ETSI EN 300 220-2 V3.1.1 (2017-02)

~~Electromagnetic compatibility~~
~~and Radio spectrum Matters (ERM);~~
Short Range Devices (SRD~~);~~) operating
~~Radio equipment to be used~~ in the frequency range
25 MHz to 1 000 MHz
~~frequency range with power levels ranging up to 500 mW~~;
Part 2: ~~Harmonized EN~~Harmonised Standard covering the essential requirements
~~under~~ of article 3.2 of ~~the R&TTE~~ Directive 2014/53/EU
for non specific radio equipment

Reference
REN/ERM-TG28-~~435~~534

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Contents

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Foreword

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

The present document has been ~~produced by ETSI in response to a mandate from the European Commission issued~~prepared under ~~Directive 98/34/EC~~the Commission's standardisation request C(2015) 5376 final [i.5~~] as amended by Directive 98/48/EC [i.7].~~

~~The title and reference to the~~] 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 ~~are intended to be included in the publication~~is cited 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~~ 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 ~~and Harmonised Standards or parts thereof the references of which have been published in the Official Journal of the European Union~~with the corresponding essential requirements of that Directive and associated EFTA regulations.

The present document is part 2 of a multi-part deliverable ~~covering the Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW, as identified below:~~. Full details of the entire series can be found in part 1 [1].

~~Part 1: "Technical characteristics and test methods";~~

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

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

National transposition dates	
Date of adoption of this EN:	27 January 2017
Date of latest announcement of this EN (doa):	30 April 2017
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 October 2017
Date of withdrawal of any conflicting National Standard (dow):	31 October 2018

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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Introduction

The present document is part 2 of a ~~set of standards developed by ETSI and is designed to fit in a modular structure~~multi-part deliverable covering Short Range Devices (SRD) operating in the frequency range 25 MHz to ~~cover all radio and telecommunications terminal equipment within the scope of the R&TTE~~1 000 MHz. Full details of the entire series can be found in part 1 [1].

The present document is structured as follows:

Clause 2 provides references.

Clause 3 provides definitions of terms and abbreviations used.

Clause 4 provides technical requirements.

Annex A (informative) provides a relationship between the present document and essential requirements of Directive ~~[i.1]. The modular structure is shown in EG 201 399~~ 2014/53/EU [~~i.5~~i.2].

Annex B (normative): EU wide harmonised national radio interfaces from 25 MHz to 1 000 MHz.

Annex C (normative): National Radio Interfaces not EU wide harmonised.

Annex D (informative): Application form for testing.

Annex E (informative): Selection of parameters.

Annex F (informative): Bibliography.

Annex G (informative): Change History.

1 Scope

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

specifies technical characteristics and methods of measurements for Non-specific Short Range Devices category equipment types.

~~1) Alarms, identification systems, radio determination, telecommand, telemetry, etc.~~

~~2) Radio Frequency Identification (RFID).~~

~~Detection, movement and alert applications~~Non specific SRDs category is defined by the EU Commission Decision 2013/752/EU [i.3] as:

"The non-specific short-range device category covers all kinds of radio devices, regardless of the application or the 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".

The present document covers equipment intended for fixed, mobile or nomadic use, including:

- stand-alone radio equipment;
- plug-in radio devices intended for use with or within a variety of host systems;
- plug-in radio devices intended for use within combined equipment.

These radio equipment types are capable of operating in ~~the frequency bands within the 25 MHz to 1 000 MHz range as specified in table 1:~~

- ~~either with a Radio Frequency (RF) output connection and dedicated antenna or with an integral antenna;~~
- ~~for~~ all ~~types of modulation;~~
- ~~with~~ or ~~without speech.~~

~~Table 1 shows a list~~any part of the frequency bands ~~as designated to Short Range Devices by some European Commission Decisions [i.3] and [i.4] and the CEPT/ERC/REC 70-03 [i.6] as known at the date of publication of the present document~~given in table 1.

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

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

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

Table 1: SRDs frequency ranges

	Short Range Devices frequency ranges
Transmit and receive	26,957 MHz to 27,283 MHz
Transmit and receive	40,660 MHz to 40,700 MHz
Transmit and receive	138,2 MHz to 138,45 MHz
Transmit and receive	169,4 MHz to 169,8125 MHz
Transmit and receive	433,040 MHz to 434,790 MHz
Transmit and receive	863 MHz to 876 MHz
Transmit and receive	915 MHz to 921 MHz
NOTE: It should be noted that not all frequency bands in table 1 are implemented in all European countries. Annex B provides an overview of radio interfaces which are harmonised in the European Union. Annex C provides an overview of national radio interfaces not harmonised in the European Union.	

~~NOTE 2: In addition, it should be~~ It is noted that ~~other frequency bands may be available~~ in ~~a country within~~ the ~~frequency range 25 MHz to 1 000 MHz for SRD covered by the present document. See~~ European Commission ~~Decisions~~Decision on Short Range Devices [i.3~~] and [i.4] and CEPT/ERC/REC 70-03 [i.6] as implemented through National Radio Interfaces (NRI) or additional NRI as relevant.~~

~~NOTE 3: On non-harmonized parameters, national administrations may impose certain conditions~~], some harmonised frequency bands may be subject to usage restrictions such as the ~~type~~exclusion of ~~modulation, frequency, channel/frequency separations, maximum transmitter radiated power, duty cycle, and the inclusion of an automatic transmitter shut-off facility, as a condition for the issue of Individual Rights for use of spectrum or General Authorization, or as a condition for use under "licence exemption" as it is in most cases for Short Range Devices~~video or audio use.

~~The~~ Equipment transmitting voice with analog modulation are excluded from the present document~~ covers fixed stations, mobile stations and portable stations~~.

The present document ~~is intended to cover~~covers the ~~provisions~~essential requirements of article 3.2 of Directive ~~1999/5/EC~~ 2014/53/EU [i.2~~]~~
~~(R&TTE Directive). The present document does not apply to radio equipment for which a specific Harmonized EN applies as such Harmonized EN may specify additional EN requirements relevant to the presumption of conformity under article 3.2 of the R&TTE Directive [i.1].~~

~~NOTE 4: A list of such ENs is included on the web site http://www.newapproach.org.~~

] under the conditions identified in annex A.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

~~References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.~~

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

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

~~2.1 Normative references~~

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

[1] ETSI EN 300 220-1 (~~V2.4~~V3.1~~): "Electromagnetic compatibility and Radio spectrum Matters (ERM);~~ .1) (02-2017): "Short Range Devices (SRD~~); Radio equipment to be used~~) operating in the frequency range 25 MHz to 1 000 MHz ~~frequency range with power levels ranging up to 500 mW~~; Part 1: Technical characteristics and ~~test~~ methods of measurement".

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] CEPT/ERC/REC 70-03: "Relating to the use of Short Range Devices (SRD)".

NOTE: Available at http://www.erodocdb.dk/docs/doc98/official/pdf/rec7003e.pdf.

[i.2] Directive ~~1999/5/EC~~2014/53/EU of the European Parliament and of the Council of ~~9 March 1999~~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 ~~telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE~~repealing Directive~~).~~ 1999/5/EC.

