

**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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Contents

Intellectual Property Rights	5
Foreword.....	5
Introduction	6
1 Scope	7
2 References	7
2.1 Normative references	7
2.2 Informative references	8
3 Definitions, symbols and abbreviations	8
3.1 Definitions	8
3.2 Symbols	9
3.3 Abbreviations	9
4 Essential requirements specification	9
4.1 Environmental profile.....	9
4.2 Conformance requirements	10
4.2.1 Introduction.....	10
4.2.2 Spectrum emission mask	10
4.2.2.1 Definition	10
4.2.2.2 Limits	10
4.2.2.2.1 Spectrum emission mask for 5 MHz bandwidth.....	10
4.2.2.2.2 Spectrum emission mask for 10 MHz bandwidth.....	11
4.2.3 Transmitter Adjacent Channel Leakage power Ratio (ACLR)	12
4.2.3.1 Definition	12
4.2.3.2 Limits	12
4.2.3.2.1 ACLR requirements for 5 MHz bandwidth.....	12
4.2.3.2.2 ACLR requirements for 10 MHz bandwidth	12
4.2.4 Transmitter spurious emissions.....	13
4.2.4.1 Definition	13
4.2.4.2 Limits	13
4.2.5 Accuracy of maximum output power.....	13
4.2.5.1 Definition	13
4.2.5.2 Limits	13
4.2.5.3 Requirement	14
4.2.6 Transmitter power control	14
4.2.6.1 Definition	14
4.2.6.2 Requirement	14
4.2.7 Control and monitoring functions	14
4.2.7.1 Definition	14
4.2.7.2 Limits	14
4.2.7.3 Conformance.....	14
4.2.8 Receiver spurious emissions	14
4.2.8.1 Definition	14
4.2.8.2 Limits	14
4.2.9 Receiver adjacent and alternate channel rejection	15
4.2.9.1 Definition	15
4.2.9.2 Limits	15
4.2.10 Receiver blocking characteristics	16
4.2.10.1 Definition	16
4.2.10.2 Limits	16
4.2.11 Receiver intermodulation characteristics	17
4.2.11.1 Definition and applicability.....	17
4.2.11.2 Limits	17
4.2.12 Receiver spurious response.....	18
4.2.12.1 Definition	18

4.2.12.2	Limits	18
5	Testing for compliance with technical requirements.....	18
5.1	Environmental conditions for testing	18
5.2	Product information.....	18
5.3	Interpretation of the measurement results	19
5.4	Essential radio test suites.....	19
5.4.1	Spectrum emission mask	19
5.4.1.1	Method of test for UE spectral emission mask.....	19
5.4.1.1.1	Initial conditions	20
5.4.1.1.2	Procedure.....	20
5.4.2	Transmitter Adjacent Channel Leakage power Ratio (ACLR)	20
5.4.2.1	Method of test for UE ACLR	20
5.4.2.1.1	Initial conditions	21
5.4.2.1.2	Procedure.....	21
5.4.3	Transmitter spurious emissions.....	22
5.4.3.1	Method of test for UE transmitter spurious emission.....	22
5.4.3.1.1	Initial conditions	22
5.4.3.1.2	Procedure.....	22
5.4.4	Transmitter power control and maximum output power accuracy.....	23
5.4.4.1	Method of test	23
5.4.4.1.1	Initial conditions	23
5.4.4.1.2	Procedure.....	23
5.4.5	Control and monitoring functions	24
5.4.5.1	Method of test	24
5.4.6	Receiver spurious emissions	24
5.4.6.1	Method of test	24
5.4.6.1.1	Initial conditions	25
5.4.6.1.2	Procedure.....	25
5.4.7	Receiver adjacent and alternate channel rejection.....	25
5.4.7.1	Method of test	25
5.4.7.1.1	Procedure.....	25
5.4.8	Receiver blocking characteristics	26
5.4.8.1	Method of test	26
5.4.8.1.1	Initial conditions	26
5.4.8.1.2	Procedure.....	27
5.4.9	Receiver intermodulation characteristics	28
5.4.9.1	Method of test	28
5.4.9.1.1	Initial conditions	28
5.4.9.1.2	Procedure.....	28
5.4.10	Receiver response rejection	30
5.4.9.1	Method of test	30
5.4.9.1.1	Initial conditions	30
5.4.9.1.2	Procedure.....	30
Annex A (normative):	HS Requirements and conformance Test specifications Table (HS-RTT).....	32
Annex B (informative):	The EN title in the official languages	34
Annex C (informative):	Bibliography.....	35
History		36

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Foreword

This Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Broadband Radio Access Networks (BRAN), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

Comments are particularly invited on values in clause 4.2.4.2. and out of band blocking in clause 4.2.10.2.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC (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 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") [1].

