
**Elektromagnetna združljivost in zadeve v zvezi z radijskim spektrom (ERM) -
Naprave kratkega dosega (SRD) - Radijska oprema, ki se uporablja v frekvenčnem
območju od 25 MHz do 1000 MHz z močnostnimi nivoji do največ 500 mW - 1. del:
Tehnične karakteristike in preskusne metode**

Electromagnetic compatibility and Radio spectrum Matters (ERM) - Short Range Devices (SRD) - Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW - Part 1: Technical characteristics and test methods

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**Electromagnetic compatibility
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Short Range Devices (SRD);
Radio equipment to be used in the 25 MHz to 1 000 MHz
frequency range with power levels ranging up to 500 mW;
Part 1: Technical characteristics and test methods**

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Foreword

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

For non EU countries the present document may be used for regulatory (Type Approval) purposes.

The present document includes improvements to the previous version of the standard that take advantage of technical developments within the SRD industry. It also serves the purpose of providing the requirements and associated measurement methods to improve the intra- SRD co-existence and promote efficient spectrum use.

The present document is part 1 of a multi-part deliverable covering the Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW, as identified below:

Part 1: "Technical characteristics and test methods";

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

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Introduction

Clauses 1 and 3 provide a general description of the types of equipment covered by the present document and the definitions and abbreviations used.

Clause 4 provides a guide as to the number of samples required in order that tests may be carried out, and any markings on the equipment which the provider should provide.

The present document describes a generic categorization of receiver performance in clause 4.1.1.

Clauses 5 and 6 give guidance on the test and general conditions for testing of the device.

Clause 7 specifies the spectrum utilization parameters which are required to be measured. The clauses provide details on how the equipment should be tested and the conditions which should be applied.

Clause 8 specifies receiver parameters.

Clause 9 specifies spectrum access techniques in case of Listen Before Talk (LBT) protocol is used to control the transmitter.

Clause 10 gives the maximum measurement uncertainty values.

Annex A (normative) provides specifications concerning radiated measurements.

Annex B (normative) contains specifications for a filter for transmitter measurement arrangements.

Annex C (normative) provides the spectrum analyser specification.

Annex D (normative) covers normative requirements for social alarms.

Annex E (normative) covers supplementary requirements for receivers.

Annex F (informative) Bibliography covers other supplementary information.

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1 Scope

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

- 1) Non-specific Short Range Devices.
- 2) Alarms, identification systems, radio-determination, telecommand, telemetry, etc.
- 3) Radio Frequency Identification (RFID).
- 4) Detection, movement and alert applications.

These radio equipment types are capable of operating in the frequency bands within the 25 MHz to 1 000 MHz 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;
- with or without speech.

Table 1 shows a list of the frequency bands as designated to Short Range Devices by some European Commission Decisions [i.4] and [i.5] and the CEPT/ERC/REC 70-03 [i.1] as known at the date of publication of the present document.

Table 1: Frequency bands commonly designated to Short Range Devices within 25 MHz to 1 000 MHz

| | Frequency Bands/frequencies | Applications |
|----------------------|--|--|
| Transmit and Receive | 26,995 MHz, 27,045 MHz, 27,095 MHz, 27,145 MHz, 27,195 MHz, 34,995 MHz to 35,225 MHz, 40,665 MHz, 40,675 MHz, 40,685 MHz, 40,695 MHz | Model control |
| Transmit and Receive | 26,957 MHz to 27,283 MHz | Non-specific use |
| Transmit and Receive | 40,660 MHz to 40,700 MHz | Non-specific use |
| Transmit and Receive | 138,200 MHz to 138,450 MHz | Non-specific use |
| Transmit and Receive | 169,400 MHz to 169,475 MHz | Tracking, tracing and data acquisition and meter reading |
| Transmit and Receive | 169,475 MHz to 169,4875 MHz | Social alarms |
| Transmit and Receive | 169,5875 MHz to 169,6000 MHz | Social alarms |
| Transmit and Receive | 433,050 MHz to 434,790 MHz | Non-specific use |
| Transmit and Receive | 863,000 MHz to 870,000 MHz | Non-specific use |
| Transmit and Receive | 864,800 MHz to 865,000 MHz | Wireless audio applications |
| Transmit and Receive | 868,000 MHz to 868,600 MHz | Non-specific use |
| Transmit and Receive | 868,600 MHz to 868,700 MHz | Alarms |
| Transmit and Receive | 868,700 MHz to 869,200 MHz | Non-specific use |
| Transmit and Receive | 869,200 MHz to 869,250 MHz | Social alarms |
| Transmit and Receive | 869,250 MHz to 869,300 MHz | Alarms (0,1 % duty cycle) |
| Transmit and Receive | 869,300 MHz to 869,400 MHz | Alarms (1 % duty cycle) |
| Transmit and Receive | 869,400 MHz to 869,650 MHz | Non-specific use |
| Transmit and Receive | 869,650 MHz to 869,700 MHz | Alarms |
| Transmit and Receive | 869,700 MHz to 870,000 MHz | Non-specific use |