~~[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] Commission Decision ~~2006/771/EC~~2013/752/EU on ~~harmonization~~harmonisation of the radio spectrum for use by short-range devices as amended by subsequent Commission Decisions.

[i.4] ~~Commission Decision 2005/928/EC on the harmonization of the 169,4-169,8125 MHz frequency band in the Community as amended by Commission Decision of 13 August 2008.~~

[i.5] ETSI EG 201 399203 336: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guideGuide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".

[i.5] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the production of candidate Harmonized Standards for application under the R&TTE Directive".

[i.6] CEPT/ERC/REC 70-03: "Relating European Committee for Electrotechnical Standardisation and to the use of Short Range Devices (SRD)".

[i.7] European Telecommunications Standards Institute as regards radio equipment in support of Directive 98/48/EC2014/53/EU 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.

[i.6] ECC Report 200: "Co-existence studies for proposed SRD and RFID applications in the frequency band 870-876 MHz and 915-921 MHz". September 2013.

[i.7] Commission Decision 2000/299/EU: "Commission Decision of 6 April 2000 establishing the initial classification of radio equipment and telecommunications terminal equipment and associated identifiers (notified under document number C(2000) 938) (Text with EEA relevance)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE RE-Directive [i.2] and], ETSI EN 300 220- -1- [1] and the following apply.:

dwell time: time period the equipment stays on channel before hopping to the next hop channel

epoch: the value of 4 times the dwell time times the number of hop channels

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

number of hop channels: number of non-overlapping channels used by an FHSS equipment

return time to a hop channel: maximum period of time within which a specific hop channel is reused

3.2 Symbols

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

3.3 Abbreviations

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

NRI National Radio Interface

4 Technical requirements specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the ~~supplier~~manufacturer. The equipment shall comply with all the technical requirements of the present document which are identified as applicable in annex A at all times when operating within the boundary limits of the declared operational environmental profile. Normal and extreme tests conditions are defined in ETSI EN 300 220-1 [1], clauses 4.3.3 and 4.3.4.

4.2 ~~Conformance~~ All equipment conformance requirements

4.2.~~1 Transmitter~~0 Compliance

When an operational frequency band is selected from table B.1 in annex B or from table C.1 in annex C for the equipment under test, the equipment shall comply with all parameters, exclusions and notes from the row in table B.1 or table C.1 unless a different National Radio Interface applies.

The present document may be used to show conformance to any applicable National Radio Interface (NRI), provided the equipment under test complies with all parameters, exclusions and notes from that NRI.

4.2.1 Operating frequency

4.2.1.0 Applicability

Clause 4.2.1 applies to all equipment.

4.2.1.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.1.1 applies.

4.2.1.2 Limits

The manufacturer may declare either one or more operating frequencies and operating channels.

Operating channel(s) shall be be entirely within operational frequency bands allowed by annexes B, C or any NRI.

4.2.1.3 Conformance

The conformance for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.1.2.

4.2.2 Unwanted emissions in the spurious domain

4.2.2.0 Applicability

Clause 4.2.1 applies to all equipment.

4.2.2.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.9.1 applies.

4.2.2.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.9.2 under normal test condition.

4.2.2.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.9.3.

Conformance shall be established under normal test conditions.

4.3 Transmitters conformance requirements

4.2.1.1 Frequency error and frequency drift3.1 Effective Radiated Power

One4.3.1.0 Applicability

Effective radiated power applies only to transmitters.

4.3.1.1 Description

For the purpose of the following shall be met:

1) if the equipment can produce an unmodulated carrier thenpresent document, the frequency error or frequency drift, as definedescription in ETSI EN 300 220-1 [1], clause 75.2.1 applies.

4.3.1.2 Limits

The effective radiated power shall not exceedbe greater than the limitsvalue allowed in annexes B or C for the chosen operational frequency band(s).

4.3.1.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 7.15.2.2.

Conformance shall be established under normal and extreme test conditions.

4.3, table 4a for systems with channel spacing of less than or equal.2 Maximum e.r.p. spectral density

4.3.2.0 Applicability

Maximum e.r.p. spectral density applies to 25 kHz or table 4b for alltransmitters using annex B bands I, L.

Maximum e.r.p. spectral density applies to transmitters using DSSS or wideband techniques other systems; orthan FHSS modulation, in annex C band X.

2) if4.3.2.1 Description

For the equipment is not able to produce an unmodulated carrier then either:

a) purpose of the adjacent channel power as defined in present document, the description in ETSI EN 300 220-1 [1], clause 7.6 5.3.1 for narrowband and channelized equipmentapplies.

4.3.2.2 Limits

The Maximum e.r.p. spectral density shall not exceedbe greater than the limitsvalue allowed in annexes B or C for the chosen operational frequency band(s).

4.3.2.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 7.65.3.2.

Conformance shall be established under ~~extreme~~normal test conditions~~;~~.

4.3.3 Duty Cycle

4.3.3.0 Applicability

Duty cycle applies to all transmitters except EUT with polite spectrum access (described in clause 4.5) where permitted in annex B, table B.1 or annex C, table C.1 or any NRI.

~~b)~~ 4.3.3.1 Description

For the ~~modulation bandwidth as defined in~~ purpose of the present document, the description in ETSI EN 300 220-1 [1], clause ~~7.7~~5.4.1 ~~for all other equipment~~applies.

4.3.3.2 Limits

The Duty Cycle at the operating frequency shall not ~~exceed the limit~~be greater than values in ~~clause 7.7.3 under extreme conditions.~~annex B or C for the chosen operational frequency band(s).

~~This~~4.3.3.3 Conformance

The conformance tests for this requirement ~~applies to all transmitters.~~

~~4.2.1.2 Average power (conducted)~~

~~The average power,~~shall be as defined in ETSI EN 300 220-1 [1], clause ~~7~~5.4.2.

4.3.4 Occupied Bandwidth

4.3.4.0 Applicability

Maximum occupied bandwidth applies to all transmitters.

4.3.4.1~~, shall not exceed~~ Description

For the ~~limits~~purpose of the present document, the description in ETSI EN- 300- 220-1 [1], clause ~~7.2.3, table~~ 5.6.1 applies.

4.~~2.1.3 Effective radiated power~~3.4.2Limits

The ~~effective radiated power, as defined in~~ occupied bandwidth of the EUT according to ETSI EN 300 220-1 [1], clause ~~7.3.1,~~5.6.2 shall ~~not exceed~~comply with the limits in annex B or C.

4.3.4.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN- 300- 220-1 [1], clause ~~7.2~~5.6.3~~, table 5~~.

~~This requirement~~ Conformance shall be established under normal and extreme test conditions.

4.3.5 Tx Out of Band Emissions

4.3.5.0 Applicability

TX Out of Band Emissions applies to all transmitters with ~~an integral antenna or~~ OCW > 25 kHz.

4.3.5.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.8.1 applies.

4.3.5.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.8.2.

4.3.5.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.8.3.

Conformance shall be established under normal and extreme test conditions.

