Draft ETSI EN 303 940-1 V1.1.0 (2025-11)

HARMONISED EUROPEAN STANDARD

Short Range Devices (SRDs) using Ultra Wide Band technology (UWB); Harmonised standard for access to radio spectrum; Part 1: Indoor Millimeter Wave Security Scanners operating in the band 69,8 GHz to 80,5 GHz

Reference
DEN/ERM-TGUWB-609

Keywords
harmonised standard, measurement,
security, SRD, UWB,

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Contents

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI IPR online database.

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™**, **LTE™** and **5G™** logo are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM**® and the GSM logo are trademarks registered and owned by the GSM Association.

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 Standardisation Request deliverable Approval Procedure (SRdAP).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.9] 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.1].

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 1 of a multi-part deliverable covering Security Scanning devices based on Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised standard for access to radio spectrum; as identified below:

Part 1: "Indoor Millimeter Wave Security Scanners operating in the band 69,8 GHz to 80,5 GHz";

Part 2: "MicroWave Security Scanners operating < 12 GHz".

Proposed national transposition dates	
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

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 1 of a multi-part deliverable developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the Directive 2014/53/EU [i.1].

For the case of the present document, the following references are the basis:

- SRdoc ETSI TR 103 664 [i.11] (2020-04);
- ECC Report 344 [i.2];
- ERC Recommendation 70-03 [i.6], Annex 6.

1 Scope

The present document specifies technical requirements, limits and test methods for Millimeter Wave Security Scanners (mmWave SSC, SSC equipment) operating indoor in the band 69,8 GHz to 80,5 GHz.

The operating frequency range is split into two bands 97 from 69,8 GHz to 79,9 GHz and 99 from 76,5 GHz to 80,5 GHz as defined in Decision (EU) 2025/105 [i.8].

Details on mmWave SSC equipment and the related categorization is further specified in clause 4.2.

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given in annex A.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) 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 in the ETSI docbox.

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 303 883-1 (V2.1.1) (08-2024): "Short Range Devices (SRD) and Ultra Wide Band (UWB); Part 1: Measurement techniques for transmitter requirements".

[2] ETSI EN 303 883-2 (V2.1.1) (08-2024): "Short Range Devices (SRD) and Ultra Wide Band (UWB); Part 2: Measurement techniques for receiver requirements".

[3] ETSI TS 103 941 (V1.1.1) (01-2024): "Short Range Devices (SRD) and Ultra Wide Band (UWB); Measurement setups and specifications for testing under full environmental profile (normal and extreme environmental conditions)".

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 may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

[i.1] 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 (RE-Directive).

[i.2] ECC Report 344: "Sharing and compatibility studies of Security Scanners (SSCs) within frequency range 60-82 GHz" (published on 07-10-2022).

[i.3] CEPT ERC Recommendation 74-01 (May 2022): "Unwanted emissions in the spurious domain".

[i.4] ETSI EG 203 336 (V1.2.1) (2020-05): "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] ETSI TS 103 567 (V1.1.1) (09-2019): "Requirements on signal interferer handling".

[i.6] ERC/REC 70-03 (8 March 2024): "ERC Recommendation of 1997 on relating to the use of Short Range Devices (SRD)".

[i.7] ETSI TS 103 361 (V1.1.1) (03-2016): "Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Receiver technical requirements, parameters and measurement procedures to fulfil the requirements of the Directive 2014/53/EU".

[i.8] Commission implementing Decision (EU) 2025/105 of 22 January 2025 amending Decision 2006/771/EC updating harmonised technical conditions in the area of radio spectrum use for short-range devices and repealing Implementing Decision 2014/641/EU on harmonised technical conditions of radio spectrum use by wireless audio programme making and special events equipment in the Union (notified under document C(2025) 192).

[i.9] 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.10] EN 50131-2-3:2021: "Alarm systems – Intrusion and hold-up systems – Part 2-3: Requirements for microwave detectors", produced by CENELEC.

[i.11] ETSI TR 103 664 (V1.1.1) (04-2020): "System Reference document (SRdoc); Security Scanners (SSc) within the frequency range from 60 GHz to 90 GHz".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 303 883-1 [1] and ETSI EN 303 883-2 [2].

3.2 Symbols

For the purposes of the present document, the following symbol applies:

P_d Detection Performance

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 303 883-1 [1] and ETSI EN 303 883-2 [2] and the following apply:

CF Correction Factor
mmW Millimeter Wave
SSC Security Scanner

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 in accordance with its intended use. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the operational environmental profile defined by its intended use.

4.2 Equipment Categories

4.2.1 General

Technical and regulatory requirements for Security Scanners are provided in general in European Commission Implementing Decision (EU) [i.8] and in annex 6 of ERC Recommendation 70-03 [i.6] which are based on ECC Report 344 [i.2] resulting in European Commission Implementing Decision (EU) 2025/105 [i.8] implementing Security Scanners.

All SSC equipment covered by the present document are operating with a continuous frequency modulated signal.

Table 1 shows an excerpt from Decision (EU) 2025/105 [i.8].

Table 1: Technical requirements for SSC equipment

Band Number (note 2)	Frequency Band	Power / Magnetic Field	Spectrum access and mitigation requirements	Modulation /occupied bandwidth	Notes
97	69,8 GHz to 79,9 GHz	7 dBm peak e.i.r.p.	No requirement	Not specified	For security scanners operated indoors
99	76,5 GHz to 80,5 GHz	19 dBm peak e.i.r.p. (note 1)	No requirement	Not specified	For security scanners operated indoors
NOTE 1: At least 23 dB out-of-band attenuation, relative to the maximum allowed peak e.i.r.p., is required. NOTE 2: Limits in the table are an excerpt from Decision (EU) 2025/105 [i.8].					

4.2.2 Categorization by output power

The following categorization of SSC equipment by the output power is used according to Table 1 and frequency bands 97 and 99 of Decision (EU) 2025/105 [i.8]:

Table 2: Categorization of equipment

Category	Frequency band	Radiated Power
SSC 1	69,8 GHz to 79,9 GHz (band 97)	7 dBm peak e.i.r.p.
SSC 2	76,5 GHz to 80,5 GHz (band 99)	19 dBm peak e.i.r.p.