NOTE 1: It should be noted that table 1 represents the most widely implemented position within the European Union and the CEPT countries, but it should not be assumed that all designated bands are available in all countries.

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 25 MHz to 1 000 MHz covered by the present document. See European Commission Decisions on Short Range Devices [i.4] and [i.5] and CEPT/ERC/REC 70-03 [i.1] as implemented through National Radio Interfaces (NRI) or 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 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.

2.1 Normative references

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

- [1] ITU-T Recommendation O.153: "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [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] CISPR 16 (2006) (parts 1-1, 1-4 and 1-5): "Specification for radio disturbance and immunity measuring apparatus and methods; Part 1: Radio disturbance and immunity measuring apparatus".
- [4] ITU-T Recommendation O.41: "Psophometer for use on telephone-type circuits".
- [5] ETSI TR 102 273 (all parts) (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties".
- [6] ANSI C63.5 (2006): "American National Standard for Calibration of Antennas Used for Radiated Emission Measurements in Electro Magnetic Interference".

2.2 Informative references

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/REC 70-03: "Relating to the use of Short Range Devices (SRD)".
- [i.2] ITU-R Radio Regulations.
- [i.3] 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).
- [i.4] Commission Decision 2006/771/EC on harmonization of the radio spectrum for use by short-range devices as amended by subsequent Commission Decisions.
- [i.5] Commission Decision 2005/928/EC on the harmonization of the 169,4-169,8125 MHz frequency band in the Community as amended by Commission Decision of 13 August 2008.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

adaptive frequency agility: capability of an equipment to dynamically change the temporary operational channel within its available frequencies for proper operation

NOTE 1: For the purpose of the present document, non-overlapping channels are used.

NOTE 2: Dynamic change of a channel can be triggered by sensing an occupied channel (e.g. LBT), reaching the maximum channel occupancy time, evaluating the radio link quality.

adjacent channels: channels on either side of the nominal channel separated by the nominal channel bandwidth

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

alternate adjacent channels: those two channels offset from the nominal channel by double the channel bandwidth

NOTE 1: The wanted channel is described by the occupied bandwidth (see definition below) of the wanted emissions, i.e. the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0,5 % of the total mean power of a given emission. In addition, the necessary bandwidth of the emissions as defined by the ITU-R Radio Regulations [i.2] is not to exceed the wanted channel.

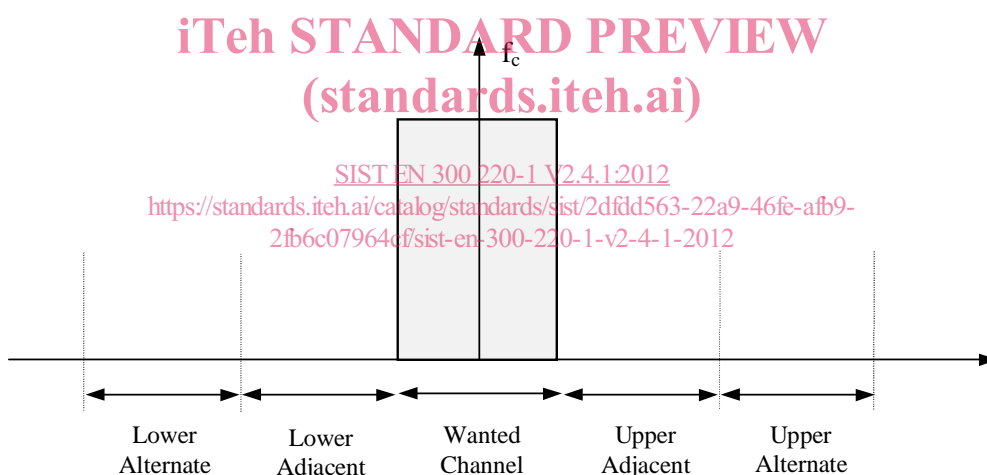


Figure 1: Adjacent and alternate adjacent channel definitions

NOTE 2: For equipment to be used in a frequency band where channelization is not defined by regulation, the channel spacing of the equipment is defined by the provider.

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

audio: wideband application where the activity factor is high (e.g. music)

channelized equipment: equipment to be used at a frequency where a channel spacing is defined by regulation or is defined by the provider

conducted measurements: measurements which are made using a direct 50 Ω connection to the equipment under test

continuous transmission: modulated transmission without interruption for the period of the test

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

fixed station: equipment intended for use in a fixed location

frequency agility: ability to change sub-band or channel of operation

Frequency Hopping Spread Spectrum (FHSS): 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 (see clause 6.1.3).

identification system: equipment consisting of a transmitter(s), receiver(s) (or a combination of the two) and an antenna(s) to identify objects by means of a transponder

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

Listen Before Talk (LBT): combination of the listen mode followed by the talk mode

listen mode: action taken by an interrogator to detect an unoccupied sub-band or channel prior to transmitting

meter reading: devices which allow remote status monitoring, measuring and service commands using radio communication

mobile station: equipment normally fixed in a vehicle

model control: devices used to control models (principally miniature representations of vehicles) in the air, on land or over or under the water surface

narrowband: equipment to be used in a non-channelized continuous frequency band with an occupied bandwidth of equal or less than 25 kHz, or equipment to be used in a channelized frequency band with a channel spacing of equal or less than 25 kHz

NOTE: For equipment to be used in a non-channelized frequency band by the regulation the channel spacing of the equipment is defined by the provider.

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 to be accommodated within the assigned frequency band.

non overlapping channels: hopping positions separated by channel bandwidth of 90 % or more below the maximum power as measured with a spectrum analyser

non-specific use: any type of application

occupied bandwidth: 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

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.

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

provider: manufacturer, or his authorized representative or the person responsible for placing on the market

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

social alarm devices: devices that allow reliable communication for a person in distress in a limited area to initiate a call for assistance by a simple manipulation

spurious emissions: emissions 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: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

talk mode: transmission of intentional radiation by a transmitter

telecommand: use of radio communication for the transmission of signals to initiate, modify or terminate functions of equipment at a distance

telemetry: use of radio communication for indicating or recording data at a distance

tracking and tracing: devices which allow the tracing and tracking of goods, leading to their recovery, consisting in general of a radio transmitter placed on the item to be protected and a receiver and may also include an alarm

transponder: device that responds to an interrogation signal

voice (speech): audio communications that are considered to be inherently low activity factor devices where there are frequent interruptions to the communications transmitted

wanted channel: occupied bandwidth of the wanted emissions

wideband: any equipment not falling under the definition of narrowband

wireless audio applications: cordless audio devices for portable use

NOTE: Possible applications include cordless loudspeakers, cordless headphones for portable use, babyphones, ring bells, etc.

iTeh STANDARD PREVIEW

3.2 Symbols [standards.iteh.ai](https://standards.iteh.ai/catalog/standards/sist/2dfdd563-22a9-46fe-afb9-2fb6c07964cf/sist-en-300-220-1-v2-4-1-2012)

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

| | |
|-----------------|-----------------------------------|
| dB | decibel |
| E | Electric field strength |
| FR _C | Centre of Frequency Range |
| FR _H | Higher end of Frequency Range |
| FR _L | Lower end of Frequency Range |
| NaCl | sodium chloride |
| R | distance |
| S | Sensitivity of receiver |
| t _L | Total listen time |
| t _F | Fixed part of listen time |
| t _{PS} | Pseudo random part of listen time |
| λ | wavelength |

3.3 Abbreviations

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

| | |
|--------|--|
| AFA | Adaptive Frequency Agility |
| ARQ | Automatic Repeat reQuest |
| BER | Bit Error Ratio |
| BW | BandWidth |
| CEPT | Commission Européenne des Postes et Télécommunications |
| CISPR | International Special Committee on Radio Interference |
| DSSS | Direct Sequence Spread Spectrum |
| e.r.p. | effective radiated power |
| EC | European Commission |