SLOVENSKI STANDARD

oSIST EN 301 489-1 V1.7.1:2006

01-september-2006

Elektromagnetna združljivost in zadeve v zvezi z radijskim spektrom (ERM) - Standard elektromagnetne združljivosti (EMC) za radijsko opremo in storitve - 1. del: Splošne tehnične zahteve

Electromagnetic compatibility and Radio spectrum Matters (ERM) - ElectroMagnetic Compatibility (EMC) standard for radio equipment and services - Part 1: Common technical requirements

Ta slovenski standard je istoveten z:

ICS:

33.060.01	Radijske komunikacije na splošno	Radiocommunications in general
33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

oSIST EN 301 489-1 V1.7.1:2006 **en**

Draft ETSI EN 301 489-1 V1.7.1 (2006-07)

Candidate Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

Reference
REN/ERM-EMC-246-1

Keywords
EMC, radio, regulation

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

Important notice

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, please send your comment to one of the following services:
http://portal.etsi.org/chaircor/ETSI_support.asp

Copyright Notification

Contents

Intellectual Property Rights 6
Foreword 6
1 Scope 9
2 References 10
3 Definitions and abbreviations 11
3.1 Definitions 11
3.2 Abbreviations 13
4 Test conditions 13
4.1 General 13
4.2 Arrangements for test signals 14
4.2.1 Arrangements for test signals at the input of transmitters 14
4.2.2 Arrangements for test signals at the output of transmitters 14
4.2.3 Arrangements for test signals at the input of receivers 14
4.2.4 Arrangements for test signals at the output of receivers 15
4.2.5 Arrangements for testing transmitter and receiver together (as a system) 15
4.3 RF exclusion band of radio communications equipment 15
4.4 Narrow band responses of receivers or receivers which are part of transceivers 15
4.5 Normal test modulation 16
5 Performance assessment 16
5.1 General 16
5.2 Equipment which can provide a continuous communication link 17
5.3 Equipment which does not provide a continuous communication link 17
5.4 Ancillary equipment 17
5.5 Equipment classification 18
6 Performance criteria 18
6.1 Performance criteria for continuous phenomena applied to transmitters and receivers 18
6.2 Performance criteria for transient phenomena applied to transmitters and receivers 19
6.3 Performance criteria for equipment which does not provide a continuous communication link 19
6.4 Performance criteria for ancillary equipment tested on a stand alone basis 19
7 Applicability overview tables 20
7.1 EMC emission 20
7.2 Immunity 20
8 Methods of measurement and limits for EMC emissions 21
8.1 Test configuration 21
8.2 Enclosure of ancillary equipment measured on a stand alone basis 22
8.2.1 Definition 22
8.2.2 Test method 22
8.2.3 Limits 22
8.3 DC power input/output ports 22
8.3.1 Definition 23
8.3.2 Test method 23
8.3.3 Limits 23
8.4 AC mains power input/output ports 24
8.4.1 Definition 24
8.4.2 Test method 24
8.4.3 Limits 24
8.5 Harmonic current emissions (AC mains input port) 24
8.6 Voltage fluctuations and flicker (AC mains input port) 24
8.7 Telecommunication ports 24
8.7.1 Definition 25
8.7.2 Test method 25

8.7.3 Limits 25

9 Test methods and levels for immunity tests 25
9.1 Test configuration 25
9.2 Radio frequency electromagnetic field (80 MHz to 1 000 MHz and 1 400 MHz to 2 700 MHz) 26
9.2.1 Definition 26
9.2.2 Test method 26
9.2.3 Performance criteria 26
9.3 Electrostatic discharge 26
9.3.1 Definition 27
9.3.2 Test method 27
9.3.3 Performance criteria 27
9.4 Fast transients, common mode 27
9.4.1 Definition 27
9.4.2 Test method 27
9.4.3 Performance criteria 28
9.5 Radio frequency, common mode 28
9.5.1 Definition 28
9.5.2 Test method 28
9.5.3 Performance criteria 28
9.6 Transients and surges in the vehicular environment 29
9.6.1 Definition 29
9.6.2 Test method 29
9.6.2.1 Test requirements for 12 V and 24V DC powered equipment 29
9.6.3 Performance criteria 29
9.7 Voltage dips and interruptions 29
9.7.1 Definition 30
9.7.2 Test method 30
9.7.3 Performance criteria 30
9.8 Surges 30
9.8.1 Definition 31
9.8.2 Test method 31
9.8.2.1 Test method for telecommunication ports directly connected to outdoor cables 31
9.8.2.2 Test method for telecommunication ports connected to indoor cables 31
9.8.2.3 Test method for mains ports 31
9.8.3 Performance criteria 31

