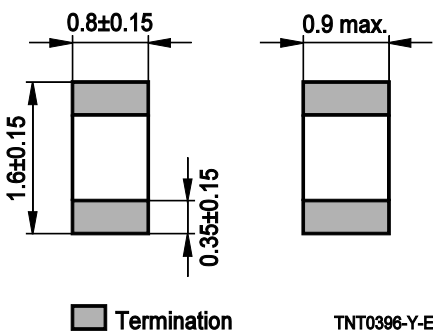


<p>Specification available from:</p> <p>Österreichischer Verband für Elektrotechnik (OVE) Eschenbachgasse 9 A-1010 VIENNA</p>	<p>IEC 60539-2-1 AT0001 Issue 2 / 2023-03</p>
<p>ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH:</p> <p>IEC 60539-1:2022-12 IEC 60539-2:2019</p>	<p>IEC/PAS 60539-1-1: 2016-04</p>
<p>Outline drawing: [see 1.2] SMD NTC EIA size 0603</p>  <p> Termination </p> <p>TNT0396-Y-E</p>	<p>DIRECTLY HEATED NEGATIVE TEMPERATURE COEFFICIENT THERMISTORS – SENSING APPLICATION</p> <p>Surface mount negative temperature coefficient thermistors</p> <p>Assessment level: EZ</p>

Information on the availability of components qualified to this detail specification is given in the Register of Approvals

1. General data

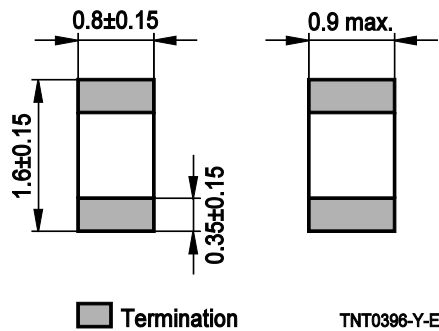
1.1 Method(s) of mounting

If not otherwise specified the SMD Thermistors shall be soldered as follows, according to IEC 6068-2-58:

- Soldering on 1,6 mm thick epoxide woven glass fabric laminated printed board.
- Method of soldering: Reflow. Peaktemperature 260°C details see datasheet
- Solder paste: Sn96,5-Ag3,0-Cu0,5.

Note: After soldering a recovery time of 24h must be considered (before measurements on PCB).

1.2 Dimensions



1.3 Coating

Not organic coated NTC thermistors with glass passivation

1.4 Terminations

The terminations are suitable for soldering.

1.5 Flammability

Not applicable

1.6 Resistance to solvents

Not applicable

1.7 Packaging

SMD NTC thermistors are taped according to IEC 60286-3.

1.8 Electrical data/ratings and characteristics

Upper/Lower category temperatures: $\theta_{max} = 150^{\circ}\text{C}$ / $\theta_{min} = -40^{\circ}\text{C}$

Zero-power resistance (R_T); according table b)

B-value; according table b)

Resistance-temperature characteristics; (R_T at T_R and $B_{(25/100)}$) according table b)

Maximum power dissipation at ambient temperature $\theta_3 = 65^{\circ}\text{C}$ ($P_{max \theta R}$): 180 mW

Highest Temperature at which the maximum power can be dissipated Temperature $T_3=65^{\circ}\text{C}$

Table b) Electrical specification

ordering code / type code	R_T [Ω]	R_T -tol. [%]	T_R [$^{\circ}\text{C}$]	R_{25} [Ω]	R_{25} -tol. [%]	R_{100} [Ω]	R_{100} - tol. [%]	$B(25/100)$ [K]	B -tol. [%]
B57357V5104A160	100.000	1	25	100.000	1	6238	6,6	4131	2
B57357V5104F360	100.000	1	25	100.000	1	6238	6,6	4121	2
B57343V5103A360	10.000	1	25	10.000	1	868,4	4,2	3624	1

1.9 Related documents

IEC 60539-1:2022-12, Thermistors – Directly heated negative temperature coefficient – Part 1: Generic specification

IEC 60539-2: 2019-07 “Directly heated negative temperature coefficient thermistors – Part 2: Sectional specification – Surface mount negative temperature coefficient thermistors”

1.10 Marking

No marking on the Thermistor

Marking on the package with bar code label:

- Manufacturer – logo
- Resistance value
- NTC THERMISTOR
- Date code

Note:

For part number, when “0”, “00” and “000” next after the letters, respectively, they display as one/ two/ three blank space in the label.

