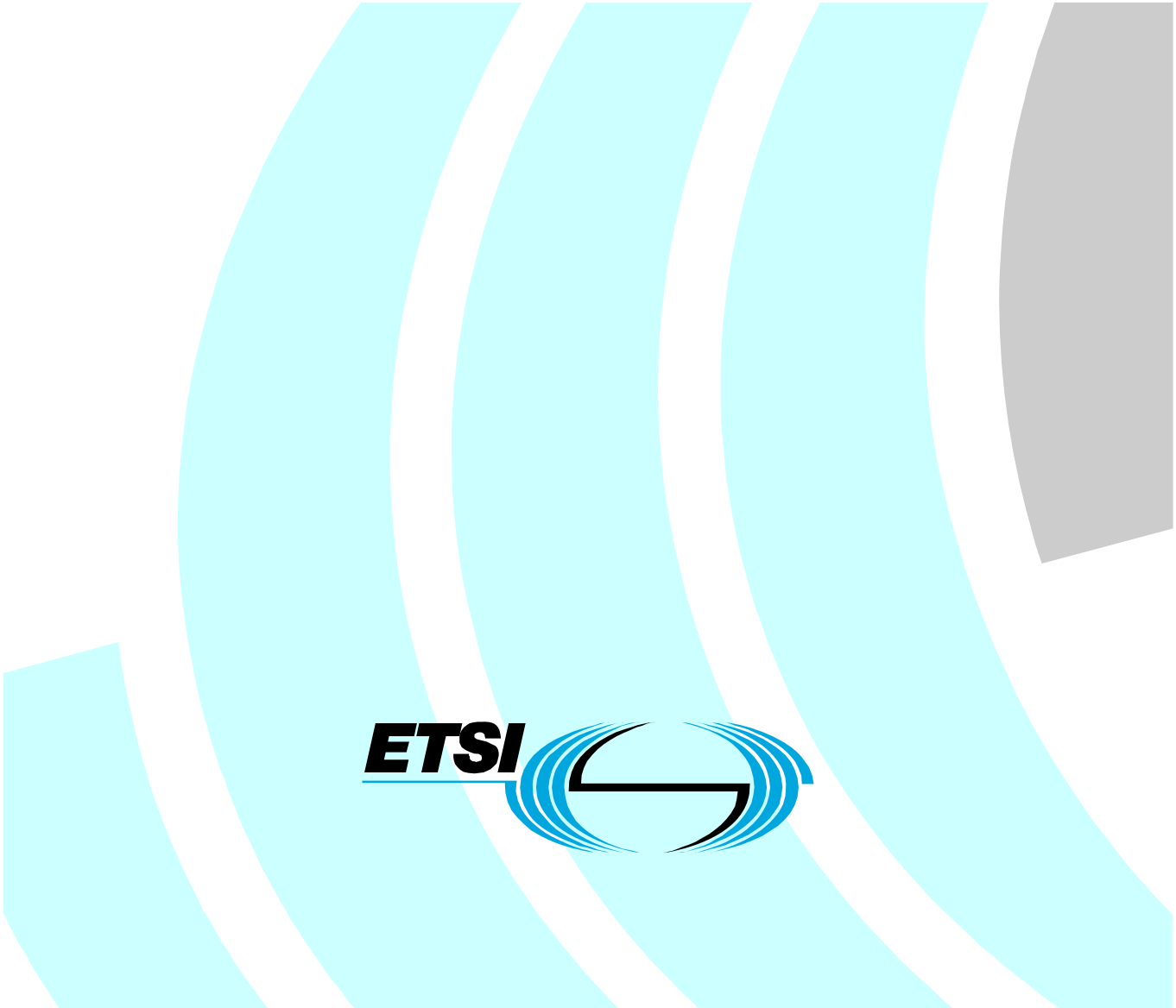
ETSI EN 301 166-2 V1.2.3 (2009-11)

Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrow band channels and having an antenna connector; Part 2: Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive



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Contents

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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 has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [i.4] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [i.3] 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 ("the R&TTE Directive" [i.3]).

