SLOVENSKI STANDARD

SIST EN 60738-1:2007

januar 2007

Termistorji - Neposredno ogrevani s pozitivnim temperaturnim koeficientom - 1. del: Rodovna specifikacija (IEC 60738-1:2006)

(istoveten EN 60738-1:2006)

Thermistors – Directly heated positive temperature coefficient - Part 1: Generic specification (IEC 60738-1:2006)

ICS 31.040.30

Referenčna številka
SIST EN 60738-1:2007(en)

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60738-1

June 2006

ICS 31.040.30

English version

Thermistors - Directly heated positive temperature coefficient Part 1: Generic specification

(IEC 60738-1:2006)

Thermistances à coefficient de température positif à chauffage direct
Partie 1: Spécification générique
(CEI 60738-1:2006)

Direkt geheizte temperaturabhängige Widerstände mit positivem Temperaturkoeffizienten
Teil 1: Fachgrundspezifikation
(IEC 60738-1:2006)

This European Standard was approved by CENELEC on 2006-05-01. 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 Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 60738-1:2006 E

Foreword

The text of document 40/1651/FDIS, future edition 3 of IEC 60738-1, prepared by IEC TC 40, Capacitors and resistors for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60738-1 on 2006-05-01.

This European Standard supersedes EN 60738-1:1999.

The changes with respect to EN 60738-1:1999 refer to the tables, figures and references.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2007-02-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-05-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60738-1:2006 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60027	Series	Letter symbols to be used in electrical technology	HD 60027	Series
IEC 60050	Series	International Electrotechnical Vocabulary (IEV)	-	-
IEC 60062 (mod)	2004	Marking codes for resistors and capacitors	EN 60062	2005
IEC 60068-1 + corr. October + A1	1988 1988 1992	Environmental testing - Part 1: General and guidance	EN 60068-1	1994
IEC 60068-2-1 + A1 + A2	1990 1993 1994	Environmental testing - Part 2: Tests - Tests A: Cold	EN 60068-2-1 + A1 + A2	1993 1993 1994
IEC 60068-2-2 + A1	1974 1993	Basic environmental testing procedures - Part 2: Tests - Tests B: Dry heat	EN 60068-2-2 + A1	1993 1993
IEC 60068-2-6	-[1]	Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	1995[2]
IEC 60068-2-11	-[1]	Environmental testing - Part 2: Tests - Test Ka: Salt mist	EN 60068-2-11	1999[2]
IEC 60068-2-13	-[1]	Environmental testing - Part 2: Tests - Test M: Low air pressure	EN 60068-2-13	1999[2]
IEC 60068-2-14 + A1	1984 1986	Environmental testing - Part 2: Tests - Test N: Change of temperature	EN 60068-2-14	1999
IEC 60068-2-20 + A2	1979 1987	Basic environmental testing procedures - Part 2: Tests - Test T: Soldering	HD 323.2.20 S3	1988
IEC 60068-2-21	-[1]	Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	1999[2]
IEC 60068-2-27	-[1]	Basic environmental testing procedures - Part 2: Tests - Test Ea and guidance: Shock	EN 60068-2-27	1993[2]
IEC 60068-2-29	-[1]	Basic environmental testing procedures - Part 2: Tests - Test Eb and guidance: Bump	EN 60068-2-29	1993[2]

[1] Undated reference.

[2] Valid edition at date of issue.

Publication	Year	Title	EN/HD	Year
IEC 60068-2-30	2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN 60068-2-30	2005
IEC 60068-2-45	1980	Basic environmental testing procedures - Part 2: Tests - Test Xa and guidance: Immersion in cleaning solvents	EN 60068-2-45	1992
IEC 60068-2-58	-[1)]	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)	EN 60068-2-58 + corr. December	2004[2)] 2004
IEC 60068-2-78	-[1)]	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2001[2)]
IEC 60294	-[1)]	Measurement of the dimensions of a cylindrical component having two axial terminations	-	-
IEC 60410	-[1)]	Sampling plans and procedures for inspection by attributes	-	-
IEC 60617	data-base	Graphical symbols for diagrams	-	-
IEC 60717	-[1)]	Method for the determination of the space required by capacitors and resistors with unidirectional terminations	-	-
IEC 61249-2-7	-[1)]	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	EN 61249-2-7 + corr. September	2002[2)] 2005
IEC 61760-1	-[1)]	Surface mounting technology - Part 1: Standard method for the specification of surface mounting components (SMDs)	EN 61760-1	2006[2)]
IEC QC 001002-3	-[1)]	IEC Quality Assessment System for Electronic Components (IECQ) - Rules of Procedure - Part 3: Approval procedures	-	-
ISO 1000	-[1)]	SI units and recommendations for the use of their multiples and of certain other units	-	-

INTERNATIONAL STANDARD

IEC 60738-1

QC 440000

Third edition
2006-04

Thermistors – Directly heated positive temperature coefficient –

Part 1: Generic specification

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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THERMISTORS – DIRECTLY HEATED POSITIVE TEMPERATURE COEFFICIENT –

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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International Standard IEC 60738-1 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 1998 and constitutes a minor revision. The changes with respect to the previous edition refer to the tables, figures and references.

