

ETSI EN 305 550-1 V1.2.1 (2014-10)



EUROPEAN STANDARD

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Short Range Devices (SRD);  
Radio equipment to be used  
in the 40 GHz to 246 GHz frequency range;  
Part 1: Technical characteristics and test methods**

---

Reference

REN/ERM-TG28-501

---

Keywords

radio, SRD, testing

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

The present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

[http://portal.etsi.org/chaicor/ETSI\\_support.asp](http://portal.etsi.org/chaicor/ETSI_support.asp)

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2014.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**GSM®** and the GSM logo are Trade Marks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Modal verbs terminology.....	6
1 Scope .....	7
2 References .....	7
2.1 Normative references .....	8
2.2 Informative references.....	8
3 Definitions, symbols and abbreviations .....	9
3.1 Definitions.....	9
3.2 Symbols.....	10
3.3 Abbreviations .....	10
4 Technical requirements specifications .....	11
4.1 General requirements .....	11
4.1.1 Environmental profile .....	11
4.1.2 Receiver category .....	11
4.2 Presentation of equipment for testing purposes.....	11
4.2.1 Choice of model for testing .....	12
4.2.2 Testing of equipment with alternative power levels .....	12
4.3 Mechanical and electrical design.....	12
4.3.1 General.....	12
4.3.2 Controls .....	12
4.3.3 Transmitter shut-off facility.....	12
4.3.4 Receiver automatic switch-off .....	12
4.3.5 Marking (equipment identification).....	12
4.3.5.1 Equipment identification .....	12
4.3.5.2 Marking.....	13
4.4 Auxiliary test equipment .....	13
4.5 General requirements for RF cables .....	13
4.6 RF waveguides .....	14
4.7 External harmonic mixers .....	14
4.7.1 Introduction.....	14
4.7.2 Signal identification.....	15
4.7.3 Measurement hints.....	16
4.8 Interpretation of the measurement results .....	16
4.8.1 For measurement above 110 GHz.....	17
4.8.2 Conversion loss data and measurement uncertainty .....	17
5 Test conditions, power sources and ambient temperatures .....	18
5.1 Product information.....	18
5.2 Normal and extreme test conditions .....	18
5.3 Test power source.....	19
5.3.1 External test power source.....	19
5.3.2 Internal test power source .....	19
5.4 Normal test conditions.....	19
5.4.1 Normal temperature and humidity .....	19
5.4.2 Normal test power source .....	19
5.4.2.1 Mains voltage.....	19
5.4.2.2 Other power sources.....	20
5.5 Extreme test conditions .....	20
5.5.1 Extreme temperatures .....	20
5.5.2 Extreme test source voltages.....	20
5.5.2.1 Mains voltage.....	20
5.5.2.2 Regulated lead-acid battery power sources .....	20
5.5.2.3 Power sources using other types of batteries.....	20

