

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Active radar target enhancers;
Harmonized EN covering the essential requirements
of article 3.2 of the R&TTE Directive**

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/20f5c4b9-dd6b-4eab-acf8-fde3eca13cb8/etsi-en-302-752-v1.1.1-2009-02>



Reference

DEN/ERM-TG26-080

Keywords

maritime, navigation, radar, radio

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

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the 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

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2008.
All rights reserved.

DECTTM, PLUGTESTSTM, UMTSTM, TIPHONTM, the TIPHON logo and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.

3GPPTM is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

Contents

Intellectual Property Rights	5
Foreword.....	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	7
3 Abbreviations	7
4 Technical requirements	7
4.1 Environmental profile.....	7
4.2 Conformance requirements	8
4.2.1 Radiated emissions	8
4.2.1.1 Definition	8
4.2.1.2 Limits	8
4.2.1.3 Conformance.....	8
4.2.2 Operating frequency	8
4.2.2.1 Definition	8
4.2.2.2 Limits	8
4.2.2.3 Conformance.....	8
4.2.3 Radiated output power	8
4.2.3.1 Definition	8
4.2.3.2 Limits	9
4.2.3.3 Conformance.....	9
4.2.4 Stability	9
4.2.4.1 Definition	9
4.2.4.2 Limits	9
4.2.4.3 Conformance.....	9
4.2.5 Radiated spurious emissions	9
4.2.5.1 Definition	9
4.2.5.2 Limits	9
4.2.5.3 Conformance.....	9
5 Testing for compliance with technical requirements.....	10
5.1 Test conditions, power supply and ambient temperatures	10
5.1.1 Standard operating mode of the RTE equipment.....	10
5.1.2 Normal test conditions	10
5.1.2.1 Normal temperature and humidity	10
5.1.2.2 Normal test power supply	10
5.1.2.2.1 AC test power supply	10
5.1.2.2.2 DC test power supply	10
5.1.3 Extreme test conditions.....	10
5.1.3.1 Extreme temperatures.....	10
5.1.3.1.1 Indoor unit	10
5.1.3.1.2 Outdoor unit	11
5.1.3.2 Extreme power supply voltage test conditions	11
5.1.4 Excitation Signals	11
5.1.4.1 Test Signal for X-Band testing.....	11
5.1.4.2 Test Signal for S-Band testing	11
5.2 Interpretation of the measurement results	11
5.3 Essential radio test suites.....	12
5.3.1 Radiated emissions	12
5.3.2 Operating frequency	12
5.3.3 Radiated output power	13
5.3.4 Stability.....	13
5.3.5 Radiated spurious emissions	14

5.4	Other test specifications	14
Annex A (normative):	HS Requirements and conformance Test specifications Table (HS-RTT).....	15
Annex B (normative):	Radiated measurement.....	17
B.1	Test sites and general arrangements for measurements involving the use of radiated fields	17
B.1.1	Anechoic chamber	17
B.1.2	Anechoic chamber with a ground plane	18
B.1.3	OATS	19
B.1.4	Test antenna.....	20
B.1.5	Substitution antenna	20
B.1.6	Measuring antenna	21
B.2	Guidance on the use of radiation test sites	21
B.2.1	Verification of the test site	21
B.2.2	Preparation of the RTE.....	21
B.2.3	Power supplies to the RTE	21
B.2.4	Void.....	22
B.2.5	Range length.....	22
B.2.6	Site preparation	22
Annex C (informative):	The EN title in the official languages	24
Annex D (informative):	Bibliography	25
History		26

PREVIEW
STANDARD
ETSI
 Full standard:
<https://standards.iteh.ai/catalog/standards/sist/265c4b-dd6b-4eab-acf8-fdc3eca13cb8/etsi-en-302-752-v1.1.1-2009-02>
 (standards.iteh.ai)

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://webapp.etsi.org/IPR/home.asp>).

