Draft ETSI EN 302 065-3-3 V0.2.3 (2025-06)

**Short Range Devices (SRD)
using Ultra Wide Band technology (UWB);
Harmonised standard for access to radio spectrum;
Part 3: UWB devices installed in motor and railway vehicles;
Sub-part 3: Requirements for UWB radiodetermination applications operating within 6,0 GHz to 8,5 GHz**

Reference
DEN/ERM-TGUWB-615

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI Standardisation Request deliverable Approval Procedure (SRdAP).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.6] 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 3, sub-part 3 of a multi-part deliverable covering Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised standard for access to radio spectrum, as identified below:

Part 1: "Generic UWB devices":

- Sub-part 1: "Communication devices within 3,1 GHz to 4,8 GHz using LDC mitigation or within the 6 GHz to 8,5 GHz".

Part 2: "Ultra Wide Band location tracking devices":

- Sub-part 1: "Requirements for devices within 6 GHz to 8,5 GHz";
- Sub-part 2: "Requirements for devices in the frequency band between 3,1 GHz to 4,8 GHz utilizing LDC mitigation technique";
- Sub-part 3: "Requirements for fixed infrastructure UWB based localization systems in the frequency band between 3,1 GHz to 4,8 GHz deploying Detect-And-Avoid (DAA) mitigation technique";

Sub-part 4: "Requirements for fixed outdoor devices within 6,0 GHz to 8,5 GHz";

Sub-part 5: "Requirements for enhanced indoor devices within 6,0 GHz to 8,5 GHz".

Part 3: "UWB devices installed in motor and railway vehicles":

Sub-part 1: "Requirements for UWB devices for vehicular access systems within 3,8 GHz to 4,2 GHz or 6 GHz to 8,5 GHz";

Sub-part 2: "Requirements for location tracking devices installed in rail and road vehicles operating in the frequency range of 3,1 GHz to 4,8 GHz or 6,0 GHz to 8,5 GHz**";**

Sub-part 3: "Requirements for UWB radiodetermination applications operating within 6,0 GHz to 8,5 GHz".

Part 4: "Material Sensing devices":

Sub-part 1: "Building material analysis operating within 30 MHz to 10,6 GHz";

Sub-part 2: "UWB Material Sensing devices for Security Scanning";

Sub-part 3: "Ground humidity and condition sensor ";

Sub-part 4: "Exterior material sensing applications for ground based vehicles below 10,6 GHz";

Sub-part 5: "UWB surveillance devices for parking lot sensors below 10,6 GHz".

Part 5: "Devices using UWB technology onboard aircraft";

Part 6: "Ultra Wide Band radio-determination for radar sensing devices":

Sub-part 1: "Requirements for presence detection applications within 6,0 GHz to 8,5 GHz";

Sub-part 2: "Requirements for generic UWB through-air non-contact vital signs applications within 6,0 GHz to 8,5 GHz";

Sub-part 3: "Requirements for fixed outdoor presence detection devices within 6,0 GHz to 8,5 GHz";

Sub-part 4: "Requirements for fixed outdoor through-air non-contact vital signs applications within 6,0 GHz to 8,5 GHz";

Sub-part 5: "Requirements for enhanced indoor presence detection devices within 6,0 GHz to 8,5 GHz";

Sub-part 6: "Requirements for enhanced indoor through-air non-contact vital signs applications within 6,0 GHz to 8,5 GHz".

NOTE 1: The list above shows the planned multi-part deliverable at the time when the present document was finalized.

NOTE 2: Part 4, sub-part 2 (UWB Material Sensing devices for Security Scanning), sub-part 3 (Ground humidity and condition sensor) and sub-part 5 (UWB surveillance devices for parking lot sensors below 10,6 GHz) of this multi-part deliverable are under discussion (change WI) or will be stopped.

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.

1 Scope

The present document specifies technical requirements, limits and test methods for UWB devices installed in motor and railway vehicles in the frequency range 6,0 GHz to 8,5 GHz, used for UWB radiodetermination applications.

The present document covers only monostatic radar equipment.

Further details of the covered UWB radiodetermination equipment installed in motor and railway vehicles and the related EUT categories can be found in clause 4.2 of the present document.

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)". .

[4] ETSI TS 103 789 (V1.1.1) (05-2023): "Short Range Devices (SRD) and Ultra Wide Band (UWB); Radar related parameters and physical test setup for object detection, identification and RCS 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 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/DEC/(06)04: "ECC Decision of 24 March 2006 on the harmonised use, exemption from individual licensing and free circulation of devices using Ultra-Wideband (UWB) technology in bands below 10.6 GHz (ECC Decision (06)04), amended on 6 July 2007, amended 9 December 2011, amended on 8 March 2019 and amended 18 November 2022".

[i.3] ECC/DEC/(20)/01: "ECC Decision of 20 November 2020 on the harmonised use of the frequency band 5945-6425 MHz for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN)".

[i.4] CEPT/ERC/Recommendation 74-01: "Unwanted emissions in the spurious domain".

[i.5] Commission Implementing Decision (EU) 2022/180 of 8 February 2022 amending Decision 2006/771/EC as regards the update of harmonised technical conditions in the area of radio spectrum use for short-range devices (notified under document C(2022) 644).

[i.6] 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.7] Commission Implementing Decision (EU) 2024/1467 of 27 May 2024 amending Implementing Decision (EU) 2019/785 on the harmonisation of radio spectrum for equipment using ultra-wideband technology in the Union.

[i.8] ETSI TS 103 361 (V1.1.1): "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.9] ETSI EG 203 336 (V1.2.1): "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.10] ETSI TS 103 567 (V1.1.1): "Requirements on signal interferer handling".

[i.11] Recommendation ITU-R SM.1755-0 (2006): "Characteristics of ultra-wideband technology".

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], ETSI EN 303 883-2 [2] and the following apply:

decision update rate: ratio of decisions within a given time interval after the first decision

detection: observable decision at the output of the EUT when the radiodetermination mode is activated

macro motion: motions which occur as an event or non-recurring as gesture recognition or intrusion detection

micro motion: motions which occur periodic or recurring as detecting respiration or heartbeat

monostatic radar equipment: radar system that transmits and receives through either a common antenna or through collocated antennas

observation interval: initial time after which the EUT produces a first decision

3.2 Symbols

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

D_{conf} distance for conformance test (= D_T)

D_{int}	distance between interfering antenna and EUT
$D_{sens/scal}$	distance for RBS test
D_T	distance to the EUT
D_{WP}	distance for RBS limit (Wanted Performance)
ΔD	sensitivity degradation
ΔD_T	amplitude of periodic input signal
delta Θ	Delta of the elevation angle Θ
delta Φ	Delta of the azimuth angle Φ
f_c	Centre frequency of wanted signal
f_L	lowest frequency of the operating frequency range
f_H	highest frequency of the operating frequency range
F_{LOWER}	lowest frequency for the spurious emission assessment
F_{UPPER}	highest frequency for the spurious emission assessment
ν_T	frequency of input signal
OFR_{max}	Maximum possible OFR (Operating frequency range)
ω_T	rotation speed
P_{max}	Maximum signal level in duty-cycle measurement
P_{thresh}	threshold level in duty cycle measurement
rcs_T	radar cross section target
RCS_{WP}	Radar Cross Section of target for RBS test (Wanted Performance)
r_T	radius around the rotating axis
T_{dis}	disregard time; time interval below which interruptions within a transmission are considered as part of T_{on}
T_{obs}	reference interval of time (observation period)
X	parameter to specify the OFR of the emission
X_{TXUE}	parameter to specify the spurious domain of the EUT emission

