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Short Range Devices (SRD); Social Alarms Equipment operating in the frequency range 25 MHz to 1 000 MHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

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Contents

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Foreword

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

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.10] 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.

National transposition dates	
Date of adoption of this EN:	10 February 2017
Date of latest announcement of this EN (doa):	31 May 2017
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 2017
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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.

Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio equipment within the scope of the Radio Equipment Directive (RED) [i.2].

It is recognized that the radio communications link alone does not determine the overall operation of a system, but that a functioning radio communications link is an essential foundation upon which a system may be built.

The present document sets out various means and features by which the performance of a radio communications link may be improved. These include:

1) Spectrum Access Rules - with the aim of reducing the probability of collisions between transmissions from different equipment.

2) Receiver Parameters - with the aim of reducing the probability of interference from equipment on other frequencies.

3) Bi-Directional Communications - with the aim of reducing the time and number of transmissions required to achieve a given level of confidence in successful communication.

4) Frequency Agility - with the aim of enabling the equipment to change its operating frequency to avoid certain types of interference.

Application of these features, separately or in combination, does not necessarily ensure successful radio communication. In addition, there are other features that may be considered, such as listen before talk or error correction, that may improve overall performance.

Clauses 1 and 3 provide a general description on the types of equipment covered by the present document and the definitions and abbreviations used.

Clause 4 specifies technical requirements to be met by all equipment.

Clause 5 specifies technical requirements for receivers in equipment with uni-directional communications.

Clause 6 specifies technical requirements for equipment with bi-directional communications and frequency agility.

Clause 7 specifies the methods for testing for compliance with the technical requirements.

Annex A summarizes the requirements relevant to the RE-Directive [i.2].

1 Scope

The present document specifies technical characteristics and methods of measurements for social alarm systems operating on a range of frequencies that may be shared with other equipment types.

Social alarms are defined in Commission Decision 2013/752/EU [i.3] as:

"Social alarm devices" are radio communications systems that allow reliable communication for a person in distress in a confined area to initiate a call for assistance. Typical uses of social alarm are to assist elderly or disabled people.

These radio equipment types are capable of operating, for transmission or reception, in all or part of the frequency bands given in table 1.

Table 1: Frequency bands and usage information

Frequency band	Usage information
169,400 MHz to 169,8125 MHz	This band is shared with other SRD equipment
868,600 MHz to 868,700 MHz	This band is shared with other SRD alarm equipment
869,250 MHz to 869,400 MHz	This band is shared with other SRD alarm equipment
869,650 MHz to 869,700 MHz	This band is shared with other SRD alarm equipment
863,000 MHz to 870,000 MHz	This band is shared with other SRD equipment, except as noted above
870,000 MHz to 876,000 MHz	This band is shared with other SRD equipment
915,000 MHz to 921,000 MHz	This band is shared with other SRD equipment

NOTE 1: The probability of interference may be different when operating in bands shared with other short range devices compared to bands from which other short range devices are excluded.

NOTE 2: Social alarms operating in a designated band are covered in ETSI EN 300 220-3-1 [i.5].

The present document covers the essential requirements of article 3.2 of Directive 2014/53/EU [i.2] 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.

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".

2.2 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] 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.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 (the "RED").

[i.3] Commission Decision 2013/752/EU amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2005/928/EC.

[i.4] ETSI TS 103 060: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Method for a harmonized definition of Duty Cycle Template (DCT) transmission as a passive mitigation technique used by short range devices and related conformance test methods".

[i.5] ETSI EN 300 220-3-1: "Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 3-1: Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU; Low duty cycle high reliability equipment, social alarms equipment operating on designated frequencies (869,200 MHz to 869,250 MHz)".

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

[i.7] ECC Report 37: "Compatibility of planned SRD applications with currently existing radiocommunications applications in the frequency band 863 - 870 MHz".

[i.8] ECC Report 181: "Improving spectrum efficiency in the SRD bands".

[i.9] "Channel Access Rules for SRDs", study by IMST GmbH (November 2012).

