

ETSI EN 300 676-2 V1.4.1 (2010-04)

Harmonized 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 2: Harmonized EN covering essential requirements
of article 3.2 of the R&TTE Directive**



Reference

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Foreword

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

The present document is part 2 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 under article 3.2 of the R&TTE Directive".

National transposition dates	
Date of adoption of this EN:	3 April 2010
Date of latest announcement of this EN (doa):	31 July 2010
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Date of withdrawal of any conflicting National Standard (dow):	31 January 2012

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 R&TTE Directive. The modular structure is shown in EG 201 399 [i.3].

1 Scope

The present document applies to DSB AM ground base stations, with channel separations of 8,33 kHz or 25 kHz intended for analogue speech or intended for ACARS data communication. The scope of the present document is limited to ground based stations, ground mobile and hand-held radios for ground use. These radio equipment types are capable of operating in all or any part of the aeronautical frequency band between 118 MHz and 136,975 MHz.

The present document is intended to cover the provisions of Directive 1999/5/EC [i.1] (R&TTE Directive), article 3.2, which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as 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 R&TTE Directive as well as essential requirements under the Single European Sky Interoperability Regulation (as amended) [i.2] and related implementing rules 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

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://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.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI EN 300 676-1 (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); 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".
- [2] ETSI EN 300 113-1 (V1.6.1): "Electromagnetic compatibility and Radio spectrum 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] ETSI TR 100 028 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] 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; amended by Regulation (EC) No 1882/2003 of the European Parliament and of the Council of 29/09/2003.
- [i.2] Regulation (EC) 552/2004 of the European Parliament and Council of 10 March 2004 on the interoperability of the European Air Traffic Management network (the interoperability Regulation). Official Journal L 096, 31/03/2004 P. 0026 - 0042; amended by Regulation (EC) No 1070/2009 of the European Parliament and of the Council of 21/10/2009. Official Journal L 300/34, 14/11/2009.
- [i.3] ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [i.1] and the following 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

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

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

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 Ω 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

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

3.2 Abbreviations

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

ACARS	Aircraft Communications Addressing and Reporting System
AF	Audio Frequency
AM	Amplitude Modulation
DC	Direct Current (feeding, signalling)
DSB	Double Side Band
ICAO	International Civil Aviation Organization
PTT	Press To Talk
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency

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.

4.2 Conformance requirements

4.2.1 Transmitter requirements

4.2.1.1 Frequency error

The frequency error as defined in clause 7.2 of EN 300 676-1 [1] shall not exceed the values shown in table 1 of EN 300 676-1 [1].

4.2.1.2 Carrier power (conducted)

The carrier power as defined in clause 7.3.1 of EN 300 676-1 [1] shall conform to the requirements in clause 7.3.3 of EN 300 676-1 [1].

4.2.1.3 Adjacent channel power

Adjacent channel power as defined in clause 7.5.1 of EN 300 676-1 [1] shall conform to the requirements in clause 7.5.3 of EN 300 676-1 [1].

4.2.1.4 Conducted spurious emissions

Conducted spurious emissions as defined in clause 7.7.1 of EN 300 676-1 [1] shall conform to the limits in clause 7.7.3, table 3 of EN 300 676-1 [1].

4.2.1.5 Intermodulation attenuation (Applicable to Base stations only)

Intermodulation attenuation as defined in clause 7.8.1 of EN 300 676-1 [1] shall conform to the limits in clause 7.8.3 of EN 300 676-1 [1].

4.2.1.6 Keying transient frequency behaviour (Applicable to base stations only)

Keying transient frequency behaviour as defined in clause 7.10.1 of EN 300 676-1 [1] shall conform to the limits in clause 7.10.3 of EN 300 676-1 [1].

4.2.2 Receiver requirements

NOTE: These aspects and parameters are considered essential to ensure immediate and successful ground to air communication. Inadequate performance in any of these aspects may lead to retransmission with consequential inefficient use of the spectrum.

4.2.2.1 Sensitivity

Sensitivity as defined in clause 8.1.1 of EN 300 676-1 [1] shall conform to the limits in clause 8.1.3 of EN 300 676-1 [1].

4.2.2.2 Adjacent channel rejection

Adjacent channel rejection as defined in clause 8.6.1 of EN 300 676-1 [1] shall conform to the limits in clause 8.6.3 of EN 300 676-1 [1].

4.2.2.3 Spurious response rejection

Spurious response rejection as defined in clause 8.7.1 of EN 300 676-1 [1] shall conform to the limits in clause 8.7.5 of EN 300 676-1 [1].