3.3 Abbreviations

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

AMT	Active Mitigation Technique
CEPT	European Conference of Postal and Telecommunications Administrations
CW	Continuous Wave
e.i.r.p.	equivalent isotropic radiated power
EC	European Commission
ECC	Electronic Communications Committee
EN	European Norm
ERM	Electromagnetic compatibility and Radio spectrum Matters
ETSI EG	ETSI Guide
ETSI	European Telecommunications Standards Institute
EU	European Union
EUT	Equipment Under Test
FAR	False Alarm Rate
LDC	Low Duty Cycle
MSR	Message Success Rate
NLOS	Non Line Of Sight
OFR	Operating Frequency Range
OOB	Out Of Band
POD	Probability Of Detections
RBR	Receiver Baseline Resilience
RBS	Receiver Baseline Sensitivity
RBW	Resolution BandWidth
RCS	Radio Cross Section
RDM	Radio Determination Mode
REG	Regulation
RL	Regulated Limit
RLAN	Radio Local Area Network
RP	Radiated Power
RX	Receiver

SRD	Short Range Device
TG	Task Group
TGUWB	Task Group Ultra Wide Band
TPC	Transmit Power Control
TS	Technical Specification
TX	Transmitter
TXUE	TX Unwanted Emissions
UWB	Ultra Wide Band
VLP	Very Low Power
WAS	Wireless Access Systems
WTPC	Wanted Technical Performance Criterion

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, but as a minimum, shall be that specified in the test conditions contained in the present document. 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

The present document covers UWB equipment installed in motor and railway vehicles used for radiodetermination applications.

The types of equipment covered by the present document are UWB radiodetermination equipment, which:

- transmit signals with the purpose of being reflected by objects or humans; and
- receive reflected signals, including basic signal processing for detecting motions.

RX spurious emission requirements do not apply. Monostatic radar does not have an RX only mode in its intended use, and therefore spurious emissions are covered by the TX Unwanted emissions test (see ETSI EN 303 883-2 [2], clause 5.2.1).

The following criteria were considered for equipment categorization and sub-categorization:

- Regulation: ECC decision, see clause 4.2.2.
- Usage of active UWB mitigation techniques (e.g. duty cycle), see clause 4.2.3.
- Difference of the wanted technical performance requirements based on the intended use and the relation with the receiver requirements, see clause 4.2.4.

An overview of the EUT categories is provided in clause 4.2.5, Table 1.

4.2.2 Categorization by Regulation (REG)

The present document defines one category of EUTs for UWB radiodetermination applications:

- Sub-category REG1: according Decision (EU) 2024/1467 [i.7] (UWB devices installed in motor and railway vehicles) and ECC/DEC/(06)04, Annex 1.2 [i.2].

4.2.3 Categorization by Active Mitigation Technique (AMT)

Category REG1 has two sub-categories with respect to active mitigation techniques:

- Sub-category AMT1: according to Decision (EU) 2024/1467 [i.7], UWB devices installed in motor and railway vehicles, General technical requirements (3.1) without mitigation (no LDC and no TPC).

NOTE 1: The same requirements are specified in ECC/DEC/(06)04 [i.2], Annex 1.2.1, Table 2.

- Sub-category AMT2: according to Decision (EU) 2024/1467 [i.7], UWB devices installed in motor and railway vehicles, Other (3.3) with duty-cycle 1 % and height of the installed antenna of maximum 4 m.

NOTE 2: The same requirements are specified in ECC/DEC/(06)04 [i.2], Annex 1.2.3, Table 4.

NOTE 3: An equipment may support one or more of the defined AMT categories.

4.2.4 Categorization based on the wanted technical performance criteria (RDM - Radiodetermination Mode)

There are different kinds of radiodetermination applications with respect to their intended use respectively the kind of target and the detection objectives. The different radiodetermination applications result in differences for the detection mode requirements of the equipment and thus for the wanted technical performance criteria.

Following categories are defined to represent the different radiodetermination modes:

- Sub-category RDM1: Micro motions (periodic or recurring), e.g. detecting respiration or heartbeat.
- Sub-category RDM2: Macro motions (event or non-recurring), e.g. gesture recognition or intrusion detection.

NOTE 1: Wanted technical performance requirements for micro and macro motions are specified in clause 4.4.2.

NOTE 2: An equipment may support one or more of the defined radiodetermination categories.

More information are provided in Annex C of the present document.

4.2.5 Summary of EUT Categories

Table 1: Overview of EUT categories

Equipment Category	Regulation Sub-category (REG)	Mitigation Sub-category (AMT)	Radiodetermination Sub-category (RDM)
Category 1	Decision (EU) 2024/1467 (REG1) [i.7]	none (AMT1)	Micro-motion (RDM1)
Category 2	Decision (EU) 2024/1467 (REG1) [i.7]	none (AMT1)	Macro-motion (RDM2)
Category 3	Decision (EU) 2024/1467 (REG1) [i.7]	Duty-Cycle (AMT2)	Micro-motion (RDM1)
Category 4	Decision (EU) 2024/1467 (REG1) [i.7]	Duty-Cycle (AMT2)	Macro-motion (RDM2)

An overview of requirements for the different equipment categories is given in Table 2.

Table 2: Overview of requirements for UWB radiodetermination devices installed in road and rail vehicles

Equipment Category	TX-requirements				RX-requirements	
	Emission requirements		Mitigation technique			
		Clause		Clause		Clause
1, 2	OFR	4.3.2	none			
	Mean e.i.r.p. spectral density	4.3.3			RBS	4.4.4
	Peak e.i.r.p. spectral density	4.3.4				

Equipment Category	TX-requirements				RX-requirements	
	Emission requirements		Mitigation technique			
		Clause		Clause		Clause
	TX unwanted emissions	4.3.5			RBR	4.4.5
	TX behaviour under complete environmental profile	4.3.7				
3, 4	OFR	4.3.2	Duty-Cycle	4.3.6		
	Mean e.i.r.p. spectral density	4.3.3			RBS	4.4.4
	Peak e.i.r.p. spectral density	4.3.4				
	TX unwanted emissions	4.3.5			RBR	4.4.5
	TX behaviour under complete environmental profile	4.3.7				
NOTE: The equipment is in accordance with Decision (EU) 2024/1467 [i.7] and ECC/DEC/(06)04 [i.2].						

4.3 Transmitter Requirements

4.3.1 General

The requirements in clause 4.3 are applicable for all equipment categories as specified in clause 4.2.5, Table 2 of the present document.

4.3.2 Operating Frequency Range (OFR)

4.3.2.1 Applicability

The Operating Frequency Range (OFR) requirement applies to all equipment categories as described in Table 2 in clause 4.2.5.

