



NTC thermistors for temperature measurement

Miniature sensors,
lead spacing 2.5 mm

Series/Type: **B57962**
Date: March 2006

Applications

- Heating and air conditioning systems
- Industrial electronics
- Automotive electronics

Features

- Fast response
- High measuring accuracy
- Different tolerances available
- Epoxy resin encapsulation
- Improved resistance to humidity
- Insulated leads of silver-plated nickel wire, AWG 30 (black)
- Lead spacing 2.5 mm

Options

Non-standard lead lengths
AWG 26 on request

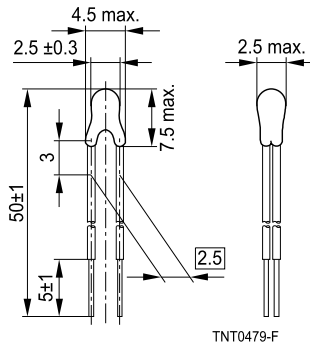
Delivery mode

Bulk

General technical data

Climatic category	(IEC 60068-1)	P_{25}	55/155/56	
Max. power	(at 25 °C)	$\Delta R_R/R_R$	60	mW
Resistance tolerance		T_R	$\pm 1, \pm 3, \pm 5$	%
Rated temperature		δ_{th}	25	°C
Dissipation factor	(in air)	τ_c	approx. 1.6	mW/K
Thermal cooling time constant	(in air)	C_{th}	approx. 16	s
Heat capacity			approx. 26	mJ/K

Dimensional drawing



Dimensions in mm

Approx. weight 60 mg

Electrical specification and ordering codes

R_{25} Ω	No. of R/T characteristic	$B_{25/100}$ K	Ordering code
2795	8016	3988 ±1%	B57962S0282+001

+ = Resistance tolerance

F = ±1%

H = ±3%

J = ±5%

Note

The type series S962 has a specially designed insulation (coating, wire coating) to withstand the immersion test in water of 1000 h, 25 °C. Therefore these sensors must be protected to avoid any damage of the insulation material during handling and in the application.

Reliability data

Test	Standard	Test conditions	$\Delta R_{25}/R_{25}$ (typical)	Remarks
Storage in dry heat	IEC 60068-2-2	Storage at upper category temperature T: 155 °C t: 1000 h	< 2%	No visible damage
Storage in damp heat, steady state	IEC 60068-2-78	Temperature of air: 40 °C Relative humidity of air: 93% Duration: 56 days	< 1%	No visible damage
Rapid temperature cycling	IEC 60068-2-14	Lower test temperature: –55 °C Upper test temperature: 155 °C Number of cycles: 100	< 2%	No visible damage
Immersion test		Test voltage 2.7 VDC on NTC over protective resistor, sensors immersed into water, ambient temperature (25 °C), voltage switched on 5 h switched off 1 h. t: 1000 h	< 2%	No visible damage
Long-term stability (empirical value)		Temperature: 70 °C t: 10000 h	< 3%	No visible damage

R/T characteristics

	B57962S0282F001					
R/T No.	8016					
T (°C)	$B_{25/100} = 3988 \text{ K}$, $R_{25} = 2795 \Omega$, $T_R = 25 \text{ °C}$, $\Delta R_R/R_R = \pm 1\%$					
	$R_{\text{noml}}[\Omega]$	$R_{\text{minl}}[\Omega]$	$R_{\text{maxl}}[\Omega]$	$\Delta R_R/R_R[\pm\%]$	$\Delta T[\pm\text{°C}]$	$\alpha (\%/K)$
-55.0	269170	253140	285200	6.0	0.8	7.4
-50.0	187290	176910	197680	5.5	0.8	7.1
-45.0	131840	125040	138630	5.2	0.7	6.9
-40.0	94052	89557	98547	4.8	0.7	6.7
-35.0	67804	64807	70801	4.4	0.7	6.4
-30.0	49471	47455	51488	4.1	0.7	6.2
-25.0	36438	35074	37803	3.7	0.6	6.0
-20.0	27131	26201	28061	3.4	0.6	5.8
-15.0	20384	19747	21020	3.1	0.6	5.6
-10.0	15465	15027	15902	2.8	0.5	5.4
-5.0	11827	11526	12128	2.5	0.5	5.3
0.0	9126	8918	9333	2.3	0.4	5.1
5.0	7096	6953	7239	2.0	0.4	5.0
10.0	5562	5464	5660	1.8	0.4	4.8
15.0	4390	4324	4457	1.5	0.3	4.7
20.0	3491	3446	3536	1.3	0.3	4.5
25.0	2795	2767	2823	1.0	0.2	4.4
30.0	2252	2223	2281	1.3	0.3	4.3
35.0	1826	1798	1853	1.5	0.4	4.1
40.0	1489	1464	1514	1.7	0.4	4.0
45.0	1221	1198	1244	1.9	0.5	3.9
50.0	1007	986.0	1028	2.1	0.5	3.8
55.0	834.6	815.7	853.6	2.3	0.6	3.7
60.0	695.4	678.3	712.5	2.5	0.7	3.6
65.0	582.2	566.9	597.5	2.6	0.8	3.5
70.0	489.7	476.0	503.4	2.8	0.8	3.4
75.0	414.0	401.7	426.3	3.0	0.9	3.3
80.0	351.6	340.6	362.6	3.1	1.0	3.2
85.0	299.7	289.9	309.6	3.3	1.0	3.2
90.0	256.5	247.7	265.3	3.4	1.1	3.1
95.0	220.4	212.5	228.3	3.6	1.2	3.0
100.0	190.1	183.0	197.2	3.7	1.3	2.9
105.0	164.5	158.1	170.9	3.9	1.4	2.9
110.0	142.9	137.1	148.6	4.0	1.4	2.8
115.0	124.5	119.3	129.7	4.2	1.5	2.7
120.0	108.8	104.2	113.5	4.3	1.6	2.7
125.0	95.51	91.29	99.72	4.4	1.7	2.6
130.0	84.10	80.29	87.91	4.5	1.8	2.5
135.0	74.19	70.74	77.64	4.7	1.9	2.5

