BS EN 55032:2015+A11:2020
Incorporating corrigendum June 2016

BSI Standards Publication

Electromagnetic compatibility of multimedia equipment – Emission Requirements

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Full document details: BS EN 55032:2015+A11:2020

National foreword

This British Standard is the UK implementation of EN 55032:2015+A11:2020. It is derived from CISPR 32:2015, incorporating corrigendum June 2016. It supersedes BS EN 55032:2015, which will be withdrawn on 27 November 2022.

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.

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Amendments/corrigenda issued since publication

Date	Text affected
31 August 2016	Implementation of IEC corrigendum June 2016: Table B.1 corrected
31 March 2020	Implementation of CENELEC amendment A11:2020: Annex ZZ replaced

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 55032:2015+A11

March 2020

ICS 33.100.10

Supersedes EN 55032:2012

English Version

Electromagnetic compatibility of multimedia equipment - Emission Requirements (CISPR 32:2015)

Compatibilité électromagnétique des équipements multimédia - Exigences d'émission (CISPR 32:2015)

Elektromagnetische Verträglichkeit von Multimediageräten und -einrichtungen - Anforderungen an die Störaussendung (CISPR 32:2015)

This European Standard was approved by CENELEC on 2015-05-05. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European Foreword

The text of document CIS/I/498/FDIS, future edition 2 of CISPR 32, prepared by CISPR SC I "Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55032:2015.

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) 2016-02-05
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-05-05

This document supersedes EN 55032:2012.

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

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For the relationship with EU Directive see informative Annex ZZ, which is an integral part of this document.

Endorsement notice

The text of the International Standard CISPR 32:2015 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

CISPR 13:2009	NOTE	Harmonized as EN 55013:2013 (modified).
CISPR 16 Series	NOTE	Harmonized as EN 55016 Series.
CISPR 22:2008	NOTE	Harmonized as EN 55022:2010 (modified).

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European foreword to amendment A11

This document (EN 55032:2015/A11:2020) has been prepared by CLC/TC 210 "Electromagnetic Compatibility (EMC)".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2020-11-27
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2022-11-27

This document amends EN 55032:2015.

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For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

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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 16-1-1	2010	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	2010
+A1	2010		+A1	2010
+A2	2014		+A2	2014
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	EN 55016-1-2	2004 [1)]
+A1	2004		+A1	2005
+A2	2006		+A2	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 - Antennas and test sites for radiated disturbance measurements	EN 55016-1-4	2010
+A1	2012		+A1	2012
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	EN 55016-2-1	2009 [2)]
+A1	2010		+A1	2011
+A2	2013		+A2	2013
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
+A1	2010		+A1	2010
+A2	2014		+A2	2014

[1)] Superseded by EN 55016-1-2:2014 (CISPR 16-1-2:2014): DOW = 2017-04-25.

[2)] Superseded by EN 55016-2-1:2014 (CISPR 16-2-1:2014): DOW = 2017-04-02.

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Publication	Year	Title	EN/HD	Year
CISPR 16-4-2	2011	Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Measurement instrumentation uncertainty	EN 55016-4-2	2011
IEC 61000-4-6	2008	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6	2009 [3)]
ISO/IEC 17025	2005	General requirements for the competence of testing and calibration laboratories	-	-
ANSI C63.5	2006	American National Standard (for) Electromagnetic Compatibility - Radiated Emission Measurements in Electromagnetic Interference (EMI) Control - Calibration of Antennas (9 kHz to 40 GHz)	-	-
IEEE 802.3	-	IEEE Standard for Information technology - Specific requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CMSA/CD) Access Method and Physical Layer Specifications	-	-

[3)] Superseded by EN 61000-4-6:2014 (IEC 61000-4-6:2013): DOW = 2016-11-27.

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Annex ZZ
(informative)

Relationship between this European standard and the essential requirements of Directive 2014/30/EU [2014 OJ L96] aimed to be covered

This European standard has been prepared under the European Commission standardisation request C(2016) 7641 final of 30.11.2016[1], ('M/552'), as regards harmonised standards in support of Directive 2014/30/EU relating to electromagnetic compatibility, to provide one voluntary means of conforming to essential requirements of Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility [2014 OJ L96].

Once this standard is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of this standard given in Table ZZ.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

Table ZZ.1 — Correspondence between this European standard and the Essential Requirements set out in Directive 2014/30/EU [2014 OJ L96]

Essential requirements of Directive 2014/30/EU	Clause(s) / sub-clause(s) of this EN	Remarks / Notes
Annex I. 1(a) (electromagnetic disturbances)	5 Requirements	Not applicable to terrestrial and satellite broadcast receivers under Directive 2014/30/EU. With respect to Clause 11 (Measurement uncertainty), the following shall not be applied, if Clause 5 (Requirements) is applied for the purposes of the presumption of conformity: 'Refer to CISPR TR 16-4-3 for guidance on the applicability of the limits to a series production MME'.

WARNING 1: Presumption of conformity stays valid only as long as a reference to this European standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING 2: Other Union legislation may be applicable to the product(s) falling within the scope of this standard."

