 2009): "Test Application Specification for cdma2000 Ultra Mobile Broadband (UMB)" (to be published as TIA-1172).

NOTE: Available at http://www.3gpp2.org/Public_html/specs/C.S0090-0_v1.0_TAS_for_UMB-090402.pdf.

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".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

access network: network equipment providing data connectivity between a packet switched data network (typically the Internet) and the access terminals

NOTE: Connectivity is typically provided at the Link Layer (PPP). An access network is equivalent to a Base Station in TIA-1121.001 [3]. In the context of transmitter testing, an access network applies to operation with a single carrier and single sector active only.

access terminal: device providing data connectivity to a user

NOTE: An access terminal may be connected to a computing device such as a laptop personal computer or may be self-contained data device such as a personal digital assistant.

ACK channel: used by the access terminal to inform the access network whether a data packet transmitted on the Forward Traffic Channel has been received successfully or not

active set: set of pilots assigned to a particular access terminal

adjacent channel leakage power ratio: ratio of the on-channel transmit power to the power measured in one of the adjacent channels with no active channel in the adjacent channel

band class: set of frequency channels and a numbering scheme for these channels

code division multiple access: technique for spread-spectrum multiple-access digital communications that creates channels through the use of unique code sequences

control channel: portion of the Forward Channel that carries control information

effective isotropic radiated power: product of the power supplied to the antenna and the antenna gain in a direction relative to an isotropic antenna

effective radiated power: product of the power supplied to the antenna and the antenna gain relative to a half-wave dipole in a given direction

error: when referring to packet error, an error event occurs when a packet FCS does not check

NOTE: When referring to a symbol error, an error event occurs when the symbol is classified as a valid symbol different from the transmitted symbol.

forward channel: UMB Channel from an access network to access terminals

NOTE: The Forward Channel is transmitted on a CDMA frequency assignment using a particular pilot PN offset.

forward test application protocol: test application protocol allowing Forward Link performance characterizations

NOTE: See 3GPP2 C.S0090-0 [4].

forward traffic channel: Forward Channel used to transport user and signalling traffic from an access network to an access terminal

Frame Check Sequence (FCS): Frame Check Sequence of the Physical Layer packets is a CRC

line impedance stabilization network: network inserted in the supply mains lead of apparatus to be tested that provides, in a given frequency range, a specified load impedance for the measurement of disturbance voltages and that may isolate the apparatus from the supply mains in that frequency range

packet: physical layer protocol data unit

power control bit: bit sent in every slot on the Reverse Power Control Channel that signals the access terminal to increase or decrease its transmit power

received signal quality indicator: Reverse Traffic Channel measure of signal quality related to the received Data E_b/N_t

NOTE: See also E_b and N_t .

reverse channel: UMB Channel from the access terminal to the access network

NOTE: From the access network's perspective, the Reverse Channel is the sum of all access terminal transmissions on a UMB frequency assignment.

reverse traffic channel: reverse channel used to transport user and signalling traffic from a single access terminal to one or more sectors

sector: part of the access network that provides the land side modem

servicing sector: sector which is responsible for sending data to the access terminal

system time: time reference used by the system

NOTE: System Time is synchronous to UTC time (except for leap seconds) and uses the same time origin as Global Positioning System (GPS) time. All sectors use the same System Time (within a small error). Access terminals use the same System Time, offset by the propagation delay from the sector to the access terminal. See also Universal Coordinated Time.

traffic channel: communication path between an access terminal and an access network used for user and signalling traffic

NOTE: The term Traffic Channel implies a Forward Traffic Channel and Reverse Traffic Channel pair. See also Forward Traffic Channel and Reverse Traffic Channel.

Universal Coordinated Time (UTC): internationally agreed-upon time scale maintained by the Bureau International de l'Heure (BIH) used as the time reference by nearly all commonly available time and frequency distribution systems

3.2 Symbols

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

bps	Bits per second
C	Confidence level
dBc	The ratio (in dB) of the sideband power of a signal, measured in a given bandwidth at a given frequency offset from the center frequency of the same signal, to the total inband power of the signal
dBm	A measure of power expressed in terms of its ratio (in dB) to one milliwatt
dBm/Hz	A measure of power spectral density
NOTE:	The ratio, dBm/Hz, is the power in one Hertz of bandwidth, where power is expressed in units of dBm.
dBW	A measure of power expressed in terms of its ratio (in dB) to one Watt
E_b	Average energy per information bit for the Reverse Data Channel at the sector RF input ports
E_b/N_t	The ratio in dB of the combined received energy per bit to the effective noise power spectral density for the Reverse Data Channel at the sector RF input ports
GHz	Gigahertz (10^9 Hertz)
I_0	The total received power spectral density, including signal and interference, as measured at the sector RF input ports
I_{oc}	The power spectral density of a band-limited white noise source (simulating interference from other users and cells) as measured at the sector RF input ports
I_{or}	The total transmit power spectral density of the Reverse Channel at the access terminal simulator antenna connector
\hat{I}_{or}	The received power spectral density of the Reverse Channel as measured at the sector RF input ports
kbps	Kilobits per second
kHz	Kilohertz (10^3 Hertz)
km/h	Kilometers per hour
MHz	Megahertz (10^6 Hertz)
ms	Millisecond (10^{-3} second)
ns	Nanosecond (10^{-9} second)
N_t	The effective noise power spectral density at the sector RF input ports
ppm	Parts per million
μ s	Microsecond (10^{-6} second)
χ^2	Chi-squared distribution

