



**SLOVENSKI STANDARD**  
**oSIST prEN 303 213-5-1 V1.0.0:2020**  
**01-februar-2020**

---

**Napredni sistem za vodenje in nadzor gibanja po zemlji (A-SMGCS) - 5. del:  
Harmonizirani standard za dostop do radijskega spektra za večplastno (MLAT)  
opremo - 1. poddel: Sprejemniki in bralniki**

Advanced Surface Movement Guidance and Control System (A-SMGCS) - Part 5:  
Harmonised Standard for access to radio spectrum for Multilateration (MLAT) equipment  
- Sub-part 1: Receivers and Interrogators

(standards.iteh.ai)

[SIST EN 303 213-5-1 V1.1.1:2020](https://standards.iteh.ai/catalog/standards/sist/2fabd9e2-3643-42d1-874e-f61a6b7be2ea/sist-en-303-213-5-1-v1-1-1-2020)

<https://standards.iteh.ai/catalog/standards/sist/2fabd9e2-3643-42d1-874e-f61a6b7be2ea/sist-en-303-213-5-1-v1-1-1-2020>

**Ta slovenski standard je istoveten z: ETSI EN 303 213-5-1 V1.0.0 (2019-12)**

---

**ICS:**

03.220.50	Zračni transport	Air transport
49.090	Oprema in instrumenti v zračnih in vesoljskih plovilih	On-board equipment and instruments

**oSIST prEN 303 213-5-1 V1.0.0:2020**      **en**



Draft **ETSI EN 303 213-5-1** V1.0.0 (2019-12)



**Advanced Surface Movement Guidance and  
Control System (A-SMGCS);  
Part 5: Harmonised Standard for access to  
radio spectrum for Multilateration (MLAT) equipment;  
Sub-part 1: Receivers and Interrogators**

<https://standards.iteh.ai/catalog/standards/sist/2fabd9e2-3645-42d1-874e-f61a6b7be2ea/sist-en-303-213-5-1-v1-1-1-2020>

---

**Reference**

DEN/ERM-TGAERO-37-5-1

---

**Keywords**aeronautical, harmonised standard,  
interoperability, radio**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  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

iTeh STANDARDS PREVIEW  
(standards.iteh.ai)

---

**Important notice**

The present document can be downloaded from:

<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at [www.etsi.org/deliver](http://www.etsi.org/deliver).

Users of the present document should be aware that the document may be subject to revision or change of status.

Information on the current status of this and other ETSI documents is available at

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:

<https://portal.etsi.org/People/CommiteeSupportStaff.aspx>

---

**Copyright Notification**

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.

The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2019.

All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members.

**3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

**GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Modal verbs terminology.....	7
Introduction .....	7
1 Scope .....	8
2 References .....	8
2.1 Normative references .....	8
2.1 Informative references.....	8
3 Definition of terms, symbols and abbreviations.....	9
3.1 Terms.....	9
3.2 Symbols.....	10
3.3 Abbreviations .....	10
4 Technical requirements specifications .....	10
4.1 Environmental profile.....	10
4.2 Conformance Requirements .....	11
4.2.1 Applicability .....	11
4.2.1.1 Equipment with multiple functions.....	11
4.2.2 Transmitter operating frequency and frequency error .....	11
4.2.2.1 Definition .....	11
4.2.2.2 Limits .....	11
4.2.2.3 Conformance.....	11
4.2.3 Spectrum mask.....	11
4.2.3.1 Definition .....	11
4.2.3.2 Limits .....	11
4.2.3.3 Conformance.....	12
4.2.4 Residual Power Output .....	12
4.2.4.1 Definition .....	12
4.2.4.2 Limits .....	12
4.2.4.3 Conformance.....	12
4.2.5 Spurious emissions of transmitter in active mode.....	12
4.2.5.1 Definition .....	12
4.2.5.2 Limits .....	13
4.2.5.3 Conformance.....	13
4.2.6 Sensitivity variation over the operating frequency range.....	13
4.2.6.1 Definition .....	13
4.2.6.2 Limits .....	13
4.2.6.3 Conformance.....	13
4.2.7 RF selectivity and spurious response rejection .....	13
4.2.7.1 Definition .....	13
4.2.7.2 Limits .....	13
4.2.7.3 Conformance.....	14
4.2.8 Inter-modulation response rejection .....	14
4.2.8.1 Definition .....	14
4.2.8.2 Limits .....	14
4.2.8.3 Conformance.....	14
4.2.9 Co-channel rejection .....	14
4.2.9.1 Definition .....	14
4.2.9.2 Limits .....	14
4.2.9.3 Conformance.....	14
4.2.10 Blocking.....	14
4.2.10.1 Definition .....	14
4.2.10.2 Limits .....	14
4.2.10.3 Conformance.....	15
4.2.11 Sensitivity .....	15

