ETSI EN 302 574-3 V2.1.1 (2016-06)

**Satellite Earth Stations and Systems (SES);
Harmonised Standard for Mobile Earth Stations (MES)
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
covering the essential requirements
of article 3.2 of the Directive 2014/53/EU;
Part 3: User Equipment (UE) for narrowband systems**

Reference
REN/SES-00397

Keywords
MES, mobile, MSS, narrowband, satellite

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Sous-Préfecture de Grasse (06) N° 7803/88

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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.6] 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.

The present document is part 3 of a multi-part deliverable covering the Harmonised Standard for Mobile Earth Stations (MES) 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 covering the essential requirements of article 3.2 of the Directive 2014/53/EU, as identified below:

Part 1: "Complementary Ground Component (CGC) for wideband systems";

Part 2: "User Equipment (UE) for wideband systems";

Part 3: "User Equipment (UE) for narrowband systems".

National transposition dates	
Date of adoption of this EN:	30 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

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 and telecommunications terminal equipment within the scope of the Directive 2014/53/EU [7]. The modular structure is shown in ETSI EG 201 399 [i.5].

1 Scope

The present document applies to User Equipment (UE) radio equipment type which have the following characteristics:

- these UEs have both transmit and receive capabilities and operate in a Geostationary satellite network;
- these UEs operate with an assigned channel signal bandwidth (CBw) smaller than 1 MHz;
- these UEs may be handset, handheld, portable, vehicle-mounted, host connected, semi-fixed or fixed equipment, or may be an element in a multi-mode terminal. It may consist of a number of modules with associated connections and user interface, or may be a self-contained single unit;
- if the UE is an element in a multi-mode terminal, unless otherwise stated in the present document, its requirements apply only to the UE element of the terminal operating in the Mobile Satellite Service (MSS) frequency bands given in table 1.

This radio equipment type is capable of operating in all or any part of the frequency bands given in table 1.

Table 1: Mobile Satellite Service UE frequency bands

Operating band	Direction of transmission	UE frequency bands
I	UE Transmit (earth-to-space)	1 980 MHz to 2 010 MHz
	UE Receive (space-to-earth)	2 170 MHz to 2 200 MHz

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: 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.

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

[1] Void.

[2] Recommendation ITU-T O.153 (10/1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".

[3] CISPR 16-1-4 (2010): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Antennas and test sites for radiated disturbance measurements".

[4] ETSI TR 100 028 (V1.4.1) (12-2001) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

[5] IEC 60068-2-1 (2007): "Environmental testing - Part 2-1: Tests - Test A: Cold".

[6] IEC 60068-2-2 (2007): "Environmental testing - Part 2-2: Tests - Test B: Dry heat".

[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

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] ETSI TR 102 215: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Recommended approach, and possible limits for measurement uncertainty for the measurement of radiated electromagnetic fields above 1 GHz".

[i.2] Void.

[i.3] Void.

[i.4] Void.

[i.5] 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.6] 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 [7] and the following apply:

3 dB Bandwidth (B3dB): total width of the signal spectrum 3 dB below the maximum in-band density

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

carrier-on time (initial bursts): period when a UE is transmitting a signal

NOTE: For UEs that transmit in a non-continuous mode, the carrier-on time only includes the times when the UE is transmitting a signal.

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

carrier-off state: state in which the UE is not transmitting a carrier

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

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 the antenna gain in the direction considered, relative to an isotropic source radiating uniformly in all directions

fellow radio station: one of the (other) modes of a multimode UE

handheld: indicates a UE which is self-contained and is small enough and light enough to be carried and used during a call with one hand

host-connected: mode in which a UE is connected to a host equipment for its operation

host equipment: any equipment which has a complete user functionality when not connected to the UE, and to which the UE provides additional functionality, and to which connection is necessary for the UE 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): 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 provided by a test laboratory

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

multimode: mode in which the UE can operate with different radio networks

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 a UE receives general control information from the NCF

nominated bandwidth (Bn): The nominated bandwidth of the UE radio frequency transmission is nominated by the applicant.

NOTE: The nominated bandwidth is wide enough to encompass all spectral elements of the transmission necessary for communication and 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 centred on the transmit frequency and does not exceed 180 % of the 3dB bandwidth of the signal. The nominated bandwidth is within the assigned part of the MSS transmit frequency band within which the UE operates.

operational frequency range(s): sub-portion(s) of the band in the earth-to-space direction to the MSS network, for which the equipment has been designed as declared by the applicant

Portable Equipment (PE): equipment generally intended to be self-contained, free standing and portable

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

radiated measurement: measurement of an actual radiated field

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

spurious emissions: emissions at frequencies beyond the limit of 2,5 MHz above and below the centre frequency of the wanted emission

NOTE: Spurious emissions are generally considered as emissions at frequencies beyond the limit of 250 % of the necessary bandwidth above and below the centre frequency of the wanted emission. For the purposes of the present specification, this limit is defined as frequencies which are 2,5 MHz or greater away from the UE centre carrier frequency, where 2,5 MHz corresponds to 250 % of the maximum value of assigned channel signal bandwidth (CBw).

test laboratory: laboratory which performs the conformance testing of the UE against the present document

NOTE: The test laboratory may be the applicant's laboratory.

