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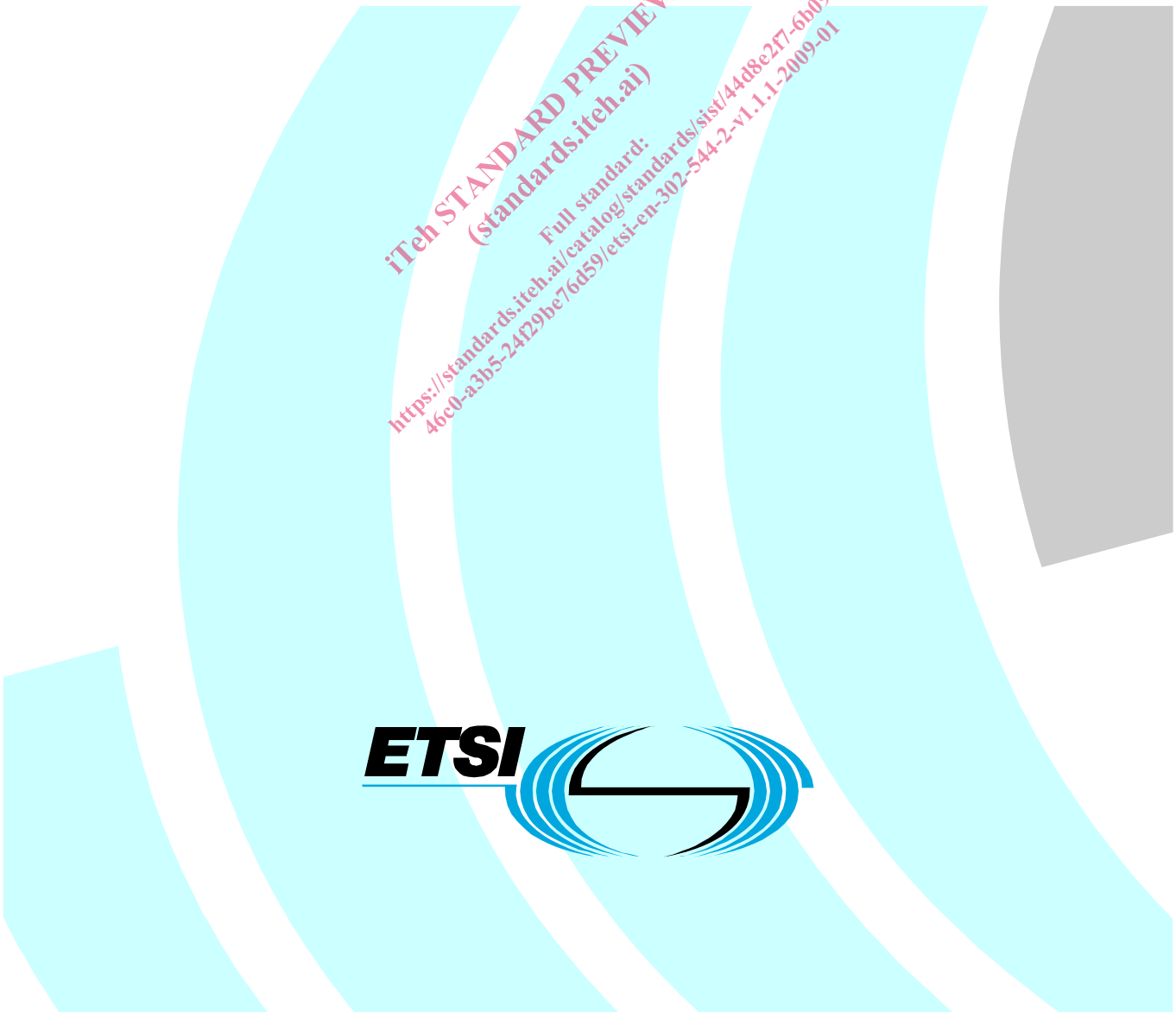
Harmonized European Standard (Telecommunications series)

Broadband Data Transmission Systems operating in the 2 500 MHz to 2 690 MHz frequency band; Part 2: TDD User Equipment Stations; Harmonized EN 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 Broadband Radio Access Networks (BRAN).

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.5] (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.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 [i.1] are given in annex A.

The present document is part 2 of a multi-part deliverable covering the Base Stations (BS) and User Equipment (UE) for Broadband Data Transmission Systems in the 2 500 MHz to 2 690 MHz frequency band, as identified below:

Part 1: "TDD Base Stations; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

Part 2: "TDD User Equipment Stations; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

Part 3: "FDD Base Stations; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

Part 4: "FDD User Equipment Stations; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive".

