

Specification for radio disturbance and immunity measuring apparatus and methods —

Part 4: Uncertainty in EMC measurements

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National foreword

This British Standard reproduces verbatim CISPR 16-4:2002 and implements it as the UK national standard.

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

- aid enquirers to understand the text;
- 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.

Cross-references

The British Standards which implement international publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online

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This British Standard, having been prepared under the direction of the Electrotechnical Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 15 August 2002

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**Spécifications des méthodes et des appareils
de mesure des perturbations radioélectriques et
de l'immunité aux perturbations radioélectriques –**

**Partie 4:
Incertitudes de mesure CEM**

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

**Part 4:
Uncertainty in EMC measurements**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION
INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

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

Part 4: Uncertainty in EMC measurements

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard CISPR 16-4 has been prepared by CISPR, subcommittee A: Radio-interference measurements and statistical methods.

The text of this standard is based on the following documents:

FDIS	Report on voting
CISPR/A/355/FDIS	CISPR/A/377/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

Annex A is for information only.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

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

SPECIFICATION FOR RADIO DISTURBANCE AND IMMUNITY MEASURING APPARATUS AND METHODS –

Part 4: Uncertainty in EMC measurements

1 Scope

This part of CISPR 16 is designated a basic standard, which specifies the manner in which measurement uncertainty is to be taken in to account in determining compliance with CISPR limits. The material is also relevant to any EMC test when interpretation of the results and conclusions reached will be impacted by the uncertainty of the instrumentation used during the testing. Annex A contains the background material used in providing the amount of measurement uncertainty found in generating the CISPR values shown in Clause 4 and hence provides valuable background material for those needing both initial and further information on measurement uncertainty and how to take into account individual uncertainties in the measurement chain. The annex however is not intended to be a tutorial of user manual or to be copied when making uncertainty calculations. For that, the references shown in the bibliography should be used.

Measurement instrumentation specifications are given in CISPR 16-1, while the methods of measurement are covered in CISPR 16-2. Further information on radio disturbance and other uncertainty considerations are given in CISPR 16-3.

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 16-1:1999, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1: Radio disturbance and immunity measuring apparatus*

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

CISPR 16-3, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 3: Reports and recommendations of CISPR*

3 Definitions and symbols

For the purpose of this part of CISPR 16, the following symbols apply.

NOTE General uncertainty terms and definitions used in uncertainty are contained in bibliography reference [2]. General definitions are contained in bibliography reference [1]. These definitions will not be repeated here.

3.1 General symbols

X_i	input quantity
x_i	estimate of X_i
$u(x_i)$	standard uncertainty of x_i
c_i	sensitivity coefficient
y	result of a measurement, (the estimate of the measurand), corrected for all recognised significant systematic effects
$u_c(y)$	(combined) standard uncertainty of y
k	coverage factor
U	expanded uncertainty of y

3.2 Measurands

V	Voltage, in dB(μ V)
P	Disturbance power, in dB(pW)
E	Electric field strength, in dB(μ V/m)

3.3 Input quantities

V_r	Receiver voltage reading, in dB(μ V)
L_c	Attenuation of the connection between the receiver and the artificial mains network, absorbing clamp or antenna, in dB
L_{amn}	Voltage division factor of the AMN, in dB
L_{ac}	Insertion loss of the absorbing clamp, in dB
AF	Antenna factor, in dB(/m)
δV_{sw}	Correction for receiver sine wave voltage inaccuracy, in dB
δV_{pa}	Correction for imperfect receiver pulse amplitude response, in dB
δV_{pr}	Correction for imperfect receiver pulse repetition rate response, in dB
δV_{nf}	Correction for the effect of the receiver noise floor, in dB
δM	Correction for the error caused by mismatch, in dB
δMD	Correction for the error caused by mains disturbances, in dB
δZ	Correction for imperfect AMN impedance, in dB
δE	Correction for the effect of the environment, in dB
δAF_f	Correction for antenna factor interpolation error, in dB
δAF_h	Correction for the difference between the antenna factor variation with height, and the variation with height of the antenna factor of a reference dipole, in dB
δA_{dir}	Correction for antenna directivity, in dB
δA_{ph}	Correction for antenna phase centre location, in dB
δA_{cp}	Correction for antenna cross-polarisation response, in dB
δA_{bal}	Correction for antenna unbalance, in dB
δSA	Correction for imperfect site attenuation, in dB
δd	Correction for imperfect antenna distance, in dB
δh	Correction for imperfect table height above ground plane, in dB