NOTE: Available at http://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Koexistenzstudie_EN.pdf?__blob=publicationFile&v=2.

[i.10] 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.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

mode A: mode of operation with uni-directional communication (specified in clause 5)

mode BN: mode of operation with bi-directional communication and frequency agility (specified in clause 6)

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:

ACK	ACKnowledgement
ER-GSM	Extended Railway Global System for Mobile communications
MI	Message Initiator
MR	Message Responder

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 test conditions are described in ETSI EN 300 220-1 [1], clauses 4.3.3 and 4.3.4.

4.2 Technical requirements for transmit mode

4.2.1 Applicability

The requirements in clause 4.2 apply to all EUT when operating in transmit mode, except where stated.

4.2.2 Operating Frequency and Channel

4.2.2.1 Description

The nominal operating frequency is the centre of a channel of width OCW.

4.2.2.2 Limits

The channel widths, OCW, shall comply with the limits given in annex B for the relevant band. The channels shall lie on a raster formed by the OCW and the edges of the bands.

4.2.2.3 Conformance

There is no conformance test specified for this requirement.

The manufacturer shall details of the operating frequency.

NOTE: More than one operating frequency on one or more channels may be declared.

4.2.3 Effective Radiated Power

4.2.3.1 Description

The effective radiated power (e.r.p) is the power radiated in the direction of the maximum field strength under specified conditions of measurements for any condition of modulation. For equipment with a permanent or temporary antenna connection it may be taken as the power delivered from that connector.

If the equipment is designed to operate with different carrier powers, the rated power for each level or range of levels shall be declared by the manufacturer.

4.2.3.2 Limits

The effective radiated power shall comply with the limits given in annex B for the relevant band.

4.2.3.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.2.2.

Compliance shall be established under normal and extreme conditions for conducted measurements and under normal conditions for radiated measurements.

4.2.4 Duty Cycle

4.2.4.1 Description and Applicability

This requirement applies for operation in bands for which a duty cycle limit is given in annex B.

The present document applies to equipment operating with low duty cycle and transmissions of limited duration. Equipment may be triggered manually, by internal timing or by external stimulus. Depending on the method of triggering the timing may be predictable or random.

4.2.4.2 Limits

The EUT shall comply with the limit given in annex B.

Unless otherwise stated in annex B, the observation period T_{obs} is 1 hour.

Unless otherwise stated in annex B, the observation bandwidth F_{obs} is the operating band.

An equipment may transmit on only one channel at a time in each of the bands.

An equipment may transmit sequentially in more than one of the bands.

4.2.4.3 Conformance

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

Compliance shall be established under normal conditions.

4.2.5 Short term behaviour

4.2.5.1 Description and applicability

This requirement applies for operation in bands for which an entry under **Other spectrum access requirements** are given in annex B.

Short term behaviour is expressed in terms of Duty Cycle Template (as described in ETSI EN 300 220-1 [1]).

The present document applies to equipment operating with low duty cycle and transmissions of limited duration. Equipment may be triggered manually, by internal timing or by external stimulus. Depending on the method of triggering the timing may be predictable or random.

Duty cycle template describes the behaviour of a device for a single or a small number of transmissions. Each transmission is limited in maximum duration (Tx-On-max) and is followed by a minimum interval of silence by the transmitting device (Tx-Off-min). Additional refinements include brief gaps (T-disregard) in a sequence of transmissions which may be ignored provided other limits are respected.

4.2.5.2 Limits

The EUT shall comply with the limits in one of the appropriate rows in of table 2 for the requirement given in annex B.

Table 2: DCT Parameters

Requirement	Duty Cycle	Cum Ton	T_{obs}	F_{obs}	Max T_{on}	Min T_{off}
DCT1 option 1	0,1 %		1 hr		200 ms	200 ms
DCT1 option 2		10 s	24 hr		800 ms	200 ms
DCT2	1 %		1 hr	200 kHz	400 ms	400 ms
NOTE 1: For ER-GSM protection (873 MHz to 876 MHz, where applicable), the duty cycle is limited to $\leq$ 0,01 % and a maximum single transmitter on time of 5 ms/1 s. NOTE 2: Unless otherwise stated the observation bandwidth F_{obs} is the operating band.						