4.3.2.2 Description

For the description of the Operating Frequency Range (OFR), see ETSI EN 303 883-1 [1], clause 5.2.1.

Requirement for test parameter X as specified in ETSI EN 303 883-1 [1], clause 5.2.1:

X: 10 dB

NOTE: The present document is in accordance with the -10 dB bandwidth for UWB EUT below 10 GHz, as defined in annex 1 of Recommendation ITU-R SM.1755-0 [i.11].

4.3.2.3 Limits

The OFR (all frequencies between f_L and f_H) shall be within the permitted frequency range (see Table 3).

The OFR shall be at least 50 MHz.

NOTE: The minimum OFR requirement comes from the EC Decision on UWB [i.7], Article 2 (a).

Table 3: Permitted frequency ranges for vehicular radiodetermination devices

Equipment Category	Frequency Range
Category 1 to 4	6,0 GHz to 8,5 GHz
NOTE: Permitted frequency ranges for all EUT categories are according to Decision (EU) 2024/1467 [i.7]. In details for equipment categories 1 and 2 Table 3.1 applies and for equipment categories 3 and 4 Table 3.3 applies, see clause 4.2.3 of the present document.	

4.3.2.4 Conformance

The conformance test for OFR is specified in clause 5.3.2.

4.3.3 Mean e.i.r.p. Spectral Density

4.3.3.1 Applicability

The Mean e.i.r.p. Spectral Density requirement applies to all equipment categories as described in Table 2 in clause 4.2.5.

4.3.3.2 Description

The description of Mean e.i.r.p. Spectral Density is given in clause 5.3.2.1 of ETSI EN 303 883-1 [1].

4.3.3.3 Limits

Within the OFR the transmitter Mean e.i.r.p. Spectral Density shall not exceed the values given in Table 4.

Table 4: Maximum Mean e.i.r.p. Spectral Density

Frequency Bands	EUT category	Limit	Notes
6,0 GHz to 8,5 GHz	1, 2	-53,3 dBm/MHz	According to Decision (EU) 2024/1467 [i.7], Table 3.1.
	3, 4	-41,3 dBm/MHz	According to Decision (EU) 2024/1467 [i.7], Table 3.3.

4.3.3.4 Conformance

The conformance test for Mean e.i.r.p. Spectral Density is specified in clause 5.3.3.

4.3.4 Peak e.i.r.p. Spectral Density

4.3.4.1 Applicability

The Peak e.i.r.p. Spectral Density requirement applies to all equipment categories as described in Table 2 in clause 4.2.5.

4.3.4.2 Description

The description of Peak e.i.r.p. Spectral Density is given in clause 5.3.4.1 of ETSI EN 303 883-1 [1].

4.3.4.3 Limits

The Peak e.i.r.p. Spectral Density shall not exceed the values given in Table 5.

Table 5: Maximum Peak e.i.r.p. Spectral Density

Frequency Bands	EUT category	Limit	Notes
6,0 GHz to 8,5 GHz	1, 2	-13,3 dBm/ 50 MHz	According to Decision (EU) 2024/1467 [i.7], Table 3.1.
	3, 4	0 dBm/50 MHz	According to Decision (EU) 2024/1467 [i.7], Table 3.3.

4.3.4.4 Conformance

The conformance test for Peak e.i.r.p. Spectral Density is specified in clause 5.3.4.

4.3.5 TX Unwanted Emissions (TXUE)

4.3.5.1 Applicability

The TX Unwanted Emissions (TXUE) requirement applies to all equipment categories as described in Table 2 in clause 4.2.5.

4.3.5.2 Description

For the description of the TX Unwanted Emissions, see ETSI EN 303 883-1 [1], clause 5.5.1.

As requested in ETSI EN 303 883-1 [1], clause 5.5.1 the limit for the parameter X_{TXUE} for all EUT categories is specified to:

X_{TXUE}: 50 %

4.3.5.3 Limits

The TX Unwanted Emissions shall be assessed based on ETSI EN 303 883-1 [1], clause 5.5.2.

The spurious emission limits are defined in Table 6.

Table 6: Spurious emissions limits

Frequency range	Limit values for TXUE
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 ≤ 26 GHz (see note 3)	-30 dBm/1 MHz
NOTE 1: Not applicable for RP emissions within the OFR. NOTE 2: The limits are according to ERC/REC 74-01 [i.4], Annex 2. NOTE 3: ERC/REC 74-01, Table 1 recommends as the upper frequency (F_{UPPER}) 26 GHz	

Based in TXUE specification of 50 % (see clause 4.3.5.2) there is no OOB-domain for equipment in UWB-mode. Therefore, an OOB domain is not applicable.

4.3.5.4 Conformance

The conformance test for TX Unwanted Emissions is specified in clause 5.3.5.

4.3.6 Duty-Cycle

4.3.6.1 Applicability

The Duty-Cycle requirement applies only to equipment categories 3 and 4 as described in Table 2 in clause 4.2.5.

4.3.6.2 Description

The description of Duty-Cycle is given in clause 5.11.1 of ETSI EN 303 883-1 [1].

4.3.6.3 Limits

The Duty Cycle limit is defined in accordance with Decision (EU) 2024/1467 [i.7], note 2 of the table in Annex 3.3.

The Duty-Cycle shall not exceed 1 % per second.

4.3.6.4 Conformance

The conformance test for Duty-Cycle is specified clause 5.3.6.

4.3.7 TX behaviour under the complete environmental profile

4.3.7.1 Applicability

The TX behaviour under the complete environmental profile requirement applies to all equipment categories as described in Table 2 in clause 4.2.5.

4.3.7.2 Description

The TX behaviour under the complete environmental profile verifies the conformance of the Mean e.i.r.p. Spectral Density over the environmental profile as specified in clause 5.1.3.

For more information on the TX behaviour under the complete environmental profile, see ETSI TS 103 941 [3], clause 4.3.1.

4.3.7.3 Limits

The TX behaviour is obtained by measuring the Mean e.i.r.p. Spectral Density across the complete environmental profile (as specified in clause 5.1.3) and assessing the variation with respect to an adjusted Regulated Limit (RL).

The procedure to adjust the regulated limit is descripted in ETSI TS 103 941 [3], clause 6.4.

4.3.7.4 Conformance

The conformance test for TX behaviour under the complete environment profile is specified in clause 5.3.7.

4.4 Receiver Requirements

4.4.1 General

The receiver conformance requirements defined below are specified according to the framework as set out in ETSI EN 303 883-2 **[**2**]**.

With respect to the specific input parameters of equipment category 1 and 2 for the RBR and RBS tests, the equipment is a Radio Determination application. As described in clause 5.3.3.2 of ETSI EN 303 883-2 [2], the Wanted Technical Performance Criterion (WTPC) is based on the minimum detection probability and maximum false alarm rate for detecting a defined movement of a specific target.

NOTE: More information are provided in Annex C of the present document.

4.4.2 Wanted technical performance requirements

4.4.2.1 General

The wanted technical performance requirement is specified with the objective to ensure an acceptable confidence in the detection of a (micro or macro) motion related to the intended use. It covers the successful detection if a target is present, as well as avoiding false alarms when the target is not present.

