



**Satellite Earth Stations and Systems (SES);
Mobile Earth Stations (MES)
providing Low Bit Rate Data Communications (LBRDC)
using Low Earth Orbiting (LEO) satellites operating
below 1 GHz frequency band
Harmonised Standard for access to radio spectrum**

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Contents

Intellectual Property Rights	6
Foreword.....	6
Modal verbs terminology.....	6
Introduction	7
1 Scope	8
2 References	8
2.1 Normative references	8
2.2 Informative references.....	9
3 Definition of terms, symbols and abbreviations.....	9
3.1 Terms.....	9
3.2 Symbols.....	11
3.3 Abbreviations	11
4 Technical requirements specifications	12
4.1 Environmental profile.....	12
4.1.1 General.....	12
4.1.2 Temperature.....	12
4.1.3 Voltage.....	12
4.2 Conformance requirements	12
4.2.1 Unwanted emission outside the bands 148 MHz to 150,05 MHz, 235 MHz to 322 MHz, 335,4 MHz to 399,9 MHz and 399,9 MHz to 400,05 MHz	12
4.2.1.1 Justification	12
4.2.1.2 Technical requirements	13
4.2.1.3 Requirements for conformance test.....	14
4.2.1.4 Requirements for test conditions.....	14
4.2.1.5 Requirements for tests.....	15
4.2.2 Unwanted emission within the bands 148 MHz to 150,05 MHz, 235 MHz to 322 MHz, 335,4 MHz to 399,9 MHz and 399,9 MHz to 400,05 MHz	15
4.2.2.1 Justification	15
4.2.2.2 Technical requirements	15
4.2.2.3 Requirements for conformance test.....	16
4.2.2.4 Requirements for test conditions.....	16
4.2.2.5 Requirements for tests.....	17
4.2.3 EIRP density within the operational band.....	17
4.2.3.1 Justification	17
4.2.3.2 Technical requirements	17
4.2.3.3 Requirements for conformance test.....	17
4.2.3.4 Test conditions	18
4.2.3.5 Requirements for tests.....	18
4.2.4 Unwanted emissions in carrier-off state.....	18
4.2.4.1 Justification	18
4.2.4.2 Technical requirements	18
4.2.4.3 Requirements for conformance test.....	18
4.2.4.4 Requirements for test conditions.....	19
4.2.4.5 Requirements for tests.....	19
4.2.5 MES Control and Monitoring Functions (CMF)	19
4.2.5.1 Justification	19
4.2.5.2 Special Test Equipment (STE).....	19
4.2.5.3 Technical requirements	19
4.2.5.3.1 Void.....	19
4.2.5.3.2 Network control authorization and reception - Network control authorization	19
4.2.5.3.3 Network control authorization and reception - Network control reception	20
4.2.5.3.4 Transmit frequency control	21
4.2.6 Equipment identity.....	22
4.2.6.1 Justification	22