4.3 Transmitter Requirements

4.3.1 General

The transmitter requirements for SSC equipment covered by the scope of the present document are justified in Table B.1.

4.3.2 Operating Frequency Range (OFR)

4.3.2.1 Applicability

This requirement shall apply to all SSC equipment as specified in clause 4.2.2.

4.3.2.2 Description and general requirements

The operating frequency range is described in clause 5.2.1 of ETSI EN 303 883-1 [1]. Based on the definition in clause 5.2.1, the applicable value for the parameter X shall be taken from Table 3.

Table 3: Parameter X

Equipment Category	X [dB] (note)
SSC 1	**23**
SSC 2	**23**
NOTE: According to ECC Report 344 [i.2].	

4.3.2.3 Limits

The OFR (all frequencies between f_L and f_H) shall be within the permitted frequency range as defined in Table 4. In addition, the operating frequency range for SSC 1 and SSC 2 shall fulfil the OFR requirement as specified in Table 4.

Table 4: Permitted frequency range and OFR requirement for SSC equipment

Equipment Category	Frequency range	OFR
SSC 1	69,8 GHz to 79,9 GHz	10 GHz
SSC 2	76,5 GHz to 80,5 GHz	1,5 GHz
NOTE: According to Decision (EU) 2025/105 [i.8].		

4.3.2.4 Conformance

The conformance test for the OFR shall be as defined in clause 5.4.1 and shall be done under normal conditions as defined in clause 5.1.

4.3.3 Peak e.i.r.p.

4.3.3.1 Applicability

This requirement shall apply to SSC 1 and SSC 2 as specified in clause 4.2.2.

4.3.3.2 Description

The peak e.i.r.p. is described in clause 5.3.3.1 of ETSI EN 303 883-1 [1].

4.3.3.3 Limits

Within the OFR the peak e.i.r.p. shall not exceed the limits in Table 5.

Table 5: Peak e.i.r.p. limits

Frequency range which contains the OFR of the SSC equipment	Maximum peak e.i.r.p. (P_{max})
69,8 GHz to 79,9 GHz	7 dBm
76,5 GHz to 80,5 GHz	19 dBm
NOTE: According to Decision (EU) 2025/105 [i.8].	

4.3.3.4 Conformance

The conformance test for peak e.i.r.p. shall be as defined in clause 5.4.2 and shall be done under normal conditions as defined in clause 5.1.

4.3.4 Transmitter Unwanted Emissions (TXUE)

4.3.4.1 Applicability

The TX Unwanted Emissions (TXUE) requirement applies to all SSC sub-categories (defined in clause 4.2.2).

4.3.4.2 Description

For the description of the TX unwanted emissions, see ETSI EN 303 883-1 [1] clause 5.5.1. As required in ETSI EN 303 883-1 [1], clause 5.5.1, the limit for the parameter X_{TXUE} for all SSC equipment is specified to X_{TXUE} = 250 %.

X_{TXUE}: 250 %

4.3.4.3 Limits

The frequency ranges and limit tables for spurious emissions and Out-Of-Band (OOB) emissions are provided in Figure 1 and Tables 6 to 8, with $f_{LS} = f_c - X_{TXUE}$ x OFR and $f_{HS} = f_c + X_{TXUE}$ x OFR.

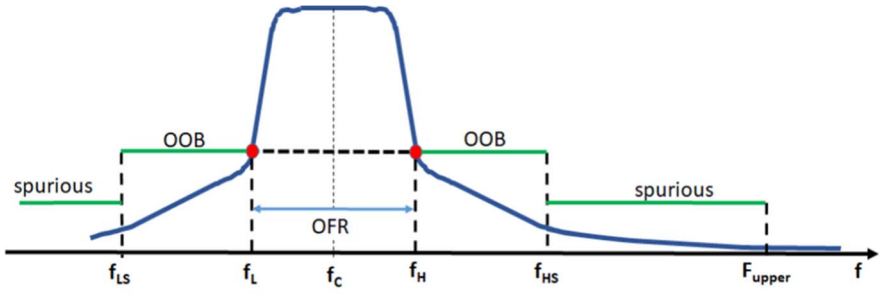

Figure 1: Overview of limits for OOB and spurious domain

For unwanted emissions in the OOB-domain the limits in Table 6 and Table 7 apply.

Table 6: Limits for OOB domain for SSC 1

Frequency range	Limits OOB domain
$f_{LS} < f <= f_L$	$7\ dBm - 20\ dB = -13\ dBm$ peak e.i.r.p
$f_{HS} > f => f_H$	$7\ dBm - 20\ dB = -13\ dBm$ peak e.i.r.p
NOTE: According to ERC Recommendation 70-03 [i.6], annex 6 and ECC Report 344 [i.2].	

Table 7: Limits for OOB domain for SSC 2

Frequency range	Limits OOB domain
$f_{LS} < f <= f_L$	$19\ dBm - 23\ dB = -4\ dBm$ peak e.i.r.p
$f_{HS} > f => f_H$	$19\ dBm - 23\ dB = -4\ dBm$ peak e.i.r.p
NOTE: According to ERC Recommendation 70-03 [i.6], annex 6 and ECC Report 344 [i.2].	

For the unwanted emission limits in the spurious domain Table 8 applies.

Table 8: Transmitter unwanted emissions limits for SSC devices in the spurious domain

SSC category	Frequency range	Limit values for TXUE/RB (see note 1)
SSC1, SSC2	87,5 MHz ≤ f ≤ 118 MHz	-54 dBm / 100 kHz
	174 MHz ≤ f ≤ 230 MHz	-54 dBm / 100 kHz
	470 MHz ≤ f ≤ 694 MHz	-54 dBm / 100 kHz
	otherwise in band 30 MHz ≤ f ≤ 1 000 MHz	-36 dBm / 100 kHz
	1 000 MHz < f ≤ F_{UPPER} (see Table 9)	-30 dBm / 1 MHz
NOTE 1: Only applicable in the spurious domain (see clause 4.3.4.2). NOTE 2: According to ERC/REC 74-01 [i.3] (see note 1, and clause 2 of ERC/REC 74-01 [i.3].		