The **performance requirement** is related to **Probability Of Detections (POD)**, while maintaining an acceptable **False Alarm Rate (FAR)**.

A "**detection**" is an observable decision at the output of the EUT when the radiodetermination mode is activated.

The initial time after which the EUT produces a first decision is called "**observation interval**".

The ratio of decisions within a given time interval after the first decision is called "**decision update rate**".

Observation interval and decision update rate depend on the EUT implementation and radiodetermination mode.

A "**correct detection**" is indicated, if the EUT decides for the correct motion classification when a target is present. **"Probability of Detection (POD)"** is the ratio of "correct detections" to the total number of equipment decisions.

A "**false alarm**" is indicated, if the EUT decides for a motion classification, if there is no target present. **"False Alarm Rate (FAR)"** is the ratio of "false alarms" to the total number of equipment decisions.

4.4.2.2 Equipment Sub-category RDM1 (Micro-Motions)

An equipment of sub-category RDM1 shall be able to detect periodic motions with small amplitude as defined in clause 5.4.2.1.

The detection shall be done with an observation interval of maximum 15 seconds. The decision update rate shall be not less than 1 decision every 15 seconds.

Probability of Detection (POD) shall be derived from 20 equipment decisions.

False Alarm Rate (FAR) shall be derived from 400 equipment decisions.

Acceptance criteria for sub-category RDM1 (micro-motions):

- Probability of Detection (POD):
  - Target present, periodic motion (see clause 5.4.2.1) POD > 90 %
- False Alarm Rate (FAR):
  - No target FAR < 1 %

4.4.2.3 Equipment Sub-category RDM2 (Macro-Motions)

An equipment of sub-category RDM2 shall be able to detect one-time movements as defined in clause 5.4.2.2.

The detection shall be done with an observation interval of max. 2 seconds. The decision update rate shall be not less than 1 decision every 2 seconds.

Probability of Detection (POD) shall be derived from 20 equipment decisions.

False Alarm Rate (FAR) shall be derived from 400 equipment decisions.

Acceptance criteria for category RDM2 (macro-motions):

- Probability of Detection (POD):
  - Target present, one-time movement (see clause 5.4.2.2) POD > 90 %
- False Alarm Rate (FAR):
  - No target FAR < 1 %

4.4.2.4 Wanted Technical Performance Criterion 1

The wanted technical performance criterion 1 is used for the RBS and RBR tests.

The equipment shall fulfil a POD better than 90 % and FAR < 1 % (as specified in clauses 4.4.2.2 and 4.4.2.3).

For the RBR test the equipment shall meet this requirement also during interferer present, as shown in Figure 1.

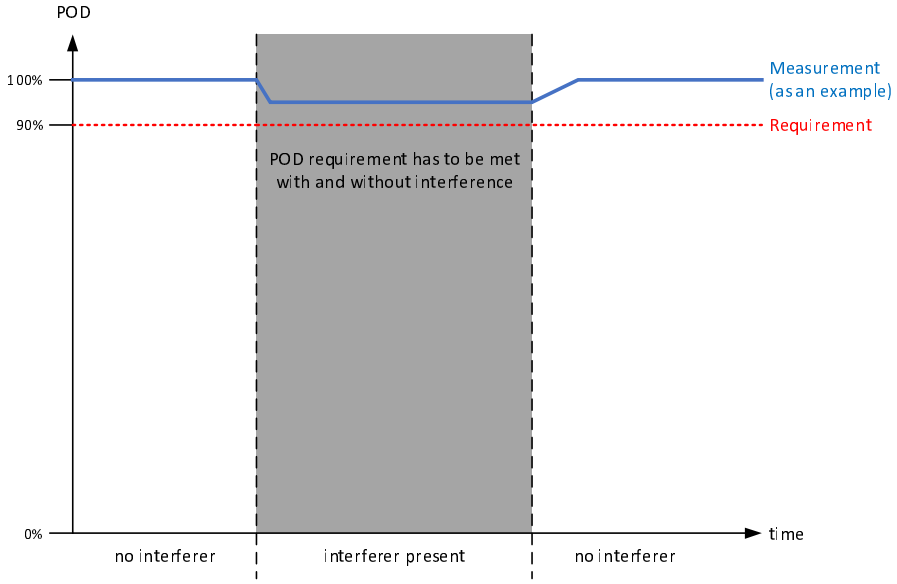

Figure 1: Wanted technical performance criterion 1 for RBR test (POD requirement)

The equipment shall support the determination of the POD/FAR for all relevant test setups in the present document.

The POD shall be determined with 20 equipment decisions (e.g. 18 successful decisions out of 20).

4.4.2.5 Wanted Technical Performance Criterion 2

The wanted technical performance criterion 2 is used for the RBR tests only.

The wanted technical performance criterion 2 takes into account the non-protected nature of UWB operations.

During the presence of an interferer, the equipment may have a temporary loss of function or degradation of performance.

However, when the interferer is removed, the equipment shall recover its normal performance - which is a POD better than 90 % (see clauses 4.4.2.2 and 4.4.2.3) and FAR less than 1 % - without operator intervention.

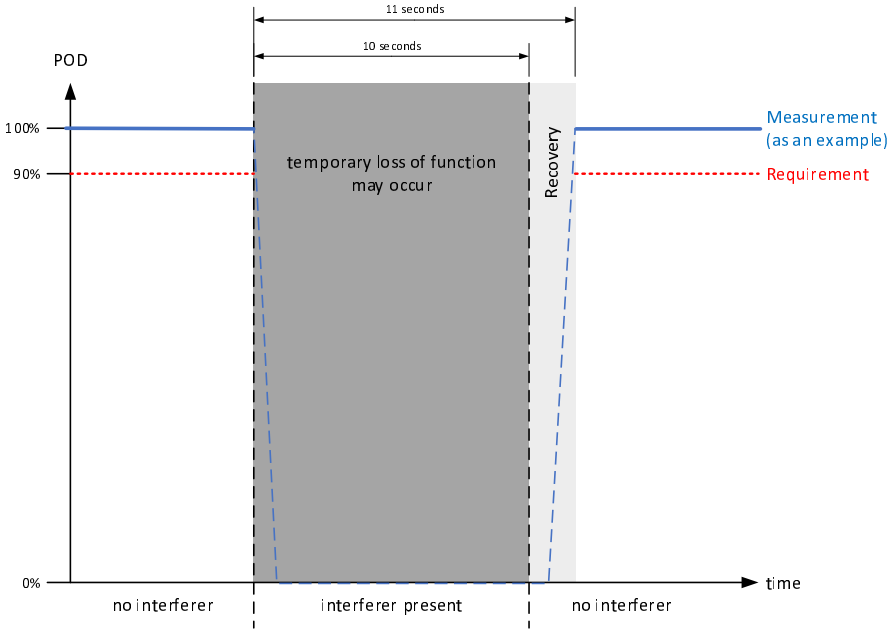

Figure 2: Wanted technical performance criterion 2 for RBR test (POD requirement)

The requirements for the wanted technical performance criterion 2 are listed below and are depicted in Figure 2:

- Interference shall be present for 10 seconds.
- Recovery of performance shall be completed 1 second after interference has been removed.
- After 11 seconds the POD/FAR measurement is started and the EUT shall fulfil POD better than 90 % and FAR less than 1 %.

