



ElectroMagnetic Compatibility (EMC)
standard for radio equipment and services;
Part 3: Specific conditions for ~~Short Range Devices (SRD)~~
Short Range Devices (SRD)
operating on frequencies between 9 kHz and 246 GHz;
Harmonised Standard ~~covering the essential requirements for~~
ElectroMagnetic Compatibility
~~of article 3.1(b) of Directive 2014/53/EU~~

Reference

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Foreword

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

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.3i.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].

National transposition dates

Date of adoption of this EN:	8 May 2017 <u>23 January 2023</u>
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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 ~~standardised~~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.

1 Scope

The present document, ~~together with ETSI EN 301 489 1 [1],~~ covers the assessment of Short Range Devices (SRD) ~~and ancillary equipment 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.

~~In case of differences (for instance concerning special conditions, definitions, abbreviations) between the~~ The present document ~~and applies to the categories of SRD listed in Table 1 with the ETSI EN 301 489 1 [1], the~~ ~~provisions~~ 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 take precedence are based on the Decision (EU) 2019/1345 [i.1], Table 1.

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

Table 1: Categories of short range device

<u>Category of Short Range Devices</u>	<u>Scope of the category</u>
<u>Non-specific SRD</u>	<u>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.)</u>
<u>Active medical implant devices</u> (See note 2)	<u>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].</u>
<u>Assistive Listening Devices (ALDs)</u> (See note 2)	<u>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.</u>
<u>High duty cycle/continuous transmission devices</u>	<u>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.</u>
<u>Inductive devices</u>	<u>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.</u>
<u>Low duty cycle/high reliability devices</u>	<u>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.</u>
<u>Medical data acquisition devices</u> (See note 2)	<u>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.</u>
<u>PMR446 devices</u>	<u>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. PMR446 equipment operates in short-range peer-to-peer mode and excludes use either as a part of infrastructure network or as a repeater.</u>

<u>Category of Short Range Devices</u>	<u>Scope of the category</u>
<u>Radio determination devices (See note 2)</u>	<u>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.</u>
<u>Radio Frequency Identification (RFID) devices</u>	<u>Covers tag/interrogator based radio communications systems, consisting of:</u> <ul style="list-style-type: none"> <u>i) radio devices (tags) attached to animate or inanimate items; and</u> <u>ii) transmitter/receiver units (interrogators) which activate the tags and receive data back.</u> <u>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.</u>
<u>Transport and traffic telematics devices</u>	<u>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.</u>
<u>Wideband data transmission devices (See note 2)</u>	<u>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.</u>
<u>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.</u>	
<u>NOTE 2: A product specific harmonised EMC standard may be applicable for some devices and should be used in preference to the present document.</u>	

Technical specifications related to the antenna port of radio equipment and radiated emissions from the enclosure port of ~~radio equipment and combinations of radio and associated ancillary~~ 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.

~~The Emissions requirements in the present document, together with~~ 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], are aimed to cover except for any special conditions included in the present document.

NOTE 2: The relationship between the present document and essential requirements to demonstrate an adequate level of electromagnetic compatibility 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. Only) 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 (V2.2.0) (03-20173) (11-2019): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU for ElectroMagnetic Compatibility".~~
- [2] ~~ETSI Void.~~
- [3] ~~Void.~~
- [4] ~~EN 300 220-1 (V3.1.1) (02-2017): "Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; 61000-4-4 (2012): "Electromagnetic compatibility (EMC) - Part 4- Technical characteristics 4-4: Testing and methods of 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.

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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 ETSI-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] 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 Definitions Definition of terms, symbols and abbreviations

3.1 Definitions Terms

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

(relevant) 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 for the purposes of determining compliance of the EUT with 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] and ETSI EN 300 220-1 [i.6] and the following apply:

<u>ALD</u>	<u>Assistive Listening Device</u>
<u>EAS</u>	<u>Electronic Article Surveillance</u>
<u>FDD</u>	<u>Frequency Division Duplex</u>
<u>FM</u>	<u>Frequency Modulation</u>
<u>FOC</u>	<u>Final Operational Capability</u>
<u>ITS</u>	<u>Intelligent Transport Systems</u>
<u>PMR446</u>	<u>Licence-exempt ETSI PMR standard operating under ERC/DEC(98)26 and ERC/DEC(98)27</u>
<u>RFID</u>	<u>Radio Frequency IDentification</u>
<u>TDD</u>	<u>Time Division Duplex</u>
<u>TDMA</u>	<u>Time Division Multiple Access</u>
<u>WAS/RLAN</u>	<u>Wireless Access Systems/Radio Local Area Network</u>

4 Test conditions

4.1 General

Clause 4 describes details of the configuration and connections for testing of the EUT.