For the upper frequency F_{upper} Table 9 applies.

Table 9: Upper frequency boundary for the spurious domain based on the SSC equipment Operating Frequency Range (OFR)

SSC category	Frequency range which contains the OFR of the SSC equipment (defined by f_L and f_H) (see note)	Upper frequency (F_{UPPER})
SSC1, SSC2	13 GHz ≤ f < 150 GHz	161 GHz
NOTE: According to ERC/REC 74-01 [i.3].		

4.3.4.4 Conformance

The conformance test for Transmitter Unwanted Emissions (TXUE) shall be as defined in clause 5.4.3 and shall be done under normal conditions as defined in clause 5.1.

4.4 Receiver Requirements

4.4.1 General

The following receiver requirements apply for all SSC equipment as specified in clause 4.2.2:

- Receiver Baseline Sensitivity (RBS), see clause 4.4.3;
- Receiver Baseline Resilience (RBR), see clause 4.4.4.

Justification for the receiver requirements for SSC equipment in the scope covered by the present document is provided in annex B. According to ETSI EN 303 883-2 [2], clause 5.2, the Receiver Spurious Emissions are not in the present document as these are only applicable for receive only SSC equipment (TX not present) or for SSC equipment which have a receive only mode (TX is present but inactive).

4.4.2 Wanted Technical Performance Criteria (WTPC)

The wanted technical performance criterion for Receiver Baseline Sensitivity (RBS) is defined as the detection probability of a specified test object during a defined period of time.

The wanted performance criterion for Receiver Baseline Resilience (RBR) is defined as the detection probability of a specified test object over a defined period of time covering a minimum of 10 measurement cycles under the influence of an interfering signal.

Table 10: Wanted Technical Performance Criteria

Value	Limit
Detection probability	≥ 90 %

4.4.3 Receiver Baseline Sensitivity (RBS)

4.4.3.1 Applicability

This requirement shall apply to all SSC equipment as specified in clause 4.2.2.

4.4.3.2 Description

Receiver baseline sensitivity is the capability of the SSC equipment to detect a wanted object at application related defined input signal levels while maintaining a minimum level of performance.

This quality of the SSC equipment enables the transmitter power to be used efficiently for a particular detection capability and thus demonstrates the efficient use of radio spectrum.

4.4.3.3 Limits

The test object shall be detected in the test scenario (both specified in Table 11) while fulfilling the wanted technical performance criterion from clause 4.4.2.

Table 11: RBS requirements

Categorization of SSC equipment	Test object	Test scenario
SSC 1	Plastic granulate type 1 (clause C.1.1)	Clause C.2
SSC 2	Metal disk (clause C.1.2) in 7,5 m distance	Clause C.3

4.4.3.4 Conformance

The conformance test for Receiver Baseline Sensitivity (RBS) shall be as defined in clause 5.5.2 and shall be done under normal conditions as defined in clause 5.1.

4.4.4 Receiver Baseline Resilience (RBR)

4.4.4.1 Applicability

This requirement shall apply to all SSC equipment as specified in clause 4.2.2.

4.4.4.2 Description

Receiver Baseline Resilience (RBR) is the capability of the SSC equipment to maintain a minimum level of performance in the presence of interfering signals in the Operating Frequency Range (OFR), in adjacent bands and in remote frequency bands.

This quality of the SSC equipment ensures a proper operation in an environment where other spectrum users are present and demonstrates the efficient use of radio spectrum by way of an increased resilience against interference.

4.4.4.3 Limits

The test object shall be detected in the test scenario (both specified in Table 12) in presence of the interfering signals from clause C.4.1 while fulfilling the wanted technical performance criterion from clause 4.4.2.

Table 12: RBR requirements

Categorization of SSC equipment	Test object	Test scenario
SSC 1	Plastic granulate type 2 (clause C.1.1)	Clause C.2
SSC 2	Metal disk (clause C.1.2) in 5,25 m distance	Clause C.3

4.4.4.4 Conformance

The conformance test for receiver baseline sensitivity shall be as defined in clause 5.5.3 and shall be done under normal conditions as defined in clause 5.1.

5 Testing for compliance with technical requirements

5.1 Environmental conditions for testing

5.1.1 General

Tests defined in the present document shall be carried out at representative temperature points within the boundary limits of the operational environmental profile defined by its intended use, which, as a minimum, shall be that specified in the test conditions contained in the present document.

Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions as specified in the present document to give confidence of compliance for the affected technical requirements.

5.1.2 Normal test conditions

SSC 1 and SSC 2 are allowed to operate indoor only. Normal test conditions shall therefore be applied as they consider representative temperature points. Normal test conditions follow the common understanding in ETSI as defined in ETSI TS 103 941 [3], clause 4.5.3.1.

5.1.3 Complete environmental profile test conditions

The complete environmental profile test conditions include both the normal and extreme test conditions. Normal test conditions shall be as defined in ETSI TS 103 941 [3], clause 4.5.3.1. Extreme test conditions follow the common understanding in ETSI as defined in ETSI TS 103 941 [3], clause 4.5.3.2. The devices SSC 1 and SSC 2 are allowed to operate indoors only where the environmental conditions are typically within specified temperature ranges that comply with "normal test conditions" and the extreme test conditions are in the range of the "normal test conditions".

The normal test conditions comply with the intended use of the equipment.

The usage of SSC equipment is indoor. No negative temperatures or great variations in temperature are expected in air conditioned controlled indoor environments where these devices operate.

In addition, test sides for commercial equipment can test great different temperature ranges for smaller, handheld like devices like smartphones or radios for dedicated frequency ranges. Heating up big FAR to cover SSCs equipment which are heavy and are large devices is not possible, see ETSI TS 103 941 (V1.1.1) [3].

t_{low}: +20 °C

t_{high}: +25 °C

t_{steps}: 5 °C

supply voltage: 90 % and 110 % of its nominal value

NOTE: The nominal supply voltage is provided in the SSC equipment user manual.