[1] COMMISSION IMPLEMENTING DECISION C(2016) 7641 final of 30.11.2016 on a standardisation request to the European Committee for Standardisation, to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards harmonised standards in support of Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROMAGNETIC COMPATIBILITY OF MULTIMEDIA EQUIPMENT –

Emission requirements

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. 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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9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard CISPR 32 has been prepared by CISPR subcommittee I: Electromagnetic compatibility of information technology equipment, multimedia equipment and receivers.

This second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) additional requirements using FAR,
b) additional requirements for outdoor unit of home satellite receiving systems,
c) addition of new informative annexes covering GTEM and RVC,
d) numerous maintenance items are addressed to improve the testing of MME.

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

FDIS	Report on voting
CIS/I/498/FDIS	CIS/I/501/RVD

Full information on the voting for the approval of this publication 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.

The committee has decided that the contents of this 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

The contents of the corrigendum of June 2016 have been included in this copy.

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ELECTROMAGNETIC COMPATIBILITY OF MULTIMEDIA EQUIPMENT –

Emission requirements

1 Scope

NOTE Blue coloured text within this document indicates text that will be aligned with the future MME immunity publication CISPR 35.

This International Standard applies to multimedia equipment (MME) as defined in 3.1.24 and having a rated r.m.s. AC or DC supply voltage not exceeding 600 V.

Equipment within the scope of CISPR 13 or CISPR 22 is within the scope of this publication.

MME intended primarily for professional use is within the scope of this publication.

The radiated emission requirements in this standard are not intended to be applicable to the intentional transmissions from a radio transmitter as defined by the ITU, nor to any spurious emissions related to these intentional transmissions.

Equipment, for which emission requirements in the frequency range covered by this publication are explicitly formulated in other CISPR publications (except CISPR 13 and CISPR 22), are excluded from the scope of this publication.

In-situ testing is outside the scope of this publication.

This publication covers two classes of MME (Class A and Class B). The MME classes are specified in Clause 4.

The objectives of this publication are:

1) to establish requirements which provide an adequate level of protection of the radio spectrum, allowing radio services to operate as intended in the frequency range 9 kHz to 400 GHz;
2) to specify procedures to ensure the reproducibility of measurement and the repeatability of results.

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 16-1-1:2010, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*
CISPR 16-1-1:2010/AMD1:2010
CISPR 16-1-1:2010/AMD2:2014

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CISPR 16-1-2:2003[1], *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Ancillary equipment – Conducted disturbances*
CISPR 16-1-2:2003/AMD 1:2004
CISPR 16-1-2:2003/AMD 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 – Antennas and test sites for radiated disturbance measurements*
CISPR 16-1-4:2010/AMD1:2012

CISPR 16-2-1:2008[2], *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements*
CISPR 16-2-1:2008/ AMD 1:2010
CISPR 16-2-1:2008/ AMD 2:2013

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*
CISPR 16-2-3:2010/AMD1:2010
CISPR 16-2-3:2010/AMD2:2014

CISPR 16-4-2:2011, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Measurement instrumentation uncertainty*

IEC 61000-4-6:2008 [3], *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

ISO IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*

ANSI C63.5-2006, *American National Standard (for) Electromagnetic Compatibility – Radiated Emission Measurements in Electromagnetic Interference (EMI) Control – Calibration of Antennas (9 kHz to 40 GHz)*

IEEE Std 802.3, *IEEE Standard for Information technology – Specific requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CMSA/CD) Access Method and Physical Layer Specifications*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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1 First edition (2003). This first edition has been replaced in 2014 by a second edition 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*.

2 First edition (2008). This first edition has been replaced in 2014 by a second edition 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*.

3 Third edition (2008). This third edition has been replaced in 2013 by a fourth edition IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*.

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NOTE Terms and definitions related to EMC and to relevant phenomena are given in IEC 60050-161. A common set of definitions has been written for both CISPR 32 and the future CISPR 35. It is noted that some terms and definitions will only be used in one of these two publications but for purposes of consistency they are intentionally included in both.

3.1.1
AC mains power port
port used to connect to the mains supply network

Note 1 to entry: Equipment with a DC power port which is powered by a dedicated AC/DC power converter is defined as AC mains powered equipment.

3.1.2
analogue/digital data port
signal/control port (3.1.30), antenna port (3.1.3), wired network port (3.1.32), broadcast receiver tuner port (3.1.8), or optical fibre port (3.1.25) with metallic shielding and/or metallic strain relief member(s)

3.1.3
antenna port
port, other than a broadcast receiver tuner port (3.1.8), for connection of an antenna used for intentional transmission and/or reception of radiated RF energy

3.1.4
arrangement
physical layout and orientation of all the parts of the EUT, AE and any associated cabling, located within the area

3.1.5
associated equipment
AE
equipment needed to exercise and/or monitor the operation of the EUT

Note 1 to entry: AE may be either local (within the measurement or test area) or remote.

3.1.6
audio equipment
equipment which has a primary function of either (or a combination of) generation, input, storage, play, retrieval, transmission, reception, amplification, processing, switching or control of audio signals

3.1.7
broadcast receiver equipment
equipment containing a tuner that is intended for the reception of broadcast services

Note 1 to entry: These broadcast services are typically television and radio services, including terrestrial broadcast, satellite broadcast and/or cable transmission.

