BS EN 55022:2010
Incorporating corrigendum October 2011



BSI Standards Publication

Information technology equipment — Radio disturbance characteristics — Limits and methods of measurement

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The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by ⟦C⟩ ⟨C⟧.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by CENELEC corrigendum October 2011 is indicated in the text by ⟦AC1⟩ ⟨AC1⟧.

The UK participation in its preparation was entrusted by Technical Committee GEL/210, EMC - Policy committee, to Subcommittee GEL/210/11, EMC product standards.

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

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Supersedes EN 55022:2006 + A1:2007 + A2:2010
Incorporating corrigendum October 2011

English version

Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

(CISPR 22:2008, modified)

Appareils de traitement de l'information - Caractéristiques des perturbations radioélectriques - Limites et méthodes de mesure (CISPR 22:2008, modifiée)

Einrichtungen der Informationstechnik - Funkstöreigenschaften - Grenzwerte und Messverfahren (CISPR 22:2008, modifiziert)

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CENELEC

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

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Foreword

The text of the International Standard CISPR 22:2008, prepared by CISPR SC I, "Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers", together with common modifications prepared by the Technical Committee CENELEC TC 210, "Electromagnetic compatibility (EMC)", was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 55022 on 2010-12-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 55022:2006 + A1:2007 + FprA2:2009.

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)	2011-12-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-12-01

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directives 2004/108/EC and 1999/5/EC. See Annex ZZ.

Annexes ZA and ZZ have been added by CENELEC.

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Endorsement notice

The text of the International Standard CISPR 22:2008 was approved by CENELEC as a European Standard with agreed common modifications as given below.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC/TR 60083	2006	Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC	-	-
IEC 61000-4-6 + A1 + A2	2003 2004 2006	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6 + corr. August [1) 2)]	2007 2007
CISPR 11 (mod) + A1	2003 2004	Industrial scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement	EN 55011[3)]	2007
CISPR 13 (mod) + A1 + A2	2001 2003 2006	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55013 + A1 + A2	2001 2003 2006
CISPR 16-1-1 + A1	- 	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus	EN 55016-1-1 + A1	-
CISPR 16-1-2 + A1 + A2 + corr. January	2003 2004 2006 2009	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances	EN 55016-1-2 + A1 + A2	2004 2005 2006
CISPR 16-1-4	-	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Radiated disturbances	EN 55016-1-4	-
CISPR 16-2-3 + A1 + A2	2003 2005 2005	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements	EN 55016-2-3 + A1 + A2	2004 2005 2005
CISPR 16-4-2	2003	Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Uncertainty in EMC measurements	EN 55016-4-2	2004

[1)] EN 61000-4-6 includes A1 + A2 to IEC 61000-4-6.

[2)] EN 61000-4-6 is superseded by EN 61000-4-6:2009, which is based on IEC 61000-4-6:2008.

[3)] EN 55011 includes A1 to CISPR 11 (mod).

Annex ZZ
(informative)

Coverage of Essential Requirements of EC Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers essential requirements as given in Annex I Article 1(a) of the EC Directive 2004/108/EC, and essential requirements of Article 3.1(b) (emission only) of the EC Directive 1999/5/EC.

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directives concerned.

WARNING: Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard.

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SC CIS/I/Publication CISPR 22 (2008), Sixth edition/I-SH 01

INFORMATION TECHNOLOGY EQUIPMENT – RADIO DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT

INTERPRETATION SHEET 1

This interpretation sheet has been prepared by CISPR subcommittee I: Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers, of IEC technical committee CISPR: International special committee on radio interference.

The text of this interpretation sheet is based on the following documents:

ISH	Report on voting
CISPR/I/299/ISH	CISPR/I/312/RVD

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

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Introduction:

At the CISPR SC I plenary, held on the 27th October 2007, a decision was taken to set the maintenance date for CISPR 22, Edition 6 to 2012. As a result the work identified within CISPR/I/279/MCR will not be started for the time being. At the subsequent meeting of CISPR SC I WG3 it was decided that certain items within the MCR would benefit now from further clarification and an interpretation sheet would be helpful to users of the standard, with the intent of including this information in a future amendment to the standard.

This information does not change the standard; it serves only to clarify the points noted.

CISPR SC I WG3 hopes that these clarifications will be of use to users and especially laboratories testing to CISPR 22, Edition 6.0. The document is based on the comments received on CISPR/I/290/DC.