5.2 General conditions

5.2.1 General conditions for testing

General guidance for TX and RX testing requirements are given respectively in ETSI EN 303 883-1 [1], clause 5.1.1 for the TX requirements and ETSI EN 303 883-2 [2], clause 5.1 for the RX requirements.

ETSI EN 303 883-1 [1], annex A provides complementary information on general conditions for testing, e.g. test environment and test conditions, see ETSI EN 303 883-1 [1], clause A.1 for an overview. For measurement uncertainty, ETSI EN 303 883-1 [1], clause A.8, shall be considered.

ETSI EN 303 883-1 [1], annex B provides complementary information on test setups for testing, e.g. radiated and conducted measurements. An overview for radiated measurements is provided in ETSI EN 303 883-1 [1], clause B.2.1.

5.2.2 Disregard time T_{dis} and threshold level P_{thres}

For signal timing parameter guidance is given in ETSI EN 303 883-1 [1], annex C. The disregard time T_{dis} and the threshold level P_{thres} are addressed as follows:

The threshold level P_{Thresh} shall be set to 10 dB below the measured peak e.i.r.p value given in clause 5.4.2.

T_{dis} depends on the categorization of SSC equipment and is defined in Table 13.

Table 13: T_{dis} values

Categorization of SSC equipment	T_{dis}
SSC 1	100 ms
SSC 2	89,6 ms

5.3 Conformance test and conformance test suites

ETSI EN 303 883-1 [1], annex B provides additional information on test setups for radiated and conducted measurements.

The conformance tests described in clause 5.4 for the transmitter and clause 5.5 for the receiver shall be done on a test site according to ETSI EN 303 883-1 [1], clause B.2.2.2 under the conditions and measurement distances according to description present in figure 2 and figure 3.

Radiated emission measurements, unless otherwise specified, shall in addition use the test method adapted from ETSI EN 303 883-1 [1], clause B.2.5. The measurement procedure with the measurement positions and antenna is described below.

Measured power levels are very low. As a test antenna, a waveguide horn antenna suitable for the frequency range with a gain of 24 dBi (or more) shall be used.

For SSC 1 and SSC 2 ETSI EN 303 883-1 [1], clause B.2.2.5 for the test antenna mounting and height range shall be used as a basis.

For SSC 1 the ETSI EN 303 883-1 [1], clause B.2.2.5 is adapted as follows and shall be used:

- The antenna height steps shall be equal to 1 m at the antenna mast where the antenna should move in height from 1 m to maximum 4 m in 1 m steps with the antenna pointing to the virtual centre of the SSC. The azimuth steps of the turntable should be equal to 15°.

Figure 2 shows the measurement setup dedicated for SSC 1 that shall be used. Figure 3 shows the measurement setup dedicated for SSC 2 that shall be used.

The reference point is a representative position at the SSC. This point is as specified in the intended use of the SSC equipment.