3.1.8
broadcast receiver tuner port
port intended for the reception of a modulated RF signal carrying terrestrial, satellite and/or cable transmissions of audio and/or video broadcast and similar services

Note 1 to entry: This port may be connected to an antenna, a cable distribution system, a VCR or similar device.

3.1.9
common mode impedance
asymmetrical mode (see CISPR 16-2-1) impedance between a cable attached to a port and the Reference Ground Plane (RGP)

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Note 1 to entry: The complete cable is seen as one wire of the circuit and the RGP is seen as the other wire of the circuit. The common mode current flowing around this circuit can lead to the emission of radiated energy of EUT.

3.1.10
configuration
operational conditions of the EUT and AE, consisting of the set of hardware elements selected to comprise the EUT and AE, mode of operation (3.1.23) used to exercise the EUT and arrangement (3.1.4) of the EUT and AE

3.1.11
converted common mode current
asymmetrical mode current converted from differential mode current by the unbalance of an attached cable and/or network

3.1.12
DC network power port
port, not powered by a dedicated AC/DC power converter and not supporting communication, that connects to a DC supply network

Note 1 to entry: Equipment with a DC power port which is powered by a dedicated AC/DC power converter is considered to be AC mains powered equipment.

Note 2 to entry: DC power ports supporting communications are considered to be wired networks ports, for example Ethernet ports which include Power Over Ethernet (POE).

3.1.13
enclosure port
physical boundary of the EUT through which electromagnetic fields may radiate

3.1.14
entertainment lighting control equipment
equipment generating or processing electrical signals for controlling the intensity, colour, nature or direction of the light from a luminaire, where the intention is to create artistic effects in theatrical, televisual or musical productions and visual presentations

3.1.15
Equipment Under Test
EUT
multimedia equipment (MME) being evaluated for compliance with the requirements of this standard

3.1.16
formal measurement
measurement used to determine compliance

Note 1 to entry: This is often the final measurement performed. It may be carried out following a prescan measurement. It is the measurement recorded in the test report.

3.1.17
function
operation carried out by a MME

Note 1 to entry: Functions are related to basic technologies incorporated in the MME such as: displaying, recording, processing, controlling, reproducing, transmitting, or receiving single medium or multimedia content. The content may be data, audio or video, either individually or in combination.

3.1.18
highest internal frequency
F_x
highest fundamental frequency generated or used within the EUT or highest frequency at which it operates

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Note 1 to entry: This includes frequencies which are solely used within an integrated circuit.

3.1.19
Information Technology Equipment
ITE
equipment having a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control of data and/or telecommunication messages and which may be equipped with one or more ports typically for information transfer

Note 1 to entry: Examples include data processing equipment, office machines, electronic business equipment and telecommunication equipment.

3.1.20
LNB
low noise block convertor which amplifies and converts broadcast satellite frequencies to frequencies usable by a satellite receiver

3.1.21
local AE
AE located within the measurement or test area

3.1.22
launched common mode current
asymmetric mode current produced by internal circuitry and appearing at the wired network port of the EUT

Note 1 to entry: Measurement of the launched common mode current requires the EUT port to be loaded by a perfectly balanced termination.

3.1.23
mode of operation
set of operational states of all functions of an EUT during a test or measurement

3.1.24
MultiMedia Equipment
MME
equipment that is information technology equipment (3.1.19), audio equipment (3.1.6), video equipment (3.1.31), broadcast receiver equipment (3.1.7), entertainment lighting control equipment (3.1.14) or combinations of these

3.1.25
optical fibre port
port at which an optical fibre is connected to an equipment

3.1.26
outdoor unit of home satellite receiving systems
outdoor unit which typically consists of a reflecting surface (or antenna) and an LNB

Note 1 to entry: The unit excludes the intermediate frequency amplifier and the demodulator included in the indoor receiver.

3.1.27
port
physical interface through which electromagnetic energy enters or leaves the EUT

Note 1 to entry: See Figure 1.

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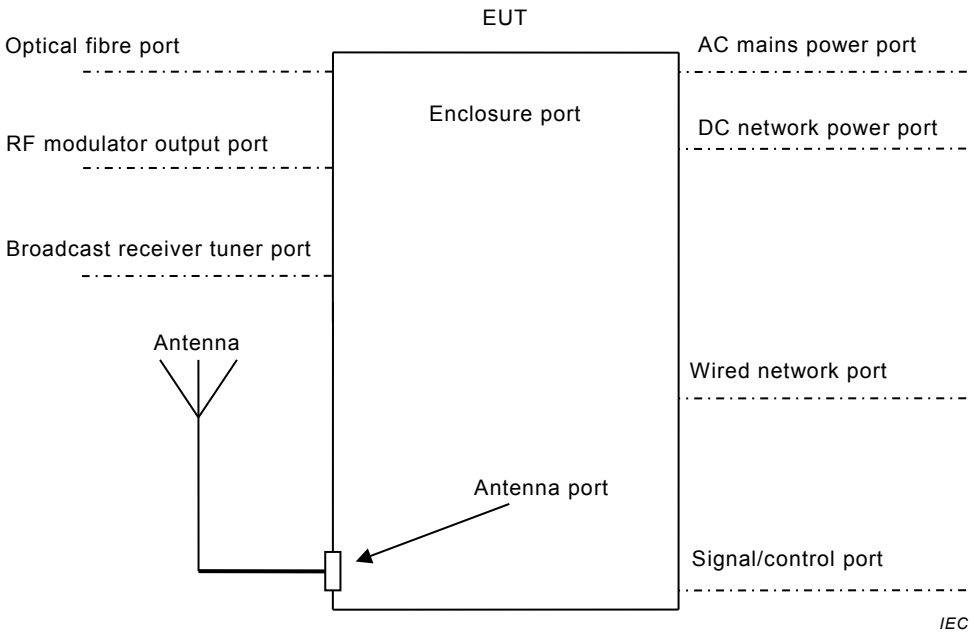