4.2.6.2	Technical requirements	22
4.2.6.3	Requirements for conformance test.....	22
4.2.6.4	Requirements for test procedure	22
4.2.6.5	Requirements for tests.....	22
4.2.7	Protection of the Radio Astronomy Service (RAS) from emissions produced by the MES in the bands 150,05 MHz to 153 MHz, 322 MHz to 328,6 MHz and 406,1 MHz to 410 MHz	23
4.2.7.1	Justification	23
4.2.7.2	Technical requirements	23
4.2.7.3	Requirements for conformance test.....	23
4.2.7.4	Test procedure.....	23
4.2.7.5	Test requirement	23
4.2.8	Receiver Performance Requirements.....	23
4.2.8.1	General	23
4.2.8.2	Receiver Adjacent Channel Selectivity.....	23
4.2.8.2.1	Justification	23
4.2.8.2.2	Technical requirements.....	23
4.2.8.2.3	Requirements for conformance test.....	24
4.2.8.2.4	Test procedure	24
4.2.8.3	Receiver Blocking Characteristics	24
4.2.8.3.1	Justification	24
4.2.8.3.2	Technical requirements.....	24
4.2.8.3.3	Requirements for conformance test.....	24
4.2.8.3.4	Test procedure	24
5	Testing for compliance with technical requirements.....	24
5.1	Environmental conditions for testing	24
5.1.1	General.....	24
5.1.2	Specification of the environmental test conditions	25
5.1.3	Tests under extreme voltage conditions.....	25
5.2	Essential radio test suites.....	25
5.2.1	Presentation of equipment for testing purposes	25
5.2.2	Description of equipment.....	25
5.2.3	Host-connected equipment	26
5.2.4	General test requirements	26
5.2.4.1	MES test modes	26
5.2.4.2	Special Test Equipment (STE).....	27
5.2.4.2.1	STE description	27
5.2.4.2.2	Use of STE for control and monitoring functions tests	27
5.2.4.2.3	Test modulating signal	28
5.2.4.3	Laboratory Test Equipment (LTE).....	28
5.2.4.4	Methods of test for MES RF emissions.....	28
5.2.4.5	Interpretation of the measurement results	28
5.2.4.6	Test report	28
5.2.5	Testing of host-connected equipment and plug-in modules.....	28
5.2.5.1	Test set up arrangements	28
5.2.5.2	Set up for combined equipment	28
5.2.5.3	Set up for the use of a test jig.....	29
5.2.6	Procedures for measurement of radiated emissions	29
5.2.6.1	General	29
5.2.6.2	Test site	29
5.2.6.3	Test set up for radiated emissions of the MES	29
5.2.6.4	Reference position of the MES	30
5.2.6.5	Measurement procedure for radiated emissions (average)	30
5.2.6.5.1	Measurement procedure for average radiated emissions of the MES.....	30
5.2.6.5.2	Measurement procedure for average radiated emissions of the cabinet	32
5.2.7	Procedures for measurement of conducted emissions	32
5.2.7.1	General	32
5.2.7.2	Test site	32
5.2.7.3	Test set-up	33
5.2.7.4	Measurement procedure for conducted emissions (average).....	33
5.2.8	Receiver Adjacent Channel Selectivity.....	33
5.2.8.1	General	33

5.2.8.2	Test set-up	34
5.2.8.3	Measurement procedure	34
5.2.9	Receiver Blocking Characteristics	34
5.2.9.1	General	34
5.2.9.2	Test set-up	34
5.2.9.3	Measurement procedure	34
Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	36
Annex B (informative):	Maximum measurement uncertainty	39
Annex C (informative):	Vibration.....	40
Annex D (informative):	Bibliography.....	41
Annex E (informative):	Change history	42
History		43

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI Standardisation Request deliverable Approval Procedure (SRdAP).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.2] 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.3].

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

The present document is based on ETSI EN 300 721 [i.5].

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

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1 Scope

The present document specifies technical characteristics and methods of measurements for Mobile Earth Stations (MES) providing Low Bit Rate Data Communications (LBRDC) using Low Earth Orbit (LEO) satellites and which have the following characteristics:

- the MES as covered by the present document are a Based MES (BMES), a Vehicle mounted MES (VMES), or a Portable MES (PMES);
- the MESs operate through satellites in Low Earth Orbit (LEO) as part of a network providing Low Bit Rate Data Communications (LBRDC);
- these radio equipment are designed to operate in all or any part of the frequency bands given in table 1.
- The MESs have to be part of a satellite network and controlled and monitored by a Network Control Facility (NCF). The specification of the NCF is outside the scope of the present document.

Table 1: Frequency ranges in Transmit and Receive frequencies

MES Transmit frequencies and Service allocations (MHz)		MES Receive frequencies and Service allocations (MHz)	
148 to 149,9	MSS	137 to 137,025	MSS
149,9 to 150,05	MSS	137,025 to 137,175	mss
235 to 322	MSS	137,175 to 137,825	MSS
335,4 to 399,9	MSS	137,825 to 138	mss
399,9 to 400,05	MSS	235 to 322	MSS
		335,4 to 399,9	MSS
		400,15 to 401	MSS

NOTE 1: The acronyms "MSS" and "mss" refer to mobile satellite service (See list of abbreviations). Capital letters "MSS" refer to Primary MSS service. Lower case "mss" refers to secondary MSS service.

