



**Electromagnetic compatibility
radio spectrum Matters (E
Magnetic Compatibility (E
for radio equipment and s
conditions for Short-Rang
requencies between 9 kHz**

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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
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Foreword

This final draft Harmonized European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

The present document has been produced by ETSI in response to mandate 284 issued from the European Commission under Directive 98/34/EC [i.2] as amended by Directive 98/48/EC [i.7].

The title and reference to the present document are intended to be included in the publication in the Official Journal of the European Union of titles and references of Harmonized Standard under the Directive 1999/5/EC [i.1].

See article 5.1 of Directive 1999/5/EC [i.1] for information on presumption of conformity and Harmonized Standards or parts thereof the references of which have been published in the Official Journal of the European Union.

The present document is part 3 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

Proposed national transposition dates

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Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

1 Scope

The present document, together with EN 301 489-1 [1], covers the assessment of Short Range Devices (SRD) and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC).

Technical specifications related to the antenna port and emissions from the enclosure port of Short Range Devices (SRD) are not included in the present document. Such technical specifications are found in the relevant product standards for the effective use of the radio spectrum.

Examples of SRDs are given in annex A.

The present document specifies the applicable test conditions, performance assessment, and performance criteria for Short Range Devices (SRD) and the associated ancillary equipment.

In case of differences (for instance concerning special conditions, definitions, abbreviations) between the present document and the EN 301 489-1 [1], the provisions of the present document take precedence.

The environmental classification and the emission and immunity requirements used in the present document are as stated in the EN 301 489-1 [1], except for any special conditions included in the present document.

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.

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2.1 Normative references

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

- [1] ETSI EN 301 489-1 (V1.9.2) (09-2011): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements".

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] 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.2] 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.
- [i.3] ETSI EN 300 220-1: "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".

- [i.4] ETSI EN 300 330-1: "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 1: Technical characteristics and test methods".
- [i.5] ETSI EN 300 440-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 1: Technical characteristics and test methods".
- [i.6] ETSI EN 305 550-1: "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".
- [i.7] Directive 98/48/EC of the European Parliament and of the Council of 20 July 1998 amending Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulations.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in EN 301 489-1 [1], clause 3 and the following apply:

device type: classification of devices based on the risk assessment of communication link performance

receiver: stand alone receiver or receiver being part of a transceiver

receiver category: set of relevant receiver requirements and minimum performance criteria

Short Range Device (SRD): piece of apparatus which includes a transmitter, and/or a receiver and or parts thereof, used in alarm, telecommand and telemetry applications, etc. operating with analogue speech/music or data (analogue and/or digital) or with combined analogue speech/music and data, using any modulation type

NOTE: These devices can be used in a fixed, mobile or portable application.

transmitter: stand alone transmitter or transmitter being part of a transceiver

3.2 Abbreviations

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

AC	Alternating Current
CR	Continuous phenomena applied to Receivers
CT	Continuous phenomena applied to Transmitters
DC	Direct Current
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
fo	operating frequency
RF	Radio Frequency
SINAD	Ratio of (Signal + Noise + Distortion) to (Noise + Distortion)
SRD	Short Range Device
TR	Transient phenomena applied to Receivers
TT	Transient phenomena applied to Transmitters

4 Test conditions

For the purposes of the present document, the test conditions of the EN 301 489-1 [1], clause 4, shall apply as appropriate. Further product related test conditions for Short Range Devices (SRD) are specified in the present document.

4.1 General

For emission and immunity tests the normal test modulation, test arrangements, etc., as specified in the present document, clauses 4.1 to 4.5, shall apply.

Whenever the Equipment Under Test (EUT) is provided with a detachable antenna, the EUT shall be tested with the antenna fitted in a manner typical of normal intended use, unless specified otherwise.

For the purpose of the present document Short Range Devices are divided into three types of primary function, based on the technical nature of the primary function.

Table 1: Technical nature of the primary function

Primary Function Type	Technical nature of the primary function
I	Transfer of messages (digital or analogue signals)
II	Transfer of audio (speech or music)
III	Others

4.2 Arrangements for test signals

The provisions of the EN 301 489-1 [1], clause 4.2, shall apply.

