SLOVENSKI STANDARD
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Satelitske zemeljske postaje in sistemi (SES) - Harmonizirani standard, ki zajema bistvene zahteve člena 3.2 direktive 2014/53/EU, za satelitske zemeljske postaje na ladjah, ki delujejo v frekvenčnih pasovih 4/6 GHz, dodeljenih za fiksne satelitske storitve (FSS)

Satellite Earth Stations and Systems (SES) - Harmonised Standard for satellite Earth Stations on board Vessels (ESVs) operating in the 4/6 GHz frequency bands allocated to the Fixed Satellite Service (FSS) covering the essential requirements of article 3.2 of the Directive 2014/53/EU

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ETSI EN 301 447 V2.1.1 (2016-05)

Satellite Earth Stations and Systems (SES);
Harmonised Standard for satellite Earth Stations on board Vessels (ESVs) operating in the 4/6 GHz frequency bands allocated to the Fixed Satellite Service (FSS) covering the essential requirements of article 3.2 of the Directive 2014/53/EU

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Contents

Intellectual Property Rights 7
Foreword 7
Modal verbs terminology 7
Introduction 7
1 Scope 9
2 References 10
2.1 Normative references 10
2.2 Informative references 10
3 Definitions, symbols and abbreviations 11
3.1 Definitions 11
3.2 Symbols 13
3.3 Abbreviations 13
4 Technical requirements specifications 14
4.1 General 14
4.1.1 Environmental profile 14
4.1.2 Operational configurations 14
4.1.3 ESV states and radio states 14
4.2 Conformance requirements 15
4.2.1 On-axis emissions 15
4.2.1.1 Justification 15
4.2.1.2 Specification 16
4.2.1.3 Conformance tests 16
4.2.2 Transmit antenna on-axis gain and off-axis gain pattern 16
4.2.2.1 Justification 16
4.2.2.2 Specification 16
4.2.2.3 Conformance tests 16
4.2.3 Off-axis spurious radiation 16
4.2.3.1 Justification 16
4.2.3.2 Specification 16
4.2.3.3 Conformance tests 17
4.2.4 On-axis spurious radiation for ESV 17
4.2.4.1 Justification 17
4.2.4.2 Specification 18
4.2.4.2.1 "Carrier-on" radio state 18
4.2.4.2.2 "Carrier-off" and "Emissions disabled" radio states 18
4.2.4.3 Conformance tests 18
4.2.5 Maximum ESV emissions towards the horizon 18
4.2.5.1 Justification 18
4.2.5.2 Specification 19
4.2.5.2.1 Specification 1: Maximum e.i.r.p. spectral density towards the horizon 19
4.2.5.2.2 Specification 2: Maximum e.i.r.p. towards the horizon 19
4.2.5.3 Conformance tests 19
4.2.6 Off-axis e.i.r.p. emission density within the band 19
4.2.6.0 General 19
4.2.6.1 Justification 19
4.2.6.2 Specification 19
4.2.6.3 Conformance tests 21
4.2.7 Carrier suppression 21
4.2.7.1 Justification 21
4.2.7.2 Specification 21
4.2.7.3 Conformance tests 21
4.2.8 Antenna Pointing and Polarization Alignment for ESVs 21
4.2.8.1 Justification 21
4.2.8.2 Specification 21

4.2.8.3 Conformance tests 22
4.2.9 Cessation of emissions of the ESV 22
4.2.9.1 Justification 22
4.2.9.2 Specification 22
4.2.9.2.1 Specification 1: Mode of cessation of emissions 22
4.2.9.2.2 Specification 2: Conditions under which the ESV shall cease emissions 23
4.2.9.2.3 Specification 3: Cessation of emissions 23
4.2.9.2.4 Specification 4: Fault conditions 24
4.2.9.3 Conformance tests 24
4.2.10 Identification of ESV 24
4.2.10.1 Justification 24
4.2.10.2 Specification 24
4.2.10.3 Conformance tests 24
4.2.11 Control and Monitoring Functions (CMFs) 24
4.2.11.1 CMF State Diagram 24
4.2.11.2 Processor monitoring 25
4.2.11.2.1 Justification 25
4.2.11.2.2 Specification 25
4.2.11.2.3 Conformance tests 25
4.2.11.3 Transmit subsystem monitoring 26
4.2.11.3.1 Justification 26
4.2.11.3.2 Specification 26
4.2.11.3.3 Conformance tests 26
4.2.11.4 Power-on/Reset 26
4.2.11.4.1 Justification 26
4.2.11.4.2 Specification 26
4.2.11.4.3 Conformance tests 26
4.2.11.5 Control Channel (CC) and Response Channel (RC) 26
4.2.11.5.1 Justification 26
4.2.11.5.2 Specification 26
4.2.11.5.3 Conformance tests 27
4.2.11.6 Network control commands 27
4.2.11.6.1 Justification 27
4.2.11.6.2 Specification 27
4.2.11.6.3 Conformance test 28
4.2.11.7 Initial burst transmission 28
4.2.11.7.1 Justification 28
4.2.11.7.2 Specification 28
4.2.11.7.3 Conformance tests 28
4.2.12 Receive antenna off-axis gain pattern 28
4.2.12.1 Justification 28
4.2.12.2 Specification 28
4.2.13 Blocking performance 29
4.2.13.1 Justification 29
4.2.13.2 Specification 29
4.2.13.3 Conformance tests 29
4.2.14 Adjacent Signal Selectivity 29
4.2.14.1 Justification 29
4.2.14.2 Specification 29
4.2.14.3 Conformance tests 30

