

**SLOVENSKI STANDARD
SIST EN 300 676-1 V1.5.1:2010
01-oktober-2010**

Talni VHF ročni, mobilni in fiksni radijski oddajniki, sprejemniki in sprejemniki-oddajniki za VHF aeronavtično mobilno storitev, ki uporablja amplitudno modulacijo - 1. del: Tehnične karakteristike in merilne metode

Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation - Part 1: Technical characteristics and methods of measurement

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

[SIST EN 300 676-1 V1.5.1:2010](#)

<https://standards.iteh.ai/catalog/standards/sist/8c1ba011-03e7-46e8-9ad3-285daee0e92d/sist-en-300-676-1-v1-5-1-2010>

Ta slovenski standard je istoveten z: EN 300 676-1 Version 1.5.1

ICS:

33.060.20	Sprejemna in oddajna oprema	Receiving and transmitting equipment
49.090	Oprema in instrumenti v zračnih in vesoljskih plovilih	On-board equipment and instruments

SIST EN 300 676-1 V1.5.1:2010

en

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 300 676-1 V1.5.1:2010

<https://standards.iteh.ai/catalog/standards/sist/8c1ba011-03e7-46e8-9ad3-285daee0e92d/sist-en-300-676-1-v1-5-1-2010>

ETSI EN 300 676-1 V1.5.1 (2010-07)

European Standard (Telecommunications series)

Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation; Part 1:Technical characteristics and methods of measurement

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

SIST EN 300 676-1 V1.5.1:2010

<https://standards.iteh.ai/catalog/standards/sist/8c1ba011-03e7-46e8-9ad3-285daee0e92d/sist-en-300-676-1-v1-5-1-2010>



Reference

REN/ERM-JTFA-004-1

Keywords

aeronautical, AM, DSB, radio, testing, VHF

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° 7303/88

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 300 676-1 V1.5.1:2010

https://standards.iteh.ai/catalog/standards/sist/8c1ba011-03e7-46e8-9ad3-285daee0e900?content_id=0000000000000000-v1-5-1-2010

Individual copies of the present document can be downloaded from:
<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

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

<http://portal.etsi.org/tb/status/status.asp>

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

http://portal.etsi.org/chaircor/ETSI_support.asp

Copyright Notification

No part may be reproduced except as authorized by written permission.
 The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2010.
 All rights reserved.

DECT™, PLUGTESTS™, UMTS™, TIPHON™, the TIPHON logo and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.

3GPP™ is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

LTE™ is a Trade Mark of ETSI currently being registered for the benefit of its Members and of the 3GPP Organizational Partners.

GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	7
Foreword.....	7
Introduction	7
1 Scope	9
2 References	9
2.1 Normative references	9
2.2 Informative references.....	9
3 Definitions and abbreviations.....	10
3.1 Definitions	10
3.2 Abbreviations	10
4 General requirements	11
4.1 Controls and indicators.....	11
4.2 Class of emission and modulation characteristics	11
4.3 Warm up.....	11
5 Test conditions, power sources and ambient temperatures	11
5.1 Normal and extreme test conditions	11
5.2 Test power source.....	12
5.3 Normal test conditions.....	12
5.3.1 Normal temperature and humidity	12
5.3.2 Normal power sources	12
5.3.2.1 Mains voltage and frequency	12
5.3.2.2 Regulated lead-acid battery power sources used on vehicles	12
5.3.2.3 Other power sources.....	12
5.4 Extreme test conditions.....	12
5.4.1 Extreme temperatures ..285daee0e92d/sist-en-300-676-1-v1.5-1-2010.....	12
5.4.2 Extreme values of test power sources	13
5.4.2.1 Mains voltage	13
5.4.2.2 Other power sources.....	13
5.4.3 Extended temperatures.....	13
5.5 Performance test.....	13
5.6 Environmental tests	13
5.6.1 General.....	13
5.6.2 Procedure for tests at extreme temperatures	14
5.6.3 Temperature tests.....	14
5.6.3.1 High temperature.....	14
5.6.3.2 Low temperature	14
6 General conditions of measurement	14
6.1 Receiver test signal arrangement.....	14
6.1.1 Test signal sources	14
6.1.2 Nominal frequency	14
6.1.3 Normal test signal	15
6.1.4 Squelch	15
6.1.5 Normal audio output power	15
6.1.6 Audio AGC	15
6.2 Transmitter test signal arrangement	15
6.2.1 Coaxial termination.....	15
6.2.2 Signal sources	15
6.2.3 Normal test signal	15
6.3 Test channels	15
7 Transmitter	15
7.1 Protection of the transmitter	16