~~For the purposes of the present document, the~~ The test conditions and provisions of ETSI-EN 301 489-1-[1], ~~clause 4, shall apply as appropriate, except as varied and/or extended herein.~~

4.2 Environmental profile

~~The equipment shall be tested under normal test conditions according to the relevant radio standard.~~

~~NOTE: The technical requirements of the present document apply under the environmental profile for operation of the EUT, which is declared by the manufacturer. The EUT should comply with all the technical requirements~~ modifications in clause 4 of the present document ~~at all times when operating within the boundary limits of the declared operational environmental profile.~~

4.3 Test signal connections

4.2 Arrangements for test signals

4.32.1 General

~~For the purposes of the present document, the requirements of ETSI-EN 301 489-1 [1], clause 4.2, shall apply as appropriate, except as varied and/or extended herein.~~

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 4.2.2.3-2 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.

~~The wanted RF input and output signals shall be delivered between the EUT antenna connector and the measuring and/or test equipment by a shielded transmission line, such as a coaxial cable. Adequate measures shall be taken to minimize the effect of common mode currents on the transmission line at the point of entry to the EUT and at the measuring/test equipment.~~

~~4.3.~~4.2.4 Equipment without an external antenna connector (integral antenna)

This clause applies to EUT to which clause 4.~~2.3.2~~ does not apply. ~~Such EUT are generally known as integral antenna or dedicated antenna equipment.~~

The EUT shall be tested ~~with its antenna fitted in a manner typical of normal~~ as configured for intended use.

~~4.3.~~4.2.5 Equipment with more than one antenna

If the EUT has more than one antenna port, e.g. separate antennas for Tx and Rx or separate antennas for different operating frequencies or diversity antennas, then:

- If clause 4.~~2.3.2~~ applies to all the antenna ports, then the EUT shall be tested according to clause 4.~~2.3.2~~.
- Otherwise it shall be tested according to clause 4.~~3.~~4.2.4.

NOTE: The reason is that replacing one antenna by a transmission line may affect the operation of any other antennas.

4.4 ~~Narrow band responses of receivers~~

4.3 RF Exclusion bands

4.3.1 General

The provisions of ETSI EN 301 489-1 [1], clause 4.4, shall apply.

4.5 ~~Arrangements for testing~~

4.5.1 ~~Testing transmitter and receiver together (as a system)~~

The provisions of ETSI EN 301 489-1 [1], clause 4.2.5.3 shall not apply. Stand alone receivers and transmitters shall be tested separately. Transceivers shall be tested so that operation in each direction is confirmed.

4.5.2 ~~Operating modes~~

The EUT, whether transmitter, receiver, transceiver or multi mode, will generally have one or more of the following operating modes:

- ~~Power Off~~
- ~~Standby (there may be more than one level of standby)~~
- ~~Receive~~
- ~~Transmit~~
- ~~Duplex such as Frequency Division Duplex (FDD) or Time Division Duplex (TDD), or Time Division Multiple Access (TDMA)~~

An "off" condition in which the EUT is able to respond to a wake up event, other than mechanical operation of a power switch, is really a form of standby mode.

4.6 ~~RF Exclusion bands~~

4.6.1 ~~General~~

The provisions of ETSI EN 301 489-1 [1], clause 4.3 shall not apply.

The frequencies on which the EUT is intended to operate shall be excluded from the conducted and radiated RF emission and immunity tests.

4.6.3.2 ~~Exclusion bands for emissions testing~~

4.6.3.2.1 ~~Transmitters~~

The exclusion band shall be those frequencies specified in the relevant Where the applicable harmonised radio standard as the operating frequency bands specifies an Operating Channel and the an Out of Band domain, then these together shall form the exclusion band.