4.2.11.1	Definition .....	15
4.2.11.2	Limits .....	15
4.2.11.3	Conformance .....	15
4.2.12	Receiver spurious emissions .....	15
4.2.12.1	Definition .....	15
4.2.12.2	Limits .....	15
4.2.12.3	Conformance .....	15
5	Testing for compliance with technical requirements.....	16
5.1	Environmental conditions for testing .....	16
5.1.1	General requirements .....	16
5.1.2	Procedure for Tests .....	16
5.1.2.1	All Equipment .....	16
5.1.2.2	Equipment including Transmitters .....	16
5.2	Interpretation of the measurement results .....	16
5.3	Test and General Conditions .....	16
5.3.1	Transmitter test signals .....	16
5.3.1.1	General Considerations .....	16
5.3.1.2	Test signal 1 .....	17
5.3.1.3	Test signal 2 .....	17
5.3.2	Simulated received signals.....	17
5.3.2.1	General Considerations .....	17
5.3.2.2	Test signal 3 .....	18
5.3.2.3	Test signal 4 .....	18
5.4	Transmitter tests .....	18
5.4.1	Operating frequency and frequency error .....	18
5.4.1.1	Description .....	18
5.4.1.2	Test conditions .....	18
5.4.1.3	Method of measurement.....	18
5.4.1.4	Measurement procedure .....	19
5.4.2	Spectrum mask.....	19
5.4.2.1	Description .....	19
5.4.2.2	Test conditions .....	19
5.4.2.3	Method of measurement.....	19
5.4.2.4	Measurement procedure .....	19
5.4.3	Residual power output .....	20
5.4.3.1	Description .....	20
5.4.3.2	Test conditions .....	20
5.4.3.3	Method of measurement.....	20
5.4.3.4	Measurement procedure .....	20
5.4.4	Spurious emissions of transmitter in active mode.....	21
5.4.4.1	Description .....	21
5.4.4.2	Test conditions .....	21
5.4.4.3	Method of measurement.....	21
5.4.4.4	Measurement Procedure.....	21
5.5	Receiver Tests .....	22
5.5.1	Sensitivity variation over the operating frequency range.....	22
5.5.1.1	Description .....	22
5.5.1.2	Test conditions .....	22
5.5.1.3	Method of measurement.....	22
5.5.1.4	Measurement procedure .....	22
5.5.2	RF selectivity and spurious response rejection .....	23
5.5.2.1	Description .....	23
5.5.2.2	Test conditions .....	23
5.5.2.3	Method of measurement.....	23
5.5.2.4	Measurement procedure .....	23
5.5.3	Inter-modulation response rejection .....	24
5.5.3.1	Description .....	24
5.5.3.2	Test conditions .....	24
5.5.3.3	Method of measurement.....	24
5.5.3.4	Measurement procedure .....	24
5.5.4	Co-channel rejection .....	25

