

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Short range devices;
Radio equipment to be used
in the 1 GHz to 40 GHz frequency range;
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), and is now submitted for the ETSI standards One-step Approval Procedure.

The present document includes improvements to the previous version of the standard that take advantage of technical developments within the SRD industry. In particular this includes optional features such as Listen Before Talk (LBT) and Detect And Avoid (DAA).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC (as amended) [i.1] 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.2] 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.2] are given in annex A.

The present document is part 2 of a multi-part deliverable covering Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range, as identified below:

Part 1: "Technical characteristics and test methods";

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

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

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.2]. The modular structure is shown in EG 201 399 [i.4].

1 Scope

The present document applies to the following Short Range Device major equipment types:

- 1) Generic Short Range Devices, including alarms, telecommand, telemetry, data transmission in general, etc.;
- 2) Radio Frequency IDentification (RFID);
- 3) Radiodetermination, including detection, movement and alert applications.

These radio equipment types are capable of operating in the permitted frequency bands within the 1 GHz to 40 GHz range as specified in table 1:

- either with a Radio Frequency (RF) output connection and dedicated antenna or with an integral antenna;
- for all types of modulation;
- with or without speech.

Table 1 shows a list of the frequency bands as designated by the European Commission Decisions on Short Range Devices [i.6], [i.7], [i.8] and the CEPT/ERC/REC 70-03 [i.3] as known at the date of publication of the present document.

Table 1: Short Range Devices within the 1 GHz to 40 GHz frequency band

	Frequency Bands	Applications	Notes
Transmit and Receive	2 400 MHz to 2 483,5 MHz	Generic use	
Transmit and Receive	2 400 MHz to 2 483,5 MHz	Detection, movement and alert applications	
Transmit and Receive	(a) 2 446 MHz to 2 454 MHz	RFID	See annex C of EN 300 440-1 [1]
Transmit and Receive	(b) 2 446 MHz to 2 454 MHz	RFID	See annex C of EN 300 440-1 [1]
Transmit and Receive	5 725 MHz to 5 875 MHz	Generic use	
Transmit and Receive	9 200 MHz to 9 500 MHz	Radiodetermination: radar, detection, movement and alert applications	
Transmit and Receive	9 500 MHz to 9 975 MHz	Radiodetermination: radar, detection, movement and alert applications	
Transmit and Receive	10,5 GHz to 10,6 GHz	Radiodetermination: radar, detection, movement and alert applications	
Transmit and Receive	13,4 GHz to 14,0 GHz	Radiodetermination: radar, detection, movement and alert applications	
Transmit and Receive	17,1 GHz to 17,3 GHz	Radiodetermination: GBSAR detection, movement and alert applications	See annex E of EN 300 440-1 [1]
Transmit and Receive	24,00 GHz to 24,25 GHz	Generic use and for Radiodetermination: radar, detection, movement and alert applications	

NOTE: (a) and (b) refer to two different operational restrictions for different power levels in the same frequency band.

NOTE 1: It should be noted that table 1 represents the most widely implemented position within the European Union [i.6], [i.7] and [i.8] and the CEPT countries [i.3], but it should not be assumed that all designated bands are available in all countries.

NOTE 2: In addition, it should be noted that other frequency bands may be available in a country within the frequency range 1 GHz to 40 GHz covered by the present document. See the European Commission Decisions on Short Range Devices [i.6], [i.7], [i.8] and the CEPT ERC Recommendation 70-03 [i.3] as implemented through National Radio Interfaces (NRI) and additional NRI as relevant.

NOTE 3: On non-harmonized parameters, national administrations may impose certain conditions such as the type of modulation, frequency, channel/frequency separations, maximum transmitter radiated power, duty cycle, and the inclusion of an automatic transmitter shut-off facility, as a condition for the issuing of an Individual Rights for use of spectrum or General Authorization, or as a condition for use "under licence exemption", as it is in most cases for Short Range Devices.

The present document covers fixed stations, mobile stations and portable stations.

Applications using Ultra Wide Band (UWB) technology are not covered by the present document.

The present document does not require measurements for radiated emissions below 25 MHz.

