



**Satellite Earth Stations and Systems (SES);
Harmonised Standard for low data rate
Mobile satellite Earth Stations (MES)
except aeronautical mobile satellite earth stations,
operating in the 11/12/14 GHz frequency bands
covering the essential requirements
of article 3.2 of the Directive 2014/53/EU**

Reference

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satellite**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
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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.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 [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.

National transposition dates	
Date of adoption of this EN:	16 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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

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 under the RE Directive [3]. The modular structure is shown in ETSI EG 201 399 [i.1].

Figure 1: Void

The present document is based on ETSI TBR 027 [i.2].

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 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 MES.

The determination of the parameters of the user earth stations using a given geostationary 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.

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1 Scope

The present document applies to Mobile Earth Stations (MES), except aeronautical mobile earth stations, which have the following characteristics:

- The MES are operating in one or more frequency ranges of the Fixed Satellite Service (FSS):
 - 10,70 GHz to 11,70 GHz (space to earth);
 - 12,50 GHz to 12,75 GHz (space to earth);
 - 14,00 GHz to 14,25 GHz (earth to space).

Because the transmissions from the MES to the Satellite in the 14,00 GHz to 14,25 GHz band fall under a secondary allocation, the transmissions should not cause harmful interference to primary services (e.g. the Fixed Satellite Service (FSS)) and at the same time cannot claim protection from harmful interference from those services.

- The MES may be either:
 - a Land Mobile Earth Station (LMES) radio equipment; and/or
 - a Maritime Mobile Earth Station (MMES) radio equipment not providing those distress and safety functions required by the International Maritime Organization (IMO).
- These LMESs could be either vehicle mounted or portable equipment.
- These MMESs are installable equipment on ships.
- The MES could consist of a number of modules including a keyboard interface to the user.
- The MES use linear polarization.
- The MES operate through a geostationary satellite at least 3° away from any other geostationary satellite operating in the same frequency band and covering the same area.
- The antenna of the MES may be omnidirectional or directional with a means of tracking the satellite.
- The MES are operating as part of a satellite network used for the distribution and/or exchange of information between users.
- The MES are 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 MES with its ancillary equipment and its various terrestrial ports, and when operated within the boundary limits of the operational environmental profile declared by the manufacturer.

The present document is intended to cover the provisions of Directive 2014/53/EU [3] (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 [3] may apply to equipment within the scope of the present document.

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

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 (07-2007): "Specification for radio disturbance and immunity measuring apparatus and methods; Part 1: Radio disturbance and immunity measuring apparatus".
- [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 (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] 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.2] ETSI TBR 027: "Satellite Earth Stations and Systems (SES); Low data rate Land Mobile satellite Earth Stations (LMES) operating in the 11/12/14 GHz frequency bands".
- [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, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the Directive 2014/53/EU [3] and the following apply:

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

Control Channel (CC): channel or channels by which MES receive control information from the NCF of their network

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

Externally Mounted Equipment (EME): modules of the Installable Equipment (IE) which are intended to be mounted externally to the vehicle as stated by the manufacturer

Installable Equipment (IE): equipment intended to be fitted to a vehicle

NOTE: An IE may consist of one or several interconnected modules.

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

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

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 MES radio frequency transmission is nominated by the manufacturer

NOTE: 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 transmit frequency band within which the MES operates.

Portable Equipment (PE): self-contained, free standing and portable

NOTE: Normally, a PE would consist of a single module, but may consist of several interconnected modules.

unwanted emissions: emissions falling outside the nominated bandwidth

3.2 Symbols

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

dBsd Ratio expressed in decibels relative to the spectral density

3.3 Abbreviations

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

BW	Wanted signal occupied Bandwidth
CC	Control Channel
CISPR	International Special Committee on Radio Interference
CMF	Control and Monitoring Functions
EFTA	European Free Trade Association
EIRP	Equivalent Isotropically Radiated Power
EME	Externally Mounted Equipment
EUT	Equipment Under Test
FSS	Fixed Satellite Service

