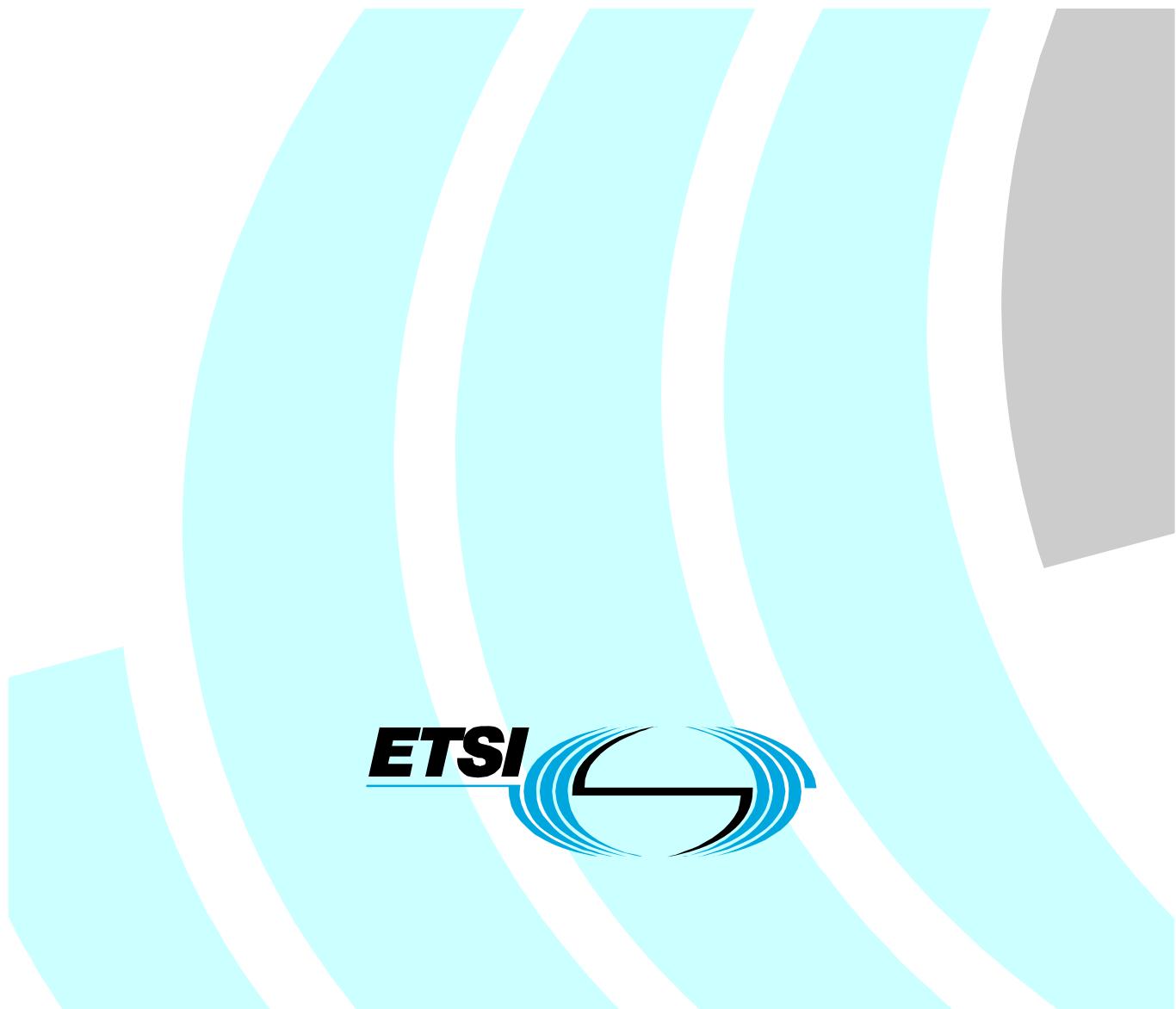


ETSI EN 300 720-1 V1.3.2 (2007-10)

European Standard (Telecommunications series)

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Ultra-High Frequency (UHF) on-board vessels
communications systems and equipment;
Part 1: Technical characteristics and
methods of measurement**



Reference

REN/ERM-TG26-078-1

Keywords

maritime, radio, UHF

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/chaircor/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 2007.
All rights reserved.