Figure 1 – Examples of ports

3.1.28
primary function
any function of an MME considered essential for the user or for the majority of users

Note 1 to entry: An MME may have more than one primary function. For example the primary functions of a basic television set include broadcast reception, audio reproduction and display.

3.1.29
RF modulator output port
port intended to be connected to a broadcast receiver tuner port in order to transmit a signal to the broadcast receiver

3.1.30
signal/control port
port intended for the interconnection of components of an EUT, or between an EUT and local AE and used in accordance with relevant functional specifications (for example for the maximum length of cable connected to it)

Note 1 to entry: Examples include RS-232, Universal Serial Bus (USB), High-Definition Multimedia Interface (HDMI), IEEE Standard 1394 (“Fire Wire”).

3.1.31
video equipment
equipment which has a primary function of either (or a combination of) generation, input, storage, display, play, retrieval, transmission, reception, amplification, processing, switching, or control of video signals

3.1.32
wired network port
port for the connection of voice, data and signalling transfers intended to interconnect widely-dispersed systems by direct connection to a single-user or multi-user communication network

Note 1 to entry: Examples of these include CATV, PSTN, ISDN, xDSL, LAN and similar networks.

Note 2 to entry: These ports may support screened or unscreened cables and may also carry AC or DC power where this is an integral part of the telecommunication specification.

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3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

AAN	Asymmetric Artificial Network
AC	Alternating Current
AC-3	ATSC standard: digital Audio Compression (AC-3)
AE	Associated Equipment, see 3.1.5
AM	Amplitude Modulation
AMN	Artificial Mains Network
ATSC	Advanced Television Systems Committee
AV	Audio Visual
BPSK	Binary Phase Shift Keying
CATV	Cable TV network
CISPR	International special committee on radio interference
CM	Common Mode
CMAD	Common Mode Absorbing Device
CVP	Capacitive Voltage Probe
DC	Direct Current
DMB-T	Digital Multimedia Broadcast – Terrestrial
DQPSK	Differential Quadrature Phase Shift Keying
DSL	Digital Subscriber Line
DVB	Digital Video Broadcast
DVB-C	Digital Video Broadcast – Cable
DVB-S	Digital Video Broadcast – Satellite
DVB-T	Digital Video Broadcast – Terrestrial
DVD	Digital Versatile Disc (an optical disc format also known as a Digital Video Disc)
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test, see 3.1.15
FAR	Fully Anechoic Room
FM	Frequency Modulation
FSOATS	Free Space Open Area Test Site
F/UTP	Foil screened/Unscreened Twisted Pair
GTEM	Gigahertz Transverse ElectroMagnetic
HDMI	High-Definition Multimedia Interface
HID	Human Interface Device
IEC	International Electrotechnical Commission
IF	Intermediate Frequency
ISDB	Integrated Services Digital Broadcasting
ISDB-S	Integrated Services Digital Broadcasting – Satellite
ISDN	Integrated Services Digital Network
ISO	International Standardisation Organisation
ITE	Information Technology Equipment, see 3.1.19
ITU	International Telecommunication Union

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ITU-R	International Telecommunication Union – Radio Communication Sector
ITU-T	International Telecommunication Union – Telecommunication Sector
LAN	Local Area Network
LCL	Longitudinal Conversion Loss
LO	Local Oscillator
LNB	Low-Noise Block converter
MME	Multimedia Equipment, see 3.1.24
MPEG	Moving Picture Experts Group
NSA	Normalized Site Attenuation
OATS	Open Area Test Site
OFDM	Orthogonal Frequency Division Multiplexing
PC	Personal Computer
POE	Power Over Ethernet
POS	Point Of Sale
PSTN	Public Switched Telephone Network
PSU	Power Supply Unit (including a AC/DC power converter)
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
RGP	Reference Ground Plane
RVC	ReVerberation Chamber
SAC	Semi Anechoic Chamber
STP	Shielded Twisted Pair
TV	Television
TEM	Transverse ElectroMagnetic
UHF	Ultra High Frequency
USB	Universal Serial Bus
U/UTP	Unscreened/Unscreened Twisted Pair
VCR	Video Cassette Recorder
VHF	Very High Frequency
VSB	Vestigial Side Band
xBase-T	Where x is 10, 100 and 1 000 as defined in the IEEE 802.3 series of standards
xDSL	Generic term for all types of DSL technology

4 Classification of equipment

This standard defines Class A equipment and Class B equipment associated with two types of end-use environment.

