



**Short Range Devices (SRD) operating  
in the frequency range 25 MHz to 1 000 MHz;  
Part 2: Harmonised Standard for access to radio spectrum  
for non specific radio equipment**

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Reference

REN/ERM-TG28-535

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## Foreword

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

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.5] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.2].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

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

<b>Proposed national transposition dates</b>	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

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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).

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

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## Introduction

The present document is part 2 of a multi-part deliverable covering Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz.

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 2014/53/EU [i.2].

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

Annex C (Informative): 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 specifies technical characteristics and methods of measurements for Non-specific Short Range Devices category equipment types.

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, portable, 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 all or any part of the frequency bands given in table 1.

**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.

It is noted that in the European Commission Decision on Short Range Devices [i.3], some harmonised frequency bands may be subject to usage restrictions such as the exclusion of video or audio use.

Equipment transmitting voice with analog modulation are excluded from the present document.

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.2] is given 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.

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 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".
- [2] Commission Decision 2017/1483/EU Commission Implementing Decision (EU) 2017/1483 of 8 August 2017 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2006/804/EC on harmonisation of the radio spectrum for use by short-range devices as amended by subsequent Commission Decisions.

## 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 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] Commission Decision 2013/752/EU on harmonisation of the radio spectrum for use by short-range devices as amended by subsequent Commission Decisions.
  - [i.4] ETSI EG 203 336: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Guide 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 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] 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/EC: "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)".

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## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

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

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

**epoch:** 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

**nomadic use:** the location of the equipment may change but is stationary while in use

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

**portable use:** equipment intended to be carried, attached or implanted while in use

**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:

DSSS	Direct Sequence Spread Spectrum
NRI	National Radio Interface

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# 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 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 All equipment conformance requirements

### 4.2.0 Compliance

When an operational frequency band is selected:

- 1) from table B.1:

the equipment shall comply with all parameters, exclusions and notes from the corresponding row in table B.1.

- 2) otherwise:

the present document may be used in conjunction with a National Radio Interface in which case some parameters may be modified according to the NRI.

NOTE: Where NRI has been applied there may be restrictions on the use of equipment in some countries.

Some examples of NRI parameters are given in annex C but this is not an exhaustive list.

### 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 entirely within operational frequency bands allowed by annex B 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 4.2.2 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 conditions.

#### 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

### 4.3.1 Effective Radiated Power

#### 4.3.1.0 Applicability

Effective radiated power applies only to transmitters.

#### 4.3.1.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.2.1 applies.

#### 4.3.1.2 Limits

The effective radiated power shall not be greater than the value allowed in annex B or in any NRI 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 5.2.2.

Conformance shall be established under normal and extreme test conditions.

## 4.3.2 Maximum e.r.p. power spectral density

### 4.3.2.0 Applicability

Maximum e.r.p. power spectral density applies to transmitters using annex B bands I.

Maximum e.r.p. power spectral density applies to transmitters using DSSS or wideband techniques other than FHSS modulation, in annex C band W, AA or AC.

### 4.3.2.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.3.1 applies.

### 4.3.2.2 Limits

The Maximum e.r.p. power spectral density shall not be greater than the value allowed in annex B or any NRI 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 5.3.2.

Conformance shall be established under 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.

### 4.3.3.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.4.1 applies.

### 4.3.3.2 Limits

The Duty Cycle at the operating frequency shall not be greater than values in annex B or any NRI for the chosen operational frequency band(s).

### 4.3.3.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.4.2.

## 4.3.4 Occupied Bandwidth

### 4.3.4.0 Applicability

Maximum occupied bandwidth applies to all transmitters.

### 4.3.4.1 Description

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

#### 4.3.4.2 Limits

The occupied bandwidth of the EUT according to ETSI EN 300 220-1 [1], clause 5.6.2 shall comply with the limits in annex B or any NRI for the chosen operational frequency band(s).

#### 4.3.4.3 Conformance

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

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 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.