4.2.5.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.4.2 and clause 5.5.2.

4.2.6 Adjacent Channel Power for OCW $\leq$ 25 kHz

4.2.6.1 Description and Applicability

Adjacent channel power is power incidental to proper operation of a transmitter falling into the neighbouring channels.

This requirement applies for operation in bands where the maximum occupied channel width given in annex B is less than or equal to 25 kHz.

If the frequency error measurements in clause 4.2.9 cannot be performed, then this requirement shall also be met under extreme test conditions.

4.2.6.2 Limits

The power in the adjacent channels shall not exceed the reference limits defined in ETSI EN 300 220-1 [1], clause 5.11.2.

4.2.6.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.11.

Compliance shall be established under normal conditions and also under extreme conditions if the conformance tests for Tx Frequency Error (clause 4.2.9) are not carried out.

4.2.7 Occupied Bandwidth

4.2.7.1 Description and Applicability

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

If the frequency error measurements in clause 4.2.9 cannot be performed, then this requirement shall also be met under extreme test conditions.

4.2.7.2 Limits

The EUT shall comply with reference limits defined in ETSI EN 300 220-1 [1], clause 5.6.2.

4.2.7.3 Conformance

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

Compliance shall be established under normal conditions and also under extreme conditions if the conformance tests for Tx Frequency Error (clause 4.2.9) are not carried out.

4.2.8 Tx Out Of Band Emissions

4.2.8.1 Description and Applicability

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

This requirement applies for operation in bands where the maximum OCW given in annex B is greater than 25 kHz.

If the frequency error measurements in clause 4.2.9 cannot be performed, then this requirement shall also be met under extreme test conditions.

4.2.8.2 Limits

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

4.2.8.3 Conformance

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

Compliance shall be established under normal conditions and also under extreme conditions if the conformance tests for Tx Frequency Error (clause 4.2.9) are not carried out.

4.2.9 Transmitter Frequency Error

4.2.9.1 Description and Applicability

Frequency error is the difference, under normal and extreme conditions, between the measured unmodulated carrier frequency and the nominal operating frequency.

Frequency error is normally measured with an unmodulated carrier. If the equipment is not capable of producing an unmodulated carrier, then this requirement does not apply. Instead the adjacent channel power requirements (clause 4.2.6), the OBW and OoB requirements (clauses 4.2.7 and 4.2.8), as appropriate shall be met under extreme test conditions.

4.2.9.2 Limits

The frequency error shall not exceed:

- ±10 % of the OCW; or
- ±12 ppm of the nominal frequency.

4.2.9.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.7.2.

Compliance shall be established under normal and extreme conditions.

4.2.10 Transmitter Transient Power

4.2.10.1 Description

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

4.2.10.2 Limits

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

4.2.10.3 Conformance

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

Compliance shall be established under normal conditions.

4.2.11 Tx Behaviour under Low Voltage Conditions

4.2.11.1 Description and Applicability

This requirement applies only to transmitters in battery operated equipment.

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

4.2.11.2 Limits

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

4.2.11.3 Conformance

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

Compliance shall be established under normal conditions.

4.3 Technical requirements for all EUT

4.3.1 Applicability

The requirements in clause 4.3 apply to all EUT.

4.3.2 Spurious Emissions

4.3.2.1 Description

Spurious emissions are unwanted emissions in the spurious domain radiated by the equipment or its antenna.

For transmitters, the spurious domain is all frequencies apart from the channel on which the transmitter is intended to operate and its adjacent and alternate adjacent channels.

For receivers, the spurious domain is all frequencies.

4.3.2.2 Limits

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

4.3.2.3 Conformance

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

Compliance shall be established under normal conditions.

