



**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Radio Frequency Identification Equipment operating in the
band 865 MHz to 868 MHz with power levels up to 2 W and
in the band 915 MHz to 921 MHz with power levels up to 4 W;
Part 2: Harmonized EN covering the essential requirements of
article 3.2 of the R&TTE Directive**

Reference

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This Harmonized European Standard (EN) 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 the mandate M/284 issued from the European Commission under Directive 98/34/EC [i.3] as amended by Directive 98/48/EC [i.4].

The title and reference to the present document are intended to be included in the publication in the Official Journal of the European Union of titles and references of Harmonized Standard under the Directive 1999/5/EC [i.1].

The requirements relevant to Directive 1999/5/EC [i.1] are summarized in annex A.

The present document is part 2 of a multi-part deliverable covering Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W and in the band 915 MHz to 921 MHz with power levels up to 4 W e.r.p. as identified below:

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

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

The present document includes improvements to the previous version of the standard that take advantage of technical developments within the RFID industry. In addition it includes provisions for RFID to operate in the band 915 MHz to 921 MHz at power levels up to 4 W e.r.p.

| National transposition dates | |
|--|------------------|
| Date of adoption of this EN: | 16 February 2015 |
| Date of latest announcement of this EN (doa): | 31 May 2015 |
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| Date of withdrawal of any conflicting National Standard (dow): | 30 November 2016 |

Modal verbs terminology

In the present document "shall", "shall not", "should", "should not", "may", "may not", "need", "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.

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

1 Scope

The present document applies to RFID interrogators and tags operating together as a system. The interrogators transmit either within the lower band in up to four specified channels of 200 kHz or in the upper band in up to four specified channels of 400 kHz. The tags preferably respond with a modulated signal in the adjacent low power channels. Interrogators may be used with either integral or external antennas.

The present document applies to RFID interrogators used in conjunction with their RFID transponders (tags). The interrogators preferably operate in the dense interrogator mode in either 200 kHz channels or 400 kHz channels as applicable using a modulated carrier. The tags respond in the adjacent channels with a modulated signal. Interrogators may be used with either integral or external antennas.

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

- fixed interrogators;
- portable interrogators;
- batteryless tags;
- battery assisted tags;
- battery powered tags.

These radio equipment types are capable of operating in all or any part of the frequency band as specified below.

Table 1: Frequencies of operation

| Equipment | Operating frequencies |
|----------------------------------|------------------------|
| Interrogator Transmit channel 4 | 865,6 MHz to 865,8 MHz |
| Interrogator Transmit channel 7 | 866,2 MHz to 866,4 MHz |
| Interrogator Transmit channel 10 | 866,8 MHz to 867,0 MHz |
| Interrogator Transmit channel 13 | 867,4 MHz to 867,6 MHz |
| Interrogator Receive | 865,0 MHz to 868,0 MHz |
| Tag Transmit | 865,0 MHz to 868,0 MHz |
| Interrogator Transmit channel 3 | 916,1 MHz to 916,5 MHz |
| Interrogator Transmit channel 6 | 917,3 MHz to 917,7 MHz |
| Interrogator Transmit channel 9 | 918,5 MHz to 918,9 MHz |
| Interrogator Transmit channel 12 | 919,7 MHz to 920,1 MHz |
| Interrogator Receive | 915,3 MHz to 925,0 MHz |
| Tag Transmit | 915,3 MHz to 920,9 MHz |

The present document is intended to cover the provisions of Directive 1999/5/EC [i.1] (R&TTE Directive), article 3.2, which states that "..... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive [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/>.

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>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 302 208-1 (V2.1.1) (02-2015): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radio Frequency Identification Equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W and in the band 915 MHz to 921 MHz with power levels up to 4 W; Part 1: Technical requirements and methods of measurement".
- [2] ETSI TR 100 028 (V1.4.1) (12-2001) (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

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.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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] 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] 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 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.4] Directive 98/48/EC of the European Parliament and of the Council 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.1] and ETSI EN 302 208-1 [1] apply.

