

**Broadband Wireless Access Systems (BWA) in the
3 400 MHz to 3 800 MHz frequency band;
Mobile Terminal 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), and is now submitted for the Public Enquiry 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 [4] (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 [5] 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 are given in annex A.

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

1 Scope

The present document is applicable to FDD and TDD Mobile Terminal Stations (TS) of Broadband Wireless Access Systems (BWA) in the Frequency Band 3 400 MHz to 3 800 MHz.

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 [5] (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.

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>.

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

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] 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] 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".

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.

- [4] 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.
- [5] 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).
- [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".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

Automatic Transmit Power Control (ATPC): function implemented to offer a dynamic power control

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

maximum output power: maximum mean output power available at the antenna connector; for equipment implementing dynamic change of modulation format, it is intended as the maximum mean output power associated to the modulation format delivering the highest power

maximum power density: maximum mean output power density, defined as dBm/MHz

maximum radiated power density: maximum mean radiated output power (EIRP) density, defined as dBm/MHz

3.2 Symbols

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

A_{BS}	Base Station Interface A
A_{TS}	Terminal Station Interface A
A_{UUT}	Unit Under Test Interface A
dB	deciBel
dBc	deciBel relative to carrier
dBm	deciBel relative to 1 mW
f_c	center frequency
GHz	GigaHertz
kHz	kiloHertz
MHz	MegaHertz

3.3 Abbreviations

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

ACLR	Adjacent Channel Leakage power Ratio
ATPC	Automatic Transmit Power Control
BER	Bit Error Rate
BWA	Broadband Wireless Access

FDD	Frequency Division Duplex
PER	Packet Error Rate
TDD	Time Division Duplex
TPC	Transmit Power Control
TS	Terminal Station
UUT	Unit Under Test

4 Essential requirements specification

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.

4.2 Conformance requirements

4.2.1 Introduction

To meet the essential requirement under article 3.2 of the R&TTE Directive five essential parameters have been identified. Table 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. 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	4.2.3 Transmitter Spectrum emissions mask
	4.2.4 Transmitter adjacent channel leakage power ratio
Conducted spurious emissions from the transmitter antenna connector	4.2.5 Transmitter spurious emissions
Output power	4.2.2 Transmitter output power
	4.2.6 Transmitter power control
Conducted spurious emissions from the receiver antenna connector	4.2.7 Receiver spurious emissions
Impact of interference on receiver performance	4.2.8 Receiver adjacent and alternate rejection
Control and monitoring functions	4.2.9 Control and monitoring functions

4.2.2 Transmitter output power

4.2.2.1 Definition

The maximum power of the transmitter has to be defined in terms of maximum radiated power density. The terms maximum output power, maximum power density and maximum radiated power density are defined in clause 3.1.

4.2.2.2 Limits

The maximum radiated power density is 25 dBm/MHz.

4.2.2.3 Output Power tolerance

The maximum output power shall be declared by the supplier. The error of the maximum output power shall be within a tolerance of ± 2 dB under normal conditions. In any case the limit for the maximum radiated power density shall not be exceeded.

4.2.3 Transmitter spectrum emission mask

4.2.3.1 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.

4.2.3.2 Limits

4.2.3.2.1 Spectrum Emission Mask for 5 MHz Bandwidth

The spectrum emission mask of the TS applies to frequency offsets between 2,5 MHz and 12,5 MHz on both sides of the TS center carrier frequency. The out-of-channel emission is specified as power level measured over the specified measurement bandwidth but relative to the total mean power of the TS carrier measured in the 5 MHz band.

The TS emission shall not exceed the levels specified in table 2.

Table 2: Spectrum emission mask requirement (5 MHz option)

Frequency offset Δf	Minimum requirement	Measurement bandwidth
2,5 MHz to 3,5 MHz	$\left\{ -33,5 - 15 \times \left(\frac{\Delta f}{\text{MHz}} - 2,5 \right) \right\} \text{dBc}$	30 kHz
3,5 MHz to 7,5 MHz	$\left\{ -33,5 - 1 \times \left(\frac{\Delta f}{\text{MHz}} - 3,5 \right) \right\} \text{dBc}$	1 MHz
7,5 MHz to 8,5 MHz	$\left\{ -37,5 - 10 \times \left(\frac{\Delta f}{\text{MHz}} - 7,5 \right) \right\} \text{dBc}$	1 MHz
8,5 MHz to 12,5 MHz	-47,5 dBc	1 MHz
NOTE 1: Δf is the separation between the carrier frequency and the centre of the measuring filter. NOTE 2: The first measurement position with a 30 kHz filter is at Δf equals to 2,515 MHz; the last is at Δf equals to 3,485 MHz. NOTE 3: The first measurement position with a 1 MHz filter is at Δf equals to 4 MHz; the last is at Δf equals to 12 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. NOTE 4: Note that equivalent PSD type mask can be derived by applying $10 \cdot \log((5 \text{ MHz})/(30 \text{ kHz})) = 22,2 \text{ dB}$ and $10 \cdot \log((5 \text{ MHz})/(1 \text{ MHz})) = 7 \text{ dB}$ scaling factor for 30 kHz and 1 MHz measurement bandwidth respectively.		

4.2.3.2.2 Spectrum Emission Mask for 7 MHz Bandwidth

The spectrum emission mask of the TS applies to frequency offsets between 3,5 MHz and 17,5 MHz on both sides of the TS center carrier frequency. The out-of-channel emission is specified as power level measured over the specified measurement bandwidth but relative to the total mean power of the TS carrier measured in the 7 MHz band.

The TS emission shall not exceed the levels specified in table 3.

Table 3: Spectrum emission mask requirement (7 MHz option)

Frequency offset Δf	Minimum requirement	Measurement bandwidth
3,5 MHz to 4,75 MHz	$\left\{ -33,5 - 13,5 \times \left(\frac{\Delta f}{\text{MHz}} - 3,5 \right) \right\} \text{dBc}$	30 kHz
4,75 MHz to 10,5 MHz	$\left\{ -35,0 - 0,7 \times \left(\frac{\Delta f}{\text{MHz}} - 4,75 \right) \right\} \text{dBc}$	1 MHz
10,5 MHz to 11,9 MHz	$\left\{ -39,0 - 7 \times \left(\frac{\Delta f}{\text{MHz}} - 10,5 \right) \right\} \text{dBc}$	1 MHz
11,9 MHz to 17,5 MHz	-49,0 dBc	1 MHz
<p>NOTE 1: Δf is the separation between the carrier frequency and the centre of the measuring filter.</p> <p>NOTE 2: The first measurement position with a 30 kHz filter is at Δf equals to 3,515 MHz; the last is at Δf equals to 4,735 MHz.</p> <p>NOTE 3: The first measurement position with a 1 MHz filter is at Δf equals to 5,25 MHz; the last is at Δf equals to 17 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.</p> <p>NOTE 4: Note that equivalent PSD type mask can be derived by applying $10 \cdot \log((5 \text{ MHz})/(30 \text{ kHz})) = 23,7 \text{ dB}$ and $10 \cdot \log((5 \text{ MHz})/(1 \text{ MHz})) = 8,5 \text{ dB}$ scaling factor for 30 kHz and 1 MHz measurement bandwidth respectively.</p>		

4.2.3.2.3 Spectrum Emission Mask for 10 MHz Bandwidth

The spectrum emission mask of the TS applies to frequency offsets between 5 MHz and 25 MHz on both sides of the TS center carrier frequency. The out-of-channel emission is specified as a power level relative to the total mean power of the TS carrier measured in the 10 MHz band.

The TS emission shall not exceed the levels specified in table 4.