

Directly heated negative temperature coefficient thermistors - Part 2: Sectional specification - Surface mount negative temperature coefficient thermistors (IEC 60539-2:2003)

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 60539-2:2004](https://standards.iteh.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004)  
<https://standards.iteh.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 60539-2:2004

<https://standards.iteh.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004>

English version

**Directly heated negative temperature coefficient thermistors  
Part 2: Sectional specification -  
Surface mount negative temperature coefficient thermistors  
(IEC 60539-2:2003)**

Thermistors à coefficient de température  
négatif à chauffage direct  
Partie 2: Spécification intermédiaire -  
Montage en surface de thermistors  
à coefficient de température négatif  
(CEI 60539-2:2003)

Direkt geheizte temperaturabhängige  
Widerstände mit negativem  
Temperaturkoeffizienten  
Teil 2: Rahmenspezifikation -  
Oberflächenmontierbare  
temperaturabhängige Widerstände  
mit negativem Temperaturkoeffizienten  
(IEC 60539-2:2003)

iTeh STANDARD PREVIEW  
(standards.itech.ai)

SIST EN 60539-2:2004

<https://standards.itech.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004>

This European Standard was approved by CENELEC on 2004-02-01. 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, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and 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**

## Foreword

The text of document 40/1346/FDIS, future edition 1 of IEC 60539-2, 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 60539-2 on 2004-02-01.

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) 2004-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-02-01

Annex ZA has been added by CENELEC.

---

## Endorsement notice

The text of the International Standard IEC 60539-2:2003 was approved by CENELEC as a European Standard without any modification.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 60539-2:2004](https://standards.iteh.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004)

<https://standards.iteh.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004>

**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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-2	1974	Basic environmental testing procedures Part 2: Tests - Tests B: Dry heat	EN 60068-2-2 <sup>1)</sup>	1993
A1	1993		A1	1993
A2	1994		A2	1994
IEC 60068-2-14	1984	Part 2: Tests - Test N: Change of temperature		
+ A1	1986		EN 60068-2-14	1999
IEC 60068-2-30	1980	Part 2: Tests - Test Db and guidance, Damp heat, cyclic (12 + 12 hour cycle)		
+ A1	1985		EN 60068-2-30	1999
IEC 60068-2-58	1999	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	1999
IEC 60068-2-78	- 2)	Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2001 3)
IEC 60410	1973	Sampling plans and procedures for inspection by attributes	-	-
IEC 60539-1	2002	Directly heated negative temperature coefficient thermistors Part 1: Generic specification	EN 60539-1	2002

1) EN 60068-2-2 includes supplement A:1976 to IEC 60068-2-2.

2) Undated reference.

3) Valid edition at date of issue.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 60539-2:2004

<https://standards.iteh.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004>

# INTERNATIONAL STANDARD

# IEC 60539-2

First edition  
2003-11

---

---

## Directly heated negative temperature coefficient thermistors –

### Part 2:

### Sectional specification –

### Surface mount negative temperature coefficient thermistors (standards.iteh.ai)

[SIST EN 60539-2:2004](https://standards.iteh.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004)

<https://standards.iteh.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004>

© IEC 2003 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland  
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: [inmail@iec.ch](mailto:inmail@iec.ch) Web: [www.iec.ch](http://www.iec.ch)



Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE

**S**

*For price, see current catalogue*

## CONTENTS

FOREWORD .....	4
1 General .....	6
1.1 Scope .....	6
1.2 Normative references .....	6
1.3 Information to be given in a detail specification.....	6
1.3.1 Outline drawing and dimensions .....	7
1.3.2 Mounting.....	7
1.3.3 Ratings and characteristics .....	7
1.4 Terminology.....	7
2 Preferred ratings and characteristics.....	7
2.1 Tolerances on rated zero-power resistance .....	7
2.2 Climatic categories .....	7
3 Quality assessment procedures .....	8
3.1 Primary stage of manufacture .....	8
3.2 Structurally similar components .....	8
3.3 Qualification approval procedures.....	8
3.3.1 The manufacturer shall comply with 3.4 of IEC 60539-1.....	8
3.4 Quality conformance inspection .....	8
3.4.1 Qualification approval on the basis of the fixed sample size procedure .....	8
3.5 Quality conformance inspection .....	10
3.5.1 Formation of inspection lots .....	10
3.5.2 Test schedule .....	11
3.5.3 Delayed delivery .....	11
3.5.4 Assessment level.....	11
4 Test and measurement procedures .....	12
4.1 Mounting .....	12
4.2 Drying and recovery.....	12
4.2.1 Drying.....	12
4.2.2 Recovery .....	12
4.3 Visual examination and check of dimensions .....	12
4.3.1 Visual examination.....	12
4.3.2 Requirements .....	12
4.3.3 Marking.....	14
4.3.4 Dimensions .....	14
4.4 Electrical tests .....	14
4.4.1 Zero-power resistance .....	14
4.4.2 B-value or resistance ratio .....	14
4.4.3 Resistance/temperature characteristic .....	15
4.5 Thermal tests.....	15
4.5.1 Dissipation factor ( $\delta$ ).....	15
4.5.2 Thermal time constant by cooling after self-heating ( $\tau_c$ ).....	15



4.6	Resistance to soldering heat .....	15
4.6.1	Initial measurement .....	15
4.6.2	Test conditions .....	15
4.6.3	Recovery .....	16
4.6.4	Final inspection, measurements and requirements .....	16
4.7	Solderability .....	16
4.7.1	Test conditions .....	16
4.7.2	Recovery .....	17
4.7.3	Final inspection, measurements and requirements .....	17
4.8	Rapid change of temperature .....	17
4.9	Thermal shock.....	17
4.10	Climatic sequence .....	18
4.10.1	Initial measurements .....	18
4.10.2	Dry heat .....	18
4.10.3	Damp heat (cyclic), first cycle .....	18
4.10.4	Cold .....	18
4.10.5	Damp heat (cyclic), remaining cycles.....	18
4.10.6	Final measurements .....	19
4.11	Damp heat, steady state.....	19
4.12	Endurance.....	19
4.12.1	Endurance at $\theta_3$ and $P_{max}$ .....	19
4.12.2	Endurance at upper category temperature .....	19
4.13	Shear (adhesion) test .....	20
4.14	Substrate bending test .....	20
4.15	Component solvent resistance.....	20
4.16	Solvent resistance of marking.....	20
Annex A (normative) Guide for the specification and coding of dimensions of surface mount negative temperature coefficient thermistors .....		21
Table 1 – Upper and lower category temperatures and duration of the damp heat test.....		8
Table 2 – Fixed sample size test schedule for qualification approval of surface mount negative temperature coefficient thermistors Assessment level EZ .....		10
Table 3 – Lot-by-lot inspection .....		11
Table 4 – Periodic test .....		12
Table 5 – Number of cycles .....		18
Table A.1 – Dimensions .....		21
Figure 1 – Fault: fissure or defect .....		13
Figure 2 – Fault: crack .....		13
Figure 3 – Separation or delamination .....		13
Figure 4 – Exposed electrodes.....		13
Figure 5 – Principal faces .....		14
Figure A.1 – Dimensioning of surface mount thermistors.....		21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

DIRECTLY HEATED NEGATIVE TEMPERATURE COEFFICIENT THERMISTORS –

Part 2: Sectional specification – Surface mount negative temperature coefficient thermistors

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60539-2 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

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

FDIS	Report on voting
40/1346/FDIS	40/1368/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 committee has decided that the contents of this publication will remain unchanged until 2008. At this date, the publication will be

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

A bilingual edition of this document may be issued at a later date.

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

SIST EN 60539-2:2004

<https://standards.iteh.ai/catalog/standards/sist/e7fc3b49-7bec-4ab7-90dd-fc2b0428019e/sist-en-60539-2-2004>