DECT™, PLUGTESTS™ and UMTS™ are Trade Marks of ETSI registered for the benefit of its Members.
TIPHON™ and the **TIPHON logo** are Trade Marks currently being registered by ETSI for the benefit of its Members.
3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

Contents

Intellectual Property Rights	7
Foreword.....	7
1 Scope	8
2 References	8
3 Definitions, symbols and abbreviations	8
3.1 Definitions	8
3.2 Symbols	8
3.3 Abbreviations	9
4 General requirements	9
4.1 Construction	9
4.2 Frequencies.....	9
4.3 Controls	10
4.4 Switching time.....	10
4.5 Safety precautions	10
4.6 Class of emission and modulation characteristics	11
4.7 Batteries for portable equipment	11
4.8 Loudspeaker and microphone.....	11
4.9 Labelling.....	11
4.10 Equipment documentation.....	11
5 Test conditions, power sources and ambient temperatures	11
5.1 Normal end extreme test conditions	11
5.2 Test power source.....	11
5.3 Normal test conditions.....	12
5.3.1 Normal temperature and humidity.....	12
5.3.2 Normal test voltage	12
5.3.2.1 Battery power source.....	12
5.3.2.2 Other power sources.....	12
5.4 Extreme test conditions	12
5.4.1 Extreme temperatures	12
5.4.1.1 Upper extreme temperature.....	12
5.4.1.2 Lower extreme temperature	12
5.4.2 Extreme test power supply values.....	12
5.4.2.1 Upper extreme test voltage - Portable equipment	12
5.4.2.2 Lower extreme test voltage - Portable equipment	12
5.4.2.3 Extreme test voltages - Other equipment	13
5.5 Procedure for tests at extreme temperatures	13
6 General conditions of measurement	13
6.1 Test connections	13
6.2 Arrangements for test signals	13
6.2.1 Test signals applied to the transmitter input	13
6.2.2 Test signals applied to the antenna terminal	14
6.3 Receiver mute or squelch facility	14
6.4 Normal test modulation	14
6.5 Artificial antenna	14
6.6 Test channels	14
6.7 Measurement uncertainty and interpretation of the measuring results	15
6.7.1 Measurement uncertainty.....	15
6.7.2 Interpretation of the measurement results	15
7 Environmental tests	16
7.1 Procedure.....	16
7.2 Performance check	16
7.3 Drop test on to a hard surface - Portable equipment	16

7.3.1	Definition.....	16
7.3.2	Method of measurement	17
7.3.3	Requirement.....	17
7.4	Temperature tests	17
7.4.1	General.....	17
7.4.2	Dry heat	17
7.4.2.1	Method of measurement.....	17
7.4.2.2	Requirement	17
7.4.3	Damp heat.....	18
7.4.3.1	Method of measurement.....	18
7.4.3.2	Requirement	18
8	Transmitter	18
8.1	Frequency error	18
8.1.1	Definition.....	18
8.1.2	Method of measurement	18
8.1.3	Limits.....	18
8.2	Maximum effective radiated power.....	18
8.2.1	Definition.....	18
8.2.2	Method of measurement	19
8.2.3	Limit	19
8.3	Frequency deviation	19
8.3.1	Definition.....	19
8.3.2	Maximum frequency deviation	20
8.3.2.1	Method of measurement.....	20
8.3.2.2	Limit.....	20
8.3.3	Frequency deviation at modulation frequencies above 3 kHz	20
8.3.3.1	Method of measurement.....	20
8.3.3.2	Limits	20
8.4	Limitation characteristics of the modulator.....	21
8.4.1	Definition.....	21
8.4.2	Method of measurement	21
8.4.3	Limit	21
8.5	Sensitivity of the modulator, including microphone (except for repeater equipment)	22
8.5.1	Definition.....	22
8.5.2	Method of measurement	22
8.5.3	Limit	22
8.6	Audio frequency response	22
8.6.1	Definition.....	22
8.6.2	Method of measurement	22
8.6.3	Limit	23
8.7	Audio frequency harmonic distortion of the emission.....	23
8.7.1	Definition.....	23
8.7.2	Method of measurement	24
8.7.3	Limit	24
8.8	Adjacent channel power	24
8.8.1	Definition.....	24
8.8.2	Method of measurement	24
8.8.3	Limit	25
8.9	Residual modulation of the transmitter	25
8.9.1	Definition.....	25
8.9.2	Method of measurement	25
8.9.3	Limit	25
8.10	Transient frequency behaviour of the transmitter.....	25
8.10.1	Definition.....	25
8.10.2	Method of measurement	26
8.10.3	Limits.....	27
8.11	Conducted spurious emissions conveyed to the antenna	29
8.11.1	Definition.....	29
8.11.2	Method of measurement	29
8.11.3	Limit	29
8.12	Cabinet radiation and conducted spurious emissions other than those conveyed to the antenna	29