4.2.2.4 Intermodulation response rejection

Intermodulation response rejection as defined in clause 8.8.1 of EN 300 676-1 [1] shall conform to the limits in clause 8.8.3 of EN 300 676-1 [1].

4.2.2.5 Blocking or desensitisation

Blocking or desensitisation as defined in clause 8.9.1 of EN 300 676-1 [1] shall conform to the limits in clause 8.9.3 of EN 300 676-1 [1].

4.2.2.6 Conducted spurious emissions

Conducted spurious emissions as defined in clause 8.10.1 of EN 300 676-1 [1] shall conform to the limits in clause 8.10.3 (see table 4) of EN 300 676-1 [1].

4.2.2.7 Cross modulation rejection

Cross modulation rejection as defined in clause 8.12.1 of EN 300 676-1 [1] shall conform to the limits in clause 8.12.3 of EN 300 676-1 [1].

5 Testing for compliance with technical requirements

5.1 Environmental conditions for testing

The test conditions and procedures shall be as defined in clauses 5 and 6 of EN 300 676-1 [1].

5.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 1.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028 [3] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ or $k = 2$ (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterising the actual measurement uncertainties are normal (Gaussian)).

Table 1 is based on such expansion factors.

Table 1: Measurement uncertainty: maximum values

Measurement uncertainties	Maximum values
Adjacent channel power	±2,5 dB
Adjacent channel rejection	±4 dB
Blocking and desensitization	±4 dB
Carrier power (normal and extreme test conditions)	±0,75 dB
Conducted spurious emissions:	
below 1 GHz	±3 dB
between 1 GHz and 4 GHz	±6 dB
Conducted spurious radiation:	
below 1 GHz	±3 dB
between 1 GHz and 4 GHz	±6 dB
Cross modulation rejection	±4 dB
Frequency error	±1 × 10 ⁻⁹
Intermodulation	±3 dB
Intermodulation response rejection	±3 dB
Keying transient frequency behaviour	±3 dB
Receiver dynamic range	±2 dB
Receiver sensitivity	±3 dB
Spurious response rejection	±4 dB
Transient frequency behaviour	±250 Hz

For the test methods according to the present document the uncertainty figures are valid to a confidence level of 95 % calculated according to the methods described in TR 100 028 [3].

5.3 Essential radio test suites

5.3.1 Transmitter test specifications

5.3.1.1 Frequency error

The test procedure specified in clause 7.2.2 of EN 300 676-1 [1] shall be carried out.

5.3.1.2 Carrier power (conducted)

The test procedure specified in clause 7.3.2 of EN 300 676-1 [1] shall be carried out.

5.3.1.3 Adjacent channel power

The test procedure specified in clause 7.5.2 of EN 300 676-1 [1] shall be carried out.

5.3.1.4 Conducted spurious emissions

The test procedure specified in clause 7.7.2 of EN 300 676-1 [1] shall be carried out.

5.3.1.5 Intermodulation attenuation

The test procedure specified in clause 7.8.2 of EN 300 676-1 [1] shall be carried out.

5.3.1.6 Keying transient frequency behaviour

The test procedure specified in clause 7.10.2 of EN 300 676-1 [1] shall be carried out.

5.3.2 Receiver test specifications

5.3.2.1 Sensitivity

The test procedure specified in clause 8.1.2 of EN 300 676-1 [1] shall be carried out.

5.3.2.2 Adjacent channel rejection

The test procedure specified in clause 8.6.2 of EN 300 676-1 [1] shall be carried out.

5.3.2.3 Spurious response rejection

The test procedures specified in clause 8.7.3 and clause 8.7.4 of EN 300 676-1 [1] shall be carried out.

5.3.2.4 Intermodulation response rejection

The test procedure specified in clause 8.8.2 of EN 300 676-1 [1] shall be carried out.

5.3.2.5 Blocking or desensitisation

The test procedure specified in clause 8.9.2 of EN 300 676-1 [1] shall be carried out.

5.3.2.6 Conducted spurious emissions

The test procedure specified in clause 8.10.2 of EN 300 676-1 [1] shall be carried out.

5.3.2.7 Cross modulation rejection

The test procedure specified in clause 8.12.2 of EN 300 676-1 [1] shall be carried out.

