

Specification for radio disturbance and immunity measuring apparatus and methods —

Part 2-2: Methods of measurement of disturbances and immunity — Measurement of disturbance power

The European Standard EN 55016-2-2:2004, with the incorporation of amendments A1:2005 and A2:2005, has the status of a British Standard

ICS 33.100.10; 33.100.20

National foreword

This British Standard is the official English language version of EN 55016-2-2:2004. It is identical with CISPR 16-2-2:2003, including amendments A1:2005 and A2:2005. Together with BS EN 55016-2-1:2004, BS EN 55016-2-3:2004 and BS EN 55016-2-4:2004 it supersedes BS CISPR 16-2:1996 which will be withdrawn on 2007-09-01.

The standards in the new BS EN 55016 series referred to above have been produced following the publication by CISPR of a new multi-part edition of CISPR 16 and constitute an editorial reorganisation of CISPR 16 without technical changes. This has resulted in the BS CISPR 16 series being replaced as follows:

BS CISPR 16-1:1999 replaced by BS EN 55016-1-1:2004,
BS EN 55016-1-2:2004, BS EN 55016-1-3:2004, BS EN 55016-1-4:2004
and BS EN 55016-1-5:2004.

BS CISPR 16-2:1996 replaced by BS EN 55016-2-1:2004,
BS EN 55016-2-2:2004, BS EN 55016-2-3:2004 and BS EN 55016-2-4:2004.

BS CISPR 16-3:2000 replaced by PD CISPR/TR 16-3:2003,
PD CISPR/TR 16-4-1:2003, PD CISPR/TR 16-4-3:2003 and
PD CISPR/TR 16-4-4:2003.

BS CISPR 16-4:2002 replaced by BS EN 55016-4-2:2004.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated in the text by **A1** **A1**.

The UK participation in its preparation was entrusted by Technical Committee GEL/210, EMC — Policy, to Subcommittee GEL/210/12, EMC — Basic and generic standards, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Summary of pages

This document comprises a front cover, an inside front cover, page i, a blank page, the EN title page, pages 2 to 45 and a back cover.

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Amendments issued since publication

Amd. No.	Date	Comments
15693 A1 and A2	March 2006	See national foreword

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 21 January 2005

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ISBN 0 580 45223 9

Cross-references

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**Specification for radio disturbance and immunity
measuring apparatus and methods
Part 2-2: Methods of measurement of disturbances and immunity –
Measurement of disturbance power
(CISPR 16-2-2:2003)
(including amendments A1:2005 and A2:2005)**

Spécifications des méthodes et des appareils de mesure
des perturbations radioélectriques et de l'immunité aux
perturbations radioélectriques
Partie 2-2: Méthodes de mesure des perturbations et de
l'immunité – Mesure de la puissance perturbatrice
(CISPR 16-2-2:2003)
(inclut les amendements A1:2005 et A2:2005)

Anforderungen an Geräte und Einrichtungen sowie
Festlegung der Verfahren zur Messung der
hochfrequenten Störaussendung (Funkstörungen) und
Störfestigkeit
Teil 2-2: Verfahren zur Messung der hochfrequenten
Störaussendung (Funkstörungen) und Störfestigkeit –
Messung der Störleistung
(CISPR 16-2-2:2003)
(enthält Änderungen A1:2005 und A2:2005)

This European Standard was approved by CENELEC on 2004-09-01. Amendment A1 was approved by CENELEC on 2004-12-01 and amendment A2 was approved by CENELEC on 2005-08-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard CISPR 16-2-2:2003, prepared by CISPR SC A, Radio-interference measurements and statistical methods, was submitted to the formal vote and was approved by CENELEC as EN 55016-2-2 on 2004-09-01 without any modification.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2005-09-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2007-09-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard CISPR 16-2-2:2003 was approved by CENELEC as a European Standard without any modification.

Foreword to amendment A1

The text of amendment 1:2004 to the International Standard CISPR 16-2-2:2003, prepared by CISPR SC A, Radio-interference measurements and statistical methods, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as amendment A1 to EN 55016-2-2:2004 on 2004-12-01 without any modification.

The following dates were fixed:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2005-12-01
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2007-12-01

Endorsement notice

The text of amendment 1:2004 to the International Standard CISPR 16-2-2:2003 was approved by CENELEC as an amendment to the European Standard without any modification.