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI EN 302 208-1 [1] apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI EN 302 208-1 [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.

4.1.1 Choice of samples for test suite

Measurement shall be performed according to the present document on samples of equipment defined in ETSI EN 302 208-1 [1], clause 4.2.3.

4.2 Transmitter conformance requirements

4.2.1 Frequency error

This requirement shall apply only to interrogators.

The frequency error, as defined in ETSI EN 302 208-1 [1], clause 8.1.1 shall not exceed the limits in ETSI EN 302 208-1 [1], clause 8.1.3.

4.2.2 Frequency stability under low voltage conditions

This requirement shall apply only to battery- powered interrogators.

The frequency stability under low voltage conditions as defined in ETSI EN 302 208-1 [1], clause 8.2.1 shall comply with the limits given in ETSI EN 302 208-1 [1], clause 8.2.3.

4.2.3 Effective radiated power

This requirement applies only to interrogators.

The effective radiated power, as defined in ETSI EN 302 208-1 [1], clause 8.3.1 shall not exceed the limits in ETSI EN 302 208-1 [1], clause 8.3.3.

4.2.4 Transmitter antenna beamwidth

This requirement shall apply only to antennas of interrogators.

The transmitter antenna beamwidth shall comply with the limits in ETSI EN 302 208-1 [1], clause 8.3.3.

4.2.5 Transmitter spectrum masks

This requirement shall apply only to interrogators.

The transmitter spectrum masks, as applicable, defined in ETSI EN 302 208-1 [1], clause 8.4.1 shall not exceed the limits in ETSI EN 302 208-1 [1], clause 8.4.3.

4.2.6 Transmitter spurious emissions

This requirement shall apply only to interrogators.

The transmitter spurious emissions, as defined in ETSI EN 302 208-1 [1], clause 8.5.1 shall not exceed the limits in ETSI EN 302 208-1 [1], clause 8.5.3.

4.2.7 Transmission times

This requirement shall apply only to interrogators.

Transmission times, as defined in ETSI EN 302 208-1 [1], clause 8.6.1 shall comply with the conditions in ETSI EN 302 208-1 [1], clause 8.6.3.

4.2.8 Mitigation using DAA

This requirement shall apply only to interrogators operating in the upper band.

The mitigation requirements specified in ETSI EN 302 208-1 [1], clause 8.7.1 shall comply with the conditions in ETSI EN 302 208-1 [1], clause 8.7.2

4.3 Receiver conformance requirements

4.3.1 Receiver spurious radiations

This requirement shall apply only to interrogators.

Spurious radiations from the receiver of an interrogator, as defined in ETSI EN 302 208-1 [1], clause 9.4.1 shall not exceed the limits in ETSI EN 302 208-1 [1], clause 9.4.3.

4.4 Tag conformance requirements

4.4.1 Radiated power

This requirement shall apply only to tags.

Tag emissions as defined in ETSI EN 302 208-1 [1], clause 10.1.1 shall not exceed the limits in ETSI EN 302 208-1 [1], clause 10.1.3.

4.4.2 Unwanted emissions

This requirement shall apply only to tags.

Unwanted emissions as defined in ETSI EN 302 208-1 [1], clause 10.2.1 shall not exceed the limits in ETSI EN 302 208-1 [1], clause 10.2.3.

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

Tests shall be made under normal test conditions, and also where stated, under extreme test conditions. The test procedures shall be as specified in ETSI EN 302 208-1 [1], clauses 5.3 and 5.4.

5.1.2 Test power sources

The test power sources shall meet the requirements of ETSI EN 302 208-1 [1], clause 5.2.

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 shall 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, for each measurement, shall comply with the values in clause 7, table 3 of ETSI EN 302 208-1 [1].

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with the principles contained within ETSI TR 100 028 [2] and shall correspond to an expansion factor (coverage factor) $k = \pm 1,96$ or $k = \pm 2$ (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

The test suites described in ETSI EN 302 208-1 [1] shall be carried out in the lower and upper bands, as applicable.

5.3.1 Frequency error

The test specified in ETSI EN 302 208-1 [1], clause 8.1 shall be carried out.

