

# ETSI EN 300 113-2 V1.4.2 (2009-11)

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*Harmonized European Standard (Telecommunications series)*

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

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Reference

REN/ERM-TGDMR-286-2

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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.2] (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.1] 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").

Technical specifications relevant to Directive 1999/5/EC [i.1] are given in annex A.

The present document is part 2 of a multi-part deliverable covering the 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, 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".**

<b>Proposed national transposition dates</b>	
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

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## 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].

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# 1 Scope

The present document covers the technical requirements for radio transmitters and receivers used in stations in the Private Mobile Radio (PMR) service.

It applies to use in the land mobile service, operating on radio frequencies in all or in any part of the frequencies as given below, with channel separations of 12,5 kHz, 20 kHz and 25 kHz, intended for speech and/or data.

**Table 1: Radiocommunications service frequency bands**

	<b>Radiocommunications service frequency bands</b>
Transmit	30 MHz to 1 000 MHz
Receive	30 MHz to 1 000 MHz

It applies to equipment for continuous and/or discontinuous transmission of data and/or digital speech.

The equipment comprises a transmitter and associated encoder and modulator and/or a receiver and associated demodulator and decoder. The types of equipment covered by the present document are as follows:

- base station (equipment fitted with an antenna connector, intended for use in a fixed location);
- mobile station (equipment fitted with an antenna connector, normally used in a vehicle or as a transportable);
- and those hand portable stations:
  - a) fitted with an antenna socket; or
  - b) without an external antenna socket, but fitted with a permanent internal or a temporary internal 50  $\Omega$  Radio Frequency (RF) connector which allows access to the transmitter output and the receiver input.

Hand portable equipment without an external or internal RF connector and without the possibility of having a temporary internal 50  $\Omega$  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 (R&TTE Directive) [i.1], which states that "(...) radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radiocommunications 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.1] 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>.

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# 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 300 113-1 (V1.6.2): "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

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 (R&TTE Directive).
- [i.2] 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 and of rules on information society services.
- [i.3] 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".

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# 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.1] and EN 300 113-1 [1] apply.

## 3.2 Symbols

For the purposes of the present document, the symbols given in EN 300 113-1 [1] apply.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in EN 300 113-1 [1] apply.

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## 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 of the equipment. 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 300 113-1 [1], clause 7.1.1.

##### 4.2.1.2 Limit

The frequency error shall not exceed the limits in EN 300 113-1 [1], clause 7.1.3.

##### 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 Transmitter power (conducted)

##### 4.2.2.1 Definition

The transmitter power (conducted) is defined in EN 300 113-1 [1], clause 7.2.1.

##### 4.2.2.2 Limit

The transmitter power (conducted) shall not exceed the limits in EN 300 113-1 [1], clause 7.2.3.

##### 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 300 113-1 [1], clause 7.3.1.

##### 4.2.3.2 Limit

The maximum effective radiated power shall not exceed the limits in EN 300 113-1 [1], clause 7.3.3.

##### 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 and alternate channel power is defined in EN 300 113-1 [1], clause 7.4.1.

### 4.2.4.2 Limit

The adjacent and alternate channel power shall not exceed the limits in EN 300 113-1 [1], clause 7.4.3.

### 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 300 113-1 [1], clause 7.5.1.

### 4.2.5.2 Limit

The unwanted emissions in the spurious domain shall not exceed the limits in EN 300 113-1 [1], clause 7.5.4.

### 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 300 113-1 [1], clause 7.6.1.

### 4.2.6.2 Limit

The intermodulation attenuation shall not exceed the limits in EN 300 113-1 [1], clause 7.6.3.

### 4.2.6.3 Conformance

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

## 4.2.7 Transient frequency behaviour of the transmitter

### 4.2.7.1 Definition

The transient frequency behaviour of the transmitter is defined in EN 300 113-1 [1], clause 7.9.1.

### 4.2.7.2 Limit

The transient frequency behaviour of the transmitter shall not exceed the limits in EN 300 113-1 [1], clause 7.9.4.

### 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 receiver sensitivity

#### 4.3.1.1 Definition

The maximum usable receiver sensitivity is defined in EN 300 113-1 [1], clause 8.1.1 (conducted) and clause 8.2.1 (field strength).

In addition, for duplex equipment (equipment providing simultaneous transmission and reception), the receiver desensitization is defined in EN 300 113-1 [1], clause 9.1.1.

#### 4.3.1.2 Limit

The sensitivity shall not exceed the limits in EN 300 113-1 [1], clause 8.1.3 (conducted) and clause 8.2.3 (field strength).

In addition, for duplex equipment (equipment providing simultaneous transmission and reception), the receiver desensitization shall meet the requirements of EN 300 113-1 [1], clause 9.1.4.

#### 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 300 113-1 [1], clause 8.5.1.

#### 4.3.2.2 Limit

The co-channel rejection shall not exceed the limits in EN 300 113-1 [1], clause 8.5.3.

#### 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 300 113-1 [1], clause 8.6.1.

#### 4.3.3.2 Limit

The adjacent channel selectivity shall not exceed the limits in EN 300 113-1 [1], clause 8.6.3.

#### 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 300 113-1 [1], clause 8.7.1.

In addition, in the case of duplex equipment (equipment providing simultaneous transmission and reception), the receiver spurious response rejection is defined in EN 300 113-1 [1], clause 9.2.1.