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

FDIS	Report on voting
40/1651/FDIS	40/1730/RVD

Full information on the voting for the approval of this standard 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 QC number that appears on the front cover of this publication is the specification number in the IEC Quality Assessment System for Electronic Components (IECQ).

IEC 60738 consists of the following parts, under the general title *Thermistors – Directly heated positive step-function coefficient*:

Part 1: Generic specification

Part 1-1: Blank detail specification – Current limiting application – Assessment level EZ

Part 1-2: Blank detail specification – Heating element application – Assessment level EZ

Part 1-3: Blank detail specification – Inrush current application – Assessment level EZ

Part 1-4: Blank detail specification – Sensing application – Assessment level EZ

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site 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.

A bilingual version of this standard may be issued at a later date.

THERMISTORS – DIRECTLY HEATED POSITIVE TEMPERATURE COEFFICIENT –

Part 1: Generic specification

1 Scope

This part of IEC 60738 describes terms and methods of test for positive step-function temperature coefficient thermistors, insulated and non-insulated types typically made from ferro-electric semi-conductor materials.

It establishes standard terms, inspection procedures and methods of test for use in detail specifications for Qualification Approval and for Quality Assessment Systems for electronic components.

2 Normative references

The following referenced documents are indispensable for the application 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 60062, *Marking codes for resistors and capacitors*

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

IEC 60068-2-1:1990, *Environmental testing – Part 2: Tests – Tests A: Cold*
Amendment 1 (1993)
Amendment 2 (1994)

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

IEC 60068-2-6, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-11, *Environmental testing – Part 2: Tests – Test Ka: Salt mist*

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

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

IEC 60068-2-20:1979, *Environmental testing – Part 2: Tests – Test T: Soldering*
Amendment 2 (1987)

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

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

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

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

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

IEC 60068-2-58, *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 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

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

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

IEC 60617 (all parts) [DB][1]: *Graphical symbols for diagrams*

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

IEC 61249-2-7, *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 61760-1, *Surface mounting technology – Part 1: Standard method for the specification of surface mounting components (SMDs)*

IEC QC 001002-3, *Rules of Procedure of the IEC Quality Assessment System for Electronic Components (IECQ) – Part 3: Approval procedures*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*

3 Terms and definitions

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

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

They are generally covered by a single detail specification

NOTE Components described in several detail specifications, may, in some cases, be considered as belonging to the same type but they are generally covered by a single detail specification.

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[1] "DB" refers to the IEC on-line database.

3.2
style
variation within a type having specific nominal dimensions and characteristics

3.3
thermistor
thermally sensitive semiconducting resistor which exhibits a significant change in electrical resistance with a change in body temperature

3.4
positive temperature coefficient thermistor
thermistor, the resistance of which increases with its increasing temperature throughout the useful part of its characteristic

3.5
positive step-function temperature coefficient thermistor
PTC
thermistor which shows a step-like increase in its resistance when the increasing temperature reaches a specific value

A PTC thermistor will show secondary effects which are to be taken into account

3.6
zero-power resistance
R_T
value of the resistance of a PTC thermistor, at a given temperature, under conditions such that the change in resistance due to the internal generation of heat is negligible with respect to the total error of measurement

NOTE Any resistance value of a PTC thermistor is dependent on the value and the mode of the applied voltage (a.c. or d.c.) and, when an a.c. source is used, on the frequency (see 3.8 and 3.9).

3.7
nominal zero-power resistance
R_n
d.c. resistance value of a thermistor measured at a specified temperature, preferably at 25 °C, with a power dissipation low enough that any further decrease in power will result only in a negligible change in resistance. Zero-power resistance may also be measured using a.c. if required by the detail specification

3.8
voltage dependency
secondary effect, exhibiting a decreasing resistance with increasing voltage across the thermistor when measured at a constant body temperature

3.9
frequency dependency
secondary effect exhibiting a substantial decrease of the positive temperature coefficient of the thermistor with increasing frequency

3.10
resistance/temperature characteristics
relationship between the zero-power resistance of a thermistor and the temperature of the thermo-sensitive element when measured under specified reference conditions (see Figure 1)

NOTE PTC thermistors may have more than one resistance/temperature characteristic specified. The zero-power resistance of the resistance/temperature characteristics can be measured using a pulse voltage (U_{pulse}) higher than 1,5 V, which is specified in the detail specification. The right curve in Figure 1 shows the typical resistance/temperature characteristic when using the pulse voltage (U_{pulse}).