5 Testing for compliance with technical requirements 30
5.1 Environmental conditions for testing 30
5.2 Radio test suites 30

6 Test methods for the complete ESV 30
6.1 General 30
6.2 On-axis emissions 31
6.2.1 Test method 31
6.2.1.1 Test site 31
6.2.1.2 Method of measurement 31
6.2.1.2.1 General 31

6.2.1.2.2 Method of measurement at the antenna flange 31
6.2.1.2.3 Method of measurement with a test antenna 32
6.3 Transmit antenna on-axis gain and off-axis gain pattern 32
6.3.1 Method of measurement 32
6.4 Off-axis spurious radiation 32
6.4.0 Introduction 32
6.4.1 Test method 32
6.4.1.0 General 32
6.4.1.1 Up to 2 000 MHz 33
6.4.1.1.1 Test site 33
6.4.1.1.2 Procedure 34
6.4.1.2 Above 2 000 MHz 34
6.4.1.2.0 General 34
6.4.1.2.1 Identification of the significant frequencies of spurious radiation 34
6.4.1.2.2 Measurement of radiated power levels of identified spurious radiation 35
6.4.1.2.3 Measurement of conducted spurious radiation at the antenna flange 36
6.5 On-axis spurious radiation 37
6.5.1 Test method 37
6.5.1.1 Test site 37
6.5.1.2 Method of measurement 37
6.5.1.2.1 General 37
6.5.1.2.2 Method of measurement at the antenna flange 37
6.5.1.2.3 Method of measurement with a test antenna 38
6.6 Maximum ESV emissions towards the horizon 39
6.6.1 Maximum e.i.r.p. towards the horizon 39
6.6.2 Maximum e.i.r.p. spectral density towards the horizon 39
6.7 Off-axis e.i.r.p. emission density within the band 39
6.7.0 General 39
6.7.1 Test method 40
6.7.1.1 General 40
6.7.1.2 Transmit output power density 40
6.7.1.2.1 General 40
6.7.1.2.2 Test site 40
6.7.1.2.3 Method of measurement 40
6.7.1.3 Antenna transmit gain 41
6.7.1.3.1 General 41
6.7.1.3.2 Test site 41
6.7.1.3.3 Method of measurement 42
6.7.1.4 Antenna transmit radiation patterns 43
6.7.1.4.1 General 43
6.7.1.4.2 Test site 43
6.7.1.4.3 Test arrangement 43
6.7.1.4.4 Co-polar radiation pattern-azimuth 43
6.7.1.4.5 Co-polar radiation pattern-elevation 44
6.7.1.4.6 Cross-polar radiation pattern-azimuth 45
6.7.1.4.7 Cross-polar radiation pattern-elevation 45
6.7.2 Computation of results 46
6.8 Carrier suppression 46
6.8.1 Test method 46
6.9 Antenna pointing for ESV 47
6.9.1 General 47
6.9.2 Test method 47
6.10 Antenna mechanical stability 48
6.10.1 Test method 48
6.11 Polarization angle alignment capability 48
6.11.1 Test method 48
6.12 Cessation of emissions of the ESV 49
6.12.1 Test arrangement 49
6.12.2 Test method 50
6.12.2.1 General 50
6.12.2.2 Cessation of emissions from the "Transmission enabled" state 50
6.12.2.3 Cessation of emission from the "Transmission disabled" state 50