Where this is not so specified the exclusions bands shall be as below:

- For transmitters operating, or intended to operate, in a channelized frequency band, the exclusion band is five times (i.e. $\pm 250\%$) the maximum operating channel width Operating Channel Width (OCW) allowed for that service, centred around the operating frequency.

- For ~~wide band~~ all other transmitters, ~~i.e. transmitters in a non-channelized frequency band~~, the exclusion band is twice the intended operating frequency band centred around the centre frequency of the intended operating frequency band.

~~The~~ This exclusion band shall only apply when the EUT is in transmit mode of operation.

4.63.2.2 Receivers

No exclusion band applies.

4.63.2.3 Duplex and multi-mode equipment

In the case of EUT tested with a simultaneous transmit and receive mode, the exclusion band used shall be the one for the transmitter. I.e. only one exclusion band shall be applied.

In the case of transmitters capable of operating on more than one frequency band, testing shall be carried out on each band separately.

4.63.3 Exclusion bands for immunity testing

4.63.3.1 Transmitters

The exclusion band shall be as specified for emissions testing in clause 4.63.2.1.

4.63.3.2 Receivers

The exclusion band is based on ~~an extension value~~.

~~The lower limit of the exclusion band is the lower edge (FOC_{low}) and the upper edge (FOC_{high}) and the centre (f_0) of the Operating Channel (OC) minus the extension value, or zero, whichever is the greater.~~

~~The upper limit is the upper edge of~~ Where the OC ~~plus the extension value~~.

The extension value is given in table 1. The OC is defined in the relevant applicable harmonised radio standard, the values for that shall be used and f_0 shall be the centre of the OC. In all other cases, f_0 shall be the receiver operating frequency and the OC shall be $\pm 0,05$ % around f_0 .

Table 1: Extension values

Tables 2 and 3 show the lower and upper limits of the exclusion band.

Table 2: Lower limit of exclusion band

Receiver operating frequency f_0 Lower edge of OC, FOC_{low}	Extension value Lower limit of exclusion band
< 300 kHz	300 kHz
300 kHz to < 30 MHz	$FOC_{low} - 3$ MHz
30 MHz to < 42 MHz	27 MHz
42 MHz to < 1 GHz	$FOC_{low} - 15$ MHz, or $5\% \times f_0$ or $FOC_{low} - 0,05 \times f_0$, whichever is greater <u>lower</u>
1 GHz to < 1,05 GHz	950 MHz
1,05 GHz to < 6 GHz	$FOC_{low} - 100$ MHz
≥ 6 GHz to < 6,3 GHz	$5\% \times f_0$
$\geq 6,3$ GHz	$FOC_{low} - 0,05 \times f_0$

NOTE: ~~The receiver exclusion band frequency range aligns as far as possible with the blocking test frequency range defined in ETSI EN 300 220-1 [2].~~

Table 3: Upper limit of exclusion band

<u>Upper edge of OC, FOC_{high}</u>	<u>Upper limit of exclusion band</u>
<u>< 300 kHz</u>	<u>FOC_{high} + 300 kHz</u>
<u>300 kHz to < 30 MHz</u>	<u>FOC_{high} + 3 MHz</u>
<u>30 MHz to < 42 MHz</u>	<u>FOC_{high} + 5 MHz</u>
<u>42 MHz to < 1 GHz</u>	<u>FOC_{high} + 15 MHz, or FOC_{high} + 0,05 x fo, whichever is higher</u>
<u>1 GHz to < 6 GHz</u>	<u>FOC_{high} + 100 MHz</u>
<u>≥ 6 GHz</u>	<u>FOC_{high} + 0,05 x fo</u>

4.63.3.3 Duplex and multi-mode equipment

In the case of EUT tested with a simultaneous transmit and receive mode, the exclusion band used shall be the combination of the exclusion band for the transmitter and the exclusion band for the receiver. I.e. both exclusion bands shall be applied.

In the case of transmitters capable of operating on more than one frequency band, testing shall be carried out on each band separately.