Annex A (normative): The HS Requirements & conformance Test specifications Table (HS-RTT) 32

Annex B (normative): Technical requirements for after market equipment (ESAs), which are not related to immunity related functions of the vehicle, necessary to demonstrate conformance to the motor vehicle EMC Directive 2004/104/EC 36

B.1 General 36

B.2 Technical requirements for radio equipment 36
B.2.1 Broadband electromagnetic interference (emissions) generated by the ESA 36
B.2.2 Narrow-band electromagnetic interference (emissions) generated by the ESA 36
B.2.2.1 Narrow-band spurious emissions of RF transmitters 37
B.2.2.2 Narrow-band spurious emissions of transceivers in stand by mode and receivers 37
B.2.2.3 Narrow-band spurious emissions of ancillary equipment 37
B.2.3 Immunity of the ESA to transient disturbances conducted along the supply lines 37
B.2.4 Conducted disturbances (emissions) caused by the ESA 37

Annex C (normative): Application of harmonized EMC standards to multi-radio and combined radio and non-radio equipment 39

C.1 Where all products can operate independently of each other 39
C.1.1 Emissions 39
C.1.2 Immunity 40

C.2 Where one or more of the individual products cannot operate independently 40
C.2.1 Products physically incorporated within another product 40
C.2.2 Products connected to, but not physically incorporated within, another product 41

C.3 Where none of the component parts operate independently 41
C.3.1 Emissions 41
C.3.2 Immunity 41

C.4 Application of harmonized EMC standards to multi-radio equipment 42
C.4.1 Multi-radio equipment capable of independent transmission 42
C.4.2 Multi-radio equipment not capable of independent transmission 42

Annex D (informative): Bibliography 43

Annex E (informative): The EN title in the official languages 44

History 45

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Candidate 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 Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [3] (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 Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (89/336/EEC [2] as amended) and Directive 1999/5/EC [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").

The present document is based upon the Generic Standards EN 61000-6-3 [4] and EN 61000-6-1 [5] and other standards, where appropriate, to meet the essential requirements of Council Directives 89/336/EEC [2], 1999/5/EC [1] and the motor vehicle EMC Directive 2004/104/EC [18] respectively.

The motor vehicle EMC Directive 2004/104/EC [18], is a type approval Directive, and contains in its annexes, all the technical requirements necessary to demonstrate conformance. There are two categories of after market equipment covered by the Directive as follows:

a) After market (radio) equipment (and ancillary equipment) intended for installation in a motor vehicle, and which **are not related to immunity related functions** (annex I, clause 2.1.12 of the Directive) of the motor vehicle.

b) After market (radio) equipment (and ancillary equipment) intended for installation in a motor vehicle , and which **is related to immunity related functions** (annex I, clause 2.1.12) of the motor vehicle, are subject to **type approval requirements** of the Directive 2004/104/EC [18].

The present document only deals with equipment of category a) subject to the requirements set out below.

Annex I, clause 3.2.9 of 2004/104/EC [18**]**, sets out the acceptance of conformity according to the procedures of 89/336/EEC [2] or 1999/5/EC [1] for after market equipment (ESAs) not related to immunity related functions of the motor vehicle (annex I, clause 2.1.12), but additionally requires that the ESA fulfils the limits defined in annex I, clauses 6.5, 6.6, 6.8, and 6.9 of the Directive. Requirements applicable to this type of after market equipment (ESAs) are set out in annex B of the present document.