The present document is part 2 of a multi-part deliverable covering Land Mobile Service; Radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrow band channels and having an antenna connector, 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".

Technical specifications relevant to Directive 1999/5/EC [i.3] are given in annex A.

National transposition dates	
Date of latest announcement of this EN (doa):	28 February 2010
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2010
Date of withdrawal of any conflicting National Standard (dow):	31 August 2011

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 [i.3]. The modular structure is shown in EG 201 399 [i.2].

1 Scope

The present document applies to radio transmitters and receivers used in stations in the Private Mobile Radio (PMR) service. It applies to use in the land mobile service capable of operating in all or any part of the frequency bands given below.

Table 1: Radiocommunications service frequency bands

	Radiocommunications service frequency bands
Transmit	30 MHz to 3 000 MHz
Receive	30 MHz to 3 000 MHz

The present document applies to equipment operating with narrow channel separations (CSP) (less than 10 kHz) and intended for speech and/or data. It is the intention of the present document to cover any Channel BandWidths (CBW) permitted by National Administrations for such systems e.g. 6,25 kHz.

In the present document different requirements are given for the different radio frequency bands, environmental conditions and types of equipment where appropriate.

In the present document, data transmission systems are defined as systems which transmit and/or receive data and/or digitized voice. The equipment comprises a transmitter and associated encoder and modulator and/or a receiver and associated demodulator and decoder.

The present document covers equipment which may use constant envelope or non-constant envelope modulation.

The types of equipment covered by the present document are as follows:

- base station: equipment fitted with antenna connector;
- mobile station: equipment fitted with antenna connector;
- handportable stations:
  a) either fitted with an antenna connector; or
  b) without an external antenna connector but fitted with a permanent internal or a temporary internal 50 Ω RF connector which allows access to the transmitter output and the receiver input.

Handportable station equipment without an external or internal Radio Frequency (RF) connector and without the possibility of having a temporary internal 50 Ω RF connector is not covered by the present document.

The present document is intended to cover the provisions of article 3.2 of Directive 1999/5/EC [i.3] (R&TTE Directive), 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 [i.3] may apply to equipment within the scope of the present document.

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 301 166-1 (V1.3.2): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Land Mobile Service; Radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrow band channels and having an antenna connector; Part 1: Technical characteristics and methods of measurement".

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] ETSI TR 100 028 (V1.4.1) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

[i.2] ETSI EG 201 399 (V2.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive".

[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] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [i.3] and EN 301 166-1 [1] apply.

3.2 Symbols

For the purposes of the present document, the symbols given in EN 301 166-1 [1] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in EN 301 166-1 [1] apply.

4 Technical requirements

For equipment without an external antenna connector (integral antenna equipment) but fitted with a permanent internal or a temporary internal 50 Ω RF connector which allows access to the transmitter output and the receiver input, the following additional measurements are made using the equipment antenna connected to the station (and not using any connector):

- transmitter effective radiated power;
- transmitter radiated spurious emissions;
- receiver maximum usable sensitivity (field strength);
- receiver spurious radiations.

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. 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 Transmitter requirements

4.2.1 Frequency error

4.2.1.1 Definition

The frequency error is defined in EN 301 166-1 [1], clause 7.7.1.

4.2.1.2 Limit

The frequency error shall not exceed the limits in EN 301 166-1 [1], clause 7.7.3.

4.2.1.3 Conformance

If the transmitter adjacent and alternate channels power (clause 5.3.4) has not been measured under extreme test conditions, then the conformance tests as defined in clause 5.3.1 shall be carried out.

4.2.2 Maximum power (PX) (conducted)

4.2.2.1 Definition

The maximum power (conducted) is defined in EN 301 166-1 [1], clause 7.1.1.

4.2.2.2 Limit

The maximum power (conducted) shall not exceed the limits in EN 301 166-1 [1], clause 7.1.3.

4.2.2.3 Conformance

Conformance tests as defined in clause 5.3.2 shall be carried out.

