



**Satellite Earth Stations and Systems (SES);
Harmonised Standard for Aircraft Earth Stations (AES)
providing Aeronautical Mobile Satellite Service (AMSS)/
Mobile Satellite Service (MSS) and/or the
Aeronautical Mobile Satellite on Route Service (AMS(R)S/
Mobile Satellite Service (MSS), operating in the frequency band
below 3 GHz covering the essential requirements
of article 3.2 of the Directive 2014/53/EU**

Reference

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Contents

Intellectual Property Rights	9
Foreword.....	9
Modal verbs terminology.....	9
Introduction	9
1 Scope	10
2 References	11
2.1 Normative references	11
2.2 Informative references.....	11
3 Definitions and abbreviations.....	12
3.1 Definitions.....	12
3.2 Abbreviations	13
4 General	14
4.1 Presentation of equipment for testing purposes.....	14
4.2 Aircraft earth stations	14
4.3 Description of equipment	15
5 Requirements for AES transmitting in the band 1 610 MHz to 1 626,5 MHz	16
5.1 Unwanted emissions limits outside the band 1 610 MHz to 1 626,5 MHz and the band 1 626,5 MHz to 1 628,5 MHz (carrier-on)	16
5.1.1 Purpose	16
5.1.2 Conformance requirements.....	16
5.1.3 Method of test.....	16
5.1.4 Peak measurement	17
5.1.5 Average measurement.....	17
5.1.6 Test requirements.....	17
5.2 Unwanted emissions limits within the band 1 610 MHz to 1 626,5 MHz and the band 1 626,5 MHz to 1 628,5 MHz (carrier-on)	18
5.2.1 Purpose	18
5.2.2 Conformance requirements.....	18
5.2.3 Method of test.....	19
5.2.4 Measurement method.....	20
5.2.5 Test requirements.....	20
5.3 EIRP density limits within the operational band	20
5.3.1 Purpose	20
5.3.2 Conformance requirements.....	20
5.3.3 Method of test.....	21
5.3.4 Peak Limit Test.....	21
5.3.5 Mean Limit Test	21
5.3.6 Test requirements.....	22
5.4 Unwanted emissions limits (carrier-off).....	22
5.4.1 Purpose	22
5.4.2 Conformance requirements.....	22
5.4.3 Method of test.....	22
5.4.4 Peak measurement	23
5.4.5 Average measurement.....	23
5.4.6 Test requirements.....	23
5.5 AES Control and Monitoring Functions (CMF).....	23
5.5.1 Special test equipment	23
5.5.2 Self-monitoring functions	24
5.5.2.1 Processor monitoring	24
5.5.2.1.1 Purpose	24
5.5.2.1.2 Conformance requirements.....	24
5.5.2.1.3 Method of test.....	24
5.5.2.2 Transmit frequency generation sub-system monitoring	24