The present document is intended to cover the provisions of article 3.2 of Directive 2014/53/EU [i.3] (RE Directive).

NOTE 2: The relationship between the present document and essential requirements of article 3.2 of the Directive 2014/53 [i.3] is given in Annex A.

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 in the [ETSI docbox](#).

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The following referenced documents are necessary for the application of the present document.

- [1] Void.
- [2] [IEC Publication 60068-2-1 \(2025\)](#): "Environmental testing - Part 2: Tests. Tests A: Cold".
- [3] [IEC Publication 60068-2-2 \(2025\)](#): "Environmental testing - Part 2: Tests. Tests B: Dry heat".
- [4] Void.

- [5] Void.
- [6] [CISPR 16-1-5:2014+AMD1:2016 CSV](#): "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".

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 may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

- [i.1] Void.
- [i.2] [Commission Implementing Decision C\(2015\) 5376](#) 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.
- [i.3] [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.
- [i.4] Recommendation ITU-R M.1039-1: Co-frequency sharing between stations in the mobile service below 1 GHz and FDMA non-geostationary-satellite orbit (non-GSO) mobile earth stations.
- [i.5] ETSI EN 300 721 (V2.1.1) (2016): "Satellite Earth Stations and Systems (SES); Mobile Earth Stations (MES) providing Low Bit Rate Data Communications (LBRDC) using Low Earth Orbiting (LEO) satellites operating below 1 GHz".
- [i.6] [IEC 60068-2-64:2008+AMD1:2019 CSV](#): "Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

BMES (Based MES): MES intended to be installed in a fixed location, and which is powered either by DC or AC power supply

carrier-off state: radio state in which the MES does not actually transmit a carrier

carrier-on state: state in which the MES is transmitting a carrier

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

control channel: channel used to transmit a signal from the satellite containing control information used to command the MES either to enable or disable its transmission

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

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

host-connected: MES for which connection to or integration with host equipment is necessary to provide functionality

host equipment: equipment which has a complete user functionality when not connected to the MES, and to which the MES provides additional functionality, and to which connection is necessary for the MES to provide functionality

in-band signals: signals which are located in the occupied bandwidth

Installable Equipment (IE), Internally Mounted Equipment (IME) And Externally Mounted Equipment (EME): equipment which is intended to be installed either internally or externally to the MES (usually in a vehicle)

NOTE: An IE consists of one or several interconnected modules. The IE is composed of modules intended to be externally mounted as defined for the intended use of the MES and defined as Externally Mounted Equipment (EME) and the remaining modules(s) as Internally Mounted Equipment (IME).

Laboratory Test Equipment (LTE): logical grouping that contains the standard test equipment

Low bit rate data communications: in the present document, bit rates up to 15 kbps

MSS band: continuous range of frequencies allocated by the ITU to the MSS (Mobile Satellite Service)

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

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 (STE).

network control channel: channel by which an MES receives general control information from the NCF

nominated bandwidth: bandwidth of the MES radio frequency transmission nominated for the intended use of the MES and which meets the following conditions of notes 1 and 2 below.

NOTE 1: The nominated bandwidth is wide enough to encompass all spectral elements of the transmission which have a level greater than the specified unwanted emissions limits. The nominated bandwidth is also 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. The nominated bandwidth is within the MSS transmit frequency band within which the MES operates.

