ETSI EN 302 065-2 V2.1.1 (2016-11)

Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 2: Requirements for UWB location tracking

Reference

REN/ERM-TGUWB-139

Keywords

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Contents

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Foreword

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

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.18] 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.15].

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

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.17].

National transposition dates	
Date of adoption of this EN:	18 July 2016
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Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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

1 Scope

The present document applies to transceivers, transmitters and receivers utilizing Ultra WideBand (UWB) technologies and used for location tracking purposes.

The present document applies to impulse, modified impulse and RF carrier based UWB communication technologies.

The present document applies to fixed, mobile or portable applications, e.g. the present document applies to the following equipment types:

- stand-alone radio equipment with or without its own control provisions;
- plug-in radio devices intended for use with, or within, a variety of host systems, e.g. personal computers, hand-held terminals, etc.;
- plug-in radio devices intended for use within combined equipment, e.g. cable modems, set-top boxes, access points, etc.;
- combined equipment or a combination of a plug-in radio device and a specific type of host equipment.

The present document applies to UWB equipment with an output connection used with a dedicated antenna or UWB equipment with an integral antenna.

The present document covers three different types of location tracking system, which may use either of the UWB technologies listed previously:

- **LT1 systems**: These systems, operating in the 6 GHz to 9 GHz region (see CEPT Report 45 [i.13]), are intended for general location tracking of people and objects. They operate on an unlicensed basis. The transmitting terminals in these systems are mobile (indoors or outdoors), or fixed (indoors only). Fixed outdoor LT1 transmitters are not permitted. Typically, LT1 transmitters are mobile location tracking tags which are attached to people or objects, and tags are tracked using a fixed receiver infrastructure to only receive the UWB emission emitted by the tags, ETSI EG 201 399 [i.1].
- **LT2 systems**: These systems, operating in the 3,1 GHz to 4,8 GHz region (see ECC/REC(11)09 [i.8]), are intended for person and object tracking and industrial applications at well-defined locations. The transmitting terminals in these systems may be located indoors or outdoors, and may be fixed or mobile. They operate at fixed sites and may be subject to registration and authorization, provided local coordination with possible interference victims has been performed, ECC Report 167 [i.10] and ECC Report 170 [i.11].
- **LAES systems**: These systems, operating in the 3,1 GHz to 4,8 GHz region (see ECC/REC(11)10 [i.9]), are intended for tracking staff belonging to the fire and other emergency services, who need to work in dangerous situations. Being able to track such people, even when deep inside a building, provides an important enhancement to command and control and to their personal safety. Typically, an LAES system is deployed temporarily at the scene of a fire or other emergency in a building. Licences may be required for user organization, ECC Report 167 [i.10] and ECC Report 170 [i.11].

Some individual location tracking devices may be able to operate within different kinds of location tracking systems, and therefore may meet (in different modes) the requirements of any or all of LT1, LT2 and LAES.

The present document does not cover UWB transmitters whose authorization to operate depends solely on the tests set out in the present document and which are installed or used in flying models, aircraft and other forms of aviation. Furthermore, it does not cover LT1 UWB transmitters that are operated on board a road or rail vehicle running on a public network or highway.

The permitted frequency ranges of operation for the various device types covered by the present document are given in table 1.

Table 1: Operating frequency bands

Device type	Mode	Permitted range of operation	Intended range of operation (preferred range of Operational Bandwidth) (see note 1)
LT1	Transmit	30 MHz to 10,6 GHz (note 2)	6,0 GHz to 9 GHz
	Receive	30 MHz to 10,6 GHz	6,0 GHz to 9 GHz
LAES	Transmit	30 MHz to 10,6 GHz (note 3)	3,1 GHz to 4,8 GHz
	Receive	30 MHz to 10,6 GHz	3,1 GHz to 4,8 GHz
LT2	Transmit	30 MHz to 10,6 GHz (note 4)	3,1 GHz to 4,8 GHz
	Receive	30 MHz to 10,6 GHz	3,1 GHz to 4,8 GHz
NOTE 1: This is the preferred range for the operating bandwidth, as defined in clause 4.3.1.			
NOTE 2: Limits in table 2 (clause 4.3.2.3) and table 5 (clause 4.3.3.3) are to be met.			
NOTE 3: Limits in table 3 (clause 4.3.2.3) and table 6 (clause 4.3.3.3) are to be met.			
NOTE 4: Limits in table 4 (clause 4.3.2.3) and table 7 (clause 4.3.3.3) are to be met.			