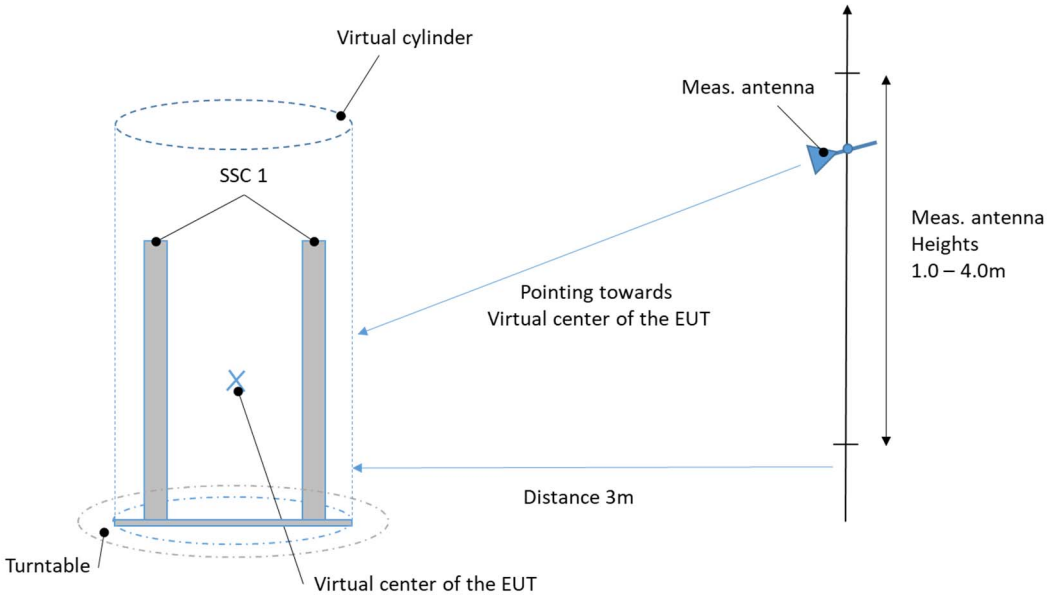

Figure 2: Basic measurement set-up with mast antenna for SSC 1

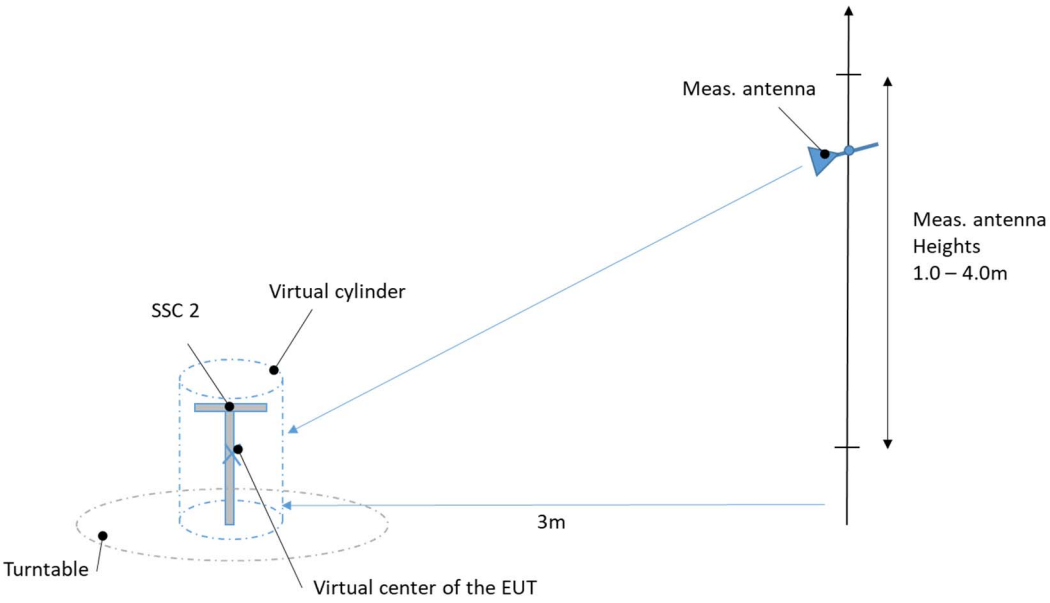

Figure 3: Basic measurement set-up with mast antenna for SSC 2

5.4 Conformance test methods of measurement for transmitter

5.4.1 Operating Frequency Range (OFR)

The OFR conformance test shall use the procedure described in ETSI EN 303 883-1 [1] clause 5.2.2 using the peak e.i.r.p. measurement as defined in clause 5.4.2 in the present document.

5.4.2 Peak e.i.r.p.

The peak e.i.r.p. conformance test shall use the procedure described in ETSI EN 303 883-1 [1], clause 5.3.3.3. The RBW is specified as 50 MHz.

NOTE: For the assessment of the measurement time clause D.1 can be considered.

5.4.3 Transmitter Unwanted Emissions (TXUE)

Step 1: A fast pre-scan using a peak detector is conducted in order to determine the spatial direction and the frequencies where SSC equipment produces emissions above the limit. This shall be done with the procedure in ETSI EN 303 883-1 [1], clause 5.5.3.1.2 and the test setup in ETSI EN 303 883-1 [1], clause B.2.5.

The procedure in ETSI EN 303 883-1 [1], clause 5.5.3.1.2 is also applied for the out of band domain and thus the following spectrum analyser settings shall be used:

For measurement below the OFR:

Start frequency: F_{LOWER}

Stop frequency: f_L

For measurement above the OFR:

Start frequency: f_H

Stop frequency: F_{UPPER}

NOTE 1: There can be a need to split the measurement into different frequency ranges depending on the measurement setup (e.g. due to external mixers, bandwidth of antennas and waveguides, RBW).

The RBW should be 50 MHz. The Correction Factor (CF) of 16,98 dB according to CF = 10 x log (50 MHz / 1 MHz) has to be considered. The measurement value shall be corrected according to equation (1).

$$\text{Measurement\_value}\ (RBW_{1\ MHz}) = \text{Measurement\_value}\ (RBW_{50\ MHz}) - 10 \times \log(50\ MHz / 1\ MHz) \quad (1)$$

Step 2: The identified frequencies and spatial directions from step 1 are then measured using a RMS detector according to ETSI EN 303 883-1 [1], clause 5.5.3.1.3.

To assess the burst duration, see ETSI EN 303 883-1 [1], clause 5.11.2.3.

The RBW shall be 50 MHz. The correction factor of 16,98 dB according to CF = 10 x log (50 MHz / 1 MHz) has to be considered. The measurement value should be corrected according to equation (2).

$$\text{Measurement\_value}\ (RBW_{1\ MHz}) = \text{Measurement\_value}\ (RBW_{50\ MHz}) - 10 \times \log(50\ MHz / 1\ MHz) \quad (2)$$

NOTE 2: For the assessment of the measurement time clause D.1 can be considered.

5.5 Conformance test methods of measurements for receiver

5.5.1 General

ETSI EN 303 883-2 [2], clause 5.1 gives general guidance on RX measurements applicable to all SSC.

5.5.2 Receiver Baseline Sensitivity (RBS)

The test procedure for receiver baseline sensitivity shall be conducted as follows:

1) Test object and test scenario shall be in accordance with Table 11.

2) The scan shall be initiated.

3) The scan result is evaluated. The SSC equipment shall indicate whether the test object is detected.

4) The result shall be counted and the scan repeated at least 10 times.

5) The detection performance P_d shall be calculated according to equation (3)

$$P_d = \frac{number\ of\ scans\ pass}{number\ of\ all\ scans} \text{ x } 100\ \% \quad (3)$$

The test is passed if the technical wanted performance criteria and the RBS limits are met, which are provided in clause 4.4.3.3.

5.5.3 Receiver Baseline Resilience (RBR)

For the RBR test, there are two signals which have to be provided to the SSC simultaneously:

1) The echo signal of the test object in the given test scenario (see Table 12) which will be represented as a "detection" in the SSC.

2) The appropriate interfering signals (see clause C.4).

The test setup for SSC 1 is depicted in Figure 4. The test antenna of the interferer points into the virtual centre of the SSC. The distance of the interferer test antenna is calculated such that the interference level as described in Table C.2 is met. The distance of the interferer test antenna shall be outside of the virtual cylinder, not interfere with the SSC 1 operation and meet far field conditions according to ETSI EN 303 883-1 [1], clause B.2.3.5 and the SSC shall be in the 3 dB half power beamwidth of the test antenna.