Class A equipment is equipment which meets the requirements given in Table A.2, Table A.3, Table A.9, and Table A.11, using the limitations defined in Table A.1 and Table A.8.

Class B equipment is equipment which meets the requirements given in Table A.4, Table A.5, Table A.6, Table A.7, Table A.10, Table A.12 and Table A.13, using the limitations defined in Table A.1 and Table A.8.

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The Class B requirements for equipment are intended to offer adequate protection to broadcast services within the residential environment.

Equipment intended primarily for use in a residential environment shall meet the Class B limits. All other equipment shall comply with the Class A limits.

Broadcast receiver equipment is class B equipment.

NOTE Equipment meeting Class A requirements may not offer adequate protection to broadcast services within a residential environment.

5 Requirements

The requirements for equipment covered within the scope of this publication are defined in Annex A.

6 Measurements

6.1 General

This clause defines the measurement facilities and instrumentation specific to the measurement of emissions from MME; it includes by reference the relevant basic requirements given in the CISPR 16 series and other standards shown in the normative references in this standard. It also defines how to configure and arrange the EUT, local AE and associated cabling, and provides the relevant measurement procedures.

The specification of the measurement facility, measurement equipment, procedures, and the arrangement of the measurement equipment to be used are given in the basic standards referred to in the tables in Annex A. Unless otherwise specified, the basic standards shall be used for all aspects of the measurement.

Where there are conflicts in the information presented in the CISPR 16 series and this publication, the content of this publication takes precedence.

The procedures to be used for measurement of emission levels depend upon several elements. These include but are not limited to:

- the type of EUT,
- the type of port,
- the types of cables used,
- the frequency range,
- the mode of operation.

If a single port satisfies the definition of more than one of the types of port defined in this standard, it is subject to the requirements for each of the port types that it satisfies. Where a port is specified by the manufacturer for use with both screened and unscreened cables, the port shall be evaluated with both cable types.

6.2 Host systems and modular EUT

This subclause describes how to configure EUTs that are a host system or modular in nature. Modular systems can comprise different types of module(s), for example the EUT can be:

- an external module, for example an infra-red remote control;
- an internal module, for example a computer hard disk;
- a plug-in module, for example a memory stick;

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- a mounted module, for example a sound card or a video card.

Modules intended to be marketed and/or sold separately from a host shall be assessed with at least one representative host system. The modules may be internal, mounted, plug-in or external as illustrated in Figure 2. The port(s) of any module being assessed shall be terminated in accordance with Annex D. The functions of the host device that are specific to the module being assessed shall be exercised during the measurements. Modules shown to meet the requirements of this publication in any one representative host are deemed to meet the requirements of this publication when used in any host. The host and modules used during measurements shall be listed in the test report.

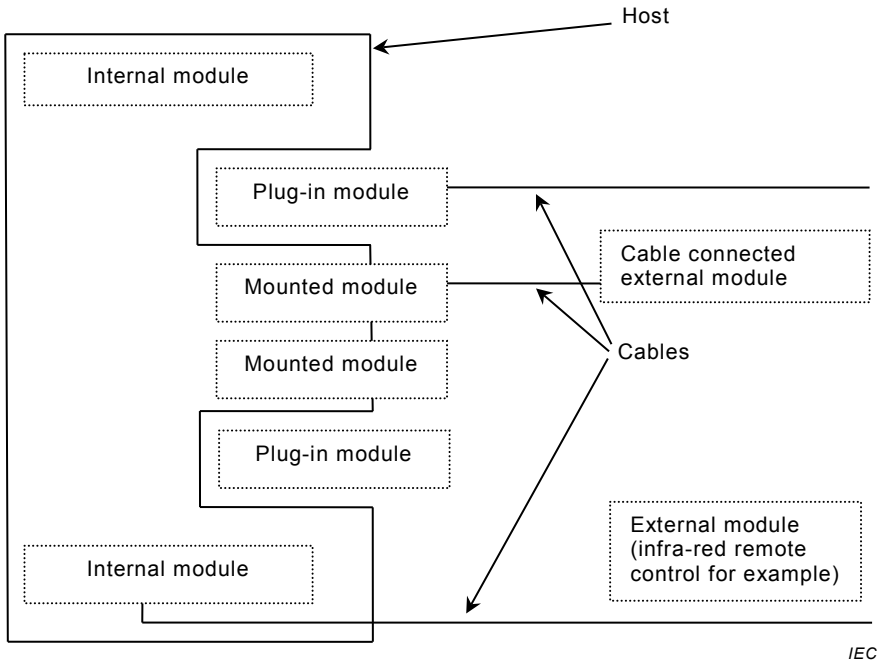

Figure 2 – Example of a host system with different types of modules

Modules whose functionality and connectivity allow them to be either, plug-in, internal, mounted and/or external shall be measured in each of the applicable configurations. However, where it can be shown that one particular configuration provides a worst case, measurement in the worst case configuration is sufficient to show compliance.