#### 4.3.6.1 Description

For the purpose of 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.

#### 4.3.6.3 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.

### 4.3.7 Adjacent Channel Power

#### 4.3.7.0 Applicability

Adjacent channel power applies to all transmitters with OCW  $\leq$  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 AF.

#### 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 operating in the range 863 MHz to 870 MHz.

### 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 as defined in European Commission Decision 2017/1483/EC [2].
- b) The number of hopping channels shall be greater than or equal to the values given in table 2.

**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).

- c) For FHSS transmissions with a dwell time less than 10 ms, a 0,1 % duty cycle restriction applies.
- d) Each hopping channel of the sequence shall be occupied at least once during an epoch.
- e) The return time to a hop channel shall be less than or equal to the lower of an epoch or 20 seconds.
- f) The dwell time shall not exceed 400 ms.
- g) 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.
- h) 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  $T_{\text{on}}$  or  $T_{\text{off}}$  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  $T_{\text{on}}/T_{\text{off}}$  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

Rx sensitivity requirement is applicable to all EUT employing polite spectrum access as set out in clause 4.5.1.

#### 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 2 reference limits level defined in ETSI EN 300 220-1 [1], clause 5.18.3.

#### 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 Assessment 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 timing parameters clause applies to EUT with polite spectrum 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 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 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.

## 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	Essential requirements of Directive	Clause(s) of the present document	U/C	Condition
1	Operating frequency	3.2	4.2.1	U	
2	Unwanted emissions in the spurious domain	3.2	4.2.2	U	
3	TX effective radiated power	3.2	4.3.1	U	
4	TX Maximum e.r.p. spectral density	3.2	4.3.2	C	Applies to EUT using annex B band I. Applies to EUT using DSSS or wideband techniques other than FHSS modulation, using annex C band W, AA or AC.
5	TX Duty cycle	3.2	4.3.3	C	Not applicable to EUT with polite spectrum access where permitted in annex B, table B.1.
6	TX Occupied bandwidth	3.2	4.3.4	U	
7	TX out of band emissions	3.2	4.3.5	C	Applies to EUT with OCW > 25 kHz.
8	TX Transient	3.2	4.3.6	U	
9	TX Adjacent channel power	3.2	4.3.7	C	Applies to EUT with OCW ≤ 25 kHz.
10	TX behaviour under low voltage conditions	3.2	4.3.8	C	Applies to battery powered EUT.
11	TX Adaptive power control	3.2	4.3.9	C	Applies to EUT with adaptive power control using annex C band AF.
12	TX FHSS	3.2	4.3.10	C	Applies to FHSS EUT using the band 863 MHz to 870 MHz.
13	TX Short term behaviour	3.2	4.3.11	C	Applies to EUT using annex C bands AD, AE, AF, AG, AH, or AI.
14	RX sensitivity	3.2	4.4.1	C	Applies to EUT employing polite spectrum access.
15	RX Blocking	3.2	4.4.2	U	
16	Clear channel assessment threshold	3.2	4.5.2	C	Applies to EUT employing polite spectrum access.
17	Polite spectrum access timing parameters	3.2	4.5.3	C	Applies to EUT employing polite spectrum access.
18	Adaptive Frequency Agility	3.2	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.

**Essential requirements of Directive**

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

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

Table B.1 summarizes the harmonised frequency bands and their technical key parameters for non specific short-range devices from EC Decision 2017/1483/EU [2].