2 References

2.1 Normative references

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

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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

[1] ETSI TS 102 754 (V1.3.1) (03-2013): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Technical characteristics of Detect And Avoid (DAA) mitigation techniques for SRD equipment using Ultra Wideband (UWB) technology".

[2] ETSI EN 303 883 (V1.1.1) (09-2016): "Short Range Devices (SRD) using Ultra Wide Band (UWB); Measurement Techniques".

[3] 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".

[4] Void.

2.2 Informative references

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

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI EG 201 399 (V2.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive".

[i.2] Void.

[i.3] Void.

[i.4] CEPT ECC/DEC/(06)04 of 24 March 2006 amended 9 December 2011: "The harmonised conditions for devices using Ultra-Wideband (UWB) technology in bands below 10.6 GHz".

[i.5] Commission Decision 2007/131/EC of 21 February 2007 on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community (notified under document number C(2007) 522).

[i.6] ECC Report 120 (March 2008): "ECC Report on Technical requirements for UWB DAA (Detect and avoid) devices to ensure the protection of radiolocation in the bands 3.1-3.4 GHz and 8.5-9 GHz and BWA terminals in the band 3.4 - 4.2 GHz".

[i.7] Void.

[i.8] ECC Recommendation (11)09 on UWB Location Tracking Systems Type 2 (LT2), October 2011.

[i.9] ECC Recommendation (11)10 on Location Tracking Application for Emergency and Disaster Situations, October 2011.

[i.10] ECC Report 167 (May 2011): "The Practical Implementation of Registration/Coordination Mechanism for UWB LT2 (Location Tracking Type 2) Systems".

[i.11] ECC Report 170 (October 2011): "ECC Report on Specific UWB Applications in the Bands 3.4 - 4.8 GHz and 6 - 8.5 GHz Location Tracking Applications for Emergency Services (LAES), Location Tracking Applications Type 2 (LT2) and Location Tracking and Sensor Applications for Automotive and Transportation Environments (LTA)".

[i.12] Void.

[i.13] CEPT Report 45: "Report from CEPT to the European Commission in response to the Fifth Mandate to CEPT on ultra-wideband technology to clarify the technical parameters in view of a potential update of Commission Decision 2007/131/EC; Report approved on 21 June 2013 by the ECC".

[i.14] Commission Decision 2014/702/EU of 7 October 2014 amending Decision 2007/131/EC on allowing the use of the radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community (notified under document C(2014) 7083).

[i.15] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

[i.16] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

[i.17] ETSI EN 302 065-1 (V.2.1.0): "Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Requirements for Generic UWB applications".

[i.18] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

3 Definitions, symbols and abbreviations

3.1 Definitions

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

transmitter off time: time interval between two consecutive bursts when the UWB emission is kept idle

transmitter on time: duration of a burst irrespective of the number of pulses contained

3.2 Symbols

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

d	distance
k	coverage factor
φ	azimuth angle
Toff	transmitter off time
Ton	transmitter on time

3.3 Abbreviations

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

CEPT	European Conference of Postal and Telecommunications Administrations
NF	Noise Figure

4 Technical requirements specifications

4.1 Environmental conditions

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the manufacturer. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

The normal test conditions are defined in clause 5.4.3 of ETSI EN 303 883 [2].

4.2 General

UWB devices in the scope of the present document can operate in a broad permitted range of frequencies from 30 MHz to 10,6 GHz, as defined in table 1 of the present document. The intended range of operation gives the preferred range of operating frequencies for the UWB operation based on the allowed spectrum mask with increase permitted emission levels in the intended range of operation. In order to clearly identify the required limits and thus measurement procedures it is essential to define the operating bandwidth of the UWB equipment under test, The operating bandwidth of the UWB equipment under test shall be the -10 dBc bandwidth of the intended UWB signal under normal operational conditions as defined in ETSI EN 303 883 [2], clause 5.4.3. A single UWB device can have more than one operating bandwidth.

The basic concept is depicted in figure 1. Here two separate operating bandwidths are depicted, one with a UWB operating bandwidth in the lower frequency range and one in the upper frequency range. All UWB related emissions shall be measured in the identified operating bandwidth of the UWB device under test. The required mitigation techniques are only valid in the operating bandwidth.