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 (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [i.4] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [i.1] 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 ("the R&TTE Directive").

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

1 Scope

The present document applies to active radar target enhancers which operate in the frequency range 2 900 MHz to 3 100 MHz and/or 9 300 MHz to 9 500 MHz allocated to the radio navigation service as defined in article 5 of the Radio Regulations [i.2].

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.

The present document is intended to cover the provisions of Directive 1999/5/EC [i.1](R&TTE Directive) article 3.2, which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of Article 3 of the R&TTE Directive [i.1] may apply to equipment within the scope of the present document.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

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

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

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 indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- | | |
|-----|--|
| [1] | CENELEC EN 60945 (Edition 4 - 2002): "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results". |
| [2] | ITU-R Recommendation SM.329-10 (2003): "Unwanted emissions in the spurious domain". |
| [3] | ITU-R Recommendation SM.1541-1 (2002): "Unwanted emissions in the out-of-band domain". |
| [4] | ANSI C63.5 (2006): "American National Standard for Calibration of Antennas Used for Radiated Emission Measurements in Electro Magnetic Interference". |

- [5] ETSI TR 102 273 (V1.2.1) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM);Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties".
- [6] ETSI TR 100 028 (V1.4.1) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [7] IEC 62388: "Maritime navigation and radiocommunication equipment and systems - Shipborne radar - Performance requirements, methods of testing and required test results".
- [8] IEC 62252: "Maritime navigation and radiocommunication equipment and systems - Radar for craft not in compliance with IMO SOLAS Chapter V - Performance requirements, methods of test and required test results".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] 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.2] ITU Radio Regulations (2008).
- [i.3] ITU-R Recommendation M.1176 (1995): "Technical parameters of radar target enhancers".
- [i.4] Directive 98/34/EC of the European Parliament and of the Council laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on information society services.

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CSP	Channel SPacing
e.i.r.p.	equivalent isotropically radiated power
HS	Harmonized Standard
OATS	Open Area Test Site
OoB	Out of Band
RCS	Radar Cross Section
RF	Radio Frequency
RTE	Radar Target Enhancer
VSWR	Voltage Standing Wave Ratio

4 Technical requirements

4.1 Environmental profile

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile which, as a minimum, shall be that specified in the test conditions contained in the present document.

As 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 (which shall also be within the boundary limits of the declared operational environmental profile).

4.2 Conformance requirements

4.2.1 Radiated emissions

4.2.1.1 Definition

Radiated electromagnetic emissions are to be understood as any signals radiated by the completely assembled and operated radar equipment, other than the operating frequency, with its spectra, which can potentially disturb other equipment on the ship, such as radio receivers or rate of turn indicators.

4.2.1.2 Limits

In the frequency range 150 kHz to 2 GHz, the measured radio frequency field strength at a distance of 3 m caused by the RTE shall not exceed the limits shown in table 1.

Table 1: Radiated electromagnetic emission

Frequency range	Measuring Bandwidth	Limits
150 kHz to 300 kHz	9 kHz	10 mV/m to 316 μ V/m (80 dB μ V/m to 52 dB μ V/m)
300 kHz to 30 MHz	9 kHz	316 μ V/m to 50 μ V/m (52 dB μ V/m to 34 dB μ V/m)
30 MHz to 2 GHz	120 kHz	500 μ V /m (54 dB μ V/m)
156 MHz to 165 MHz	9 kHz	16 μ V/m (24 dB μ V/m) quasi peak or 32 μ V /m (30 dB μ V/m) peak

4.2.1.3 Conformance

Conformance tests as defined in clause 5.3.1 shall be carried out.

4.2.2 Operating frequency

4.2.2.1 Definition

Radar target enhancers simply amplify a received signal and then retransmit it at a higher power without any form of frequency translation. The frequency of the input and output signals is always the same (see ITU-R Recommendation M.1176 [i.3]).