In the case of receivers operating on more than one frequency, the exclusion band used shall be the combination of the exclusion bands for each operating frequency, i.e. an exclusion band for each operating frequency shall be applied.

NOTE: Where the operating frequencies are in the same operational frequency band, the result will usually be an enlarged single exclusion band. Where the frequencies are widely spaced, e.g. in different bands, the result will be to create multiple separate exclusion bands.

5 ~~Performance assessment~~

54.4 ~~Arrangements for testing~~

4.4.1 Operating modes

The EUT, whether transmitter, receiver, transceiver or multi-mode, will generally have one or more of the following operating modes:

Power Off~~General~~

- ~~Clause 5 describes the means by~~
- Standby (there may be more than one level of standby).
- Receive.
- Transmit.
- Duplex such as Frequency Division Duplex (FDD) or Time Division Duplex (TDD), or Time Division Multiple Access (TDMA).

~~An "off" condition in which the correct functioning of the EUT shall be assessed.~~

~~Clause 5.2 relates EUT is able to equipment with a communications function.~~

~~Clause 5.3 applies respond to equipment with a function a wake up event, other than communications.~~

For the purposes of the present document, the provisions of ETSI EN 301 489 1 [1], clause 5, shall apply as appropriate, except as varied and/or extended herein.

~~5.2~~ ~~Continuous and non-continuous communication links~~

~~For the purposes of the present document, the provisions of ETSI EN 301 489-1 [1], clauses 5.2 and 5.3, shall not apply to assessment of communications links in standby mode.~~

~~For EUT providing a continuous link, assessment of the correct functioning can generally be made immediately the EMC stress is applied.~~

~~Where this is not the case, it is necessary to take into account the maximum acceptable latency in the function of the EUT. Correct functioning requires completing the relevant operation within the maximum latency time.~~

~~Where the maximum latency is specified in the relevant radio standard (in the wanted performance criterion, or an acknowledge requirement), that value shall be used.~~

~~Where this is not the case, then the value shall be specified by the manufacturer.~~

~~5.3~~ ~~Functions other than a communications link~~

~~For the purposes of the present document, the provisions of ETSI EN 301 489-1 [1], clause 5.3, shall apply for assessment of functions other than communications links.~~

5.4.4.2 Associated test equipment

For the purposes of demonstrating correct functioning, the EUT may be required to interact with associated equipment, generally outside the measurement area.

The associated equipment may be:

- standard test or measuring equipment;
- a device similar to the EUT;
- ancillary equipment;
- special test equipment;
- a simulator.

~~Where necessary the associated equipment may be specified and/or supplied by the manufacturer.~~

5.5 Ancillary equipment

The provisions of ETSI EN 301 489-1-[41], clause 5.4, shall apply.

~~5.6~~ ~~Equipment classification~~

~~The provisions of ETSI EN 301 489-1 [1], clause 5.5, shall apply.~~

6 Performance Criteria

6.1 Introduction

For the purposes of the present document the provisions of ETSI EN 301 489-1 [1], clause 6, shall not apply.

The performance criteria are used to make an assessment whether a radio equipment passes or fails immunity tests.

6.2 Performance Criteria

~~In~~Only the table below:

- ~~• performance criterion A applies for immunity tests with phenomena of a continuous nature;~~
- ~~• performance criterion B applies for immunity tests with phenomena of a transient nature.~~

~~NOTE: Whether a phenomenon is considered transient, continuous or otherwise is indicated criteria specified in the test procedures for the phenomenon present document or in ETSI EN 301 489-1 [1], clause 9] where referenced shall apply.~~

The provisions of ETSI EN 301 489-1 [1] clause 6 shall apply, together with clauses 6.2 and 6.3 of the present document.

6.2 Continuous and non-continuous operation

Latency is the time delay between the initiation and the completion of operation of the EUT. Correct functioning requires completing the relevant operation within the maximum latency time.

Table 2: Performance Requirements

Criterion	During test	After test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions

Where "operate as intended" or "no loss of function" the maximum latency is specified, the EUT in the applicable harmonised radio standard (in the wanted performance criterion, or an acknowledge requirement), that value shall demonstrate correct functioning as described in clause 5 be used.

Where this is not the case, then the maximum latency is that required by the intended use of the EUT.