5.5.2.4	Other power sources.....	20
6	General conditions.....	21
6.1	Normal test signals and test modulation.....	21
6.1.1	Normal test signals for data .....	21
6.1.2	Product Information.....	21
6.1.3	Testing of frequency agile or hopping equipment .....	22
6.2	Test sites and general arrangements for radiated measurements .....	22
6.2.1	Test fixture.....	22
6.2.1.1	Requirements .....	22
6.2.1.2	Calibration.....	23
6.2.1.3	Test Sites and general arrangement.....	23
6.2.1.3.1	Open Area Test Site (OATS).....	23
6.2.1.3.2	Other test sites .....	24
6.2.1.3.3	Semi-Anechoic Rooms with a conductive Ground Plane.....	24
6.2.1.3.4	Fully Anechoic Rooms (FAR).....	26
6.2.1.3.5	Minimum requirements for test sites for measurements above 18 GHz.....	28
6.3	Measuring receiver .....	29
6.4	Antennas.....	30
6.4.1	Test antenna .....	30
6.4.2	Substitution antenna.....	30
6.4.3	Signalling antenna .....	31
7	Methods of measurement and limits for transmitter parameters .....	31
7.1	Power Spectral density .....	31
7.1.1	Definition.....	31
7.1.2	Limit .....	31
7.1.3	Conformance.....	32
7.2	RF output power.....	33
7.2.1	Definition.....	33
7.2.2	Limit .....	33
7.2.3	Conformance.....	33
7.3	Permitted range of operating frequencies .....	34
7.3.1	Definition.....	34
7.3.2	Method of measurement .....	34
7.3.3	Method of measurement for equipment using FHSS modulation.....	35
7.3.4	Limit .....	35
7.4	Out-of-band emissions (OOB) .....	35
7.4.1	Definitions .....	35
7.4.2	Measuring receiver .....	36
7.4.3	Method of measurement .....	36
7.4.4	Limits.....	37
7.5	Radiated spurious emissions.....	38
7.5.1	Definition.....	38
7.5.2	Measuring receiver .....	38
7.5.3	Method of measurement for radiated spurious emissions.....	39
7.5.4	Limits.....	40
8	Receiver.....	40
8.1	Unwanted emissions.....	40
8.1.1	Definition.....	40
8.1.2	Method of measurement radiated unwanted components.....	40
8.1.3	Limits.....	41
<b>Annex A (normative):</b>	<b>Radiated measurements .....</b>	<b>42</b>
A.1	Substitution method.....	42
A.1.1	Principle of the substitution measurement method.....	42
A.2	Pre-Substitution method.....	43
A.2.1	Principle of radiated power measurement based on site attenuation (Pre-Substitution).....	43
<b>Annex B (informative):</b>	<b>Atmospheric absorptions and material dependent attenuations.....</b>	<b>45</b>

B.1 Atmospheric absorptions .....	45
B.2 Material dependent attenuations.....	47
<b>Annex C (informative): Bibliography.....</b>	<b>49</b>
History .....	50

---

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

---

## Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 1 of a multi-part deliverable covering Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 40 GHz to 246 GHz frequency range, as identified below:

**Part 1: "Technical characteristics and test methods";**

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

For non EEA countries the present document may be used for regulatory (type approval) purposes.

<b>National transposition dates</b>	
Date of adoption of this EN:	17 October 2014
Date of latest announcement of this EN (doa):	31 January 2015
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 July 2015
Date of withdrawal of any conflicting National Standard (dow):	31 July 2015

---

## Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**may not**", "**need**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

# 1 Scope

The present document applies to the following Short Range Device major equipment types:

- Generic Short Range Devices, including alarms, telecommand, telemetry, data transmission in general, etc.

These radio equipment types are capable of operating in frequency bands within the 40 GHz to 246 GHz range as specified in table 1:

- either with a Radio Frequency (RF) output connection and dedicated antenna or with an integral antenna;
- for all types of modulation.

Table 1 shows a list of the frequency bands as designated in the CEPT/ERC Recommendation 70-03 [i.1] as known at the date of publication of the present document.

NOTE 1: Table 1 represents the most widely implemented position within the CEPT countries [i.1], but it should not be assumed that all designated bands are available in all countries. It is also foreseen that these frequencies may be implemented in European Commission Decision 2006/771/EC [i.2], European Commission Decision 2013/752/EU [i.12] and CEPT/ERC Recommendation 74-01 [i.4] in the future.

**Table 1: Short Range Devices within the 40 GHz to 246 GHz frequency range**

Frequency Bands (Transmit and Receive)	Applications	Notes
57 GHz to 64 GHz	Non-specific SRD	
61,0 GHz to 61,5 GHz	Non-specific SRD	
122 GHz to 123 GHz	Non-specific SRD	
244 GHz to 246 GHz	Non-specific SRD	

NOTE 2: In addition, it should be noted that other frequency bands may be available for short range devices in a country within the frequency range 40 GHz to 246 GHz covered by the present document. See the CEPT/ERC Recommendation 70-03 [i.1] or as implemented through National Radio Interfaces (NRI) and additional NRI as relevant.

NOTE 3: On non-harmonized parameters, national administrations may impose certain conditions such as the type of modulation, frequency, channel/frequency separations, maximum transmitter radiated power, duty cycle, and the inclusion of an automatic transmitter shut-off facility, as a condition for the issue of an individual or general licence, or as a condition for the issuing of Individual Rights for use of spectrum or General Authorization, or as a condition for use "under licence exemption" as it is in most cases for Short Range Devices.

The present document covers fixed stations, mobile stations and portable stations.

# 2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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.