#### 4.3.4.2 Limit

The spurious response rejection shall not exceed the limits in EN 300 113-1 [1], clause 8.7.6.

In addition, in the case of duplex equipment (equipment providing simultaneous transmission and reception), the receiver spurious response rejection shall not exceed the limits in EN 300 113-1 [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 300 113-1 [1], clause 8.8.1.

#### 4.3.5.2 Limit

The intermodulation response rejection shall not exceed the limits in EN 300 113-1 [1], clause 8.8.3.

#### 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 300 113-1 [1], clause 8.9.1.

#### 4.3.6.2 Limit

The blocking or desensitization shall not exceed the limits in EN 300 113-1 [1], clause 8.9.3.

#### 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 300 113-1 [1], clause 8.10.1.

#### 4.3.7.2 Limit

The spurious radiations shall not exceed the limits in EN 300 113-1 [1], clause 8.10.4.

#### 4.3.7.3 Conformance

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

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## 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 300 113-1 [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 300 113-1 [1], clause 5.2.

#### 5.1.3 Choice of samples for test suites

Measurement shall be performed, according to the present document, on samples of equipment defined in EN 300 113-1 [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 given in clause 10 (table 11) in EN 300 113-1 [1].

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028 (see bibliography) 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 particular expansion factor used for the evaluation of the measurement uncertainty shall be stated.

The absolute measurement uncertainties are given in clause 10 (table 11) in EN 300 113-1 [1].

## 5.3 Essential radio test suites

Essential test suites are referred to in annex III of R&TTE Directive [i.1].

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 300 113-1 [1], clause 7.1.2 shall be carried out.

### 5.3.2 Transmitter power (conducted)

The measurements specified in EN 300 113-1 [1], clause 7.2.2 shall be carried out.

### 5.3.3 Maximum effective radiated power

The measurements specified in EN 300 113-1 [1], clause 7.3.2 shall be carried out.

### 5.3.4 Adjacent and alternate channel power

The measurements specified in EN 300 113-1 [1], clause 7.4.2 shall be carried out.

### 5.3.5 Unwanted emissions in the spurious domain

The measurements specified in EN 300 113-1 [1], clauses 7.5.2 and 7.5.3 shall be carried out.

### 5.3.6 Intermodulation attenuation

The measurements specified in EN 300 113-1 [1], clause 7.6.2 shall be carried out.

### 5.3.7 Transient frequency behaviour of the transmitter

The measurements specified in EN 300 113-1 [1], clause 7.9.3 shall be carried out.

### 5.3.8 Receiver Spurious radiations

The measurements specified in EN 300 113-1 [1], clauses 8.10.2 and 8.10.3 shall be carried out.

## 5.4 Other radio 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 receiver sensitivity

The measurements specified in EN 300 113-1 [1], clause 8.1.2 (conducted) and clause 8.2.2 (field strength) shall be carried out.

In addition, in the case of duplex equipment (equipment providing simultaneous transmission and reception), the measurements specified in EN 300 113-1 [1], clauses 9.1.2 or 9.1.3 shall be carried out.

### 5.4.2 Co-channel rejection

The measurements specified in EN 300 113-1 [1], clause 8.5.2 shall be carried out.

### 5.4.3 Adjacent channel selectivity

The measurements specified in EN 300 113-1 [1], clause 8.6.2 shall be carried out.

### 5.4.4 Spurious response rejection

The measurements specified in EN 300 113-1 [1], clauses 8.7.2, 8.7.3 and either 8.7.4 or 8.7.5 shall be carried out.

In addition, in the case of duplex equipment (equipment providing simultaneous transmission and reception), the measurements specified in EN 300 113-1 [1], clause 9.2.2 shall be carried out.

### 5.4.5 Intermodulation response rejection

The measurements specified in EN 300 113-1 [1], clause 8.8.2 shall be carried out.

### 5.4.6 Receiver blocking or desensitization

The measurements specified in EN 300 113-1 [1], clause 8.9.2 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 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)**

<b>Harmonized Standard EN 300 113-2</b>						
The following essential requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive						
<b>Essential Requirement</b>			<b>Requirement Conditionality</b>		<b>Test Specification</b>	
<b>No</b>	<b>Description</b>	<b>Reference: Clause No</b>	<b>U/C</b>	<b>Condition</b>	<b>E/O</b>	<b>Reference: Clause No</b>
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 power conducted	4.2.2	U		E	5.3.2
3	Transmitter maximum effective radiated power	4.2.3	C	Applies only to equipment without an external antenna connector.	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 transmitters to be used in base stations.	E	5.3.6
7	Transmitter transient frequency behaviour	4.2.7	U		E	5.3.7
8	Receiver spurious radiations	4.3.7	U		E	5.3.8

Harmonized Standard EN 300 113-2						
The following essential requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive						
Essential Requirement			Requirement Conditionality		Test Specification	
No	Description	Reference: Clause No	U/C	Condition	E/O	Reference: Clause No
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.



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## 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.

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## Annex C (informative): Bibliography

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".

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## History

<b>Document history</b>		
V1.1.1	March 2001	Publication
V1.2.1	April 2002	Publication
V1.3.1	December 2003	Publication
V1.4.1	July 2007	Publication
V1.4.2	November 2009	Publication