



**ElectroMagnetic Compatibility (EMC)
standard for radio equipment and services;
Part 3: Specific conditions for
Short Range Devices (SRD)
operating on frequencies between 9 kHz and 246 GHz;
Harmonised Standard for ElectroMagnetic Compatibility**

ReferenceREN/ERM-EMC-402

KeywordsEMC, harmonised standard, SRD

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Foreword

This final 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 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.5] 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.2].

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 part 3 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1]. A guide to using the series can be found in ETSI TR 103 088 [i.4].

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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Introduction

The product family of Short Range Devices covers a wide range of equipment types, which may have different sets of performance criteria set out in the relevant radio standards and/or product standards.

The present document is intended for all SRD types and applies a standard set of performance criteria. This includes the requirement that the equipment continues to operate as intended under certain standardized conditions of EMC stress.

The term "Short Range Device" (SRD) is intended to cover the radio equipment which provides either uni-directional or bi-directional communication and which have low capability of causing interference to other radio equipment. SRDs use either integral, dedicated or external antennas and all modes of modulation can be permitted subject to relevant standards. For Short Range Devices individual licenses are normally not required.

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<https://standards.etsi.org/ETSI/EN/301489-3>
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1 Scope

The present document covers the assessment of Short Range Devices (SRD) operating in the frequency range 9 kHz to 246 GHz in respect of ElectroMagnetic Compatibility (EMC).

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

The present document applies to the categories of SRD listed in Table 1 with the exception that the present document does not apply to devices for which a product specific harmonised EMC standard is available.

NOTE 1: The entries in Table 1 of the present document are based on the Decision (EU) 2019/1345 [i.1], Table 1.

Table 1: Categories of short range device

Category of Short Range Devices	Scope of the category
Non-specific SRD	Covers all kinds of radio devices, regardless of the application or their 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. (See note 1.)
Active medical implant devices (See note 2)	Covers the radio part of active implantable medical devices that are intended to be fully or partially introduced, surgically or medically, into the human body or that of an animal, and where applicable their peripherals. Active implantable medical devices are defined in Council Directive 90/385/EEC [i.3].
Assistive Listening Devices (ALDs) (See note 2)	Covers radio communications systems that allow persons with hearing impairment to increase their listening capability. Typical system installations include one or more radio transmitters and one or more radio receivers.
High duty cycle/continuous transmission devices	Covers radio devices that rely on low latency and high duty cycle transmissions. These devices are typically used for personal wireless audio and multimedia streaming systems used for combined audio/video transmissions and audio/video sync signals, mobile phones, automotive or home entertainment system, wireless microphones, cordless loudspeakers, cordless headphones, radio devices carried on a person, assistive listening devices, in-ear monitoring, wireless microphones for use at concerts or other stage productions, and low power analogue FM transmitters.
Inductive devices	Covers radio devices that use magnetic fields with inductive loop systems for near field communications. This typically includes devices for car immobilisation, animal identification, alarm systems, cable detection, waste management, personal identification, wireless voice links, access control, proximity sensors, anti-theft systems as well as RF anti-theft induction systems, data transfer to hand-held devices, automatic article identification, wireless control systems and automatic road tolling.
Low duty cycle/high reliability devices	Covers radio devices that rely on low overall spectrum utilization and low duty cycle spectrum access rules to ensure highly reliable spectrum access and transmissions in shared bands. Typical applications include alarm systems that use radio communication for indicating an alert condition at a distant location and social alarm systems that allow reliable communication for a person in distress.
Medical data acquisition devices (See note 2)	Covers the transmission of non-voice data to and from non-implantable medical devices in order to monitor, diagnose and treat patients in healthcare facilities or in their homes as prescribed by duly authorized healthcare professionals.
PMR446 devices	Covers hand portable equipment (without base station or repeater use) carried on a person or manually operated, which uses integral antennas only in order to maximize sharing and minimize interference. PMR 446 equipment operates in short-range peer-to-peer mode and excludes use either as a part of infrastructure network or as a repeater.
Radio determination devices (See note 2)	Covers radio devices used for determining the position, velocity and/or other characteristics of an object, or for obtaining information relating to these parameters. Radio determination equipment typically conducts measurements to obtain such characteristics. Radio determination devices exclude any kind of point-to-point or point-to-multipoint radio communications.