**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 2017/1483/EU [2]
<b>A</b>	26,957 MHz to 27,283 MHz	10 mW e.r.p.	No requirement	The whole band		28
<b>B</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
<b>C</b>	40,660 MHz to 40,700 MHz	10 mW e.r.p.	No requirement	The whole band	Video applications excluded.	35
<b>D</b>	169,400 MHz to 169,475 MHz	500 mW e.r.p.	≤ 1,0 % duty cycle For metering devices duty cycle limit is 10 %	50 kHz		37c
<b>E</b>	169,4000 MHz to 169,4875 MHz	10 mW	≤ 0,1 % duty	The whole band		38
<b>F</b>	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
<b>G</b>	169,5875 MHz to 169,8125 MHz	10 mW	≤ 0,1 % duty cycle	The whole band		40
<b>H</b>	433,050 MHz to 434,790 MHz	10 mW	10 %	The whole band		44b, 45b

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 2017/1483/EU [2]
I	433,050 MHz to 434,790 MHz	1 mW e.r.p. -13 dBm/10 kHz power spectral density for bandwidth modulation larger than 250 kHz	No requirement	The whole band	Audio and video applications are excluded.	44a, 45a
J	434,040 MHz to 434,790 MHz	10 mW	No requirement	25 kHz	Audio and video applications are excluded.	45c
K	863 MHz to 865 MHz	25 mW e.r.p.	$\leq 0,1$ % duty cycle or polite spectrum access	The whole band except for audio & video applications limited to 300 kHz		46a
L	865 MHz to 868 MHz	25 mW e.r.p.	$\leq 1$ % duty cycle or polite spectrum access	The whole band		47
M	868,000 MHz to 868,600 MHz	25 mW e.r.p.	$\leq 1$ % duty cycle or polite spectrum access	The whole band		48
N	868,700 MHz to 869,200 MHz	25 mW e.r.p.	$\leq 0,1$ % duty cycle or polite spectrum access	The whole sub-band		50
P	869,400 MHz to 869,650 MHz	500 mW e.r.p.	$\leq 10$ % duty cycle or polite spectrum access	The whole band		54
P	869,700 MHz to 870,000 MHz	5 mW e.r.p.	No requirement	The whole band	Audio and video applications are excluded.	56a
Q	869,700 MHz to 870,000 MHz	25 mW e.r.p.	$\leq 1$ % duty cycle or polite spectrum access	The whole band	Analogue audio applications are excluded. Analogue video applications are excluded.	56b

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

In addition to EU wide harmonised radio interfaces listed in annex B, nations may implement NRIs with associated technical requirements to ensure spectrum compatibility. Usually these requirements come from CEPT/ERC/REC 70-03 [i.1] which sets out the general position on spectrum designations 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 [i.2]. 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 these NRIs which might be available in some EU countries. Manufacturers are advised to check the most recently published version of any given NRI.

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

	Operational Frequency Band	Maximum Effective Radiated Power	Channel access and occupation rules	Additional spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Band number in CEPT/ERC/REC 70-03 [i.1]
<b>R</b>	34,995 MHz to 35,225 MHz	100 mW e.r.p.	No requirement		10 kHz	Only for Flying radio models	Annex 8; b
<b>S</b>	40,665 MHz, 40,675 MHz, 40,685 MHz, 40,695 MHz	100 mW e.r.p.	No requirement		10 kHz	Only for Radio models	Annex 8, c1, c2, c3, c4
<b>T</b>	138,20 MHz to 138,45 MHz	10 mW e.r.p.	$\leq 1,0$ % duty cycle		The whole band		Annex 1; e
<b>U</b>	865 MHz to 868 MHz	25 mW e.r.p.	$\leq 1$ % duty cycle or polite spectrum access		50 kHz for 58 or more channels	Applies only to equipment using FHSS technique	Annex 1; h1.1 (Notes 1, 2, 4, 5)
<b>V</b>	865 MHz to 868 MHz	25 mW e.r.p. Power spectral density: +6,2 dBm/100 kHz.	$\leq 0.1$ % duty cycle or polite spectrum access		3 MHz except for audio and video limited to 300 kHz and voice limited to 25 kHz	Applies only to equipment using DSSS and any techniques other than FHSS	Annex 1; h1.2 (Notes 1, 4, 7)
<b>W</b>	865 MHz to 868 MHz	10 mW e.r.p.	$\leq 1$ % duty cycle or polite spectrum access	Minimum occupied bandwidth is 200 kHz	3 MHz except for audio and video limited to 300 kHz	Applies only to equipment using DSSS and any techniques other than FHSS	Annex 1; h1.2 (Notes 1, 4, 6)

