

# ETSI EN 300 328-2 V1.2.1 (2001-12)

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*Candidate Harmonized European Standard (Telecommunications series)*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Wideband Transmission systems;  
Data transmission equipment operating  
in the 2,4 GHz ISM band and  
using spread spectrum modulation techniques;  
Part 2: Harmonized EN covering essential requirements  
under article 3.2 of the R&TTE Directive**

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Reference

REN/ERM-TG11-001-4

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Keywords

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# Contents

Intellectual Property Rights .....	4
Foreword.....	4
Introduction .....	5
1 Scope .....	7
2 References .....	7
3 Definitions and abbreviations.....	8
3.1 Definitions .....	8
3.2 Abbreviations .....	8
4 Technical requirements specifications .....	9
4.1 Environmental profile.....	9
4.2 Conformance requirements .....	9
4.2.1 Effective radiated power .....	9
4.2.1.1 Definition .....	9
4.2.1.2 Limit.....	9
4.2.1.3 Conformance.....	9
4.2.2 Peak power density .....	9
4.2.2.1 Definition .....	9
4.2.2.2 Limit.....	9
4.2.2.3 Conformance.....	9
4.2.3 Frequency range.....	9
4.2.3.1 Definition .....	9
4.2.3.2 Limit.....	9
4.2.3.3 Conformance.....	9
4.2.4 Transmitter spurious emissions.....	10
4.2.4.1 Definition .....	10
4.2.4.2 Limit.....	10
4.2.4.3 Conformance.....	10
4.2.5 Receiver spurious emissions .....	10
4.2.5.1 Definition .....	10
4.2.5.2 Limit.....	10
4.2.5.3 Conformance.....	10
5 Testing for compliance with technical requirements.....	10
5.1 Test conditions, power supply and ambient temperatures .....	10
5.2 Interpretation of the measurement results .....	10
5.3 Essential radio test suites.....	11
5.3.1 Effective radiated power .....	11
5.3.2 Peak power density .....	11
5.3.3 Frequency range.....	11
5.3.4 Transmitter spurious emissions.....	11
5.3.5 Receiver spurious emissions .....	11
<b>Annex A (normative): The EN Requirements Table (EN-RT).....</b>	<b>12</b>
<b>Annex B (informative): Bibliography .....</b>	<b>13</b>
History .....	14

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## Foreword

This Candidate 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 [6] (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]").

The present document is part 2 of a multi-part deliverable covering the Wideband Transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques, as identified below:

Part 1: "Technical characteristics and test conditions";

**Part 2: "Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive".**

Technical specifications relevant to Directive 1999/5/EC are given in annex A.

<b>National transposition dates</b>	
Date of adoption of this EN:	30 November 2001
Date of latest announcement of this EN (doa):	28 February 2002
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2002
Date of withdrawal of any conflicting National Standard (dow):	31 August 2003

## Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive [1]. Each standard is a module in the structure. The modular structure is shown in figure 1.