When the EUT is a host, it shall be configured with modules so that the resulting system is representative of typical use.

In the case where the EUT is a module, the host is considered as an AE.

In the case of plug-in, mounted, external or internal modules, the host shall be located in the measurement area.

6.3 Measurement procedure

Measurements shall be performed as follows:

- using the relevant measurement methods and procedures given in Table A.1, Table A.8 and Annex C, and the EUT exercised in accordance with Annex B;
- with the EUT, local AE and associated cabling configured and arranged, and with ports loaded as shown in 6.2 and Annex D;
- in accordance with supporting information and clarifications defined elsewhere within this publication.

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In addition, during prescan measurements, the arrangement of the EUT, the arrangement of the local AE and the placement of cables shall be varied within the range of typical and normal placement to attempt to determine the cable arrangement giving the maximum emission level, as described in Annex D.

The arrangement for formal measurement shall be representative of a typical arrangement of the EUT, local AE and associated cabling.

The measurement is performed with the EUT and/or AE arranged either as floor-standing equipment, table-top equipment or combinations thereof as defined in D.1.1 and illustrated in Figure D.2 to Figure D.12.

For some products it is not always obvious how the EUT and/or AE should be arranged. This may be due to variations in the configurations of the EUT in practice, physical or practical limitations. Examples of these arrangements include:

- wall, ceiling or rack mounted,
- handheld,
- body worn.

For example, a video projector can be positioned in various ways with respect to walls, ceiling or the floor of a room. D.1.1 defines the additional information needed to configure the EUT to simulate these types of arrangements.

7 Equipment documentation

The user documentation and/or manual shall contain details of any special measures required to be taken by the purchaser or user to ensure EMC compliance of the EUT with the requirements of this publication. One example would be the need to use shielded or special cables, such as category 5 F/UTP or category 6 U/UTP cabling as defined in ISO IEC 11801.

Equipment compliant with the class A requirements of this publication should have a warning notice in the user manual stating that it could cause radio interference. For example

> Warning: Operation of this equipment in a residential environment could cause radio interference.

8 Applicability

Measurements shall be performed on the relevant ports of the EUT according to the appropriate tables given in Annex A.

Where a manufacturer determines from the electrical characteristics and intended usage of the EUT that one or more measurements are unnecessary, the decision and justification not to perform these measurements shall be recorded in the test report.

The following table shows the highest frequency up to which radiated emission measurements shall be performed.

Based upon the value of F_x, Table 1 specifies the highest frequency applicable for the limits given in Table A.3 or Table A.5.

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Table 1 – Required highest frequency for radiated measurement

Highest internal frequency (F_x)	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
108 MHz $< F_x \leq 500$ MHz	2 GHz
500 MHz $< F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, F_x is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies. NOTE 2 F_x is defined in 3.1.18. NOTE 3 For outdoor units of home satellite receiving systems highest measured frequency shall be 18 GHz.	

Where F_x is unknown, the radiated emission measurements shall be performed up to 6 GHz.

9 Test report

General requirements for compiling a test report taken from 5.10 of ISO IEC 17025:2005, can be found in Annex F. Sufficient details shall be provided to facilitate reproducibility of the measurements. This shall include photographs of the measurement configuration for the formal measurements where this is appropriate.

The test report shall state the mode of operation of the EUT and how its ports were exercised (see Annex B). The test report shall clearly indicate whether the product is compliant with the Class A or Class B limits defined in Annex A.

For each relevant table clause in Annex A, the test report shall include the measurement results of at least the six highest emissions relative to the limit for each detector type,[4] unless the emissions are:

- below the measurement system noise floor, or
- 10 dB or more below the limit.

The results shall include the following information for each of these emissions:

- the port assessed (including enough information to identify it);
- for AC power line measurements the line under test, for example line or neutral;
- frequency and amplitude of the emission;
- margin with respect to the specified limit;
- the limit at the frequency of the emission;
- the detector used.

The report shall indicate if fewer than six emissions within 10 dB of the limit are observed.

NOTE It can also be beneficial to record emissions 10 dB or more below the limit. In addition other aspects, such as antenna polarization or turntable azimuth, can be useful to record.

Additionally, the following shall be included in the test report:

[4] It is sufficient to show compliance with all limits and detectors as shown in Figure C.3 to Figure C.5.

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- the frequency F_x of the highest internal frequency source within the EUT as defined in 3.1.18. This frequency need not be reported if radiated emissions are measured up to 6 GHz;
- the calculated measurement instrumentation uncertainty for each measurement type performed (see Table 1 of CISPR 16-4-2:2011). No reporting is required if U_{cispr} is not defined for the relevant measurement type;
- the category of cable simulated by the AAN, where emissions from wired network ports are measured using an AAN. See Table C.2;
- the measurement distance for radiated emission measurements as defined in C.2.2.4 and Table A.2 to Table A.7. If another measurement distance is used, the report shall include a description of how the limits were calculated.

Further guidance is given in Annex F.

10 Compliance with this publication

Compliance with this publication requires that the EUT satisfies either the Class A or Class B requirements defined in Annex A, as appropriate. An EUT which fulfils the applicable requirements specified in Annex A is deemed to fulfil the requirements in the entire frequency range from 9 kHz to 400 GHz. No measurements need be performed at frequencies where no requirement is specified.

Where this publication gives options for measuring particular requirements with a choice of measurement methods, compliance can be shown against any of the specified limits using the appropriate measurement method. In any situation where it is necessary to re-measure the equipment to show compliance with this publication, the measurement method originally chosen shall be used in order to guarantee consistency of the results, unless it is agreed by the manufacturer to do otherwise. Requirements for radiated emission measurements are defined in Table A.2 to Table A.7 with the restrictions and limitations defined in Table A.1. Requirements for conducted emission measurements are defined in Table A.9 to Table A.13 with the restrictions defined in Table A.8.

The determination of compliance with this publication shall be based solely on contributions from the EUT. For example, where an AE is required to exercise or monitor the EUT, and emissions from the AE are known to contribute to the overall measured emission of the system being assessed (for example an AE which is a plug-in module for the EUT), the AE selected should, wherever possible, be compliant with relevant emission limits. If the AE is known to cause significant emissions, these emissions may be reduced by mitigation measures, as long as these measures do not reduce the emissions from the EUT. The preferred configuration is that the AE is removed from the measurement area, as allowed by D.1.

Compliance can be shown by measuring the EUT's emissions when operating its functions simultaneously, individually in turn, or any combination thereof.

11 Measurement uncertainty

The measurement instrumentation uncertainty shall be calculated in accordance with CISPR 16-4-2 and reported as described in Clause 9.

Measurement instrumentation uncertainty shall not be taken into account in the determination of compliance. Refer to CISPR TR 16-4-3 for guidance on the applicability of the limits to a series produced MME.

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Annex A
(normative)

Requirements

A.1 General

The requirements for an EUT covered by this publication are given on a port by port basis in Table A.1 to Table A.13, respectively.

Throughout this annex and unless otherwise stated:

The peak detector limits in Table A.3 and Table A.5 shall not be applied to emissions produced by arcs or sparks that are high voltage breakdown events. Such emissions arise when MME devices contain or control mechanical switches that control current in inductors, or when MME devices contain or control subsystems that create static electricity (such as paper handling devices). The average limits apply to emissions from arcs or sparks. Both peak and average limits apply to other emissions from such MME devices.

Other measurement methods and associated limits for RVCs and GTEM cells are presented in Annex H for information.

Where the limit value varies over a given frequency range, it changes linearly with respect to the logarithm of the frequency. For example, a graphical representation of the AC mains power port limits defined in Table A.10 is presented in Figure A.1.

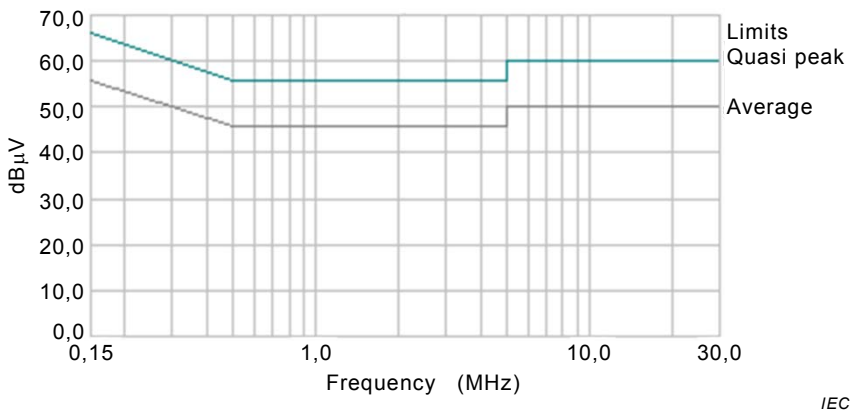

Figure A.1 – Graphical representation of the limits for the AC mains power port defined in Table A.10

- Where there is a step in the relevant limit, the lower value shall be applied at the transition frequency.
- The measurements shall be limited to:

  a) the operating ranges of voltage and frequency as specified for the EUT, having regard to the supply voltage and frequency for the intended market of the EUT.

     Measurement at two nominal voltages of 230 V (±10 V) and 110 V (±10 V), using a frequency of 50 Hz or 60 Hz, is normally sufficient for an EUT intended for worldwide use.

  b) the environmental parameters (temperature, humidity and atmospheric pressure) specified for the EUT.

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No additional environmental parameters are defined. It is not necessary to repeat measurements at more than one set of environmental parameters.

- If different detectors have been specified, the EUT shall be assessed using all relevant detectors against the appropriate limits. This procedure can be optimised by use of the decision trees in Figure C.3 to Figure C.5.
- For Ethernet interfaces, measurements are required at the highest data rate supported by the interface.
- The measurement facility validation shall be performed in accordance with the relevant basic standard and, for the purposes of this publication, may be limited to the frequency range where requirements are defined in Annex A.
- Equipment with a DC power port powered by a dedicated AC/DC power converter is considered to be AC mains powered equipment and shall be measured with a power converter. Where the power converter is provided by the manufacturer, the converter provided shall be used.

A.2 Requirements for radiated emissions

The EUT is deemed to comply fully with the radiated emission requirements in this publication when it has been shown to be compliant with the applicable limits as given in Table A.2 to Table A.7 using the specified requirements in the relevant table clause.[5]

Compliance may only be shown at measurement distances for which compliant measurement facility (or site) validation measurements exist for the measurement facility used.

Where limits in a frequency range are given for different types of measurement facility and/or distances, measurements only need to be performed using one combination of measurement facility and distance. The same combination shall be used for all frequencies in the range.

[5] In this publication, table clauses are referenced using an x.y format, where x denotes the table and y denotes the referenced clause by row within the table. For example table clause A1.2 is Table A.1, clause (row) 2.

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Table A.1 – Radiated emissions, basic standards and the limitation of the use of particular methods

Table clause	Measurement facility	Validation method	Measurement		Limitations and clarifications
			Procedure	Arrangement	
A1.1	SAC or OATS with weather protection cover	5.3 of CISPR 16-1-4:2010/AMD1: 2012	7.3 of CISPR 16-2-3:2010	Annex D	The maximum width of the EUT, local AE and associated cabling shall be within the test volume as demonstrated during the NSA test site validation. The validated measurement volume does not need to encompass any local AE and associated cabling which are located below the RGP or turntable, or remotely located, as described in D.1. NSA verification figures for 5 m facilities are presented in Table C.3.
A1.2	OATS without weather protection cover	5.2 of CISPR 16-1-4:2010/AMD1: 2012	7.3 of CISPR 16-2-3:2010	Annex D	NSA verification figures for 5 m facilities are presented in Table C.3.
A1.3	FSOATS	8.3 of CISPR 16-1-4:2010/AMD1: 2012	7.6.6 of CISPR 16-2-3:2010	Annex D	A facility validated against the FSOATS requirements shall be used for measurements above 1 GHz. The EUT, local AE and associated cabling shall be within the measurement volume as demonstrated during the test site validation. An FSOATS may be a SAC/OATS with RF absorber on the RGP or a FAR.
A1.4	FAR	5.4.7 of CISPR 16-1-4:2010/AMD1: 2012	Annex C and 7.4 of CISPR 16-2-3:2010	Annex D	This table clause applies to radiated emission measurement up to 1 GHz for an EUT set-up in the table top arrangement as shown Figure D.11 and Figure D.12. Where the same room is to be used for radiated emission testing above 1 GHz, apply table clause A.3 and use the room as a FSOATS. The maximum width and height of an EUT, local AE including cables connected to local AE shall be less than half of the measurement distance as demonstrated during the test site validation. Where relevant, the height of the EUT includes 0,8 m of vertically exposed cable. Where relevant, the width of the EUT includes 0,8 m of horizontally exposed cable.
NOTE As per Clause 2, the version of CISPR 16-1-4 is CISPR 16-1-4:2010 /AMD 1:2012. The version of CISPR 16-2-3 is CISPR 16-2-3:2010/ AMD 1:2010.					

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Table A.2 – Requirements for radiated emissions at frequencies up to 1 GHz for class A equipment

Table clause	Frequency range MHz	Measurement			Class A limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type / bandwidth	
A2.1	30 to 230	OATS/SAC	10	Quasi Peak / 120 kHz	40
	230 to 1 000				47
A2.2	30 to 230	OATS/SAC	3		50
	230 to 1 000				57
A2.3	30 to 230	FAR	10	Quasi Peak / 120 kHz	42 to 35
	230 to 1 000				42
A2.4	30 to 230	FAR	3		52 to 45
	230 to 1 000				52
Apply only A2.1 or A2.2 or A2.3 or A2.4 across the entire frequency range.					

Table A.3 – Requirements for radiated emissions at frequencies above 1 GHz for class A equipment

Table clause	Frequency range MHz	Measurement			Class A limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type / bandwidth	
A3.1	1 000 to 3 000	FSOATS	3	Average / 1 MHz	56
	3 000 to 6 000				60
A3.2	1 000 to 3 000			Peak / 1 MHz	76
	3 000 to 6 000				80
Apply A3.1 and A3.2 across the frequency range from 1 000 MHz to the highest required frequency of measurement derived from Table 1.					

Table A.4 – Requirements for radiated emissions at frequencies up to 1 GHz for class B equipment

Table clause	Frequency range MHz	Measurement			Class B limits dB(μV/m)
		Facility (see Table A.1)	Distance m	Detector type / bandwidth	
A4.1	30 to 230	OATS/SAC	10	Quasi Peak / 120 kHz	30
	230 to 1 000				37
A4.2	30 to 230	OATS/SAC	3		40
	230 to 1 000				47
A4.3	30 to 230	FAR	10	Quasi Peak / 120 kHz	32 to 25
	230 to 1 000				32
A4.4	30 to 230	FAR	3		42 to 35
	230 to 1 000				42
Apply only table clause A4.1 or A4.2 or A4.3 or A4.4 across the entire frequency range. These requirements are not applicable to the local oscillator and harmonics frequencies of equipment covered by Table A.6.					

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