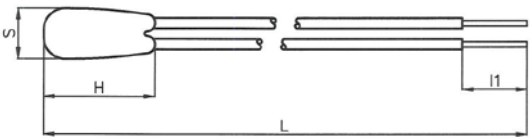


<p>Specification available from:</p> <p>Österreichischer Verband für Elektrotechnik (OVE) Eschenbachgasse 9 A-1010 VIENNA</p>	<p>IEC 60539-1-1 AT0003 Issue 1/ 2020-05</p>
<p>ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH:</p> <p>IEC 60539-1:2016-04 IEC 60539-1:2016/COR1:2017</p>	
<p>Outline drawing: [see 1.2]</p>  <p>[Other shapes are permitted within the dimensions given]</p>	<p>DIRECTLY HEATED NEGATIVE TEMPERATURE COEFFICIENT THERMISTORS – SENSING APPLICATION</p> <hr/> <p>Miniature sensors with bendable wires</p> <hr/> <p>Assessment level: EZ</p>

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

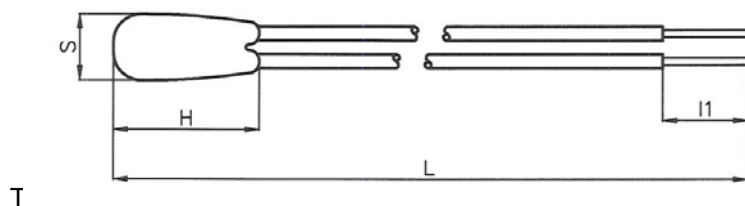
1. General data

1.1 Method(s) of mounting

Not applicable (for surface mount thermistors only)

1.2 Dimensions

Drawing:



Ordering code/Type	Head diameter max (S)	Head length max (H)	component length (L)	stripped ends (l1)
B57861S4302F040/ S4861/3k/F40 ¹⁾	2,41	6,5	X	Y
B57861S4473A001/ S4861/10k/A 1	2,6	6,5	X	Y
B57861S4103A001/ S4861/47k/A 1	2,6	6,5	X	Y

¹⁾ Alternative customer specific type S4861/3k/A1 (same ratings, customer specific lead)

All dimensions are in millimetres

X: Customer specific length in a range between 15 mm to 200mm

Y: Customer specific length in a range between 1 mm to 30mm

1.3 Coating

NTC thermistors are coated with epoxy resin.

The colour of the epoxy resin is black.

Insulation specification according 1.8.

1.4 Terminations

The types S4861* have AWG 28/30 Silver plated Copper wires with insulation. They are suitable for soldering, welding, clamping or crimping.

1.5 Flammability

No flammability specified

1.6 Resistance to solvents

Not applicable.

1.7 Packaging

Bulk packed.

1.8 Electrical data/ratings and characteristics

Upper/Lower category temperatures: $\theta_{max} = 155^{\circ}\text{C}$ / $\theta_{min} = -55^{\circ}\text{C}$

Rated/ nominal zero-power resistance (R_N); according table b)

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

Maximum power dissipation at ambient temperature $\theta_3 = 25^{\circ}\text{C}$ ($P_{max \theta R}$): 60 mW

B-value; according table b)

Isolation voltage (insulated thermistors only); according table c)

Insulation resistance; > 100 MOhm

Table b) R/T data

ordering code / type code	R _N [Ω]	R _N -tol. [%]	T _N [°C]	R ₂₅ [Ω]	R ₂₅ -tol. [%]	R ₁₀₀ [Ω]	R ₁₀₀ -tol. [%]	B(25/100) [K]	B-tol. [%]
B57861S4302F040 S4861/3k/F40 ¹⁾	3000	1,0	25	3000	1,0	204	3,74	3988	1,0
B57861S4473A001 S4861/47k/A 1	11775	3,5	60	46578	4,2	3218	4,2	3964	0,5
B57861S4103A001 S4861/10k/A 1	6531	1,0	35	10000	1,5	680	3,3	3988	1,0

Table c) other specification requirements

ordering code / type code	Dissipation factor* [mW/K]	Cooling time constant * [sec.]	Min. voltage proof [V ac]
B57861S4302F040 S4861/3k/F40 ¹⁾	1.5	15	1250
B57861S4473A001 S4861/47k/A 1	1,5	17	1250
B57861S4103A001 S4861/10k/A 1	1,5	17	1250

¹⁾ Alternative customer specific type S4861/3k/A1 (same ratings, customer specific lead)

* The specified parameter of dissipation factor and cooling time constant are typical values. The limits are ±50%.