4.4.3 Receiver Baseline Sensitivity (RBS)

4.4.3.1 Applicability

The Receiver Baseline Sensitivity (RBS) requirement applies to all equipment categories as described in Table 2 in clause 4.2.5.

4.4.3.2 Description for the RBS requirements

For the description of the RBS requirement, see ETSI EN 303 883-2 [2], clause 5.4.1.

4.4.3.3 Limits

The RBS requirements and limits for all equipment categories, object distance and the kind of object for measurement, for the wanted technical performance shall be as specified in Table 7.

Table 7: RBS limits

Equipment category	RBS requirement	Note
1,3 (micro-motion), see clause 4.4.2.2 (RDM1)	D_{wp} ≥ 1 m with RCS_{wp}= -18 dBm²	Requirement relates to the detection of periodic movements like respiration.
2,4 (macro-motion), see clause 4.4.2.3 (RDM2)	D_{wp} ≥ 1 m with RCS_{wp}= -6 dBm²	Requirement relates to the detection of non-periodic movements like gestures.

4.4.3.4 Conformance

The conformance test for equipment categories 1 and 3 (micro-motion) for the RBS requirement is specified in clause 5.4.2.1

The conformance test for equipment categories 2 and 4 (macro-motion) for the RBS requirement is defined in clause 5.4.2.2.

4.4.4 Receiver Baseline Resilience (RBR)

4.4.4.1 Applicability

This requirement shall apply to all EUT categories as described in Table 2 in clause 4.2.5.

4.4.4.2 Description

For the description of the Receiver Baseline Resilience (RBR), see ETSI EN 303 883-2 [2], clause 5.5.

4.4.4.3 Limits

The present document considers two interference scenarios:

- Interference Scenario 1: Weak interference: Wanted Technical Performance Criterion 1 (clause 4.4.2.4) shall be fulfilled.
- Interference scenario 2: Strong interference: Wanted Technical Performance Criterion 2 (clause 4.4.2.5) shall be fulfilled.

Both interference scenarios shall be tested and the EUT shall comply with the limits given in Table 8 and Table 9.

Limits for the interferer within OFR are specified in Table 8.

Table 8: RBR limits within OFR

	Interference Scenario	**Interference power level at EUT**	**Wanted technical performance criterion**	**Test frequencies**	**Modulation of test signals**
All EUT categories	Scenario 1	-85 dBm	Criterion 1	• f_L (lower edge of OFR) • f_c (centre frequency of wanted signal) • f_H (upper edge of OFR)	CW
	Scenario 2	-50 dBm	Criterion 2		

Limits for the interferer outside OFR are specified in Table 9.

Table 9: RBR limits outside OFR

	Interference Scenario	**Interference power level at EUT**	**Wanted technical performance criterion**	**Test frequencies**	**Modulation of test signals**
All EUT categories	Scenario 1	-85 dBm	Criterion 1	• f_c - 2 × OFR • f_c - 1 × OFR • f_c + 1 × OFR • f_c + 2 × OFR	CW
	Scenario 2	-50 dBm	Criterion 2		

NOTE: Interfering signals and limits are defined in accordance with ETSI EN 303 883-2 [2], Annex A.

4.4.4.4 Conformance

The conformance test for Receiver Baseline Resilience (RBR) is specified in clause 5.4.3.

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 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

Normal test conditions shall be 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 includes both the normal and extreme test conditions.

Normal test conditions are as defined in ETSI TS 103 941 [3] clause 4.5.3.1.

The temperature range specified for the intended use of the EUT shall cover at least the temperature range of Table 10.

Extreme test conditions are as defined in clause ETSI TS 103 941 [3] clause 4.5.3.2 with the temperature range of Table 10.

Table 10: Temperature range for extreme test conditions

EUT Category	Min.	Max.
All categories	-40°C	+85°C

The primary supply voltage varies from 90 % to 110 % of its nominal value.

The nominal supply voltage shall be as specified for the intended use for the equipment (e.g. in the user manual or technical specification file).

5.2 General conditions for testing and conformance test suites

5.2.1 General conditions for testing

General guidance on testing TX and RX measurements 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, measurement uncertainty and interpretation of the measurement results. An overview is provided in ETSI EN 303 883-1 [1], clause A.1.

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.

General information on test set-up for measurements under environmental profile are given respectively in ETSI TS 103 941 [3], clause 5.1. More detailed test solutions are provided in:

- ETSI TS 103 941 [3], clause 5.2 with the usage of a temperature chamber; and
- ETSI TS 103 941 [3], clause 5.3 with the usage of a climate dome and anechoic chamber.

General conditions for testing for the TX are defined in ETSI EN 303 883-1 [1], clauses A.3 and A.5.

General conditions for testing for the RX are defined in ETSI EN 303 883-2 [2], clause 5.1.

5.2.2 Conformance test suites

The choice of equipment shall follow ETSI EN 303 883-1 [1], clause A.6.

Radiated tests shall be carried out in an anechoic chamber according to ETSI EN 303 883-1 [1], clause B.2.2.2.

5.2.3 Test scenarios

Setup for all EUT categories:

- The EUT shall be measured as a stand-alone component.

5.3 Conformance methods of measurement for transmitter

5.3.1 General

See clause 5.1 of ETSI EN 303 883-1 [1] for general guidance on TX measurements and emission concept.

5.3.2 Operating Frequency Range (OFR)

The OFR conformance test shall be performed under normal conditions as defined in clause 5.1.2.

The OFR conformance tests shall be performed on a test site according to ETSI EN 303 883-1 [1], clause B.2.2.2 (anechoic chamber) and the test setup shall be the spherical scan test method as described in ETSI EN 303 883-1 [1], clause B.4.1.

For the OFR conformance assessment, at the direction of the highest Mean e.i.r.p. Spectral Density (see clause 5.3.3), the conformance test procedure as specified in ETSI EN 303 883-1 [1], clause 5.2.2 shall be used.

The OFR conformance assessment shall be determined with the number for the parameter X as specified in clause 4.3.2.2.

5.3.3 Mean e.i.r.p Spectral Density

The Mean e.i.r.p Spectral Density conformance test shall be performed under normal conditions as defined in clause 5.1.2.

The Mean e.i.r.p Spectral Density conformance tests shall be performed on a test site according to ETSI EN 303 883-1 [1], clause B.2.2.2 (anechoic chamber) and the test setup shall be the spherical scan test method as described in ETSI EN 303 883-1 [1], clause B.4.1.

For the Mean e.i.r.p Spectral Density conformance assessment, the conformance test method as specified in ETSI EN 303 883-1 [1], clause 5.3.2.3 ("Mean e.i.r.p. spectral density, averaged over 1 ms") shall be used.

For a full spherical assessment, the EUT need to be turned by 180 degrees around the horizontal plane H (see ETSI EN 303 883-1 [1], clause B.4).

For angular steps delta Θ and delta Φ a value of 15 degrees shall be used.

