Final draft ETSI EN 301 489-19 V2.2.1 (2022-07)

ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band providing positioning, navigation, and timing data; Harmonised Standard for ElectroMagnetic Compatibility

Reference
REN/ERM-EMC-406

Keywords
data, earth station, EMC, GNSS, harmonised standard, mobile, MSS, radio, receiver, regulation, satellite, testing

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Foreword

This final 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 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 19 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 covers the assessment of Receive Only Mobile Earth Stations (ROMES) and Global Navigation Satellite System (GNSS) receivers in respect of electromagnetic compatibility.

ROMES operate in the Land Mobile Satellite Service (LMSS) space to earth bands, 1 518 MHz to 1 559 MHz, allocated by the ITU Radio Regulations [i.3]. ROMES operate as part of a satellite system providing one way data communications.

Global Navigation Satellite System (GNSS) receivers operate in either or both of the space to earth RNSS frequency bands of 1 164 MHz to 1 300 MHz and 1 559 MHz to 1 610 MHz defined as "A radiodetermination-satellite service used for the purpose of radionavigation" (article 1.43 of ITU Radio Regulations [i.3]) with the ability to receive any GNSS (e.g. Galileo, Global Positioning System (GPS), BeiDou (BDS), GLObal NAvigation Satellite System (GLONASS), Space Based Augmentation Systems (SBAS)).

Technical specifications related to the antenna port and emissions from the enclosure port of ROMES and GNSS 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 in table 1.

Table 1: Radio Technologies in Scope of the present document

Technology	ETSI Standard
ROMES	ETSI EN 300 487 [i.4]: "Satellite Earth Stations and Systems (SES); Harmonised Standard for Receive-Only Mobile Earth Stations (ROMES) providing data communications operating in the 1,5 GHz frequency band; Radio Frequency (RF) specifications covering the essential requirements of article 3.2 of the Directive 2014/53/EU".
GNSS	ETSI EN 303 413 [i.5]: "Satellite Earth Stations and Systems (SES);Global Navigation Satellite System (GNSS) receivers; Radio equipment operating in the 1 164 MHz to 1 300 MHz and 1 559 MHz to 1 610 MHz frequency bands; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

Emissions requirements in the present document are specified for frequencies above 9 kHz.

The present document specifies the applicable test conditions, performance assessment and performance criteria for ROMES, GNSS and associated ancillary equipment.

ROMESs and GNSS can have several configurations, including:

- vehicular equipment;
- portable equipment;
- fixed equipment;
- a number of modules including a display/control interface to the user.

The performance criteria used in the present document require that the satellite communications system of which the ROMES and GNSS is a part provides reliable delivery of data or messages.

The environmental classification and the emission and immunity requirements used in the present document are as stated in ETSI EN 301 489-1 [1], except for any special conditions included in the present document.

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".

2.2 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] 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] ITU Radio Regulations (2016).

[i.4] ETSI EN 300 487 (V2.1.2) (11-2016): "Satellite Earth Stations and Systems (SES); Harmonised Standard for Receive-Only Mobile Earth Stations (ROMES) providing data communications operating in the 1,5 GHz frequency band; Radio Frequency (RF) specifications covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

[i.5] ETSI EN 303 413 (V1.2.1) (04-2021): "Satellite Earth Stations and Systems (SES); Global Navigation Satellite System (GNSS) receivers; Radio equipment operating in the 1 164 MHz to 1 300 MHz and 1 559 MHz to 1 610 MHz frequency bands; Harmonised Standard for access to radio spectrum".

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

NOTE: It is considered as an ancillary equipment if:

- the equipment is intended for use with a receiver 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; and
- the receiver to which it is connected, is capable of providing some intended operation such as receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

Equipment Under Test (EUT): equipment subject to the performance requirements of the present document

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.

fixed equipment: equipment intended for use in a fixed location and fitted with one or more antennas

live sky signal: signal received from actual existing satellites

portable equipment: radio equipment intended for portable use and powered by integral batteries or battery

NOTE: Devices will typically be handheld.

stand-alone radio equipment: equipment that is intended primarily as communications equipment and that is normally used on a stand-alone basis

vehicular equipment: radio equipment intended for installation and use in a vehicle, and powered by the main battery of the vehicle

3.2 Symbols

Void.