Annex A (normative): HS Requirements and conformance Test specifications Table (HS-RTT)

The HS Requirements and conformance Test specifications Table (HS-RTT) in table A.1 serves a number of purposes, as follows:

- it provides a statement of all the requirements in words and by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- it provides a statement of all the test procedures corresponding to those requirements by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- it qualifies each requirement to be either:
 - Unconditional: meaning that the requirement applies in all circumstances, or
 - Conditional: meaning that the requirement is dependant on the manufacturer having chosen to support optional functionality defined within the schedule.
- in the case of Conditional requirements, it associates the requirement with the particular optional service or functionality;
- it qualifies each test procedure to be either:
 - Essential: meaning that it is included with the Essential Radio Test Suite and therefore the requirement shall be demonstrated to be met in accordance with the referenced procedures;
 - Other: meaning that the test procedure is illustrative but other means of demonstrating compliance with the requirement are permitted.

Table A.1: HS Requirements and conformance Test specifications Table (HS-RTT)

Harmonized Standard EN 300 676-2						
The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive						
Requirement			Requirement Conditionality		Test Specification	
No	Description	Reference: Clause No	U/C	Condition	E/O	Reference: Clause No
1	Frequency error	4.2.1.1	U		E	5.3.1.1
2	Carrier power	4.2.1.2	U		E	5.3.1.2
3	Adjacent channel power	4.2.1.3	U		E	5.3.1.3
4	Spurious emissions (TX)	4.2.1.4	U		E	5.3.1.4
5	Intermodulation attenuation	4.2.1.5	C	Base station only	E	5.3.1.5
6	Keying transient behaviour	4.2.1.6	C	Base station only	E	5.3.1.6
7	Void	Void	Void	Void	Void	Void
8	Sensitivity	4.2.2.1	U		E	5.3.2.1
9	Adjacent channel rejection	4.2.2.2	U		E	5.3.2.2
10	Spurious response rejection	4.2.2.3	U		E	5.3.2.3
11	Intermodulation response rejection	4.2.2.4	U		E	5.3.2.4
12	Blocking or desensitisation	4.2.2.5	U		E	5.3.2.5

Harmonized Standard EN 300 676-2						
The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive						
Requirement			Requirement Conditionality		Test Specification	
No	Description	Reference: Clause No	U/C	Condition	E/O	Reference: Clause No
13	Conducted spurious emissions	4.2.2.6	U		E	5.3.2.6
14	Cross modulation rejection	4.2.2.7	U		E	5.3.2.7

Key to columns:**Requirement:**

No A unique identifier for one row of the table which may be used to identify a requirement or its test specification.

Description A textual reference to the requirement.

Clause Number Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

U/C Indicates whether the requirement is to be *unconditionally* applicable (U) or is *conditional* upon the manufacturers claimed functionality of the equipment (C).

Condition Explains the conditions when the requirement shall or shall not be applicable for a technical requirement which is classified "conditional".

Test Specification:

E/O Indicates whether the test specification forms part of the Essential Radio Test Suite (E) or whether it is one of the Other Test Suite (O).

NOTE: All tests whether "E" or "O" are relevant to the requirements. Rows designated "E" collectively make up the Essential Radio Test Suite; those designated "O" make up the Other Test Suite; for those designated "X" there is no test specified corresponding to the requirement. The completion of all tests classified "E" as specified with satisfactory outcomes is a necessary condition for a presumption of conformity. Compliance with requirements associated with tests classified "O" or "X" is a necessary condition for presumption of conformity, although conformance with the requirement may be claimed by an equivalent test or by manufacturer's assertion supported by appropriate entries in the technical construction file.

Clause Number Identification of clause(s) defining the test specification in the present document unless another document is referenced explicitly. Where no test is specified (that is, where the previous field is "X") this field remains blank.

Annex B (informative): The EN title in the official languages

The enlargement of the European Union (EU) resulted in a requirement from the EU for a larger number of languages for the translation of the titles of Harmonized Standards and mandated ENs that are to be listed in the Official Journal to support the implementation of this legislation.

For this reason the title translation concerning the present document can be consulted via the [e-approval](#) application.

Annex C (informative): Bibliography

Commission Regulation (EC) No 1265/2007 of 26 October 2007 laying down requirements on air-ground voice channel spacing for the single European sky (Text with EEA relevance), OJEU L283, 27.10.2007, p. 25-36.

ITU-T Recommendation O.41: "Psophometer for use on telephone-type circuits".

ISO 7637 (parts 1 and 2): "Road vehicles - Electrical disturbances from conduction and coupling".

ICAO Annex 10 "Aeronautical Telecommunications", Volume V "Aeronautical Radio Frequency Spectrum Utilization" - Second Edition (July 2001, including amendments up to amendment 84)".

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