The present document is intended to cover the provisions of article 3.2 of Directive 1999/5/EC [i.2] (R&TTE Directive). The present document does not apply to radio equipment for which a specific Harmonized EN applies as such specific Harmonized EN may specify additional EN requirements relevant to the presumption of conformity under article 3.2 of the R&TTE Directive [i.2].

NOTE 4: 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 300 440-1 (V1.6.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 1: Technical characteristics and test methods".

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 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.

- [i.2] 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.3] CEPT/ERC Recommendation 70-03 (Tromso 1997): "Relating to the use of Short Range Devices (SRD)".
- [i.4] 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.5] 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.6] European Commission Decision 2006/771/EC of 9 November 2006 on harmonization of the radio spectrum for use by short-range devices.
- [i.7] European Commission Decision 2008/432/EC of 23 May 2008 (amending Decision 2006/771/EC) on harmonization of the radio spectrum for use by short-range devices.
- [i.8] European Commission Decision 2009/381/EC of 13 May 2009 (amending Decision 2006/771/EC) on harmonization of the radio spectrum for use by short-range devices.

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.2] and EN 300 440-1 [1] apply.

3.2 Symbols

For the purposes of the present document, the symbols given in EN 300 440-1 [1] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in EN 300 440-1 [1] apply.

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 Equivalent isotropically radiated power

The equivalent isotropically radiated power, as defined in EN 300 440-1 [1], clause 7.1.1, shall not exceed the limits in EN 300 440-1 [1], clause 7.1.3, table 4.

This requirement applies to transmitters with an integral or dedicated antenna.

4.2.1.2 Permitted range of operating frequencies

The permitted range of operation frequencies, as defined in EN 300 440-1 [1], clause 7.2.1, shall not exceed the limits in EN 300 440-1 [1], clause 7.2.4.

4.2.1.3 Unwanted emissions in the spurious domain

The unwanted emissions in the spurious domain, as defined in EN 300 440-1 [1], clause 7.3.1, shall not exceed the limits in EN 300 440-1 [1], clause 7.3.6, table 5.

This requirement applies to all transmitters.

4.2.1.4 Duty cycle

The duty cycle, as defined in EN 300 440-1 [1], clause 7.4.1, shall not exceed the limits in EN 300 440-1 [1], clause 7.4.3, table 6.

This requirement applies to RFID transmitters operating in 2 446 MHz to 2 454 MHz only.

4.2.2 Receiver requirements

4.2.2.1 Adjacent channel selectivity

The adjacent channel selectivity, as defined in EN 300 440-1 [1], clauses 8.1 and 8.1.1, shall not be less than the limits in EN 300 440-1 [1], clause 8.1.3, table 7.

This requirement applies to Equipment Category 1 receivers, when invoked, as defined in EN 300 440-1 [1], clause 4.1.1.

4.2.2.2 Blocking or desensitization

The blocking or desensitization, as defined in EN 300 440-1 [1], clause 8.2.1, shall not be less than the limits in EN 300 440-1 [1], clause 8.2.3, table 9.

This requirement applies to Equipment Category 1 and Category 2 receivers, when invoked, as defined in EN 300 440-1 [1], clause 4.1.1.

4.2.2.3 Spurious radiations

The spurious radiations, as defined in EN 300 440-1 [1], clause 8.3.1, shall not exceed the limits in EN 300 440-1 [1], clause 8.3.5.

This requirement applies to all receivers.

4.2.3 2,45 GHz RFID systems

2,45 GHz RFID systems as defined in EN 300 440-1 [1], annex C, shall not exceed the limits as defined in EN 300 440-1 [1], clauses C.1, C.1.1 and C.1.2.

4.2.4 GBSAR systems

4.2.4.1 Effective radiated power

The equivalent isotropically radiated power, as defined in EN 300 440-1 [1], clause E.2.1, shall not exceed the limits in EN 300 440-1 [1], clause E.2.1.3.

4.2.4.2 Permitted range of operating frequencies

The permitted range of operation frequencies, as defined in EN 300 440-1 [1], clause E.3.1, shall not exceed the limits in EN 300 440-1 [1], clause E.3.3.