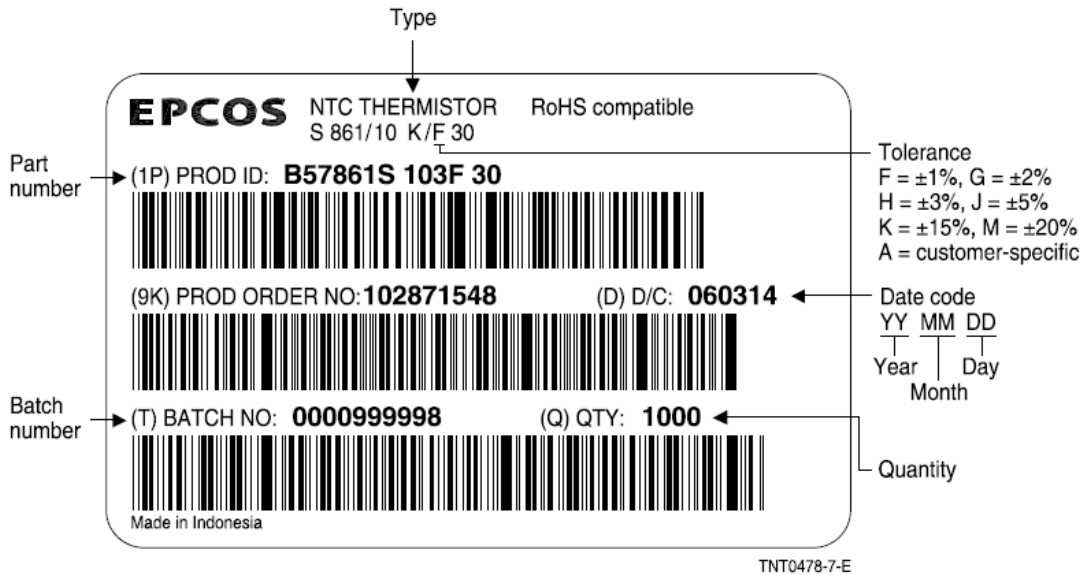
1.9 Related documents

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

1.10 Marking

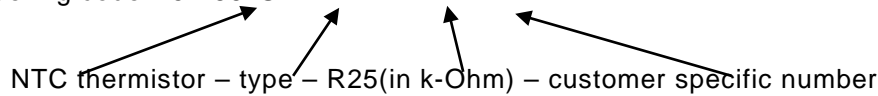
No marking on the Thermistor.

Marking on the package with bar code label:



1.11 Ordering information

Ordering code: B57-86xS4-xxx-xxxx



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

None.

Inspection requirements

2.1 Procedures

- 2.1.1 For qualification approval, the procedures shall be in accordance with the generic specification, IEC 60539-1, 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, 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 60539-1.
- 2) Number to be tested: sample size as directly allotted to the code letter for IL of IEC 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) Where the terminations are stated to be suitable for printed wiring applications, the appropriate test conditions in IEC 60068-2-58 shall apply.
- 8) The thermistors shall be mounted by their normal means.
- 9) The bump test and the shock test are alternatives. The test selected in the detail specification shall be used.
- 10) The detail specification shall specify which test is appropriate to the construction and application of the thermistor for measuring the thermal time constant.
- 11) Any deviation from annex B of the generic specification shall be given in the detail specification.
- 12) 100 % testing shall be followed by re-inspection by sampling in order to monitor outgoing quality level by non-conforming items per million ($\times 10^{-6}$). The sampling level shall be established by the manufacturer. For the calculation of $\times 10^{-6}$ values any parametric failure shall be counted as a non-conforming item. In case one or more non-conforming items occur in a sample, this lot shall be rejected.

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 5.6 Zero power resistance R_T	ND		100% (see list item 12)			according the detail specification 1.7
Subgroup A1 5.5.1 Visual examination	ND	According OIP	S-4	2)	0	According 5.5.1
Subgroup A2 5.5.1 Marking 5.5.2 Dimensions	ND	Not applicable S, H, L, I1	S-4	2)	0	according the detail specification 1.2
GROUP B INSPECTION						
Subgroup B1 5.7 B-Value 5.10 Resistance/temp. characteristic	ND	R_{25} , R_{100} R_T , R_{25} , R_{100}	S-2	2)	0	according the detail specification 1.8 according the detail specification 1.8
Subgroup B2 5.9 Voltage proof 5.16 Solderability	ND	(Insulated thermistors only) Method: 5.9.2 Metal balls method (1.6 ± 0.2 mm) Applied voltage: according the detail specification 1.8. $t = 60 \pm 5$ s IEC 60068-2-20 Test T_a , Method 1: Solder bath Pb-free: $245^\circ\text{C} \pm 5^\circ\text{C}$, 3 s <u>Alternative condition:</u> Pb: $T = 235^\circ\text{C} \pm 3^\circ\text{C}$, 2 s	S-2	2)	0	No breakdown/flashover Wetting of the wire >95%

Table 2 - Test schedule for quantity 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 C1A						
Part of sample						
5.15 Resistance to soldering heat	D	IEC 60068-2-20 Test Tb, Method 1: solder bath Bath temp. 260°C±3°C Duration: 5 sec. (only stripped ends dipped into the bath) Visual examination Zero power resistance R ₂₅	6	5	0	No visible damage Δ R ₂₅ /R ₂₅ : ±1%
5.14 Robustness of terminations		IEC 60068-2-21 Tensile strength: Ua1, F: 1±0.1N; t: 10sec; Bending strength: Ub: 2 bends 90°; F: 0.5±0.05N Bending strength: Ub: Torsion Uc: 2x 180° Visual examination Zero power resistance R ₂₅				No visible damage Δ R ₂₅ /R ₂₅ : ±1%
Subgroup C1B						
Other part of sample						
5.17 Rapid change of temperature	D	IEC 60068-2-14; Test Na T _A : -55±2°C T _B : 155±2°C Exposure time: 15 min, 100 cycles, Visual examination Zero power resistance R ₂₅	6	5	0	No visible damage Δ R ₂₅ /R ₂₅ : ±3%
5.18 Vibration		IEC 60068-2-6 Frequency range: 10 – 55Hz; Amplitude: 0,75 mm or Acceleration: 100 m/s ² Endurance: 6h Visual examination Zero power resistance R ₂₅				No visible damage Δ R ₂₅ /R ₂₅ : ±1%
5.19 Bump		IEC 60068-2-27 Acceleration: 400 m/s ² Number of shocks: 4000 (each direction) Duration: 6 ms Visual examination Zero power resistance R ₂₅				No visible damage Δ R ₂₅ /R ₂₅ : ±1%
4.20 Shock		Not specified.				No visible damage Δ R ₂₅ /R ₂₅ : ±1%

Table 2 - Test schedule for quantity 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	
Subgroup C1 Combined sample of specimens of subgroups C1A and C1B 4.24 Dry heat 5.32 Climatic sequence Temperature / humidity cycle Final measurement	D	IEC 60068-2-2 T = 155±2°C, t = 16h IEC 60068-2-38 Damp heat: 10 cycles - first 5 cycles with cold, - next 5 cycles without cold: T = 25±2°C, 65±2°C 93±3% r.H.; Cold: T = -10±2°C, t=3h Visual examination Zero power resistance R ₂₅ Insulation resistance 5.8 (Insulated thermistors only): Metal balls method (1.6±0.2mm) U =500±15V, t = 60±5s Voltage proof 5.9 (Insulated thermistors only): Metal balls method (1.6±0.2mm) Applied voltage: according the detail specification, t = 60±5s	6	10	0	No visible damage Δ R ₂₅ /R ₂₅ : ±2% R _{IS} > 100 MOhm No breakdown/flashover
GROUP D INSPECTION						
Subgroup D1 5.11 Power dissipation 5.12 Thermal time constant by ambient temperature change 5.13 Thermal time constant by cooling after self-heating	D	T _b = 85±2°C Dissipation factor in still air at T = 25±5°C. Not specified T _a = 25±2°C, T _b =85±2°C Measurement in still air at T = 25±5°C. τ after T _i = T _b - (T _b - T _a)x0,632	6	10	0	according the detail specification 1.8 according the detail specification 1.8

Table - Test schedule for quantity 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	
Subgroup D2 5.25.5 Endurance at upper category temperature	D	Temperature: 155±2°C Duration: 1000h Zero power resistance R ₂₅ Examination at 168h, 500h and 1000h Visual examination Zero power resistance R _T	12	10	0	No visible damage Δ R ₂₅ /R ₂₅ : ±3%
Subgroup D3 5.25.4 Endurance at θ ₃ and P _{max θ}	D	Temperature: θ ₃ = 25±2°C P _{max} : according the detail specification 1.8. Duration: 1000h Examination at 168h, 500h and 1000h: Visual examination Zero power resistance R ₂₅	12	10	0	No visible damage Δ R ₂₅ /R ₂₅ : ±3%
Subgroup D4 5.24 Damp heat, steady state	D	IEC 60068-2-78, Cab Temperature: 40±2 °C Humidity: 93±3%rF U _{NTC} = 0.3V Duration: 56 d Visual examination Zero power resistance R ₂₅ Insulation resistance 5.8 (Insulated thermistors only): Metal balls method (1.6±0.2mm) U =500±15V, t = 60±5s Voltage proof 5.9 (Insulated thermistors only) Metal balls method (1.6±0.2mm) Applied voltage: according the detail specification, t = 60±5s	12	10	0	No visible damage Δ R ₂₅ /R ₂₅ : ±2% R _{IS} > 100 MOhm No breakdown/flashover