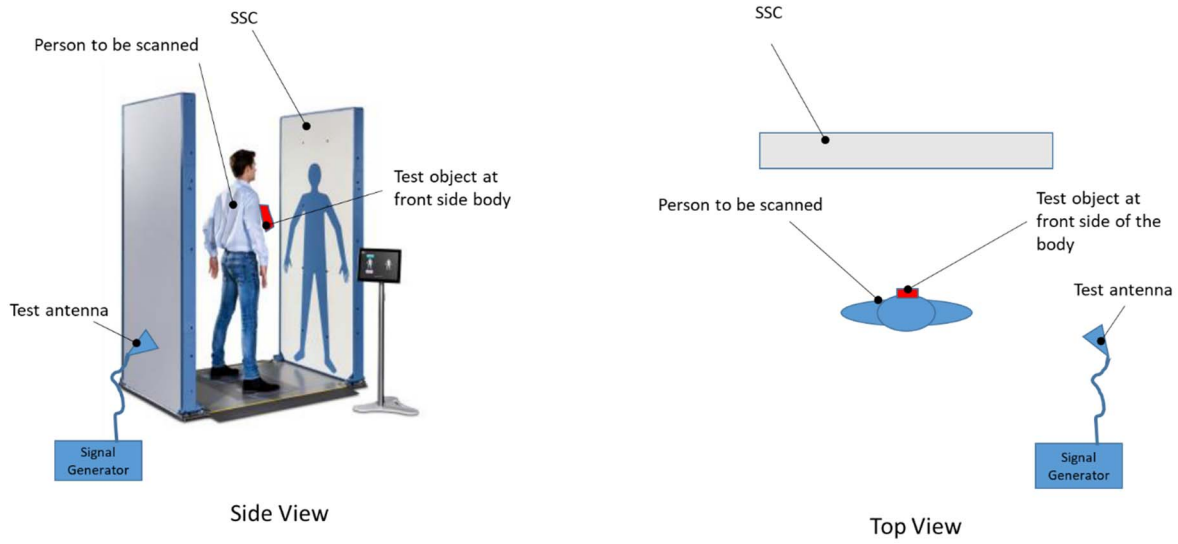

Figure 4: Test setup for RBR test for SSC 1

The test setup for SSC2 is shown in Figure 5.

The test antenna should be placed 15° with respect to virtual centre of the SSC 2.

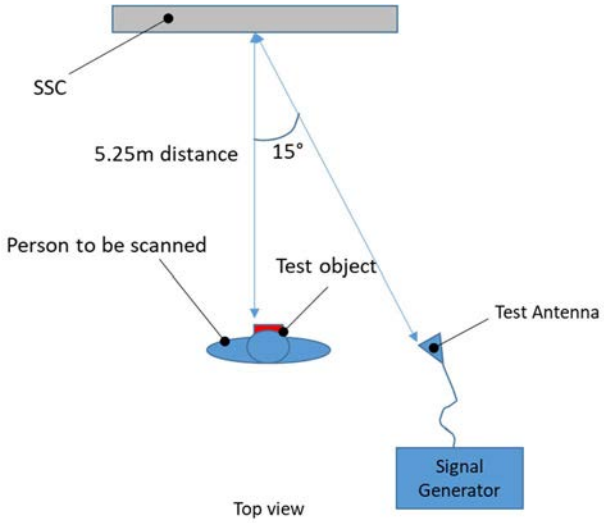

Figure 5: Test setup for RBR test for SSC 2

It is necessary to place both, the test antenna and the radar target within the Half Power Beamwidth (HPBW) of the scanning volume of the SSC antenna. It shall be ensured that the test antenna is outside the scanning volume of the SSC as the SSC would otherwise also detect the test antenna.

The test procedure for receiver baseline resilience shall be conducted as follows:

1) Test object and test scenario shall be in accordance with Table 12:

   a) For SSC 1 the position and the test object will be kept the same as in the RBS test, but the size of the test object is increased as defined in clause C.2.

   b) For SSC 2 the test object will be kept as in the RBS test, but the distance of the test object shall be 70 % of RBS distance of 7,5 m which is 5,25 m.

2) The signal generator is switched on with the power level, frequency and signal type as specified in clause C.4.1.

3) The scan shall be initiated.

4) The scan result is evaluated. The SSC equipment shall indicate whether a test object is detected.

5) The result shall be counted and the scan repeated.

6) The detection performance shall be calculated according to equation (4):

$$P_d = \frac{number\ of\ scans\ pass}{number\ of\ all\ scans} \text{ x } 100\ \% \quad (4)$$

The test is passed if the technical wanted performance criteria and the RBS limits are met, which are provided in clause 4.4.4.3.

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.9] 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.1].

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 303 940-1					
Requirement				Requirement Conditionality	
No	Description	Essential requirements of Directive	Clause(s) of the present document	U/C	Condition
1	Operating Frequency Range (OFR)	3.2	4.3.2	U	
2	Peak e.i.r.p.	3.2	4.3.3	U	
3	TX Unwanted Emissions (TXUE)	3.2	4.3.4	U	
4	Receiver Baseline Sensitivity (RBS)	3.2	4.4.3	U	
5	Receiver Baseline Resilience (RBR)	3.2	4.4.4	U	

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

Annex B (informative): Selection of technical parameters

ETSI EG 203 336 [i.4] clause 5 lists the technical parameters applicable to transmitters and receivers that should be considered when producing Harmonised Standards and that are intended to cover the essential requirements in article 3.2 of Directive 2014/53/EU [i.1]. 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. Table B.1 contains the parameters listed in ETSI EG 203 336 [i.4] clause 5 for transmitter and receiver, and cross references these to the clauses within the present document in which the requirements for measurement of such parameters are satisfied or justified.

