



**Short Range Devices;  
Transport and Traffic Telematics (TTT);  
Radar equipment operating in the 76 GHz to 77 GHz range;  
Harmonised Standard covering the essential requirements  
of article 3.2 of the Directive 2014/53/EU;  
Part 2: Fixed infrastructure radar equipment**

*PRE-REVIEW*  
*https://standards.etsi.org/standards-search/48-a07b-4244-92ec-c5d46c00-59/et301091-2-v2-1-2017-01*

---

Reference

REN/ERM-TGSRR-72

---

Keywords

Harmonised standard, radio, radar, testing

**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

---

**Important notice**

The present document can be downloaded from:  
<http://www.etsi.org/standards-search>

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  
<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:  
<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**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 2016.  
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
Modal verbs terminology.....	5
1 Scope .....	6
2 References .....	7
2.1 Normative references .....	7
2.2 Informative references.....	7
3 Definitions, symbols and abbreviations .....	8
3.1 Definitions.....	8
3.2 Symbols.....	8
3.3 Abbreviations .....	8
4 Technical requirements specifications .....	8
4.1 Environmental conditions.....	8
4.2 General .....	8
4.2.1 General requirements.....	8
4.2.2 Wanted performance criteria.....	9
4.2.3 Fixed and scanning antennas .....	9
4.3 Transmitter Conformance Requirements.....	9
4.3.1 Operating Frequency Range .....	9
4.3.1.1 Applicability.....	9
4.3.1.2 Description .....	9
4.3.1.3 Limits .....	9
4.3.1.4 Conformance.....	9
4.3.2 Mean Power .....	9
4.3.2.1 Applicability.....	9
4.3.2.2 Description .....	9
4.3.2.3 Limits .....	9
4.3.2.4 Conformance.....	10
4.3.3 Peak Power .....	10
4.3.3.1 Applicability.....	10
4.3.3.2 Description .....	10
4.3.3.3 Limits .....	10
4.3.3.4 Conformance.....	10
4.3.4 Unwanted emissions in the out-of-band domain.....	10
4.3.4.1 Applicability.....	10
4.3.4.2 Description .....	10
4.3.4.3 Limits .....	11
4.3.4.4 Conformance.....	11
4.3.5 Unwanted emissions in the spurious domain .....	11
4.3.5.1 Applicability.....	11
4.3.5.2 Description .....	11
4.3.5.3 Limits .....	11
4.3.5.4 Conformance.....	11
4.4 Receiver Conformance Requirements .....	12
4.4.1 Introduction.....	12
4.4.2 Receiver spurious emissions .....	12
4.4.2.1 Applicability.....	12
4.4.2.2 Description .....	12
4.4.2.3 Limits .....	12
4.4.2.4 Conformance.....	12
4.4.3 Receiver in-band, out-of-band and remote-band signals handling.....	13
4.4.3.1 Applicability.....	13
4.4.3.2 Description .....	13
4.4.3.3 Limits .....	13
4.4.3.4 Conformance.....	13

4.4.4	Receiver sensitivity .....	13
5	General considerations for performing the tests.....	13
6	Test setup and procedures .....	13
7	Conformance methods of measurement for transmitter and receiver.....	13
<b>Annex A (normative):</b>	<b>Relationship between the present document and the essential requirements of Directive 2014/53/EU .....</b>	<b>14</b>
<b>Annex B (informative):</b>	<b>Bibliography .....</b>	<b>15</b>
<b>Annex C (informative):</b>	<b>Change History .....</b>	<b>16</b>
History .....		17

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

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/baf64a48-a07b-4244-92ec-c5dd6c08fa59/etsi-en-301-091-2-v2.1.1-2017-01>

## 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 (<https://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 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 standards EN Approval Procedure.

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.2].

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

The present document is part 2 of a multi-part deliverable covering Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices; Transport and Traffic Telematics (TTT); Radar equipment operating in the 76 GHz to 77 GHz range, as identified below:

- Part 1: "Ground based vehicular radar";
- Part 2: "Fixed infrastructure radar equipment";**
- Part 3: "Railway/Road Crossings obstacle detection system applications".

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

<b>Proposed national transposition dates</b>	
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 applies to radar equipment for fixed infrastructure Transport and Traffic Telematic (TTT) applications in the frequency range from 76 GHz to 77 GHz. It covers integrated transceivers and separate transmit/receive modules.

The present document applies to:

- equipment with an integral antenna;
- equipment operating in the frequency range from 76 GHz to 77 GHz.

