



**Short Range Devices (SRD) operating in  
the frequency range 25 MHz to 1 000 MHz;  
Part 2: Harmonised Standard covering the essential  
requirements of article 3.2 of the Directive 2014/53/EU  
for non specific radio equipment**

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Reference

REN/ERM-TG28-534

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## Foreword

This 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 combined Public Enquiry and 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 non specific Short Range Devices (SRD) operating in the frequency range 25 MHz to 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 (normative) 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 applies to 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, mobile or nomadic use, e.g.:

- 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**

	<b>Short Range Devices frequency ranges</b>
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.

The present document contains requirements to demonstrate that radio equipment both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference.

## 2 References

### 2.1 Normative references

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

Referenced documents which are not found to be publicly available in the expected location might be found at <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.

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

- [1] ETSI EN 300 220-1 (V3.1.0) (05-2016): "Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 1: Technical characteristics and 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 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/EC on harmonization 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/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)".

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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] and ETSI EN 300 220-1 [1] apply.

### 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] apply.

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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 supplier. The equipment shall comply with all the technical requirements of the present document 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 from annex B or C for the equipment under test, the equipment shall comply with all parameters, exclusions and notes from the row in annex B or C unless a different National Radio Interface applies.

#### 4.2.1 Operating frequency

##### 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 provider may declare either one or more operating frequencies and operating channels.

Operating channel(s) shall be included in operational frequency bands allowed by annex B or C.

##### 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

##### 4.2.2.1 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

#### 4.3.1 Effective Radiated Power

##### 4.2.1.0 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 C for the chosen operational frequency band(s). The signal shall be located within the operational frequency band.

#### 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 spectral density

#### 4.3.2.0 Applicability

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

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

#### 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. spectral density shall not be greater than the value allowed in annex 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 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 using bands L, M, N, O, P, R and X.

#### 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 C 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 C.

#### 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 for equipment with operating channel width less than 25 kHz

Where the Operating Channel 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 5.14.1 applies.

### 4.3.9.2 Limits

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

### 4.3.9.3 Conformance

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

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

The following specific definitions for FHSS apply:

- a) The number hopping channels is defined as the number of non-overlapping channels used by the FHSS equipment.
- b) The dwell time is defined as the period the equipment stays on channel before hopping to the next hop channel.
- c) Return time to a hop channel is the maximum period within which a specific hop channel shall be reused.

### 4.3.10.2 Limits

Each channel of the hopping sequence shall be occupied at least once during a period not exceeding four times the product of the dwell time per hop and the number of hop channels.

For FHSS equipment the following limits shall be met:

- a) The number of FHSS hopping channels shall be greater than or equal to the values given in Table 2.

**Table 2: Minimum of hop channels and other requirements for FHSS**

Band	Number of hop channels/bandwidth (BW)	Other requirements
865 MHz to 868 MHz	$\geq 58$ at $\leq 50$ kHz BW each	LBT or $< 1$ % TX duty cycle (see note 1)
863 MHz to 870 MHz (see note 2)	$\geq 47$ at $\geq 100$ kHz BW each	LBT or $< 0,1$ % TX duty cycle (see note 1)
NOTE 1: The duty cycle applies to the entire transmission (not at each hopping channel).		
NOTE 2: FHSS as shown in the present table shall not be used in the frequency bands for LDC/HR devices as defined in European Commission Decision 2013/752/EC [i.3].		

- b) Each channel of the hopping sequence shall be occupied at least once during a period not exceeding the product of 4 x dwell time per hop and the number of hopping channels.
- c) In case of LBT being used for FHSS, this function shall be used at each hop channel. LBT can also be used on the first frequency corresponding to frame preamble transmissions, FHSS can then apply to remaining data frame provided the duty cycle is respected during the entire transmission, i.e. preamble excluded.
- d) When LBT access is used the requirement of clause 4.4.4 shall apply.
- e) In the case of FHSS with a dwell time less than 10 ms, a 0,1 % duty cycle restriction applies for the entire FHSS transmission mode. LBT can also be used on the first frequency corresponding to frame preamble transmissions, FHSS can then apply to remaining data frame provided the duty cycle is respected during the entire transmission, i.e. preamble excluded.
- f) If the operating channel is  $\leq 25$  kHz, the requirement of clause 4.3.7 shall apply.