4.2.4.3 DAA threshold

The DAA threshold, as defined in EN 300 440-1 [1], clause E.4.3.1, shall not exceed the limits in EN 300 440-1 [1], clause E.4.3.3.

4.2.4.3.1 DAA timing parameters

4.2.4.3.1.1 Minimum listen time

The minimum listen time, as defined in EN 300 440-1 [1], clause E.4.4.1.1, shall not exceed the limits in EN 300 440-1 [1], clause E.4.4.1.3.

4.2.4.3.1.2 Minimum listen time after detection

The DAA threshold, as defined in EN 300 440-1 [1], clause E.4.4.2.1, shall not exceed the limits in EN 300 440-1 [1], clause E.4.4.2.3.

4.2.4.3.1.3 Maximum transmitter on-time

The maximum transmitter on-time, as defined in EN 300 440-1 [1], clause E.4.4.3.1, shall not exceed the limits in EN 300 440-1 [1], clause E.4.4.3.3.

4.2.4.3.1.4 Minimum transmitter off-time

The minimum transmitter off-time, as defined in EN 300 440-1 [1], clause E.4.4.4.1, shall not exceed the limits in EN 300 440-1 [1], clause E.4.4.4.3.

4.2.4.4 Antenna pattern

The antenna pattern, as defined in EN 300 440-1 [1], clause E.5.1, shall not exceed the limits in EN 300 440-1 [1], clause E.5.3.

4.2.4.5 Unwanted emissions in the spurious domain

The unwanted emissions in the spurious domain, as defined in EN 300 440-1 [1], clause 7.3.1, shall not exceed the limits in EN 300 440-1 [1], clause 7.3.6, table 5.

5 Testing for compliance with technical requirements

5.1 Description of testing for compliance with technical requirements

5.1.1 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.

5.1.1.1 Normal and extreme test-conditions

The test procedures shall be as specified in EN 300 440-1 [1], clauses 5.3 and 5.4.

5.1.1.2 Test power source

The test power source shall meet the requirements of EN 300 440-1 [1], clause 5.2.

5.1.2 Choice of samples for test suites

Measurement shall be performed, according to the present document, on samples of equipment defined in EN 300 440-1 [1], clauses 4.2.1 to 4.2.3.2.

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 values in clause 10, table 10 of EN 300 440-1 [1].

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with the principles contained within TR 100 028 [i.5] 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.

5.3 Essential transmitter test suites

5.3.1 Equivalent isotropically radiated power

Either:

- the test specified in EN 300 440-1 [1], clauses 7.1.2 and 7.1.2.1 shall be carried out; or
- the test specified in EN 300 440-1 [1], clauses 7.1.2 and 7.1.2.2 shall be carried out.

This test suite applies to transmitters with an integral or dedicated antenna.

5.3.2 Permitted range of operation frequencies

Either:

- the test specified in EN 300 440-1 [1], clause 7.2.2 shall be carried out; or
- the test specified in EN 300 440-1 [1], clause 7.2.3 as appropriate shall be carried out.

This test suite applies to all transmitters.

5.3.3 Unwanted emissions in the spurious domain

Either:

- the tests specified in EN 300 440-1 [1], clause 7.3.2 and EN 300 440-1 [1], clause 7.3.3 shall be carried out; or
- the test specified in EN 300 440-1 [1], clause 7.3.4 shall be carried out.

This test suite applies to all transmitters.

5.4 Essential receiver test suites

5.4.1 Adjacent channel selectivity

- the test specified in EN 300 440-1 [1], clause 8.1.2 shall be carried out.

This test suite applies to Category 1 and Category 2 receivers when invoked, as defined in EN 300 440-1 [1], clause 4.1.1.

5.4.2 Blocking or desensitization

- the test specified in EN 300 440-1 [1], clause 8.2.2 shall be carried out.

This test suite applies to Category 1 and Category 2 receivers when invoked, as defined in EN 300 440-1 [1], clause 4.1.1.

5.4.3 Spurious radiations

Either:

- the test specified in EN 300 440-1 [1], clause 8.3.2 and EN 300 440-1 [1], clause 8.3.3 shall be carried out; or
- the test specified in EN 300 440-1 [1], clause 8.3.4 shall be carried out.

