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HARMONISED EUROPEAN STANDARD

ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 20: Specific conditions for Mobile Earth Stations (MES) used in the Mobile Satellite Services (MSS); Harmonised Standard for ElectroMagnetic Compatibility

Reference

REN/ERM-EMC-405

Keywords

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Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the combined Public Enquiry and 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.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.1].

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.

The present document is part 20 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

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).

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

1 Scope

The present document specifies technical characteristics and methods of measurement for Mobile Earth Stations (MESs) operating in the Mobile Satellite Services (MSSs) as defined in annex B, and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC).

Technical specifications related to the antenna port and emissions from the enclosure port of the equipment are not included in the present document. Such technical specifications are found in the relevant product standards for the effective use of the radio spectrum, see table 1.

Table 1: Radio Technologies in scope of the present document

Technology	ETSI Standard
Low data rate Land Mobile satellite Earth Stations (LMES) and Maritime Mobile satellite Earth Stations (MMES) operating in the 1 518 MHz to 1 675 MHz frequency bands	ETSI EN 301 426 [i.3]
Low data rate Land Mobile satellite Earth Stations (LMES) operating in the 11/12/14 GHz frequency bands	ETSI EN 301 427 [i.4]
Mobile Earth Stations (MESs), including handheld earth stations, for Satellite Personal Communications Networks (S-PCN) in the 1 610 MHz to 2 500 MHz frequency bands under the Mobile Satellite Service (MSS)	ETSI EN 301 441 [i.5]
Mobile Earth Stations (MESs), including handheld earth stations, for Satellite Personal Communications Networks (S-PCN) in the 1 980 MHz to 2 200 MHz frequency bands under the Mobile Satellite Service (MSS)	ETSI EN 301 442 [i.6]
Land Mobile Earth Stations (LMES) and Maritime Mobile Earth Stations (MMES) operating in the 1 518 MHz to 1 675 MHz frequency bands providing voice and/or data communications	ETSI EN 301 444 [i.7]
Mobile Earth Stations (MES) providing Low Bit Rate Data Communications (LBRDC) using Low Earth Orbiting (LEO) satellites operating in the 137 MHz to 401 MHz frequency bands	ETSI EN 301 721 [i.8]
Land Mobile Earth Stations (LMES) and Maritime Mobile Earth Stations (MMES) of Geostationary mobile satellite systems, including handheld earth stations, for Satellite Personal Communications Networks (S-PCN) under the Mobile Satellite Service (MSS), operating in the 1 518 MHz to 1 675 MHz frequency bands	ETSI EN 301 681 [i.9]
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 1 518 MHz to 2 500 MHz frequency bands	ETSI EN 301 473 [i.10]

The environmental classification used in the present document are as stated in ETSI EN 301 489-1 [1].

For a multimode radio station, the present document only applies to the radio station when operated in the Mobile Satellite Service mode.

NOTE: The relationship between the present document and essential requirements of article 3.1(b) of Directive 2014/53/EU [i.1] 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 at https://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] ETSI EN 301 489-1 (V2.2.3) (11-2019): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility".

[2] Void.

[3] Void.

[4] ITU-R Radio Regulations (2020).

[5] Void.

[6] EN 61000-3-3 (2013) +A1 (2019): "Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection" (produced by CENELEC).

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.

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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] 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.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.

[i.3] ETSI EN 301 426: "Satellite Earth Stations and Systems (SES); Harmonised Standard for Low data rate Land Mobile satellite Earth Stations (LMES) and Maritime Mobile satellite Earth Stations (MMES) not intended for distress and safety communications operating in the 1,5 GHz/1,6 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.4] ETSI EN 301 427: "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".

[i.5] ETSI EN 301 441: "Satellite Earth Stations and Systems (SES); Harmonised Standard for Mobile Earth Stations (MES), including handheld earth stations, for Satellite Personal Communications Networks (S-PCN) operating in the 1,6 GHz/2,4 GHz frequency band under the Mobile Satellite Service (MSS) covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.6] ETSI EN 301 442: "Satellite Earth Stations and Systems (SES); Harmonised Standard for NGSO Mobile Earth Stations (MES) including handheld earth stations, for Satellite Personal Communications Networks (S-PCN) operating in the 1 980 MHz to 2 010 MHz (earth-to-space) and 2 170 MHz to 2 200 MHz (space-to-earth) frequency bands under the Mobile Satellite Service (MSS) covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.7] ETSI EN 301 444: "Satellite Earth Stations and Systems (SES); Land Mobile Earth Stations (LMES) and Maritime Mobile Earth Stations (MMES) providing voice and/or data communications, operating in the 1,5 GHz and 1,6 GHz frequency bands; Harmonised Standard for access to radio spectrum".