1.11 Ordering information

SMD NTC thermistors for automotive applications

Example: Chip size 0603, $B_{25/100} = 4000 \text{ K} \pm 3\%$, $R_{25} = 10 \text{ k}\Omega \pm 5\%$, cardboard tape, 180-mm reel

B57	3	51	V5	103	J	0	60
NTC thermistor							
Series: 2 \triangleq EIA chip size 0402 (1005) 3 \triangleq EIA chip size 0603 (1608) 4 \triangleq EIA chip size 0805 (2012)							
B value code							
Multilayer SMD NTC thermistor V5 \triangleq automotive series							
Resistance at rated temperature (25 °C): 103 = $10 \cdot 10^3 \Omega = 10 \text{ k}\Omega$							
Resistance tolerance: F = $\pm 1\%$, G = $\pm 2\%$, H = $\pm 3\%$, J = $\pm 5\%$, A = customer specific							
Internal coding							
Packaging codes: 60 \triangleq cardboard tape, 180-mm reel 62 \triangleq blister tape, 180-mm reel 70 \triangleq cardboard tape, 330-mm reel 72 \triangleq blister tape, 330-mm reel							

1.12 Additional information (not for inspection purposes)

None.

1.13 Additional or increased severities or requirements to those specified in the generic sectional specification

Inspection requirements

2.1 Procedures

- 2.1.1** For qualification approval, the procedures shall be in accordance with the generic specification, IEC 60539-1:2022-12 / Annex Q
- 2.1.2** For quality conformance inspection, the test schedules (tables 1 and 2) include sampling, periodicity, severities and requirements. The formation of inspection lots is covered by the generic specification IEC 60539-1:2022-12/ Annex Q.

The following list applies to the test schedules developed in tables 1 and 2:

- 1) Sub-clause numbers of tests and performance requirements refer to the generic specification IEC 60539-2.
- 2) Number to be tested: sample size as directly allotted to the code letter for IL of EC 61193-2 (Single sampling plan for normal inspection).
- 3) In these tables: p is the periodicity (in months)
n is the sample size
c is the acceptance criterion (permitted number of non-conforming items)
D indicates a destructive test
ND indicates a non-destructive test
IL is the inspection level
- 4) The temperature at which the zero-power resistance shall be measured is the temperature specified in the detail specification. This temperature shall be stated, where required, in the test schedule.
- 5) The specimens used for this group may, at the discretion of the manufacturer, be used for any subsequent group which is identified as being "destructive".
- 6) The soldering – solderability and soldering resistance to heat tests – shall only be applied where the thermistor has terminations which are appropriate for soldering.
- 7) 100 % testing shall be followed by re-inspection by sampling. The sampling level shall be established by the manufacturer. In case one or more non-conforming items occur in a sample, this lot shall be blocked and treated according to the procedure for non-conforming products and special release.
- 8) IL for subgroup B deviant to IEC 60539-2:2019 requirement: Changed from S-3 to S-2.