4.3.6 Transient power

4.3.6.0 Applicability

Transient power applies to all transmitters ~~supplied with a dedicated antenna~~.

4.~~2~~3.6.1.~~4 Types~~ Description

For the purpose of ~~spread spectrum modulation~~the present document, the description in ETSI EN 300 220-1 [1], clause 5.10.1 applies.

4.3.6.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.10.2.

4.~~2.1.~~3.6.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.10.3.

Conformance shall be established under normal test conditions.

4.~~1~~ 3.7 Adjacent Channel Power

4.3.7.0 Applicability

Adjacent channel power applies to all transmitters with OCW ≤ 25 kHz.

4.3.7.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.11.1 applies.

4.3.7.2 Limits

Where the Operating Channel Width is less than or equal to 25 kHz, the power in the adjacent channels shall not exceed the reference limits defined in ETSI EN 300 220-1 [1], clause 5.11.2.

4.3.7.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.11.3.

Conformance shall be established under normal test conditions.

4.3.8 TX behaviour under Low Voltage Conditions

4.3.8.0 Applicability

TX behaviour under low voltage condition applies to battery powered EUT.

4.3.8.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.12.1 applies.

4.3.8.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.12.2.

4.3.8.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.12.3.

Conformance shall be established under normal test conditions.

4.3.9 Adaptive Power Control

4.3.9.0 Applicability

Adaptive power control applies to all EUT with adaptive power control using annex C band AA.

4.3.9.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.13.1 applies.

4.3.9.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.13.2.

4.3.9.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.13.3.

Conformance shall be established under normal test conditions.

4.3.10 FHSS equipment

4.3.10.0 Applicability

Applies to all FHSS equipment.

4.3.10.1 Description

Frequency Hopping Spread Spectrum (FHSS) is a technique where each transmission is spread over multiple Operating Frequencies known as (hop channels).

4.3.10.2 Limits

FHSS equipment shall meet the following limits:

a) FHSS equipment shall not transmit in the frequency bands for LDC/HR devices ~~(FHSS)~~as defined in European Commission Decision 2013/752/EC [i.3].

b)

c) ~~Frequency~~The number of hopping ~~spread spectrum devices, as defined~~channels shall be greater than or equal to the values given in ~~EN 300 220-1 [~~**Error! Reference source not found.**~~], clause 7.4.1.1, shall not exceed the limits in EN 300 220-1 [1], clause 7.4.1.3 indent a) to i) and table 6.~~

Table 2: Number of Hop Channels

Operational frequency band	Number of hop channels	Maximum occupied bandwidth per hopping channel	Specific requirements
865 MHz to 868 MHz	≥ 58	≤ 50 kHz	< 1 % TX duty cycle (see note)
863 MHz to 870 MHz	≥ 47	≤ 100 kHz	< 0,1 % TX duty cycle (see note)
NOTE: The duty cycle applies to the entire transmission (not at each hopping channel).			

d) For FHSS transmissions with a dwell time less than 10 ms, a 0,1 % duty cycle restriction applies.

e) Each hopping channel of the shall be occupied at least once during an epoch.

f) The return time to a hop channel shall be less than or equal to the lower of an epoch or 20 seconds.

g) The dwell time shall not exceed 400 ms.

h) CCA if used shall be applied:

i) at each hop channel; or

ii) on the first frequency corresponding to frame preamble transmissions. In this case the Duty Cycle limit applies to the remainder of the FHSS Transmission, i.e. preamble excluded.

i) When CCA access is used the requirement of clause 4.5.2 and clause 4.5.3 shall apply.

4.3.10.3 Conformance

The following declarations for FHSS shall be made by the manufacturer:

a) The number of non-overlapping hopping channels.

b) The hop channel bandwidth.

c) The dwell time.

d) The return time to a hop channel.

4.3.11 Short term behaviour

4.3.11.0 Applicability

Short term behaviour applies to EUT for operation in bands where Ton or Toff limits are specified in annex C, table C.1 or NRI.

4.3.11.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.5.1 applies.

4.3.11.2 Limits

The short term behaviour shall comply with Ton/Toff values specified in annex C, table C.1 or NRI for the operational frequency(ies) band(s) used.

4.3.11.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.5.2.

Conformance shall be established under normal test conditions.

4.4 Receivers conformance requirements

4.4.1 RX sensitivity

4.4.1.0 Applicability

Polite spectrum access parameters clause applies to EUT with polite spectrum access instead of duty cycle where permitted by table B.1 in annex B, or table C.1 in annex C or any NRI.

4.4.1.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.14.1 applies.

4.4.1.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.14.2.

4.4.1.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.14.3.

Conformance shall be established under normal test conditions.

4.4.2 Blocking

4.4.2.0 Applicability

Blocking applies to all receivers.

4.4.2.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.18.1 applies.

4.4.2.2 Limits

The blocking level shall be better or equal to category 3 reference limits level defined in ETSI EN 300 220-1 [1], clause 5.18.2.

NOTE: After December 31st, 2018, the receiver category 3 will be withdrawn, therefore receiver category 2 will be the minimum applicable level.

4.4.2.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.18.6.

Conformance shall be established under normal test conditions.

4.5 Polite spectrum access conformance requirement

4.5.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.21.1 applies.

4.5.2 Clear Channel Assessment threshold

4.5.2.0 Applicability

Clear channel Assessement clause applies to EUT with polite spectrum access instead of duty cycle where permitted by table B.1 in annex B, or table C.1 in annex C or any NRI.

4.5.2.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.21.2.1 applies.

4.5.2.2 Limits

The CCA threshold shall not exceed the limits given in ETSI EN 300 220-1 [1], clause 5.21.2.2.

4.5.2.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.21.2.3.

Conformance shall be established under normal test conditions.

4.5.3 Polite spectrum access timing parameters

4.5.3.1 Applicability

Polite spectrum access parameters clause applies to EUT with polite spectrum access instead of duty cycle where permitted by table B.1 in annex B, or table C.1 in annex C or any NRI.

4.5.3.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.21.3.1.

4.5.3.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.21.3.2.

Conformance shall be established under normal test conditions.

4.5.4 Adaptive Frequency Agility

4.5.4.0 Applicability

Adaptive Frequency Agility clause applies to EUT with AFA.

4.5.4.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.21.4.1 applies.

4.5.4.2 Limits

The use of overlapping operating channels is not permitted.

4.5.4.3 Conformance

The conformance for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.21.4.2.