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

transmission format: physical characteristics of the signal that is transmitted by a UE

NOTE: A UE may use more than one transmission format within a single network.

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

3.2 Symbols

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

B3dB	3 dB Bandwidth
Bn	Nominated Bandwidth
CBw	Assigned Channel Signal Bandwidth

3.3 Abbreviations

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

AC	Alternating Current
BE_L	Lower Band Edge of the operating band
BE_U	Upper Band Edge of the operating band
BW	Bandwidth
CDMA	Code Division Multiple Access
CGC	Complementary Ground Component
CISPR	International Special Committee on Radio Interference
CMF	Control and Monitoring Functions
CW	Continuous Wave
EFTA	European Free Trade Association
EIRP	Equivalent Isotropically Radiated Power
EMC	Electro-Magnetic Compatibility
EME	Externally Mounted Equipment
EU	European Union
EUT	Equipment Under Test
IE	Installable Equipment
IEC	International Electrotechnical Commission/Committee
IME	Internally Mounted Equipment
ITU	International Telecommunications Union
ITU-T	ITU Telecommunication Standardization Sector
LTE	Laboratory Test Equipment
LTE	Long Term Evolution
LV	Low Voltage
MES	Mobile Earth Station
MSS	Mobile Satellite Service
NCF	Network Control Facility

PE	Portable Equipment
R&TTE	Radio and Telecommunications Terminal Equipment
RE	Radio Equipment
RED	RE Directive
RF	Radio Frequency
RMS	Root Mean Square
SNR	Signal to Noise Ratio
STE	Special Test Equipment
TDMA	Time Division Multiple Access
TH	Temperature High
TL	Temperature Low
UE	User Equipment

4 Technical requirements 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 supplier. 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.

For guidance on how a supplier can declare the environmental profile, see annex B.

4.2 Conformance requirements

4.2.0 General

The requirements in the present document are based on the assumption that the operating band is shared between systems of the IMT-2000 satellite family or systems having compatible characteristics.

4.2.1 Introduction

To meet the essential requirements under article 3.2 of the Directive 2014/53/EU [7] a set of essential parameters have been identified. Table 2 provides a cross reference between these 4 essential parameters and the corresponding 4 technical requirements for equipment within the scope of the present document.

Table 2: Cross reference to technical requirements

Essential Parameter	Corresponding Technical Requirement
Spurious emissions in carrier-on state	Clause 4.2.2: Unwanted emissions outside the band 1 980 MHz to 2 010 MHz (carrier on state)
Out-of-band emissions (spectrum emissions mask) in carrier-on state	Clause 4.2.3: Unwanted emissions within the band 1 980 MHz to 2 010 MHz (carrier on state)
Spurious emissions in carrier-off state	Clause 4.2.4: Unwanted emissions in carrier off state
Control and Monitoring functions	Clause 4.2.5: UE Control and Monitoring Functions (CMF)

In the event of any conflict between these different requirements, the most stringent requirement shall apply.

4.2.2 Unwanted emissions outside the band 1 980 MHz to 2 010 MHz (carrier-on state)

4.2.2.1 Justification

Protection of other radio services operating outside the band 1 980 MHz to 2 010 MHz from emissions caused by UEs operating within the band 1 980 MHz to 2 010 MHz.

4.2.2.2 Technical requirements

The maximum EIRP spectral density of the unwanted emissions from the UE outside the band 1 980 MHz to 2 010 MHz shall not exceed the limits in tables 3a and 3b in the carrier-on state.

The limits defined in table 3a are only applicable for frequencies which are 2,5 MHz or greater away from the UE centre carrier frequency. Unwanted emissions at frequencies which are less than 2,5 MHz away from the UE centre carrier frequency shall not exceed the limits defined in table 3b.

NOTE 1: For the purposes of the present document, spurious emissions are defined as unwanted emissions at frequencies which are 2,5 MHz or greater away from the UE centre carrier frequency, where 2,5 MHz corresponds to 250 % of the maximum value of assigned channel signal bandwidth (CBw).

The limits defined in table 3b are defined by reference to clause 4.2.3 for two specified frequency bands for frequencies which are less than 2,5 MHz away from the UE centre carrier frequency. Unwanted emissions in these bands shall not exceed the limits defined in either table 4a or table 4b in the carrier-on state: the applicant shall declare which alternative shall be used.

In addition to the limits defined in table 3b, unwanted emissions at frequencies which are less than 2,5 MHz away from the UE centre carrier frequency shall also not exceed the limits defined in either table 4a or table 4b in the carrier-on state: the applicant shall declare which alternative shall be used. In the event of any conflict, the more stringent limit shall apply.

In tables 3a and 3b, whenever a change of limit between adjacent frequency bands occurs, the lower of the two limits shall apply at the transition frequency.

For systems employing CDMA, the EIRP limits shall be decreased by 10 log (N) dB, where N is the maximum number of UEs in the receive beam of the satellite to which these UEs are communicating and which are expected to transmit simultaneously in the same frequency band within that same beam. This number shall be declared by the manufacturer.

NOTE 2: N = 1 in a TDMA system.