

ETSI EN 303 402 V2.1.1 (2017-05)



HARMONISED EUROPEAN STANDARD

**Maritime mobile transmitters and receivers
for use in the MF and HF bands;
Harmonised Standard covering the essential requirements
of articles 3.2 and 3.3(g) of Directive 2014/53/EU**

Reference

DEN/ERM-TG26-520

Keywords

harmonised standard, maritime, radio, regulation,
telephony

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 2017.

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.

oneM2M logo is protected for the benefit of its Members

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

Contents

Intellectual Property Rights	8
Foreword.....	8
Modal verbs terminology.....	8
1 Scope	9
2 References	9
2.1 Normative references	9
2.2 Informative references.....	9
3 Definitions, symbols and abbreviations	10
3.1 Definitions	10
3.2 Symbols.....	11
3.3 Abbreviations	11
4 General requirements	12
4.1 Environmental profile.....	12
4.2 General, operational and technical requirements.....	12
4.2.1 Testing of requirements	12
4.2.2 General requirements.....	12
4.2.2.1 Composition	12
4.2.2.1.1 DSC requirements	12
4.2.2.1.2 Audio frequencies interfaces	13
4.2.2.1.3 DSC Interface	13
4.2.2.1.4 Digital input panels.....	13
4.2.2.1.5 GNSS receiver antenna.....	13
4.2.2.2 Construction	13
4.2.2.3 Controls and indicators	13
4.2.2.3.1 General	13
4.2.2.3.2 Illumination	14
4.2.2.4 Labelling	14
4.2.2.4.1 General	14
4.2.2.4.2 Distress frequencies.....	14
4.2.2.5 Protection against mishandling	15
4.2.3 Operational requirements.....	15
4.2.3.1 Frequency bands	15
4.2.3.1.1 Operating bands.....	15
4.2.3.1.2 MF band	15
4.2.3.1.3 HF bands.....	15
4.2.3.2 Classes of emission	15
4.2.4 Warming up period	15
4.2.4.1 Time	15
4.2.4.2 Heaters	15
4.2.4.3 Heating circuits	16
4.2.4.4 Delay	16
4.2.5 Technical requirements.....	16
4.2.5.1 Distress controls	16
4.2.5.2 Telephony transmit control	16
4.2.5.3 Misuse	16
4.2.5.4 Control panel priority.....	16
4.2.5.5 Manual gain control and Automatic Gain Control (AGC).....	16
4.2.5.6 Output indication.....	16
4.2.5.7 DSC operation.....	16
4.2.5.8 Synthesizer lock	16
4.2.5.9 Channel switching.....	17
5 Test conditions, power sources and ambient temperatures	17
5.1 General	17
5.2 Test power source.....	17

5.3	Normal test conditions.....	17
5.3.1	Normal temperature and humidity	17
5.3.2	Normal test power source	17
5.3.2.1	Mains voltage and frequency	17
5.3.2.2	Secondary battery power sources	17
5.3.2.3	Other power sources.....	18
5.4	Extreme test conditions	18
5.4.1	Extreme temperature tests.....	18
5.4.2	Extreme values of test power source	18
5.4.2.1	Mains voltage and mains frequency.....	18
5.4.2.2	Secondary battery power sources	18
5.4.2.3	Other power sources.....	18
6	General conditions of measurement	18
6.1	Artificial antennas	18
6.1.1	Transmitters	18
6.1.2	Receivers	19
6.2	Standard test signals	19
6.2.1	Test signals applied to the receiver input.....	19
6.2.1.1	Sources	19
6.2.1.2	Levels	19
6.2.2	Normal test signals.....	19
6.2.2.1	General	19
6.2.2.2	Class of emission J3E.....	19
6.2.2.3	Class of emission F1B.....	19
6.2.3	Choice of testing frequencies.....	19
6.2.4	Exclusion bands for emissions testing	20
6.2.4.1	Transmitter exclusion bands.....	20
6.2.4.2	Receiver exclusion bands.....	20
6.2.5	Reference bandwidths for spurious measurements	20
7	Environmental tests	20
7.1	Introduction	20
7.2	Procedure.....	20
7.3	Performance check	21
7.4	Temperature tests	21
7.4.1	Definition.....	21
7.4.2	Dry heat	21
7.4.2.1	Method of measurement.....	21
7.4.2.1.1	Internally mounted equipment.....	21
7.4.2.1.2	Externally mounted equipment.....	22
7.4.2.2	Requirement	22
7.4.3	Damp heat.....	22
7.4.3.1	Method of measurement.....	22
7.4.3.2	Requirement	22
7.4.4	Low temperature cycle.....	22
7.4.4.1	Method of measurement.....	22
7.4.4.1.1	Internally mounted equipment.....	22
7.4.4.1.2	Externally mounted equipment.....	23
7.4.4.2	Requirement	23
7.5	Vibration test.....	23
7.5.1	Definition.....	23
7.5.2	Method of measurement	23
7.5.3	Requirements	24
7.6	Corrosion test	24
7.6.1	Applicability	24
7.6.2	Definition.....	24
7.6.3	Method of measurement	24
7.6.4	Requirements	25
7.7	Rain test.....	25
7.7.1	Applicability	25
7.7.2	Method of measurement	25

