



**Short Range Devices (SRD);
Radio equipment to be used
in the 40 GHz to 246 GHz frequency range;
Harmonised Standard for access to radio spectrum**

Standard PREVIEW
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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.10] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.9].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

The present document is covering Short Range Devices (SRD) Radio equipment to be used in the 40 GHz to 246 GHz frequency range.

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

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**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).

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1 Scope

The present document specifies technical characteristics and methods of measurements for Non-specific Short Range Devices category equipment types.

Non specific SRDs category is defined by the EU Commission Decision 2013/752/EU [i.2] as:

- "The non-specific short-range device category covers all kinds of radio devices, regardless of the application or the purpose, which fulfil the technical conditions as specified for a given frequency band. Typical uses include telemetry, telecommand, alarms, data transmissions in general and other applications".

The present document covers equipment:

- capable of operating in frequency bands listed in table 1;
- intended for fixed, mobile or nomadic use;
- either with a Radio Frequency (RF) output connection and dedicated antenna or with an integral antenna;
- with all types of modulation.

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

Frequency Bands (Transmit and Receive)	Applications
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 1: The frequency usage conditions for Non-specific SRDs are EU wide harmonised bands according to EC Decision 2013/752/EU [i.2] as known at the date of publication of the present document. 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

NOTE 2: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.9] is given in annex A.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://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.

The following referenced documents are necessary for the application of the present document.

- [1] CISPR 16-1-1:2015: "Specification for radio disturbance and immunity measuring apparatus and methods; Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus".
- [2] Recommendation ITU-T O.153 (1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".

- [3] ETSI TS 103 052 (V1.1.1) (03-2011): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".
- [4] ETSI EN 303 396 (V1.1.1) (12-2016): "Short Range Devices; Measurement Techniques for Automotive and Surveillance Radar Equipment".
- [5] ETSI TS 103 361 (V1.1.1) (03-2016): "Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Receiver technical requirements, parameters and measurement procedures to fulfil the requirements of the Directive 2014/53/EU".
- [6] Recommendation ITU T O.41 (1994): "Psophometer for use on telephone-type circuits".
- [7] CISPR 16-1-4:2010: "Specification for radio disturbance and immunity measuring apparatus and methods; Part 1-4: Radio disturbance and immunity measuring apparatus - Antennas and test sites for radiated disturbance measurements".
- [8] CISPR 16-1-5:2014: "Specification for radio disturbance and immunity measuring apparatus and methods; Part 1-5: Radio disturbance and immunity measuring apparatus - Antenna calibration sites and reference test sites for 5 MHz to 18 GHz".

2.2 Informative 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 referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] CEPT/ERC Recommendation 70-03: "Relating to the use of Short Range Devices (SRD)".
- [i.2] European Commission Decision 2013/752/EU of 11 December 2013 (amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2005/928/EC).
- [i.3] CEPT/ERC Recommendation 74-01: "Unwanted emissions in the spurious domain", Hradec Kralove, Cardiff 2011.
- [i.4] Recommendation ITU-R P.676-5 (2001): "Attenuation by atmospheric gases".
- [i.5] IEC 60153: "Hollow metallic waveguides".
- [i.6] ETSI TR 102 215: "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.7] ETSI TR 102 273 (V1.2.1) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties".
- [i.8] ETSI TR 100 028 (V1.4.1) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.9] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.10] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

alarm: use of radio communication for indicating an alarm condition at a distant location

artificial antenna: non-radiating dummy load equal to the nominal impedance specified by the manufacturer

assigned frequency band: frequency band within which the device is authorized to operate and to perform the intended function of the equipment

dedicated antenna: removable antenna supplied and tested with the radio equipment, designed as an indispensable part of the equipment

Direct Sequence Spread Spectrum (DSSS): form of modulation where a combination of data to be transmitted and a fixed code sequence (chip sequence) is used to directly modulate a carrier, e.g. by phase shift keying

NOTE: The code rate determines the occupied bandwidth.

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

fixed station: equipment intended for use in a fixed location

Frequency Hopping Spread Spectrum (FHSS): 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 number of hop positions and the bandwidth per hop position determine the occupied bandwidth.

integral antenna: permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment

mobile station: equipment normally fixed in a vehicle or used as a transportable station

necessary bandwidth: width of the emitted frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions

NOTE: The necessary bandwidth including the frequency tolerances is accommodated within the assigned frequency band.

Occupied Bandwidth (OBW): width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0,5 % of the total mean power of a given emission

NOTE: This corresponds to the -23 dBc bandwidth of the signal.

operating frequency: nominal frequency at which equipment is operated; this is also referred to as the operating centre frequency

NOTE: Equipment may be able to operate at more than one operating frequency.

operating frequency range: range of operating frequencies over which the equipment can be adjusted through tuning, switching or reprogramming

portable station: equipment intended to be carried, attached or implanted

Power Spectral Density (PSD): ratio of the amount of power to the used radio measurement bandwidth

NOTE: It is expressed in units of dBm/Hz or as a power in unit dBm with respect to the used bandwidth. In case of measurement with a spectrum analyser the measurement bandwidth is equal to the RBW.

radiated measurements: measurements which involve the absolute measurement of a radiated field

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

ultra low power equipment: equipment using transmit envelope power below the receiver and idle/standby transmitter limits given in CEPT/ERC Recommendation 74-01 [i.3], see table 8

unwanted emissions: emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information

NOTE: Unwanted emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products.

