

ETSI EN 301 721 V2.1.1 (2016-05)



**Satellite Earth Stations and Systems (SES);
Harmonised Standard for Mobile Earth Stations (MES)
providing Low Bit Rate Data Communications (LBRDC)
using Low Earth Orbiting (LEO) satellites operating
below 1 GHz frequency band covering the essential
requirements of article 3.2 of the Directive 2014/53/EU**

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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.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 [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:	12 May 2016
Date of latest announcement of this EN (doa):	31 August 2016
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

ETSI has designed a modular structure for the standards. Each standard is a module in the structure. The modular structure is shown in ETSI EG 201 399 [i.1].

Figure 1: Void

The present document is based on ETSI EN 300 721 [6].

The requirements of the present document have been selected to ensure an adequate level of compatibility with other radio services.

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

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

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1 Scope

The present document applies to Mobile Earth Stations (MES) providing Low Bit Rate Data Communications (LBRDC) using Low Earth Orbiting (LEO) satellites and which have the following characteristics:

- the MES could be 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 types are capable of operating in all or any part of the frequency bands given in table 1.

Table 1: Frequency ranges

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	LMSS	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	LMSS	235 to 322	MSS
		335,4 to 399,9	MSS
		400,15 to 401	MSS

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"

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 [7] may apply to equipment within the scope of the present document.

NOTE 1: A list of such ENs is included on the ETSI web site.

NOTE 2: The MESs are controlled and monitored by a Network Control Facility (NCF). The NCF is outside the scope of the present document.

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] IEC Publication 60068-2-1 (2007): "Environmental testing - Part 2: Tests. Tests A: Cold".
- [3] IEC Publication 60068-2-2 (2007): "Environmental testing - Part 2: Tests. Tests B: Dry heat".
- [4] IEC Publication 60068-2-64 (2008): "Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance".
- [5] Void.

- [6] ETSI EN 300 721 (V1.2.2) (07-1999): "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".
- [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.

2.2 Informative references

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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] ETSI EG 201 399 (V3.1.1): "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.2] 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 terms and definitions given in Directive 2014/53/EU [7] and the following apply:

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

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

carrier-off state: state in which the MES is not transmitting 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 offer 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 offer functionality

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

Installable Equipment (IE), Internally Mounted Equipment (IME) And Externally Mounted Equipment (EME): equipment which is intended to be installed in a vehicle

NOTE: An IE may consist of one or several interconnected modules. The IE is composed of modules intended to be externally mounted as declared by the applicant, 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: one 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 by the applicant

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 wide enough to take account of the transmit carrier frequency stability. The nominated bandwidth is within the MSS transmit frequency band within which the MES operates.

NOTE 2: For FDMA/DCAA 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.

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 noted in the relevant text.

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, and generated in the carrier-off state

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

wideband system: 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 Abbreviations

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

AC	Alternating Current
ASD	Acceleration Spectral Density
BMES	Base MES
BW	Bandwidth

BE _L	Lower Band Edge of the operating band
BE _U	Upper Band Edge of the operating band
CMF	Control and Monitoring Function
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
IE	Installable Equipment
IEC	International Electrotechnical Commission/Committee
IME	Internally Mounted Equipment
kbps	kilobits per second
LBRDC	Low Bit Rate Data Communications
LMSS	Land Mobile Satellite Service
LTE	Laboratory Test Equipment
LTE	Long Term Evolution
MES	Mobile Earth Station
MIC	MES Identification Code
MSS	Mobile Satellite Service
NCF	Network Control Facility
PMES	Portable MES
ppm	parts per million
R&TTE	Radio and Telecommunications Terminal Equipment
RAS	Radio Astronomy Service
RE	Radio Equipment
RED	Radio Equipment Directive
RF	Radio Frequency
STE	Special Test Equipment
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 specified below for operation of the equipment. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the specified operational environmental profile.

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 applicant will take the necessary actions to ensure proper operation.

4.1.3 Voltage

The applicant shall declare the nominal, lower and the higher extreme voltages.

The MES shall fulfil all the requirements in the full voltage range between the extreme voltages.