4.2.3 Maximum effective radiated power

4.2.3.1 Definition

The maximum effective radiated power is defined in EN 301 166-1 [1], clause 7.2.1.

4.2.3.2 Limit

The maximum effective radiated power shall not exceed the limits in EN 301 166-1 [1], clause 7.2.3.

4.2.3.3 Conformance

Conformance tests as defined in clause 5.3.3 shall be carried out.

4.2.4 Adjacent and alternate channel power

4.2.4.1 Definition

The adjacent channel power is defined in EN 301 166-1 [1], clause 7.3.1.

4.2.4.2 Limit

The adjacent channel power shall not exceed the limits in EN 301 166-1 [1], clause 7.3.3.

4.2.4.3 Conformance

Conformance tests as defined in clause 5.3.4 shall be carried out.

4.2.5 Unwanted emissions in the spurious domain

4.2.5.1 Definition

The unwanted emissions in the spurious domain are defined in EN 301 166-1 [1], clause 7.4.1.

4.2.5.2 Limit

The unwanted emissions in the spurious domain shall not exceed the limits in EN 301 166-1 [1], clause 7.4.3.

4.2.5.3 Conformance

Conformance tests as defined in clause 5.3.5 shall be carried out.

4.2.6 Intermodulation attenuation

4.2.6.1 Definition

The intermodulation attenuation is defined in EN 301 166-1 [1], clause 7.5.1.

4.2.6.2 Limit

The intermodulation attenuation shall not exceed the limits in EN 301 166-1 [1], clause 7.5.3.

4.2.6.3 Conformance

Conformance tests as defined in clause 5.3.6 shall be carried out.

4.2.7 Transient power

4.2.7.1 Definition

The transient power is defined in EN 301 166-1 [1], clause 7.6.1.

4.2.7.2 Limit

The transient power shall not exceed the limits in EN 301 166-1 [1], clause 7.6.3.

4.2.7.3 Conformance

Conformance tests as defined in clause 5.3.7 shall be carried out.

4.2.8 Transmitter timeout timer

4.2.8.1 Definition

A transmitter timeout timer is a call duration timer that starts when the PTT key is pressed and when this timer expires, the equipment will stop transmitting immediately and may not re-transmit until PTT has been released and pressed again.

4.2.8.2 Limit

This timer and the limits values used will depend on the class and use of the equipment.

NOTE: Equipment complying with the present document and operating within the frequency range from 446,1 MHz to 446,2 MHz require a limit value of 180 seconds.

4.2.8.3 Conformance

Compliance with this function and the limit value employed shall be by declaration.

4.3 Receiver requirements

4.3.1 Maximum usable sensitivity

4.3.1.1 Definition

The sensitivity is defined in EN 301 166-1 [1], clause 8.1.1 (analogue conducted), clause 8.2.1 (analogue field strength), clause 8.3.1 (digital conducted) and clause 8.4.1 (digital field strength).

In addition, for duplex equipment (equipment providing simultaneous transmission and reception), the receiver desensitization is defined in EN 301 166-1 [1], clause 9.1.1.

4.3.1.2 Limit

The sensitivity shall not exceed the limits in EN 301 166-1 [1], clause 8.1.3 (analogue conducted), clause 8.2.3, (analogue field strength), clause 8.3.3 (digital conducted) and clause 8.4.3, (digital field strength).

In addition, for duplex equipment (equipment providing simultaneous transmission and reception), the receiver desensitization shall meet the requirements of EN 301 166-1 [1], clause 9.1.3.

4.3.1.3 Conformance

Conformance tests as defined in clause 5.4.1 may be carried out.

4.3.2 Co-channel rejection

4.3.2.1 Definition

The co-channel rejection is defined in EN 301 166-1 [1], clause 8.10.1.

4.3.2.2 Limit

The co-channel rejection shall not exceed the limits in EN 301 166-1 [1], clause 8.10.3.

4.3.2.3 Conformance

Conformance tests as defined in clause 5.4.2 may be carried out.