7.1.1	Definition.....	16
7.1.2	Method of measurement	16
7.1.3	Requirement.....	16
7.2	Frequency error	16
7.2.1	Definition.....	16
7.2.2	Method of measurement	16
7.2.3	Limits.....	16
7.3	Carrier power.....	17
7.3.1	Definitions	17
7.3.2	Method of measurement	17
7.3.3	Tolerances.....	17
7.3.3.1	Normal test conditions	17
7.3.3.2	Extreme test conditions	17
7.4	Amplitude modulation characteristic.....	17
7.4.1	Modulation depth (speech)	17
7.4.1.1	Definitions.....	17
7.4.1.2	Method of measurement.....	17
7.4.1.3	Limits	18
7.4.1.4	Modulation depth (analogue data mode).....	18
7.4.1.5	Method of measurement.....	18
7.4.1.6	Limits	18
7.4.2	Modulation compression (speech mode)	18
7.4.2.1	Definition	18
7.4.2.2	Method of measurement.....	18
7.4.2.3	Limits	18
7.4.3	Amplitude modulation distortion.....	19
7.4.3.1	Definition	19
7.4.3.2	Method of measurement.....	19
7.4.3.3	Limits	19
7.4.4	Audio frequency response	19
7.4.4.1	Definition	19
7.4.4.2	Method of measurement.....	19
7.4.4.3	Limits 8 ¹³³ kHz channel spacing	19
7.4.4.4	Limits 25 kHz channel spacing	19
7.4.4.5	Limits 25 kHz channel spacing (Data)	20
7.4.5	Group delay variation (data mode only)	20
7.4.5.1	Definition	20
7.4.5.2	Transmitter method of measurement.....	20
7.4.5.3	Limits	20
7.5	Adjacent channel power	20
7.5.1	Definition.....	20
7.5.2	Measurement.....	21
7.5.3	Limits.....	21
7.6	Broadband noise measurement.....	21
7.6.1	Definition.....	21
7.6.2	Method of measurement	22
7.6.3	Limit	22
7.7	Conducted spurious emissions	22
7.7.1	Definition.....	22
7.7.2	Method of measurement	23
7.7.3	Limits.....	23
7.8	Intermodulation attenuation.....	23
7.8.1	Definition.....	23
7.8.2	Method of measurement	24
7.8.3	Limits.....	24
7.9	RF power attack time and release time.....	24
7.9.1	Definitions	24
7.9.2	Method of measurement	25
7.9.2.1	Attack time.....	25
7.9.2.2	Release time	25
7.9.3	Limits.....	26
7.10	Keying Transient frequency behaviour of the transmitter	26

7.10.1	Definitions	26
7.10.2	Method of measurement	26
7.10.3	Limits	26
7.11	Sidetone	27
7.11.1	Limits	27
7.12	Cabinet Radiation	27
8	Receiver	27
8.1	Sensitivity	27
8.1.1	Definition	27
8.1.2	Method of measurement	27
8.1.3	Limits	27
8.2	Harmonic distortion	28
8.2.1	Definition	28
8.2.2	Method of measurement	28
8.2.3	Limits	28
8.3	Audio frequency response	28
8.3.1	Definition	28
8.3.2	Method of measurement	28
8.3.3	Limits	28
8.3.4	Limit for DATA operation	28
8.4	Audio noise	29
8.4.1	Definition	29
8.4.2	Method of measurement	29
8.4.3	Limits	29
8.5	Effective acceptance bandwidth	29
8.5.1	Definition	29
8.5.2	Method of measurement	29
8.5.3	Limits	29
8.6	Adjacent channel rejection <i>(standards.iteh.ai)</i>	30
8.6.1	Definition	30
8.6.2	Method of measurement	30
8.6.3	Limits	30
8.7	Spurious response rejection <i>285daee0e92d/sist-en-300-676-1-v1-5-1-2010</i>	30
8.7.1	Definition	31
8.7.2	Introduction to the method of measurement	31
8.7.3	Method of search of the limited frequency range	31
8.7.4	Method of measurement	31
8.7.5	Limit	32
8.8	Intermodulation response rejection	32
8.8.1	Definition	32
8.8.2	Method of measurement	32
8.8.3	Limit	32
8.9	Blocking or desensitization	33
8.9.1	Definition	33
8.9.2	Method of measurement	33
8.9.3	Limit	33
8.10	Conducted spurious emissions	33
8.10.1	Definition	33
8.10.2	Method of measuring the power level	33
8.10.3	Limits	34
8.11	Squelch operation	34
8.11.1	Definition	34
8.11.2	Method of measurement	34
8.11.3	Limits	34
8.12	Cross modulation rejection	35
8.12.1	Definition	35
8.12.2	Method of measurement	35
8.12.3	Limits	35
8.13	Receiver dynamic range	35
8.13.1	Definition	35
8.13.2	Method of measurement	35