GEUT	Gain of EUT
IE	Installable Equipment
IME	Internally Mounted Equipment
IMO	International Maritime Organization
LMES	Land Mobile Earth Station
LNB	Low Noise Block
MES	Mobile Earth Station
MMES	Maritime Mobile Earth Station
NCF	Network Control Facility
PE	Portable Equipment
R&TTE	Radio and Telecommunications Terminal Equipment
RE	Radio Equipment
RED	Radio Equipment Directive
RF	Radio Frequency
rms	root mean square
STE	Special Test Equipment
TBR	Technical Basis for Regulation

4 Technical requirement specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the manufacturer. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

The environmental profile for operation of the equipment shall include the ranges of humidity, temperature and supply voltage.

4.2 Conformance requirements

4.2.1 Unwanted emissions outside the band

4.2.1.1 Justification

Protection of terrestrial and satellite services from emissions caused by MES outside the band 14,00 GHz to 14,25 GHz.

4.2.1.2 Specification

The unwanted emissions in the measurement bandwidth and in all directions from the MES outside the band 14,00 GHz to 14,25 GHz, within which the MES is designed to operate, shall be below the following limits:

- 1) The unwanted emissions over the frequency range 30 MHz to 1 000 MHz shall not exceed the limits in table 1a for LMESs and table 1b for MMESs.

Table 1a: Limits of LMESs unwanted emissions up to 1 000 MHz at a measuring distance of 10 m in a 120 kHz bandwidth

Frequency (MHz)	Quasi-peak limits (dB(μV/m))
30 to 230	30
230 to 1 000	37

Table 1b: Limits of MMESs unwanted emissions up to 1 000 MHz at a measuring distance of 10 m in a 120 kHz bandwidth

Frequency (MHz)	Quasi-peak limits (dB(µV/m))
30 to 156	30
156 to 165	14 (see note)
165 to 230	30
230 to 1 000	37
NOTE: In the band 156 MHz to 165 MHz, a 9 kHz bandwidth apply.	

The lower limit shall apply at the transition frequency.

- 2) The unwanted emissions Equivalent Isotropically Radiated Power (EIRP) above 1 000 MHz, in the measurement bandwidth and in all directions shall not exceed the limits given in table 2.

Table 2: Limits of unwanted emissions above 1 000 MHz and outside the band 14,00 GHz to 14,25 GHz

Frequency range (MHz)	Carrier-on		Carrier-off	
	EIRP limit (dBpW)	Measurement bandwidth (kHz)	EIRP limit (dBpW)	Measurement bandwidth (kHz)
1 000 to 1 525	49	100	48	100
1 525 to 1 559	49	100	17	3
1 559 to 3 400	49	100	48	100
3 400 to 10 700	55	100	48	100
10 700 to 21 200	61	100	54	100
21 200 to 40 000	67	100	60	100

The lower limits shall apply at the transition frequencies.

4.2.1.3 Conformance tests

Conformance tests shall be carried out in accordance with clause 6.1.

4.2.2 Unwanted emissions within the band

4.2.2.1 Justification

Protection of the primary services operating in the 14,00 GHz to 14,25 GHz frequency band.

4.2.2.2 Specification

Specification 1: Carrier-on state

The EIRP spectral density of the unwanted emissions shall not exceed $4 - 10 \log N$ dBW/100 kHz in the 14,00 GHz to 14,25 GHz band and outside the nominated bandwidth.

N is the maximum number of MES which are expected to transmit simultaneously on the same frequency. This number shall not be exceeded for more than 0,01 % of the time. The value of N and the operational conditions of the system shall be declared by the manufacturer.

Specification 2: Carrier-off state

The EIRP spectral density of any emission in the 14,00 GHz to 14,25 GHz band shall not exceed -21 dBW/100 kHz.

4.2.2.3 Conformance tests

Conformance tests shall be carried out in accordance with clause 6.2.