5.5.2.2.1	Purpose	24
5.5.2.2.2	Conformance requirements.....	24
5.5.2.2.3	Method of test.....	24
5.5.3	Network control authorization and reception.....	24
5.5.3.1	Network control authorization	24
5.5.3.1.1	Purpose	24
5.5.3.1.2	Conformance requirements.....	25
5.5.3.1.3	Method of test.....	25
5.5.3.1.4	Test procedure	25
5.5.3.1.5	Test requirement	25
5.5.3.2	Network control reception transmit frequency control.....	25
5.5.3.2.1	Purpose	25
5.5.3.2.2	Conformance requirements.....	26
5.5.3.2.3	Method of test.....	26
5.5.3.2.4	Test procedure	26
5.5.3.2.5	Test requirement	26
5.6	Equipment identity	26
5.6.1	Purpose	26
5.6.2	Conformance requirements	26
5.6.3	Method of test	27
5.6.4	Test procedure	27
5.6.5	Test requirements.....	27
6	Requirements for AES transmitting in the band 1 626,5 MHz to 1 660,5 MHz and the band 1 668,0 MHz to 1 675,0 MHz	27
6.1	Unwanted emissions limits outside the band 1 626,5 MHz to 1 660,5 MHz and the band 1 660,5 MHz to 1 662,5 MHz and also outside the band 1 666,0 MHz to 1 668,0 MHz, the band 1 668,0 MHz to 1 675,0 MHz and the band 1 675,0 MHz to 1 677,0 MHz.....	27
6.1.1	Purpose	27
6.1.2	Conformance requirements.....	28
6.1.3	Testing for carrier on state	34
6.1.3.1	Method of test	34
6.1.3.2	Measurement method.....	35
6.1.3.3	Test requirements.....	35
6.1.4	Testing for carrier off state	35
6.1.4.1	Method of test	35
6.1.4.2	Peak measurement method.....	35
6.1.4.3	Average measurement.....	36
6.1.4.4	Test requirements.....	36
6.2	Unwanted emissions limits within the band 1 626,5 MHz to 1 660,5 MHz and the band 1 660,5 MHz to 1 662,5 MHz and also within the band 1 666,0 MHz to 1 668,0 MHz, the band 1 668,0 MHz to 1 675,0 MHz and the band 1 675,0 MHz to 1 677,0 MHz.....	36
6.2.1	Purpose	36
6.2.2	Conformance requirements.....	37
6.2.2.1	General	37
6.2.2.2	Specification 1: Carrier-on state.....	37
6.2.2.3	Specification 2: Carrier-off state	39
6.2.3	Testing for carrier on state	40
6.2.3.1	Method of test	40
6.2.3.2	Measurement method.....	40
6.2.3.3	Test requirements.....	40
6.2.4	Testing for carrier off state	41
6.2.4.1	Method of test	41
6.2.4.2	Peak measurement method.....	41
6.2.4.3	Average measurement.....	41
6.2.4.4	Test requirements.....	41
6.3	AES Control and Monitoring Functions (CMF).....	42
6.3.1	Special test equipment	42
6.3.2	Self-monitoring functions	42
6.3.2.1	Processor monitoring	42
6.3.2.1.1	Purpose	42
6.3.2.1.2	Conformance requirements.....	42

6.3.2.1.3	Method of test.....	42
6.3.2.2	Transmit frequency generation sub-system monitoring	42
6.3.2.2.1	Purpose	42
6.3.2.2.2	Conformance requirements.....	42
6.3.2.2.3	Method of test.....	43
6.3.3	Network control authorization and reception.....	43
6.3.3.1	Network control authorization	43
6.3.3.1.1	Purpose	43
6.3.3.1.2	Conformance requirements.....	43
6.3.3.1.3	Method of test.....	43
6.3.3.1.4	Test procedure	43
6.3.3.1.5	Test requirement	44
6.3.3.2	Network control reception transmit frequency control.....	44
6.3.3.2.1	Purpose	44
6.3.3.2.2	Conformance requirements.....	44
6.3.3.2.3	Method of test.....	44
6.3.3.2.4	Test procedure	44
6.3.3.2.5	Test requirement	45
6.4	Equipment identity	45
6.4.1	Purpose	45
6.4.2	Conformance requirements	45
6.4.3	Method of test	45
6.4.4	Test procedure	45
6.4.5	Test requirements.....	45
7	Requirements for NGSO AES transmitting in the band 1 980 MHz to 2 010 MHz	46
7.0	General	46
7.1	Unwanted emissions limits outside the band 1 980,1 MHz to 2 009,9 MHz (carrier-on)	46
7.1.1	Purpose	46
7.1.2	Conformance requirements.....	46
7.1.3	Method of test	47
7.1.4	Peak measurement	47
7.1.5	Average measurement.....	47
7.1.6	Test requirements.....	48
7.2	Unwanted emissions limits within the bands 1 980,1 MHz to 2 009,9 MHz, 1 978,1 MHz to 1 980,1 MHz and 2 009,9 MHz to 2 011,9 MHz (carrier-on).....	48
7.2.1	Purpose	48
7.2.2	Conformance requirements	48
7.2.3	Method of test	49
7.2.4	Measurement method.....	49
7.2.5	Test requirements.....	50
7.3	Unwanted emissions limits (carrier-off).....	50
7.3.1	Purpose	50
7.3.2	Conformance requirements	50
7.3.3	Method of test	50
7.3.4	Peak measurement	51
7.3.5	Average measurement.....	51
7.3.6	Test requirements.....	51
7.4	AES Control and Monitoring Functions (CMF).....	51
7.4.1	Special test equipment	51
7.4.2	Self-monitoring functions	52
7.4.2.1	Processor monitoring	52
7.4.2.1.1	Purpose	52
7.4.2.1.2	Conformance requirements.....	52
7.4.2.1.3	Method of test.....	52
7.4.2.2	Transmit frequency generation sub-system monitoring	52
7.4.2.2.1	Purpose	52
7.4.2.2.2	Conformance requirements.....	52
7.4.2.2.3	Method of test.....	52
7.4.3	Network control authorization and reception.....	52
7.4.3.1	Network control authorization	52
7.4.3.1.1	Purpose	52