3.3 Abbreviations

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

AC	Alternating Current
BDS	BeiDou - Chinese satellite navigation system
dB	decibel
DC	Direct Current
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
GHz	Gigahertz
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
kHz	Kilohertz
LMSS	Land Mobile Satellite Service
MFCN	Mobile Fixed Communications Network

MHz	Megahertz
Pmin	Minimum power required to establish a communication link
RF	Radio Frequency
RNSS	Radio-Navigation Satellite Service
ROMES	Receive Only Mobile Earth Station
RX	Receiver
SBAS	Space Based Augmentation System
SES	Satellite Earth System

4 Test conditions

4.1 General

The manufacturer should at the time of submission of the equipment for test, supply the applicable environments, referred to in ETSI EN 301 489-1 [1], where ROMES, and or GNSS may be used.

For emission and immunity tests the test modulation, test arrangements, etc., as specified in the present document, clauses 4.1 to 4.5 shall apply.

The Equipment Under Test (EUT) is the ROMES or GNSS receiver, together with any applicable ancillary equipment.

4.2 Arrangements for test signals

4.2.0 General

The test configuration and mode of operation shall represent the intended use and shall be recorded.

4.2.1 Arrangements for test signals at the input of ROMES and GNSS receivers

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

If necessary, an appropriate test fixture and/or message generator capable of generating the wanted input signal may be supplied with the ROMES or GNSS receiver to facilitate testing.

Alternatively, the wanted signal may be presented to the EUT via a live sky signal from outdoors.

For radiated immunity, the level of the wanted signal at the input of the receiver or the enclosure 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.

4.2.2 Arrangements for test signals at the output of ROMES and GNSS receivers

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

The performance of the ROMES and GNSS device shall be checked before and after the assessment using one or more of the following:

- presented messages;
- satellite information;
- call received alert signal(s).

During the immunity test with radiated RF electromagnetic fields (ETSI EN 301 489-1 [1], clause 9.2) the output of the ROMES/GNSS receiver shall be coupled to the outside of the test environment to enable the performance of the equipment to be assessed.

4.3 Exclusion bands

4.3.0 General

The provision of ETSI EN 301 489-1 [1], clause 4.3.1 shall apply with the following modifications:

- There shall be no exclusion bands for the ancillary equipment.
- The receiver exclusion bands as defined in clause 4.3.1 shall apply.

4.3.1 Receiver exclusion bands

4.3.1.1 General

The receiver exclusion band is the band of frequencies over which no tests of radiated immunity of a receiver are made.

4.3.1.2 GNSS exclusion bands

The exclusion band for immunity testing of equipment operating in the 1 559 MHz to 1 610 MHz band shall be:

- lower limit of exclusion band = 1 492 MHz (-67 MHz of the lowest band edge frequency)
- upper limit of exclusion band = 1 706 MHz (+96 MHz of the highest band edge frequency)

NOTE 1: The lower frequency is based on the presence of a MFCN below 1 492 MHz. The upper limit is based on the bandwidth of a GNSS transmission of 32 MHz and a value of n=3 from ETSI EN 301 489-1 [1], clause 4.3.3. This receiver exclusion band includes the blocking test frequencies specified in the relevant product standards for the effective use of the radio spectrum.

The exclusion band for immunity testing of equipment operating in the 1 164 MHz to 1 300 MHz band shall be:

- lower limit of exclusion band = 1 100 MHz (-64 MHz of the lowest band edge frequency)
- upper limit of exclusion band = 1 364 MHz (+64 MHz of the highest band edge frequency)

NOTE 2: This is based on the bandwidth of a GNSS transmission of 32 MHz and a value of n=2 from ETSI EN 301 489-1 [1], clause 4.3.3. This receiver exclusion band includes the blocking test frequencies specified in the relevant product standards for the effective use of the radio spectrum.

4.3.1.3 ROMES Exclusion Bands

The receiver exclusion band is the band of frequencies over which no tests of radiated immunity are conducted.

The exclusion band for immunity testing of equipment operating in the 1 518 MHz to 1 559 MHz band shall be:

- lower limit of exclusion band = 1 492 MHz (-26 MHz of the lowest band edge frequency)
- upper limit of exclusion band = 1 627 MHz (+68 MHz of the highest band edge frequency)

NOTE: The lower frequency is based on the presence of MFCN below 1 492 MHz. The upper limit is based on the bandwidth of ROMES transmission of 34 MHz and a value of n=2 from ETSI EN 301 489-1 [1], clause 4.3.3. This receiver exclusion band includes the blocking test frequencies specified in the relevant product standards for the effective use of the radio spectrum.