Foreword to amendment A2

The text of document CISPR/A/583/FDIS, future amendment 2 to CISPR SC A, Radio-interference measurements and statistical methods, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 55016-2-2:2004 on 2005-08-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2006-05-01
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2008-08-01

Endorsement notice

The text of amendment 2:2005 to the International Standard CISPR 16-2-2:2003 was approved by CENELEC as an amendment to the European Standard without any modification.

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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.

Old CISPR 16 publications		New CISPR 16 publications	
CISPR 16-1	Radio disturbance and immunity measuring apparatus	CISPR 16-1-1	Measuring apparatus
		CISPR 16-1-2	Ancillary equipment – Conducted disturbances
		CISPR 16-1-3	Ancillary equipment – Disturbance power
		CISPR 16-1-4	Ancillary equipment – Radiated disturbances
		CISPR 16-1-5	Antenna calibration test sites for 30 MHz to 1 000 MHz
CISPR 16-2	Methods of measurement of disturbances and immunity	CISPR 16-2-1	Conducted disturbance measurements
		CISPR 16-2-2	Measurement of disturbance power
		CISPR 16-2-3	Radiated disturbance measurements
		CISPR 16-2-4	Immunity measurements
CISPR 16-3	Reports and recommendations of CISPR	CISPR 16-3	CISPR technical reports
		CISPR 16-4-1	Uncertainties in standardised EMC tests
		CISPR 16-4-2	Measurement instrumentation uncertainty
		CISPR 16-4-3	Statistical considerations in the determination of EMC compliance of mass-produced products
CISPR 16-4	Uncertainty in EMC measurements	CISPR 16-4-4	Statistics of complaints and a model for the calculation of limits

More specific information on the relation between the 'old' CISPR 16-2 and the present 'new' CISPR 16-2-2 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 16-2 consists of the following parts, under the general title *Specification for radio disturbance and immunity measuring apparatus and methods – Methods of measurement of disturbances and immunity*:

- Part 2-1: Conducted disturbance measurements,
- Part 2-2: Measurement of disturbance power,
- Part 2-3: Radiated disturbance measurements,
- Part 2-4: Immunity measurements.

TABLE RECAPITULATING CROSS-REFERENCES

Second edition of CISPR 16-2
Clauses, subclauses

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First edition of CISPR 16-2-2
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SPECIFICATION FOR RADIO DISTURBANCE AND IMMUNITY MEASURING APPARATUS AND METHODS –

Part 2-2: Methods of measurement of disturbances and immunity – Measurement of disturbance power

1 Scope

This part of CISPR 16 is designated a basic standard, which specifies the methods of measurement of disturbance power using the absorbing clamp in the frequency range 30 MHz to 1 000 MHz.

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 13:2001, *Sound and television broadcast receivers and associated equipment – Radio disturbance characteristics – Limits and methods of measurement*

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 16-1-3:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-3: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Disturbance power*

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

CISPR 16-2-3:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements*

CISPR 16-2-4: 2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Immunity 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*

CISPR 16-4-3:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-3: Uncertainties, statistics and limit modelling – Statistical considerations in the determination of EMC compliance of mass-produced products*

ITU-R Recommendation BS.468-4: *Measurement of audio-frequency noise voltage level in sound broadcasting*

3 Terms and definitions

For the purpose of this part of CISPR 16, the definitions of IEC 60050(161) apply, as well as the following:

3.1

associated equipment

- 1) Transducers (e.g. probes, networks and antennas) connected to a measuring receiver or test generator
- 2) Transducers (e.g. probes, networks, antennas) which are used in the signal or disturbance transfer between an EUT and measuring equipment or a (test-) signal generator

3.2

EUT

the equipment (devices, appliances and systems) subjected to EMC (emission) compliance tests

3.3

product publication

publication specifying EMC requirements for a product or product family, taking into account specific aspects of such a product or product family

3.4

emission limit (from a disturbing source)

the specified maximum emission level of a source of electromagnetic disturbance

[IEV 161-03-12]

3.5

ground reference

a connection that constitutes a defined parasitic capacitance to the surrounding of an EUT and serves as reference potential

NOTE See also IEV 161-04-36.

3.6

(electromagnetic) emission

the phenomenon by which electromagnetic energy emanates from a source

[IEV 161-01-08]

3.7

coaxial cable

a cable containing one or more coaxial lines, typically used for a matched connection of associated equipment to the measuring equipment or (test-)signal generator providing a specified characteristic impedance and a specified maximum allowable cable transfer impedance

3.8

common mode (asymmetrical disturbance voltage)

the RF voltage between the artificial midpoint of a two-conductor line and reference ground, or in case of a bundle of lines, the effective RF disturbance voltage of the whole bundle (vector sum of the unsymmetrical voltages) against the reference ground measured with a clamp (current transformer) at a defined terminating impedance

NOTE See also IEV 161-04-09.

