CISPR 11

Edition 7.0 2024-02
COMMENTED VERSION

INTERNATIONAL STANDARD

colour inside

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

PRODUCT FAMILY EMC STANDARD

Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement

CISPR 11:2024-02 CMV(en)

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

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INDUSTRIAL, SCIENTIFIC AND MEDICAL EQUIPMENT – RADIO-FREQUENCY DISTURBANCE CHARACTERISTICS – LIMITS AND METHODS OF MEASUREMENT

FOREWORD

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This commented version (CMV) of the official standard CISPR 11:2024 edition 7.0 allows the user to identify the changes made to the previous CISPR 11:2015+AMD1:2016+AMD2:2019 CSV edition 6.2. Furthermore, comments from CISPR Subcommittee B experts are provided to explain the reasons of the most relevant changes, or to clarify any part of the content.

A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text. Experts' comments are identified by a blue-background number. Mouse over a number to display a pop-up note with the comment.

This publication contains the CMV and the official standard. The full list of comments is available at the end of the CMV.

International Standard CISPR 11 has been prepared by CISPR Subcommittee B: Interference relating to industrial, scientific and medical radio-frequency apparatus, to other (heavy) industrial equipment, to overhead power lines, to high voltage equipment and to electric traction.

This seventh edition cancels and replaces the sixth edition published in 2015, Amendment 1:2016 and Amendment 2:2019. This edition constitutes a technical revision.

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

a) introduction of limits for radiated disturbances in the frequency range above 1 GHz for group 1 equipment in line with the requirements given in the generic emission standards;
b) introduction of limits for conducted disturbances on the wired network port in line with the requirements given in the generic emission standards;
c) introduction of requirements for equipment which incorporates radio transmit/receive functions;
d) introduction of definitions for various types of robots;
e) consideration of some particular conditions when measuring robots, such as measurement setups and operating modes of robots.

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

Draft	Report on voting
CIS/B/831/FDIS	CIS/B/837/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

This document has the status of a Product Family EMC standard in accordance with IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications (2014)*.

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

- reconfirmed,
- withdrawn, or
- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document 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 main content of this document is based on CISPR Recommendation No. 39/2 given below:

RECOMMENDATION No. 39/2

Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment

The CISPR

CONSIDERING

a) that ISM RF equipment is an important source of disturbance;

b) that methods of measuring such disturbances have been prescribed by the CISPR;

c) that certain frequencies are designated by the International Telecommunication Union (ITU) for unrestricted radiation from ISM equipment,

RECOMMENDS

that the latest edition of CISPR 11 be used for the application of limits and methods of measurement of ISM equipment.

INTRODUCTION

This CISPR publication contains, amongst common requirements for the control of RF disturbances from equipment intended for use in industrial, scientific, and medical electrical applications, specific requirements for the control of RF disturbances caused by ISM RF applications in the meaning of the definition of the International Telecommunication Union (ITU), see also Definition 3.1.18 in this document. CISPR and ITU share their responsibilities for the protection of radio services in respect of the use of ISM RF applications.

The CISPR is concerned with the control of RF disturbances from ISM RF applications by means of an assessment of these disturbances either at a standardised test site or, for an individual ISM RF application which cannot be tested at such a site, at its place of operation. Consequently, this CISPR Publication covers requirements for ~~conformity assessment of~~ both, equipment assessed by means of ~~type~~ tests at standardised test sites or of individual equipment under *in situ* conditions.

The ITU is concerned with the control of RF disturbances from ISM RF applications during normal operation and use of the respective equipment at its place of operation (see Definition 1.15 in the ITU Radio Regulations (2020)). There, use of radio-frequency energy decoupled from the ISM RF application by radiation, induction or capacitive coupling is restricted to the location of that individual application.

This CISPR publication contains, in 6.3, the essential emission requirements for an assessment of RF disturbances from ISM RF applications at standardised test sites. These requirements allow for ~~type~~ testing of ISM RF applications operated at frequencies up to 18 GHz. It further contains, in 6.4, the essential emission requirements for an *in situ* assessment of RF disturbances from individual ISM RF applications in the frequency range up to 1 GHz. All requirements were established in close collaboration with the ITU and enjoy approval of the ITU.