The measurement distance d is specified from the EUT to the measurement antenna. For the measurement distance d = 3 m shall be used.

If the noise level of the overall measurement system (ETSI EN 303 883-1 [1], clause B.2.5) has less than 10 dB margin to the maximum Mean e.i.r.p. Spectral Density limits (see clause 4.3.3.3), a smaller measurement distance d shall be used, and the measurement distance assessment as descripted as range length in ETSI EN 303 883-1 [1], clause B.2.3.5 shall be done.

5.3.4 Peak e.i.r.p Spectral Density

The Peak e.i.r.p Spectral Density conformance test shall be performed under normal conditions as defined in clause 5.1.2.

For the Peak e.i.r.p Spectral Density the same test setup and considerations for the measurement distance and angular steps as for the Mean e.i.r.p spectral density (see clause 5.3.3) shall be used.

Conformance shall be tested according to ETSI EN 303 883-1 [1], clause 5.3.4.2 ("General method") and RBW of 50 MHz shall be used.

5.3.5 TX Unwanted Emissions (TXUE)

The TX Unwanted Emissions (TXUE) conformance test shall be performed under normal conditions as defined in clause 5.1.2.

For the TX Unwanted Emission conformance test the set-up as specified in clause 5.3.3 and the conformance test procedure as specified in ETSI EN 303 883-1 [1], clause 5.5.3 shall be used.

For the measurement distance d and angular steps, the same distance and step width than for the Mean e.i.r.p. Spectral Density conformance test (see clause 5.3.3) shall be used.

The measured results of the TX Unwanted Emission measurements and the used measurement distance and angular steps shall be recorded. For the TX Unwanted Emission conformance assessment, the value for parameter X_{TXUE} as specified in clause 4.3.5.2. shall be used.

5.3.6 Duty-Cycle

The Duty-Cycle conformance test shall be performed under normal conditions as defined in clause 5.1.2.

Conformance of Duty-Cycle shall be tested according to ETSI EN 303 883-1 [1], clause 5.11.2.1 ("Duty cycle, spectrum analyser method") or using the equivalent oscilloscope method according to ETSI EN 303 883-1 [1], clause 5.11.2.2 ("Duty cycle, oscilloscope method").

Following parameters shall be used for duty-cycle tests:

- T_{obs} = 1 s
- T_{dis} = 10 µs

NOTE: This value for disregard time T_{dis} is large enough to span pulse-based symbols and include them in the On-time, but small enough to differentiate packets and account the time between as Off-time.

- RBW ≥ 1 MHz, Peak Detector
- $P_{thresh} = P_{max}$ - 10 dB

For improved measurement accuracy (increasing signal-to-noise ratio), the test can be carried out at reduced distance (if radiated) or as conducted measurement.

5.3.7 TX behaviour under the complete environmental profile

5.3.7.1 General

The TX behaviour under the complete environmental profile conformance test shall be done under the complete environmental profile as defined in clause 5.1.3.

A test set-up shall be chosen based on clause 4.3.1 and Figure 1 in ETSI TS 103 941 [3].

5.3.7.2 Conformance test procedure

The procedure according to ETSI TS 103 941 [3], clause 6.4 shall be used.

Based on clause 5.1.3 and Figure 6 of ETSI TS 103 941 [3] clause 4.5.4 the parameters for the assessment are specified as follow:

- t_{low}: see clause 5.1.3 Table 10.
- t_{high}: see clause 5.1.3 Table 10.
- t_{steps}: 10 °C.
- supply voltage: see clause 5.1.3, the nominal value of the supply voltage is usually provided by the user manual of the EUT.

5.4 Conformance methods of measurement for receiver

5.4.1 General

All tests shall be performed radiated.

The Receiver Baseline Sensitivity (RBS) and Receiver Baseline Resilience (RBR) conformance test shall be performed under normal conditions as defined in clause 5.1.2.

5.4.2 Receiver Baseline Sensitivity (RBS)

5.4.2.1 Equipment Category 1 and 3 (RDM1; micro-motion)

If the equipment supports a measurement distance of 3 m, the following test setup according to ETSI TS 103 789 [4], clause 6.5 "Set-up 3: constant RCS to the EUT with small movement" shall be used for the conformance test:

Table 11: Setup parameters for RBS Test, Sub-category RDM1 (Micro Motion)

Parameter	Value	Note
Distance to the EUT $D_T = D_{conf}$	3 m (scaled from 1 m)	RCS scaling is applied for test distance of 3 m, see Annex D.
Radar Cross-Section target rcs_T	+1 dBm² (scaled from -18 dBm²)	RCS scaling is applied for test distance of 3 m, see Annex D.
Frequency of input signal v_T	0,5 Hz	Sinusoidal signal
Amplitude of periodic input signal ΔD_T	0,003 m	Peak-to-peak amplitude of the sinusoidal input signal.
Target	Corner reflector	Careful alignment towards EUT required; specification of corner reflector TBD.

If the equipment is not supporting a measurement distance of 3 m, a setup according to ETSI TS 103 789 [4], clause 6.4 "Set-up 2: constant RCS to the EUT" shall be used for the conformance test.

Table 12: Setup parameters for RBS Test at 1m, Sub-category RDM1 (Micro Motion)

Parameter	Value	Note
Distance to the EUT $D_T = D_{conf}$	1 m	
Radar Cross-Section target rcs_T	-18 dBm²	
Rotation speed ω_T	0,5 cps	
Radius around the rotating axis r_T	0,003 m	Peak-to-peak amplitude of the sinusoidal input signal.
Target	Rotating sphere (isotropic)	Specification of sphere TBD.

5.4.2.2 Equipment Category 2 and 4 (RDM2; macro-motion)

The test setup shall be according to ETSI TS 103 789 [4], clause 6.6 "Set-up 4: constant RCS to the EUT with large movement".

Following setup parameters shall be used for the conformance test.

Table 13: Setup parameters for RBS Test, Sub-category RDM2 (Macro Motion)

Parameter	Value	Note
Distance to the EUT $D_T = D_{conf}$	2 m (scaled from 1 m)	RCS scaling is applied for test distance of 3 m.
Radar Cross-Section target rcs_T	+6 dBm² (scaled from -6 dBm²)	RCS scaling is applied for test distance of 3 m.
Movement speed of the target v_T	1,0 m/s	This is a one-time movement, with v_T being the maximum speed. The motion profile shall be a sinusoidal signal (see Figure 3).
Delta distance ΔD_T	0,3 m	This is the distance the target moves across. The motion profile shall be a sinusoidal signal (see Figure 3), ramp up and down to and from max value of delta distance around 2 m (from 1,85 m to 2,15 m).
Target	Triple Mirror (Corner Reflector)	Dimension see ETSI TS 103 789 [4].

The motion profile shall be as defined below.

Distance vs. time: $d(t) = D_T - 0{,}5 \times \Delta D_T \times cos\left(\frac{2\pi}{T}\mathrm{t}\right)$

Movement speed vs time: $\mathrm{v}(t) = \Delta D_T \times \frac{\pi}{T} \times \sin(\frac{2\pi}{T}\mathrm{t})$

T is the movement duration and is calculated from the (maximum) movement speed v_T and the delta distance ΔD_T: $\mathrm{T} = \Delta D_T \times \frac{\pi}{v_T} = 0{,}94\ s$

The resulting distance and movement speed over time are illustrated in Figure 3.