Table 1 - Test schedule for quality conformance inspection: lot-by-lot

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and criterion of acceptability (see list item 3)			Performance requirements (see list item 1)
			IL	n	c	
GROUP A INSPECTION						
Subgroup A0						
7.4.1 Zero power resistance R_T	ND	R_{25}	100% (see list item 7)			according the detail specification 1.8
Subgroup A1						
7.3.1 Visual examination	ND	According OIP	100% (see list item 7)			According 7.3.1
Subgroup A2						
7.3.3 Marking 7.3.4 Dimensions	ND	not applicable l, w, h, k	100% (see list item 7)			AOI
GROUP B INSPECTION						
Subgroup B1						
7.4.2 B-Value 7.4.3 Resistance/temp. characteristic	ND	$B_{25/100}$ $R_{25} (R_T), R_{100}$ Resistance-temperature curve	S-2	2)	0	according the detail specification 1.8
Subgroup B2						
7.7 Solderability 7.15 Solvent resistance of marking	D	IEC 60068-2-58 Test Td1, Method 2: Reflow method $T_{peak} = 235^{\circ}\text{C}, t = 10\text{s}$ Not applicable	S-2	2)	0	Leaching on edges $\leq 25\%$

Table 2 - Test schedule for quality conformance inspection: periodic

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and criterion of acceptability (see list item 3)			Performance requirements (see list item 1)
			p	n	c	
GROUP C INSPECTION						
Subgroup C1						
7.6 Resistance to soldering heat	ND	IEC 60068-2-58 Method 2: Reflow method $T_{peak} = 260\text{-}/+5^{\circ}\text{C}$, $t_3 \leq 10\text{s}$ Visual examination Zero power resistance R_{25}	12	10	0	Leaching on edges $\leq 25\%$ $\Delta R_{25}/R_{25}: \pm 1\%$
Subgroup C2						
7.5.1 Dissipation factor	ND		12	20		Not specified
7.5.2 Thermal time constant by cooling after self-heating	ND		12	20		Not specified
7.8 Rapid change of temperature	ND	IEC60068-2-14; Test Na $T_A = -40\pm 3^{\circ}\text{C}$ $T_B = 150\pm 2^{\circ}\text{C}$ Dwell time: $t = 30\text{min}$, 100 cycles, Visual examination Zero power resistance R_{25}	12	20	0	No visible damage $\Delta R_{25}/R_{25}: \pm 5\%$
7.10 Damp heat, steady state	ND	IEC 60068-2-78, Ca Temperature: $40\pm 2^{\circ}\text{C}$ Humidity: $93\pm 3\%rF$ Duration: $t = 56\text{ d}$ Visual examination Zero power resistance R_{25}	12	20	0	No visible damage $\Delta R_{25}/R_{25}: \pm 5\%$

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and criterion of acceptability (see list item 3)			Performance requirements (see list item 1)
			p	n	c	
Subgroup C3						
7.11.1 Endurance at θ_3 and $P_{\max \theta}$	ND	IEC 60539-1:2022-12 8.6.4 1000h $\theta_3 = 65^\circ\text{C}$ and $P_{\max \theta} = 180\text{mW}$ intermediate measurements at 168h and 500h	12	20	0	No visible damage $\Delta R_{25}/R_{25}: \pm 5\%$
7.11.2 Endurance at upper category temperature	ND	IEC 60539-1:2022-12 8.6.5 $T = 150 \pm 2^\circ\text{C}$, $t = 1000\text{h}$ intermediate measurements at 168h and 500h	12	20	0	No visible damage $\Delta R_{25}/R_{25}: \pm 5\%$
Subgroup C4						
7.13 Substrate bending test	ND	IEC 60068-2-21 Test Ue1: Bending $d = 2\text{ mm}$, $t = 20 \pm 1\text{ s}$. One bending. Visual examination Zero power resistance R_{25}	12	10	0	No visible damage $\Delta R_{25}/R_{25}: \pm 2\%$
7.12 Robustness of terminations – Shear test	ND	IEC 60068-2-21 Test Ue3: Force $F = 5\text{ N}$, $t = 10 \pm 1\text{ s}$. Zero-power resistance R_{25} Visual examination	12	10	0	No visible damage $\Delta R_{25}/R_{25}: \pm 2\%$