Operational Frequency Band		Maximum Effective Radiated Power	Channel access and occupation rules	Additional spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Band number in CEPT/ERC/REC 70-03 [i.1]
X	865 MHz to 868 MHz	25 mW e.r.p.	≤ 1 % duty cycle or polite spectrum access		300 kHz except for voice limited to 25 kHz		Annex 1; h1.3 (Notes 1, 3, 4, 5)
ZY	863 MHz to 870 MHz	25 mW e.r.p.	≤ 0,1 % duty cycle or polite spectrum access		100 kHz for 47 or more channels	Applies only to equipment using FHSS technique  Sub-bands for alarms [868,6 MHz to 868,7 MHz], [869,250 MHz to 869,4 MHz], [869,650 MHz to 869,700 MHz] are excluded	Annex 1; h1.1 (Notes 1, 2, 3, 4)
Z	863 MHz to 870 MHz	25 mW e.r.p. Power spectral density: -4,5 dBm/100 kHz.	≤ 0,1 % duty cycle or polite spectrum access		7 MHz except for audio & video limited to 300 kHz and voice limited to 25 kHz	Applies only to equipment using 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	Annex 1; h1.2 (Notes 1, 3, 4, 7)



Operational Frequency Band		Maximum Effective Radiated Power	Channel access and occupation rules	Additional spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Band number in CEPT/ERC/REC 70-03 [i.1]
<b>AA</b>	863 MHz to 870 MHz	25 mW e.r.p.	$\leq 0,1$ % 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 MHz to 869,4 MHz], [869,650 MHz to 869,700 MHz] for alarms are excluded	Annex 1; h1.3 (Notes 1, 3, 4)
<b>AB</b>	865 MHz to 870 MHz	25 mW e.r.p. Power spectral density: -0,8 dBm/100 kHz.	$\leq 0,1$ % duty cycle or polite spectrum access		5 MHz except for audio & video limited to 300 kHz and voice limited to 25 kHz	Applies only to equipment using 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	Annex 1; h1.2 (Notes 1, 3, 4, 7)
<b>AC</b>	870,000 MHz to 875,800 MHz	25 mW e.r.p.	$\leq 1$ % duty cycle  For ER-GSM protection (873 MHz to 875,8 MHz, where applicable), the duty cycle is limited to $\leq 0,01$ % and $T_{On\_max}$ is limited to 5 ms /1 s		600 kHz	See note	Annex 1; h2.1

Operational Frequency Band		Maximum Effective Radiated Power	Channel access and occupation rules	Additional spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Band number in CEPT/ERC/REC 70-03 [i.1]
<b>AD</b>	875,8 MHz to 876 MHz	25 mW e.r.p.	<p>≤ 0,1 % duty cycle</p> <p>For ER-GSM protection where applicable, the duty cycle is limited to ≤ 0,01 % and T<sub>on_max</sub> is limited to 5 ms/1 s</p>	<p>DCT with T<sub>on_max</sub> ≤ 200 ms, T<sub>off_min</sub> ≥ 200 ms</p> <p>Alternatively DCT with T<sub>on_cum</sub> = 10 s T<sub>obs</sub> = 24h T<sub>on_max</sub> ≤ 800 ms, T<sub>off_min</sub> ≥ 200 ms</p>	200 kHz	See note	Annex 1; h2
<b>AE</b>	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.	<p>≤ 0,1 % duty cycle</p> <p>For ER-GSM protection (873 MHz to 875,8 MHz, where applicable), the duty cycle is limited to ≤ 0,01 % and T<sub>on_max</sub> is limited to 5 ms/1 s</p>	<p>Adaptive Power Control (APC) is required. The APC is able to reduce a link's transmit power from its maximum to ≤ 5 mW.</p>	500 kHz	<p>Only for tracking, tracing and data acquisition</p> <p>See note</p>	Annex 5; a
<b>AF</b>	915 MHz to 915,2 MHz	25 mW e.r.p.	≤ 0,1 % duty cycle	<p>DCT with T<sub>on_max</sub> ≤ 200 ms, T<sub>off_min</sub> ≥ 200 ms</p> <p>Alternatively DCT with T<sub>on_cum</sub> = 10 s T<sub>obs</sub> = 24h T<sub>on_max</sub> ≤ 800 ms, T<sub>off_min</sub> ≥ 200 ms</p>	200 kHz	See note	Annex 1; h3