[i.8] ETSI EN 301 721: "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".

[i.9] ETSI EN 301 681: "Satellite Earth Stations and Systems (SES); Harmonised Standard for Mobile Earth Stations (MES) of Geostationary mobile satellite systems, including handheld earth stations, for Satellite Personal Communications Networks (S-PCN) under the Mobile Satellite Service (MSS), operating in the 1,5 GHz and 1,6 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.10] ETSI EN 301 473: "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".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 301 489-1 [1] and the following apply:

ancillary equipment: electrical or electronic equipment, that is intended to be used with a receiver or transmitter

NOTE 1: It is considered as an ancillary equipment if:

- the equipment is intended for use with a receiver or transmitter to provide additional operational and/or control features to the radio equipment (e.g. to extend control to another position or location);
- the ancillary equipment cannot be used without being connected to radio equipment to provide user functions independently of a receiver or transmitter; and
- the receiver or transmitter, to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

NOTE 2: An example of ancillary equipment would be a docking station for radio equipment whose interface is dedicated to a particular product or range of products.

carrier-off state (idle mode): state of an MES when it is powered-on but not transmitting a signal, i.e. not in a carrier-on state

carrier-on state (allocated a channel): state of an MES when it is transmitting a signal in a continuous or a non-continuous mode

critical stored data: data that is essential for an EUT to perform a primary function in accordance with that EUT's specification

NOTE: This may include data previously stored by the user.

drive equipment: equipment used to enable the EUT to operate as intended during the test process

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

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

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

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

integral antenna: antenna designed for permanent connection to the equipment and considered part of the enclosure port

Internally Mounted Equipment (IME): IE modules which are not defined as EME

multimode MES: equipment that accommodates radio stations of different radio systems

occupied bandwidth: See ITU-R Radio Regulations [4], part A, chapter 1, Terminology RR 147.

Portable Equipment (PE): radio equipment intended for portable use and powered by integral batteries or battery

NOTE 1: A PE would normally consist of a single module, but may consist of several interconnected modules.

NOTE 2: More than one of the equipment classifications can apply to certain equipment, as described in clause 5.4, dependent upon the manufacturer's declaration of normal intended use.

transmission disabled state: state of an MES when it is not authorized to transmit by the Network Control Facilities (NCF)

3.2 Symbols

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

Pmin minimum power required to establish a communication link

3.3 Abbreviations

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

AC	Alternating Current
AES	Aeronautical Earth Station
BER	Bit Error Ratio
DC	Direct Current
EFTA	European Free Trade Association
EMC	ElectroMagnetic Compatibility
EME	Externally Mounted Equipment
EUT	Equipment Under Test
F-MES	Fixed MES
IE	Installable Equipment
IME	Internally Mounted Equipment
LBRDC	Low Bit Rate Data Communication
LEO	Low Earth Orbit
LMES	Land Mobile Earth Station
MES	Mobile Earth Station
MMES	Maritime Mobile Earth Station
MSS	Mobile Satellite Service
NCF	Network Control Facilities
PE	Portable Equipment
PEP	Peak Envelope Power
P-MES	Portable MES
QTMA	Quality of Transmission Measurement Apparatus
RF	Radio Frequency
S-PCN	Satellite Personal Communications Network
V-MES	Vehicle mounted MES

4 Test conditions

4.1 General

For the purposes of the present document, the test conditions of ETSI EN 301 489-1 [1], clause 4, shall apply with the following additions. Further product related test conditions for MES are specified in the present document.

For MESs with ancillary equipment and/or various ports, the selection of test configurations shall be determined. The assessment shall include sufficient representative configurations of the MES to adequately exercise the equipment. These configurations shall be recorded in the test report.

In clauses 4.2 and 4.3, the Equipment Under Test (EUT) is the MES with the selected configurations of ancillary equipment.

The EUT operational frequencies used during the test, shall be recorded in the test report.

For testing, any physically separated voltage converter from the MES, shall form part of the EUT.

Where radio equipment is provided with an integral antenna, it shall be tested with the antenna fitted in a manner representative of intended use.

4.2 Arrangements for test signals

4.2.0 General

The provisions of ETSI EN 301 489-1 [1], clause 4.2 shall apply with the following additions.

In order to measure the system emissions and electromagnetic immunity under operational conditions, the following arrangements shall be provided:

a) a Drive Equipment to put the MES terminal in its normal operating mode, and providing the MES with a receive signal to emulate the operational conditions of reception. This equipment shall control the EUT, when it is capable of transmission, so that it switches between the transmission disabled, carrier-on and carrier-off states. This Equipment may also be used to achieve loop back mode operation;

b) a Quality of Transmission Measurement Apparatus (QTMA).