The present document, and the product related parts of it are based on the current EMC standards published by ETSI. It should be noted that the majority of these EMC standards have also been published in the Official Journal of the European Commission.

The present document is part 1 of a multi-part deliverable covering ElectroMagnetic Compatibility (EMC) standard for radio equipment and services, as identified below:

Part 1: "Common technical requirements";

Part 2: "Specific conditions for radio paging equipment";

Part 3: "Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz";

Part 4: "Specific conditions for fixed radio links and ancillary equipment and services";

Part 5: "Specific conditions for Private land Mobile Radio (PMR) and ancillary equipment (speech and non-speech)";

Part 6: "Specific conditions for Digital Enhanced Cordless Telecommunications (DECT) equipment";

Part 7: "Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS)";

Part 8: "Specific conditions for GSM base stations";

Part 9: "Specific conditions for wireless microphones, similar Radio Frequency (RF) audio link equipment, cordless audio and in-ear monitoring devices";

Part 10: "Specific conditions for First (CT1 and CT1+) and Second Generation Cordless Telephone (CT2) equipment";

Part 11: "Specific conditions for terrestrial sound broadcasting service transmitters";

Part 12: "Specific conditions for Very Small Aperture Terminal, Satellite Interactive Earth Stations operated in the frequency ranges between 4 GHz and 30 GHz in the Fixed Satellite Service (FSS)";

Part 13: "Specific conditions for Citizens' Band (CB) radio and ancillary equipment (speech and non-speech)";

Part 14: "Specific conditions for analogue and digital terrestrial TV broadcasting service transmitters";

Part 15: "Specific conditions for commercially available amateur radio equipment";

Part 16: "Specific conditions for analogue cellular radio communications equipment, mobile and portable";

Part 17: "Specific conditions for 2,4 GHz wideband transmission systems and 5 GHz high performance RLAN equipment";

Part 18: "Specific conditions for Terrestrial Trunked Radio (TETRA) equipment";

Part 19: "Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications";

Part 20: "Specific conditions for Mobile Earth Stations (MES) used in the Mobile Satellite Services (MSS)";

Part 22: "Specific conditions for ground based VHF aeronautical mobile and fixed radio equipment";

Part 23: "Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) Base Station (BS) radio, repeater and ancillary equipment";

Part 24: "Specific conditions for IMT-2000 CDMA Direct Spread (UTRA) for Mobile and portable (UE) radio and ancillary equipment";

Part 25: "Specific conditions for CDMA 1x spread spectrum Mobile Stations and ancillary equipment";

Part 26: "Specific conditions for CDMA 1x spread spectrum Base Stations, repeaters and ancillary equipment";

Part 27: "Specific conditions for Ultra Low Power Active Medical Implants (ULP-AMI) and related peripheral devices (ULP-AMI-P)";

Part 28: "Specific conditions for wireless digital video links";

Part 31: "Specific conditions for equipment in the 9 kHz to 315 kHz band for Ultra Low Power Active Medical Implants (ULP-AMI) and related peripheral devices (ULP-AMI-P)";

Part 32: "Specific conditions for Ground and Wall Probing Radar applications".

Technical specifications relevant to the EMC Directive [2] and the R&TTE Directive [1] are given in annex A.

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

1 Scope

The present document contains the common requirements for radio communications equipment and associated ancillary equipment, in respect of ElectroMagnetic Compatibility (EMC).

Product dependent arrangements necessary to perform the EMC tests on dedicated types of radio communications equipment, and the assessment of test results, are detailed in the appropriate product related parts of EN 301 489 series [21].

The present document, together with the product related part, specifies the applicable EMC tests, the methods of measurement, the limits and the performance criteria for radio equipment and associated ancillary equipment. In case of differences (for instance concerning special conditions, definitions, abbreviation) between part 1 of the present document and the relevant product related part of EN 301 489 series [21], the product related part takes precedence.

Technical specifications related to the antenna port of radio equipment and radiated emissions from the enclosure port of radio equipment and combinations of radio and associated ancillary equipment are not included in the present document. Such technical specifications are normally found in the relevant product standards for the effective use of the radio spectrum.