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

- a) The provider shall declare the number of non-overlapping channels or hopping positions separated by the declared hop channel bandwidth. The minimum number of channels shall be greater than or equal to the limit given in Table 2.
- b) The provider shall declare the dwell time per channel, which shall not exceed 400 ms.
- c) The provider shall declare the return time to a hop channel which shall be equal or less than the product of 4 x channel dwell time x the number of hopping channels, and shall not exceed 20 s.

It shall be noted that each channel of the hopping sequence shall be occupied at least once during a period not exceeding four times the product of the dwell time per hop and the number of hop channels.

### 4.3.10.3 Conformance

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

- a) The provider shall declare the number of non-overlapping channels or hopping positions separated by the declared hop channel bandwidth.
- b) The provider shall declare the dwell time per channel.
- c) The provider shall declare the return time to a hop channel.

## 4.3.11 Short term behaviour

### 4.3.11.0 Applicability

Short term behaviour applies to EUT using Annex C bands Y, Z, AA, AB, AC, AD.

#### 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  $T_{xon}/T_{xoff}$  values of Annex C 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 applies to EUT with polite spectrum access.

##### 4.4.1.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.15.1 applies.

##### 4.4.1.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.15.2.

##### 4.4.1.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.15.3.

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 5.19.1 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 5.19.2.

##### 4.4.2.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.19.6.

Conformance shall be established under normal test conditions.

#### 4.4.3 Clear Channel Assessment threshold

##### 4.4.3.0 Applicability

CCA threshold applies to EUT with polite spectrum access.

#### 4.4.3.1 Description

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

#### 4.4.3.2 Limits

The CCA threshold shall not exceed the limits given in ETSI EN 300 220-1 [1], clause 5.21.2.

#### 4.4.3.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.21.3.

Conformance shall be established under normal test conditions.

### 4.4.4 Polite spectrum access

#### 4.4.4.0 Applicability

Polite spectrum access applies to EUT with polite spectrum access.

#### 4.4.4.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.22.1 applies.

#### 4.4.4.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.22.2.

#### 4.4.4.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.22.3.

Conformance shall be established under normal test conditions.

## 4.5 Other conformance requirements

### 4.5.1 Adaptive Frequency Agility

#### 4.5.1.0 Applicability

Adaptive Frequency Agility applies to EUT with AFA.

#### 4.5.1.1 Description

For the purpose of the present document, the description in ETSI EN 300 220-1 [1], clause 5.24.1 applies.

#### 4.5.1.2 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.24.2.

Conformance shall be established under normal test conditions.



## Annex A (normative): 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 A1 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				
The following requirements are relevant to the presumption of conformity under the article 3.2 of Directive 2014/53/EU [i.2]				
Requirements			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 other wideband techniques other than FHSS modulation in Annex C band X.
5	TX Duty cycle	4.3.3	C	Not applicable to EUT with polite spectrum access using bands L,M,N,O,P,R,X.
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	4.4.3	C	Applies to EUT with polite spectrum access.
16	Polite spectrum access	4.4.4	C	Applies to EUT with polite spectrum access.
17	RX Blocking	4.4.2	U	
18	Adaptive Frequency Agility	4.5.1	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:**

