



**Ground-based UHF radio transmitters,
receivers and transceivers for the UHF
aeronautical mobile service using amplitude modulation;
Part 2: Harmonised Standard covering the essential
requirements of article 3.2 of the Directive 2014/53/EU**

Reference

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Keywords

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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 to provide a means of conforming to the essential requirements of Directive 2014/53/EU [i.2] 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.

NOTE: The corresponding Commission's standardisation request is expected shortly.

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 2 of a multi-part deliverable covering Ground-based UHF radio transmitters, receivers and transceivers for the UHF aeronautical mobile service using amplitude modulation, as identified below:

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

Part 2: "Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

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.

Executive summary

The present document covers the essential requirements for efficient use of radio spectrum by DSB AM ground base stations, with channel separations of 25 kHz intended for analogue speech. The present document includes necessary changes due to adaption to the new Radio Equipment Directive.

1 Scope

The present document applies to ground based transmitters, receivers and transceivers. These radio equipment types are capable of operating in all or any part of the aeronautical frequency band between 225 MHz and 399,975 MHz.

The present document contains requirements to demonstrate 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*" [i.2].

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 [i.2] as well as essential requirements under the Single European Sky Interoperability Regulation (as amended) [i.3] and related implementing rules and/or essential requirements under the EASA basic regulation 216/2008 [i.5] may apply to equipment within the scope of the present document.

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] ETSI EN 302 617-1 (V1.1.1) (01-2009): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Ground-based UHF radio transmitters, receivers and transceivers for the UHF aeronautical mobile service using amplitude modulation; Part 1: Technical characteristics and methods of measurement".
- [2] ETSI EN 300 113-1 (V1.6.2) (11-2009): "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".

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 100 028 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.2] 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.3] 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), OJEU L96, 31.03.2004, p. 26-42 as amended by Regulation (EC) 1070/2009 of the European Parliament and of the Council of 21 October 2009, OJEU L300/34, 14/11/2009.

- [i.4] ETSI TR 100 028-2 (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".
- [i.5] Regulation (EC) 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the RE Directive [i.2] 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

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

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:

AM	Amplitude Modulation
DSB	Double Side Band
EASA	European Aviation Safety Agency
EFTA	European Free Trade Association
RE	Radio Equipment
RF	Radio Frequency
UHF	Ultra High 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, but as a minimum, shall be that specified in the test conditions contained in the present document. 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

4.2.1.0 Applicability

All technical requirements in clause 4.2.1 shall only be applicable to transmitter equipment (including transceiver equipment).

4.2.1.1 Frequency error

The frequency error as defined in clause 7.2 of ETSI EN 302 617-1 [1] shall not exceed the values shown in table 1 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.1.1.

4.2.1.2 Carrier power (conducted)

The carrier power as defined in clause 7.3.1 of ETSI EN 302 617-1 [1] shall conform to the requirements in clause 7.3.3 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.1.2.

4.2.1.3 Adjacent channel power

Adjacent channel power as defined in clause 7.5.1 of ETSI EN 302 617-1 [1] shall conform to the requirements in clause 7.5.3 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.1.3.

4.2.1.4 Conducted spurious emissions

Conducted spurious emissions as defined in clause 7.7.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 7.7.3, table 3 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.1.4.

4.2.1.5 Intermodulation attenuation

Intermodulation attenuation as defined in clause 7.8.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 7.8.3 of ETSI EN 302 617-1 [1].

This requirement shall not apply to ground mobile and hand held radio.

The conformance test shall be as given in clause 5.3.1.5.

4.2.1.6 Keying transient frequency behaviour

Keying transient frequency behaviour as defined in clause 7.10.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 7.10.3 of ETSI EN 302 617-1 [1].

This requirement shall not apply to ground mobile and hand held radio.

The conformance test shall be as given in clause 5.3.1.6.

4.2.1.7 Cabinet Radiation

Cabinet radiation as defined in clause 7.12 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 7.5.4 of ETSI EN 300 113-1 [2].

The conformance test shall be as given in clause 5.3.1.7.

4.2.2 Receiver requirements

4.2.2.1 General

The aspects and parameters in clause 4.2.2 shall be 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.

All technical requirements in clause 4.2.2 shall only be applicable to receiver equipment (including transceiver equipment).

4.2.2.2 Sensitivity

Sensitivity as defined in clause 8.1.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 8.1.3 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.2.1.

4.2.2.3 Adjacent channel rejection

Adjacent channel rejection as defined in clause 8.6.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 8.6.3 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.2.2.

4.2.2.4 Spurious response rejection

Spurious response rejection as defined in clause 8.7.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 8.7.5 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.2.3.

4.2.2.5 Intermodulation response rejection

Intermodulation response rejection as defined in clause 8.8.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 8.8.3 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.2.4.

4.2.2.6 Blocking or desensitization

Blocking or desensitization as defined in clause 8.9.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 8.9.3 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.2.5.

4.2.2.7 Conducted spurious emissions

Conducted spurious emissions as defined in clause 8.10.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 8.10.3, (table 4) of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.2.6.

4.2.2.8 Cross modulation rejection

Cross modulation rejection as defined in clause 8.12.1 of ETSI EN 302 617-1 [1] shall conform to the limits in clause 8.12.3 of ETSI EN 302 617-1 [1].

The conformance test shall be as given in clause 5.3.2.7.

4.2.2.9 Cabinet radiation

Cabinet radiation shall be as defined in clause 8.16 of ETSI EN 302 617-1 [1] and shall conform to the limits in clause 8.10.4 of ETSI EN 300 113-1 [2].

