

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE  
COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES

BASIC EMC PUBLICATION  
PUBLICATION FONDAMENTALE EN CEM

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

**Spécifications des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques –  
Partie 2-3: Méthodes de mesure des perturbations et de l'immunité –  
Mesures des perturbations rayonnées**



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Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
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INTERNATIONAL ELECTROTECHNICAL COMMISSION  
INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

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

**Part 2-3: Methods of measurement of disturbances and immunity –  
Radiated disturbance measurements**

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**The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience. A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.**

International Standard CISPR 16-2-3 has been prepared by CISPR subcommittee A: Radio-interference measurements and statistical methods.

This edition includes the following significant technical changes with respect to the previous edition: addition of the measurand for radiated emissions measurements in an OATS and a SAC in the range of 30 MHz to 1 000 MHz, and addition of a new normative annex on the determination of suitability of spectrum analysers for compliance tests. Also, numerous maintenance items are addressed to make the standard current with respect to other parts of the CISPR 16 series.

It has the status of a basic EMC publication in accordance with IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications*.

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

A list of all parts of the CISPR 16 series, published under the general title *Specification for radio disturbance and immunity measuring apparatus and methods*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability 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

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## INTRODUCTION (to amendment 1)

The recent addition of FFT-based measuring instrumentation in CISPR 16-1-1 necessitates the addition of related specifications for the test methods covered in CISPR 16-2-3. Those new specifications are introduced in this amendment.

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

## Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements

### 1 Scope

This part of CISPR 16 specifies the methods of measurement of radiated disturbance phenomena in the frequency range of 9 kHz to 18 GHz. The aspects of measurement uncertainty are specified in CISPR 16-4-1 and CISPR 16-4-2.

NOTE In accordance with IEC Guide 107, CISPR 16-2-3 is a basic EMC publication for use by product committees of the IEC. As stated in Guide 107, product committees are responsible for determining the applicability of the EMC standard. CISPR and its sub-committees are prepared to co-operate with product committees in the evaluation of the value of particular EMC tests for specific products.

### 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 14-1:2005, *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission*

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

CISPR 16-1-2:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted disturbances*  
Amendment 1 (2004)  
Amendment 2 (2006)

CISPR 16-1-4:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Radiated disturbances*

CISPR 16-2-1:2008, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*

CISPR 16-4-1, *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, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements*

CISPR 16-4-5, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-5: Uncertainties, statistics and limit modelling – Conditions for the use of alternative test methods*

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

Amendment 1 (1997)

Amendment 2 (1998)

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*  
Amendment 1 (2007)

IEC 61000-4-20, *Electromagnetic compatibility (EMC) – Part 4-20: Testing and measurement techniques – Emission and immunity testing in transverse electromagnetic (TEM) waveguides*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-161, as well as the following apply.

#### 3.1

##### **absorber-lined OATS/SAC**

OATS or SAC with ground plane partially covered by RF-energy absorbing material

#### 3.2

##### **ancillary equipment**

transducers (e.g. current and voltage probes and artificial networks) connected to a measuring receiver or (test) signal generator and used in the disturbance signal transfer between the EUT and the measuring or test equipment

#### 3.3

##### **antenna beam**

main lobe of the antenna pattern (gain pattern) of the receive antenna (usually the direction with maximum sensitivity or lowest antenna factor) that is directed towards the EUT

#### 3.4

##### **antenna beamwidth**

angle between the half-power (3 dB) points of the main lobe of the antenna beam, when referenced to the maximum power of the main lobe. It may be expressed for the *H* plane or for the *E* plane of the antenna

NOTE Antenna beamwidth is expressed in degrees.

#### 3.5

##### **associated equipment**

##### **AE**

apparatus, that is not part of the system under test, but needed to help exercise the EUT

#### 3.6

##### **auxiliary equipment**

##### **AuxEq**

peripheral equipment that is part of the system under test

#### 3.7

##### **basic standard**

standard that has a wide-ranging coverage or contains general provisions for one particular field

NOTE A basic standard may function as a standard for direct application or as a basis for other standards.

[ISO/IEC Guide 2, definition 5.1]

### 3.8

#### **coaxial cable**

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

### 3.9

#### **common-mode absorption device**

##### **CMAD**

device that may be applied on cables leaving the test volume in radiated emission measurements to reduce the compliance uncertainty

[CISPR 16-1-4, 3.1.4]

### 3.10

#### **conformity assessment**

demonstration that specified requirements relating to a product, process, system, person or body are fulfilled

NOTE The subject field of conformity assessment includes activities defined elsewhere in ISO/IEC 17000:2004, such as testing, inspection and certification, as well as the accreditation of conformity assessment bodies.

[ISO/IEC 17000:2004, 2.1, modified]

### 3.11

#### **continuous disturbance**

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

[IEC 60050-161:1990, 161-02-11, modified]

### 3.12

#### **(electromagnetic) emission**

phenomenon by that electromagnetic energy emanates from a source

[IEC 60050-161:1990, 161-01-08]

### 3.13

#### **emission limit** (from a disturbing source)

specified maximum emission level of a source of electromagnetic disturbance

[IEC 60050-161:1990, 161-03-12]

### 3.14

#### **equipment-under-test**

##### **EUT**

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

### 3.15

#### **fully-anechoic room**

##### **FAR**

shielded enclosure, the internal surfaces of which are lined with radio-frequency-energy absorbing material (i.e. RF absorber) that absorbs electromagnetic energy in the frequency range of interest

**3.16****loop-antenna system****LAS**

antenna system consisting of three orthogonally-oriented loop antennas that are used to measure the three orthogonal magnetic dipole moments of an EUT located in the centre of the three loops

**3.17****measurement, scan and sweep times****3.17.1****measurement time** $T_m$ 

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 rms detector, the effective time to determine the rms of the signal envelope

**3.17.2****scan**

continuous or stepped frequency variation over a given frequency span

**3.17.3****span** $\Delta f$ 

difference between stop and start frequencies of a sweep or scan

**3.17.4****sweep**

continuous frequency variation over a given frequency span

**3.17.5****sweep or scan rate**

frequency span divided by the sweep or scan time

**3.17.6****sweep or scan time** $T_s$ 

time between start and stop frequencies of a sweep or scan

**3.17.7****observation time** $T_o$ 

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  $T_o = n \times T_m$

**3.17.8****total observation time** $T_{tot}$ 

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  $T_{tot} = c \times n \times T_m$