4.4 Receiver Parameters

4.4.1 Applicability

The requirements in clause 4.4 apply to all receiving equipment that is part of a MI.

4.4.2 Blocking

4.4.2.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.18.1 applies.

4.4.2.2 Limits

The EUT shall comply with the reference limits for Rx Category 2 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.

Compliance shall be established under normal conditions.

5 Technical Requirements for Uni-Directional Communication

5.1 Mode A Applicability and Conformance Requirements

Clause 5 applies to equipment in systems using uni-directional communication.

NOTE 1: This clause forms a technical solution known as Mode A.

For Mode A, equipment shall meet the requirements of clause 4, plus the additional requirements of clause 5.

NOTE 2: For some parameters, conformance with clause 5 will demonstrate conformance with clause 4.

5.2 Communication method

No additional requirements.

5.3 Transmitter Parameters

No additional requirements.

5.4 Receiver Parameters

5.4.1 Applicability

The requirements in clause 5.4 shall apply to all receiving equipment that is part of a MR.

5.4.2 Adjacent Channel Selectivity

5.4.2.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.15.1 applies.

5.4.2.2 Limits

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

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

Compliance shall be established under normal conditions.

5.4.3 Blocking

5.4.3.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.18.1 applies.

5.4.3.2 Limits

The EUT shall comply with the reference limits for Rx Category 1 in ETSI EN 300 220-1 [1], clause 5.18.5.

5.4.3.3 Conformance

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

Compliance shall be established under normal conditions.

5.4.4 Adjacent Channel Saturation

5.4.4.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.16.1 applies.

5.4.4.2 Limits

The EUT shall comply with the reference limits for Rx Category 1 in ETSI EN 300 220-1 [1], clause 5.16.2.

5.4.4.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.16.3.

Compliance shall be established under normal conditions.

5.4.5 Spurious Response Rejection

5.4.5.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.17.1 applies.

5.4.5.2 Limits

The EUT shall comply with the reference limits for Rx Category 1 in ETSI EN 300 220-1 [1], clause 5.17.2.

5.4.5.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.17.3.

Compliance shall be established under normal conditions.

5.4.6 Behaviour at high wanted signal level

5.4.6.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.19.1 applies.

5.4.6.2 Limits

The EUT shall comply with the reference limits for Rx Category 1 in ETSI EN 300 220-1 [1], clause 5.19.1.

5.4.6.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.19.3.

Compliance shall be established under normal conditions.

6 Bi-Directional Communication with Frequency Agility

6.1 Mode BN Applicability and Conformance Requirements

Clause 6 applies to equipment in systems using bi-directional communication on more than one frequency.

NOTE 1: This clause forms an alternative technical solution to Mode A known as Mode BN.

For Mode BN, equipment shall meet the requirements of clause 4, plus the additional requirements of clause 6.

NOTE 2: For some parameters, conformance with clause 6 will demonstrate conformance with clause 4.

For the purposes of this clause, the EUT will consist of two or more parts. The manufacturer shall identify one part as the Message Initiator (MI) and one part as the Message Responder (MR). If only one part is being tested the other part may be replaced by a simulator if necessary.

6.2 Bi-directional Communication and Frequency Agility

6.2.1 Applicability

The requirements of clause 6.2 apply to the MI and the MR when working in conjunction.

6.2.2 Acknowledgement

6.2.2.1 Description

An acknowledgement (ACK) is a short message sent in the return direction to signal that a forward going message has been received successfully.

6.2.2.2 Limits

The EUT shall be able to demonstrate an acknowledgment (ACK) of message transfer, with a latency of no more than 5 seconds.

6.2.2.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.22.2.

Compliance shall be established under normal conditions.

6.2.3 Ability to change communication frequency

6.2.3.1 Description

Frequency agility is the ability of the two parts of the system to co-ordinate a change of operating frequency.

6.2.3.2 Limits

The system shall demonstrate the ability to change frequency and maintain or re-establish communication within 5 seconds.

6.2.3.3 Conformance

The conformance tests for this requirement shall be as defined in clause 7.4.1.