EXAMPLE: The quality of transmission may concern:

- the audio signal;
- the BER;
- the message throughput;
- the continuity of the communication link; or
- a combination of them.

For the immunity tests of the EUT, a communications link shall be established between the EUT and the testing system. The EUT shall be placed in the normal operating mode.

4.2.1 Arrangements for test signals at the input of transmitters

The provisions of ETSI EN 301 489-1 [1], clause 4.2.1 shall apply.

4.2.2 Arrangements for test signals at the output of transmitters

The provisions of ETSI EN 301 489-1 [1], clause 4.2.2 shall apply with the following additions.

For transmitters, the EUT shall be operated at its maximum rated RF output Peak Envelope Power (PEP). The transmitter shall be modulated with a test signal which represents normal operation. A communication link shall be established at the start of the test and be maintained throughout the test. A suggested test configuration is shown in figure 1.

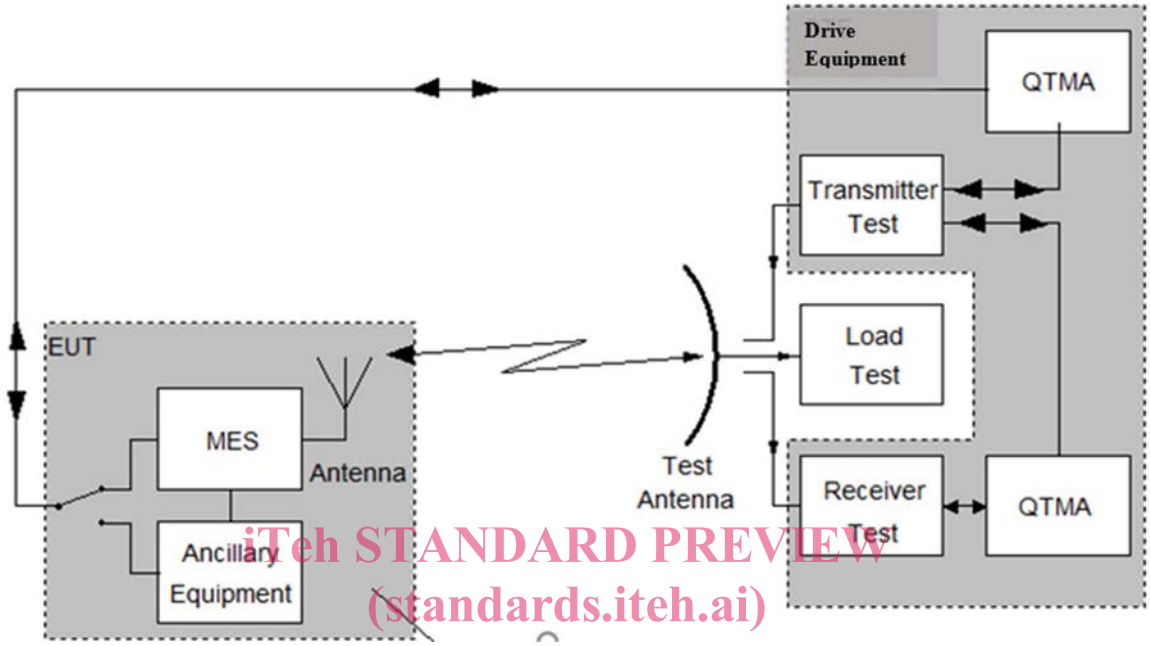

Figure 1: Test configuration

4.2.3 Arrangements for test signals at the input of receivers

The provisions of ETSI EN 301 489-1 [1], clause 4.2.3 shall apply with the following additions.

For radiated immunity, the level of the wanted signal at the input of the receiver or the enclosure terrestrial port of the EUT, shall be 20 dB (±3 dB) above the Pmin for the EUT. For all other tests the level of the wanted signal, required to establish a communication link, shall be representative of the EUT intended use.

NOTE: A simple method to establish the required communication link is establish link, reduce power to point of link failure then increase by 20 dB.

4.2.4 Arrangements for test signals at the output of receivers

The provisions of ETSI EN 301 489-1 [1], clause 4.2.4 shall apply with the following additions.

For the quality of transmission measurements the MES shall be put in a mode of operation where the received data are looped back to the modulation input of the transmitter part of the EUT.

4.3 Exclusion bands

4.3.0 General

Exclusion bands shall be in accordance with clauses 4.3.1 and 4.3.2. There shall be no exclusion bands for the ancillary equipment.