7.4.3.1.2	Conformance requirements.....	53
7.4.3.1.3	Method of test.....	53
7.4.3.1.4	Test procedure	53
7.4.3.1.5	Test requirement	53
7.4.3.2	Network control reception.....	54
7.4.3.2.1	Transmit frequency control	54
7.5	Equipment identity	54
7.5.1	Purpose	54
7.5.2	Conformance requirements	55
7.5.3	Method of test	55
7.5.4	Test procedure	55
7.5.5	Test requirements.....	55
8	Protection of the global navigation satellite service operating in the band 1 559 MHz to 1 610 MHz.....	55
8.1	1 559 MHz to 1 605 MHz	55
8.1.1	Purpose	55
8.1.2	Conformance requirements	55
8.2	1 605 MHz to 1 610 MHz	56
8.2.1	Purpose	56
8.2.2	Conformance requirements	56
8.3	Method of test.....	56
8.4	Average measurement	57
8.5	Test requirements	57
9	Protection of the radio astronomy services operating in the band 1 610,6 MHz to 1 613,8 MHz and in the band 1 660 MHz to 1 670 MHz.....	57
9.1	Purpose	57
9.2	Conformance requirements	57
9.2.1	Alternative 1	57
9.2.2	Alternative 2	58
9.2.3	Protection of the radio astronomy service in the 1 660,0 MHz to 1 670,0 MHz band.....	58
9.3	Method of test - unwanted emissions (alternative 1).....	59
9.4	Test procedure - unwanted emissions (alternative 1).....	59
9.5	Test requirement - unwanted emissions (alternative 1).....	59
9.6	Method of test - CMF function (alternative 2).....	60
9.7	Test procedure- CMF function (alternative 2).....	60
9.8	Test requirement- CMF function (alternative 2)	60
10	Requirements for GSO AES transmitting in the band 1 980 MHz to 2 010 MHz	60
10.0	General	60
10.1	Unwanted emissions limits outside the band 1 980 MHz to 2 010 MHz (carrier-on)	61
10.1.1	Purpose	61
10.1.2	Conformance requirements	61
10.1.3	Method of test	61
10.1.4	Peak measurement	62
10.1.5	Average measurement.....	62
10.1.6	Test requirements.....	62
10.2	Unwanted emissions limits within the bands 1 980 MHz to 2 010 MHz, 1 978,1 MHz to 1 980 MHz and 2 010 MHz to 2 011,9 MHz (carrier-on)	63
10.2.1	Purpose	63
10.2.2	Conformance requirements	63
10.2.3	Method of test	63
10.2.4	Measurement method.....	64
10.2.5	Test requirements.....	64
10.3	Unwanted emissions limits (carrier-off).....	64
10.3.1	Purpose	64
10.3.2	Conformance requirements	64
10.3.3	Method of test	65
10.3.4	Peak measurement	65
10.3.5	Average measurement.....	65
10.3.6	Test requirements.....	66
10.4	AES Control and Monitoring Functions (CMF).....	66