Table B.1: Cross reference of clauses in the present document to technical parameters for transmitter and receiver listed in ETSI EG 203 336 [i.4]

ETSI EG 203 336 [i.4]		Present document		Justification
Clause	**Parameter**	**Clause**	**Parameter**	
5.2.2	Transmitter power limits	-	Mean e.i.r.p.	Not applicable, According to Decision (EU) 2025/105 [i.8] there is no regulation of mean e.i.r.p which justifies no applicability.
5.2.2	Transmitter power limits	4.3.3	Peak e.i.r.p.	Applicable
5.2.3	Transmitter power accuracy	-		
5.2.4	Transmitter spectrum mask	-	Antenna requirements, i.e. HPBW and sidelobe suppression	Not applicable, According to Decision (EU) 2025/105 [i.8] there is no regulation of a spectrum mask and therefore not applicability.
5.2.5	Transmitter frequency stability	-	-	See note 1
5.2.6	Transmitter intermodulation attenuation	-	-	Not applicable, This requirement is applicable for high power communication systems only and not for low power SSC equipment. According to Decision (EU) 2025/105 [i.8] there is no applicability.
5.2.7.2	Transmitter unwanted emissions in the out of band domain	4.3.4	TX Unwanted emissions	
5.2.7.3	Transmitter unwanted emissions in the spurious domain	4.3.4	TX Unwanted emissions	
5.2.8	Transmitter time domain characteristics	-	-	Not applicable, According to Decision (EU) 2025/105 [i.8] there is no regulation of time domain characteristics like duty cycle or else and therefore it is not applicable.
5.2.9	Transmitter transients	-	-	Not applicable
5.3.2	Receiver sensitivity	4.4.3	-	Covered by RBS See justification in ETSI EN 303 883-2 [2], annex D
5.3.2.3	Desensitization	-	-	
5.3.3	Receiver co-channel rejection	-	-	
5.3.4.2.1	Receiver adjacent channel selectivity	-	-	
5.3.4.2.2	Receiver adjacent band selectivity	-	-	
5.3.4.3	Receiver blocking	-	-	
5.3.4.4	Receiver spurious response rejection	-	-	
5.3.4.5	Receiver radio-frequency intermodulation	-	-	
5.3.5	Receiver unwanted emissions in the spurious domain	-	-	See note 2

ETSI EG 203 336 [i.4]		Present document		Justification
Clause	**Parameter**	**Clause**	**Parameter**	
5.3.6.1	Receiver dynamic range	-	-	Covered by RBS See justification in ETSI EN 303 883-2 [2], annex D
5.3.6.2	Reciprocal mixing	-	-	Covered by RBR See justification in ETSI EN 303 883-2 [2], annex D
5.3.1	Signal interferer handling	4.4.3 4.4.4	Receiver baseline sensitivity (RBS) Receiver baseline resilience (RBR)	Signal interferer handling (ETSI EG 203 336 [i.4], clause 5.3.1) is an alternative method for specifying receiver parameters intended for receivers such as UWB and certain types of radar equipment. The present document is following this concept, see ETSI TS 103 567 [i.5] and ETSI EN 303 883-2 [2].
NOTE 1: Not applicable for UWB/wideband devices based on the nature of operation. NOTE 2: Only if the SSC equipment covered by the EN has a receive-only mode or is a receive-only device.				

Annex C (normative): Receiver tests

C.1 Test objects

C.1.1 Plastic granulate

Table C.1: Test objects for SSC1

Description	Plastic granulate type 1 for RBS tests (note)	Plastic granulate type 2 for RBR tests (note)
Length, width and height (LxWxH) of the cuboid-shaped object	150 mm x 110 mm x 30 mm with tolerances for all individual dimensions of ±5 mm.	150 mm x 220 mm x 60 mm with tolerances for all individual dimensions of ±5 mm.
Properties of plastic granulate	Plastic, grain volume 25 % filled of the total volume The grain is not smaller than 2 mm in any dimension and not larger than 5 mm in any dimension. Permittivity in the range 2 < Epsilon_r < 3 (almost all plastics are in this range)	
Properties of the sealed plastic film	Thickness of < 0,25 mm permittivity in the range 2 < Epsilon_r < 3 (almost all plastics are in this range)	
NOTE: Cuboid-shaped object constructed from plastic granulate sealed in plastic film.		

C.1.2 Metal disk

A round metal disk out of stainless steel shall be used. The disk diameter shall be 10 cm and have a thickness of 2 mm.

C.1.3 Test person ("real" human)

SSCs intended use is scanning humans with average tallness, average weight and their ranges which occurs typically and hold for many persons. Therefore, the test person has to reflect this and appear "average".

The "test person" has to have the physical dimensions of 1,60 m to 1,85 m in height, and a weight of 70 kg ± 10 kg (in accordance with the standard walking target from EN 50131-2-3 [i.10]).

The "test person" shall wear close-fitting light indoor clothing without outerwear as jackets during the test.

Any kind of metallic objects worn or carried by the "test person" except the "test object" shall be avoided or incorrect microwave reflection will adulterate the measurement results.

C.2 Scenario for SSC1

The scenario specified below shall be tested and the detection rate of the test object specified in clause C.1.1. measured. Figure C.1 shows the test setup. The test person shall be a "real" human as defined in clause C.1.3.

The plastic granulate specified in clause C.1.1 is placed with non-metallic fixing tape on the front side of the body in the height at the middle of the stomach of the test person as shown in Figure C.1.

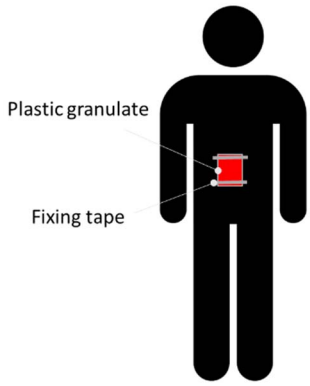

Figure C.1: Test setup with plastic granulate on front side of the body of the test person

The test person stands in the detection area of the security scanner in the dedicated detection pose. The scanning process is initiated. The output of the security scanner is observed and checked if the object has been detected. The number of test results (pass/fail) is counted and the probability of detection is calculated.

C.3 Scenario for SSC2

Figure C.2 shows the test setup. The test person shall be a "real" human as defined in clause C.1.3.

The test metal disk specified in clause C.1.2 is placed with non-metallic fixing tape on the front side of the body in the height of the middle of the stomach of the test person, see Figure C.2. The test metal disk should face the SSC virtual centre in the direction of yaw and pitch.

