IEC 61051-1

Edition 3.0 2018-10
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Varistors for use in electronic equipment – Part 1: Generic specification

IEC 61051-1:2018-10 RLV(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.040.99

ISBN 978-2-8322-6211-5

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Part 1: Generic specification

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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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 61051-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This third edition cancels and replaces the second edition published in 2007. This edition constitutes a technical revision.

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

a) 10 new terms and definitions – leaded varistors, surface mount varistors(SMV), electrostatic discharge (ESD), ESD clamping voltage, equivalent rectangular pulse duration, maximum peak current derating characteristic, rated average dissipation power, rated energy, abnormal overvoltage withstanding duration and temperature derating curve – have been added (see 3.6, 3.7, 3.14, 3.15, 3.19, 3.20, 3.23, 3.24, 3.25 and 3.29);

b) General requirements for electrical tests and 7 new test items – clamping voltage, ESD clamping voltage, maximum peak current, rated average dissipation power, rated energy, electrostatic discharge (ESD), robustness of terminations of surface mount varistors – have been added (see 6.5, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16 and 6.17.8);

c) In 6.6, 6.7, 6.8, 6.9.3, 6.23.2, 6.23.4 and 6.26, following test items have been revised:

- Varistor voltage, leakage current and capacitance: more detailed requirements and information have been added;
- Voltage proof – foil method: the space between the edge of the foil and each termination has been changed from 1 mm ~ 1,5 mm to 3 mm ~ 3.5 mm for testing varistors not having axial terminations and the minimum space between the foil and the termination has been changed from 1 mm to 3 mm for testing varistors having axial terminations;
- Climatic sequence – dry heat: the method has been changed from Ba to Bb;
- Climatic sequence – cold: the method has been changed from Aa to Ab;
- Endurance at upper category temperature: the method of "applying test voltages in cycles of 1,5 h on and 0,5 h off" has been changed to the method of applying test voltages continuously throughout the test lasting for 1 000 h;

d) The test items of pulse current, voltage under pulse condition and bump have been deleted from the section of test and measurement procedures;

e) Annex A and the contents referring to the test fixture specified in Annex A have been deleted;

f) All contents related to silicon carbide varistors have been deleted;

g) A new normative annex entitled "Test pulses used in this specification" (Annex B) has been added;

h) A new informative annex entitled "Recommended measurement/test methods for characteristics and parameters for application reference" (Annex C) has been added, in which guidelines of measuring/testing characteristics and parameters for application reference including voltage vs. current characteristic, maximum peak current derating characteristic, thermal resistance and abnormal overvoltage withstanding duration have been given.

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

FDIS	Report on voting
40/2621/FDIS	40/2625/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.

A list of all parts in the IEC 61051 series, published under the general title *Varistors for use in electronic equipment*, can be found on the IEC website.

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.

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VARISTORS FOR USE IN ELECTRONIC EQUIPMENT –

Part 1: Generic specification

1 Scope

~~This part of IEC 61051 is applicable to varistors with symmetrical voltage-current characteristics for use in electronic equipment.~~

~~**1.2 Object**~~

~~The object of this standard is to establish standard terms, inspection procedures and methods of test for use in sectional and detail specifications for Qualification Approval and for Quality Assessment Systems for electronic components.~~

This part of IEC 61051 is a generic specification and is applicable to varistors with symmetrical voltage-current characteristics for use in electronic equipment.

It establishes standard terms, inspection procedures and methods of test for use in sectional and detail specifications for quality assessment or any other purpose.

NOTE Detail specifications can be specifications within the IEC system, another specification system linked to IEC, or specified by the manufacturer or user. The drafting of a complete detail specification by IEC technical committee 40, if required, follows the rules described in Annex A.