10.4.1	Special test equipment	66
10.4.2	Self-monitoring functions	66
10.4.2.1	Processor monitoring	66
10.4.2.1.1	Purpose	66
10.4.2.1.2	Conformance requirements.....	66
10.4.2.1.3	Method of test.....	66
10.4.2.2	Transmit frequency generation sub-system monitoring	67
10.4.2.2.1	Purpose	67
10.4.2.2.2	Conformance requirements.....	67
10.4.2.2.3	Method of test.....	67
10.4.3	Network control authorization and reception.....	67
10.4.3.1	Network control authorization	67
10.4.3.1.1	Purpose	67
10.4.3.1.2	Conformance requirements.....	67
10.4.3.1.3	Method of test.....	67
10.4.3.1.4	Test procedure	67
10.4.3.1.5	Test requirement	68
10.4.3.2	Network control reception.....	68
10.4.3.2.1	Transmit frequency control	68
10.5	Equipment identity	69
10.5.1	Purpose	69
10.5.2	Conformance requirements	69
10.5.3	Method of test	69
10.5.4	Test procedure	69
10.5.5	Test requirements.....	70
11	Receiver Performance Requirements	70
11.1	General	70
11.2	Receiver Adjacent Channel Selectivity	70
11.2.1	Purpose	70
11.2.2	Conformance requirements	70
11.2.3	Conformance test	70
11.3	Receiver Blocking Characteristics	70
11.3.1	Purpose	70
11.3.2	Conformance requirements	71
11.3.3	Conformance test	71
11.4	Method of testing	71
11.4.1	Receiver Adjacent Channel Selectivity.....	71
11.4.1.1	General	71
11.4.1.2	Test arrangement.....	71
11.4.1.3	Test procedures	72
11.4.2	Receiver Blocking Characteristics	72
11.4.2.1	General	72
11.4.2.2	Test arrangement.....	72
11.4.2.3	Test procedures	72
Annex A (normative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	73
Annex B (normative):	General test requirements.....	75
B.1	AES test modes	75
B.2	Special Test Equipment.....	75
B.2.1	STE description.....	75
B.2.2	Use of STE for control and monitoring functions tests	76
B.2.3	Test modulating signal	76
B.3	Laboratory Test Equipment.....	76
B.4	Interpretation of the measurement results	77
B.5	Test report	77

Annex C (normative):	Environmental conditions	78
C.1	General	78
C.2	Environmental conformance requirements.....	78
C.3	Environmental test conditions	78
Annex D (normative):	Arrangements for measurement of emissions from AES	79
D.1	General	79
D.2	Carrier-on emissions.....	79
D.2.1	Equipment required	79
D.2.2	Equipment arrangement	80
D.2.3	Emissions from 4 GHz to 18 GHz.....	80
D.2.4	Emissions from 10 kHz to 4 GHz.....	80
D.3	Carrier-off emissions	81
D.3.1	Equipment required	81
D.3.2	Equipment arrangement	81
D.3.3	Carrier-off emissions from 4 GHz to 18 GHz	81
D.3.4	Carrier-off emissions from 10 kHz to 4 GHz	82
Annex E (informative):	Explanation of nominated bandwidth	83
E.1	Introduction	83
E.2	Interpretation of Parameters [B _n , f _c , a, b].....	83
E.3	Choice of nominated bandwidth.....	83
E.4	Maximum value for nominated bandwidth	85
Annex F (informative):	Bibliography	87
History	88

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Foreword

This final draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES), and is now submitted for the 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.3] 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 [6].

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).

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Introduction

An AES to be effectively used on board an aircraft will also be subject to airworthiness approval. This approval will refer to additional requirements (e.g. ISO 7137 equivalent to EUROCAE ED-14D and RTCA DO-160D [1]). Foreseeable evolution of the GNSS (i.e. Galileo or GPS L5) would result in the coming years in specific requirements to protect the use of the GNSS signals on board aircraft. Therefore these new GNSS frequency bands may require different protection than currently stated in the present document.

1 Scope

The present document specifies certain minimum technical performance requirements of Aircraft Earth Station (AES) equipment with both transmit and receive capabilities for operation in the Aeronautical Mobile Satellite Service (AMSS)/Mobile Satellite Service (MSS), and/or in the Aeronautical Mobile Satellite on Route Service (AMS(R)S)/Mobile Satellite Service (MSS), in the frequency bands given in table 1.