3.3 Abbreviations

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

AC	Alternating Current
ACLR	Adjacent Channel Leakage power Ratio
ACLR1	Measured Adjacent Channel Leakage Ratio
ACLR2	Alternate Channel Leakage Ratio
ACS	Adjacent Channel Selectivity
AWGN	Additive White Gaussian Noise
Bps	Bits per second
CBW	Channel BandWidth
CDMA	Code Division Multiple Access
CRC	Cyclic Redundancy Code
CW	Continuous Waveform
DC	Direct Current
EIRP	Effective Isotropic Radiated Power
ERP	Effective Radiated Power
FCS	Frame Check Sequence
FER	Frame Error Rate
FLAB	Forward Link Assignment Block
F-PCCH	Forward Power Control Channel
F-PQICH	Forward Pilot Quality Indicator Channel
F-SPCH	Forward Start of Packet Channel
FTAP	Forward Test Application Protocol
HARQ	Hybrid Automatic Repeat Request
LAB	Link Assignment Block
OFDM	Orthogonal Frequency Division Multiplexing
PCP	Packet Consolidation Protocol
PER	Packet Error Rate
PN	PseudoNoise
PPP	Point-to-Point Protocol
R-ACKCH	Reverse Acknowledgement Channel
R-CDCCH	Reverse CDMA Dedicated Control Channel
RL	Reverse Link
RLAB	Reverse Link Assignment Block
Rx	receive
SEM	Spectral Emissions Mask
TAP	Test Application Protocol
Tx	transmit
UE	User Equipment
UMB	Ultra Mobile Broadband
UTC	Universal Coordinated Time (Universel Temps Coordonné)
VSWR	Voltage Standing Wave Ratio

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 (band class 6, 8, 9, 13) is shared between systems of the IMT-2000 family (for band class 8 and 9 also GSM) or systems having compatible characteristics.

4.2.1 Introduction

To meet the essential requirement under article 3.2 of Directive 1999/5/EC [i.2] (R&TTE Directive) for IMT-2000 User Equipment (UE) seven essential parameters in addition to those in EN 301 908-1 [1] have been identified. Table 4.2.1-1 provides a cross reference between these seven essential parameters and the seven corresponding 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 Conducted spurious emissions when transmitting
Conducted spurious emissions in active mode	4.2.2 Conducted spurious emissions when transmitting
Accuracy of maximum output power	4.2.3 Transmitter maximum output power
Prevention of harmful interference through control of power	4.2.4 Minimum controlled output power
Conducted spurious emission in idle mode	4.2.5 Conducted spurious emissions when not transmitting (Receiver spurious emissions)
Impact of interference on receiver performance	4.2.6 Receiver Blocking characteristics
	4.2.7 Intermodulation spurious response attenuation
Receiver adjacent channel selectivity	4.2.8 Receiver Adjacent Channel Selectivity (ACS)
Control and Monitoring functions	EN 301 908-1 [1], clause 4.2.4 "Control and Monitoring Functions"

4.2.2 Conducted spurious emissions when transmitting

4.2.2.1 Definition

The conducted spurious emissions are emissions at frequencies that are outside the assigned UMB Channel, measured at the access terminal antenna connector. This test measures the spurious emissions during continuous transmission.

4.2.2.2 Limits

The spurious emissions with ten or more averages shall be less than the limits specified for general spectral emissions mask in table 4.2.2-1.

Table 4.2.2-1: General Spectral Emission Mask for different bandwidths

Offset from channel edge (MHz)	5 MHz Emissions in dBm/measurement BW	10 MHz Emissions in dBm/measurement BW	20 MHz Emissions in dBm/measurement BW	Measurement BW
±0 to 1	-15	-18	-21	30 kHz
±1 to 5	-10	-10	-10	1 MHz
±5 to 6	-13	-13	-13	1 MHz
±6 to 10	-25	-13	-13	1 MHz
±10 to 15		-25	-13	1 MHz
±15 to 20			-13	1 MHz
±20 to 25			-25	1 MHz

The spurious emissions with ten or more averages shall be less than the limits specified additional spectral emission masks (A-SEM1) in table 4.2.2-2.