However, for operation and use of several types of ISM RF applications the manufacturer, installer and/or customer should be aware of additional national provisions regarding possible licensing and particular protection needs of local radio services and applications. Depending on the country concerned, such additional provisions ~~may~~ can apply to individual ISM RF applications operated at frequencies outside designated ISM bands (see Table 1). They also ~~may~~ can apply to ISM RF applications operated at frequencies above 18 GHz. ~~For the latter type of applications, local protection of radio services and appliances requires an accomplishment of the conformity assessment by application of the relevant national provisions in the frequency range above 18 GHz in accordance with vested interests of the ITU and national administrations. These additional national provisions may apply to spurious emissions, emissions appearing at harmonics of the operation frequency, and to wanted emissions at the operation frequency allocated outside a designated ISM band in the frequency range above 18 GHz.~~

Recommendations of CISPR for the protection of radio services in particular areas are found in Annex C of this document.

~~Definition 1.15 of the ITU Radio Regulations reads as follows:~~

~~**1.15** *industrial, scientific and medical (ISM) applications (of radio frequency energy)*: Operation of equipment or appliances designed to generate and use locally radio frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications.~~

~~[ITU Radio Regulations Volume 1: 2012 – Chapter I, Definition 1.15]~~

Introduction to Amendment 1

This Amendment introduces the fully-anechoic room (FAR) for measurements of the disturbance field strength in the range 30 MHz to 1 GHz on equipment in the scope of CISPR 11.

It contains the complete set of requirements for measurement of radiated disturbances from equipment fitting into the validated test volume of a given FAR. It specifies a separation distance of 3 m and restricts use of the FAR to measurements on table-top equipment.

At the moment the FAR can be used:

- for measurements on table-top equipment fitting into the validated test volume of the given FAR,
- for a separation distance of 3 m only, and
- if the FAR was validated according to CISPR 16-1-4.

The limits for class A and class B group 1 equipment in this CDV base on the limits in the generic emission standards IEC 61000-6-3:2006/AMD 1 (2010) and IEC 61000-6-4:2006/AMD 1 (2010). The limits for class A and class B group 2 equipment were derived using the same approximation formula as used when deriving the limits for the generic emission standards in mid of the years 2000 to 2010. CISPR/H/104/INF, published in 2005, gives detailed explanations how these limits for the FAR were derived.

More detailed background information is still found in CISPR/B/627/CDV.

CISPR/B WG1 in October 2015

Introduction to the Amendment 2

This AMD 2 combines the contents of two fragments which have been circulated as CIS/B/688/CDV (f2) and CIS/B/697/CDV (f3).

Fragment 2: Requirements for semiconductor power converters (SPC)

CISPR 11 Ed. 6.1 needs to be supplemented with further information for full inclusion of type test requirements for SPCs specified hereafter. These requirements apply only to the following types of equipment:

a) power conversion equipment intended for assembly into photovoltaic power generating systems, such as grid connected power converters (GCPCs) and d.c. to d.c. converters,

b) GCPCs intended for assembly into energy storage systems.

Fragment 3: Improvement of repeatability for measurements in the frequency range 1-18 GHz

Based on the comments from the National Committees on CIS/B/662/DC, CIS/B/WG1 decided on its meeting in Hangzhou 2016 to amend the test procedure for group 2 equipment in the frequency range 1 to 18 GHz for the following reasons:

a) CISPR 11 allows final measurements on group 2 equipment operating at frequencies above 400 MHz with two different weighting functions, the traditional “LogAV detector” with a video bandwidth of 10 Hz and the new APD method, where the Amplitude Probability Distribution is evaluated.

With the alignment of emission requirements for sources of fluctuating emissions with those generating CW-type emissions (Fraction 4 of the last general maintenance of CISPR 11) for most of the frequency range 1 to 18 GHz the peak detector is used mostly for preliminary