3.9

common mode current

the vector sum of the currents flowing through two or more conductors at a specified cross-section of a "mathematical" plane intersected by these conductors

3.10

measuring receiver

a receiver for the measurement of disturbances with different detectors

NOTE The receiver is specified according to CISPR 16-1-1.

3.11

test configuration

gives the specified measurement arrangement of the EUT in which an emission level is measured

NOTE The emission level is measured as required by IEV 161-03-11, IEV 161-03-12, IEV 161-03-14 and IEV 161-03-15, definitions of emission level.

3.12

weighting (quasi-peak detection)

the repetition-rate dependent conversion of the peak-detected pulse voltages to an indication corresponding to the psychophysical annoyance of pulsive disturbances (acoustically or visually) according to the weighting characteristics, or alternatively gives the specified manner in which an emission level or an immunity level is evaluated

NOTE 1 The weighting characteristics are specified in CISPR 16-1-1.

NOTE 2 The emission level or immunity level is evaluated as required by IEC 60050(161) definitions of level (see IEV 161-03-01, IEV 161-03-11 and IEV 161-03-14).

3.13

continuous disturbance

RF disturbance with a duration of more than 200 ms at the IF-output of a measuring receiver, which causes a deflection on the meter of a measuring receiver in quasi-peak detection mode which does not decrease immediately

[IEV 161-02-11, modified]

NOTE The measuring receiver is specified in CISPR 16-1-1.

3.14

discontinuous disturbance

for counted clicks, disturbance with a duration of less than 200 ms at the IF-output of a measuring receiver, which causes a transient deflection on the meter of a measuring receiver in quasi-peak detection mode

NOTE 1 For impulsive disturbance, see IEV 161-02-08.

NOTE 2 The measuring receiver is specified in CISPR 16-1-1.

3.15

measurement time

T_m

the effective, coherent time for a measurement result at a single frequency (in some areas also called dwell time)

- for the peak detector, the effective time to detect the maximum of the signal envelope,
- for the quasi-peak detector, the effective time to measure the maximum of the weighted envelope
- for the average detector, the effective time to average the signal envelope
- for the r.m.s. detector, the effective time to determine the r.m.s. of the signal envelope

3.16

sweep

a continuous frequency variation over a given frequency span

3.17

scan

a continuous or stepped frequency variation over a given frequency span

3.18

sweep or scan time

T_s

the time between start and stop frequencies of a sweep or scan

3.19

span

Δf

difference between stop and start frequencies of a sweep or scan

3.20

sweep or scan rate

the frequency span divided by the sweep or scan time

3.21

number of sweeps per time unit (e.g. per second)

n_s

1/(sweep time + retrace time)

3.22

observation time

T_o

the sum of measurement times T_m on a certain frequency in case of multiple sweeps. If n is the number of sweeps or scans, then $T_o = n \times T_m$

3.23

total observation time

T_{tot}

the effective time for an overview of the spectrum (either single or multiple sweeps). If c is the number of channels within a scan or sweep, then $T_{tot} = c \times n \times T_m$

A1 3.24

lead under test

LUT

lead, associated with a EUT, that is the subject of an emission or an immunity test

NOTE In general, a EUT may have one or more leads that are used for interconnections to the mains supply, or other networks, or for interconnection to auxiliary equipment. These leads are generally electrical cables such as mains cables, coaxial cables, data bus cables, etc.

3.25

absorbing clamp measurement method

ACMM

method for measurement of disturbance power of an equipment under test (EUT) by using an absorbing clamp device that is clamped around the lead(s) of the EUT

3.26

absorbing clamp test site

ACTS

test site that is validated to perform disturbance power measurements by using the absorbing clamp measurement method (ACMM)

3.27

clamp factor

CF

ratio of the disturbance power of an EUT to the received voltage at the output of the absorbing clamp

NOTE The clamp factor is a transducer factor of the absorbing clamp.

3.28

clamp reference point

CRP

indication on the outside of the absorbing clamp that is related to the longitudinal position of the front edge of the current transformer within the clamp and is used to define the horizontal position of the clamp during the measurement

3.29

slide reference point

SRP

end of the clamp slide where the EUT is located and which is used to define the horizontal distance to the clamp reference point (CRP) of the absorbing clamp during the measurement procedure **A1**