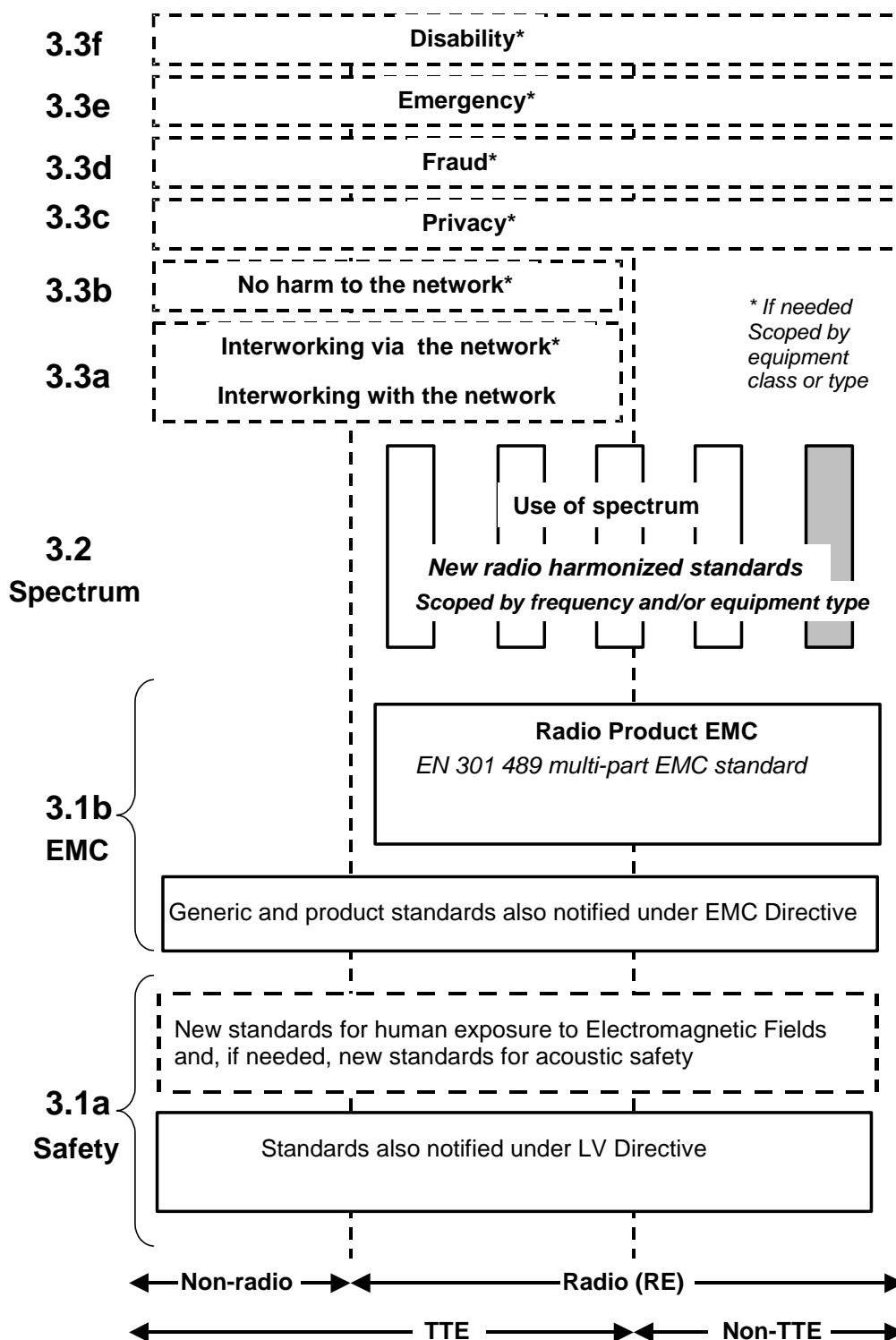


Figure 1: Modular structure for the various standards used under the R&TTE Directive [1]

The left hand edge of the figure 1 shows the different clauses of article 3 of the R&TTE Directive [1].

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of the present document essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.1b the diagram shows EN 301 489, the multi-part product EMC standard for radio used under the EMC Directive [2].

For article 3.1a figure 1 shows the existing safety standards currently used under the LV Directive [3] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of the figure shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. A radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement under the R&TTE Directive [1] is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive [1] may be covered in a set of standards.

The modularity principle has been taken because:

- it minimizes the number of standards needed. Because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment;
- it provides scope for standards to be added:
  - under article 3.2 when new frequency bands are agreed; or
  - under article 3.3 should the Commission take the necessary decisions, without requiring alteration of standards that are already published;
- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

# 1 Scope

The present document applies to the following transceivers, transmitters and receivers including such technologies as IEEE 802.11 (see Bibliography) and HomeRF™.

Fixed, mobile or portable applications, e.g.:

- stand-alone radio equipment with or without their own control provisions;
- plug-in radio devices intended for use with or within a variety of host systems, e.g. personal computers, hand-held terminals, etc.;
- plug-in radio devices intended for use within combined equipment, e.g. cable modems, set-top boxes, access points, etc.;
- combined equipment or a combination of a plug-in radio device and a specific type of host equipment.