Temperature measurement
B57962
Leaded NTCs, lead spacing 2.5 mm
S962

B57962S0282F001						
R/T No.	8016					
T (°C)	B _{25/100} = 3988 K, R ₂₅ = 2795 Ω, T _R = 25 °C, ΔR _R /R _R = ± 1%					
	R _{nom} [Ω]	R _{min} [Ω]	R _{max} [Ω]	ΔR _R /R _R [±%]	ΔT[±°C]	α (%/K)
140.0	65.63	62.49	68.76	4.8	2.0	2.4
145.0	58.23	55.38	61.07	4.9	2.1	2.4
150.0	51.79	49.20	54.38	5.0	2.2	2.3
155.0	46.21	43.85	48.58	5.1	2.3	2.3

B57962S0282H001						
R/T No.	8016					
T (°C)	B _{25/100} = 3988 K, R ₂₅ = 2795 Ω, T _R = 25 °C, ΔR _R /R _R = ± 3%					
	R _{nom} [Ω]	R _{min} [Ω]	R _{max} [Ω]	ΔR _R /R _R [±%]	ΔT[±°C]	α (%/K)
-55.0	269170	247760	290590	8.0	1.1	7.4
-50.0	187290	173160	201430	7.5	1.1	7.1
-45.0	131840	122410	141270	7.2	1.0	6.9
-40.0	94052	87676	100430	6.8	1.0	6.7
-35.0	67804	63451	72157	6.4	1.0	6.4
-30.0	49471	46466	52477	6.1	1.0	6.2
-25.0	36438	34345	38532	5.7	1.0	6.0
-20.0	27131	25658	28604	5.4	0.9	5.8
-15.0	20384	19340	21428	5.1	0.9	5.6
-10.0	15465	14718	16212	4.8	0.9	5.4
-5.0	11827	11289	12365	4.5	0.9	5.3
0.0	9126	8736	9516	4.3	0.8	5.1
5.0	7096	6811	7380	4.0	0.8	5.0
10.0	5562	5353	5771	3.8	0.8	4.8
15.0	4390	4236	4545	3.5	0.8	4.7
20.0	3491	3377	3605	3.3	0.7	4.5
25.0	2795	2711	2879	3.0	0.7	4.4
30.0	2252	2178	2326	3.3	0.8	4.3
35.0	1826	1762	1889	3.5	0.8	4.1
40.0	1489	1434	1544	3.7	0.9	4.0
45.0	1221	1174	1269	3.9	1.0	3.9
50.0	1007	965.9	1048	4.1	1.1	3.8
55.0	834.6	799.0	870.3	4.3	1.2	3.7
60.0	695.4	664.4	726.4	4.5	1.2	3.6
65.0	582.2	555.2	609.2	4.6	1.3	3.5
70.0	489.7	466.2	513.2	4.8	1.4	3.4
75.0	414.0	393.5	434.6	5.0	1.5	3.3
80.0	351.6	333.6	369.7	5.1	1.6	3.2
85.0	299.7	283.9	315.6	5.3	1.7	3.2
90.0	256.5	242.5	270.5	5.4	1.8	3.1