8.13.3	Limit	36
8.14	AGC attack time and release time (data mode only)	36
8.14.1	Definitions	36
8.14.2	Method of measurement	36
8.14.2.1	Attack time	36
8.14.2.2	AGC Decay time	36
8.14.3	Limits	36
8.15	AF AGC	37
8.15.1	Definition	37
8.15.2	Method of measurement	37
8.15.3	Limit	37
8.16	Group delay variation (data mode only)	37
8.16.1	Definition	37
8.16.2	Receiver method of measurement	37
8.16.3	Limits	38
8.17	Cabinet Radiation	38
9	Measurement uncertainty and interpretation of the measured results	38
9.1	Maximum measurement uncertainties	38
9.2	Interpretation of the measurement results	39
Annex A (normative):	Auxiliary cables.....	40
Annex B (normative):	Specification for adjacent channel power measurement arrangements.....	41
B.1	Power measuring receiver specification	41
B.1.1	IF filter	41
B.1.2	Attenuation indicator	42
B.1.3	RMS value indicator	42
B.1.4	Oscillator and amplifier	42
Annex C (informative):	Bibliography SIST EN 300 676-1 V1.5.1:2010.....	43
History	https://standards.iteh.ai/catalog/standards/sist/8c1ba011-03e7-46e8-9ad3-285dace0e92d/sist-en-300-676-1-v1-5-1-2010	44

Intellectual Property Rights

IPRs essential or potentially essential to the present document 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 (<http://webapp.etsi.org/IPR/home.asp>).

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.

Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 1 of a multi-part deliverable covering the Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation, as identified below:

Part 1: "Technical characteristics and methods of measurement";

Part 2: "Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive".

(standards.iteh.ai) National transposition dates

Date of adoption of this EN:	SIST EN 300 676-1 V1.5.1:2010 https://standards.iteh.ai/catalog/standards/sist/8c1ba011-03e7-46e8-9ad3-285dace0e92d/sist-en-300-676-1-v1-5-1-2010	15 July 2010
Date of latest announcement of this EN (doa):		31 October 2010
Date of latest publication of new National Standard or endorsement of this EN (dop/e):		30 April 2011
Date of withdrawal of any conflicting National Standard (dow):		30 April 2011

Introduction

The present document states the minimum performance requirements for ground based radio transmitters, transceivers and receivers for the aeronautical mobile service operating in the VHF band (118 MHz to 136,975 MHz), using Double Sideband Amplitude Modulation with 8,33 kHz or 25 kHz channel spacing.

NOTE: For equipment designed to cover the extended VHF frequency bands 108 MHz to 117,975 MHz and 137 MHz to 155,975 MHz the same test methods and procedures may be applied to show technical acceptance of the product in the band 108 MHz to 155,975 MHz.

Additional requirements, outside the scope of the present document, may be required to ensure operation in the 108 MHz to 117,975 MHz band does not cause interference to the FM broadcast band.

The present document may be used by accredited test laboratories for the assessment of the performance of the equipment. The performance of the equipment submitted for type testing should be representative for the performance of the corresponding production model.

The present document has been written on the assumption that:

- the type test measurements will be performed only once, in an accredited test laboratory and the measurements accepted by the various authorities in order to grant type approval;
- if equipment available on the market is required to be checked it will be tested in accordance with the methods of measurement specified in the present document.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 300 676-1 V1.5.1:2010](#)

<https://standards.iteh.ai/catalog/standards/sist/8c1ba011-03e7-46e8-9ad3-285daee0e92d/sist-en-300-676-1-v1-5-1-2010>

1 Scope

The present document states the minimum performance requirements for radio transmitters, receivers and transceivers at ground-based aeronautical stations operating in the VHF band (118 MHz to 136,975 MHz) allocated to the aeronautical mobile service.

In situations where transmitters and receivers are located in close proximity there is the possibility of interference. In such cases, external filters and isolators may be necessary as part of the installation to achieve an isolation performance in excess of the minima defined in the present document to overcome the interference.

The present document applies to DSB AM systems, with channel separations of 8,33 kHz or 25 kHz intended for analogue speech and ground base stations with a channel spacing of 25 kHz intended for ACARS data communication.

NOTE: The test methods and procedures in the present document may also be used to show technical acceptance for radio transmitters, receivers and transceivers at ground based aeronautical stations operating with 25 kHz channel spacing in the extended VHF bands (108 MHz to 117,975 MHz and 137 MHz to 155,975 MHz).

The scope of the present document is limited to ground base stations, ground mobile and hand held radios for ground use.