3.2 Symbols

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

D_{ant}	Aperture dimension of the radiating antenna
dB	decibel
dB _i	gain in decibels relative to an isotropic antenna
E	Electrical field strength
E_0	Reference electrical field strength

NOTE: See annex B.

f	Frequency
P	Power
R	Distance
R_0	Reference distance

NOTE: See annex B.

t	Time
λ	wavelength

3.3 Abbreviations

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

CEPT	European Conference of Postal and Telecommunications administrations
CISPR	Comité International Spécial des Perturbations Radioélectriques
DC	Direct Current
DSSS	Direct Sequence Spread Spectrum
e.i.r.p.	equivalent isotropical radiated power
ECC	Electronic Communications Committee
EESS	Earth Exploration Satellite Service
EIA	Electronic Industries Alliance
EIRP	Equivalent Isotropic Radiated Power
EMC	Electro Magnetic Compatibility
emf	electromagnetic field
ERC	European Radiocommunication Committee
EUT	Equipment Under Test
FAR	Fully Anechoic Rooms
FH	Frequency Hopping
FHSS	Frequency Hopping Spread Spectrum
FMCW	Frequency Modulated Continuous-Wave radar
FSK	Frequency Shift Keying
FSL	Free Space Loss
IF	Intermediate Frequency
ITU-R	International Telecommunications Union, Radio sector
ITU-T	International Telecommunications Union, Telecommunications sector
LNA	Low Noise Amplifier

LO	Local Oscillator
NF	Noise Figure
NRI	National Radio Interfaces
OBW	Occupied BandWidth
OFR	Operating Frequency Range
OOB	Out-of-Band
P _{CORR}	Power correcting
PRF	Pulse Repetition Frequency
PSD	Power Spectral Density
R&TTE	Radio and Telecommunications Terminal Equipment
RBW	Resolution BandWidth
RBW _{REF}	measuring receiver resolution bandwidth
RCS	Radar Cross Section
RCSC	Radio Components Standardization Committee
RF	Radio Frequency
RMS	Root Mean Square
RX	Receiver
SMA	SubMiniature version A - connector
SND/ND	Signal + Noise + Distortion / Noise + Distortion
SRD	Short Range Device
TX	Transmitter
UWB	Ultra WideBand
VSWR	Voltage Standing Wave Ratio

4 Technical requirements specifications

4.1 Environmental conditions

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the manufacturer. The equipment shall comply with all the technical requirements of the present document which are identified as applicable in annex A at all times when operating within the boundary limits of the declared operational environmental profile. The normal and extreme test conditions are defined in clauses 4.4.3 and 4.4.4 of ETSI EN 303 396 [4].

4.2 General

4.2.1 Background information

In this clause general considerations for the testing of EUT in the frequency range listed in table 1 are given. The tests cover integrated transceivers and separate transmit/receive modules.

All operating bandwidths of the equipment shall be declared by the equipment manufacturer (see clause 4.3.1).

Where equipment has more than one operating bandwidths, sufficient number of operating bandwidths shall be chosen for testing so as to encompass the lower and higher limits of the operating frequency and the minimum and maximum bandwidth.

4.2.2 Wanted performance criteria

For the purpose of the receiver performance tests, the criterion that the EUT shall indicate the properties of a given scenario for which the EUT was foreseen to operate, e.g. target at a given distance or other possible use-cases as described in ETSI TS 103 361 [5]. Since EUT considered here typically are tailored to specific applications, no single wanted performance criterion can be defined here.

Therefore the EUT/receiver shall produce an appropriate output under normal conditions.

Examples for a wanted performance criteria as indicated below:

- a SND/ND ratio of 20 dB, measured at the receiver output through a telephone psophometric weighting network as described in Recommendation ITU-T O.41 [6]; or
- after demodulation, a data signal with a bit error ratio of 10^{-2} without correction (as described in Recommendation ITU-T O.153 [2]); or
- after demodulation, a message acceptance ratio of 80 % (as described in Recommendation ITU-T O.153 [2]); or
- an appropriate false alarm rate or sensing criteria as declared by the manufacturer;
- some performance criteria and test cases are defined in clauses 9.2.1 and 9.4 of ETSI TS 103 361 [5].

For the performance criteria of radio determination the manufacturer shall declare:

- the relevant use-case properties (e.g. presence, range, relative speed, azimuth angle, datarate, etc.) of the sensing scenario;
- the related radio parameter of the scenario, like type and RCS of the target and the distance.

4.3 Transmitter Conformance Requirements

4.3.1 Permitted range of operating frequencies

4.3.1.1 Applicability

This requirement shall apply to all transmitting EUT.

4.3.1.2 Description

The permitted range of operating frequencies is the frequency range over which the equipment is authorized to operate.

4.3.1.3 Limits

The permitted range of operating frequency for intentional emissions shall be within one of the frequency ranges from table 1.

Outside the permitted range of operating frequencies the unintentional emissions shall be reduced to the limits given in clauses 4.3.5 and 4.3.6.

4.3.1.4 Conformance

The manufacturer shall declare the permitted range of operating frequencies. The justification/test shall be performed for Operating frequency ranges, see clause 4.3.2.

4.3.2 Operating frequency range(s) (OFR)

4.3.2.1 Applicability

This requirement shall apply to all transmitting EUT.

4.3.2.2 Description

The operating frequency range is the frequency range over which the EUT is intentionally transmitting.