~~The frequency hopping performance specified in EN 300 220-1 [1], clause 7.4.1.2 shall be declared by the provider.~~

~~This applies to all transmitters which employ FHSS.~~

~~4.2.1.4.2 Direct sequence or other spread spectrum than FHSS~~

~~Direct sequence or other spread spectrum than FHSS devices, as defined in EN 300 220-1 [1], clause 7.4.2.1, shall not exceed the limits in EN 300 220-1 [1], clause 7.4.2.2 table 7.~~

~~Direct sequence or other spread spectrum than FHSS specified in EN 300 220-1 [1], clause 7.4.2.2 shall be declared by the provider.~~

~~This applies to all transmitters which employ DSSS and other spread spectrum than FHSS.~~

~~4.2.1.5 Transient Power~~

~~The transient power, as defined in EN 300 220-1 [1], clause 7.5.1, shall not exceed the limits in EN 300 220-1 [1], clause 7.5.3.~~

~~This requirement applies to all transmitters.~~

~~4.2.1.6 Adjacent channel power~~

~~The adjacent channel power, as defined in EN 300 220-1 [1], clause 7.6.1, shall not exceed the limits in EN 300 220-1 [1], clause 7.6.3.~~

~~This requirement applies to transmitters of narrowband systems.~~

~~4.2.1.7 Modulation bandwidth~~

~~The modulation bandwidth, as defined in EN 300 220-1 [1], clause 7.7.1, shall not exceed the limits in EN 300 220-1 [1], clause 7.7.3.~~

~~This requirement applies to equipment not covered by EN 300 220-1 [1], clause 7.6.~~

~~4.2.1.8 Unwanted emissions in the spurious domain~~

~~The spurious emissions, as defined in EN 300 220-1 [1], clause 7.8.1, shall not exceed the limits in EN 300 220-1 [1], clause 7.8.3, table 11.~~

~~This requirement applies to all transmitters.~~

~~4.2.1.9 Frequency stability under low-voltage conditions~~

~~The frequency stability under low-voltage conditions, as defined in EN 300 220-1 [1], clause 7.9.1, shall not exceed the limits in EN 300 220-1 [1], clause 7.9.3.~~

~~This requirement applies to all battery-operated transmitters.~~

~~4.2.1.10 Duty cycle~~

~~The duty cycle, as defined in EN 300 220-1 [1], clause 7.10.1, shall not exceed the limits in EN 300 220-1 [1], clause 7.10.3.~~

The duty cycle shall be declared by the provider.

This requirement applies to all transmitters excluding those with a listen before talk facility with AFA or equivalent mitigation method and FHSS devices with LBT.

4.2.1.11 Listen Before Talk (LBT)

4.2.1.11.1 Minimum transmitter off-time

The minimum transmitter off-time, as defined in EN 300 220-1 [1], clause 9.2.1.1, shall not be less than the limits in EN 300 220-1 [1], clause 9.2.1.2.

The minimum transmitter off-time shall be declared by the provider.

This requirement applies to all transmitters using LBT.

4.2.1.11.2 Minimum listening time

The minimum listening time, as defined in EN 300 220-1 [1], clause 9.2.2.1 shall not shall not be less than the limits in EN 300 220-1 [1], clause 9.2.2.2.

The minimum listening time shall be declared by the provider.

This requirement applies to all transmitters using LBT.

4.2.1.11.3 Maximum dead time

The maximum dead time, as defined in EN 300 220-1 [1], clause 9.2.3.1 shall not shall not exceed the limit in EN 300 220-1 [1], clause 9.2.3.2.

The maximum dead time shall be declared by the provider.

This requirement applies to all transmitters using LBT.

4.2.1.11.4 Maximum transmitter on-time

The maximum transmitter on-time, as defined in EN 300 220-1 [1], clause 9.2.5.1 shall not exceed the limits in EN 300 220-1 [1], clause 9.2.5.2.

The maximum transmitter on-time shall be declared by the provider.

This requirement applies to all transmitters using LBT.

4.2.1.11.5 Time-out-timer

The time-out-timer, as defined in EN 300 220-1 [1], clause 7.11.1, shall not exceed the limit in EN 300 220-1 [1], clause 7.11.3.

The time-out-timer shall be declared by the provider.

This requirement applies to all transmitters supporting voice applications not employing duty cycle restriction and operating in the frequency bands 433,050 MHz to 434,790 MHz or 869,7 MHz to 870 MHz.

4.3 Receiver requirements

4.3.1 Receiver categories

The product family of short range radio devices is divided into three receiver categories, see table 2 in EN 300 220-1 [1], clause 4.1.1.

Each category having a set of relevant receiver requirements and minimum performance criteria. The set of receiver requirements depends on the choice of receiver category by the equipment provider.

Manufacturers when designing their SRD receivers shall choose one of the three receiver categories according to the grade of operational reliability they provide, therefore the provider shall specify the receiver category of his choice and this shall be declared in the product literature provided to the user. In particular where an SRD which may have an 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.

Manufacturers should provide advice to users on the risks of potential interference and its consequences.

4.3.2 Receiver sensitivity

The receiver sensitivity as defined in EN 300 220-1 [1], clauses 8.1.1 and E.2.1, shall be equal to or less than the limits in EN 300 220-1 [1], clauses 8.1.4 or E.2.2, as appropriate.

This requirement applies to all receivers with Listen Before Talk (LBT) facility.

4.3.3 Receiver LBT threshold

a) The LBT threshold, as defined in EN 300 220-1 [1], clause 8.2.1, shall be equal to or less than the limits in EN 300 220-1 [1], clause 8.2.3, table 12.

b) The transmitter max on-time, as defined in EN 300 220-1 [1], clause 9.2.5.1, shall be equal to or less than the limits in EN 300 220-1 [1], clause 8.2.3, table 12.

This requirement applies to all receivers with Listen Before Talk (LBT) facility.

4.3.4 Adjacent channel selectivity

The adjacent channel selectivity as defined in EN 300 220-1 [1], clause 8.3.1, shall be equal to or greater than the limits in EN 300 220-1 [1], clause 8.3.3, table 13 and clause 8.3.4.3, table 14.

This requirement applies only to all category 1 receivers, as defined in EN 300 220-1 [1], clause 4.1.1.

4.3.5 Blocking

The blocking, as defined in EN 300 220-1 [1], clause 8.4.1, shall be equal to or greater than the limits in EN 300 220-1 [1], clause 8.4.3, table 15.

This requirement applies to all categories of receivers.

4.3.6 Spurious response rejection

The spurious response rejection, as defined in EN 300 220-1 [1], clause 8.5.1, shall be equal to or greater than the limits in EN 300 220-1 [1], clause 8.4.3, table 15.

This requirement applies only to category 1 as defined in EN 300 220-1 [1], clause 4.1.1.

4.3.7 Spurious radiations

The spurious radiations, as defined in EN 300 220-1 [1], clause 8.6.1, shall not exceed the limits in EN 300 220-1 [1], clause 8.6.5.

This requirement applies to all categories of receivers.

5 Testing for compliance with technical requirements

5.1 Description testing for compliance with technical requirements

5.1.1 Environmental conditions for testing

5.1.1.1 Normal and extreme test conditions

Type tests shall be made under normal test conditions, and also, where stated, under extreme test conditions.

The test conditions shall be as specified in EN 300 220-1 [1], clauses 5.3, 5.4.1 and 5.4.2.

5.1.1.2 Test power source

The test power source shall meet the requirements of EN 300 220-1 [1], clause 5.2.

5.1.2 Choice of samples for test suites

Measurement shall be performed, according to the present document, on samples of equipment defined in EN 300 220-1 [1], clauses 4.2.1 to 4.2.3.2.