Category of Short Range Devices	Scope of the category
Radio Frequency Identification (RFID) devices	Covers tag/interrogator based radio communications systems, consisting of: i) radio devices (tags) attached to animate or inanimate items; and ii) transmitter/receiver units (interrogators) which activate the tags and receive data back. Typical applications include the tracking and identification of items, for instance for the purpose of Electronic Article Surveillance (EAS), and collecting and transmitting data relating to the items to which tags are attached, which may be either battery-less, battery assisted or battery powered. The responses from a tag are validated by its interrogator and passed to its host system.
Transport and traffic telematics devices	Covers radio devices that are used in the fields of transport (road, rail, water or air, depending on the relevant technical restrictions), traffic management, navigation, mobility management and in Intelligent Transport Systems (ITS). Typical applications include interfaces between different modes of transport, communication between vehicles (e.g. car to car), between vehicles and fixed locations (e.g. car to infrastructure) as well as communication from and to users.
Wideband data transmission devices (See note 2)	Covers radio devices that use wideband modulation techniques to access the spectrum. Typical uses include wireless access systems such as Radio Local Area Networks (WAS/RLANs) or wideband SRDs in data networks.
NOTE 1: The Annex of the Decision (EU) 2019/1345 [i.1] lists the frequency bands and associated conditions harmonised in the EU. There may be variations in individual countries.	
NOTE 2: A product specific harmonised EMC standard may be applicable for some devices and should be used in preference to the present document.	

Technical specifications related to the antenna port of radio equipment and radiated emissions from the enclosure port of the radio equipment are not included in the present document. Such technical specifications are normally found in the relevant product standards for the effective use of the radio spectrum.

Emissions requirements in the present document are only specified for frequencies above 9 kHz.

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

NOTE 2: The relationship between the present document and essential requirements of article 3.1(b) of Directive 2014/53/EU [i.2] is given in annex A.

2 References

2.1 Normative 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.

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] ETSI EN 301 489-1 (V2.2.3) (11-2019): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility".
- [2] Void.
- [3] Void.

- [4] EN 61000-4-4 (2012): "Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test" (produced by CENELEC).

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] Commission Implementing Decision (EU) 2019/1345 of 2 August 2019 amending Decision 2006/771/EC updating harmonised technical conditions in the area of radio spectrum use for short-range devices.
- [i.2] 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.3] Council Directive 90/385/EEC of 20 June 1990 on the approximation of the laws of the Member States relating to active implantable medical devices (OJ L 189, 20.7.1990, p. 17).
- [i.4] ETSI TR 103 088: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Using the EN 301 489 series of EMC standards".
- [i.5] 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.
- [i.6] <http://www.etsi.org/standards-store/301489-3> ETSI EN 300 220-1 (V3.1.1) (02-2017): "Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 1: Technical characteristics and methods of measurement".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 301 489-1 [1], ETSI EN 300 220-1 [i.6], Directive 2014/53/EU [i.2] and the following apply:

ancillary equipment: electrical or electronic equipment, that is intended to be used with a receiver or transmitter

NOTE 1: It is considered as an ancillary equipment if:

- the equipment is intended for use with a receiver or transmitter to provide additional operational and/or control features to the radio equipment, (e.g. to extend control to another position or location);
- the ancillary equipment cannot be used without being connected to radio equipment to provide user functions independently of a receiver or transmitter; and
- the receiver or transmitter, to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

NOTE 2: An example of ancillary equipment would be a docking station for radio equipment whose interface is dedicated to a particular product or range of products.

applicable harmonised radio standard: harmonised standard that is applied to the EUT in relation to article 3.2 of the Directive 2014/53/EU [i.2]

corresponding equipment: equipment with which the EUT interacts by means of radio waves as part of the EUT's intended use

EXAMPLE 1: If the EUT is an interrogator or reader for RFID or access control, the corresponding equipment may be a tag, label or keycard.