6.3 Operating modes

Where the EUT has more than one mode of operation (see clause 4.5.24.1), an unplanned transition from one mode to another is considered as an unintentional response. The EUT shall be tested in ~~sufficient~~ all modes to confirm there are no such unintentional responses.

7 Applicability Overview

7 Requirements

7.1 Emissions

7.1.1 General

~~For~~Table 4 contains the purposes of EMC emission requirements for the present document, relevant ports of radio and ancillary equipment.

Table 4: Emission requirements

<u>Phenomenon</u>	<u>Port</u>	<u>Applicability</u>			<u>Reference clause</u>
		<u>Fixed use (e.g. base station equipment)</u>	<u>Vehicular use (e.g. mobile equipment)</u>	<u>Portable use (portable equipment)</u>	
<u>Radiated emission</u>	<u>Enclosure of ancillary equipment</u>	<u>Applicable</u>	<u>Applicable</u>	<u>Applicable</u>	<u>ETSI EN 301 489-1 [1], clause 8.2</u>
<u>Conducted emission</u>	<u>DC power input/output</u>	<u>Applicable</u>	<u>Applicable</u>	<u>Not applicable</u>	<u>7.1.2</u>
<u>Conducted emission</u>	<u>AC mains input/output</u>	<u>Applicable</u>	<u>Not applicable</u>	<u>Not applicable</u>	<u>ETSI EN 301 489-1 [1], clause 8.4</u>
<u>Conducted emission</u>	<u>Wired network</u>	<u>Applicable</u>	<u>Not applicable</u>	<u>Not applicable</u>	<u>ETSI EN 301 489-1 [1], clause 8.7</u>

Hand portable equipment, or combinations of equipment, capable of being powered for intended use by the provisions of ETSI EN 301 489-1 [1], clause 7, main battery of a vehicle shall apply additionally be considered as appropriate, except vehicular mobile equipment.

Hand portable or mobile equipment, or combinations of equipment, capable of being powered for intended use by AC mains shall additionally be considered as varied herein fixed station equipment.

7.1.2 Special conditions for emissions

The provisions of following special conditions set out in Table 5 relate to the EMC emission measurements and limits used in ETSI-EN-301-489-1-[1], clause 7.1 shall apply 8.

7.3 Table 5: Special conditions for EMC emission tests

<u>Reference to clauses in ETSI EN 301 489-1 [1]</u>	<u>Special product-related conditions, additional to or modifying the test conditions in ETSI EN 301 489-1 [1], clause 8</u>
<u>8.3: DC power input/output ports</u>	<u>The requirements of ETSI EN 301 489-1 [1], clause 8.3 shall be applied where the cable length exceeds 3 m or is connected to a vehicle power supply.</u>

7.2 Immunity

7.2.1 General

Table 6 contains the EMC immunity requirements for the relevant ports of radio equipment.

Table 6: Immunity requirements

Phenomenon	Port	Applicability			Reference clause	Performance Criteria clause
		Fixed use (e.g. base station equipment)	Vehicular use (e.g. mobile equipment)	Portable use (portable equipment)		
RF electromagnetic field (80 MHz to 6 000 MHz)	Enclosure	Applicable	Applicable	Applicable	7.2.2	6
Electrostatic discharge	Enclosure	Applicable	Applicable	Applicable	ETSI EN 301 489-1 [1], clauses 9.3.1 and 9.3.2	6
Fast transients common mode	Signal, wired network and control	Applicable	Not Applicable	Not applicable	7.2.2	6
	DC power	Applicable	Not applicable (see note 1)	Not applicable		6
	AC mains power	Applicable	Not applicable	Not applicable		6
RF common mode 0,15 MHz to 80 MHz	Signal, wired network and control	Applicable	Applicable	Not applicable	7.2.2	6
	DC power	Applicable	Applicable	Not applicable		6
	AC mains power	Applicable	Applicable	Not applicable		6
Transients and surges in the vehicular environment	DC power input	Not applicable	Applicable	Not applicable	ETSI EN 301 489-1 [1], clauses 9.6.1 and 9.6.2	6 (see note 2)
Voltage dips and interruptions	AC mains power input	Applicable	Not applicable	Not applicable	ETSI EN 301 489-1 [1], clauses 9.7.1 and 9.7.2	6
Surges, line to line and line to ground	AC mains power input	Applicable	Not applicable	Not applicable	ETSI EN 301 489-1 [1], clauses 9.8.1 and 9.8.2	6
	Wired network	Applicable	Not applicable (see note 1)	Not applicable		6

NOTE 1: This requirement is covered by the transients and surges test on DC power input ports.
NOTE 2: For pulses 3a & 3b, the performance criteria for continuous phenomena shall apply.