National transposition dates	
Date of adoption of this EN:	26 January 2009
Date of latest announcement of this EN (doa):	30 April 2009
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 October 2009
Date of withdrawal of any conflicting National Standard (dow):	31 October 2010

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

1 Scope

The present document is applicable to TDD User Equipment radio equipment for mobile/nomadic Broadband Data Transmitting Systems operating in the 2 500 MHz to 2 690 MHz frequency band.

TDD radio equipment types operate in the frequency band 2 500 MHz to 2 690 MHz according to national frequency plans designed on the basic assumption that the assigned blocks are in multiples of 5 MHz (centre frequency). The present document covers the requirements for 5 MHz and 10 MHz channelized systems.

The document is equally applicable to systems utilizing integral or non integral antennas, noting that for equipment with an integral antenna a temporary antenna connector is needed to perform testing.

The present document is intended to cover the provisions of Directive 1999/5/EC [i.1] (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 may apply to equipment within the scope of the present document. The present document does not address those IMT-2000 systems which are considered in EN 301 908 [i.3].

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 300 019 (all parts): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment".

[2] Void.

[3] ETSI TR 100 028 (parts 1 and 2) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics" .

[4] CEPT/ERC Recommendation 74-01E (2005): "Unwanted Emissions in the Spurious Domain".

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 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.2] ETSI EG 201 399 (V2.1.1): "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 EN 301 908 (all parts): " Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks".

[i.4] ETSI TR 102 215 (V1.3.1): "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.5] 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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [i.1] and the following apply:

burst: period during which radio waves are intentionally transmitted, preceded and succeeded by periods during which no intentional transmission is made

environmental profile: declared range of environmental conditions under which equipment within the scope of the present document is required to be compliant

Eval_BW 1: test condition where the pass band of a rectangular filter with a bandwidth of 4,75 MHz for 5 MHz equipment and 9,5 MHz for 10 MHz equipment is used for measurement centred on an operating channel or a victim channel

Eval_BW 2: measurement for Eval_BW 2 on the operating channel is performed using a rectangular filter with a 4,75 MHz or 9,5 MHz bandwidth and the measurement on the victim channel is performed using an RRC filter with a 3,84 MHz or 7,68 MHz bandwidth (respectively) both with roll-off factor of 0,22 centred on the 1st or 2nd adjacent victim channel

Eval_BW 3: measurement for Eval_BW 3 on the operating channel is performed using a rectangular filter with a 9,5 MHz bandwidth and the measurement on the victim channel is performed using a RRC filter with a 3,84 MHz bandwidth (with roll-off factor of 0,22) centred on the corresponding adjacent victim channel

integral antenna: antenna which is declared to be part of the radio equipment by the supplier

NOTE: Even when equipment with an integral antenna is concerned, it might still be possible to separate the antenna from the equipment using a special tool. In such cases the assessment of the radio equipment and of the antenna against requirements of this multi-part deliverable may be done separately.

maximum output power: mean power level per carrier of the base station or mobile station measured at the antenna connector in a specified reference condition

mean power: when applied to a modulated signal, this is the power (transmitted or received) in a bandwidth

NOTE: The term "mean" here is used to exclude the amplitude fluctuation related to those theoretical variations present in signal for example due to amplitude modulation, pulse shaping, pre-equalization, etc. Time averaging should be applied to estimate mean power with the affect of the theoretical variations. The duty cycle corresponding to burst activity within a frame should be also incorporated for "mean" power estimation.

nominal maximum output power: maximum nominal mean power level measured over total allocated channel bandwidth of the user equipment available at the antenna connector declared by the manufacturer; for equipment implementing dynamic change of modulation format, it is intended as the maximum nominal mean power associated to the modulation format delivering the highest power

operating nominal RF channel width: nominal amount of spectrum used by a single device operating on an identified centre frequency

3.2 Symbols

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

A_{BS}	Base Station Interface A
A_{MS}	Mobile Station Interface A
A_{UUT}	Unit Under Test Interface A
dB	decibel
dBc	decibel relative to Pnom carrier power measured in Eval_BW 1
dBm	decibel relative to 1 milliwatt
f	Frequency (of the assigned channel frequency of the wanted signal)
F_c	centre frequency of the assigned channel
GHz	GigaHertz
M_{BS}	Base Station Interface M
MHz	MegaHertz
M_{MS}	Mobile Station Interface M
Nth	Receiver thermal noise
Pnom	declared nominal maximum output Power
P_{SENS5}	sensitivity levels at BER $\leq 10^{-6}$, for a 5 MHz channel, corresponding to the most robust modulation and coding rate supported by the technology
P_{SENS10}	sensitivity levels at BER $\leq 10^{-6}$, for a 10 MHz channel, corresponding to the most robust modulation and coding rate supported by the technology

3.3 Abbreviations

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

ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
AWGN	Additive White Gaussian Noise
BER	Bit Error Ratio
BS	Base Station
BSE	Base Station Emulator
BW	BandWidth
CW	Carrier Wave
DL	DownLink
FDD	Frequency Division Duplexing
PER	Packet Error Ratio
R&TTE	Radio equipment and Telecommunications Terminal Equipment
RF	Radio Frequency
TDD	Time Division Duplexing
TPC	Transmit Power Control
UE	User Equipment

UUT Unit Under Test

4 Essential requirements specification

With reference to article 3.2 of Directive 1999/5/EC [i.1] the phenomena in this clause have been identified as relevant to the essential requirements.