Interpretation:

1. Selection of Average detector

CISPR 22 defines limits for radiated emissions at frequencies between 1 GHz and 6 GHz with respect to both average and peak detectors. CISPR 16-1-1 defines two types of Average detector for use above 1 GHz. For the limits given in CISPR 22 the appropriate average detector is the linear average detector defined in 6.4.1 of CISPR 16-1-1:2006 with its Amendments 1:2006 and 2:2007.

2. Measurement of conducted emissions on cabinets containing multiple items of equipment

Where the EUT is a cabinet or rack that contains multiple items of equipment that are powered from an AC power distribution strip and where the AC power distribution strip is an integral part of the EUT as declared by the manufacturer, the AC power line conducted emissions should be measured on the input cable of power distribution strip that leaves the cabinet or rack, not the power cables from the individual items of equipment. This is consistent with the requirements in 9.5.1 paragraph 1 and sub paragraph c).

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October 2009 ICS 33.100.10

SC CIS I/Publication CISPR 22:2008, Sixth edition/I-SH 02

INFORMATION TECHNOLOGY EQUIPMENT – RADIO DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT

INTERPRETATION SHEET 2

This interpretation sheet has been prepared by CISPR subcommittee I: Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers, of IEC technical committee CISPR: International special committee on radio interference.

The text of this interpretation sheet is based on the following documents:

ISH	Report on voting
CISPR/I//323/ISH	CISPR/I/326/RVD

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

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Introduction

At the CISPR SC I plenary, held on the 27th October 2007, a decision was taken to set the maintenance date for CISPR 22, Edition 6 to 2012. As a result the work identified within CISPR/I/279/MCR will not be started for the time being. At the subsequent meeting of CISPR SC I WG3 it was decided that 3 items within the MCR would benefit now from further clarification and an interpretation sheet would be helpful to users of the standard, with the intent of including this information in a future amendment to the standard.

The first draft of an interpretation sheet CISPR/I/290/DC addressed the 3 items, however it was clear from the comments received (CISPR/I/293A/INF) that further work was required on the 3rd item related to ISN selection, and it was decided that this would be the subject of a separate document.

This information does not change the standard; it serves only to clarify the points noted.

CISPR SC I WG3 hopes that these clarifications will be of use to users and especially laboratories testing to CISPR 22:2008 (Edition 6.0).

Selection of ISN for unscreened balanced multi-pair cables

Subclause 9.6.3.1 of CISPR 22 states that:

> *"When disturbance voltage measurements are performed on a single unscreened balanced pair, an adequate ISN for two wires shall be used; when performed on unscreened cables containing two balanced pairs, an adequate ISN for four wires shall be used; when performed on unscreened cables containing four balanced pairs, an adequate ISN for eight wires shall be used (see Annex D)"*

Therefore the selection of ISN is based on the number of pairs physically in the cable, not the number of pairs actually used by the interface in question.

However, selection of a suitable ISN design from the examples given in Annex D requires further consideration. The ISN designs given in Figures D.4 to D.7 are only appropriate for use where all of the balanced pairs in the cable are ‘active’ and hence their use requires a more detailed knowledge of the EUT port being tested. The ISN designs given in Figures D.1 to D.3 have no such limitation and are better suited to applications where the actual use of the pairs is unknown.

The ISN designs given in Figures D.2 and D.3 are also suitable for measurements on unscreened cables containing fewer balanced pairs than the maximum number of pairs the ISN is designed for (see example 2).

The following definitions have been developed to help in determining what should be considered an ‘active’ pair of conductors:

> An **active pair** is a pair of conductors that completes an active digital, analogue, or power circuit, or is terminated in a defined impedance, or is connected to earth or the equipment frame/chassis.
>
> NOTE These circuits include such applications as "Power over Ethernet".
>
> A circuit is an a**ctive circuit** when it is in a state that is performing its intended function, which may include communications, voltage/current sensing, impedance matching or power supply.
>
> NOTE A conductor with no intended function is not part of an active circuit.

A measurement using an ISN described in Figures D.4 to D.7, when not all of the pairs are ‘active’, may result in a significant error in the measured emissions. It is therefore important that test laboratories determine on which of the designs given in the annexes their particular ISNs are based. From this they can then determine if they need to establish the number of ‘active’ pairs within the cable or not and then whether their ISNs are suitable for the port being measured or whether an alternative measurement technique needs to be used.