6.3 Transmitter Parameters

No additional requirements.

6.4 Receiver Parameters

6.4.1 Applicability

The requirements of clause 6.4 apply to all receiving equipment that is part of a MR.

6.4.2 Adjacent Channel Selectivity

6.4.2.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.15.1 applies.

6.4.2.2 Limits

The adjacent channel selectivity shall be equal to or greater than the limit in table 3.

Table 3: Adjacent channel selectivity

Requirement	Limits
Minimum Adjacent Channel Selectivity (OCW $\leq$ 25 kHz)	$\geq$ -65 dBm
Minimum Adjacent Channel Selectivity (OCW > 25 kHz)	$\geq$ -59 dBm

6.4.2.3 Conformance

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

Compliance shall be established under normal conditions.

6.4.3 Blocking

6.4.3.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.18.1 applies.

6.4.3.2 Limits

The EUT shall comply with the reference limits for Rx Category 1.5 in ETSI EN 300 220-1 [1], clause 5.18.4.

6.4.3.3 Conformance

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

Compliance shall be established under normal conditions.

6.4.4 Adjacent Channel Saturation

6.4.4.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.16.1 applies.

6.4.4.2 Limits

The receiver saturation at the adjacent channel shall be equal or greater than limit given in table 4.

Table 4: Receiver saturation at adjacent channel

Requirement	Limits
Adjacent channel saturation (OCW $\leq$ 25 kHz)	$\geq$ -35 dBm
Adjacent channel saturation (OCW > 25 kHz)	$\geq$ -25 dBm

6.4.4.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.16.3.

Compliance shall be established under normal conditions.

6.4.5 Spurious Response Rejection

6.4.5.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.17.1 applies.

6.4.5.2 Limits

The spurious response rejection of the equipment shall be equal to or greater than the limit in table 5.

Table 5: **Spurious response rejection**

Requirement	Limits
Spurious response rejection (OCW $\leq$ 25 kHz)	$\geq$ -54 dBm
Spurious response rejection (OCW > 25 kHz)	$\geq$ -44 dBm
NOTE: For spurious response tests separated from the wanted signal by less than 0,1 % of the Operating Frequency, the limits are relaxed by 25 dB.	

6.4.5.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.17.3.

Compliance shall be established under normal conditions.

6.4.6 Behaviour at high wanted signal level

6.4.6.1 Description

The description in ETSI EN 300 220-1 [1], clause 5.19.1 applies.

6.4.6.2 Limits

The wanted performance criterion shall be met with a wanted signal at a level of -15 dBm.

6.4.6.3 Conformance

The conformance tests for this requirement shall be as defined in ETSI EN 300 220-1 [1], clause 5.19.3.

Compliance shall be established under normal conditions.

7 Testing for compliance with technical requirements

7.1 General

The provisions of ETSI EN 300 220-1 [1], clause 4, shall apply except as varied herein.

7.2 Presentation of equipment for testing purposes

The following information shall be stated by the manufacturer in order to assist carrying out the test suites and/or to declare compliance to technical requirements (e.g. technical requirements for which no conformance test is included in the present document).

Table 6: Declarations to be made by the Manufacturer

Parameter	Notes
Operating Frequency	One or more operating frequencies
Channel Width, OCW	For each operating frequency
Duty Cycle (operational)	An assessment of maximum DC in normal use
Disregard Time	Where required. Maximum duration of an inter-emission gap in a transmission
Normal operating voltage	
Minimum operating voltage	Applies to battery operated EUT
Mode A or BN operation	Whether compliance with Mode A or BN
Environmental Profile	
Test modes	Transmitter test signals the EUT is capable of
Antenna type and connection	Whether the EUT has a 50 Ohm antenna port or an integral or dedicated antenna
Antenna gain	Gain in dB, relative to a dipole, where the antenna is not provided as part of the EUT
Declaration of conformity of test sample	Where EUT is provided with a temporary antenna connection
Maximum Duty Cycle (testing)	The maximum permitted DC of the EUT when undergoing testing

7.3 Wanted performance criteria

7.3.1 Receiver response

For the purpose of the performance tests involving a receiver, the wanted performance criterion is that the receiver shall produce an appropriate output as indicated below:

- after demodulation, a data signal with a bit error ratio of 10^{-3} without correction; or
- after demodulation, a message acceptance ratio of 90 %;
- an appropriate false alarm rate or sensing criteria as declared by the manufacturer.