Operational Frequency Band		Maximum Effective Radiated Power	Channel access and occupation rules	Additional spectrum access parameters	Maximum occupied bandwidth	Other usage restriction	Band number in CEPT/ERC/REC 70-03 [i.1]
<b>AG</b>	920,8 MHz to 921 MHz	25 mW e.r.p.	<p>≤ 0,1 % duty cycle</p> <p>For ER-GSM protection where applicable, the duty cycle is limited to ≤ 0,01 % and T<sub>on-max</sub> is limited to 5 ms/1 s</p>	<p>DCT with T<sub>on-max</sub> ≤ 200 ms, T<sub>off-min</sub> ≥ 200 ms</p> <p>Alternatively DCT with T<sub>on-cum</sub> = 10 s T<sub>obs</sub> = 24h T<sub>on-max</sub> ≤ 800 ms, T<sub>off-min</sub> ≥ 200 ms</p>	200 kHz	See note	Annex 1; h3
<b>AH</b>	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.	<p>≤ 1 % duty cycle</p> <p>For ER-GSM protection (918 MHz to 920,8 MHz, where applicable), the duty cycle is limited to ≤ 0,01 % and T<sub>on-max</sub> is limited to 5 ms/1 s</p>		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	Annex 1; h3.1
<p><b>NOTE:</b> To bands AD to AI: Use of all or part of sub-bands AD to AI 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 agreed mitigation 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.</p>							

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.

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## Annex D (informative): 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.

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

- a) **The name of the manufacturer or his trademark**

.....

- b) **The type equipment designation**

.....

- c) **The application(s) of the equipment**

.....

.....

- d) **The operating channel OC or channels**

(nominal centre frequency, Flow and Fhigh of each OC)

.....

.....

- 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. Where multiple powers are possible, also state rated power for each level or range of levels**

.....

**h) Upper and lower temperatures of the operational profile**

.....

**i) Upper and lower extreme test voltages**

.....

**j) Antenna maximum gain if EUT has a permanent RF connector**

.....

**k) What is the spectrum access mechanism of the equipment?** Duty cycle Polite spectrum access**l) 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.**m) Is the equipment battery powered?** Yes  No**n) Is the equipment frequency agile?** Yes  No**o) Is the equipment declared as FHSS?** Yes  No**p) 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 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.

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### E.2 Receiver parameters

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

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

Spurious response rejection is not specified in the present document because it is 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.

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## 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 102 313 (V1.1.1): "Electromagnetic compatibility and Radio Spectrum Matters (ERM); Frequency-agile Generic Short Range Devices using listen-Before-Transmit (LBT); Technical Report".
- ECO Frequency Information System.

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

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## 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: <ul style="list-style-type: none"><li data-bbox="347 421 1366 479">• New multi-part structure of ETSI EN 300 220 which is described in ETSI EN 300 220-1 [1], clause "Foreword".</li></ul>
3.2.1	Published version covering Directive 2014/53/EU [i.2] with removal of receiver category 3. Minimum receiver category for compliance to Directive 2014/53/EU article 3.2 is set to category 2.



## History

<b>Document history</b>		
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	May 2012	Publication
V3.1.1	February 2017	Publication
V3.2.0	September 2017	EN Approval Procedure      AP 20171211:    2017-09-12 to 2017-12-11
V3.2.1	April 2018	Vote      V 20180615:    2018-04-16 to 2018-06-15