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

Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment

Limites et méthodes de mesure des perturbations radioélectriques produites par les appareils électriques d'éclairage et les appareils analogues

CISPR 15:2018-05(en-fr)

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CISPR 15
Edition 9.0 2018-05

LIMITS AND METHODS OF MEASUREMENT OF RADIO DISTURBANCE CHARACTERISTICS OF ELECTRICAL LIGHTING AND SIMILAR EQUIPMENT

INTERPRETATION SHEET 1

This interpretation sheet has been prepared by subcommittee CISPR F: Interference relating to household appliances tools, lighting equipment and similar apparatus, of IEC technical committee CISPR: International special committee on radio interference.

The text of this interpretation sheet is based on the following documents:

DISH	Report on voting
CIS/F/777/DISH	CIS/F/790/RVDISH

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

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CISPR 15 interpretation sheet on the worst-case mode of operation

Introduction

Subclause 7.5 specifies the operating modes of lighting equipment that must be considered during an emission test. A few examples are given to support the explanation of what ‘different operating modes’ means. The list of examples is of course not exhaustive. Apparently, the example of ‘colour shifting’ is not clear enough and it is sometimes interpreted as if any possible colour and/or correlated colour temperature (CCT) setting that lighting equipment may produce shall be assessed during measurements. Many types of LED lighting may be set in many different colours and CCTs. Compared to other operational-mode related influence quantities such as light level regulation, flashing or radio communication, the risk of not capturing the maximum level of electromagnetic (EM) disturbances due to different colour or CCT settings is very small, provided that all channels of a LED driver used to change colour or CCT are operative. The ‘colour shifting’-example was meant for example for a mode where the light output continuously switches from one colour to another with a certain repetition frequency (e.g. applied for entertainment, events etc.), instead of emitting a single stable colour and/or CCT.

ICS 33.100.10

CISPR 15:2018-05/ISH1:2019-11(en)

Question

What is the meaning of example ‘colour shifting’ as mode of operation to be considered during testing? What colour and/or colour temperature should be selected in case lighting equipment can be set in a wide range of colours and/or CCTs?

Interpretation

The example ‘colour shifting’ in the first paragraph of 7.5 of CISPR 15:2018 must not be interpreted as if any possible colour and/or CCT setting that lighting equipment may produce shall be assessed during measurements.

Generally, according to 7.5 the worst case shall be found by prescanning every mode of operation over at least one repetition interval of the specific mode.

Alternatively, measurements can be performed using the setting(s) that are expected to produce the highest amplitude emissions relative to the limit; and, the reasons for the selection shall be given in the test report.

A reason could be that highest level of electromagnetic (EM) disturbances will be captured if all channels of a LED driver used to create different colours and/or CCTs are operative. The number of channels applied depends on the LED-driver/LED-light-source architecture. Often, maximum EM disturbances can be achieved by selecting a white colour and/or a CCT setting in the middle of the specified CCT range.

EXAMPLE Colour variation and CCT variation may be achieved using a 5-channel LED driver powering three LED strings for colour (RGB) setting and two cool white and warm white LED strings for CCT setting. Hence, in case the lighting equipment under test is capable to operate at different colours and/or CCTs, a white colour and/or a single CCT in the middle of the specified CCT range may be selected[1].

1 7.4 of CISPR 15:2018, also still applies.

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INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

LIMITS AND METHODS OF MEASUREMENT OF RADIO DISTURBANCE CHARACTERISTICS OF ELECTRICAL LIGHTING AND SIMILAR EQUIPMENT

FOREWORD

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International Standard CISPR 15 has been prepared by subcommittee CIS/F: Interference relating to household appliances tools, lighting equipment and similar apparatus, of IEC technical committee CISPR: International special committee on radio interference.

This ninth edition cancels and replaces the eighth edition published in 2013 and its Amendment 1:2015. This edition constitutes a technical revision.

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

a) full editorial revision and restructuring;
b) the restriction to mains and battery operation is deleted in the scope;
c) radiated disturbance limits in the frequency range 300 MHz to 1 GHz have been introduced;

d) the load terminals limits and the CDNE (alternative to radiated emissions) limits have changed;

e) deletion of the insertion-loss requirements and the associated Annex A;

f) introduction of three basic ports: wired network ports, local wired ports and the enclosure port;

g) introduction of a more technology-independent approach;

h) replacement of Annex B (CDNE) by appropriate references to CISPR 16-series of standards;

i) modified requirements for the metal holes of the conical housing;

j) new conducted disturbance measurement method for GU10 self-ballasted lamp;

k) addition of current probe measurement method and limits for various types of ports (in addition to voltage limits and measurement methods);

l) introduction of the term ‘module’ (instead of independent auxiliary) and requirements for measurement of modules using a host (reference) system;

m) modified specifications for stabilization times of EUTs;

n) for large EUT (> 1,6 m), addition of the magnetic field measurement method using a 60 cm loop antenna at 3 m distance (method from CISPR 14-1) as an alternative to the 3 m and 4 m LAS.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
CIS/F/733/FDIS	CIS/F/736/RVD

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

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

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

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

The contents of the interpretation sheet of November 2019 have been included in this copy.