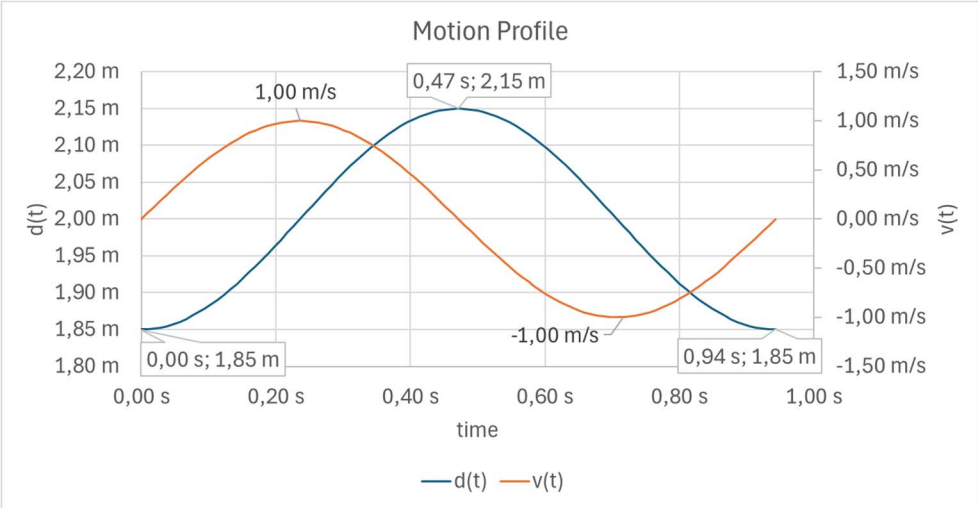

Figure 3: Motion profile for RBS Test, Category RDM2 (Macro Motion)

5.4.3 Receiver Baseline Resilience (RBR)

Conformity of Receiver Baseline Resilience shall be tested according to ETSI EN 303 883-2 [2], clause 5.5.3.5 ("Radiated Measurements for Radiodetermination Applications with Distance Limit") with the following parameters:

- The wanted technical performance criteria for the test are provided in clauses 4.4.2.
- The sensitivity degradation for all tests shall be 30 %. (either by reduction of the distance or scaling of the target rcs).

Therefore, the following changes in the RBR test set-up compared to the RBS shall be done.

RBR conformance test for equipment Category 1 and 3 (with RDM1; micro-motion)For the specified RBS micro motion test the distance of 3 m the RBR test distance calculates as follows:

$$D = D_{sense/scal} - \Delta D = 3\ m - 0{,}9\ m = 2{,}1\ m$$

For the equipment not supporting a measurement distance of 3 m the test distance of 1 m shall be kept avoiding issues with TX-RX leakage.

Instead, the equivalent scaling of the radar cross section will be considered. The RCS for this conformance test is therefore, calculated as:

$$rsc_T = -12\ dBm^2$$

NOTE: For the assessment of the rcs, see ETSI TS 103 789 [3], clause 7.

RBR conformance test for equipment Category 2 and 4 (with RDM2; micro-motion)For the specified RBS micro motion test the distance of 2 m the RBR test distance calculates as follows:

$$D = D_{sense/scal} - \Delta D = 2\ m - 0{,}6\ m = 1{,}4\ m$$

For all RBR tests the interfering signals within OFR are given in Table 8 in clause 4.4.4.3 and interfering signals outside OFR are given in Table 9 in clause 4.4.4.3.

The distance of the test antenna shall be:

$$D_{int} = 2{,}5\ m$$

For interference scenario 2 the interference shall be present for 10 seconds. After 11 seconds the MSR measurement is started again and the EUT shall fulfil message success rate better than 90 %.

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.6] 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 [i.1]

Harmonised Standard ETSI EN 302 065-3-3					
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	Mean e.i.r.p. spectral density	3.2	4.3.3	U	
3	Peak e.i.r.p. spectral density	3.2	4.3.4	U	
4	TX unwanted emissions	3.2	4.3.5	U	
5	Duty-Cycle	3.2	4.3.6	C	Applies only for equipment category 3 and 4
6	TX behaviour under the complete environmental profile	3.2	4.3.7	U	
7	Receiver Baseline Sensitivity (RBS)	3.2	4.4.3	U	
8	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 legislation may be applicable to the product(s) falling within the scope of the present document.

Annex B (informative): Requirement mapping

ETSI EG 203 336 [i.9], clause 5 lists the technical parameters applicable to transmitters and receivers that should be considered when producing Harmonised Standards 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.9], 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.9]

ETSI EG 203 336 [i.9]		Present document		Justification
Clause	**Parameter**	**Clause**	**Parameter**	
5.2.2	Transmitter power limits	4.3.3	Mean power spectral density e.i.r.p.	
		4.3.4	Peak power spectral density e.i.r.p.	
		4.3.7	TX behaviour under the complete environmental profile	
5.2.3	Transmitter power accuracy	-	-	From the latest version of ETSI EG 203 336 [i.9]. "When regulatory limits imply only a maximum emission limit (e.g. products that operate under a general licence regime), this parameter need not be considered for inclusion in an HS."
5.2.4	Transmitter spectrum mask	4.3.2 4.3.7	Operating Frequency Range	
5.2.5	Transmitter frequency stability	4.3.7	TX behaviour under the complete environmental profile	
5.2.6	Transmitter intermodulation attenuation	-	-	From latest version of ETSI EG 203 336 [i.9]. This parameter is required only "where high levels of quality services are required". This is not relevant for generic Short Range Devices which are operating under licence except regime without any kind of regulatory protection. SRDs have to accept interferences.
5.2.7.2	Transmitter unwanted emissions in the out of band domain	4.3.5	TX Unwanted emissions	
5.2.7.3	Transmitter unwanted emissions in the spurious domain	4.3.5	TX Unwanted emissions	
5.2.8	Transmitter time domain characteristics	4.3.6	Duty cycle	Only applicable for EUT category 3 and 4.