Where the indicated performance cannot be achieved, the performance criterion used to determine the performance of the receiver shall be declared and published by the manufacturer.

The receiver measurements should be conducted with any Forward Error Correction (FEC) or Automatic Repeat reQuest (ARQ) function disabled. If it is not practical to disable such error correction, a suitable note shall be made in the test report, together with any alternative test method used.

7.4 Radio test suites - Transceivers

7.4.1 Frequency Agility

7.4.1.1 Description

Frequency agility is the ability of the two parts of the system to co-ordinate a change of operating frequency.

7.4.1.2 Test Conditions

1) The measurements shall be performed under normal test conditions.
2) The measurements shall be performed on the highest and lowest frequencies declared by the manufacturer.
3) FEC, ARQ and similar facilities may be enabled.

7.4.1.3 Method of measurement

Guidance on methods of coupling the signal between the EUT and the test equipment is given in ETSI EN 300 220-1 [1], clause 4.3.9.

7.4.1.4 Measurement procedure

The Message Initiator (MI) and the Message Responder (MR) shall be configured so that a transmission from the MI reaches the MR at between 10 and 20 dB higher level than the sensitivity of the MR. The coupling mechanism shall be entirely passive so that the reciprocal path loss is the same.

NOTE: The sensitivity may be established by the procedure in ETSI EN 300 220-1 [1], clause 5.14.

The MI shall have a means of indicating reception of an ACK.

Step 1:

The MI shall be made to send a series of at least 10 messages to the MR at intervals specified by the manufacturer. For each message the reception of an ACK is required.

The operating frequency of the MI shall be noted.

Step 2:

An interfering unmodulated signal shall be introduced on the operating frequency that at the antenna or antenna connector of the MR is 10 dB higher in level than the signal from the MI.

Step 3:

The MI shall be made to send a message to the MR. An indication of an ACK shall be made within the specified time.

The operating frequency of the MI shall be checked and is required to be different from the original operating frequency.

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.10] 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 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 303 406				
Requirement			Requirement Conditionality	
No	Description	Reference: Clause No	U/C	Condition
1	Operating Frequency	4.2.2	U	
2	Tx Effective Radiated Power	4.2.3	U	
3	Tx Duty Cycle	4.2.4	C	Where specified in annex B
4	Tx Short term behaviour	4.2.5	C	Where specified in annex B
5	Tx Adjacent Channel Power	4.2.6	C	Where OCW $\leq$ 25 kHz
6	Tx Adjacent Channel Power at extreme test conditions	4.2.6	C	Where OCW $\leq$ 25 kHz and Frequency Error test (clause 4.2.9) not carried out
7	TxFrequency Error	4.2.9	C	For equipment capable of generating an unmodulated carrier
8	Tx Transient Power	4.2.10	U	
9	Tx Occupied Bandwidth	4.2.7	U	
10	Tx Occupied Bandwidth at extreme test conditions	4.2.7	C	Where Frequency Error test (clause 4.2.9) not carried out
11	Tx Out of Band emissions	4.2.8	C	Where OCW > 25 kHz
12	Tx Out of Band emissions at extreme test conditions	4.2.8	C	Where OCW > 25 kHz and Frequency Error test (clause 4.2.9) not carried out
13	Unwanted Emissions in the Spurious Domain	4.3.2	U	
14	Tx behaviour under Low Voltage Conditions	4.2.11	C	Applies to transmitters in battery operated equipment
15	Rx Adjacent Channel Selectivity	5.4.2	C	Applies to Mode A MR equipment
16	Rx Adjacent Channel Selectivity	6.4.2	C	Applies to Mode BN MR equipment
17	Rx Blocking	4.4.2	C	Applies to MI equipment
18	Rx Blocking	5.4.3	C	Applies to Mode A MR equipment
19	Rx Blocking	6.4.3	C	Applies to Mode BN MR equipment
20	Rx Adjacent Channel Saturation	5.4.4	C	Applies to Mode A MR equipment
21	Rx Adjacent Channel Saturation	6.4.4	C	Applies to Mode BN MR equipment
22	Rx Spurious Response Rejection	5.4.5	C	Applies to Mode A MR equipment
23	Rx Spurious Response Rejection	6.4.5	C	Applies to Mode BN MR equipment