6.12.2.4 Cessation of emission from the "Initial Phase" state 50
6.12.2.4.1 EUTs transmitting initial bursts 50
6.12.2.4.2 EUTs not transmitting initial bursts 51
6.12.2.5 "Single action" means of cessation of emissions 51
6.12.2.6 Fault conditions 52
6.13 Identification of ESV 52
6.13.1 Test arrangement 52
6.13.2 Test method 52
6.14 Control and Monitoring Functions 52
6.14.0 General 52
6.14.1 Test arrangement 52
6.14.2 Processor monitoring - Test method 52
6.14.3 Transmit subsystem monitoring - Test method 53
6.14.4 Power-on/Reset - Test method 53
6.14.5 Control Channel and Response Channel - Test method 53
6.14.6 Network Control commands-Test method 54
6.14.7 Initial burst transmission-Test method 56
6.15 Receive antenna off-axis gain pattern 56
6.15.1 Test Method 56
6.15.1.1 Test site 56
6.15.1.2 Method of measurement 56
6.16 Blocking performance 57
6.16.1 Test method 57
6.17 Adjacent Signal Selectivity 57
6.17.1 Test method 57

Annex A (normative): Relationship between the present document and the essential requirements of Directive 2014/53/EU 59

Annex B (normative): Mechanical stability methodology 61

Annex C (informative): Bibliography 63

History 64

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Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

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 [7].

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.

National transposition dates	
Date of adoption of this EN:	16 May 2016
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Date of latest publication of new National Standard or endorsement of this EN (dop/e):	28 February 2017
Date of withdrawal of any conflicting National Standard (dow):	28 February 2018

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).

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Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio equipment within the scope of the Directive 2014/53/EU [7]. The modular structure is shown in ETSI EG 201 399 [i.6].

Remarks on the present document

The determination of the parameters of the user earth stations using a given geo-stationary satellite for the protection of the spectrum allocated to that satellite, is considered to be under the responsibility of the satellite operator or the satellite network operators.

The requirements have been selected to ensure an adequate level of compatibility with other radio services. The levels, however, do not cover extreme cases which may occur in any location but with a low probability of occurrence.

The present document is based on the application of ITU-R Resolution 902 (WRC-03) [i.1].

The present document may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena or a continuous phenomenon is present, e.g. a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference, or the interfered part or both.

The present document does not contain any requirement, recommendation or information about the installation of the ESV.

All parts of the below-deck unit related to reception, processing and presentation of the received information except the control channel are not within the scope of the present document. The syntax of the control channel messages is outside the scope of the present document.

The present document is based upon the standard for environmental conditions for marine navigational equipment, IEC EN 60945 [4]. In addition, attention should be paid to clause 11.1 (Acoustic noise and signals), and clause 11.2 (Compass safe distance) of IEC EN 60945 [4].

1 Scope

The present document applies to Earth Stations located on board Vessels (ESVs) which have the following characteristics:

- The ESV is comprised of all the equipment, electrical and mechanical, from the antenna itself to the interface with other communications equipment on board (usually referred to as the terrestrial interface).
- The ESV transmits in the frequency range from 5 925 MHz to 6 425 MHz allocated to the Fixed Satellite Services (FSS) (earth-to-space).
- The ESV receives in one or more frequencies within the range from 3,700 GHz to 4,200 GHz in the bands allocated to the Fixed Satellite Services (FSS) (space-to-earth), depending on the ITU Region where the ESV is located.
- The ESV transmits a single carrier.
- The ESV uses linear or circular polarization.
- The ESV operates through a geostationary satellite at least 2° to 3° away from any other geostationary satellite operating in the same frequency band and covering the same area.

NOTE 1: The satellite spacing is mainly equal to 3° in ITU Regions 1 and 3 and 2° in ITU Region 2.

The ESV transmits at elevations greater or equal to the minimum elevation angle declared by the applicant.

- The ESV antenna diameter is not smaller than 2,4 m.
- The ESV is designed for transmission and reception of radio-communications signals in accordance with any of the frequency bands specified above.
- The ESV is usually designed for unattended operation.
- The ESV is operating as part of a satellite network (e.g. star, mesh or point-to-point) used for the distribution and/or exchange of information between users.
- The ESV is controlled and monitored by a Network Control Facility (NCF). The NCF is outside the scope of the present document.

The present document applies to the ESV with its ancillary equipment and its various telecommunication ports, and when operated within the boundary limits of the operational environmental profile declared by the applicant and when installed as required by the applicant by declaration or in the user documentation.

The present document is intended to cover the provisions of Directive 2014/53/EU [7] (RE Directive) article 3.2, which states that "*… radio equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference*".

The present document incorporates the technical limitations listed in annex 2 of ITU-R Resolution 902 (WRC-03) [i.1], ECC Report (05)69 [i.2], and ECC Report (06)91 [i.3].