4.2.2.2 Limits

The difference in frequency between the input exciting signal and the RTE output signal shall not exceed ± 1 MHz.

4.2.2.3 Conformance

Conformance tests as defined in clause 5.3.2 shall be carried out.

4.2.3 Radiated output power

4.2.3.1 Definition

The radiated output power of the RTE is the maximum RF output including the transmit antenna gain achievable at the point of saturation of the power amplifier.

4.2.3.2 Limits

The maximum radiated output power of the RTE shall be less than 10 W e.i.r.p.

4.2.3.3 Conformance

Conformance tests as defined in clause 5.3.3 shall be carried out.

4.2.4 Stability

4.2.4.1 Definition

This is where the input/output isolation of the RTE equipment is insufficient to prevent parasitic oscillation and should be such that adjacent reflective objects (passing ship or radar reflector on channel bouy) do not induce parasitic oscillation.

4.2.4.2 Limits

There shall be no observable emissions due to parasitic oscillation.

4.2.4.3 Conformance

Conformance tests as defined in clause 5.3.4 shall be carried out.

4.2.5 Radiated spurious emissions

4.2.5.1 Definition

Spurious emissions as described in ITU-R Recommendation SM.329-10 [2] are defined as the entity of all emissions in the frequency range of 70 % of the cut-off frequency of the waveguide to 26 GHz, but outside the OoB-boundaries.

They include:

- harmonic emissions (whole multiples of the operating frequency);
- parasitic emissions (independent, accidentally);
- intermodulation (between oscillator- and operation frequency or between oscillator and harmonics).

4.2.5.2 Limits

Out of band domain emissions do not apply to devices of this power (see ITU-R Recommendation SM.1541-1 [3]) and so only the Spurious domain emission limits will apply to an active reflector. The reflector shall meet the requirements of table 2 of ITU-R Recommendation SM.329-10 [2] with the Category A limits for radiodetermination service equipment.

4.2.5.3 Conformance

Conformance tests as defined in clause 5.3.5 shall be carried out.

5 Testing for compliance with technical requirements

5.1 Test conditions, power supply and ambient temperatures

5.1.1 Standard operating mode of the RTE equipment

Unless otherwise stated the RTE equipment shall be set to the standard operating mode as indicated in the manufacturer's instructions.

5.1.2 Normal test conditions

5.1.2.1 Normal temperature and humidity

The temperature and humidity conditions for tests shall be a combination of temperature and humidity within the following ranges:

- a) temperature: +15 °C to +35 °C; or within the manufacturers stated operating range and stated in the report.
- b) relative humidity: 20 % to 75 %.

When the relative humidity is lower than 20 %, it shall be stated in the test report.

5.1.2.2 Normal test power supply

5.1.2.2.1 AC test power supply

The test voltage for equipment to be connected to an AC supply shall be the nominal mains voltage declared by the manufacturer -10 % to +10 %. For the purpose of the present document, the nominal voltage shall be the declared voltage or any of the declared voltages for which the equipment is indicated as having been designed. The frequency of the test voltage shall be 50 Hz \pm 1 Hz.

5.1.2.2.2 DC test power supply

Where the equipment is designed to operate from a DC source, the normal test voltage shall be the nominal voltage as declared by the manufacturer -10 % to +20 %.

The internal impedance of the test power source shall be low enough for its effect on the test results to be negligible. For the purpose of testing the power source voltage shall be measured at the input terminals of the equipment.

During testing, the power source voltages shall be maintained within a tolerance of ± 3 % relative to the voltage level at the beginning of each test.

5.1.3 Extreme test conditions

5.1.3.1 Extreme temperatures

5.1.3.1.1 Indoor unit

The temperature and humidity conditions for extreme tests shall be a combination of nominal temperature and humidity within the following ranges:

- a) temperature: 0 °C to +40 °C;
- b) relative humidity: 20 % to 75 %.

When the relative humidity is lower than 20 %, it shall be stated in the test report.