ETSI EG 203 336 [i.9]		Present document		Justification
Clause	**Parameter**	**Clause**	**Parameter**	
5.2.9	Transmitter transients	-	-	Not applicable.
	Other mitigation, spectrum access requirements not specified in the ETSI Guide but specified in related ECC/EC framework	-	-	
5.3.2	Receiver sensitivity	-	not specified, superseded by RBS test	See justification in ETSI EN 303 883-2 [2], Annex C and the explanation of the interferer signal handling concept, see ETSI TS 103 567 [i.10].
5.3.2.3	Desensitization	-	not specified, superseded by RBR test	See justification in ETSI EN 303 883-2 [2], Annex C and the explanation of the interferer signal handling concept, see ETSI TS 103 567 [i.10].
5.3.3	Receiver co-channel rejection	-	not specified, superseded by RBR test	See justification in ETSI EN 303 883-2 [2], Annex C and the explanation of the interferer signal handling concept, see ETSI TS 103 567 [i.10].
5.3.4.2.1	Receiver adjacent channel selectivity	-	not specified, superseded by RBR test	See justification in ETSI EN 303 883-2 [2], Annex C and the explanation of the interferer signal handling concept, see ETSI TS 103 567 [i.10].
5.3.4.2.2	Receiver adjacent band selectivity	-	not specified, superseded by RBR test	See justification in ETSI EN 303 883-2 [2], Annex C and the explanation of the interferer signal handling concept, see ETSI TS 103 567 [i.10].
5.3.4.3	Receiver blocking	-	not specified, superseded by RBR test	See justification in ETSI EN 303 883-2 [2], Annex C and the explanation of the interferer signal handling concept, see ETSI TS 103 567 [i.10].
5.3.4.4	Receiver spurious response rejection	-	not specified, superseded by RBR test	See justification in ETSI EN 303 883-2 [2], Annex C and the explanation of the interferer signal handling concept, see ETSI TS 103 567 [i.10].
5.3.4.5	Receiver radio-frequency intermodulation	-	not specified, superseded by RBR test	See justification in ETSI EN 303 883-2 [2], Annex C and the explanation of the interferer signal handling concept, see ETSI TS 103 567 [i.10].
5.3.5	Receiver unwanted emissions in the spurious domain	-	Unwanted emissions in the spurious domain	NOTE: No EUT category has "receive only" modes.
5.3.6.1	Receiver dynamic range	-	partly by RBS	See ETSI EN 303 883-2, Table C.1 [2].
5.3.6.2	Reciprocal mixing	-	not specified, superseded by RBR test	See justification in ETSI EN 303 883-2 [2], Annex C and the explanation of the interferer signal handling concept, see ETSI TS 103 567 [i.10].
5.3.1	Signal interferer handling	4.4.3 4.4.4	Receiver Baseline Sensitivity (RBS) Receiver Baseline Resilience (RBR)	Interferer signal handling ([i.4] clause 5.3.1) is an alternative method for specifying receiver parameters intended for use for receivers such as UWB and certain types of radar equipment. The present document is following this concept, see ETSI TS 103 567 [i.10] and ETSI EN 303 883-2 [2].

Annex C (informative): Equipment Category: Use-Case, wanted technical performance criteria and TX and RX-test conditions

The intended use for equipment covered by the present document is based on provided information in ETSI TS 103 789 [4].

The necessary Radar Cross Section is based on Annex D of ETSI TS 103 789 [4].

The conformance test setups were elaborated based on clause 6.1 of ETSI TS 103 789 [4].

Annex D (normative): Interferer for RBR test

D.1 General

The RBR limits in the present document are derived based on ETSI EN 303 883-2 [2], Annex A.

Clause A.2.1.1 of ETSI EN 303 883-2 [2] is referencing to ETSI TS 103 361 [i.8], which includes the list of interferers from which the highest interferer for the in-band and out-of-band test is chosen.

The interferers from Table 7 of ETSI TS 103 361 [i.8], clause 7.6 ("Interferers for mobile (indoor and outdoor) applications") are evaluated for the permitted frequency range of the present document and the highest level is taken as the limit.

This is the worst-case for all possible OFR scenarios.

D.2 Relevant interferers - Frequency Band 6,0 GHz to 8,5 GHz

D.2.1 Relevant interferers

Max. possible OFR: f_L = 6,0, f_H = 8,5 GHz → OFR_{max} = 2,5 GHz, f_c = 7,25 GHz.

From Table 1 of ETSI TS 103 361 [i.8], clause 7.2 ("Complete list of interferers") the relevant interferers can be identified.

Table D.1 lists the relevant interferers.

Table D.1: List of relevant interferers

Radio Service	Freq. Min [MHz]	Freq. Max [MHz]	Centre Freq. [MHz]	max. EIRP [dBm]	Ch. BW [MHz]	Duty cycle
Radiodetermination applications	4 500	7 000	5 725	24	2 500	
Fixed links	5 925	8 500	7 212,5	85	29,65	
Radiodetermination applications	6 000	8 500	7 250	7	2 500	100 %
Fixed (point-to-point)	8 400	8 500	8 450	85		

D.2.2 Limits (all equipment categories)

ETSI TS 103 361 [i.8], clause 7.8 ("Interferers for automotive applications") defines interference power for "Devices inside the surface and not in the passenger area" in Table 13 and "Devices outside the surface or within the passenger area" in Table 15.

Table 15 of ETSI TS 103 361 [i.8] provides the tougher values and is used for all equipment categories (independent of its packaging location) to derive a worst-case limit.

The interference power levels out of Table 15 of ETSI TS 103 361 [i.8] for the relevant interferers (as determined in Table D.1) are listed in Table D.2.

Table D.2: List of interferers (all EUT categories)

Radio Service	Centre Freq. [MHz]	max. EIRP [dBm]	Service group	Total attenuation [dB]	Power @ device [dBm]	Ch. BW [MHz]	Duty cycle
Fixed links	7 212,5	85		170	-85	29,65	
Radiodetermination applications	7 250	7	4	132	-125	2 500	1
Fixed (point-to-point)	8 450	85		171	-86		

The worst-case value is -85 dBm which is defined as the limit for all categories.

D.3 Strong interferers

D.3.1 WAS/RLAN in 5 925 MHz to 6 425 MHz

VLP devices may be introduced to the market with maximum e.i.r.p. for in-band emissions of +14 dBm, see ECC/DEC/(20)/01 [i.3].

NOTE: In addition, Decision (EU) 2022/180 [i.5] was assessed and no stronger SRD interferer was found.

Applying the conditions for mobile interferers (service group 1) from ETSI TS 103 361 [i.8] for the total attenuation yields:

Total attenuation [dB] = Path loss for 2 m [dB] + Wall loss [dB] + Additional loss NLOS [dB]:

= 54 dB + 0 dB + 10 dB = 64 dB

The resulting interferer power at a UWB device with 0 dBi antenna is:

interferer power@device [dBm] = max. e.i.r.p. interferer [dBm] - Total attenuation [dB] = +14 dBm - 64 dB = -50 dBm

D.3.2 Limits (all equipment categories)

The interference power for VLP devices as derived in clause D.3.1 is considered to be representative for any "strong" interferers that may appear in the field.

This value will be used across all equipment types and frequency bands as test limit, for which the EUT needs to fulfil Wanted Technical Performance Criterion 2: A temporary loss of function may occur, but the EUT automatically recovers its normal performance once the interference has ceased.

The limit for all equipment categories is -50 dBm for the frequency band 6,0 GHz to 8,5 GHz.

Annex E (informative): Bibliography

CEPT Report 69: "Report from CEPT to the European Commission in response to the Mandate "Ultra-Wideband technology in view of a potential update of Commission Decision 2007/131/EC" (Report approved on 26 October 2018 by the ECC).

ECC Report 327: "Technical studies for the update of the Ultra Wide Band (UWB) regulatory framework in the band 6.0 GHz to 8.5 GHz".

European Communications Office: "EFIS: ECO Frequency Information System".

History

Document history			
V0.2.3	June 2025	SRdAP process	EV 20250903: 2025-06-05 to 2025-09-03