This is applicable when measuring in accordance with 9.6.3.1 or 9.6.3.2.

It is recommended that test reports should make reference to:

- the ISN category used;
- the Annex D figure corresponding to their particular ISN design;
- the total number of pairs in the cable and number of these that where active.

Example 1:

The EUT has an Ethernet port to which either a CAT 5 or 6 cable is connected. Typically these cables have four pairs requiring use of a four pair ISN. Transmission using 1000Base-T Ethernet protocol uses all four pairs of a typical cable. Transmission using 10Base-T and 100 Base-T Ethernet protocol uses only two of the four pairs for communication. One of the following ISNs could therefore be used:

1) ISN as shown in Figure D.3, or
2) ISN as shown in Figures D.6 or D.7 if it is known that all the pairs within the cable are ‘active’. This would be the case if a 1000BaseT Ethernet protocol were being used. These ISNs would also be suitable for 10BaseT or 100BaseT protocol if the unused pairs have controlled terminations in the EUT port by design, making all pairs ‘active’ from an EMC perspective.

Should an EUT with an Ethernet port be provided with a cable that contains only 2 pairs within it, then any of the following types of ISN could be used: D2, D3, D4 or D5.

Example 2:

The EUT has a single ADSL port and is provided with a cable containing 2 pairs. ADSL is a single pair system so only 1 pair is active. The following ISNs could be used:

1) ISN as shown in Figure D.2 or D.3.

Cable length between ISN and EUT when measuring telecommunication ports

Subclause 9.5.1 of CISPR 22 requires that the distance between the ISN and the EUT be nominally 0.8m and also clause 9.5.2 states that:

> *"Signal cables shall be positioned for their entire lengths, as far as possible, at a nominal distance of 0,4 m from the ground reference plane (using a non-conductive fixture, if necessary)."*

No other requirement is given on the actual length of the cable to be used.

Measurements have shown that non-inductive bundling of any excess cable can result in slightly higher emission levels measured at the ISN.

It is therefore recommended that the cable between the telecommunication port and the ISN should be kept as short as possible, in order to avoid the need to bundle any excess, while maintaining the requirements given in 9.5.1 and 9.5.2.

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INTRODUCTION

The scope is extended to the whole radio-frequency range from 9 kHz to 400 GHz, but limits are formulated only in restricted frequency bands, which is considered sufficient to reach adequate emission levels to protect radio broadcast and telecommunication services, and to allow other apparatus to operate as intended at reasonable distance.

INFORMATION TECHNOLOGY EQUIPMENT – RADIO DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT

1 Scope and object

This International Standard applies to ITE as defined in 3.1.

Procedures are given for the measurement of the levels of spurious signals generated by the ITE and limits are specified for the frequency range 9 kHz to 400 GHz for both class A and class B equipment. No measurements need be performed at frequencies where no limits are specified.

The intention of this publication is to establish uniform requirements for the radio disturbance level of the equipment contained in the scope, to fix limits of disturbance, to describe methods of measurement and to standardize operating conditions and interpretation of results.

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.

IEC 60083:2006, *Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC*

IEC 61000-4-6:2003, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*[1]
Amendment 1 (2004)
Amendment 2 (2006)

CISPR 11:2003, *Industrial, scientific, and medical (ISM) radio-frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement*[2]
Amendment 1 (2004)

CISPR 13:2001, *Sound and television broadcast receivers and associated equipment – Radio disturbance characteristics – Limits and methods of measurement*[3]
Amendment 1 (2003)
Amendment 2 (2006)

CISPR 16-1-1:2006, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*[4]
Amendment 1 (2006)
Amendment 2 (2007)

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1 There exists a consolidated edition 2.2 (2006) including edition 2.0, its Amendment 1 (2004) and its Amendment 2 (2006).

2 There exists a consolidated edition 4.1 (2004) including edition 4.0 and its Amendment 1 (2004).

3 There exists a consolidated edition 4.2 (2006) including edition 4.0, its Amendment 1 (2003) and its Amendment 2 (2006).

4 There exists a consolidated edition 2.2 (2007) including edition 2.0, its Amendment 1 (2006) and its Amendment 2 (2007).