EXAMPLE 2: If the EUT is a tag, label or keycard, the corresponding equipment may be a reader or interrogator.

Operating Channel (OC): range of frequencies that contains the transmitted or received signal

NOTE: Lower and upper frequency edges values of OC are denoted as FOC_{low} and FOC_{high} .

operating frequency: centre of transmitted or received signal

Operating Frequency Band (OFB): frequency band or sub-band within which the equipment is intended to operate

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

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

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 301 489-1 [1] and ETSI EN 300 220-1 [i.6] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 301 489-1 [1], ETSI EN 300 220-1 [i.6] and the following apply:

FDD	Frequency Division Duplex
TDD	Time Division Duplex
TDMA	Time Division Multiple Access

4 Test conditions

4.1 General

The test conditions and provisions of ETSI EN 301 489-1 [1], clause 4 shall apply, with the modifications in clause 4 of the present document.

4.2 Arrangements for test signals

4.2.1 General

The coupling mechanism for wanted RF signals between the EUT and the measuring and/or test equipment may include attenuation to control the level of the signals. The coupling mechanism shall be entirely passive so that the reciprocal path loss is the same.

The wanted signals and/or controls required to exercise the EUT shall be representative of the EUT's intended use.

4.2.2 Receiver wanted input signal

4.2.2.1 General

For all tests except radiated immunity testing the level of the wanted signal at the input of the receiver or the enclosure port of the EUT shall be representative of the EUT intended use.

For radiated immunity testing the standard procedure is described in clause 4.2.2.2. The alternative procedure in clause 4.2.2.3 shall be applied when:

- the EUT is tested with corresponding equipment; and
- the maximum separation between the EUT and the corresponding equipment is not more than one-tenth of a wavelength at the operating frequency.

NOTE: The separation is measured as the air gap between the outer casings of the equipment.

In the case of equipment without an antenna connector the wanted signal level shall be established for each orientation in which the EUT is tested.

4.2.2.2 Radiated immunity test wanted signal level

The level of the wanted signal at the input of the receiver or the enclosure port of the EUT, shall be 30 dB (± 3 dB) above the minimum usable receiver signal level.

NOTE 1: A simple method to establish the required wanted signal level is to establish operation, reduce level to the point of failure then increase by 30 dB.

In the case that the dynamic range at the receiver input is insufficient to accommodate the above level, then the level shall be set as follows:

The maximum usable receiver input level shall be found. The level of the wanted signal shall be set to the geometric mean power level of the minimum and maximum usable signal levels.

NOTE 2: A simple method to establish the geometric mean power level is to take the arithmetic mean of the values in dBm.

4.2.2.3 Radiated immunity test wanted separation

This clause is only applicable if the conditions in clause 4.2.2.1 are met.

The maximum usable separation between the EUT and the corresponding equipment shall be found.

With the EUT and the corresponding equipment in the same relative orientation the minimum usable separation shall be found. This may be at zero separation or at a separation below which correct operation does not occur.

With the EUT and the corresponding equipment in the same relative orientation the separation shall be set to the arithmetic mean of the minimum and maximum usable separations.

4.2.3 Equipment with an external antenna connector

This clause applies to EUT with an externally mounted conventional RF antenna connector. If access to the antenna connector involves modification or dismantling of the EUT then this clause does not apply.

The EUT shall be tested with its antenna removed. The antenna connector shall be terminated with a screened resistive load of the same impedance as the connector.

4.2.4 Equipment without an external antenna connector (integral antenna)

This clause applies to EUT to which clause 4.2.3 does not apply.

The EUT shall be tested as configured for intended use.