7.7.3	Requirements	25
8	Transmitter	26
8.1	Frequency error	26
8.1.1	Definition	26
8.1.2	Method of measurement	26
8.1.3	Limit	26
8.2	Output power and intermodulation products	26
8.2.1	Definition	26
8.2.2	Method of measurement	27
8.2.3	Limits	27
8.2.3.1	Output power in the range 1 606,5 kHz to 4 000 kHz for all modulation modes	27
8.2.3.2	Output power in the range 4 MHz to 27,5 MHz for all modulation modes	27
8.2.3.3	Intermodulation products for SSB telephony modes	27
8.2.3.4	Difference of power of B-state frequency and Y-state frequency	28
8.2.3.5	Output spectrum	28
8.3	Power of out-of-band emissions of SSB telephony	28
8.3.1	Definition	28
8.3.2	Method of measurement	28
8.3.3	Limits	29
8.4	Power of conducted spurious emissions of SSB telephony	29
8.4.1	Definition	29
8.4.2	Method of measurement	29
8.4.3	Limits	29
8.5	Carrier suppression	29
8.5.1	Definition	29
8.5.2	Method of measurement	30
8.5.3	Limit	30
8.6	Unwanted frequency modulation	30
8.6.1	Definition	30
8.6.2	Method of measurement	30
8.6.3	Limit	30
8.7	Sensitivity of the microphone and the 600 Ω line inputs for SSB telephony	30
8.7.1	Definition	30
8.7.2	Method of measurement	31
8.7.3	Limit	31
8.8	Automatic level control and/or limiter for SSB telephony	31
8.8.1	Definition	31
8.8.2	Method of measurement	31
8.8.3	Limit	32
8.9	Audio frequency response of SSB telephony	32
8.9.1	Definition	32
8.9.2	Method of measurement	32
8.9.3	Limit	32
8.10	Residual hum and noise power for telephony	33
8.10.1	Definition	33
8.10.2	Method of measurement	33
8.10.3	Limit	33
8.11	Residual frequency modulation on DSC	34
8.11.1	Definition	34
8.11.2	Method of measurement	34
8.11.3	Limit	34
8.12	Continuous operation on telephony	34
8.12.1	Definition	34
8.12.2	Method of measurement	34
8.12.3	Limits	34
8.13	Protection of transmitter	34
8.13.1	Definition	34
8.13.2	Method of measurement	35
8.13.3	Requirements	35
8.14	Transmitter radiated spurious emissions	35
8.14.1	Definition	35

