

9`Y\_lfca U[ bYfbUnXfi y`1j cgh]b`nUXYj Y`j`nj Yn]`n`fUX]`g\_`ja`gdY\_lfca`f0FAŁĚ  
BUdfUj Y`fUh\_Y[ UXcgY[ UfGF8ŁĚFUX]`g\_UcdfYa Uj`ZY\_j Yb bYa`cVa c`1`cX`-  
\_<n`Xc`&) `A<n`]b`g]ghYa ]`n`]bXi \_W]`g\_c`nUb\_c`j`ZY\_j Yb bYa`cVa c`1`cX`-`\_<n`Xc`  
'`\$`A<n`Ě`%`XY.`HY b] bY`\_UfU\_hf]gh\_Y]b`dfYg\_i gbY`a YtcXY

Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 1: Technical characteristics and test methods  
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| 33.100.01 | Elektromagnetna združljivost na splošno | Electromagnetic compatibility in general |

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# ETSI EN 300 330-1 V1.5.1 (2006-04)

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*European Standard (Telecommunications series)*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Short Range Devices (SRD);  
Radio equipment in the frequency range  
9 kHz to 25 MHz and inductive loop systems  
in the frequency range 9 kHz to 30 MHz;  
Part 1: Technical characteristics and test methods**

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## Foreword

This European Standard (Telecommunications series) 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 is part 1 of a multi-part deliverable covering the Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz, as identified below.

Additionally, the present document should be read in conjunction with CEPT/ERC Recommendation 70-03 [3] together with the respective ECC Decisions as implemented through National Radio Interfaces (NRI) and additional NRI as relevant. The Recommendation states the recommended transmitter parameters for the various SRD applications in the appropriate annexes.

The content of the standard is:

[SIST EN 300 330-1 V1.5.1:2006](https://standards.iteh.ai/catalog/standards/sist/3db5c9c0-acf3-4f5e-b1d8-7716c41aa759/sist-en-300-330-1-v1-5-1-2006)

**Part 1:** "**Technical characteristics and test methods**";  
<https://standards.iteh.ai/catalog/standards/sist/3db5c9c0-acf3-4f5e-b1d8-7716c41aa759/sist-en-300-330-1-v1-5-1-2006>

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

### National transposition dates

|  |                  |
|--|------------------|
| Date of adoption of this EN:   | 24 March 2006    |
| Date of latest announcement of this EN (doa):  | 30 June 2006     |
| Date of latest publication of new National Standard or endorsement of this EN (dop/e): | 31 December 2006 |
| Date of withdrawal of any conflicting National Standard (dow):                         | 31 December 2006 |

---

# 1 Scope

The present document applies to Short Range Devices (SRDs) transmitters and receivers:

- transmitters operating in the range from 9 kHz to 25 MHz; and
- inductive loop transmitters operating from 9 kHz to 30 MHz;
- receivers operating from 9 kHz to 30 MHz.

The present document does not necessarily include all the characteristics which may be required by a user, nor does it necessarily represent the optimum performance achievable. It is a product family standard which may be completely or partially superseded by specific standards covering specific applications.

The present document applies to generic SRDs including:

- inductive loop systems;
- systems with an antenna connector and/or an integral antenna;
- systems for alarm, identification, telecommand, telemetry, etc.; and/or
- applications with or without speech.

When selecting parameters for new SRDs, which may have inherent safety of human life implications, manufacturers and users should pay particular attention to the potential for interference from other systems operating in the same or adjacent bands.

The present document covers fixed stations, mobile stations and portable stations. If a system includes transponders, these are measured together with the transmitter.

All types of modulation for radio devices are covered by the present document, provided the requirements of clause 7.3 are met.

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The radio equipment, covered by the classification SRD is divided into several classes based on the maximum radiated magnetic field strength. The field strength designation in the present document is based on CEPT/ERC/Recommendation 70-03 [3] and National SRD-frequency designations.

Three types of measuring methods are defined in the present document due to the varied nature of the antenna types for equipment used in this band. One method measures the RF carrier current, another measures the radiated H-field and the third the conducted power.

The present document covers requirements for radiated emissions below as well as above 30 MHz.

Additional standards or specifications may be required for equipment such as that intended for connection to the Public Switched Telephone Network (PSTN).