Harmonised Standard ETSI EN 303 406				
Requirement			Requirement Conditionality	
No	Description	Reference: Clause No	U/C	Condition
24	Rx Behaviour at high wanted signal level	5.4.6	C	Applies to Mode A MR equipment
25	Rx Behaviour at high wanted signal level	6.4.6	C	Applies to Mode BN MR equipment
26	Acknowledgement	6.2.2	C	Applies to Mode BN equipment
27	Ability to change frequency	6.2.3	C	Applies to Mode BN equipment

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): Operating bands and technical parameters

Tables B.1 and B.2 list the operating bands available for equipment covered by the present document together with the relevant limits.

Table B.1 lists the bands according to EC Decision 2013/752/EU [i.3].

Table B.2 contains additional bands that are listed in CEPT/ERC/REC 70-03 [i.6] but are not harmonised. Bands in table B.2 may be available on a national basis.

Table B.1: SRD bands available for social alarms and limits

Band	Frequency Range	Maximum radiated power, e.r.p.	Occupied Channel Width	Duty Cycle	Other spectrum access requirements	Notes
E2	169,400 MHz to 169,475 MHz	500 mW	<=50 kHz	1 %		2, 3
E4	169,5875 MHz to 169,8125 MHz	10 mW	<=100 kHz	0,1 %		2
AL1	868,600 MHz to 868,700 MHz	10 mW	25 or 100 kHz	1 %		
AL3	869,250 MHz to 869,300 MHz	10 mW	25 kHz	0,1 %		
AL4	869,300 MHz to 869,400 MHz	10 mW	25 kHz	1 %		
AL5	869,650 MHz to 869,700 MHz	25 mW	25 kHz	10 %		
U1a	863,000 MHz to 865,000 MHz	25 mW	≤ 200 kHz	0,1 %		2, 4
U1b	865,000 MHz to 868,000 MHz	25 mW	≤ 200 kHz	0,1%		2
U1c	868,000 MHz to 868,600 MHz	25 mW	≤ 200 kHz	0,1 %		2
U1d	868,700 MHz to 869,200 MHz	25 mW	≤ 200 kHz	0,1 %		2
U1e	869,400 MHz to 869,650 MHz (note 1)	25 mW	≤ 200 kHz	0,1 %		2
U1f	869,700 MHz to 870,000 MHz	25 mW	≤ 200 kHz	0,1 %		2

NOTE 1: Excluding frequencies in bands AL1, AL3, AL4, and AL5 in table B.1 and 869,200 MHz to 869,250 MHz.
NOTE 2: These bands are also used by other SRD equipment types.
NOTE 3: This band is also used by other SRD equipment types at powers up to 500 mW e.r.p.
NOTE 4: This band is also used by other SRD equipment types at powers up to 2 W e.r.p.

