

---

**Elektromagnetna združljivost in zadeve v zvezi z radijskim spektrom (ERM) -  
Naprave kratkega dosega (SRD), ki uporabljajo ultra širokopasovno (UWB)  
tehnologijo za komuniciranje - Harmonizirani EN, ki zajema bistvene zahteve člena  
3.2 direktive R&TTE- 2. del: Zahteve za ultra širokopasovno (UWB) sledenje**

Electromagnetic compatibility and Radio spectrum Matters (ERM) - Short Range Devices (SRD) using Ultra Wide Band technology (UWB) for communications purposes - Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive - Part 2: Requirements for UWB location tracking

**(standards.iteh.ai)**

[SIST EN 302 065-2 V1.1.1:2014](https://standards.iteh.ai/catalog/standards/sist/875e8267-f7f5-424f-ba6a-cdc5366c7378/sist-en-302-065-2-v1-1-1-2014)

<https://standards.iteh.ai/catalog/standards/sist/875e8267-f7f5-424f-ba6a-cdc5366c7378/sist-en-302-065-2-v1-1-1-2014>

**Ta slovenski standard je istoveten z: EN 302 065-2 Version 1.1.1**

---

**ICS:**

33.060.99	Druga oprema za radijske komunikacije	Other equipment for radiocommunications
33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

**SIST EN 302 065-2 V1.1.1:2014**                      **en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 302 065-2 V1.1.1:2014

<https://standards.iteh.ai/catalog/standards/sist/875e8267-f7f5-424f-ba6a-cdc5366c7378/sist-en-302-065-2-v1-1-1-2014>

# ETSI EN 302 065-2 V1.1.1 (2014-04)



Harmonized European Standard

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Short Range Devices (SRD) using  
Ultra Wide Band technology (UWB);  
Harmonized EN covering the essential requirements  
of article 3.2 of the R&TTE Directive;  
Part 2: Requirements for UWB location tracking**

## Reference

---

DEN/ERM-TGUWB-017

## Keywords

---

radio, regulation, SRD, testing, 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 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 302 065-2 V1.1.1:2014<https://standards.iteh.ai/catalog/standards/sist/875e8267-f7f5-424f-ba6a-cdc5366c7377/ETSI-EN-302-065-2-v1-1-1-2014>**Important notice**

The present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (PDF) version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

[http://portal.etsi.org/chaicor/ETSI\\_support.asp](http://portal.etsi.org/chaicor/ETSI_support.asp)

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2014.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**GSM®** and the GSM logo are Trade Marks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	5
Foreword.....	5
Introduction .....	6
1 Scope .....	7
2 References .....	8
2.1 Normative references .....	8
2.2 Informative references.....	8
3 Definitions, symbols and abbreviations .....	9
3.1 Definitions .....	9
3.2 Symbols.....	11
3.3 Abbreviations .....	11
4 Technical requirements specification.....	11
4.1 Technical requirements .....	11
4.1.1 Mean power spectral density .....	11
4.1.1.1 Definition .....	11
4.1.1.2 Test procedure.....	12
4.1.1.3 Limit.....	12
4.1.1.4 Additional measurement for LT2 fixed outdoor terminals.....	13
4.1.1.5 Additional site registration requirements for LT2 and LAES terminals .....	13
4.1.2 Maximum value of peak power .....	13
4.1.2.1 Definition .....	13
4.1.2.2 Test procedure.....	13
4.1.2.3 Limit.....	13
4.1.3 Other Emissions .....	15
4.1.3.1 Definition .....	15
4.1.3.2 Test procedure.....	15
4.1.3.3 Limit.....	15
4.1.4 Receiver spurious emissions .....	15
4.1.4.1 Definition .....	15
4.1.4.2 Test procedure.....	15
4.1.4.3 Limit.....	15
4.1.5 Detect-And-Avoid (DAA) .....	15
4.1.5.1 Introduction .....	15
4.1.5.2 Test procedure.....	15
4.1.5.3 Limit.....	15
4.1.6 Low Duty Cycle (LDC) .....	15
4.1.6.1 Definitions.....	15
4.1.6.2 Test procedure.....	16
4.1.6.3 Limits .....	16
4.1.7 Equivalent mitigation techniques.....	16
5 Essential radio test suites.....	16
5.1 Product information.....	16
5.2 Requirements for the test modulation.....	16
5.3 Test conditions, power supply and ambient temperatures .....	17
5.4 Choice of equipment for test suites .....	17
5.5 Testing of host connected equipment and plug-in radio devices .....	17
5.6 Interpretation of the measurement results .....	17
5.7 Other emissions .....	17
6 Test procedures for essential radio test suites .....	17
6.1 General .....	17
6.1.1 Maximum mean power spectral density .....	17
6.1.2 Maximum peak power .....	17

6.1.3	Other emissions .....	18
6.1.4	Receiver spurious emissions .....	18
6.1.5	Low Duty Cycle.....	18
6.1.6	Detect-and-Avoid (DAA) .....	18
<b>Annex A (normative):</b>	<b>HS Requirements and conformance Test specifications Table (HS-RTT).....</b>	<b>19</b>
<b>Annex B (informative):</b>	<b>Bibliography.....</b>	<b>21</b>
History .....		22

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 302 065-2 V1.1.1:2014](https://standards.iteh.ai/catalog/standards/sist/875e8267-f7f5-424f-ba6a-cdc5366c7378/sist-en-302-065-2-v1-1-1-2014)

<https://standards.iteh.ai/catalog/standards/sist/875e8267-f7f5-424f-ba6a-cdc5366c7378/sist-en-302-065-2-v1-1-1-2014>

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is 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 Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, 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.