5.5.4.1	Description .....	25
5.5.4.2	Test conditions .....	25
5.5.4.3	Method of measurement.....	25
5.5.4.4	Measurement procedure .....	25
5.5.5	Blocking.....	26
5.5.5.1	Description .....	26
5.5.5.2	Test conditions .....	26
5.5.5.3	Method of measurement.....	26
5.5.5.4	Measurement procedure .....	26
5.5.6	Receiver spurious emissions .....	27
5.5.6.1	Description .....	27
5.5.6.2	Test conditions .....	27
5.5.6.3	Method of measurement.....	27
5.5.6.4	Measurement Procedure.....	27
<b>Annex A (informative):</b>	<b>Relationship between the present document and the essential requirements of Directive 2014/53/EU .....</b>	<b>29</b>
<b>Annex B (informative):</b>	<b>Bibliography.....</b>	<b>31</b>
<b>Annex C (informative):</b>	<b>Change history .....</b>	<b>32</b>
History .....		33

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 303 213-5-1 V1.1.1:2020](https://standards.iteh.ai/catalog/standards/sist/2fabd9e2-3643-42d1-874e-f61a6b7be2ea/sist-en-303-213-5-1-v1-1-1-2020)

<https://standards.iteh.ai/catalog/standards/sist/2fabd9e2-3643-42d1-874e-f61a6b7be2ea/sist-en-303-213-5-1-v1-1-1-2020>

---

# Intellectual Property Rights

## Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

## Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

---

# 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.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 [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 5, sub-part 1, of a multi-part deliverable covering Advanced Surface Movement Guidance and Control System (A-SMGCS), as identified below.

- Part 1: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS surveillance service including external interfaces";
- Part 2: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS airport safety support service";
- Part 3: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for a deployed cooperative sensor including its interfaces";
- Part 4: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for a deployed non-cooperative sensor including its interfaces";
- Part 5: "Harmonised Standard for access to radio spectrum for multilateration equipment":**
  - Sub-part 1: "Receivers and Interrogators";**
  - Sub-part 2: "Reference and vehicle transmitters".
- Part 6: "Harmonised Standard for access to radio spectrum for deployed surface movement radar sensors";



- Part 7: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS routing service";
- Part 8: "Community Specification for application under the Single European Sky Interoperability Regulation EC 552/2004 for A-SMGCS guidance service".

<b>Proposed national transposition dates</b>	
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.

---

## Introduction

A-SMGCS are systems providing routing, guidance, surveillance and control to aircraft and affected vehicles in order to maintain movement rate under all local weather conditions within the Aerodrome Visibility Operational Level (AVOL) whilst maintaining the required level of safety.

<https://standards.iteh.ai/catalog/standards/sist/2fabd9e2-3643-42d1-874e-f61a6b7be2ea/sist-en-303-213-5-1-v1-1-1-2020>

---

# 1 Scope

The present document specifies technical characteristics and methods of measurements for the following equipment:

- 1) Interrogators transmitting in the 1 030 MHz band, used in Mode S multilateration equipment in an Advanced Surface Movement Guidance and Control System (A-SMGCS);
- 2) Receivers, receiving in the 1 090 MHz band, used in Mode S multilateration equipment in an Advanced Surface Movement Guidance and Control System (A-SMGCS).

Antennas for this equipment are external and passive without an additional amplifier.

The present document does not apply to equipment which includes a transponder function, to ground vehicle locators and to reference transmitters which do not contain receivers for the purpose of replying to interrogation.

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given in Annex A.

---

## 2 References

### 2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version 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] ICAO Annex 10, Volume IV: "Surveillance and Collision Avoidance Systems", 5th edition, July 2014, including amendments up to amendment 89.
- [2] EUROCAE ED-117A (September 2016): "MOPS for Mode S Multilateration Systems for Use in Advanced Surface Movement Guidance and Control Systems (A-SMGCS)".
- [3] ERC/Recommendation 74-01 (2019): "Unwanted emissions in the spurious domain".