Table B.2: Additional SRD bands available for social alarms and limits

Band	Frequency Range	Maximum radiated power, e.r.p.	Occupied Channel Width	Duty Cycle	Other spectrum access requirements	Notes
SH1	875,800 MHz to 876,000 MHz	25 mW	≤ 100 kHz		DCT1 (note 2)	1
SH2	915,000 MHz to 915,200 MHz	25 mW	≤ 100 kHz		DCT1 (note 2)	1
SH3	920,800 MHz to 921,000 MHz	25 mW	≤ 100 kHz		DCT1 (note 2)	1
U2a	870,000 MHz to 875,600 MHz	25 mW	≤ 200 kHz		DCT2 (note 2)	1, 3
U2b	875,600 MHz to 875,800 MHz	25 mW	≤ 200 kHz	1 % (note 2)		1, 3
U3b	915,200 MHz to 920,800 MHz	25 mW	≤ 200 kHz	1 %		1, 4

NOTE 1: These bands are also used by other SRD equipment types.
NOTE 2: For ER-GSM protection (873 MHz to 876 MHz, where applicable), the duty cycle is limited to ≤ 0,01 % and a maximum single transmitter on time of 5 ms/1 s.
NOTE 3: This band is also used by other SRD equipment types at powers up to 500 mW e.r.p.
NOTE 4: This band is also used by other SRD equipment types at powers up to 2 W e.r.p.

Annex C (informative): Selection of technical parameters

C.1 Introduction

ETSI EG 203 336 [i.1] 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.

C.2 Receiver sensitivity

Receiver sensitivity is not specified in the present document in order to allow manufacturers the freedom to tailor equipment to specific circumstances.

For instance, equipment covered by the present document may have to operate in the presence of elevated background electromagnetic noise or in proximity to other transmitters. In such circumstances, specifying a high level of sensitivity may be counterproductive to the aim of achieving reliable communications.

Manufacturers should be aware of the situations in which equipment is likely to be used. In particular, it should be noted that frequency bands covered in the present document may be adjacent to bands used by mobile telephones. Other equipment operating in adjacent bands may have out of band emissions falling into bands covered by the present document. In such cases there is a possibility of in-band interference that may affect operation.

C.3 Other receiver parameters

Because sensitivity is not specified, it follows that co-channel rejection is not specified.

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. The risk of failure due to third order intermodulation products is considered low when equipment is used in bands with low expected occupancy.

Manufacturers should assess the risk of intermodulation products when operating adjacent to high occupancy bands.

C.4 Transmitter short term behaviour

Spectrum access mechanisms are an essential requirement in shared spectrum.

Duty cycle limited random access has been studied by ECC, ETSI and other bodies. ECC Report 37 [i.7], ECC Report 181 [i.8] and a study by IMST [i.9] have all recommended the introduction of limits on maximum T_{on} and minimum T_{off}. ETSI TS 103 060 [i.4] provides the framework for applying these short term behaviour requirements in Harmonised Standards.

The present document applies these requirements in some but not all the frequencies covered.

The $T_{disregard}$ feature allows a nominal T_{on} period to be divided into a series of short transmissions. This enables a transaction or handshake between two or more devices to occur within a single T_{on} period. Thus shorter transactions are not discouraged or penalized.

C.5 Listen before talk

Listen before talk is a common spectrum sharing mechanism. It is important for high duty cycle use and/or in high occupancy spectrum. For the purposes of the present document it is considered optional for low duty cycle use in low occupancy spectrum, therefore no requirements have been specified.

Nevertheless, manufacturers are reminded that listen before talk is likely to bring benefits to the equipment using it as well as to other equipment and therefore its use is recommended.

Annex D (informative): Bibliography

- ETSI EN 301 489-3: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz".
- EN 50134-5: "Alarm systems - Social alarm systems - Part 5: Interconnections and communications".
- ANSI C63.5 (2006): "American National Standard for Calibration of Antennas Used for Radiated Emission Measurements in Electro Magnetic Interference".
- ITU-R Radio Regulations.
- ETSI TR 103 056: "Electromagnetic compatibility and Radio spectrum Matters (ERM); System Reference Document; Short Range Devices (SRD); Technical characteristics for SRD equipment for social alarm and alarm applications".
- ETSI TS 103 051 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Expanded measurement uncertainty for the measurement of radiated electromagnetic fields".
- ETSI TS 103 052 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".

History

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