Hand portable equipment, or combinations of equipment, capable of being powered for intended use by the main battery of a vehicle shall additionally be considered as vehicular mobile equipment.

Hand portable or mobile equipment, or combinations of equipment, capable of being powered for intended use by AC mains shall additionally be considered as fixed station equipment.

7.2.2 Special conditions

The following special conditions set out in table 3.7 relate to the immunity test methods and performance criteria used in ETSI EN 301 489-1 [1], clause 9.

Table 3.7: Special conditions for EMC immunity tests

Reference to clauses in ETSI- EN 301 489-1 [1]	Special product-related conditions, additional to or modifying the test conditions in ETSI- EN 301 489-1 [1], clause- 9
9.2.2: Test method; Radio frequency electromagnetic field	<p>The test shall be performed over the range 80 MHz to 2 700 MHz with the exception of the exclusion bands defined in clause 4.6.</p> <p>Where the EUT is subject to EMC Immunity testing under a Harmonised Standard of a Directive other than the Directive 2014/53/EU [1.2] then the modulating signal frequency specified in that Harmonised Standard may be used. If this alternative modulating frequency is used, then the applicable Directive, Harmonised Standard & modulating frequency shall be noted in the test report.</p>
9.4: Fast transients common mode	<p>The requirements of ETSI EN 301 489-1 [1], clauses 9.4.1 and 9.4.2 shall be applied with the exception of clause 7.4 of EN 61000-4-4 [4].</p>
9.5.2: Test method; Radio frequency, common mode	<p>Where the EUT is subject to EMC Immunity testing under a Harmonised Standard of a Directive other than the Directive 2014/53/EU [1.2] then the modulating signal frequency specified in that Harmonised Standard may be used. If this alternative modulating frequency is used, then the applicable Directive, Harmonised Standard & modulating frequency shall be noted in the test report.</p>

Annex A (informative): Relationship between the present document and the essential requirements of Directive 2014/53/EU

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.3i.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.

Table A.1: Relationship between the present document and the essential requirements of Directive 2014/53/EU

Harmonised Standard ETSI-EN 301 489-3					
Requirement				Requirement Conditionality	
No	Description	Essential requirements of Directive	Reference: Clause No(s) of the present document	U/C	Condition
1	Emissions: Enclosure of ancillary equipment measured on a stand alone <u>standalone</u> basis	8.2 of ETSI-EN 301 489-1 [1]3.1(b)	<u>7.1</u>	U	
2	Emissions: DC power input/output ports	3.1(b)8.3 of ETSI-EN 301 489-1 [1]	<u>7.1</u>	C	Only where equipment has DC power input and/or output ports with a cable length greater than 3 m or from a vehicle power supply
3	Emissions: AC mains power input/output ports	8.4 of ETSI-EN 301 489-1 [1]3.1(b)	<u>7.1</u>	C	Only where equipment has AC mains power input and/or output ports
4	Emissions: Harmonic current emission (AC mains input port)	8.5 of ETSI-EN 301 489-1 [1]	<u>G</u>	Only where equipment has AC mains power input ports	
5	Emissions: Voltage fluctuations and flicker (AC mains input ports)	8.6 of ETSI-EN 301 489-1 [1]	<u>G</u>	Only where equipment has AC mains power input ports	
64	Emissions: Wired network ports	3.1(b)	8.7 of ETSI-EN 301 489-1 [1]7.1	C	Only where applies to <u>equipment has wired network ports intended for fixed use. Applies to equipment intended for fixed use</u>
75	Immunity: Radio frequency electromagnetic field (80 MHz to 6 000 MHz)	3.1(b)	7.32	U	
86	Immunity: Electrostatic discharge	9.3 of ETSI-EN 301 489-1 [1]3.1(b)	7.2	U	
97	Immunity: Fast transients common mode	9.4 of ETSI-EN 301 489-1 [1]3.1(b)	7.2	C	Only where equipment has AC mains power input ports or DC power ports or wired network ports with cables longer than 3 m <u>Only applies to equipment intended for fixed use</u>