The conformance test shall be as given in clause 5.3.2.8.

5 Testing for compliance with technical requirements

5.1 Environmental conditions for testing

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile which, as a minimum, shall be that specified in the test conditions contained in the present document.

As technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions as specified in the present document to give confidence of compliance for the affected technical requirements.

The test conditions are defined in clause 5 of ETSI EN 302 617-1 [1].

General conditions for measurements are specified in clause 6 of ETSI EN 302 617-1 [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 an 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 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 characterizing the actual measurement uncertainties are normal (Gaussian)). Principles for the calculation of measurement uncertainty are contained in ETSI TR 100 028 [i.1], in particular in annex D of the ETSI TR 100 028-2 [i.4].

Table 1 is based on such expansion factors.

Table 1: Maximum measurement uncertainty

Parameter	Uncertainty
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
Cabinet radiation	
Cross modulation rejection	±4 dB
Effective acceptance bandwidth	±3 dB
Frequency error	±1 x 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

5.3 Radio test suites

5.3.1 Transmitter test specifications

5.3.1.1 Frequency error

The test procedure is specified in clause 7.2.2 of ETSI EN 302 617-1 [1].

5.3.1.2 Carrier power (conducted)

The test procedure is specified in clause 7.3.2 of ETSI EN 302 617-1 [1].

5.3.1.3 Adjacent channel power

The test procedure is specified in clause 7.5.2 of ETSI EN 302 617-1 [1].

5.3.1.4 Conducted spurious emissions

The test procedure is specified in clause 7.7.2 of ETSI EN 302 617-1 [1].

5.3.1.5 Intermodulation attenuation

The test procedure is specified in clause 7.8.2 of ETSI EN 302 617-1 [1].

5.3.1.6 Keying transient frequency behaviour

The test procedure is specified in clause 7.10.2 of ETSI EN 302 617-1 [1].

5.3.1.7 Cabinet Radiation

The test procedure is specified in clause 7.5.3 of ETSI EN 300 113-1 [2].

5.3.2 Receiver test specifications

5.3.2.1 Sensitivity

The test procedure is specified in clause 8.1.2 of ETSI EN 302 617-1 [1].

5.3.2.2 Adjacent channel rejection

The test procedure is specified in clause 8.6.2 of ETSI EN 302 617-1 [1].

5.3.2.3 Spurious response rejection

The test procedures are specified in clauses 8.7.3 and 8.7.4 of ETSI EN 302 617-1 [1].

5.3.2.4 Intermodulation response rejection

The test procedure is specified in clause 8.8.2 of ETSI EN 302 617-1 [1].

5.3.2.5 Blocking or desensitization

The test procedure is specified in clause 8.9.2 of ETSI EN 302 617-1 [1].

5.3.2.6 Conducted spurious emissions

The test procedure is specified in clause 8.10.2 of ETSI EN 302 617-1 [1].

5.3.2.7 Cross modulation rejection

The test procedure is specified in clause 8.12.2 of ETSI EN 302 617-1 [1].

5.3.2.8 Cabinet Radiation

The test procedure is specified in clause 8.10.3 of ETSI EN 300 113-1 [2].

Annex A (normative): Relationship between the present document and the essential requirements of Directive 2014/53/EU

The present document has been prepared to provide a means of conforming to the essential requirements of 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].

NOTE: The corresponding Commission's standardisation request is expected shortly.

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.

Table A.1: Relationship between the present document and the essential requirements of of Directive 2014/53/EU [i.2]

Harmonised Standard ETSI EN 302 617-2				
The following requirements are relevant to the presumption of conformity under the article 3.2 of Directive 2014/53/EU [i.2]				
Requirement			Requirement Conditionality	
No	Description	Reference: Clause No	U/C	Condition
1	Frequency error	4.2.1.1	C	This requirement applies to transmitter equipment
2	Carrier power	4.2.1.2	C	This requirement applies to transmitter equipment
3	Adjacent channel power	4.2.1.3	C	This requirement applies to transmitter equipment
4	Spurious emissions (TX)	4.2.1.4	C	This requirement applies to transmitter equipment
5	Intermodulation attenuation	4.2.1.5	C	This requirement applies to transmitter equipment. This requirement does not apply to ground mobile and hand held radio.
6	Keying transient behaviour	4.2.1.6	C	This requirement applies to transmitter equipment. This requirement does not apply to ground mobile and hand held radio.
7	Cabinet Radiation	4.2.1.7	C	This requirement applies to transmitter equipment
8	Sensitivity	4.2.2.2	C	This requirement applies to receiver equipment
9	Adjacent channel rejection	4.2.2.3	C	This requirement applies to receiver equipment
10	Spurious response rejection	4.2.2.4	C	This requirement applies to receiver equipment
11	Intermodulation response rejection	4.2.2.5	C	This requirement applies to receiver equipment
12	Blocking or desensitization	4.2.2.6	C	This requirement applies to receiver equipment
13	Conducted spurious emissions	4.2.2.7	C	This requirement applies to receiver equipment
14	Cross modulation rejection	4.2.2.8	C	This requirement applies to receiver equipment
15	Cabinet Radiation	4.2.2.9	C	This requirement applies to receiver equipment

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 requirement which is classified "conditional".

Presumption of conformity stays valid only as long as a reference to the present document is maintained in the list published in the Official Journal of the European Union. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.

Other Union legislation may be applicable to the product(s) falling within the scope of the present document.

History

Document history		
V1.1.1	October 2010	Publication
V2.1.0	August 2015	EN Approval Procedure AP 20151203: 2015-08-05 to 2015-12-03