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 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050 (all parts), *International Electrotechnical Vocabulary (IEV)*

~~IEC 60060-2:1994, *High-voltage test techniques – Part 2: Measuring systems*~~

IEC 60062~~:2004~~, *Marking codes for resistors and capacitors*

IEC 60068-1:~~1988~~ 2013, *Environmental testing – Part 1: General and guidance*
~~Amendment 1 (1992)~~

IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:~~1974~~ 2007, *Environmental testing – Part 2-2: Tests – Tests B: Dry heat*
~~Amendment 1 (1993)~~
~~Amendment 2 (1994)~~

IEC 60068-2-6:~~1995~~ 2007, *Environmental testing – Part 2-6: Tests – Test Fc ~~and guidance~~: Vibration (Sinusoidal)*

IEC 60068-2-13:1983, *Environmental testing – Part 2-13: Tests – Test M: Low air pressure*

IEC 60068-2-14:1984 2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*
Amendment 1 (1986)

IEC 60068-2-20:1979 2008, *Environmental testing – Part 2-20: Tests – Test T: Soldering Test methods for solderability and resistance to soldering heat of devices with leads*
Amendment 2 (1987)

IEC 60068-2-21:2006, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*
IEC 60068-2-21:2006/COR1:2012

IEC 60068-2-27:1987 2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-29:1987, *Environmental testing – Part 2: Tests – Test Eb and guidance: Bump*

IEC 60068-2-30:2005, *Environmental testing – Part 2-30: Tests – Test Db and guidance: Damp heat, cyclic (12 h + 12-hour cycle)*

IEC 60068-2-45:1980, *Environmental testing – Part 2-45: Tests – Test XA and guidance – Immersion in cleaning solvents*
IEC 60068-2-45:1980/AMD1:1993

IEC 60068-2-54:2005, *Environmental testing – Part 2-54: Tests – Test Ta: Solderability testing of electronic components by the wetting balance method*

IEC 60068-2-58:2004 2015, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*

IEC 60068-2-69:1995 2017, *Environmental testing – Part 2-69: Tests – Test Te/Tc: Solderability testing of electronic components for surface mount technology and printed boards by the wetting balance (force measurement) method*

IEC 60068-2-78:2001 2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60294:1969, *Measurement of the dimensions of a cylindrical component having two axial terminations*

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

IEC 60617:2007, *Graphical symbols for diagrams*
(available at http://std.iec.ch/iec60617)

IEC 60695-11-5:2004 2016, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 60717:1981 2012, *Method for the determination of the space required by capacitors and resistors with unidirectional terminations*

IEC 61000-4-2:2008, *Electromagnetic Compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61193-2, *Quality assessment systems – Part 2: Selection and use of sampling plans for inspection of electronic components and packages*

IEC 61249-2-7:2002, *Materials for printed boards and other interconnecting structures – Part 2-7: Reinforced base materials clad and unclad – Epoxide woven E-glass laminated sheet of defined flammability (vertical burning test), copper-clad*

~~IEC QC 001002-3, see http://www.iecq.org~~

~~ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units*~~
~~Amendment 1 (1998)~~

ISO 80000-1:2009, *Quantities and units – Part 1: General*

3 Terms and definitions

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

3.1
type
group of components having similar design features and the similarity of whose manufacturing techniques enables them to be grouped together either for qualification approval or for quality conformance inspection

Note 1 to entry: They are generally covered by a single detail specification.

Note 2 to entry: Components described in several detail specifications may, in some cases, be considered as belonging to the same type and ~~may~~ can therefore be grouped together for approval and quality conformance inspection.

[SOURCE: IEC 60115-1: 2008, 2.2.25, modified – The remark on "single detail specification" has been deleted from the definition and Note 1 to entry and Note 2 to entry have been added.]

3.2
style
subdivision of a type, generally based on dimensional factors that ~~may~~ can include several variants, generally of a mechanical order

[SOURCE: IEC 60115-1:2008, 2.2.20]

3.3
varistor
voltage dependent resistor
VDR
component, whose conductance, at a given temperature range, increases rapidly with voltage within a given current range

Note 1 to entry: This note applies to the French language only.

Note 2 to entry: Varistor is graphically symbolized as Z.

Note 3 to entry: This property is expressed by either of the following formulae: