CISPR PAS 39

Edition 1.0 2024-10

PUBLICLY AVAILABLE SPECIFICATION

colour inside

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

Electromagnetic compatibility (EMC) – Conducted emission requirements on the low voltage AC mains port in the frequency range 9 kHz to 150 kHz for equipment intended to operate in residential environments

CISPR PAS 39:2024-10(en)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

CISPR PAS 39

Edition 1.0 2024-10

PUBLICLY AVAILABLE SPECIFICATION

colour inside

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

Electromagnetic compatibility (EMC) – Conducted emission requirements on the low voltage AC mains port in the frequency range 9 kHz to 150 kHz for equipment intended to operate in residential environments

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 33.100.10

ISBN 978-2-8322-9867-1

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Conducted emission requirements on the low voltage AC mains port in the frequency range 9 kHz to 150 kHz for equipment intended to operate in residential environments

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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch or www.iso.org/patents. IEC shall not be held responsible for identifying any or all such patent rights.

CISPR 39 has been prepared by CISPR subcommittee H: Limits for the protection of radio services. It is a Publicly Available Specification.

The text of this Publicly Available Specification is based on the following documents:

Draft	Report on voting
CIS/H/505/DPAS	CIS/H/517/RVDPAS

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 Publicly Available Specification 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.

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.

NOTE In accordance with ISO/IEC Directives, Part 1, IEC PASs are automatically withdrawn after 4 years.

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.

INTRODUCTION

This PAS complements IEC 61000-6-3:2020 by the addition of the following:

- addition of normative requirements for conducted emissions at the low voltage AC mains port in the frequency range 9 kHz to 150 kHz;
- addition of an informative annex providing background information on the normative limits;
- addition of an informative annex with recommendations to limit the spectral density of non-intentional emissions (NIE).

The technical content of this PAS was derived from a fragment of the maintenance of IEC 61000-6-3 and, as CIS/H/459/CDV, this fragment received 100 % support from the National Committees.

This PAS is published due to the urgent market needs for these requirements.

ELECTROMAGNETIC COMPATIBILITY (EMC) –

Conducted emission requirements on the low voltage AC mains port in the frequency range 9 kHz to 150 kHz for equipment intended to operate in residential environments

1 Scope

This document is applicable to electrical and electronic equipment within the scope of IEC 61000-6-3:2020, for which no relevant dedicated product or product family EMC emission standard has been published.

It defines low voltage AC mains conducted emission requirements in the frequency range 9 kHz to 150 kHz which are considered essential and have been selected to provide an adequate level of protection to both radio reception and Mains Communicating Systems (MCS) in the defined electromagnetic environment.

The emission requirements in this document are not intended to be applicable to the intentional transmissions and their harmonics from a radio transmitter as defined by the ITU.

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.

NOTE The normative references in this clause are identical to those published in IEC 61000-6-3:2020.

CISPR 16-1-1:2019, *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 16-1-2:2014/AMD 1:2017

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/A1:2017

IEC 61000-6-3:2020, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for equipment in residential environments*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61000-6-3:2020 and the following apply.

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

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

3.1.1
primary function
any function of an EUT considered essential for the user or for the majority of users

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

3.1.2
UPS function
power supply function, that provides power during unintentional AC mains power supply interruptions

3.1.3
adjustable speed electric power drive function
a power drive system function that provides adjustable speed AC or DC motor drives and can convert input and/or output voltages (line-to-line voltage).

3.2 Abbreviated terms

For the purposes of this document, the abbreviated terms given in IEC 61000-6-3:2020 and the following apply.

AC	Alternating Current
ACEC	Advisory Committee on Electromagnetic Compatibility
AMN	Artificial Mains Network
AP	Allowance Probability
AV	Average
BPSK	Binary Phase-Shift Keying
CF	Coupling Factor
CF(E)	Electric field Coupling Factor
CF(H)	Magnetic field Coupling Factor
CISPR	International Special Committee on Radio Interference
CM	Common Mode
DC	Direct Current
DM	Differential Mode
EMC	Electro-Magnetic Compatibility
EUT	Equipment Under Test
FS	Field Strength
FSFI	Free Space Field Impedance
FSK	Frequency-Shift Keying

H-Field	Magnetic Field
IEC	International Electrotechnical Commission
ISO	International Standards Organization
IVL	Integral Voltage Level
LED	Light Emitting Diode
LF	Low Frequency
MCE	Mains Communicating Equipment
MCS	Mains Communicating System
NEC2	Numerical Electromagnetics Code 2
NIE	Non-Intentional Emission
OFDM	Orthogonal Frequency-Division Multiplexing
RFI	Radio Frequency Interference
PR	Protection Ratio
QP	Quasi-Peak
UPS	Uninterruptible Power Systems
V-AMN	Artificial Mains V-Network
VLF	Very Low Frequency

4 General

The requirements specified in this document are applicable to an equipment intended to operate in the residential environment. For any additional information needed to assess emissions according to Table 1, refer to IEC 61000-6-3:2020.

5 Documentation for the user

In addition to the requirements specified in Clause 6 of IEC 61000-6-3:2020, the instructions for use of the equipment shall include, where relevant, the notification required by footnote [a] to Table 1.

6 Emission test details

The requirements in Table 1 shall apply.

The following shall be taken into account during the application of the measurements defined in Table 1:

- At transitional frequencies, the lower limit applies.
- Where the limit value varies over a given frequency range, it changes linearly with respect to the logarithm of the frequency.

Table 1 – Requirements for conducted emissions, low voltage AC mains port in the frequency range 9 kHz to 150 kHz

Measurement network	Frequency range MHz	Limits dB(µV) Detector	Measurement specifications	Limitations and restrictions
V-AMN	0,009 to 0,05	120,5 to 110 Quasi-peak	Instrumentation, CISPR 16-1-1:2019, Clauses 4, 5 and 7 Networks, CISPR 16-1-2:2014 and CISPR 16-1-2:2014/AMD1:2017, Clause 4 Method, CISPR 16-2-1:2014 and CISPR 16-2-1:2014/AMD1:2017, Clause 7 Set-up, CISPR 16-2-1:2014 and CISPR 16-2-1:2014/AMD1:2017, Clause 7	None
	0,05 to 0,15	104 to 80 [a] Quasi-peak		

NOTE See Annex A for background information about the normative limits, including recommendations related to the limit application in the frequency range 9 kHz to 150 kHz, and Annex B for recommendations to improve compatibility with MCE by additional assessments.

[a] For equipment with a primary function according to 3.1.2 (UPS function) or 3.1.3 (adjustable speed electric power drive function), the following limits can be applied: 110 dB(µV) to 82,5 dB(µV). When these relaxed limits are applied, it shall be recorded in the test report and a notification shall be added in the user manual of the equipment. The notification shall state that such equipment has a higher risk of interference, and specific measures might be required for its installation and operation, or it can be necessary to disconnect the equipment.