8.14.2	Method of measurement	35
8.14.3	Limits.....	36
9	Receiver.....	36
9.1	Receiver spurious emissions.....	36
9.1.1	Definition.....	36
9.1.2	Method of measurement	36
9.1.2.1	Conducted antenna port measurement	36
9.1.2.2	Radiated measurement	36
9.1.3	Limits.....	37
9.2	Maximum usable sensitivity.....	37
9.2.1	Definition.....	37
9.2.2	Method of measurement	37
9.2.3	Limits.....	38
9.3	Adjacent signal selectivity.....	38
9.3.1	Definition.....	38
9.3.2	Method of measurement	38
9.3.3	Limits.....	39
9.4	Blocking or desensitization	39
9.4.1	Definition.....	39
9.4.2	Method of measurement	39
9.4.3	Limits.....	40
9.5	Intermodulation response	40
9.5.1	Definition.....	40
9.5.2	Method of measurement	40
9.5.2.1	Class of emission J3E.....	40
9.5.2.2	Class of emission F1B analogue	40
9.5.2.3	Class of Emission F1B digital.....	41
9.5.3	Limits.....	41
9.6	Spurious response rejection ratio.....	41
9.6.1	Definition.....	41
9.6.2	Method of measurement	41
9.6.3	Limits.....	42
9.7	Receiver frequency error.....	43
9.7.1	Definition.....	43
9.7.2	Method of measurement	43
9.7.3	Limit	43
9.8	Unwanted frequency modulation	43
9.8.1	Definition.....	43
9.8.2	Method of measurement	43
9.8.3	Limit	44
9.9	Pass band.....	44
9.9.1	Definition.....	44
9.9.2	Method of measurement	44
9.9.3	Limits.....	44
9.10	Reciprocal mixing	44
9.10.1	Definition.....	44
9.10.2	Method of measurement	44
9.10.3	Limit	45
9.11	Harmonic content in output	45
9.11.1	Definition.....	45
9.11.2	Method of measurement	45
9.11.3	Limits.....	45
9.12	Audio frequency intermodulation.....	45
9.12.1	Definition.....	45
9.12.2	Method of measurement	45
9.12.3	Limit	45
9.13	Internally generated spurious signals	46
9.13.1	Definition.....	46
9.13.2	Method of measurement	46
9.13.3	Limits.....	46
9.14	AGC efficiency	46

9.14.1	Definition.....	46
9.14.2	Method of measurement	46
9.14.2.1	General	46
9.14.2.2	Settings.....	46
9.14.2.3	Increase in Signal-to-Noise Ratio (SNR)	46
9.14.3	Limits.....	46
9.15	AGC time constants (attack and recovery time).....	47
9.15.1	Definition.....	47
9.15.2	Method of measurement	47
9.15.3	Limits.....	47
9.16	Protection of input circuits	47
9.16.1	Definition.....	47
9.16.2	Method of measurement	47
9.16.3	Requirement.....	47
10	Testing for compliance with technical requirements.....	48
10.1	Environmental conditions for testing	48
10.2	Interpretation of the measurement results	48
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	49
Annex B (informative):	Bibliography.....	51
Annex C (informative):	Change history	52
History		53

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

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.12] 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.1].

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 tables A.1 and A.2 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 replaces ETSI EN 300 373-2 [i.10] and ETSI EN 300 373-3 [i.11].

National transposition dates	
Date of adoption of this EN:	25 April 2017
Date of latest announcement of this EN (doa):	31 July 2017
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2018
Date of withdrawal of any conflicting National Standard (dow):	31 January 2019

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 specifies technical characteristics and methods of measurements for radio transmitters and receivers, for use on vessels, operating in either the Medium Frequency (MF) only or in the Medium and High Frequency (MF/HF) bands allocated in the International Telecommunications Union (ITU) Radio Regulations [i.9], to the Maritime Mobile Service (MMS).

The present document refers to equipment for one or more of the following:

- Single SideBand (SSB) modulation for telephony transmission and reception (J3E);
- Frequency Shift Keying (FSK) or SSB modulation of a keyed sub-carrier to transmit and receive Digital Selective Calling (DSC) signals.

The present document also refers to radio equipment with either an integrated or external DSC controller.

The requirements in the present document are applicable to receivers for operating on all frequencies in the bands 1 606,5 kHz to 4 000 kHz or 1 606,5 kHz to 27,5 MHz as allocated in the ITU Radio Regulations [i.9], to the MMS.

Other spot frequency receivers should meet all the requirements of the present document and other relevant standards as applicable for the frequencies and modes provided.

If the equipment, or parts of it, are designed in such a manner that they can be used for other categories of maritime radiocommunication (e.g. Morse telegraphy or NBDP - ETSI ETS 300 067 [i.4]), those parts of the equipment should fulfil the relevant requirements of the appropriate standards for the service(s) in question e.g. ETSI ETS 300 067 [i.4].

The present document covers the essential requirements of article 3.2 and article 3.3(g) of Directive 2014/53/EU [i.1] 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 TS 103 052 (V1.1.1) (03-2011): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".
- [2] ITU Recommendation E.161 (02-2001): "Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network".
- [3] ETSI EN 300 338-4 (V1.2.1) (02-2017): "Technical characteristics and methods of measurement for equipment for generation, transmission and reception of Digital Selective Calling (DSC) in the maritime MF, MF/HF and/or VHF mobile service; Part 4: Class E DSC".

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.