4.2.1 Arrangements for test signals at the input of the transmitter

The provisions of the EN 301 489-1 [1], clause 4.2.1, shall apply with the following modifications.

The transmitter shall be modulated with normal test modulation as specified for that type of primary function (see clause 4.5). Where transmitters do not have a modulation input port, the internal equipment modulation shall be used.

4.2.2 Arrangements for test signals at the output of the transmitter

The provisions of the EN 301 489-1 [1], clause 4.2.2, shall apply with the following modifications.

The transmitter shall be operated at its maximum rated RF output power as specified for that type of primary function (see clause 4.5).

The manufacturer may provide a suitable companion receiver that can be used to set up a communications link and/or to receive messages.

4.2.3 Arrangements for test signals at the input of the receiver

The provisions of EN 301 489-1 [1], clause 4.2.3, shall apply with the following modifications:

- the wanted RF input signal, coupled to the receiver, shall be modulated with normal test modulation as specified for that type of primary function (see clause 4.5);
- the level of the wanted RF input signal shall be chosen to a value significantly above the threshold sensitivity but below the overload characteristics of the receiver;
- the manufacturer may provide a suitable companion transmitter that can be used to set up a communications link and/or to transmit messages.

4.2.4 Arrangements for test signals at the output of the receiver

The provisions of EN 301 489-1 [1], clause 4.2.4, shall apply.

4.2.5 Arrangements for testing transmitter and receiver together (as a system)

The provisions of EN 301 489-1 [1], clause 4.2.5, shall apply with the following modification.

The transmitter and receiver may be tested together, if appropriate (size of equipment, etc.). In this case the transmitter and the receiver shall be located inside the test environment and shall be exposed at the same time to the EMC phenomena. Instead of coupling the output signal of the transmitter to the measuring equipment outside the test environment, this signal shall be coupled, inside the test environment, to input of the receiver, via an attenuator, if required, to prevent overload of the receiver.

4.3 Exclusion bands

The frequencies on which Short Range Devices (SRD) are intended to operate, shall be excluded from the conducted and radiated RF immunity tests.

The frequencies on which the SRD transmitters are intended to operate shall be excluded from conducted and radiated emission measurements when performed in transmit mode of operation.

There shall be no frequency exclusion band applied to emission measurements of SRD receivers, and/or associated ancillary equipment.

The emission measurement and immunity test exclusions are referred to as "exclusion bands" and are defined in clauses 4.3.1 and 4.3.2 of the present document.

4.3.1 Exclusion bands for receivers

The exclusion band for receivers (including receivers part of transceivers) intended to be used in a channelized frequency band, is determined as follows:

- For receivers capable of operating on only one single frequency and not having an alignment range, the lower frequency of the exclusion band is the lower frequency of the used frequency channel minus the extension value given in table 2, and the upper frequency of the exclusion band is the upper frequency of the used frequency channel plus the extension value given in table 2. The calculated extension value shall be based on the operating frequency.
- For receivers capable of operating on only one single frequency and having an alignment range, the lower frequency of the exclusion band is the lower frequency of the alignment range minus the extension value given in table 2, and the upper frequency of the exclusion band is the upper frequency of the alignment range plus the extension value given in table 2. The calculated extension values shall be based on the centre frequency of the alignment range. However, if the alignment range is more than 10 % of the upper frequency of the alignment range the calculated value shall be based on 10 % of the upper value of the alignment range.
- For receivers capable of operating on more than one frequency in an operating frequency band the width of which is less than 20 % of the centre frequency of the operating band, the lower frequency of the exclusion band is the lower frequency of the operating band minus the extension value given in table 2, and the upper frequency of the exclusion band is the upper frequency of the operating band plus the extension value given in table 2. The calculated extension value shall be based on the centre frequency of the operating band.
- For receivers capable of operating on a number of frequencies over a frequency band wider than the band specified above, immunity tests shall be made over a selected number of test frequencies. The selected test frequencies shall be located at three evenly spaced points per logarithmic decade of the frequency band. For each test frequency the lower frequency of the exclusion band is the lower frequency of the used test frequency channel minus the extension value given in table 2, and the upper frequency of the exclusion band is the upper frequency of the used test frequency channel plus the extension value given in table 2. The calculated extension value shall be based on the used test frequency.