Table 1: Aeronautical Mobile Satellite Service (AMSS)/Mobile Satellite Service (MSS), and/or Aeronautical Mobile Satellite on Route Service (AMS(R)S)/ Mobile Satellite Service (MSS) frequency bands

	AMSS/MSS and/or AMS(R)S/MSS frequency bands
AES transmit	1 610 MHz to 1 626,5 MHz
AES receive	1 613,8 MHz to 1 626,5 MHz
AES receive	2 483,5 MHz to 2 500 MHz
AES transmit	1 626,5 MHz to 1 660,5 MHz
AES receive	1 525 MHz to 1 559 MHz
AES transmit	1 668 MHz to 1 675 MHz
AES receive	1 518 MHz to 1 525 MHz
AES transmit	1 980 MHz to 2 010 MHz
AES receive	2 170 MHz to 2 200 MHz

The technical requirements in the present document are in three major categories:

- **emission limits:** to protect other radio services and systems from harmful interference generated by the AES in normal use;
- **AES Control and Monitoring Functions (CMF):** to protect other radio services and systems from unwanted transmissions from the AES. The CMF in each AES is capable of answering to commands from the Network Control Facilities (NCF) for its supporting satellite network;
- **receiver performance specifications:** to enable reception of a wanted signal in presence of other high power signals on the adjacent channel and/or adjacent band.

NOTE 1: The requirements for Network Control Facilities (NCF) for S-PCN MES transmitting in the 1 610 MHz to 1 626,5 MHz band or the 1 980 MHz to 2 010 MHz band are contained in ETSI ETS 300 735 [4]; these requirements are also applicable to AES transmitting in those bands.

An AES may be subject to additional or alternative requirements in other standards depending on its functionality, in particular if it supports a service which is considered a justified case for regulation of terminal equipment interworking via the public telecommunications network. An AES will also be subject to additional airworthiness certification requirements.

The present document is intended to cover the provisions of Directive 2014/53/EU [6] (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*".

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 RE Directive [6] may apply to equipment within the scope of the present document.

NOTE 2: 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] ISO 7137 (1995) equivalent to EUROCAE ED-14D and RTCA DO-160D: "Aircraft - Environmental conditions and test procedures for airborne equipment".
- [2] Recommendation ITU-T O.153 (1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [3] RTCA DO-210D (04-2000): "Minimum Operational Performance Standards (MOPS) for Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) Avionics".
- [4] ETSI ETS 300 735 (edition 1) (10-1997): "Satellite Personal Communications Networks (S-PCN); Network Control Facilities (NCF) for Mobile Earth Stations (MES), including handheld earth stations, for S-PCN in the 1,6/2,4 GHz and the 2,0 GHz bands, providing voice and/or data communications under the Mobile Satellite Service (MSS)".
- [5] ITU Radio Regulations (2008).
- [6] 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

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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] ECC/DEC (04)09: "ECC Decision of 12 November 2004 on the designation of the band 1518 to 1525 MHz and 1670 to 1675 MHz for the Mobile-Satellite Service".
- [i.2] ICAO Annex 10 Volume I: "Radio Navigation Aids" (Aeronautical Telecommunications) to the convention on International Civil Aviation.
- [i.3] 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 and abbreviations

3.1 Definitions

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

antenna subsystem: includes all those RF components from the physical aperture of the antenna(s) to a single antenna port where the interconnecting cable to the transceiver is to be attached; and related ancillary components; e.g. beam-steering units and RF relays, if present

applicant: party seeking an approval, or to place an AES on the European market, i.e. the manufacturer of the equipment, or his authorized representative, or an equipment supplier to the European market

carrier-off state (idle mode): state when AES is powered on but not transmitting a signal, i.e. not in the carrier-on state

carrier-on state (allocated a channel): state when AES is transmitting a signal in a continuous or non-continuous mode

conducted measurement: measurement of emissions from an antenna port of the AES made by direct wired connection to the port

Effective Isotropically Radiated Power (EIRP): product of transmitter power and maximum antenna gain, equivalent to an isotropic source radiating uniformly in all directions

