



**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 Directive 2014/53/EU;
Obstacle Detection Radars for Use on Manned Rotorcraft**

*ETSI
STANDARD
PREVIEW
https://standards.etsi.org/standards-search/303360-2f-bd0f-44b3-8167-16f491826403-56-v1.1.1-2017-02*

Reference

DEN/ERM-TGSRR-71

Keywords

harmonised standard, radar, radio, 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
Introduction	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	7
3 Definitions, symbols and abbreviations	7
3.1 Definitions.....	7
3.2 Symbols.....	7
3.3 Abbreviations	8
4 Technical requirements specifications	8
4.1 Environmental conditions.....	8
4.2 General	8
4.2.1 Background information	8
4.2.2 Wanted performance criteria.....	8
4.2.3 Fixed and scanning antennas	8
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 Average power spectral density (mean e.i.r.p. spectral density).....	9
4.3.2.1 Applicability.....	9
4.3.2.2 Description	9
4.3.2.3 Limits	9
4.3.2.4 Conformance.....	9
4.3.3 Peak Power	9
4.3.3.1 Applicability.....	9
4.3.3.2 Description	10
4.3.3.3 Limits	10
4.3.3.4 Conformance.....	10
4.3.4 Power Duty cycle.....	10
4.3.4.1 Applicability.....	10
4.3.4.2 Description	10
4.3.4.3 Limits	10
4.3.4.4 Conformance.....	10
4.3.5 Unwanted emissions in the out-of-band domain.....	10
4.3.5.1 Applicability.....	10
4.3.5.2 Description.....	10
4.3.5.3 Limits	10
4.3.5.4 Conformance.....	11
4.3.6 Unwanted emissions in the spurious domain	11
4.3.6.1 Applicability.....	11
4.3.6.2 Description	11
4.3.6.3 Limits	11
4.3.6.4 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	14
7	Conformance methods of measurement for transmitter and receiver.....	14
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	15
Annex B (informative):	Protection of Radio Astronomy Service.....	16
B.1	General	16
B.2	ECC Decision (16)01, Annex 2: "Protection of Radio Astronomy Service (RAS) sites"	16
Annex C (informative):	Change History	23
History		24

iTeh STANDARD PREVIEW
 (standards.iteh.ai)
 Full standard:
<https://standards.iteh.ai/catalog/standards/sist/3ec03c21-bd0f-44b3-8167-16f491f83264/etsi-en-303-360-v1.1.1-2017-02>

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.7] 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.3].

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.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

Modal verbs terminology

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

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

Introduction

The present document, together with ETSI EN 303 396 [1], covers the assessment of certain types of equipment as defined herein.

1 Scope

The present document specifies technical characteristics and methods of measurements for the following type of equipment:

- Radar equipment for obstacle detection for rotorcraft use fitted with integral antennas operating in the frequency range from 76 GHz to 77 GHz and references CEPT/ERC/ECC Recommendation 70-03 [i.1], Annex 5 and Commission Decision 2006/771/EC [i.2] as amended.

NOTE 1: The use of the radar equipment is limited to manned rotorcraft for which certification specifications CS-27 [i.9] for small rotorcraft or CS-29 [i.10] for large rotorcraft apply (since pilots need to verify visually the information directly by themselves).

- Short Range Devices (SRD) intended for the use on board rotorcrafts with the application to detect obstacles.

NOTE 2: The intention of the application is to detect obstacles to increase safety for aircrew, passengers and persons on ground by reducing risk of collision with obstacles. It is not considered as a safety of life application.

NOTE 3: Protection to the Radio Astronomy Service as detailed in annex B is applicable for obstacle detection radars for rotorcraft use as described in the present document.

It covers integrated transceivers.

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.

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 (Commission Decision 2006/771/EC [i.2])

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

The present document covers the essential requirements of article 3.2 of Directive 2014/53/EU [i.3] under the conditions identified in annex A.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://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 (V1.1.1) (12-2016): " 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] CEPT/ERC Recommendation 70-03: "Relating to the use of Short Range Devices (SRD)". Annex 5: Road Transport and Traffic Telematics (RTTT).
- [i.2] Commission Decision 2006/771/EC of 9 November 2006 on harmonisation of the radio spectrum for use by short-range devices as amended.
- [i.3] European 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.4] CEPT/ERC/REC 74-01: "Unwanted emissions in the spurious domain".
- [i.5] 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.6] ECC Decision (16)01: "The harmonised frequency range 76-77 GHz, technical characteristics, exemption from individual licensing and free carriage and use of obstacle detection radars for rotorcraft use".
- [i.7] 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.8] ITU Radio regulations.
- [i.9] CS-27: EASA Certification Specification for Small Rotorcraft, Amendment 2, 17 November 2008.
- [i.10] CS-29: EASA Certification Specification for Large Rotorcraft, Amendment 3, 11 December 2012.

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:

helicopter: rotorcraft that, for its horizontal motion, depends principally on its engine-driven motors

rotorcraft: heavier-than-air aircraft that depends principally for its support in flight on the lift generated by one or more rotors

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:

CS	Certification Specification
e.r.p.	equivalent radiated power
e.i.r.p.	equivalent isotropic radiated power
IRAM	Institut de Radioastronomie Millimétrique
RAS	Radio Astronomy Service

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

4.2 General

4.2.1 Background information

In this clause general considerations for the testing of radar applications for the EUT are given.

All operating bandwidths of the equipment (see clause 4.3.1) shall be declared by the equipment manufacturer (see clauses 4.2 and 4.3 of ETSI EN 303 396 [1]).

Where equipment has more than one operating bandwidth, a 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 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 are typically 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 Average power spectral density (mean e.i.r.p. spectral density)

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 6.2.6 applies.

4.3.2.3 Limits

The average power spectral density for EUT shall not be greater than 3 dBm/MHz.

4.3.2.4 Conformance

The conformance test suite for mean power shall be as defined in clause 6.3.5 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].

4.3.3 Peak Power

4.3.3.1 Applicability

This requirement applies to all EUT.

4.3.3.2 Description

The description in ETSI EN 303 396 [1], clause 6.2.4 applies.

4.3.3.3 Limits

The peak power for EUT with fixed beam or scanning antenna shall not be greater than 30 dBm.

4.3.3.4 Conformance

The conformance test suite for peak power shall be as defined in clause 6.3.3 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].

4.3.4 Power Duty cycle

4.3.4.1 Applicability

This requirement applies to all EUT.

4.3.4.2 Description

The description in ETSI EN 303 396 [1], clause 6.2.7 applies.

4.3.4.3 Limits

The power duty cycle for EUT shall not be greater than 56 %/s.

4.3.4.4 Conformance

The conformance test suite for power duty cycle shall be as defined in clause 6.3.6 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].

4.3.5 Unwanted emissions in the out-of-band domain

4.3.5.1 Applicability

This requirement applies to all EUT.

4.3.5.2 Description

The description in ETSI EN 303 396 [1], clause 6.2.11 applies.

4.3.5.3 Limits

The RMS mean power spectral density radiated in the calculated out-of-band domain (between F_1 to f_L and f_H to F_2 band) shall not be greater than the values given in table 2.