5.1.3 Transmitter test suites

5.1.3.1 Frequency error and drift

For equipment able to provide an unmodulated carrier:

- the test specified in EN 300 220-1 [1], clause 7.1.2 shall be carried out under extreme test conditions.

For equipment not able to provide an unmodulated carrier, either:

a) for equipment with channel spacing less than or equal to 25 kHz:
The test specified in EN 300 220-1 [1], clause 7.6.2 shall be carried out under extreme test conditions;

b) for all other equipment:
The test specified in EN 300 220-1 [1], clauses 7.7.3.1 or 7.7.3.2 shall be carried out.

This test suite applies to all transmitters.

5.1.3.2 Average power (conducted)

The test specified in EN 300 220-1 [1], clause 7.2.2 shall be carried out.

This test suite applies to transmitters which may be used without an integral or dedicated antenna.

5.1.3.3 Effective radiated power

The test specified in EN 300 220-1 [1], clause 7.3.2 shall be carried out.

This test suite applies to transmitters with an integral antenna or transmitters supplied with a dedicated antenna.

5.1.3.4 Transient power

The test specified in EN 300 220-1 [1], clause 7.5.2 shall be carried out.

This test suite applies to all transmitters.

5.1.3.5 Adjacent channel power

The test specified in EN 300 220-1 [1], clause 7.6.2 shall be carried out under extreme test conditions for narrowband systems.

For all other, the test specified in EN 300 220-1 [1], clause 7.7.2 shall be carried.

This test suite applies to all narrowband system transmitters.

5.1.3.6 Modulation bandwidth

The test specified in EN 300 220-1 [1], clause 7.7.2 shall be carried out.

This test suite applies to transmitters not covered by clause 5.1.3.5.

5.1.3.7 Unwanted emissions in the spurious domain

Either:

- the tests specified in EN 300 220-1 [1], clauses 7.8.2.1 and 7.8.2.2 shall be carried out; or
- the test specified in EN 300 220-1 [1], clause 7.8.2.3 shall be carried out.

This test suite applies to all transmitters.

5.1.3.8 Frequency stability under low-voltage conditions

The test specified in EN 300 220-1 [1], clause 7.9.2 shall be carried out.

This test suite applies to all battery-operated transmitters.

5.1.4 Receiver test suites

5.1.4.1 Receiver sensitivity

The test specified in EN 300 220-1 [1], clauses 8.1.2 or 8.1.3 shall be carried out.

This test suite applies to all receivers with a Listen Before Talk facility (LBT).

5.1.4.2 Receiver LBT threshold

The test specified in EN 300 220-1 [1], clause 8.2.2 shall be carried out.

This test suite applies to all receivers with a Listen Before Talk facility (LBT).

5.1.4.3 Adjacent channel selectivity

The test specified in EN 300 220-1 [1], clause 8.3.2 shall be carried out.

This test suite applies to all Category 1 receivers.

5.1.4.4 Blocking

The test specified in EN 300 220-1 [1], clause 8.4.2 shall be carried out.

This test suite applies to all categories of receiver.

This test suite applies to all receivers with a Listen Before Talk facility (LBT).

~~5.1.4.5 Spurious response rejection~~

~~The test specified in EN 300 220-1 [1], clause 8.5.2 shall be carried out.~~

~~This test suite applies to all Category 1 receivers.~~

~~5.1.4.6 Receiver spurious radiation~~

~~Either:~~

- ~~the tests specified in EN 300 220-1 [1], clause 8.6.2 and EN 300 220-1 [1], clause 8.6.3 shall be carried out; or~~
- ~~the test specified in EN 300 220-1 [1], clause 8.6.4 shall be carried out.~~

~~This test suite applies to all receivers.~~

~~5.2 Interpretation of measurement results~~

~~The interpretation of the results recorded in the test report for the measurements described in the present document shall be as given in EN 300 220-1 [1], clause 10.~~

Annex A (normative): HS Requirements and conformance Test specifications Table (HS-RTT)

The HS Requirements and conformance Test specifications Table (HS-RTT) in table A.1 serves a number of purposes, as follows:

- it provides a statement of all the requirements in words and by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- it provides a statement of all the test procedures corresponding to those requirements by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- it qualifies each requirement to be either:
  - Unconditional: meaning that the requirement applies in all circumstances; or
  - Conditional: meaning that the requirement is dependant on the manufacturer having chosen to support optional functionality defined within the schedule.
- in the case of Conditional requirements, it associates the requirement with the particular optional service or functionality;
- it qualifies each test procedure to be either:
  - Essential: meaning that it is included with the Essential Radio Test Suite and therefore the requirement shall be demonstrated to be met in accordance with the referenced procedures;
  - Other: meaning that the test procedure is illustrative but other means of demonstrating compliance with the requirement are permitted.

Table A.1: HS Requirements and conformance Test specifications Table (HS-RTT)

Harmonized Standard EN 300 220-2 The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive [i.7]						
Requirement			**Requirement Conditionality**		**Test Specification**	
No	**Description**	**Reference: Clause No**	**U/C**	**Condition**	**E/O**	**Reference: Clause No**
1	Frequency error or frequency drift	4.2.1.1	U		E	5.1.3.1
2	Average power (conducted)	4.2.1.2	C	Applies to transmitters with permanent external antenna connector	E	5.1.3.2
3	Effective radiated power	4.2.1.3	C	Applies to transmitters with an integral or dedicated antenna	E	5.1.3.3
4	Frequency hopping spread spectrum devices	4.2.1.4.1	C	Applies to transmitters which employ FHSS	X	
5	Direct sequence or other spread spectrum than FHSS	4.2.1.4.2	C	Applies to transmitters which employ DSSS & other spread spectrum than FHSS	X	
6	Transient power	4.2.1.5	U		E	5.1.3.4
7	Adjacent channel power for channelized equipment	4.2.1.6	C	Applies to narrowband transmitters	E	5.1.3.5
8	Modulation bandwidth	4.2.1.7	C	Applies to all transmitters not covered by clause 4.2.1.6	E	5.1.3.6
9	Unwanted emissions in the spurious domain	4.2.1.8	U		E	5.1.3.7
10	Frequency stability under low-voltage conditions	4.2.1.9	C	Applies to battery-operated transmitters	E	5.1.3.8

Harmonized Standard EN 300 220-2 The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive [i.7]						
Requirement			Requirement Conditionality		Test Specification	
No	Description	Reference: Clause No	U/C	Condition	E/O	Reference: Clause No
11	Duty cycle	4.2.1.10	C	Applies to transmitters excluding those with a listen before talk facility with AFA	X	
12	Minimum transmitter off-time	4.2.1.11.1	C	Applies to transmitters using LBT	X	
13	Minimum listening time	4.2.1.11.2	C	Applies to transmitters using LBT	X	
14	Maximum dead time	4.2.1.11.3	C	Applies to transmitters using LBT	X	
15	Maximum transmitter on-time	4.2.1.11.4	C	Applies to transmitters using LBT	X	
16	Time-out timer	4.2.1.11.5	C	Applies to transmitters operating in the frequency bands 433,050 MHz to 434,790 MHz or 869,7 MHz to 870 MHz and supporting voice applications not employing duty cycle restriction	X	
17	Receiver sensitivity	4.3.2	C	Applies to receivers with LBT	E	5.1.4.1
18	Receiver LBT threshold	4.3.3	C	Applies to receivers with LBT	E	5.1.4.2
19	Adjacent channel selectivity	4.3.4	C	Applies to Category 1 receivers	E	5.1.4.3
20	Blocking	4.3.5	U		E	5.1.4.4
21	Spurious response rejection	4.3.6	C	Applies to Category 1 receivers	E	5.1.4.5
22	Receiver spurious radiation	4.3.7	U		E	5.1.4.6

Key to columns:

Requirement:

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

Description A textual reference to the requirement.

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

Requirement Conditionality:

U/C Indicates whether the requirement is to be *unconditionally* applicable (U) or is *conditional* upon the manufacturers claimed functionality of the equipment (C).

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

Test Specification:

E/O Indicates whether the test specification forms part of the Essential Radio Test Suite (E) or whether it is one of the Other Test Suite (O).

NOTE: All tests whether "E" or "O" are relevant to the requirements. Rows designated "E" collectively make up the Essential Radio Test Suite; those designated "O" make up the Other Test Suite; for those designated "X" there is no test specified corresponding to the requirement. The completion of all tests classified "E" as specified with satisfactory outcomes is a necessary condition for a presumption of conformity. Compliance with requirements associated with tests classified "O" is a necessary condition for presumption of conformity, although conformance with the requirement may be claimed by an equivalent test or by manufacturer's assertion supported by appropriate entries in the technical construction file.

Clause Number Identification of clause(s) defining the test specification in the present document unless another document is referenced explicitly. Where no test is specified (that is, where the previous field is "X") this field remains blank.

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.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 300 220-2				
Requirement			Requirement Conditionality	
No	Description	Reference: Clause No	U/C	Condition
1	Operating frequency	4.2.1	U	
2	Unwanted emissions in the spurious domain	4.2.2	U	
3	TX effective radiated power	4.3.1	U	
4	TX Maximum e.r.p. spectral density	4.3.2	C	Applies to EUT using annex B bands I, L. Applies to EUT using DSSS or wideband techniques other than FHSS modulation, using annex C band X.
5	TX Duty cycle	4.3.3	C	Not applicable to EUT with polite spectrum access where permitted in annex B, table B.1 or annex C, table C.1 or any NRI.
6	TX Occupied bandwidth	4.3.4	U	
7	TX out of band emissions	4.3.5	C	Applies to EUT with OCW > 25 kHz.
8	TX Transient	4.3.6	U	
9	TX Adjacent channel power	4.3.7	C	Applies to EUT with OCW ≤ 25 kHz.
10	TX behaviour under low voltage conditions	4.3.8	C	Applies to battery powered EUT.
11	TX Adaptive power control	4.3.9	C	Applies to EUT with adaptive power control using annex C band AA.
12	TX FHSS	4.3.10	C	Applies to FHSS EUT.
13	TX Short term behaviour	4.3.11	C	Applies to EUT using annex C bands Y, Z, AA, AB, AC, AD.
14	RX sensitivity	4.4.1	C	Applies to EUT with polite spectrum access.
15	Clear channel assessment threshold	4.5.2	C	Applies to EUT with polite spectrum access.
16	Polite spectrum access timing parameters	4.5.3	C	Applies to EUT with polite spectrum access.
17	RX Blocking	4.4.2	U	
18	Adaptive Frequency Agility	4.5.4	C	Applies to EUT with AFA.

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.

Clause Number 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 (normative): EU wide harmonised national radio interfaces from 25 MHz to 1 000 MHz

According to Article 8 (2) of Directive 2014/53/EU [i.2], the European Commission has adopted implementing acts establishing the equivalence between notified national radio interfaces and assigning a radio equipment class. So called Class 1 equipment is equipment that can be placed on the market and be put into service without restrictions. The Commission, in consultation with Member States, publishes an indicative and non-exhaustive list of equipment falling within the scope of Class 1. Table B.1 summarizes the relevant parameters in the band 25 MHz to 1 000 MHz from the latest list of class 1 equipment (December 2014). Table B.1 is in line with the harmonised frequency bands and technical parameters for short-range devices from EC Decision 2013/752/EU [i.3].

In addition, it should be noted that other frequency bands may be available in a country within the frequency range 25 MHz to 1 000 MHz covered by the present document in annex C.

Table B.1: EU wide harmonised national radio interfaces from 25 MHz to 1 000 MHz

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions	Band number from EC Decision 2013/752/EU [i.3]	Class 1 sub-class number according Commission Decision 2000/299/EU [i.7]
A	26,957 MHz to 27,283 MHz	10 mW e.r.p.	No requirement	The whole band		28b	25
B	26,995 MHz, 27,045 MHz, 27,095 MHz, 27,145 MHz, 27,195 MHz	100 mW e.r.p.	≤ 0,1 % duty cycle	10 kHz	Model control devices may operate without duty cycle restrictions.	29, 30, 31, 32, 33	Model control 94, 95, 96, 97, 98
C	40,660 MHZ to 40,700 MHz	10 mW e.r.p.	No requirement	The whole band	Video applications excluded.	35	19
D	169,400 MHz to 169,475 MHz	500 mW e.r.p.	≤ 1,0 % duty cycle	50 kHz		37c	80
E	169,4000 MHz to 169,4875 MHz	10 mW	≤ 0,1 % duty	The whole band	Equipment that concentrates or multiplexes individual equipment is excluded.	38	128

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions	Band number from EC Decision 2013/752/EU [i.3]	Class 1 sub-class number according Commission Decision 2000/299/EU [i.7]
F	169,4875 MHZ to 169,5875 MHz	10 mW	≤ 0,001 % duty cycle Between 00.00 and 06.00 local time a duty cycle limit of 0,1 % may be used	The whole band	Equipment that concentrates or multiplexes individual equipment is excluded.	39b	124
G	169,5875 MHz to 169,8125 MHz	10 mW	≤ 0,1 % duty cycle	The whole band	Equipment that concentrates or multiplexes individual equipment is excluded.	40	129
H	433,050 MHz to 434,790 MHz	10 mW	10 %	The whole band		44b, 45b	20, 125
I	433,050 MHz to 434,790 MHz	1 mW e.r.p. -13 dBm/10 kHz PSD for bandwidth modulation larger than 250 kHz	No requirement	The whole band	Audio and video applications are excluded.	44a, 45a	61, 63
J	434,040 MHz to 434,790 MHz	10 mW	No requirement	25 kHz	Audio and video applications are excluded.	45c	65
K	863 MHz to 865 MHz	25 mW e.r.p.	≤ 0,1 % duty cycle or polite spectrum access	The whole band except for audio & video applications limited to 300 kHz		46a	66
L	865 MHz to 868 MHz	25 mW e.r.p. Power density: -4,5 dBm/100 kHz The power density can be increased to +6,2 dBm/100 kHz if the band of operation is limited to 865 MHz to 868 MHz	≤ 1 % duty cycle or polite spectrum access	The whole band except for audio & video applications limited to 300 kHz	DSSS and any techniques other than FHSS.	47	67