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.

4.2 Conformance requirements

4.2.1 Introduction

To meet the essential requirement under article 3.2 of the R&TTE Directive [i.1] six essential parameters have been identified. Table 1 provides a cross reference between these six essential parameters and the corresponding eleven 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 1 must be verified.

Table 1: Cross references

Essential parameter	Corresponding technical requirements
Spectrum emission mask	4.2.2 Transmitter Spectrum emission mask 4.2.3 Transmitter adjacent channel leakage power ratio
Conducted spurious emissions from the transmitter antenna connector	4.2.4 Transmitter spurious emissions
Output power	4.2.5 Nominal maximum output power and tolerance 4.2.6 Transmitter power control
Control and monitoring functions	4.2.7 Control and monitoring functions
Conducted spurious emissions from the receiver antenna connector	4.2.8 Receiver spurious emissions
Impact of interference on receiver performance	4.2.9 Receiver adjacent channel selectivity (ACS) 4.2.10 Receiver blocking characteristics 4.2.11 Receiver intermodulation characteristics 4.2.12 Receiver response rejection

4.2.2 Spectrum emission mask

4.2.2.1 Definition

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

4.2.2.2 Limits

A user equipment device transmitting on a single RF carrier configured in accordance with the manufacturer's specification shall meet the requirement. Emissions shall not exceed the maximum level specified in tables 2 and 3 for the appropriate UE maximum output power and nominal channel bandwidths of 5 MHz and 10 MHz.

4.2.2.2.1 Spectrum emission mask for 5 MHz bandwidth

The out-of-channel emission is specified as power level measured over the specified measurement bandwidth but relative to dBc centred in the 5 MHz channel.

The power of any UE emission shall not exceed the levels specified in table 2.

Table 2: Spectrum emission mask requirement

Frequency offset Δf	Minimum requirement	Measurement bandwidth
0 MHz to 1 MHz	$\left\{-33{,}5-15\times\left(\frac{\Delta f}{MHz}\right)\right\}dBc$	30 kHz
1 MHz to 5 MHz	$\left\{-33{,}5-1\times\left(\frac{\Delta f}{MHz}-1\right)\right\}dBc$	1 MHz
5 MHz to 6 MHz	$\left\{-37{,}5-10\times\left(\frac{\Delta f}{MHz}-5\right)\right\}dBc$	1 MHz
6 MHz to 10 MHz	-47,5 dBc	1 MHz
NOTE 1: Δf is the separation between the edge of 5 MHz channel allocation and the centre of the measuring filter. NOTE 2: The first measurement position with a 30 kHz filter is at Δf equals to 0,015 MHz; the last is at Δf equals to 0,985 MHz. NOTE 3: The first measurement position with a 1 MHz filter is at Δf equals to 1,5 MHz; the last is at Δf equals to 9,5 MHz. As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.		

4.2.2.2.2 Spectrum emission mask for 10 MHz bandwidth

The out-of-channel emission is specified as a power level relative to dBc centred in the 10 MHz channel.

The power of any UE emission shall not exceed the levels specified in table 3.

Table 3: Spectrum emission mask requirement

Frequency offset Δf	Minimum requirement	Measurement bandwidth
0 MHz to 2 MHz	$\left\{-36{,}5-7{,}5\times\left(\frac{\Delta f}{MHz}\right)\right\}dBc$	30 kHz
2,0 MHz to 10,0 MHz	$\left\{-36{,}5-0{,}5\times\left(\frac{\Delta f}{MHz}-2\right)\right\}dBc$	1 MHz
10,0 MHz to 12,0 MHz	$\left\{-40{,}5-5\times\left(\frac{\Delta f}{MHz}-10\right)\right\}dBc$	1 MHz
12,0 MHz to 20,0 MHz	-50,5 dBc	1 MHz
NOTE 1: Δf is the separation between the edge of 10 MHz channel allocation and the centre of the measuring filter. NOTE 2: The first measurement position with a 30 kHz filter is at Δf equals to 0,015 MHz; the last is at Δf equals to 1,985 MHz. NOTE 3: The first measurement position with a 1 MHz filter is at Δf equals to 2,5 MHz; the last is at Δf equals to 19,5 MHz. As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.		