2 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 reference 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>. [SIST EN 300 676-1 V1.5.1:2010](#)

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

This STANDARD IS PREVIEW
(standards.iteh.ai)

2.1 Normative references

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

- [1] ITU-T Recommendation O.41: "Psophometer for use on telephone-type circuits".
- [2] ICAO Annex 10 Volume V (July 2001, including amendments up to amendment 84): "Aeronautical Radio Frequency Spectrum Utilization".

2.2 Informative references

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 100 028 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.2] ISO 7637 (parts 1 and 2): "Road vehicles - Electrical disturbances from conduction and coupling".
- [i.3] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

- [i.4] ETSI EN 300 113-1: "Electromagnetic compatibility and Radio Matters (ERM): Land mobile service; Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector: Part 1: Technical characteristics and methods of measurement".

3 Definitions and abbreviations

3.1 Definitions

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

aeronautical mobile service: mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate

conducted measurements: measurements which are made using a direct RF connection to the equipment under test

ground base station: aeronautical station equipment, in the aeronautical mobile service, for use with an external antenna and intended for use at a fixed location

hand held: radio equipment with integral batteries, designed to be hand portable and operated hand held

integral antenna equipment: radio communications equipment with an antenna integrated into the equipment without the use of an external connector and considered to be part of the equipment

NOTE: An integral antenna may be internal or external to the equipment. In equipment of this type, a $50\ \Omega$ RF connection point should be provided for test purposes. A connection point for an AF modulating input and for AF output measurements should also be provided.

mobile station: radio equipment designed for permanent or temporary vehicle installation and operation, including provision for vehicle DC power supply, and connections for external antenna, PTT key, microphone, speaker and/or headphone

<https://standards.iteh.ai/catalog/standards/sist/8c1ba011-03e7-46e8-9ad3-285daee0e921/sist-en-300-676-1-v1.5-1-2010>

non-integral antenna equipment: radio communications equipment with a connector intended for connection to an antenna

portable station: radio equipment with integral battery for independent hand-carried use

NOTE: Provisions may be made for connections of an external antenna, PTT key, microphone, headphone and charger, but principally to be operated as a self contained unit.

radiated measurements: measurements which involve the measurement of a radiated field

3.2 Abbreviations

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

ACARS	Aircraft Communications Addressing and Reporting System
AF	Audio Frequency
AGC	Automatic Gain Control
AM	Amplitude Modulation
dBc	dB relative to the carrier power
DSB	Double Side Band
ICAO	International Civil Aviation Organization
IF	Intermediate Frequency
ppm	parts per million
RF	Radio Frequency
rms	root mean square
SINAD	(Signal + Noise + Distortion)/(Noise + Distortion)
VSWR	Voltage Standing Wave Ratio

4 General requirements

8,33 kHz equipment shall be able to operate on all channels in the List of Assignable Frequencies defined in Appendix 2, chapter 4, Group F (see clause 4.1.8.1.2) of the ICAO Annex 10 Volume V [2].

The channel labelling used for 8,33 kHz channel spacing is based on a frequency-channel pairing in accordance with table 4.1 (bis) of ICAO Annex 10 Volume V [2] clause 4.1.2.4.

25 kHz equipment shall be able to operate on the frequencies 118,0 MHz to 136,975 MHz in accordance with ICAO Annex 10 Volume V [2], Appendix to Chapter 4.

It shall not be possible to transmit while any frequency synthesizer used within the transmitter is out of lock.

It shall not be possible to transmit during channel switching operations.

4.1 Controls and indicators

The equipment shall have the following controls and indicators as a minimum:

- a visual indication that the device is switched on;
- a facility to disable the squelch for test purposes;
- a visual indication that the carrier is being produced.

The equipment shall also meet the following requirements:

- iTeh STANDARD PREVIEW**
(standards.iteh.ai)
- the user shall not have access to any control which, if wrongly set, might impair the technical characteristics of the equipment.

4.2 Class of emission and modulation characteristics

The equipment shall use Double Side Band (DSB) Amplitude Modulation (AM) full carrier, (6K80A3EJN for 25 kHz, 5K00A3EJN for 8,33 kHz), for speech and 13k0A2D for data. The equipment shall be designed to operate satisfactorily with a channel separation of 8,33 kHz or 25 kHz.

4.3 Warm up

After being switched on the equipment shall meet the requirements of the present document within one minute under normal test conditions (see clause 5.3).

If the equipment includes parts which require to be heated in order to operate correctly (e.g. crystal ovens) a warming up period of 10 minutes of those parts shall be allowed.

5 Test conditions, power sources and ambient temperatures

5.1 Normal and extreme test conditions

Measurements shall be made under normal test conditions (see clause 5.3) and also, where stated, under extreme test conditions (see clauses 5.4.1 and 5.4.2).