The equipment shall utilize wideband radio modulation techniques and aggregate bit rates in excess of 250 kbits/s. Furthermore the equipment shall have an effective radiated power of up to -10 dBW (100 mW) and a power density of up to -10 dBW (100 mW) e.i.r.p. per 100 kHz for frequency hopping spread spectrum modulation or a power density of up to -20 dBW (10 mW) e.i.r.p. per 1 MHz for other forms of spread spectrum modulation.

This radio equipment is capable of operating in all or any part of the frequency band shown in table 1.

**Table 1: Industrial, Scientific and Medical (ISM) service frequency band**

Direction of transmission	Industrial, Scientific and Medical (ISM) service frequency band
Transmit/Receive	2,4 GHz to 2,483 5 GHz

Equipment using modulation techniques different from those defined in EN 300 328-1 [4], clauses 5.1.1 and 5.1.2 do not fall within the scope of the present document.

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 [1] will 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

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- 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.
- For a non-specific reference, the latest version 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.

- [2] Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).
- [3] Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).
- [4] ETSI EN 300 328-1 (V1.3.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband Transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques; Part 1: Technical characteristics and test conditions".
- [5] ETSI TR 100 028-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".
- [6] 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.

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## 3 Definitions 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:

**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

**aggregate bit rate:** bit rate at the air interface including protocol overhead where applicable and excluding the effects of signal spreading

NOTE: Further defined in EN 300 328-1 [4].

**frequency hopping spread spectrum modulation:** spread spectrum technique in which the transmitter signal occupies a number of frequencies in time, each for some period of time, referred to as the dwell time

NOTE: Transmitter and receiver follow the same frequency hop pattern. The frequency range is determined by the lowest and highest hop positions and the bandwidth per hop position.

**spread spectrum modulation:** modulation technique in which the energy of a transmitted signal is spread throughout a relatively large portion of the frequency spectrum

### 3.2 Abbreviations

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

EMC	Electro-Magnetic Compatibility
ISM	Industrial, Scientific and Medical
LV	Low Voltage
R&TTE	Radio and Telecommunications Terminal Equipment



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## 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 determined by the environmental class of the equipment. 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 Effective radiated power

##### 4.2.1.1 Definition

The effective radiated power shall be as defined in EN 300 328-1 [4], clause 5.2.1.

##### 4.2.1.2 Limit

The effective radiated power limit shall be as stated in EN 300 328-1 [4], clause 5.2.1.

##### 4.2.1.3 Conformance

Conformance tests as defined in clause 5.3.1 shall be carried out.

#### 4.2.2 Peak power density

##### 4.2.2.1 Definition

The peak power density shall be as defined in EN 300 328-1 [4], clause 5.2.2.

##### 4.2.2.2 Limit

The peak power density limit shall be as stated in EN 300 328-1 [4], clause 5.2.2.

##### 4.2.2.3 Conformance

Conformance tests as defined in clause 5.3.2 shall be carried out.

#### 4.2.3 Frequency range

##### 4.2.3.1 Definition

The frequency range shall be as defined in EN 300 328-1 [4], clause 5.2.3.

##### 4.2.3.2 Limit

The effective frequency range limit shall be as stated in EN 300 328-1 [4], clause 5.2.3.

##### 4.2.3.3 Conformance

Conformance tests as defined in clause 5.3.3 shall be carried out.

## 4.2.4 Transmitter spurious emissions

### 4.2.4.1 Definition

The transmitter spurious emissions shall be as defined in EN 300 328-1 [4], clause 5.2.4.

### 4.2.4.2 Limit

The transmitter spurious emissions limit shall be as stated in EN 300 328-1 [4], clause 5.2.4.

### 4.2.4.3 Conformance

Conformance tests as defined in clause 5.3.4 shall be carried out.

## 4.2.5 Receiver spurious emissions

### 4.2.5.1 Definition

The receiver spurious emissions shall be as defined in EN 300 328-1 [4], clause 5.3.2.

### 4.2.5.2 Limit

The receiver spurious emissions limit shall be as stated in EN 300 328-1 [4], clause 5.3.2.

### 4.2.5.3 Conformance

Conformance tests as defined in clause 5.3.5 shall be carried out.