4.3.3 Adjacent channel selectivity

4.3.3.1 Definition

The adjacent channel selectivity is defined in EN 301 166-1 [1], clause 8.5.1.

4.3.3.2 Limit

The adjacent channel selectivity shall not exceed the limits in EN 301 166-1 [1], clause 8.5.3.

4.3.3.3 Conformance

Conformance tests as defined in clause 5.4.3 may be carried out.

4.3.4 Spurious response rejection

4.3.4.1 Definition

The spurious response rejection is defined in EN 301 166-1 [1], clause 8.6.1.

In addition, for duplex equipment (equipment providing simultaneous transmission and reception), the receiver spurious response rejection (with simultaneous transmission and reception) is defined in EN 301 166-1 [1], clause 9.2.1.

4.3.4.2 Limit

The spurious response rejection shall not exceed the limits in EN 301 166-1 [1], clause 8.6.3.

In addition, for duplex equipment (equipment providing simultaneous transmission and reception), the receiver spurious response rejection (with simultaneous transmission and reception) shall not exceed the limits in EN 301 166-1 [1], clause 9.2.3.

4.3.4.3 Conformance

Conformance tests as defined in clause 5.4.4 may be carried out.

4.3.5 Intermodulation response rejection

4.3.5.1 Definition

The intermodulation response rejection is defined in EN 301 166-1 [1], clause 8.7.1.

4.3.5.2 Limit

The intermodulation response rejection shall not exceed the limits in EN 301 166-1 [1], clause 8.7.3.

4.3.5.3 Conformance

Conformance tests as defined in clause 5.4.5 may be carried out.

4.3.6 Blocking or desensitization

4.3.6.1 Definition

The blocking or desensitization is defined in EN 301 166-1 [1], clause 8.8.1.

4.3.6.2 Limit

The blocking or desensitization shall not exceed the limits in EN 301 166-1 [1], clause 8.8.3.

4.3.6.3 Conformance

Conformance tests as defined in clause 5.4.6 may be carried out.

4.3.7 Spurious radiations

4.3.7.1 Definition

The spurious radiations are defined in EN 301 166-1 [1], clause 8.9.1.

4.3.7.2 Limit

The spurious radiations shall not exceed the limits in EN 301 166-1 [1], clause 8.9.3.

4.3.7.3 Conformance

Conformance tests as defined in clause 5.3.8 shall be carried out.

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.

Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the declared operational environmental profile) to give confidence of compliance for the affected technical requirements.

5.1.1 Normal and extreme test-conditions

Measurements shall be made under normal test conditions, and also, where stated, under extreme test conditions.

The test conditions and procedures shall be as specified in EN 301 166-1 [1], clauses 5.3, 5.4 and 5.5.

5.1.2 Test power source

The test power source shall meet the requirements of EN 301 166-1 [1], clause 5.2.

5.1.3 Choice of samples for the measurements

Measurement shall be performed, according to the present document, on samples of equipment defined in EN 301 166-1 [1], clause 4.1.

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 value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in clause 10 (table 11) of EN 301 166-1 [1].

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with the principles of TR 100 028 [i.1] 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)).

The absolute measurement uncertainties are given in clause 10 (table 11) of EN 301 166-1 [1].

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 [i.1].

5.3 Essential test suites

Essential test suites are referred to in annex III of R&TTE Directive [i.3].

The following essential test suites shall be used to assess the performance of equipment.

5.3.1 Frequency error

If the transmitter adjacent and alternate channels power (clause 5.3.4) has not been measured under extreme test conditions, then the measurements specified in EN 301 166-1 [1], clause 7.7.2 shall be carried out.

5.3.2 Maximum power (PX) (conducted)

The measurements specified in EN 301 166-1 [1], clause 7.1.2 shall be carried out.

5.3.3 Maximum effective radiated power

The measurements specified in EN 301 166-1 [1], clause 7.2.2 shall be carried out.

5.3.4 Adjacent and alternate channel power

The measurements specified in EN 301 166-1 [1], clause 7.3.2 shall be carried out.