Externally Mounted Equipment (EME): IE module which is intended to be externally mounted, as declared by the manufacturer

in-band signals: signals which are located in the operating band plus an offset of 10 MHz outside this operating band

Installable Equipment (IE): equipment which is intended to be fitted to an aircraft

Internally Mounted Equipment (IME): IE module which is not defined as Externally Mounted Equipment (EME)

Laboratory Test Equipment (LTE): logical grouping that contains the standard test equipment provided by a test laboratory

MSS band: continuous range of frequencies allocated by the ITU to the MSS

narrow-band system: system in which the nominal carrier frequency spacing for AESs in the Earth-to-Space direction is less than 300 kHz

network control channel: channel by which an AES receives general control information from the NCF of its network

NCF control message: message, normally originating from a network, to a specified terminal or set of terminals of the network which indicates to the terminal or set of terminals that it/they should carry out some specific action or should enter or maintain some specific state

NOTE: For test purposes NCF control messages may originate from Special Test Equipment.

nominated Bandwidth (B_n): bandwidth of the Aircraft Earth Station (AES) radio frequency transmission

NOTE 1: B_n is wide enough to encompass all spectral elements of the transmission which have a level greater than the specified levels of unwanted emissions. See annex D.

NOTE 2: The B_n is defined relative to the AES actual carrier frequency f_c .

B_n is the width of the frequency interval $[f_c - a, f_c + b]$, where a and b, which is specified by the terminal manufacturer and may vary with f_c .

The frequency interval $[f_c - a, f_c + b]$ does not encompass more than either:

- i) when $a = b$, 4 nominal carrier frequencies for narrow-band systems;
- ii) when $a \neq b$, 1 nominal carrier frequency for narrow-band systems; or

- iii) 1 nominal carrier frequency for wideband systems.

The frequency interval $[f_c - a, f_c + b]$ is within the operational band of the AES.

operational band: sub-portion of an MSS band which has been assigned in the earth-to-space direction to the MSS network within which the AES is operating

radiated measurement: measurement of an actual radiated field

Special Test Equipment (STE): equipment provided by the applicant which allows a test laboratory to control the AES so that the tests required by the present document can be performed

test laboratory: laboratory which performs conformance testing

test load: substantially non-reactive, non-radiating power attenuator which is capable of safely dissipating the power from the transmitter(s)

transceiver subsystem: subsystem which includes transmitter, receiver and diplexer/LNA (if used) that interfaces at RF at the antenna port where it connects to the interconnecting cable, and with other on-board avionics equipment

unwanted emissions: unwanted emissions are those falling outside the nominated bandwidth in the carrier-on state, and those generated in the carrier-off state

wideband system: system in which the nominal carrier frequency spacing for AESs in the Earth-to-Space direction is equal to or greater than 300 kHz

3.2 Abbreviations

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

AES	Aircraft Earth Station
AMS(R)S	Aeronautical Mobile Satellite on Route Service
AMSS	Aeronautical Mobile Satellite Service
ARINC	Aeronautical Radio Inc.
BE _L	Lower Band Edge of the operating band
BE _U	Upper Band Edge of the operating band
B _n	nominated Bandwidth
BW	Bandwidth
CDMA	Code Division Multiple Access
CMF	Control and Monitoring Functions
CW	Continuous Wave
dBW	decibels relative to 1 Watt
ECC	Electronic Communications Committee
ED-14D	EUROCAE Document 14D
EFTA	European Free Trade Association
EIRP	Effective Isotropically Radiated Power
EME	Externally Mounted Equipment
EN	European Standard
ETS	European Telecommunications Standard
EUROCAE	EUROpean Organization for Civil Aviation Equipment
EUT	Equipment Under TEst
GES	Ground Earth Station
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSO	Geo-Synchronous Orbit
HLD	HPA and LNA/D
HPA	High Power Amplifier
ICAO	International Civil Aviation Organization
IE	Installable Equipment
IME	Internally Mounted Equipment
ISO	International Organization for Standardization
ITU	International Telecommunications Union