<b>U/C</b>	Indicates whether the requirement shall be unconditionally applicable (U) or is conditional upon the manufacturers claimed functionality of the equipment (C).
<b>Condition</b>	Explains the conditions when the requirement shall or shall not be 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]
<b>A</b>	26,957 MHz to 27,283 MHz	10 mW e.r.p	No requirement	The whole band		28b	25
<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	Model control 94, 95, 96, 97, 98
<b>C</b>	40,660 MHz to 40,700 MHz	10 mW e.r.p.	No requirement	The whole band	Video applications excluded.	35	19
<b>D</b>	169,400 MHz to 169,475 MHz	500 mW e.r.p.	≤ 1,0 % duty cycle	50 kHz		37c	80
<b>E</b>	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]
<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	124
<b>G</b>	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
<b>H</b>	433,050 MHz to 434,790 MHz	10 mW	10 %	The whole band		44b, 45b	20, 125
<b>I</b>	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
<b>J</b>	434,040 MHz to 434,790 MHz	10 mW	No requirement.	25 kHz	Audio and video applications are excluded.	45c	65
<b>K</b>	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
<b>L</b>	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]
<b>M</b>	868,000 MHz to 868,600 MHz	25 mW e.r.p.	$\leq 1$ % duty cycle or polite spectrum access	The whole band except for audio & video applications limited to 300 kHz		48	28
<b>N</b>	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 except for audio & video applications limited to 300 kHz		50	29
<b>O</b>	869,400 MHz to 869,650 MHz	25 mW e.r.p.	$\leq 0.1\%$ duty cycle or polite spectrum access	The whole band	.	54a	130
<b>P</b>	869,400 MHz to 869,650 MHz	500 mW e.r.p.	$\leq 10$ % duty cycle or polite spectrum access	The whole band		54b	30
<b>Q</b>	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
<b>R</b>	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	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. Appendix 1 in CEPT/ERC/REC 70-03 [i.1] 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
<b>S</b>	34,995 MHz to 35,225 MHz	100 mW e.r.p	No requirement		10 kHz	Flying radio models		100 %
<b>T</b>	40,665 MHz, 40,675 MHz, 40,685 MHz, 40,695 MHz	100 mW e.r.p	No requirement		10 kHz	Radio models		100 %
<b>U</b>	138,20 MHz to 138,45 MHz	10 mW e.r.p.	$\leq 1,0$ % duty cycle		The whole band			50 %
<b>V</b>	169,4750 MHz to 169,4875 MHz	10 mW e.r.p.	$\leq 0,1$ % duty cycle		12,5 kHz	Social alarms		Not included
<b>W</b>	169,5875 MHz to 169,6000 MHz	10 mW e.r.p.	$\leq 0,1$ % 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], [868,250-869,4MHz], [869,850 MHz to 869,700MHz] 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], [868,250 MHz to 869,4 MHz], [869,850 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], [868,250-869,4MHz], [869,850 MHz to 869,700MHz] 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 limited to a maximum transmit on-time of 5 ms/1s		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 (873 MHz to 876 MHz, where applicable), the duty cycle is limited to ≤ 0,01 % and limited to a maximum transmit on-time of 5 ms/1 s	DCT of 0,1 % respecting TXon ≤ 200ms, TXoff ≥ 200 ms  Alternatively DCT of 10 s/24 h with TXon ≤ 800 ms, TXoff ≥ 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 limited to a maximum transmit on-time of 5ms/1s		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
<b>AB</b>	915 MHz to 915,2 MHz	25 mW e.r.p.	<p>≤ 0,1 % duty cycle</p> <p>For ER-GSM protection (918 MHz to 921 MHz, where applicable), the duty cycle is limited to ≤ 0.01% and limited to a maximum transmit on-time of 5 ms/1 s</p>	<p>DCT of 0,1 % respecting TXon ≤ 200 ms, TXoff ≥ 200ms</p> <p>Alternatively DCT of 10s/24h with TXon ≤ 800 ms, TXoff ≥ 200 ms</p>	200 kHz		See note	20 %
<b>AC</b>	920,8 MHz to 921 MHz	25 mW e.r.p.	<p>≤ 0,1 % duty cycle</p> <p>For ER-GSM protection (918 MHz to 921 MHz, where applicable), the duty cycle is limited to ≤ 0,01 % and limited to a maximum transmit on-time of 5 ms/1s</p>		200 kHz		See note	20 %

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
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 limited to a maximum transmit on-time of 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	
<p>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 other countries that use sub-bands 873 MHz to 876 MHz / 918 MHz to 921 MHz for GSM for railways, extended band (ER-GSM), access to the part 873 MHz to 876 MHz / 918 MHz to 921 MHz by non-specific SRD applications require implementing additional mitigation measures such as transmission timing limitations as set out in ECC Report 200 [i.6]. 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.

## 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 supplier 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 supplier.

**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) Is the equipment using the following band(s)?**

band A     band C     band I     band J     band Q     band X     band Y

band Z     band AA     band AB     band AC     band AD

**g) The operating channel(s) width(s)**

.....

.....

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

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

.....

**i) What is the spectrum access mechanism of the equipment?**

- Duty cycle  
 Polite spectrum access

**j) 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.

**k) Is the equipment battery powered?**

- Yes  No

**l) Is the equipment frequency agile?**

- Yes  No

**m) Is the equipment declared as FHSS?**

- Yes  No

**n) 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 LBT implemented in the equipment?  Yes  No

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## 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 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.

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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

Date	Version	Information about changes
February 2016	3.1.1	First publication of the EN after approval by TC ERM at ERM#58 (22 February - 26 February 2016; Sophia Antipolis)

## 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
V3.1.0	May 2016	EN Approval Procedure AP 20160801: 2016-05-03 to 2016-08-01