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LIMITS AND METHODS OF MEASUREMENT OF RADIO DISTURBANCE CHARACTERISTICS OF ELECTRICAL LIGHTING AND SIMILAR EQUIPMENT

1 Scope

This document applies to the emission (radiated and conducted) of radiofrequency disturbances from:

– lighting equipment (3.3.16);
– the lighting part of multi-function equipment where this lighting part is a primary function;

NOTE 1 Examples are lighting equipment with visible-light communication, entertainment lighting.

– UV and IR radiation equipment for residential and non-industrial applications;
– advertising signs;

NOTE 2 Examples are neon tube advertising signs.

– decorative lighting;
– emergency signs.

Excluded from the scope of this document are:

– components or modules intended to be built into lighting equipment and which are not user-replaceable;

NOTE 3 See CISPR 30 (all parts) for built-in controlgear.

– lighting equipment operating in the ISM frequency bands (as defined in Resolution 63 (1979) of the ITU Radio Regulation);
– lighting equipment for aircraft and airfield facilities (runways, service facilities, platforms);
– video signs;
– installations;
– equipment for which the electromagnetic compatibility requirements in the radio-frequency range are explicitly formulated in other CISPR standards, even if they incorporate a built-in lighting function.

NOTE 4 Examples of exclusions are:

– equipment with built-in lighting devices for display back lighting, scale illumination and signaling;
– SSL-displays;
– range hoods, refrigerators, freezers;
– photocopiers, projectors;
– lighting equipment for road vehicles (in scope of CISPR 12).

The frequency range covered is 9 kHz to 400 GHz. No measurements need to be performed at frequencies where no limits are specified in this document.

Multi-function equipment which is subjected simultaneously to different clauses of this document and/or other standards need to meet the provisions of each clause/standard with the relevant functions in operation.

For equipment outside the scope of this document and which includes lighting as a secondary function, there is no need to separately assess the lighting function against this document, provided that the lighting function was operative during the assessment in accordance with the applicable standard.

NOTE 5 Examples of equipment with a secondary lighting function can be range hoods, fans, refrigerators, freezers, ovens and TV with ambient lighting.

The radiated emission requirements in this document 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.

Within the remainder of this document, wherever the term "lighting equipment" or "EUT" is used, it is meant to be the electrical lighting and similar equipment falling in the scope of this document as specified in this clause.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60038, *IEC standard voltages*

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

IEC 60050-845:1987, *International Electrotechnical Vocabulary – Chapter 845: Lighting*

IEC 60061-1, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 1: Lamp caps*

IEC 60081, *Double-capped fluorescent lamps – Performance specifications*

IEC 60598-1:2014, *Luminaires – Part 1: General requirements and tests*
IEC 60598-1:2014/AMD1:2017

IEC 60921, *Ballasts for tubular fluorescent lamps – Performance requirements*

IEC 61000-4-20:2010: *Electromagnetic compatibility (EMC) – Part 4-20: Testing and measurement techniques – Emission and immunity testing in transverse electromagnetic (TEM) waveguides*

IEC 61195, *Double-capped fluorescent lamps – Safety specifications*

IEC 62504:2014, *General lighting – Light emitting diode (LED) products and related equipment – Terms and definitions*

CISPR 16-1-1:2015, *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 16-1-4:2010/AMD2:2017

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 16-2-1:2014/AMD1:2017

CISPR 16-2-3:2016, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements*

CISPR 16-4-2:2011, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Measurement instrumentation uncertainty*
CISPR 16-4-2:2011/AMD1:2014

CISPR TR 30-1:2012, *Test method on electromagnetic emissions – Part 1: Electronic control gear for single- and double-capped fluorescent lamps*

CISPR 32:2015, *Electromagnetic compatibility of multimedia equipment – Emission requirements*

ISO/IEC 17025:2005[1], *General requirements for the competence of testing and calibration laboratories*

3 Terms, definitions and abbreviated terms

3.1 General

For the purposes of this document, the terms and definitions given in IEC 60050-161, IEC 62504, IEC 60050-845 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.2 General terms and definitions

3.2.1
base of the luminaire
mounting surface of the luminaire in normal use, usually the side opposite of the optical window

3.2.2
clock frequency
fundamental frequency of any signal used in the EUT excluding those generated inside an integrated circuit (IC) and which are solely used inside the same IC without being accessible outside that IC, and excluding those used exclusively for radio transmission or radio receiving functions

Note 1 to entry: High frequencies are often generated inside integrated circuits (IC) by phase-locked-loop (PLL) circuits from lower clock oscillator frequencies outside the IC.

[1] This edition was replaced by ISO/IEC 17025:2017 but the listed edition applies.