### 2.1 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] ITU Radio Regulations (2016).

- [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.
- [i.4] ECC/Recommendation (02)05 (2012): "Unwanted emissions".

---

## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

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

**conducted measurements:** measurements which are made using a wired connection to the EUT

**duty cycle:** ratio expressed as a percentage, of the cumulative duration of transmissions within an observation interval and the interval itself, as measured in an observation bandwidth

**environmental profile:** range of environmental conditions under which the EUT is declared by the manufacturer to comply with the provisions of the present document

**equipment under test:** system of constituents provided by the manufacturer for qualification under the present document

**ground based multilateration equipment or ground station:** aeronautical station equipment intended for use in an A-SMGCS multilateration component

NOTE: A ground station can include sensor, interrogator and/or transponder components. A ground station can be fixed or mobile.

**inactive state:** entire period between transmissions, less 100  $\mu$ s transition periods preceding and following the transmission

**interrogator:** aeronautical station equipment including at least one transmitter designed to produce aeronautical mobile service signals at 1 030 MHz

**Mode S:** particular type of transponder uplink or downlink message defined in ICAO Annex 10, Volume IV [1]

**multilateration:** surveillance technique which provides position derived from the secondary surveillance radar (SSR) transponder signals (replies or squitters) primarily using time difference of arrival (TDOA) techniques

NOTE: Additional information, including identification, can be extracted from the received signals.

**Operating Channel (OC):** frequency range in which the transmission from the EUT occurs, or in which the EUT is intended to receive transmissions

**operating frequency:** centre of the OC

**out of band emissions:** power transmitted at frequencies outside the OC but within the specified spectral mask

**probability of detection:** rate of correctly received and decoded squitter messages

**receiver:** EUT which includes the capability to convert RF signals into binary content

**resolution bandwidth:** bandwidth that is used for measurements used for spectral measurements

**sensor:** aeronautical station equipment including at least one receiver designed to receive aeronautical mobile service signals at 1 030 and/or 1 090 MHz

**spurious emissions:** power transmitted at frequencies below or above the Out-of-Band domain

NOTE: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude Out of Band emissions.

**transmission:** radio emission consisting of one uplink or downlink Mode S message

**transmitter:** EUT which includes the capability to convert binary content into RF signals

**transponder:** aeronautical station equipment including at least one transmitter designed to produce aeronautical mobile radionavigation service signals at 1 090 MHz and zero or more receivers designed to receive aeronautical mobile radionavigation service signals at 1 030 MHz

**unwanted signal:** any signal other than the wanted signal or as described in a specific test case

**wanted signal:** in-band signal modulated according to the Mode specification

NOTE: Some manufacturers may also accept Mode 3A/C and other modulations which is beyond the scope of the present document.

## 3.2 Symbols

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

dB	decibel
dBc	dB relative to carrier
dBm	power in dB relative to 1 milliwatt
dBpp	dB below PEP
f	measurement frequency
μs	Microsecond
Ω	Ohm
PD	Probability of Detection

## 3.3 Abbreviations

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

ADS-B	Automatic Dependant Surveillance Broadcast
A-SMGCS	Advanced Surface Movement Guidance and Control System
AVOL	Aerodrome Visibility Operational Level
CRC	Cyclic Redundancy Check
DME	Distance Measuring Equipment
EUT	Equipment Under Test
ICAO	International Civil Aviation Organization
MOPS	Minimum Operational Performance Specification
OC	Operating Channel
OoB	Out-of-Band
PEP	Peak Envelope Power
RBW	Reference BandWidth
RF	Radio Frequency
RMS	Root Mean Square
SSR	Secondary Surveillance Radar

---

# 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 manufacturer in accordance to the environmental requirements stated in EUROCAE ED-117A [2], Chapter 4 (Requirements [REQ 73.] to [REQ 78]). 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 environmental profile.