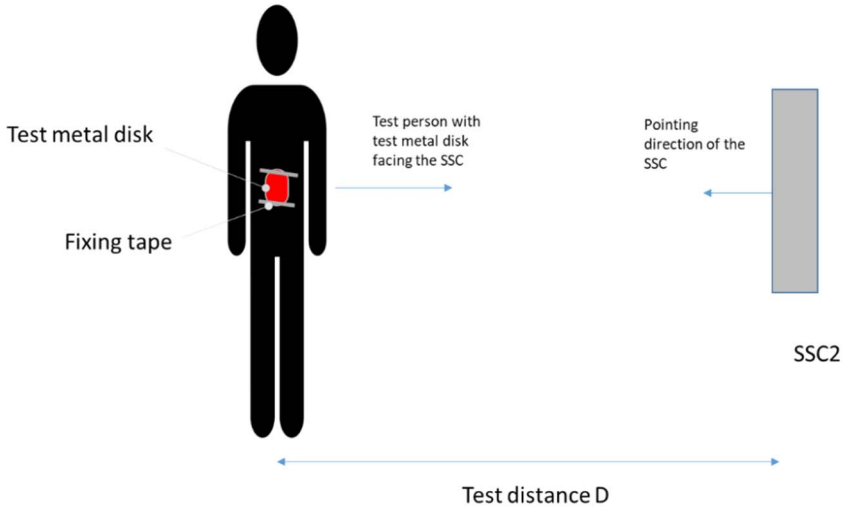

Figure C.2: Test setup with test metal disk on the body of the test person

The test person stands in the detection area of the security scanner in the dedicated detection pose in the distance D facing the SSC 2 broadside. The test object will be kept for RBS and RBR equal, but the distance of the test object for RBR shall be 70 % of RBS distance of 7,5 m which is 5,25 m. The scanning process is initiated. The output of the security scanner is observed and checked if the object has been detected. The number of test results (pass/fail) is counted and the probability of detection is calculated.

C.4 Interfering signals for RBR

C.4.1 Test frequencies specification

Table C.2: List of interfering test signals for RBR tests

Radio Service	Test frequency [MHz]	Power at SSC [dBm]	Signal modulation
Interferer outside OFR	f_{L2} = fc - 2 × OFR	-47 dBm (note)	CW
	f_{L1} = fc - 1 × OFR	-47 dBm (note)	CW
	f_{H1} = fc + 1 × OFR	-47 dBm (note)	CW
	f_{H2} = fc + 2 × OFR	-47 dBm (note)	CW
NOTE: Equivalent to an EIRP of 40 dBm e.i.r.p. in 10 m distance at 57 GHz; this simulates the likely case of a wideband data transmission devices according to EC Decision for SRDs [i.7], band Numbers 75 and 75a in 10 m distance.			

C.4.2 Assessment of potential interferers with ETSI TS 103 361

The procedure outlined in ETSI EN 303 883-2 [2], clause A.2.2 refers to ETSI TS 103 361 [i.7]. but the present document does not cover SSCs or the dedicated frequency range of interest for such indoor devices. Therefore, the approach as outlined in ETSI TS 103 361 [i.7], clause 7.7 is taken.

SSCs operate in a controlled environment and the operators have to be professionally trained where it is in the responsibility of the operator to ensure that for his application the interferer level is low for safe operation.

What cannot be controlled by the operator is the potential interference coming from the outside where the minimum distance is set to 100 m.

1) Car radar, TTT - Transport and Traffic Telematics, other fixed broadcast transmitters.
   This interference will come from outside. The minimum distance is set to 100 m. The radiation is not directed or controllable, so the maximum e.i.r.p is directed to SSC in worst case.

2) Point-to-point radio connection like mobile backhaul, etc.
   This interference will come from outside. The minimum distance is set to 100 m. The radiation is directed to the dedicated SSC with LOS connection. The SSC application will certainly not be located in the main beam of the directional antenna of the point-to-point transmitter. Therefore, the interfering radiation is coming from the side lobes of the interferer's directional antenna. A side lobe suppression of 40 dB is taken into account as NLOS attenuation on the interferer side.

SSCs operate indoors only. According to ECC Report 344 [i.2] attenuations between 3,3 dB and 52,1 dB are valid and depend on building type. An average BEL of 25 dB is considered in the present document.

Table C.3: Service groups for SSC applications

Service group (interferer)	Distance [m]	NLOS loss from interferer [dB]	Additional BEL [dB]
1) Car, TTT, fixed broadcast	100	0	25
2) Point-to-Point	100	40	25

The power at the SSC is calculated in line with ETSI TS 103 361 [i.7] considering free space loss at the dedicated frequency, non-line of sight component and building entry loss.

Table C.4: List of interferers

Radio Service	Centre Freq. [MHz]	max. EIRP [dBm]	Service Group	Total Attenuation [dB]	Power at SSC [dBm]	Ch. BW [MHz]
Railway applications	76 500	55	2	175	-120	1 000
TTT	76 500	55	1	135	-80	
SRR	78 500	55	1	135	-80	
Fixed	83 500	85	2	167	-91	250

The test signal is selected at the frequency and power level from Table C.4. and follow the signal type selected from ETSI TS 103 361 [i.7] clause 8. If nothing else is specified, the modulation of the test signal is CW.

Annex D (informative): Measurement times

D.1 Measurement Time

Based on the measurement procedures clause 5.4.2 and clause 5.4.3 of the present document the measurement time may result in a duration of many weeks for SSCs with large repetition timings and large bandwidth.

For example, the measurement time according to clause 5.4.2 of an SSC with a 7 seconds repetition time and 10 GHz span would result in a measurement time of 1 867 hours for a single measurement, Table D.1. Assessing the entire span up to 161 GHz according to clause 5.4.3 would increase the calculated measurement time in addition by a factor of 16,1.

Table D.1: Measurement time

RBW [MHz]	T_{rep} [s]	Span [GHz]	Azimuth Angles [number per 360°]	Measurement Heights [number per 1 to 4 m]	Measurement time [h]
1	7	10	24	4	1 867

To address this, the SSC equipment could be used in a continuously pulsed/burst transmit mode to reduce the measurement time. This would reduce the repetition time to small values and reduce the measurement time accordingly.

History

Version	Date	Status
V1.1.0	November 2025	SRdAP process EV 20260225: 2025-11-27 to 2026-02-25