5.3.2 Frequency stability under low voltage conditions

The test specified in ETSI EN 302 208-1 [1], clause 8.2 shall be carried out.

5.3.3 Effective radiated power

The test(s) specified in ETSI EN 302 208-1 [1], clause 8.3 shall be carried out.

5.3.4 Transmitter antenna beamwidth

The test(s) specified in ETSI EN 302 208-1 [1], clause 8.3 shall be carried out.

5.3.5 Transmitter spectrum masks

The test(s), specified in ETSI EN 302 208-1 [1], clause 8.4 shall be carried out.

5.3.6 Transmitter spurious emissions

The test(s) specified in ETSI EN 302 208-1 [1], clause 8.5 shall be carried out.

5.3.7 Transmission times

The test specified in ETSI EN 302 208-1 [1], clause 8.6 shall be carried out.

5.3.8 Mitigation using DAA

The test specified in ETSI EN 302 208-1 [1], clause 8.7 shall be carried out.

5.4 Essential receiver test suites

The test suites described in ETSI EN 302 208-1 [1] shall be carried out in the lower and upper bands, as applicable.

5.4.1 Receiver spurious radiations

The test specified in ETSI EN 302 208-1 [1], clause 9.4 shall be carried out.

5.5 Essential tag test suites

The test suites described in ETSI EN 302 208-1 [1] shall be carried out in the lower and upper bands, as applicable.

5.5.1 Radiated power

The test(s) specified in ETSI EN 302 208-1 [1], clause 10.1 shall be carried out.

5.5.2 Unwanted emissions

The test(s) specified in ETSI EN 302 208-1 [1], clause 10.2 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)

| Harmonized Standard ETSI EN 302 208-2 | | | | | | |
|---|--|-----------------------------|-----------------------------------|---|---------------------------|-----------------------------|
| The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive [i.1] | | | | | | |
| Requirement | | | Requirement Conditionality | | Test Specification | |
| No | Description | Reference: Clause No | U/C | Condition | E/O | Reference: Clause No |
| 1 | Frequency error | 4.2.1 | C | Applies to interrogators | E | 5.3.1 |
| 2 | Frequency stability under low voltage conditions | 4.2.2 | C | Applies to battery powered interrogators | E | 5.3.2 |
| 3 | Effective radiated power | 4.2.3 | C | Applies to interrogators | E | 5.3.3 |
| 4 | Transmitter antenna beamwidth | 4.2.4 | C | Applies to antennas [in both lower and upper bands] | E | 5.3.4 |
| 5 | Transmission spectrum masks | 4.2.5 | C | Applies to interrogators | E | 5.3.5 |
| 6 | Transmitter spurious emissions | 4.2.6 | C | Applies to interrogators | E | 5.3.6 |
| 7 | Transmission times | 4.2.7 | C | Applies to interrogators in the lower band | E | 5.3.7 |
| 8 | Mitigation using DAA | 4.2.8 | C | Applies to interrogators in the upper band | E | 5.3.8 |
| 9 | Receiver spurious emissions | 4.3.1 | C | Applies to interrogators | E | 5.4.1 |
| 10 | Tag radiated power | 4.4.1 | C | Applies to tags | E | 5.5.1 |
| 11 | Tag unwanted emissions | 4.4.2 | C | Applies to tags | E | 5.5.2 |

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".

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): Bibliography

- Commission Decision 2006/804/EG on harmonization of the radio spectrum for Radio Frequency Identification (RFID) devices operating in the Ultra High Frequency (UHF) band; Brussels, 25th of November 2006, Official Journal of the European Union, L 329/64.
- Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC (EMC Directive).
- Recommendation ITU-R SM.329-10 (2003): "Unwanted emissions in the spurious domain".
- 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).
- Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).

History

| Document history | | | |
|-------------------------|----------------|-----------------------|---------------------------------------|
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| V1.2.1 | April 2008 | Publication | |
| V1.3.1 | February 2010 | Publication | |
| V1.4.1 | November 2011 | Publication | |
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