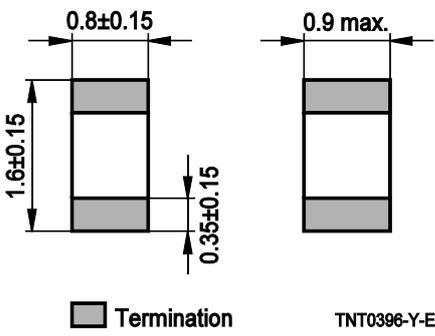


<p>Specification available from:</p> <p>Österreichischer Verband für Elektrotechnik (OVE) Eschenbachgasse 9 A-1010 VIENNA</p>	<p>IEC 60539-2-1 AT0001 Issue 1 / 2021-09</p>
<p>ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH:</p> <p>IEC 60539-1:2016-04 IEC 60539-1:2016/COR1:2017 IEC 60539-2:2019</p>	<p>IEC/PAS 60539-1-1: 2016-04</p>
<p>Outline drawing: [see 1.2] SMD NTC EIA size 0603</p>  <p> <span style="display: inline-block; width: 10px; height: 10px; background-color: grey; border: 1px solid black; margin-right: 5px;"></span> 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

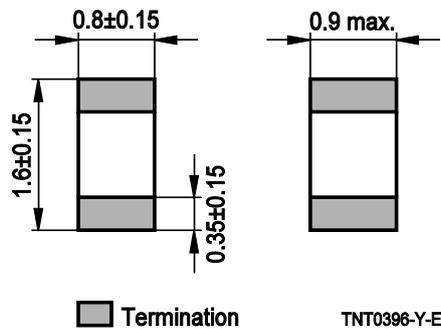
### 1.1 Method(s) of mounting

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	$R_T$ [ $\Omega$ ]	$R_T$ -tol. [%]	$T_R$ [ $^{\circ}\text{C}$ ]	$R_{25}$ [ $\Omega$ ]	$R_{25}$ -tol. [%]	$R_{100}$ [ $\Omega$ ]	$R_{100}$ - 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

## 1.9 Related documents

IEC 60539-1:2016-04, 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, 2016-4 4.4 / 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 60539-1,2016-4 4.4 / 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	
<b>GROUP A INSPECTION</b>						
<b>Subgroup A0</b>						
7.4.1 Zero power resistance $R_T$	ND	$R_{25}$	100% (see list item 7)			according the detail specification 1.8
<b>Subgroup A1</b>						
7.3.1 Visual examination	ND	According OIP	100% (see list item 7)			According 7.3.1
<b>Subgroup A2</b>						
7.3.3 Marking 7.3.4 Dimensions	ND	not applicable l, w, h, k	100% (see list item 7)			AOI
<b>GROUP B INSPECTION</b>						
<b>Subgroup B1</b>						
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
<b>Subgroup B2</b>						
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	
<b>GROUP C INSPECTION</b>						
<b>Subgroup C1</b>						
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 $\leq 25\%$ $\Delta R_{25}/R_{25}: \pm 1\%$
<b>Subgroup C2</b>						
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	
<b>Subgroup C3</b>						
7.11.1 Endurance at $\theta_3$ and $P_{\max \theta}$	ND	IEC 60539-1:2016 5.25.4 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 60539-1:2016 5.25 $T = 150 \pm 2^\circ\text{C}$ , $t = 1000\text{h}$ intermediate measurements at 168h and 500h	12	20	0	No visible damage $\Delta R_{25}/R_{25}: \pm 5\%$
<b>Subgroup C4</b>						
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 $\Delta R_{25}/R_{25}: \pm 2\%$