The present document does not necessarily include all the characteristics which may be required by a user, nor does it necessarily represent the optimum performance achievable.

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

**Table 1: Permitted range of operation [i.1]**

Permitted range of operation	
Transmit	76 GHz to 77 GHz
Receive	76 GHz to 77 GHz

The present document contains requirements to demonstrate that radio equipment both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference.

In case of differences (for instance concerning special conditions, definitions, abbreviations) between the present document and ETSI EN 303 396 [1], the provisions of the present document take precedence.

iTeh STANDARD PREVIEW  
 (standards.iteh.ai)  
 Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/b64a48-2-7b-4244-92ec-c5dd6c08fa59/etsi-en-301-091-2-v2-1-0-2017-01>

---

## 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 EN 303 396 (V1.1.0) (04-2016): " Short Range Devices; Measurement Techniques for automotive and surveillance radar equipment".

### 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] EC Decision 2013/752/EU: Commission implementing Decision of 11 December 2013 amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2005/928/EC.
- [i.2] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.
- [i.3] CEPT/ERC/REC 74-01: "Unwanted emissions in the spurious domain".
- [i.4] ETSI EG 203 336: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".
- [i.5] 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.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.

---

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI EN 303 396 [1] and the following apply:

**pulse radars:** EUTs, which determine distance (range) by the time-of-flight of short radar pulses which are not frequency modulated

### 3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 303 396 [1] and the following apply:

D antenna scan duty factor

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 303 396 [1] and the following apply:

e.r.p equivalent radiated power

---

## 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 supplier. 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 and extreme test conditions are defined in clause 4.4.3 and 4.4.4 of ETSI EN 303 396 [1]

### 4.2 General

#### 4.2.1 General requirements

In this clause all general considerations for the testing of radar equipment for applications in the frequency range from 76 GHz to 77 GHz are given. The tests covers integrated transceivers and separate transmit/receive modules.

All operating bandwidths of the equipment (see clause 4.3.1) shall be declared by the equipment manufacturer (See clause 4.2 of ETSI EN 303 396 [1]).

Where equipment has more than one operating bandwidths, sufficient number of operating bandwidths shall be chosen for testing so as to encompass the lower and higher limits of the operating frequency and the minimum and maximum bandwidth.

The EUT modulation during testing should be representative of normal use of the equipment. The manufacturer shall employ the mode of operation of the equipment which results in the highest transmitter activity consistent with the requirement to measure the highest power transmission which would be available in operation, and should ensure that:

- transmissions occur regularly in time;
- sequences of transmissions can be repeated accurately.

For transmitters that have multi-modulation schemes incorporated, it may be necessary to test each scheme.

The meaning of EUT with scanning/steerable antenna is that the EUT TX antenna pattern is electronically or mechanically adjustable.



## 4.2.2 Wanted performance criteria

The wanted performance criterion is that the EUT shall indicate the properties of a given target at a given distance. Since EUT considered here typically are tailored to specific applications, no single wanted performance criterion can be defined here.

Therefore:

- the relevant properties (e.g. presence, range, relative speed, azimuth angle) shall be declared by the manufacturer.
- the type and RCS of the target and the distance shall be declared by the manufacturer.

## 4.2.3 Fixed and scanning antennas

The provisions of ETSI EN 303 396 [1], clause 4.3.5. apply.

# 4.3 Transmitter Conformance Requirements

## 4.3.1 Operating Frequency Range

### 4.3.1.1 Applicability

This requirement applies to all EUT.

### 4.3.1.2 Description

The description in ETSI EN 303 396 [1], clause 6.2.2 applies.

### 4.3.1.3 Limits

The upper and lower limits of the operating frequency range shall meet the following conditions:

- $f_H \leq 77$  GHz.
- $f_L \geq 76$  GHz.

### 4.3.1.4 Conformance

The conformance test suite for operating frequency range shall be as defined in clause 6.3.2 of ETSI EN 303 396 [1].

Conformance shall be established under normal and extreme test conditions defined in clause 4.1.

The interpretation of the results for the measurements uncertainty shall be as given in clause 4.6 of ETSI EN 303 396 [1].

## 4.3.2 Mean Power

### 4.3.2.1 Applicability

This requirement applies to all EUT.

### 4.3.2.2 Description

The description in ETSI EN 303 396 [1], clause 6.2.5 applies.

### 4.3.2.3 Limits

The mean power shall not be greater than the limits in table 2.