## 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.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

- [1] ETSI EN 300 330-2 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive".
- [2] 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).
- [3] CEPT/ERC/Recommendation 70-03: "Relating to the use of Short Range Devices (SRD)".
- [4] ITU-T Recommendation O.153: "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [5] ETSI TR 100 028 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [6] ITU-T Recommendation O.41: "Psophometer for use on telephone-type circuits".  
<https://standards.iteh.ai/catalog/standards/sist/3db5c9c0-acf3-4f5e-b1d8-79c54a75938c/itu-t-recommendation-o-41-1963>
- [7] CISPR 16-2-3: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements".
- [8] ETSI TR 102 273-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 2: Anechoic chamber".
- [9] ETSI TR 102 273-3: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 3: Anechoic chamber with a ground plane".
- [10] ETSI TR 102 273-4: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 4: Open area test site".
- [11] ANSI C63.5-2004: "American National Standard for Electromagnetic Compatibility-Radiated Emission Measurements in Electromagnetic Interference (EMI) Control-Calibration of Antennas (9 kHz to 40 GHz)".
- [12] IEC 60489-3: "Methods of measurement for radio equipment used in the mobile services. Part 3: Receivers for A3E or F3E emissions".

## 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 or a sensing device for indicating alert information at a distant location

**artificial antenna:** tuned reduced-radiating dummy load equal to the nominal impedance specified by the provider

**assigned frequency band:** frequency band within which the device is authorized to operate

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

**customized antenna:** antenna built according to manufacturers' antenna design rules inside tested limits

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

NOTE: The antenna has been designed or developed for one or more specific types of equipment. It is the combination of dedicated antenna and radio equipment that is expected to be compliant with the regulations.

**fixed station:** equipment intended for use in a fixed location

**H-field test antenna:** electrically screened loop or equivalent antenna, with which the magnetic component of the field can be measured

**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:** antenna designed as a fixed part of the equipment, without the use of an external connector and as such which can not be disconnected from the equipment by the user

**magnetic dipole moment:** product of (Number of coil turns)  $\times$  (coil area)  $\times$  (coil current)  
(Air coils only)

**mobile station:** equipment normally installed in a vehicle

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

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

**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

**transponder:** device that responds to an interrogation signal

**type designation:** providers' marking of the equipment

### 3.2 Symbols

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

|                 |  |
|-----------------|--|
| A               | loop antenna area                                |
| C               | correction factor                                |
| E               | electrical field strength                        |
| f               | frequency  |
| f <sub>C</sub>  | carrier frequency in Hz                          |
| H               | magnetic field strength                          |
| H <sub>ef</sub> | H field-strength generated by an e-field antenna |

|                |  |
|----------------|--|
| H <sub>f</sub> | H-field-strength limit                                 |
| H <sub>C</sub> | carrier H-field strength                               |
| H <sub>S</sub> | H-field-strength limit for radiated spurious emissions |
| I <sub>C</sub> | transmitter carrier output current                     |
| I <sub>S</sub> | transmitter spurious output current                    |
| λ              | Wave length  |
| m              | magnetic dipole moment                                 |
| N              | number of turns for a loop antenna                     |
| P              | Power  |
| t              | time   |

### 3.3 Abbreviations

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

|       |   |
|-------|---|
| EAS   | Electronic Article Surveillance                 |
| EMC   | ElectroMagnetic Compatibility                   |
| erp   | effective radiated power                        |
| ISM   | Industrial, Scientific and Medical              |
| ND    | Noise and Distortion                            |
| OATS  | Open Area Test Site                             |
| PSTN  | Public Switched Telephone Network               |
| R&TTE | Radio and Telecommunications Terminal Equipment |
| RF    | Radio Frequency                                 |
| RFID  | Radio Frequency Identification                  |
| SND   | Signal, Noise and Distortion                    |
| SRD   | Short Range Device                              |
| VSWR  | Voltage Standing Wave Ratio                     |

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## 4 Technical requirements specifications

### 4.1 General requirements

#### 4.1.1 Receiver classification

The product family of short range radio devices is divided into three receiver Classes, see table 1, each having its own set of minimum performance criteria. This classification is based upon the impact on persons in case the equipment does not operate above the specified minimum performance level.

**Table 1**

| Receiver class | Relevant receiver clauses  | Risk assessment of receiver performance  |
|----------------|--|--|
| 1              | 8.1, 8.2 and 8.3   | Safety critical SRD communication media; i.e. for devices serving systems where failure may result in a physical risk to a person.                   |
| 2              | 8.2 and 8.3  | Function critical SRD communication media; i.e. when a failure to operate correctly causes loss of function but does not constitute a safety hazard. |
| 3              | 8.3  | Non-critical SRD communication media whose failure to operate correctly causes loss of function which can be overcome by parallel means.             |
| NOTE:          | With reference to the present document manufacturers are recommended to declare classification of their devices in accordance with table 1, as relevant. In particular where an SRD which may have an inherent safety of human life implication, manufacturers and users should pay particular attention to the potential for interference from other systems operating in the same or adjacent bands. |  |

## 4.1.2 General performance criteria

For the purpose of the receiver performance tests, the receiver will produce an appropriate output under normal conditions as indicated below:

- a SND/ND ratio of 20 dB, measured at the receiver output through a telephone psophometric weighting network as described in ITU-T Recommendation O.41 [6]; or
- after demodulation, a data signal with a bit error ratio of  $10^{-2}$ ; or
- after demodulation, a message acceptance ratio of 80 %.

Where the indicated performance cannot be achieved or if it is defined differently, the manufacturer shall declare and publish the performance criteria used to determine the performance of the receiver.

## 4.2 Presentation of equipment for testing purposes

Each equipment submitted for testing shall fulfil the requirements of the present document on all frequencies over which it is intended to operate.

The provider shall declare the frequency ranges, the range of operating conditions and power requirements as applicable, to establish the appropriate test conditions.

Additionally, technical documentation and operating manuals, sufficient to make the test, shall be supplied.

A test fixture for equipment with an integral antenna may be supplied by the provider (see clause 6.3). For equipment supplied without an antenna i.e. Product Class 3 as defined in clause 7.1.3, the provider will supply either a tuned reduced radiating load (see clause 6.2.1) or an artificial antenna as defined by annex E.

If an equipment is designed to operate with different radiated field strengths or power level, measurement of each transmitter parameter shall be performed, according to the present document, on samples of equipment defined in clause 4.2.1.

To simplify and harmonize the testing procedures between different testing laboratories, measurements shall be performed, according to the present document, on samples defined in clauses 4.2.1 to 4.2.4.

### 4.2.1 Choice of model for testing

The provider shall provide one or more samples of the equipment, as appropriate for testing.

Stand alone equipment shall be offered by the provider complete with any ancillary equipment needed for testing.

If an equipment has several optional features, considered not to affect the RF parameters then the tests need only to be performed on the equipment configured with that combination of features considered to be the most complex, as proposed by the provider and agreed by the test laboratory.

Where practicable, equipment offered for testing shall provide a 50  $\Omega$  connector for conducted RF power level measurements.

In the case of integral antenna equipment, if the equipment does not have an internal permanent 50  $\Omega$  connector then it is permissible to supply a second sample of the equipment with a temporary antenna connector fitted to facilitate testing, see clause 4.2.3.

The performance of the equipment submitted for testing shall be representative of the performance of the corresponding production model.

### 4.2.2 Testing of equipment with alternative radiated H-field strengths

If a family of equipment has alternative radiated field strengths provided by the use of separate power modules or add on stages, then these shall be declared by the provider. Each module or add on stage shall be tested in combination with the equipment. As a minimum, measurements of the radiated H-field strength and spurious emissions shall be performed for each combination and shall be stated in the test report.

## 4.2.3 Testing of equipment that does not have an external 50 $\Omega$ RF connector (integral antenna equipment)

### 4.2.3.1 Equipment with an internal permanent or temporary antenna connector

The means to access and/or implement the internal permanent or temporary antenna connector shall be stated by the provider with the aid of a diagram. The fact that use has been made of the internal antenna connection, or of a temporary connection, to facilitate measurements shall be recorded in the test report.

### 4.2.3.2 Equipment with a temporary antenna connector

The provider may submit one set of equipment with the normal antenna connected, to enable radiated measurements to be made. The provider shall attend the test laboratory at the conclusion of the radiated measurements, to disconnect the antenna and fit the temporary connector. The testing laboratory staff shall not connect or disconnect any temporary antenna connector.

Alternatively, the provider may submit two sets of equipment to the test laboratory, one fitted with a temporary antenna connector with the antenna disconnected and another equipment with the antenna connected. Each equipment shall be used for the appropriate tests. The provider shall declare that the two sets of equipment are identical in all aspects except for the antenna connector.

## 4.2.4 On-site testing

In certain cases it may not be possible to provide representative samples of antennas and/or equipment due to physical constraints. In these cases equivalent measurements to the present document shall be made at a representative installation of the equipment (on-site).

## 4.3 Mechanical and electrical design

### 4.3.1 General

<https://standards.iteh.ai/catalog/standards/sist/3db5c9c0-acf3-4f5e-b1d8-77f6e4faa739/sist-en-300-330-1-v1-5-1-2006>

The equipment submitted by the provider should be designed, constructed and manufactured in accordance with sound engineering practice and with the aim of minimizing harmful interference to other equipment and services.

Transmitters and receivers may be individual or combination units.

### 4.3.2 Controls

Those controls which, if maladjusted, might increase the interfering potentialities of the equipment shall not be easily accessible to the user.

### 4.3.3 Transmitter shut-off facility

If the transmitter is equipped with an automatic transmitter shut-off facility, it should be made inoperative for the duration of the test.

### 4.3.4 Receiver mute or squelch

If the receiver is equipped with a mute, squelch or battery-saving circuit, this circuit shall be made inoperative for the duration of the tests.

### 4.3.5 Marking (equipment identification)

The equipment shall be marked in a visible place. This marking shall be legible and durable. Where this is not possible due to physical constraints, the marking shall be included in the users' manual.