Harmonised Standard ETSI EN 301 489-3					
Requirement				Requirement Conditionality	
No	Description	<u>Essential requirements of Directive</u>	<u>Reference: Clause No(s) of the present document</u>	U/C	Condition
408	Immunity: Radio frequency common mode	3.1(b)	7.32	C	Only where applies to equipment has AC mains power input ports intended for fixed and/or DC power ports or wired network ports with cables longer than 3 mvehicular use
449	Immunity: Transients and surges in the vehicular environment	9.6 of ETSI EN 301 489-1 [1]3.1(b)	7.2	C	Only where applies to equipment is connected to vehicle power supply intended for vehicular use
4210	Immunity: Voltage dips and interruptions	3.1(b)	9.7 of ETSI EN 301 489-1 [1]7.2	C	Only where equipment has AC mains power input ports
4311	Immunity: Surges, line to line and line to ground	9.8 of ETSI EN 301 489-1 [1]3.1(b)	7.2	C	Only where applies to equipment has AC mains power input ports and/or wired network ports intended for fixed use

Key to columns:

Requirement:

No A unique identifier for one row of the table which may be used to identify a requirement.

Description A textual reference to the requirement.

Essential requirements of Directive

_____ Identification of article(s) defining the requirement in the Directive.

Clause Number(s) of the present document

_____ Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

U/C Indicates whether the requirement is unconditionally applicable (U) or is conditional upon the manufacturer's claimed functionality of the equipment (C).

Condition Explains the conditions when the requirement is or is not applicable for a requirement which is classified "conditional".

Presumption of conformity stays valid only as long as a reference to the present document is maintained in the list published in the Official Journal of the European Union. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Other Union legislation may be applicable to the product(s) falling within the scope of the present document.

Annex B (informative): ~~Examples of Short Range Devices (SRD) in the scope of the present document~~

~~The present document relates to article 3.1(b) of the Directive 2014/53/EU [i.1]. For the purposes of article 3.2, the SRDs that fall within the scope of the present document are covered by a range of ETSI standards.~~

~~Further guidance and a partial list of the relevant article 3.2 standards may be found in ETSI TR 103 088 [i.2].~~

Annex C (informative): Change History

Version	Information about changes
2.1.1	First publication of RED Directive 2014/53/EU version.
2.2.0	Immunity testing extended to 6 GHz. Level of wanted signal more closely specified. Updated to new skeleton. Updated to refer to version 2.2.3 of ETSI EN 301 489-1.
2.3.1	Clause 4.2.2, wanted signal level updated with provision for low frequency inductive devices.
2.3.2	A list of abbreviations was added following comments during National Vote.

History

Document history		
V1.2.1	August 2000	Publication
V1.3.1	November 2001	Publication
V1.4.1	August 2002	Publication
V1.6.1	August 2013	Publication
V2.1.0	September 2016	EN Approval Procedure AP 20161212: 2016-09-13 to 2016-12-12
V2.1.1	March 2017	Vote V 20170507: 2017-03-08 to 2017-05-08
V2.1.1	March 2019	Publication
<u>V2.1.2</u>	<u>March 2021</u>	<u>EN Approval Procedure AP 20210622: 2021-03-24 to 2021-06-22</u>
<u>V2.2.0</u>	<u>November 2021</u>	<u>Vote V 20220123: 2021-11-24 to 2022-01-24</u>
<u>V2.3.0</u>	<u>July 2022</u>	<u>EN Approval Procedure AP 20220929: 2022-07-01 to 2022-09-29</u>
<u>V2.3.1</u>	<u>November 2022</u>	<u>Vote V 20230122: 2022-11-23 to 2023-01-23</u>
<u>V2.3.2</u>	<u>January 2023</u>	<u>Publication</u>