BS EN 55016-1-4:2010+A2:2017



BSI Standards Publication

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/A2:2017)

bsi.

National foreword

This British Standard is the UK implementation of EN 55016-1-4:2010+A2:2017. It is identical to CISPR 16-1-4:2010, incorporating amendment A1:2012, corrigendum December 2010 and including amendment A2:2017. It supersedes BS EN 55016-1-4:2010 +A1:2012, which will be withdrawn on 23 February 2020.

The start and finish of text introduced or altered by CISPR amendment 1 is indicated in the text by tags.

The text of CISPR amendment A2:2017 has been provided in its entirety at the beginning of this document. BSI's policy of providing consolidated content remains unchanged; however, in the interest of expediency, in this instance BSI have chosen to collate the relevant content at the beginning of this document.

The UK participation in its preparation was entrusted to Technical Committee GEL/210/11, EMC - Standards Committee.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2010.

Amendments/corrigenda issued since publication

Date	Text affected
30 June 2011	Implementation of CISPR corrigendum December 2010: Modification to equation B.2
30 April 2013	Implementation of CISPR amendment 1:2012 with CENELEC endorsement A1:2012
30 April 2018	Implementation of CISPR amendment A2:2017 with CENELEC endorsement A2:2017

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English Version

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Spécifications des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques - Partie 1-4: Appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques - Antennes et emplacements d'essai pour les mesures des perturbations rayonnées
(CISPR 16-1-4:2010/A2:2017)

Anforderungen an Geräte und Einrichtungen sowie Festlegung der Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Teil 1-4: Geräte und Einrichtungen zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Antennen und Messplätze für Messungen der gestrahlten Störaussendung
(CISPR 16-1-4:2010/A2:2017)

This amendment A2 modifies the European Standard EN 55016-1-4:2010; it was approved by CENELEC on 2017-02-23. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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This amendment 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 CEN-CENELEC Management Centre has the same status as the official versions.

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European foreword

The text of document CISPR/A/1194/FDIS, future CISPR 16-1-4:2010/A2, prepared by SC A “Radio interference measurements and statistical methods" of IEC/TC CISPR “International special committee on radio interference” was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55016-1-4:2010/A2:2017.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2017-12-16
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-06-16

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Endorsement notice

The text of the International Standard CISPR 16-1-4:2010/A2:2017 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)
Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
CISPR 16-1-6	-	Specification for radio disturbance and immunity measuring apparatus and methods -- Part 1-6: Radio disturbance and immunity measuring apparatus - EMC-antenna calibration	EN 55016-1-6	-
+ A1	-		+ FprA1	-
CISPR 16-2-3	2010	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	2010
-	-		+ AC	2013

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FOREWORD

This amendment has been prepared by CISPR subcommittee A: Radio-interference measurements and statistical methods, of IEC technical committee CISPR: International special committee on radio interference.

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

FDIS	Report on voting
CISPR/A/1194/FDIS	CISPR/A/1203/RVD

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

_____

2 Normative references

Replace, in the existing list, the reference to CISPR 16-2-3 by the following:

CISPR 16-2-3:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements*

Add, to the existing list, the following new normative reference:

CISPR 16-1-6:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-6: Radio disturbance and immunity measuring apparatus – EMC antenna calibration*
CISPR 16-1-6:2014/AMD1:2016

3.1 Terms and definitions

Add, after the existing 3.1.27 added by Amendment 1, the following the new term and definition:

3.1.28
mechanical boresight
direction of the main beam, which is defined by the geometric properties of the antenna

3.2 Abbreviations

Add to the existing list the following new abbreviations:

RX Receive

TX Transmit

4.6 Frequency range 1 GHz to 18 GHz

Add, before the existing text, the following new title:

4.6.1 General

*Delete, in the third sentence of the first paragraph of the existing subclause, the latter half of the sentence starting with "*or provisions shall be made*…"*

Add at the end of the existing 4.6 the following new subclauses:

4.6.2 Receive antenna

4.6.2.1 General

The receive antenna shall be linearly polarized and shall be the same type as used for EUT emission measurements.

Some antenna models may have different versions with possibly different patterns and users are advised to verify this.

NOTE 1 "Antenna type" means a shape or a kind of antenna, for example horn and LPDA antenna.

NOTE 2 "Antenna model" means the specified manufacturer's model number.

NOTE 3 "Version" means the specified manufacturer's revision number, if applicable, of a particular antenna model number.

4.6.2.2 Receive antenna radiation pattern

E-plane and H-plane radiation patterns shall be measured with reference to the boresight.

The measurand is the antenna pattern in dB and as represented on the polar chart in Figure 43.

The normalization of this chart is to 0 dB.

The 0º angle shall be equal to the mechanical boresight.

The E-plane and H-plane radiation patterns of each individual antenna shall be recorded over the frequency range of the antenna with a step size of 500 MHz or smaller according to Annex I of CISPR 16-1-6:2014/AMD1:2016.

Type test results, including statistical data, supplied by the manufacturer may be used to provide evidence that the receive antenna radiation pattern requirements are met. Service measures shall be taken to assure pattern stability during the antenna life.

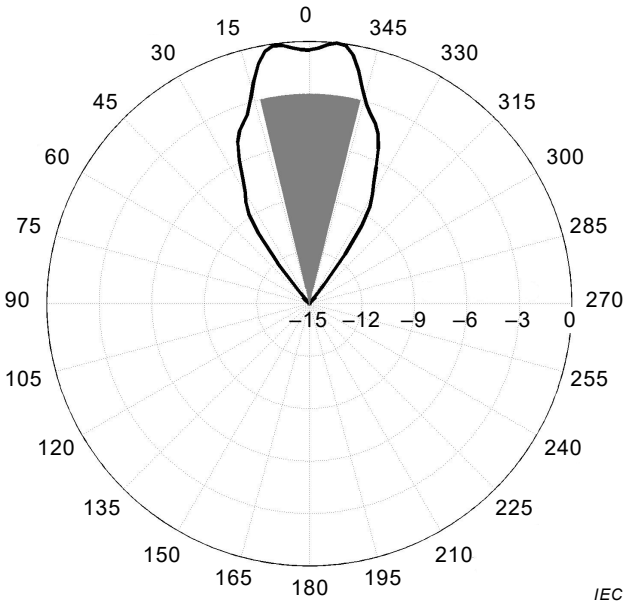


Figure 43 – RX antenna *E*-plane radiation pattern example with limit for 3 m distance and 2 m EUT width

NOTE In general, the boresight direction is the direction of maximum radiation from the antenna, However it may happen that the pattern has two radiation maxima and none of the maxima are in the direction of the mechanical boresight as in Figure 43.

4.6.2.3 Receive antenna radiation pattern requirements

The grey areas shown in the polar diagrams of Figures 44 and 45 are defined by the maximum height, h, and the maximum width, w, of the EUT and the test distance, d.

In order for the receive antenna to sufficiently illuminate the EUT, the half power beam-width of the receive antenna shall not fall inside this area in E-plane and H-plane cuts as shown in Figures 44 and 45.

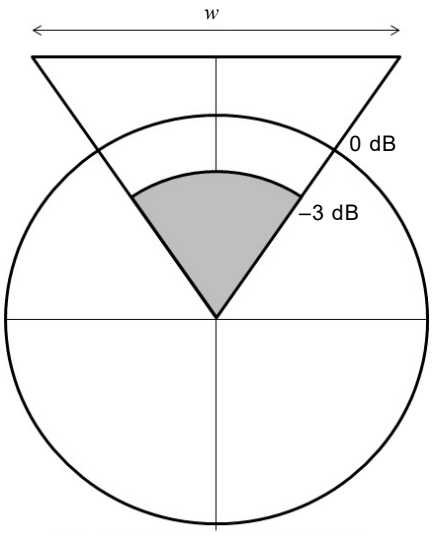
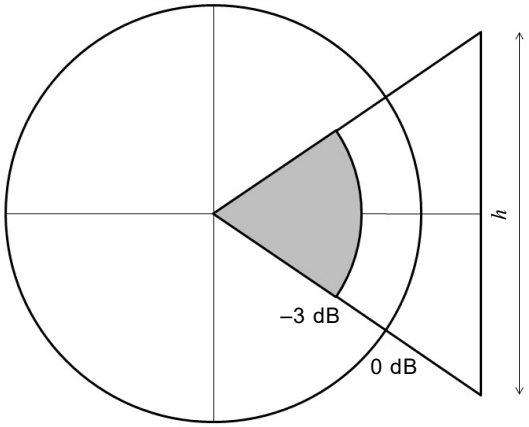


Figure 44 – Determination of maximum useable EUT width using half power beam-width



h = maximum height of the EUT

IEC

Figure 45 – Determination of maximum useable EUT height using half power beam-width

8.3.1 General

Add, between the third and fourth paragraphs, the following new paragraph and new NOTE 3:

When measuring the disturbance of an EUT size smaller than the validated diameter, the diameter of the validated test volume is assumed to apply. In this case the antenna position is adjusted such that the distance between the EUT and the antenna reference point is identical to the distance used for S_{VSWR} validation.

NOTE 3 For EUTs smaller than the validated test volume, the rationale is that the RX antenna position in relation to the front of the EUT be adjusted to remain at the distance used in S_{VSWR} validation. It is assumed that a smaller EUT will remain within the half power beam-width of the RX antenna and since the chamber is validated for the largest EUT and therefore the widest beam-width of the RX antenna, the requirements of 7.6.6.1 in CISPR 16-2-3:2010 are met.

8.3.3.1.1 General

Replace the existing text of this subclause by the following new paragraphs and note:

To provide illumination of all reflecting surfaces during this test, and to simulate the possible low-directivity radiation patterns exhibited by many EUTs, this subclause specifies characteristics for equipment used for S_{VSWR} testing. For this purpose, RX and TX antennas are used.

The following subclauses define the performance criteria for the TX antennas for the S_{VSWR} test. For the performance criteria of RX antennas see 4.6.2.3. Type test results supplied by the manufacturer may be used to provide evidence that the performance criteria are met.

The TX and RX patterns shall be measured according to Annex I of CISPR 16-1-6:2014/AMD1:2016.

For both the TX and RX antennas, one or more antennas can be used to cover the whole frequency range for the S_{VSWR} test.

NOTE It is assumed that both antennas also meet these requirements at all frequencies used for the S_{VSWR} test.

8.3.3.1.2 Test equipment for the standard S_{VSWR} procedure (i.e. 8.3.3.3)

Replace the existing title by the following new title:

8.3.3.1.2 Transmit antenna

8.3.3.1.2.1 General

Replace the existing text of this subclause by the following new text:

The antenna used as a transmit source shall be linearly polarized and shall have a radiation pattern with the following detailed characteristics.

Radiation pattern data shall be available with a frequency step size less than or equal to 1 GHz.

Different frequency step sizes are required due to the change of pattern with frequency. Typical TX antenna patterns do not change rapidly with frequency, while some LPDA RX antenna patterns do.

8.3.3.1.3 Test equipment for the reciprocal S_{VSWR} procedure (i.e. 8.3.3.4)

Replace the existing first sentence of this subclause, modified by Amendment 1, by the following new first sentence:

The antenna used to transmit into the test volume shall be the same type as used later for the emission measurements and shall meet the requirements of 4.6.2.

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EUROPEAN STANDARD

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EN 55016-1-4:2010+A1

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(CISPR 16-1-4:2010)

Spécifications des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques - Partie 1-4: Appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques - Antennes et emplacements d'essai pour les mesures des perturbations rayonnées (CISPR 16-1-4:2010)

Anforderungen an Geräte und Einrichtungen sowie Festlegung der Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Teil 1-4: Geräte und Einrichtungen zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Zusatz-/Hilfseinrichtungen - Gestrahlte Störaussendung (CISPR 16-1-4:2010)

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Ref. No. EN 55016-1-4:2010 E

Foreword

The text of document CISPR/A/885/FDIS, future edition 3 of CISPR 16-1-4, prepared by CISPR SC A, Radio-interference measurements and statistical methods, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 55016-1-4 on 2010-06-01.

This European Standard supersedes EN 55016-1-4:2007 + A1:2008 + A2:2009.

This EN 55016-1-4:2010 includes the following significant technical change with respect to EN 55016-1-4:2007 + A1:2008 + A2:2009: provisions are added to address evaluation of a set-up table in the frequency range above 1 GHz.

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*.

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.

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)	2011-03-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2013-06-01

Annex ZA has been added by CENELEC.

———————

Endorsement notice

The text of the International Standard CISPR 16-1-4:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

[1] IEC 61169-8 NOTE Harmonized as EN 61169-8.

———————

Foreword to amendment A1

The text of document CISPR/A/995/FDIS, future amendment 1 to edition 3 of CISPR 16-1-4, prepared by SC A "Radio-interference measurements and statistical methods" of IEC/TC CISPR "International special committee on radio interference" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55016-1-4:2010/A1:2012.

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• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2013-05-16
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2015-08-15

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The text of the International Standard CISPR 16-1-4:2010/A1:2012 was approved by CENELEC as a European Standard without any modification.

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
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	EN 55016-1-1	-
CISPR 16-1-5	2003	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-5: Radio disturbance and immunity measuring apparatus - Antenna calibration test sites for 30 MHz to 1 000 MHz	EN 55016-1-5	2004
CISPR 16-2-3	-	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	-
CISPR/TR 16-3		Specification for radio disturbance and immunity measuring apparatus and methods - Part 3: CISPR technical reports	-	-
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	EN 55016-4-2	-
IEC 60050-161	-	International Electrotechnical Vocabulary (IEV) - Chapter 161: Electromagnetic compatibility	-	-
IEC 61000-4-20	-	Electromagnetic compatibility (EMC) - Part 4-20: Testing and measurement techniques - Emission and immunity testing in transverse electromagnetic (TEM) waveguides	EN 61000-4-20	-

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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

1 Scope

This part of CISPR 16 specifies the characteristics and performance of equipment for the measurement of radiated disturbances in the frequency range 9 kHz to 18 GHz. Specifications for antennas and test sites are included.

NOTE In accordance with IEC Guide 107, CISPR 16-1-4 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.

The requirements of this publication apply at all frequencies and for all levels of radiated disturbances within the CISPR indicating range of the measuring equipment.

Methods of measurement are covered in Part 2-3, and further information on radio disturbance is given in Part 3 of CISPR 16. Uncertainties, statistics and limit modelling are covered in Part 4 of CISPR 16.

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

CISPR 16-1-5:2003, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-5: Radio disturbance and immunity measuring apparatus – Antenna calibration test sites for 30 MHz to 1 000 MHz*

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

CISPR/TR 16-3, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 3: CISPR technical reports*

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*