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions	Band number from EC Decision 2013/752/EU [i.3]	Class 1 sub-class number according Commission Decision 2000/299/EU [i.7]
M	868,000 MHz to 868,600 MHz	25 mW e.r.p.	≤ 1 % duty cycle or polite spectrum access	The whole band except for audio & video applications limited to 300 kHz		48	28
N	868,700 MHz to 869,200 MHz	25 mW e.r.p.	≤ 0,1% duty cycle or polite spectrum access	The whole sub-band except for audio & video applications limited to 300 kHz		50	29
O	869,400 MHz to 869,650 MHz	25 mW e.r.p.	≤ 0.1% duty cycle or polite spectrum access	The whole band	.	54a	130
P	869,400 MHz to 869,650 MHz	500 mW e.r.p.	≤ 10 % duty cycle or polite spectrum access	The whole band		54b	30
Q	869,700 MHz to 870,000 MHz	5 mW e.r.p.	No requirement	The whole band	Audio and video applications are excluded.	56a	31
R	869,700 MHz to 870,000 MHz	25 mW e.r.p.	≤ 1% duty cycle or polite spectrum access	The whole band	Analogue audio applications are excluded. Analogue video applications are excluded.	56b	69

Annex C (normative): National Radio Interfaces not EU wide harmonised

There are other NRIs in addition to the list of EU wide harmonised NRIs (see annex B) available on national level. The present document may be used to show conformance to any applicable NRI. CEPT/ERC/REC 70-03 [i.1] sets out the general position on common spectrum allocations for Short Range Devices (SRDs) for countries within the CEPT. It is also used as a reference document by the CEPT member countries when preparing their national regulations in order to keep in line with the provisions of the Radio Equipment Directive. Appendix 1 in CEPT/ERC/REC 70-03 [i.1] provides an indicative overview of the implementation status in European countries. Table C.1 provides an indicative list of NRIs, who might be available in some EU countries.

Table C.1: National Radio Interfaces not EU wide harmonised

Operational Frequency Band		Maximum Effective Radiated Power	Channel access and occupation rules	Additional/other spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Notes	CEPT/ERC/REC 70-03 [i.1] implementation status
S	34,995 MHz to 35,225 MHz	100 mW e.r.p.	No requirement		10 kHz	Flying radio models		100 %
T	40,665 MHz, 40,675 MHz, 40,685 MHz, 40,695 MHz	100 mW e.r.p.	No requirement		10 kHz	Radio models		100 %
U	138,20 MHz to 138,45 MHz	10 mW e.r.p.	≤ 1,0 % duty cycle		The whole band			50 %
V	169,4750 MHz to 169,4875 MHz	10 mW e.r.p.	≤ 0,1 % duty cycle		12,5 kHz	Social alarms		Not included
W	169,5875 MHz to 169,6000 MHz	10 mW e.r.p.	≤ 0,1 % duty cycle		12,5 kHz	Social alarms		Not included

Operational Frequency Band		Maximum Effective Radiated Power	Channel access and occupation rules	Additional/other spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Notes	CEPT/ERC/REC 70-03 [i.1] implementation status
X	863 MHz to 870 MHz	25 mW e.r.p.	≤ 0,1 % duty cycle or polite spectrum access	≤ 1 % Duty Cycle if the band is limited to 865 MHz to 868 MHz	100 kHz for 47 or more channels	FHSS	Sub-bands for alarms [868,6 MHz to 868,7 MHz], [869,250 - 869,4 MHz], [869,650 MHz to 869,700 MHz] are excluded.	90 %
		25 mW e.r.p. Power density: -4,5 dBm/100 kHz. The power density can be increased to +6,2 dBm/100 kHz if the band of operation is limited to 865 MHz to 868 MHz. The power density can be increased to -0,8 dBm/100 kHz, if the band of operation is limited 865 MHz to 870 MHz.	≤ 0,1 % duty cycle or polite spectrum access	Duty cycle may be increased to 1 % if the band is limited to 865 MHz to 868 MHz and power limited to 10 mW e.r.p.	The whole band except for audio & video limited to 300 kHz and voice limited to 25 kHz		DSSS and any techniques other than FHSS Sub-bands [868,6 MHz to 868,7 MHz], [869,250 MHz to 869,4 MHz], [869,650 MHz to 869,700 MHz] for alarms are excluded.	90 %
		25 mW e.r.p.	≤ 0,1 % duty cycle or polite spectrum access		300 kHz except for voice limited to 25 kHz		Sub-bands [868,6 MHz to 868,7 MHz], [869,250 - 869,4 MHz], [869,650 MHz to 869,700 MHz] for alarms are excluded.	90 %

Operational Frequency Band		Maximum Effective Radiated Power	Channel access and occupation rules	Additional/other spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Notes	CEPT/ERC/REC 70-03 [i.1] implementation status
Y	870,000 MHz to 875,800 MHz	25 mW e.r.p.	≤ 1 % duty cycle For ER-GSM protection (873 MHz to 875,8 MHz, where applicable), the duty cycle is limited to ≤ 0,01 % and Ton_max is limited to 5 ms /1 s		600 kHz		See note.	20 %
Z	875,8 MHz to 876 MHz	25 mW e.r.p.	≤ 0,1 % duty cycle For ER-GSM protection where applicable, the duty cycle is limited to ≤ 0,01 % and Ton_max is limited to 5 ms/1 s	DCT with Ton_max ≤ 200 ms, Toff_min ≥ 200 ms Alternatively DCT with Ton_cum= 10 s Tobs=24h Ton_max ≤ 800 ms, Toff_min ≥ 200 ms	200 kHz		See note.	20 %
AA	870,000 MHz to 875,800 MHz	500 mW e.r.p. restricted to vehicle-to-vehicle applications. 100 mW e.r.p. is restricted to in-vehicle applications.	≤ 0,1 % duty cycle For ER-GSM protection (873 MHz to 875,8 MHz, where applicable), the duty cycle is limited to ≤ 0,01 % and Ton_max is limited to 5 ms/1 s		500 kHz	Tracking, tracing and data acquisition	Adaptive Power Control (APC) is required. The APC is able to reduce a link's transmit power from its maximum to ≤ 5 mW. See note.	10 %