Technical specifications relevant to Directive 1999/5/EC [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."

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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. The modular structure is shown in EG 201 399 [6].

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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 are capable of operating in all or any part of the frequency band 2 500 MHz to 2 690 MHz according to national frequency plans designed on the same basic assumption that the assigned blocks are in multiples of 5 MHz (same centre frequency).

The document is equally applicable to systems utilizing integral or non integral antennas.

The present document is intended to cover the provisions of Directive 1999/5/EC [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 [7].

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>.

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

- [3] Void.
- [4] 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"
- [5] CEPT/ERC/REC 74-01E (2005): "Unwanted Emissions in the Spurious Domain".
- [6] 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".
- [7] 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".

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.

- [8] 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".

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 [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_BW1: 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

Eval_BW 2: measurement for EVAL_BW2 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_BW3 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 multipart EN 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

nominal maximum output power: maximum nominal mean power level per carrier 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: the 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 carrier
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
M_{BS}	Base Station Interface M
M_{MS}	Mobile Station Interface M
P_{nom}	declared nominal maximum output Power

3.3 Abbreviations

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

ACLR	Adjacent Channel Leakage power Ratio
AWGN	Additive White Gaussian Noise
BER	Bit Error Ratio
BS	Base Station
FDD	Frequency Division Duplexing
GHz	GigaHertz
MHz	MegaHertz
PER	Packet Error Ratio
RF	Radio Frequency
R&TTE	Radio equipment and Telecommunications Terminal Equipment
TDD	Time Division Duplexing
TPC	Transmit Power Control
Tx	Transmit, Transmitter
UE	User Equipment
UUT	Unit Under Test

4 Essential requirements specification

With reference to Article 3.2 of 1999/5/EC Directive [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 [1] seven essential parameters have been identified. Table 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 1 must be verified.

Table 1: Cross references

Essential parameter	Corresponding technical requirements
Spectrum emissions mask	4.2.2 Transmitter Spectrum emissions 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 Accuracy of maximum output power
	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 and alternate rejection
	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 in the frequency range of f_{offset} from 0,015 MHz to $f_{\text{offset}_{\text{max}}}$ from the channel edge, where:

- f_{offset} is the separation between the channel edge and the centre frequency of the measuring filter;
- $f_{\text{offset}_{\text{max}}}$ is either 10 MHz or the offset to the Tx band edge (whichever is the greater).

The spectrum emissions measured according to clause 5.4.1 shall not exceed the maximum level specified in tables 2 and 3 for the appropriate UE maximum output power and channel widths of 5 MHz and 10 MHz.

4.2.2.2.1 Spectrum emission mask for 5 MHz bandwidth

The spectrum emission mask of the UE applies to frequency offsets between 2,5 MHz and 12,5 MHz on both sides of the UE centre carrier frequency.

The out-of-channel emission is specified as power level measured over the specified measurement bandwidth but relative to P_{nom} of the UE carrier measured in Eval_BW1 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	$\left\{ -33,5 - 15 \times \left(\frac{\Delta f}{\text{MHz}} \right) \right\} \text{dBc}$	30 kHz
1 MHz to 5 MHz	$\left\{ -33,5 - 1 \times \left(\frac{\Delta f}{\text{MHz}} - 1 \right) \right\} \text{dBc}$	1 MHz
5 MHz to 6 MHz	$\left\{ -37,5 - 10 \times \left(\frac{\Delta f}{\text{MHz}} - 5 \right) \right\} \text{dBc}$	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 spectrum emission mask of the UE applies to frequency offsets between 5 MHz and 25 MHz on both sides of the UE centre carrier frequency.

The out-of-channel emission is specified as a power level relative to P_{nom} of the UE carrier measured in Eval_BW1 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	$\left\{ -36,5 - 7,5 \times \left(\frac{\Delta f}{\text{MHz}} \right) \right\} \text{dBc}$	30 kHz
2,0 MHz to 10,0 MHz	$\left\{ -36,5 - 0,5 \times \left(\frac{\Delta f}{\text{MHz}} - 2 \right) \right\} \text{dBc}$	1 MHz
10,0 MHz to 12,0 MHz	$\left\{ -40,5 - 5 \times \left(\frac{\Delta f}{\text{MHz}} - 10 \right) \right\} \text{dBc}$	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 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.