This test suite applies to all receivers.

5.5 Tests for RFID systems at 2,45 GHz

- the test specified in clauses 5.3.1 and 5.3.2 shall be carried out.
- the test specified in EN 300 440-1 [1], clause 7.2 shall be carried out.

5.6 Tests for GBSAR systems

5.6.1 Effective radiated power

The test specified in EN 300 440-1 [1], clause E.2.2, shall be carried out.

5.6.2 Permitted range of operating frequencies

The test specified in EN 300 440-1 [1], clause E.3.2, shall be carried out.

5.6.3 DAA threshold

The test specified in EN 300 440-1 [1], clause E.4.3.2, shall be carried out.

5.6.4 DAA timing parameters

5.6.4.1 Minimum listen time

The test specified in EN 300 440-1 [1], clause E.4.4.1.2 shall be carried out.

5.6.4.2 Minimum listen time after detection

The test specified in EN 300 440-1 [1], clause E.4.4.2.2 shall be carried out.

5.6.4.3 Maximum transmitter on-time

The test specified in EN 300 440-1 [1], clause E.4.4.3.2 shall be carried out.

5.6.4.4 Minimum transmitter off-time

The test specified in EN 300 440-1 [1], clause E.4.4.4.2 shall be carried out.

5.6.5 Antenna pattern

The test specified in EN 300 440-1 [1], clause E.5.2 shall be carried out.

5.6.6 Unwanted emissions in the spurious domain

The test specified in EN 300 440-1 [1], clauses 7.3.2 and 7.3.3; or

The test specified in EN 300 440-1 [1], clause 7.3.4.

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 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 300 440-2						
The following requirements and test specifications are relevant to the presumption of conformity under 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	Equivalent isotropically radiated power	4.2.1.1	U		E	5.3.1
2	Permitted range of operating frequencies	4.2.1.2	U		E	5.3.2
3	Unwanted emissions in the spurious domain	4.2.1.3	U		E	5.3.3
4	Duty cycle	4.2.1.4	C	Does apply for RFID in 2 446 MHz to 2 454 MHz only	O	
5	Adjacent channel selectivity	4.2.2.1	C	Applies to Category 1 receivers only. Does not apply to GBSAR (see note)	E	5.4.1
6	Blocking or desensitization	4.2.2.2	C	Applies to Category 1 and Category 2 receivers. Does not apply to GBSAR (see note)	E	5.4.2
7	Spurious radiations	4.2.2.3	U		E	5.4.3
8	2,45 GHz RFID systems	4.2.3	C	Applies to 2,45 GHz RFID systems only	E	5.5
9	Effective radiated power	4.2.4.1	C	Applies to GBSAR systems only	E	5.6.1

Harmonized Standard EN 300 440-2						
The following requirements and test specifications are relevant to the presumption of conformity under 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
10	Permitted range of operating frequencies	4.2.4.2	C	Applies to GBSAR only	E	5.6.2
11	DAA threshold	4.2.4.3	C	Applies to GBSAR only	E	5.6.3
12	Minimum listen time	4.2.4.3.1.1	C	Applies to GBSAR only	E	5.6.4.1
13	Minimum listen time after detection	4.2.4.3.1.2	C	Applies to GBSAR only	E	5.6.4.2
14	Maximum transmit on-time	4.2.4.3.1.3	C	Applies to GBSAR only	E	5.6.4.3
15	Minimum transmit off-time	4.2.4.3.1.4	C	Applies to GBSAR only	E	5.6.4.4
16	Antenna pattern	4.2.4.4	C	Applies to GBSAR only	E	5.6.5
17	Unwanted emissions in the spurious domain	4.2.4.5	C	Applies to GBSAR only	E	5.6.6

NOTE: GBSAR is radar for which items 9 to 17 apply.

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 "s""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

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).

History

Document history		
V1.1.1	September 2001	Publication
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V1.3.1	March 2009	Publication
V1.4.1	April 2010	One-step Approval Procedure OAP 20100817: 2010-04-19 to 2010-08-17