Operational Frequency Band		Maximum Effective Radiated Power	Channel access and occupation rules	Additional/other spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Notes	CEPT/ERC/REC 70-03 [i.1] implementation status
AB	915 MHz to 915,2 MHz	25 mW e.r.p.	≤ 0,1 % duty cycle	DCT with Ton_max ≤ 200 ms, Toff_min ≥ 200 ms Alternatively DCT with Ton_cum= 10 s Tobs=24h Ton_max ≤ 800 ms, Toff_min ≥ 200 ms	200 kHz		See note.	20 %
AC	920,8 MHz to 921 MHz	25 mW e.r.p.	≤ 0,1 % duty cycle For ER-GSM protection where applicable, the duty cycle is limited to ≤ 0,01 % and Ton_max is limited to 5 ms/1 s	DCT with Ton_max ≤ 200 ms, Toff_min ≥ 200 ms Alternatively DCT with Ton_cum= 10 s Tobs=24h Ton_max ≤ 800 ms, Toff_min ≥ 200 ms	200 kHz		See note.	20 %
AD	915,200 MHz to 920,800 MHz	25 mW e.r.p. except for the 4 channels for the 4 channels identified in channel with centre frequencies at 916,3 MHz, 917,5 MHz, 918,7 MHz and 919,9 MHz, where 100 mW e.r.p. applies	≤ 1 % duty cycle For ER-GSM protection (918 MHz to 920,8 MHz, where applicable), the duty cycle is limited to ≤ 0,01 % and Ton_max is limited to 5 ms/1 s		600 kHz except for the 4 channels identified in channel with centre frequencies at 916,3 MHz, 917,5 MHz, 918,7 MHz and 919,9 MHz. The channel bandwidth is limited to 400 kHz		See note.	

Operational Frequency Band	Maximum Effective Radiated Power	Channel access and occupation rules	Additional/other spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Notes	CEPT/ERC/REC 70-03 [i.1] implementation status
NOTE: To bands Y to AD: Use of all or part of sub-bands Y to AD may be denied in some European countries that use all or part of these sub-bands for defence/governmental systems. In some member states the upper sub-bands 873 MHz to 876 MHz and 918 MHz to 921 MHz are allocated to the railways for ER-GSM. For the case that a frequency allocation is available in those countries for SRDs, sharing of these sub-bands by SRDs with ER-GSM is permitted provided SRD systems operate in accordance with agreedmitigation measures such as transmission timing limitations as set out in ECC Report 200 [i.6]. The required timing restrictions are included in the column “Channel access and occupation rules”. See Appendix 3 of CEPT/ERC/REC 70-03 [i.1] for national implementation concerning ER-GSM and defence/governmental services.							

The adjacent frequency bands below 862 MHz and above 870 MHz may be used by high power systems. The same applies to the bands below 915 MHz and above 876 MHz as well as above 921 MHz. Manufacturers should take this into account in the design of equipment and choice of power levels.

Annex D (informative): ~~Void~~Application form for testing

D.1 Introduction

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the application form in this annex so that it can be used for its intended purposes and may further publish the completed application form. The form contained in this annex may be used by the manufacturer to comply with the requirement contained in clause 4 to provide the necessary information about the equipment to the test laboratory prior to the testing. It contains product information as well as other information which might be required to define which configurations are to be tested, which tests are to be performed as well the test conditions. This application form should form an integral part of the test report.

D.2 Information to declare according to ETSI EN 300 220-2

In accordance with ETSI EN 300 220-2 clause 4, the following information is provided by the manufacturer.

a) The name of the manufacturer or his trademark

……

b) The type equipment designation

……

c) The Application(s) of the equipment

……

……

d) The operating frequency(ies)

……

……

e) The operational frequency band(s)

……

……

f) The operating channel(s) width(s)

……

……

The operating channel is less than or equal to 25 kHz? ☐

g) Maximum radio-frequency power transmitted in the frequency band(s) in which the radio equipment operates

……

h) What is the spectrum access mechanism of the equipment?

☐ Duty cycle

☐ Polite spectrum access

i) In case of polite spectrum access:

The CCA time implemented by the equipment is..... ms.

The minimal unit of deferral period is: ……..

The deadtime T_{DIS} is ……ms.

j) Is the equipment battery powered?

☐Yes ☐ No

k) Is the equipment frequency agile?

☐Yes ☐ No

l) Is the equipment declared as FHSS?

☐Yes ☐ No

m) In case of FHSS equipment:

The declared hop channel bandwidth is …….kHz.

The number of non-overlapping channels or hopping positions separated by the declared hop channel bandwidth is.....

The dwell time per channel is ….. ms.

The return time to a hop channel is ….. ms.

Is CCA implemented in the equipment? ☐ Yes ☐ No

Annex ~~C~~E (informative): Selection of technical parameters

E.1 Introduction

ETSI EG 203 336 [i.4] lists candidate technical parameters to be included in a Harmonised Standard aimed at providing a presumption of conformity of radio equipment with the essential requirements in articles 3.1(b) and 3.2 of the Radio Equipment Directive 2014/53/EU [i.2].

Essential requirements are high level objectives described in European Directives. The purpose of the Harmonised Standard is to translate those high level objectives into detailed technical specifications.

This annex provides information regarding selected parameters that may be in or not in the present document.

E.2 Receiver parameters

Adjacent channel selectivity is not specified in the present document because only applicable to category 1 receivers.

Receiver saturation is not specified in the present document because only applicable to category 1 receivers.

Spurious response rejection is not specified in the present document because only applicable to category 1 receivers.

It has also to be noted that non specific SRDs are not operating in channelized band.

Many receiver requirements fall under the general heading of linearity and these are covered in the present document by requirements on blocking performance.

Intermodulation performance is not specified in order to simplify testing. The risk of failure due to second order intermodulation products is considered low because the blocking specification leads to the ability to handle strong out of band signals. Manufacturers should assess the risk of intermodulation products when operating adjacent to high occupancy bands.

Annex F (informative): Bibliography

- Ketterling, H-P: "Verification of the performance of fully and semi-anechoic chambers for radiation measurements and susceptibility/immunity testing", 1991, Leatherhead/Surrey.
- ETSI TR ~~100 028 (Parts 1 and 2~~102 313 (V1.1.1): "Electromagnetic compatibility and Radio ~~spectrum~~Spectrum Matters (ERM); ~~Uncertainties in the measurement of mobile radio equipment characteristics~~Frequency-agile Generic Short Range Devices using listen-Before-Transmit (LBT); Technical Report".
- ~~Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).~~
- ~~ETSI EN 301 489: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".~~
- ~~Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).~~
- ECO Frequency Information System.

NOTE: Available at http://www.efis.dk/.

Annex G (informative): Change History

Version	Information about changes
3.1.1	First published version covering Directive 2014/53/EU [i.2]. Major change is: • New multi-part structure of ETSI EN 300 220 which is described in ETSI EN 300 220-1 [1], clause "Foreword".

History

Document history		
Edition 1	October 1993	Publication as ETSI I-ETS 300 220
V1.2.1	November 1997	Publication
V1.3.1	September 2000	Publication
V2.1.1	April 2006	Publication
V2.1.2	June 2007	Publication
V2.3.1	February 2010	Publication
~~V2.4.1~~	~~January 2012~~	~~One-step Approval Procedure OAP 20120508: 2012-01-09 to 2012-05-08~~
V2.4.1	May 2012	Publication
V3.1.0	May 2016	EN Approval Procedure AP 20160801: 2016-05-03 to 2016-08-01
V3.1.1	November 2016	Vote V 20170127: 2016-11-28 to 2017-01-27
V3.1.1	February 2017	Publication