NOTE 2: For FDMA/DCAA [i.4] systems with a bit rate up to 2,4 kbps the Nominated Bandwidth does not exceed 25 kHz. For FDMA/DCAA systems with a bit rate up above 2,4 kbps the Nominated Bandwidth does not exceed 50 kHz.

occupied Bandwidth: for a digital modulation scheme - the width of the signal spectrum 10 dB below the maximum inband density

Portable MES (PMES): MES intended to be portable, and powered by a stand alone battery, and generally intended to be self-contained and free standing

NOTE: A PMES would normally consist of a single module, but may consist of several interconnected modules. In some cases different specifications apply to PMES and this is specified in the present document

radiated measurement: measurement of an actual radiated field

Special Test Equipment (STE): equipment which permits control of the MES so that the tests required by the present document can be performed

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

unwanted emissions: emissions falling outside the nominated bandwidth in the carrier-on state

Vehicle Mounted MES (VMES): MES intended to be installed on a vehicle

wideband system: in the context of the present document, it refers to a system in which the nominal carrier frequency spacing for MESs in the Earth-to-space direction is equal to or greater than 300 kHz

3.2 Symbols

Void.

3.3 Abbreviations

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

AC	Alternating Current
ASD	Acceleration Spectral Density
BE _L	Lower Band Edge of the operating band
BER	Bit Error Rate
BE _U	Upper Band Edge of the operating band
BMES	Base MES
BW	Wanted signal Occupied Bandwidth
CMF	Control and Monitoring Function
CW	Continuous Wave
dB	decibel
dBm	decibel with respect to milliwatt
dBpW	decibel with respect to pico Watt
DC	Direct Current
DCAA	Dynamic Channel Activity Assignment
DS-SSMA	Direct Sequence Spread Spectrum Multiple Access
EIRP	Equivalent Isotropically Radiated Power
EMC	Electro-Magnetic Compatibility
EME	Externally Mounted Equipment
EUT	Equipment Under Test
FDMA	Frequency Division Multiple Access
GHz	Gigahertz
IE	Installable Equipment
IEC	International Electrotechnical Commission/Committee
IME	Internally Mounted Equipment
kbps	kilo bits per second
kbps	kilobits per second
kHz	kilo Hertz
LBRDC	Low Bit Rate Data Communications
LEO	Low Earth Orbit
LTE	Laboratory Test Equipment
MES	Mobile Earth Station
MHz	Megahertz
MIC	MES Identification Code
MSS	Mobile satellite service

NOTE: Primary status as defined in Article 1 of the ITU Radio Regulations.

mss Mobile satellite service

NOTE: Secondary status as defined in Article 1 of the ITU Radio Regulations.

NCF	Network Control Facility
OATS	Open Area Test Site
PMES	Portable MES
ppm	parts per million
R&TTE	Former Radio Directive
RAS	Radio Astronomy Service
RE	Radio Equipment

RED	Radio Equipment Directive
RF	Radio Frequency
RR	Radio Regulations
SNR	Signal to Noise Ratio
STE	Special Test Equipment
U/C	Unconditional/Conditional
VMES	Vehicle Mounted MES

4 Technical requirements specifications

4.1 Environmental profile

4.1.1 General

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be in accordance with its intended use, but as a minimum, shall be that specified in the test conditions contained in the present document. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the operational environmental profile defined by its intended use. The environmental profile for operation of the equipment shall include the ranges of temperature and supply voltage.

4.1.2 Temperature

The MES shall fulfil all the requirements in the full temperature ranges of:

-10 °C to +55 °C;

taken from IEC publications 60068-2-1 [2] and 60068-2-2 [3].

For MESs expected to operate in an environment outside this temperature range the definition of the intended use shall indicate the necessary actions to ensure proper operation.

4.1.3 Voltage

The nominal, lower and the higher extreme voltages shall be indicated for the intended use of the MES.

The MES shall fulfil all the requirements in the full voltage range between the extreme voltages, for which the equipment was designed.

Table 2: Void

4.2 Conformance requirements

4.2.1 Unwanted emission outside the bands 148 MHz to 150,05 MHz, 235 MHz to 322 MHz, 335,4 MHz to 399,9 MHz and 399,9 MHz to 400,05 MHz

4.2.1.1 Justification

To establish unwanted emission limits to protect other terrestrial services, space radio communications services and the radio astronomy service from emissions caused by MESs outside the bands 148 MHz to 150,05 MHz, 235 MHz to 322 MHz, 335,4 MHz to 399,9 MHz and 399,9 MHz to 400,05 MHz.