NOTE 2: According to ITU-R Resolution 902 [i.1], any transmission from ESVs within the 300 km minimum distance of each country where the ESV transmit frequency band is used by the Fixed Service will be subject to the prior agreement of the concerned administration(s), which may specify additional operational requirements, or to the relevant ECC Decision.

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 Directive 2014/53/EU [7] may apply to equipment within the scope of the present document.

NOTE 3: A list of such ENs is included on the web site http://www.newapproach.org/.

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] Void.

[2] CISPR 16-1 (2003): "Specification for radio disturbance and immunity measuring apparatus and methods".

[3] Void.

[4] IEC EN 60945 (2002): "Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results".

[5] ITU-R Radio Regulations (2004).

[6] CISPR 16-1-5 (2014): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-5: Radio disturbance and immunity measuring apparatus - Antenna calibration sites and reference test sites for 5 MHz to 18 GHz".

[7] 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 (RE Directive).

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] ITU-R Resolution 902 (WRC-03): "Provisions relating to earth stations located on board vessels which operate in fixed-satellite service networks in the uplink bands 5 925-6 425 MHz and 14-14.5 GHz".

[i.2] CEPT ECC Report (05)69 (2005): "Formats for submission of information from administrations to the Office on conditions for operation of earth stations aboard vessels within the separation distances identified in ITU-R Resolution 902".

[i.3] CEPT ECC Report (06)91 (2006): "Compatibility of earth stations on board vessels transmitting within the gaps in the CEPT fixed service channel plan for the lower 6 GHz band (5 925-6 425 MHz)".

[i.4] ETSI TR 102 375 (V1.1.1): "Satellite Earth Stations and Systems (SES); Guidelines for determining the parts of satellite earth station antenna radiation patterns concerned by the geostationary satellite orbit protection".

[i.5] ETSI TR 102 215 (V1.3.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Recommended approach, and possible limits for measurement uncertainty for the measurement of radiated electromagnetic fields above 1 GHz".

[i.6] ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of Harmonized Standards for application under the Radio & Telecommunication Terminal Equipment Directive 1999/5/EC (R&TTE) and a first guide on the impact of the Radio Equipment Directive 2014/53/EU (RED) on Harmonized Standards".

[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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the Directive 2014/53/EU [7] and the following apply:

above-deck unit: part of the ESV intended to be installed above deck, as declared by the applicant, or as indicated in the user documentation

The above-deck unit usually comprises the following main parts:

a) the antenna sub-system which converts the incident radiation field into a guided wave and vice versa;

b) the Low Noise Block (LNB) down converter, which is a device that amplifies, with very low internal noise, the received signals in the Radio Frequency (RF) band and converts them to intermediate frequencies;

c) the up-converter and the power amplifier which convert from the intermediate frequency to RF and amplify the low level RF signals for transmission through the antenna subsystem;

d) the stabilization and tracking subsystems that ensure pointing of the antenna main beam towards the satellite within the required accuracy.

NOTE: The installation equipment (means of attachment) is outside the scope of the present document. However, the antenna structures and other components directly mounted on the antenna and forming an integral part of it, are subject to the specifications of the present document.

ancillary equipment: equipment used in connection with an ESV is considered as ancillary if the three following conditions are met:

a) the equipment is intended for use in conjunction with the ESV to provide additional operational and/or control features (e.g. to extend control to another position or location); and

b) the equipment cannot be used on a stand alone basis, to provide user functions independently of the ESV; and

c) the absence of the equipment does not inhibit the operation of the ESV.

applicant: manufacturer or his authorized representative within the European Community or the person responsible for placing the apparatus on the market

below-deck unit: part of the ESV equipment which is installed inside the vessel (i.e. below deck) and its connection cables with the above deck units

carrier-off radio state: radio state in which the ESV may transmit and does not transmit any carrier

NOTE 1: The phrase "the ESV may transmit" means that all the conditions for transmission are satisfied (e.g. in a state where transmissions are permitted, no failure detected, and the ESV is correctly pointed towards the satellite).

