

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



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COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES

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## iTeh STANDARD PREVIEW (standards.iteh.ai)

Specification for radio disturbance and immunity measuring apparatus and methods –  
[CISPR 16-2-3:2016](https://standards.iteh.ai/catalog/standards/sist/645f733a-84a9-4ec8-988b-711852c118da/cispr-16-2-3-2016)

[Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements](https://standards.iteh.ai/catalog/standards/sist/645f733a-84a9-4ec8-988b-711852c118da/cispr-16-2-3-2016)

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 – Mesurages des perturbations rayonnées



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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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This edition includes the following significant technical change with respect to the previous edition: addition of content on correction of the electric field strength to account for phase centre of log-periodic dipole array antennas.

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*.

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

|                    |                  |
|--------------------|------------------|
| FDIS               | Report on voting |
| CISPR/A/1176A/FDIS | CISPR/A/1182/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 2.

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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 [13]<sup>1</sup>, 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 subcommittees 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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CISPR 14-1:2016, *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 16-1-2:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Coupling devices for conducted disturbance measurements*

CISPR 16-1-4:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements*  
CISPR 16-1-4:2010/AMD1:2012

CISPR 16-2-1:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*

CISPR TR 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 – Measurement instrumentation uncertainty*

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<sup>1</sup> Numbers in square brackets refer to the Bibliography.

CISPR TR 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, *International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility*

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

IEC 61000-4-3:2006/AMD1:2007

IEC 61000-4-3:2006/AMD2:2010

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, definitions and abbreviations

#### 3.1 Terms and definitions

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

##### 3.1.1

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

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

##### 3.1.2

##### **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

##### 3.1.3

##### **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

##### 3.1.4

##### **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

Note 1 to entry: It may be expressed for the *H* plane or for the *E* plane of the antenna.

Note 2 to entry: Antenna beamwidth is expressed in degrees.

##### 3.1.5

##### **associated equipment**

##### **AE**

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

Note 1 to entry: This note applies to the French language only.

##### 3.1.6

##### **auxiliary equipment**

##### **AuxEq**

peripheral equipment that is part of the system under test

Note 1 to entry: This note applies to the French language only.

### 3.1.7

#### **basic standard**

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

Note 1 to entry: A basic standard may function as a standard for direct application or as a basis for other standards.

[SOURCE: ISO/IEC Guide 2:1991, definition 5.1 [6]]

### 3.1.8

#### **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

### 3.1.9

#### **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

Note 1 to entry: This note applies to the French language only.

[SOURCE: CISPR 16-1-4:2010, 3.1.4]

### 3.1.10

#### **conformity assessment**

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

Note 1 to entry: The subject field of conformity assessment includes activities defined elsewhere in ISO/IEC 17000:2004 [7], such as testing, inspection and certification, as well as the accreditation of conformity assessment bodies.

[SOURCE: ISO/IEC 17000:2004, 2.1, modified – Note 2 has been deleted.]

### 3.1.11

#### **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

[SOURCE: IEC 60050-161:1990, 161-02-11, modified – The definition has been changed.]

### 3.1.12

#### **emission**

<electromagnetic> phenomenon by which electromagnetic energy emanates from a source

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

### 3.1.13

#### **emission limit**

<from a disturbing source> specified maximum emission level of a source of electromagnetic disturbance

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

### 3.1.14

#### **equipment under test**

#### **EUT**

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

Note 1 to entry: This note applies to the French language only.

### 3.1.15

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

#### **FAR**

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

Note 1 to entry: This note applies to the French language only.

### 3.1.16

#### **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

Note 1 to entry: This note applies to the French language only.

### 3.1.17

#### **measurement, scan and sweep times**

#### 3.1.17.1

#### **measurement time**

$T_m$

effective, coherent time for a measurement result at a single frequency

- 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

Note 1 to entry: In some areas "measurement time" is also called dwell time.

#### 3.1.17.2

#### **scan**

continuous or stepped frequency variation over a given frequency span

#### 3.1.17.3

#### **span**

$\Delta f$

difference between stop and start frequencies of a sweep or scan

#### 3.1.17.4

#### **sweep**

continuous frequency variation over a given frequency span

#### 3.1.17.5

#### **sweep or scan rate**

frequency span divided by the sweep or scan time

**3.1.17.6****sweep or scan time** $T_s$ 

time between start and stop frequencies of a sweep or scan

**3.1.17.7****observation time** $T_o$ sum of measurement times  $T_m$  on a certain frequency in case of multiple sweepsNote 1 to entry: If  $n$  is the number of sweeps or scans, then  $T_o = n \times T_m$ .**3.1.17.8****total observation time** $T_{tot}$ 

effective time for an overview of the spectrum (either single or multiple sweeps)

Note 1 to entry: If  $c$  is the number of channels within a scan or sweep, then  $T_{tot} = c \times n \times T_m$ .**3.1.18****measuring receiver**

instrument such as a tunable voltmeter, an EMI receiver, a spectrum analyzer or an FFT-based measuring instrument, with or without preselection, that complies with CISPR 16-1-1

**3.1.19****number of sweeps per time unit** $n_s$ reciprocal of the sum of sweep time and retrace time, i.e.  $1/(\text{sweep time} + \text{retrace time})$ Note 1 to entry: Sweeps per second, for example, [CISPR 16-2-3:2016](https://standards.iteh.ai/catalog/standards/sist/645f733a-84a9-4ec8-988b-7f1852e118da/cispr-16-2-3-2016)<https://standards.iteh.ai/catalog/standards/sist/645f733a-84a9-4ec8-988b-7f1852e118da/cispr-16-2-3-2016>**3.1.20****open-area test site****OATS**

facility for measurements and calibrations in which the ground reflection is made reproducible by a large flat electrically conducting ground plane

Note 1 to entry: An OATS can be used for radiated disturbance measurements, where it is also designated as a COMTS. An OATS can also be used for antenna calibrations, where it is designated as a CALTS.

Note 2 to entry: An OATS is an uncovered outdoor site, and is far enough away from buildings, electric lines, fences, trees, underground cables, pipelines, and other potentially reflective objects, so that the effects due to such objects are negligible. See CISPR 16-1-4 for guidance on the construction of an OATS.

Note 3 to entry: This note applies to the French language only.

**3.1.21****product standard**

standard that specifies requirements to be fulfilled by a product or group of products, to establish its fitness for purpose

Note 1 to entry: A product standard may include, in addition to the fitness for purpose requirements, directly or by reference, aspects such as terminology, sampling, testing, packaging and labelling and, sometimes, processing requirements.

Note 2 to entry: A product standard can either be complete or not, according to whether it specifies all or only a part of the necessary requirements. In this respect, one may differentiate between standards such as dimensional, material and technical delivery standards.

[SOURCE: ISO/IEC Guide 2:2004, definition 5.4 [6]]