8.12.1	Definitions	29
8.12.2	Method of measurement	29
8.12.3	Limits.....	30
9	Receiver.....	31
9.1	Harmonic distortion and rated audio frequency output power	31
9.1.1	Definition.....	31
9.1.2	Methods of measurement.....	31
9.1.3	Limits.....	31
9.2	Audio frequency response	31
9.2.1	Definition.....	31
9.2.2	Method of measurement	32
9.2.3	Limits.....	32
9.3	Maximum usable sensitivity.....	33
9.3.1	Definition.....	33
9.3.2	Method of measurement	34
9.3.3	Limits.....	34
9.4	Co-channel rejection.....	34
9.4.1	Definition.....	34
9.4.2	Method of measurement	34
9.4.3	Limit	34
9.5	Adjacent channel selectivity.....	35
9.5.1	Definition.....	35
9.5.2	Method of measurement	35
9.5.3	Limits.....	35
9.6	Spurious response rejection.....	35
9.6.1	Definition.....	35
9.6.2	Method of measurement	35
9.6.3	Limit	36
9.7	Intermodulation response	36
9.7.1	Definition.....	36
9.7.2	Method of measurement	36
9.7.3	Limit	36
9.8	Blocking or desensitization	36
9.8.1	Definition.....	36
9.8.2	Method of measurement	37
9.8.3	Limit	37
9.9	Conducted spurious emissions conveyed to the antenna	37
9.9.1	Definition.....	37
9.9.2	Method of measurement	37
9.9.3	Limit	37
9.10	Radiated spurious emissions.....	37
9.10.1	Definition.....	37
9.10.2	Method of measurements.....	38
9.10.3	Limit	38
Annex A (normative):	Measuring receiver for adjacent channel power measurement.....	39
A.1	Power measuring receiver specification.....	39
A.1.1	IF filter	39
A.1.2	Attenuation indicator.....	40
A.1.3	RMS value indicator.....	40
A.1.4	Oscillator and amplifier.....	40
Annex B (normative):	Radiated measurement.....	41
B.1	Test sites and general arrangements for measurements involving the use of radiated fields	41
B.1.1	Anechoic chamber.....	41
B.1.2	Anechoic chamber with a ground plane	42
B.1.3	OATS	43
B.1.4	Test antenna.....	44
B.1.5	Substitution antenna	44
B.1.6	Measuring antenna	45

B.2	Guidance on the use of radiation test sites	45
B.2.1	Verification of the test site	45
B.2.2	Preparation of the EUT.....	45
B.2.3	Power supplies to the EUT.....	45
B.2.4	Volume control setting for analogue speech tests	45
B.2.5	Range length.....	46
B.2.6	Site preparation	46
Annex C (informative):	Bibliography.....	48
History		49

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 European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 1 of a multi-part deliverable covering Ultra-High Frequency (UHF) on-board vessels communications systems and equipment, as identified below:

Part 1: "Technical characteristics and methods of measurement";

Part 2: "Harmonized EN under article 3.2 of the R&TTE Directive".

National transposition dates	
Date of adoption of this EN:	28 September 2007
Date of latest announcement of this EN (doa):	31 December 2007
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2008
Date of withdrawal of any conflicting National Standard (dow):	30 June 2008

1 Scope

The present document specifies the minimum technical characteristics required for UHF on board vessels radio equipment and systems operating on frequencies allocated to the maritime mobile services by the ITU Radio Regulations [6].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- 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.
- For a non-specific reference, the latest version 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.

- [1] ITU-R Recommendation M.1174-2: "Technical characteristics of equipment used for on-board vessel communications in the bands between 450 and 470 MHz".
- [2] ITU-T Recommendation O.41 (1994): "Psophometer for use on telephone-type circuits".
- [3] ISO 694: "Ships and marine technology - Positioning of magnetic compasses in ships".
- [4] ANSI C63.5 (2006): "American National Standard for Electromagnetic Compatibility - Radiated Emission Measurements in Electromagnetic Interference (EMI) Control - Calibration of Antennas (9 kHz to 40 GHz)".
- [5] ITU-R Recommendation SM.332-4: "Selectivity of receivers".
- [6] ITU Radio Regulations (2004).

3 Definitions, symbols and abbreviations

3.1 Definitions

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

integral antenna: antenna designed as a fixed part of the equipment, without the use of an external connector and as such which can not be disconnected from the equipment by the user

modulation index: ratio between the frequency deviation and the modulation frequency

3.2 Symbols

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

dBA acoustic level in dB relative to 2×10^{-5} Pa