5.3.5 Unwanted emissions in the spurious domain

The measurements specified in EN 301 166-1 [1], clause 7.4.2 shall be carried out.

5.3.6 Intermodulation attenuation

The measurements specified in EN 301 166-1 [1], clause 7.5.2. shall be carried out.

5.3.7 Transient power

The measurements specified in EN 301 166-1 [1], clause 7.6.2 shall be carried out.

5.3.8 Receiver spurious radiations

The measurements specified in EN 301 166-1 [1], clause 8.9.2 shall be carried out.

5.4 Other test suites

The requirements in clauses 4.3.1 to 4.3.6 inclusive have been set on the assumption that the measurements in clauses 5.4.1 to 5.4.6 are used in order to assess the performance of the equipment.

5.4.1 Maximum usable sensitivity

The measurements specified in EN 301 166-1 [1], clause 8.1.2 (analogue conducted), clause 8.2.2 (analogue field strength), clause 8.3.2 (digital conducted) and clause 8.4.2 (digital field strength) as appropriate, shall be carried out.

In addition, in the case of duplex equipment (equipment providing simultaneous transmission and reception), the measurements specified in EN 301 166-1 [1], clause 9.1.2 shall be carried out.

5.4.2 Co-channel rejection

The measurements specified in EN 301 166-1 [1], clause 8.10.2 shall be carried out.

5.4.3 Adjacent channel selectivity

The measurements specified in EN 301 166-1 [1], clause 8.5.2 shall be carried out.

5.4.4 Spurious response rejection

The measurements specified in EN 301 166-1 [1], clause 8.6.2 shall be carried out.

In addition, in the case of duplex equipment (equipment providing simultaneous transmission and reception), the measurements specified in EN 301 166-1 [1], clause 9.2.2 shall be carried out.

5.4.5 Intermodulation response rejection

The measurements specified in EN 301 166-1 [1], clause 8.7.2 shall be carried out.

5.4.6 Blocking or desensitization

The measurements specified in EN 301 166-1 [1], clause 8.8.2 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 essential 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 essential 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 dependent 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 301 166-2 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	Transmitter frequency error	4.2.1	C	Does not apply if transmitter adjacent and alternate channels power is measured under extreme test conditions	E	5.3.1
2	Transmitter maximum power (PX) conducted	4.2.2	C	Applies to all equipment having an antenna port	E	5.3.2
3	Transmitter maximum effective radiated power	4.2.3	C	Applies to all equipment having an integral antenna	E	5.3.3
4	Transmitter adjacent and alternate channels power	4.2.4	U		E	5.3.4
5	Transmitter unwanted emissions in the spurious domain	4.2.5	U		E	5.3.5
6	Transmitter intermodulation attenuation	4.2.6	C	Applies only to base station equipment	E	5.3.6

Harmonized Standard EN 301 166-2 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**
7	Transmitter transient power	4.2.7	U		E	5.3.7
8	Receiver spurious radiations	4.3.7	U		E	5.3.8
9	Receiver maximum useable sensitivity	4.3.1	C	Applies only to equipment using listen-before-transmit	O	5.4.1
10	Receiver co-channel rejection	4.3.2	C	Applies only to equipment using listen-before-transmit	O	5.4.2
11	Receiver adjacent channel selectivity	4.3.3	C	Applies only to equipment using listen-before-transmit	O	5.4.3
12	Receiver spurious response rejection	4.3.4	C	Applies only to equipment using listen-before-transmit	O	5.4.4
13	Receiver inter-modulation response	4.3.5	C	Applies only to equipment using listen-before-transmit	O	5.4.5
14	Receiver blocking or desensitization	4.3.6	C	Applies only to equipment using listen-before-transmit	O	5.4.6
15	Transmitter time out timer	4.2.8	C	Applicable to certain classes of equipment having a transmitter time out timer	X	

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.

History

Document history		
V1.1.1	December 2001	Publication
V1.2.1	July 2007	Publication
V1.2.2	August 2008	Publication
V1.2.3	November 2009	Publication