The environment classification used in the present document refers to the environment classification used in:

- EN 61000-6-3 [4] and EN 61000-6-1 [5] for the residential, commercial and light industrial environment; or
- TR 101 651 [14] for the telecommunication centre environment; or
- ISO 7637-2 [13] for the vehicular environment.

The EMC requirements have been selected to ensure an adequate level of compatibility for apparatus intended to be used in the environments mentioned above. The levels, however, do not cover extreme cases which may occur in any location but with low probability of occurrence. The applicable environment(s) shall be declared by the manufacturer and shall be in accordance with the equipment documentation.

For radio equipment and associated ancillary equipment intended to be installed in motor vehicles (i.e. ESAs) and not related to immunity related functions of the vehicle, additional technical requirements necessary to demonstrate conformance to the motor vehicle EMC Directive 2004/104/EC [18], are set out in annex B (normative) of the present document.

The present document may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena or a continuous phenomenon is permanently present, e.g. a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference or the interfered part or both.

Compliance of radio equipment to the requirements of the present document does not signify compliance to any requirements related to spectrum management or to the use of the equipment (licensing requirements).

Compliance to the requirements of the present document does not signify compliance to any safety requirements. However, it is the responsibility of the assessor of the equipment to record in the test report any observations regarding the test sample becoming dangerous or unsafe as a result of the application of the tests called for in the present document.

NOTE: Radio equipment for use in maritime environment is covered by other ETSI EMC standards.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- 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.
- For a non-specific reference, the latest version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

[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).

[2] 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).

[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.

[4] CENELEC EN 61000-6-3 (2001): "Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments".

[5] CENELEC EN 61000-6-1 (2001): "Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments".

[6] CENELEC EN 55022 (2006): "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement".

[7] CENELEC EN 61000-4-2 (2001): "Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test".

[8] CENELEC EN 61000-4-3 (2006): "Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test".

[9] CENELEC EN 61000-4-4 (2004): "Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test".

[10] CENELEC EN 61000-4-5 (2001): "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test".

[11] CENELEC EN 61000-4-6 (2005): "Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields".

[12] CENELEC EN 61000-4-11 (2004): "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests".

[13] ISO 7637-2 (2004): "Road vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only".

[14] ETSI TR 101 651 (V1.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Classification of the electromagnetic environment conditions for equipment in telecommunication networks".

[15] CENELEC EN 61000-3-2/Amendment 1 (2006): "Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)".

[16] CENELEC EN 61000-3-3 (1995): "Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection".

[17] IEC 60050-161: "International Electrotechnical Vocabulary. Chapter 161: Electromagnetic compatibility".

[18] Commission Directive 2004/104/EC of 14 October 2004 adapting to technical progress Council Directive 72/245/EEC relating to the radio interference (electromagnetic compatibility) of vehicles and amending Directive 70/156/EEC on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers.

[19] CISPR 25 (2nd Edition 2002): "Radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on devices - Limits and methods of measurement".

[20] CENELEC EN 55016-1-4 (2004): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances".

[21] ETSI EN 301 489 series: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".

[22] CENELEC EN 61000-3-12 (2005): "Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase".

[23] CENELEC EN 61000-3-11 (2000): "Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection".

[24] ITU-R Radio Regulations (2004).

[25] ETSI EN 301 843-1 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 1: Common technical requirements".

[26] IEEE 1284-2000: "IEEE Standard Signaling Method for a Bidirectional Parallel Peripheral Interface for Personal Computers".

[27] IEEE 1394.1-2004: "IEEE Standard for High Performance Serial Bus Bridges".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

ancillary equipment: equipment (apparatus), used in connection with a receiver or transmitter

NOTE: It is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a receiver or transmitter to provide additional operational and/or control features to the radio equipment, (e.g. to extend control to another position or location); and
- the equipment cannot be used on a stand alone basis to provide user functions independently of a receiver or transmitter; and
- the receiver or transmitter, to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).