## Foreword

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

The present document has been produced by ETSI in response to mandate M/407 issued from the European Commission under Directive 98/34/EC [i.2] as amended by Directive 98/48/EC [i.12].

The title and reference to the present document are intended to be included in the publication in the Official Journal of the European Union of titles and references of Harmonized Standard under the Directive 1999/5/EC [i.3].

See article 5.1 of Directive 1999/5/EC [i.3] for information on presumption of conformity and Harmonized Standards or parts thereof the references of which have been published in the Official Journal of the European Union.

The requirements relevant to Directive 1999/5/EC [i.3] are summarized in annex A.

Equipment covered by the present document operates in accordance with ECC/DEC(06)04 [i.4] "The harmonised conditions for devices using Ultra-Wideband (UWB) technology in bands below 10,6 GHz" in road and railway vehicles.

The present document is part 2 of a multi-part deliverable covering Short Range Devices (SRD) using Ultra Wide Band technology (UWB), as identified below:

- Part 1: "Requirements for Generic UWB applications";
- Part 2: "Requirements for UWB location tracking";**
- Part 3: "Requirements for UWB devices for road and rail vehicles".

### National transposition dates

Date of adoption of this EN:	8 April 2014
Date of latest announcement of this EN (doa):	31 July 2014
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2015
Date of withdrawal of any conflicting National Standard (dow):	31 January 2016

---

## Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive [i.3]. The modular structure is shown in EG 201 399 [i.1].

### UWB Technologies

The present document provides a generic set of technical requirements covering many different types of UWB technologies used for location tracking purposes. These UWB technologies can be broken down into two groups:

- 1) Impulse based technologies; and
- 2) RF carrier based technologies.

The following clauses give a brief overview of these UWB technologies and their associated modulation techniques. In both cases, measurements of the UWB signals can be used to determine location-related properties of the signal, such as time-of-arrival, angle-of-arrival and signal strength, which can be used in turn to ascertain the location of a transmitter relative to the receiver.

- **Impulse technology**

Impulse derived UWB technology consists of a series of impulses created from a dc voltage step whose rise time can be modified to provide the maximum useful number of spectral emission frequencies. This derived impulse can then be suitably modified by the use of filters to locate the resulting waveform within a specific frequency spectrum range. This filter can be a standalone filter or incorporated into an antenna design to reduce emissions outside the designated frequency spectrum.

Modulation techniques include pulse positioning in time, pulse suppression and other techniques to convey information.

- **RF carrier based technology**

RF carrier based UWB technology is based upon classical radio carrier technology suitably modulated by a baseband modulating process. The modulating process should produce a bandwidth in excess of 50 MHz to be defined as UWB.

Different modulating processes are used to transmit data information to the receiver and can consist of a series of single hopping frequencies or multi-tone carriers.



# 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.:

- 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. EG 201 399 [i.11].
- **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.

A summary of the radio bands in which these radio equipment types are capable of operating is given in table 1.

Table 1: Operating frequency bands

Device type	Mode	Operating frequency bands
LT1	Transmit	6,0 GHz to 9 GHz
	Receive	6,0 GHz to 9 GHz
LT2	Transmit	3,1 GHz to 4,8 GHz
	Receive	3,1 GHz to 4,8 GHz
LAES	Transmit	3,1 GHz to 4,8 GHz
	Receive	3,1 GHz to 4,8 GHz

## 2 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.

### 2.1 Normative references

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

- [1] ETSI TS 102 754 (V1.2.1) (11-2008): "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 TS 102 883 (V1.1.1) (08-2012): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) using Ultra Wide Band (UWB); Measurement Techniques".

### 2.2 Informative references

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] Directive 1998/34/EC as amended by 1998/48/EC the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.
- [i.3] 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.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).

NOTE: This EC Decision is currently under revision based on CEPT Report 45 [i.13] and amended ECC/DEC(06)04 [i.4]. The new EC/DEC revision is expected within 2014.

- [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] Decision 2009/343/EC amending decision 2007/131/EC on allowing the use of radio spectrum for equipment using ultra-wideband technology in a harmonised manner in the Community.
- NOTE: This EC Decision is currently under revision based on CEPT Report 45 [i.13] and amended ECC/DEC(06)04 [i.4]. The new EC/DEC revision is expected within 2014.
- [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] Directive 98/48/EC of the European Parliament and of the Council of 20 July 1998 amending Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulations.
- [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".

(standards.iteh.ai)

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**avoidance level:** maximum amplitude to which the UWB transmit power is set for the relevant protection zone

**combined equipment:** any combination of non-radio equipment and a plug-in radio device that would not offer full functionality without the radio device

**dedicated antenna:** removable antenna supplied and tested with the radio equipment, designed as an indispensable part of the equipment

**default avoidance bandwidth:** portion of the victim service bandwidth to be protected if no enhanced service bandwidth identification mechanisms are implemented in the DAA enabled devices

**detect and avoid time:** time duration between a change of the external RF environmental conditions and adaptation of the corresponding UWB operational parameters

**detection probability:** probability that the DAA enabled UWB radio device reacts appropriately to a signal detection threshold crossing within the detect and avoid time

**effective radiated power (e.r.p.):** product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction

**equivalent isotropically radiated power (e.i.r.p.):** product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain)