

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

CISPR
16-1-2

Edition 1.2
2006-08

Edition 1:2003 consolidated with amendments 1:2004 and 2:2006

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

**Specification for radio disturbance and immunity
measuring apparatus and methods –**

Part 1-2:

**Radio disturbance and immunity measuring
apparatus – Ancillary equipment –
Conducted disturbances**

© IEC 2006 Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

CT

For price, see current catalogue

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	9
TABLE RECAPITULATING CROSS-REFERENCES	11
1 Scope.....	13
2 Normative references	13
3 Definitions	15
4 Artificial mains networks.....	17
5 Current and voltage probes	35
6 Coupling units for conducted current immunity measurement	45
7 Coupling devices for measuring signal lines	47
8 The artificial hand and series RC element	55
Annex A (normative) Artificial mains networks (clause 4).....	65
Annex B (informative) Construction, frequency range, and calibration of current probes (clause 5).....	83
Annex C (informative) Construction of the coupling units for current injection for the frequency range 0,15 MHz to 30 MHz (clause 6).....	101
Annex D (informative) Principle of operation and examples of coupling units for conducted current immunity measurements (clause 6).....	113
Annex E (normative) Example and measurement of the parameters of the asymmetric artificial network (AAN).....	121
Annex F (normative) Example and measurement of the parameters of the AN for coaxial and other screened cables.....	131
Annex G (informative) Construction and evaluation of capacitive voltage probe (subclause 5.2.2)	135
Annex H (informative) Rationale for the introduction of a minimum decoupling factor between mains and EUT/receiver ports for the V-AMN.....	149
Annex I (informative) Rationale for the introduction of a phase tolerance for the V-AMN input impedance	151

INTERNATIONAL ELECTROTECHNICAL COMMISSION
INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

**SPECIFICATION FOR RADIO DISTURBANCE AND IMMUNITY
MEASURING APPARATUS AND METHODS –**

**Part 1-2: Radio disturbance and immunity measuring apparatus –
Ancillary equipment – Conducted disturbances**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard CISPR 16-1-2 has been prepared by CISPR subcommittee A: Radio interference measurements and statistical methods.

This consolidated version of CISPR 16-1-2 consists of the first edition (2003), its amendment 1 (2004) [documents CIS/A/503/FDIS and CIS/A/521/RVD] and its amendment 2 (2006) [documents CIS/A/654/FDIS and CIS/A/670/RVD].

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 1.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

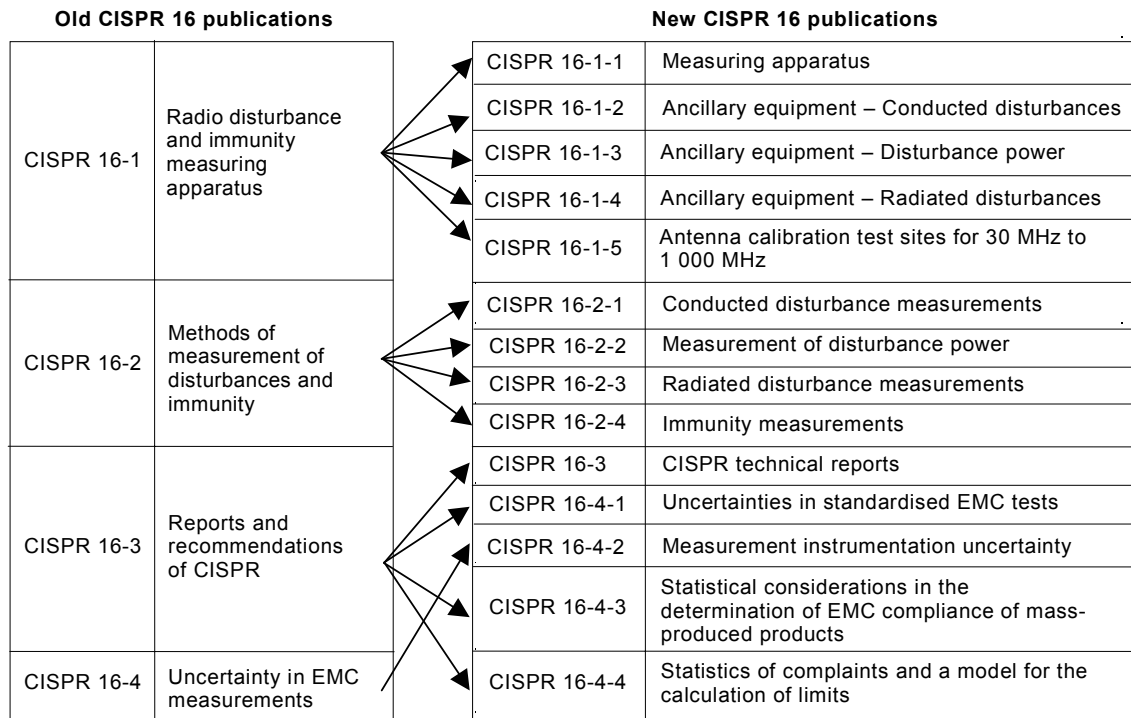
This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

CISPR 16-1, CISPR 16-2, CISPR 16-3 and CISPR 16-4 have been reorganised into 14 parts, to accommodate growth and easier maintenance. The new parts have also been renumbered. See the list given below.



More specific information on the relation between the 'old' CISPR 16-1 and the present 'new' CISPR 16-1-2 is given in the table after this introduction (TABLE RECAPITULATING CROSS REFERENCES).

Measurement instrumentation specifications are given in five new parts of CISPR 16-1, while the methods of measurement are covered now in four new parts of CISPR 16-2. Various reports with further information and background on CISPR and radio disturbances in general are given in CISPR 16-3. CISPR 16-4 contains information related to uncertainties, statistics and limit modelling.

CISPR 16-1 consists of the following parts, under the general title *Specification for radio disturbance and immunity measuring apparatus and methods – Radio disturbance and immunity measuring apparatus*:

- Part 1-1: Measuring apparatus,
- Part 1-2: Ancillary equipment – Conducted disturbances,
- Part 1-3: Ancillary equipment – Disturbance power,
- Part 1-4: Ancillary equipment – Radiated disturbances,
- Part 1-5: Antenna calibration test sites for 30 MHz to 1 000 MHz.

TABLE RECAPITULATING CROSS-REFERENCES

Second edition of CISPR 16-1

First edition of CISPR 16-1-2

Clauses, subclauses

Clauses, subclauses

2
3.8, ..., 3.10
3.20, .., 3.23

2
3.1, ..., 3.3
3.4, ..., 3.7

5.1
5.2
5.8
5.10
5.11

4
5
6
7
8

Annexes

Annexes

F
I
M
N
Q
Z

A
B
C
D
E
F

Tables

Tables

18, 22

1, 2

Figures

Figures

7, 8, 9, 23, 24
10, 20, 52, 53, 54
25, ..., 29
F.1
30, ..., 37
44, ..., 48
49, 50
Q.1, ..., Q.6

1, 2, 3, 4, 5
6, 7, 8, 9, 10
A.1, ..., A.5
A.6
B.1, ..., B.8
C.1, ..., C.5
D.1, D.2
E.1, ..., E.6

SPECIFICATION FOR RADIO DISTURBANCE AND IMMUNITY MEASURING APPARATUS AND METHODS –

Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted disturbances

1 Scope

This part of CISPR 16 is designated a basic standard, which specifies the characteristics and performance of equipment for the measurement of radio disturbance voltages and currents in the frequency range 9 kHz to 1 GHz.

Specifications for ancillary apparatus are included for: artificial mains networks, current and voltage probes and coupling units for current injection on cables.

The requirements of this publication shall be complied with at all frequencies and for all levels of radio disturbance voltages and currents within the CISPR indicating range of the measuring equipment.

Methods of measurement are covered in Part 2, and further information on radio disturbance is given in Part 3 of CISPR 16.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CISPR 14-1:2000, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission*

CISPR 16-1-1:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*

CISPR 16-2-1:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of immunity and disturbance – Conducted disturbance measurements*

CISPR 16-3:2003, *Specification for radio disturbance and Immunity measuring apparatus and methods – Part 3: CISPR Technical reports*

CISPR 16-4-1:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-1: Uncertainties, statistics and limit modelling – Uncertainties in standardized EMC tests*

CISPR 16-4-2:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Measurement instrumentation uncertainties*

IEC 60050(161):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

International Vocabulary of Basic and General Terms in Metrology, International Organization for Standardization, Geneva, 2nd edition, 1993