NOTE 2: The existence of a "Carrier-off" radio state depends on the system of transmission used. For ESVs designed for continuous transmission mode there may be no "Carrier-off" radio state.

carrier-on radio state: radio state in which the ESV may transmit and transmits a carrier

Control Channel (CC): channel or channels by which ESVs receive control information from the NCF

$EIRP_{max}$: maximum e.i.r.p. capability of the ESV as declared by the applicant

emissions disabled radio state: radio state in which the ESV is not emitting

NOTE: Examples of cases where the ESV is in this radio state: before system monitoring pass, before information of the control channel is correctly received, when a failure is detected, when the ESV is commanded to disable, and when the ESV is in a location requiring cessation of emissions.

environmental profile: range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

external control channel: control channel which is either (i) carried by the ESV network via the same or another satellite, but not within the internal protocol of the ESV system, or (ii) carried by any other radio communication system

external response channel: response channel which is either (i) carried by the ESV network via the same or another satellite, but not within the internal protocol of the ESV system, or (ii) carried by any other radio communication system

integral antenna: antenna which may not be removed during the tests according to the applicant's statement

internal control channel: control channel which is carried by the ESV network via the same satellite as used for transmission of user data and within the internal protocol structure of the ESV system

internal response channel: response channel which is carried by the ESV network via the same satellite as used for transmission of user data and within the internal protocol structure of the ESV system

Internally Mounted Equipment (IME): those of the modules of the IE which are not declared by the manufacturer as EME are defined as IME

network: a network is any network configuration including star, mesh and point-to-point configurations

Network Control Facility (NCF): set of functional entities that, at system level, monitor and control the correct operation of all ESVs in a network

nominal antenna diameter: antenna diameter declared by the manufacturer that is a parameter in performance characteristics and that allows reference to a certain performance

NOTE: An antenna with circular aperture of diameter equal to the nominal diameter does typically have the performance specified.

Network operators might request antennas of a certain diameter. Then an antenna that is compliant with the requirement for nominal antenna diameter equal to the requested antenna diameter can be used. Manufacturers can mark their equipment with antenna diameters used in the requirements during compliance test.

nominated bandwidth: bandwidth of the ESV radio frequency transmission nominated by the applicant

NOTE 1: The nominated bandwidth is centred on the transmit frequency and does not exceed 5 times the occupied bandwidth.

NOTE 2: The nominated bandwidth is wide enough to encompass all spectral elements of the transmission which have a level greater than the specified spurious radiation limits. The nominated bandwidth is wide enough to take account of the transmit carrier frequency stability. This definition is chosen to allow flexibility regarding adjacent channel interference levels which will be taken into account by operational procedures depending on the exact transponder carrier assignment situation.

occupied bandwidth:

- for a digital modulation scheme: the width of the signal spectrum between the points 10 dB below the maximum in-band density;

- for an analogue modulation scheme-the width of a frequency band such that, below the lower and above the upper frequency limits, the mean power emitted is equal to 0,5 % of the total mean power of the emission.

off-axis angle: angle between the direction of the axis of the antenna main beam and the considered direction

removable antenna: antenna which may be removed during the tests according to the applicant's statement

Response Channel (RC): channel by which the ESV transmits monitoring information to the NCF

spurious radiation: any radiation outside the nominated bandwidth

Transmission disabled state: ESV is in this state when it is not authorized by the NCF to transmit

Transmission enabled state: ESV is in this state when it is authorized by the NCF to transmit

XPD_{ESV}: maximum cross polar discrimination capability of the ESV antenna as declared by the applicant

3.2 Symbols

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

dBc	Ratio expressed in decibels relative to the e.i.r.p. of the unmodulated carrier
dBi	Ratio of an antenna gain to the gain of an isotropic antenna, expressed in decibels
dBsd	Ratio expressed in decibels relative to the spectral density
dBW	Ratio of a power to 1 watt, expressed in decibels
dBpW	Ratio of a power to 1 pico watt, expressed in decibels
dBµV/m	Ratio of an electric field to 1 µV/m, expressed in decibels (20 log(electric field /1 µV/m))

3.3 Abbreviations

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

BDU	Below Deck Unit
BW	Bandwidth
CC	Control Channel
CCF	Control Channel reception Failure
CCR	Control Channel correctly Received
CENR	Cessation of Emissions Not Requested
CEPT	Conférence Européenne des Postes et Télécommunications (European Conference of Postal and Telecommunications Administrations)
CER	Cessation of Emissions Requested
CISPR	Comité International Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference)
CMF	Control and Monitoring Functions
CW	Continuous Wave
e.i.r.p.	equivalent isotropically radiated power
ECC	Electronic Communications Committee (of CEPT)
EMC	Electro-Magnetic Compatibility
EN	European Standard
ERO	European Radiocommunications Office
ESV	Earth Station on board a Vessel
EUT	Equipment Under Test
FEC	Forward Error Correction
FSS	Fixed Satellite Service
GEUT	Gain of EUT
GSO	Geostationary Satellites Orbit
IME	Internally Mounted Equipment
IPR	Intellectual Property Rights
ITU	International Telecommunications Union
ITU-R	ITU Radiocommunication Sector
LHCP	Left Hand Circular Polarization
LNB	Low Noise Block
LO	Local Oscillator