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# 5 Testing for compliance with technical requirements

## 5.1 Test conditions, power supply and ambient temperatures

These shall be as stated in EN 300 328-1 [4], clauses 6.1 to 6.6.

## 5.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the measurement uncertainty value for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 2.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028-1 [5] and shall correspond to an expansion factor (coverage factor)  $k = 1,96$  or  $k = 2$  (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 2 is based on such expansion factors.

**Table 2: Maximum measurement uncertainty**

Parameter	Uncertainty
radio frequency	1 x 10 <sup>-5</sup>
total RF power, conducted	1,5 dB
RF power density, conducted	3 dB
spurious emissions, conducted	3 dB
all emissions, radiated	6 dB
temperature	1°C
humidity	5 %
DC and low frequency voltages	3 %

## 5.3 Essential radio test suites

### 5.3.1 Effective radiated power

The test specified in EN 300 328-1 [4], clause 7.2.1 shall be carried out. The results obtained shall be compared to the limits in clause 4.2.1.2 in order to prove compliance with the requirement.

### 5.3.2 Peak power density

The test specified in EN 300 328-1 [4], clause 7.2.2 shall be carried out. The results obtained shall be compared to the limits in clause 4.2.2.2 in order to prove compliance with the requirement.

### 5.3.3 Frequency range

The test specified in EN 300 328-1 [4], clause 7.2.3 and 7.2.4 shall be carried out. The results obtained shall be compared to the limits in clause 4.2.3.2 in order to prove compliance with the requirement.

### 5.3.4 Transmitter spurious emissions

The test specified in EN 300 328-1 [4], clause 7.2.5 shall be carried out. The results obtained shall be compared to the limits in clause 4.2.4.2 in order to prove compliance with the requirement.

### 5.3.5 Receiver spurious emissions

The test specified in EN 300 328-1 [4], clause 7.3.2 shall be carried out. The results obtained shall be compared to the limits in clause 4.2.5.2 in order to prove compliance with the requirement.

## Annex A (normative): The EN Requirements Table (EN-RT)

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the EN-RT proforma in this annex so that it can be used for its intended purposes and may further publish the completed EN-RT.

The EN Requirements Table (EN-RT) serves a number of purposes, as follows:

- it provides a tabular summary of all the requirements;
- it shows the status of each EN-R, whether it is essential to implement in all circumstances (Mandatory), or whether the requirement is dependent on the supplier having chosen to support a particular optional service or functionality (Optional). In particular it enables the EN-Rs associated with a particular optional service or functionality to be grouped and identified;
- when completed in respect of a particular equipment it provides a means to undertake the static assessment of conformity with the EN.

**Table A.1: EN Requirements Table (EN-RT)**

EN Reference		EN 300 328-2				Comments
No.	Reference	EN-R (note)	Status			
1	4.2.1	Effective radiated power	M			
2	4.2.2	Peak power density	M			
3	4.2.3	Frequency range	M			
4	4.2.4	Transmitter Spurious emissions	M			
5	4.2.5	Receiver Spurious emissions	M			

NOTE: These EN-Rs are justified under article 3.2 of the R&TTE Directive.

### Key to columns:

**No** Table entry number;

**Reference** Clause reference number of conformance requirement within the present document;

**EN-R** Title of conformance requirement within the present document;

**Status** Status of the entry as follows:

M Mandatory, shall be implemented under all circumstances;

O Optional, may be provided, but if provided shall be implemented in accordance with the requirements;

O.n this status is used for mutually exclusive or selectable options among a set. The integer "n" shall refer to a unique group of options within the EN-RT. A footnote to the EN-RT shall explicitly state what the requirement is for each numbered group. For example, "It is mandatory to support at least one of these options", or, "It is mandatory to support exactly one of these options".

**Comments** To be completed as required.

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## Annex B (informative): Bibliography

CEPT/ERC Recommendation 70-03 (annex 3): "Relating to the use of Short Range Devices (SRD)".

IEEE 802.11: "IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".

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## History

<b>Document history</b>		
V1.1.1	July 2000	Publication
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