B57962S0282H001						
R/T No.	8016					
T (°C)	$B_{25/100} = 3988 \text{ K}$, $R_{25} = 2795 \Omega$, $T_R = 25 \text{ °C}$, $\Delta R_R/R_R = \pm 3\%$					
	$R_{\text{nom}}[\Omega]$	$R_{\text{min}}[\Omega]$	$R_{\text{max}}[\Omega]$	$\Delta R_R/R_R[\pm\%]$	$\Delta T[\pm\text{°C}]$	$\alpha \text{ (}\%/\text{K)}$
95.0	220.4	208.1	232.7	5.6	1.9	3.0
100.0	190.1	179.2	201.0	5.7	2.0	2.9
105.0	164.5	154.8	174.2	5.9	2.1	2.9
110.0	142.9	134.3	151.5	6.0	2.2	2.8
115.0	124.5	116.8	132.1	6.2	2.3	2.7
120.0	108.8	102.0	115.6	6.3	2.4	2.7
125.0	95.51	89.38	101.6	6.4	2.5	2.6
130.0	84.10	78.61	89.60	6.5	2.6	2.5
135.0	74.19	69.25	79.13	6.7	2.7	2.5
140.0	65.63	61.18	70.07	6.8	2.8	2.4
145.0	58.23	54.21	62.24	6.9	2.9	2.4
150.0	51.79	48.17	55.42	7.0	3.0	2.3
155.0	46.21	42.93	49.50	7.1	3.1	2.3

B57962S0282J001						
R/T No.	8016					
T (°C)	$B_{25/100} = 3988 \text{ K}$, $R_{25} = 2795 \Omega$, $T_R = 25 \text{ °C}$, $\Delta R_R/R_R = \pm 5\%$					
	$R_{\text{nom}}[\Omega]$	$R_{\text{min}}[\Omega]$	$R_{\text{max}}[\Omega]$	$\Delta R_R/R_R[\pm\%]$	$\Delta T[\pm\text{°C}]$	$\alpha \text{ (}\%/\text{K)}$
-55.0	269170	242380	295970	10.0	1.3	7.4
-50.0	187290	169420	205170	9.5	1.3	7.1
-45.0	131840	119770	143910	9.2	1.3	6.9
-40.0	94052	85795	102310	8.8	1.3	6.7
-35.0	67804	62095	73513	8.4	1.3	6.4
-30.0	49471	45476	53467	8.1	1.3	6.2
-25.0	36438	33616	39261	7.7	1.3	6.0
-20.0	27131	25116	29146	7.4	1.3	5.8
-15.0	20384	18932	21836	7.1	1.3	5.6
-10.0	15465	14409	16521	6.8	1.3	5.4
-5.0	11827	11053	12601	6.5	1.2	5.3
0.0	9126	8553	9698	6.3	1.2	5.1
5.0	7096	6669	7522	6.0	1.2	5.0
10.0	5562	5242	5882	5.8	1.2	4.8
15.0	4390	4148	4632	5.5	1.2	4.7
20.0	3491	3307	3675	5.3	1.2	4.5
25.0	2795	2655	2935	5.0	1.1	4.4
30.0	2252	2133	2371	5.3	1.2	4.3
35.0	1826	1725	1926	5.5	1.3	4.1
40.0	1489	1404	1574	5.7	1.4	4.0
45.0	1221	1149	1293	5.9	1.5	3.9

B57962S0282J001						
R/T No.	8016					
T (°C)	B _{25/100} = 3988 K, R ₂₅ = 2795 Ω, T _R = 25 °C, ΔR _R /R _R = ± 5%					
	R _{noml} [Ω]	R _{minl} [Ω]	R _{maxl} [Ω]	ΔR _R /R _R [±%]	ΔT[±°C]	α (%/K)
50.0	1007	945.8	1068	6.1	1.6	3.8
55.0	834.6	782.3	887.0	6.3	1.7	3.7
60.0	695.4	650.5	740.3	6.5	1.8	3.6
65.0	582.2	543.6	620.8	6.6	1.9	3.5
70.0	489.7	456.4	523.0	6.8	2.0	3.4
75.0	414.0	385.2	442.9	7.0	2.1	3.3
80.0	351.6	326.5	376.7	7.1	2.2	3.2
85.0	299.7	277.9	321.6	7.3	2.3	3.2
90.0	256.5	237.4	275.6	7.4	2.4	3.1
95.0	220.4	203.7	237.1	7.6	2.5	3.0
100.0	190.1	175.4	204.8	7.7	2.6	2.9
105.0	164.5	151.5	177.5	7.9	2.8	2.9
110.0	142.9	131.4	154.3	8.0	2.9	2.8
115.0	124.5	114.3	134.6	8.2	3.0	2.7
120.0	108.8	99.80	117.8	8.3	3.1	2.7
125.0	95.51	87.47	103.5	8.4	3.2	2.6
130.0	84.10	76.92	91.28	8.5	3.4	2.5
135.0	74.19	67.77	80.61	8.7	3.5	2.5
140.0	65.63	59.87	71.38	8.8	3.6	2.4
145.0	58.23	53.05	63.40	8.9	3.8	2.4
150.0	51.79	47.13	56.45	9.0	3.9	2.3
155.0	46.21	42.00	50.43	9.1	4.0	2.3

Cautions and warnings

General

See "Important notes" at the end of this document.

Storage

- Store thermistors only in original packaging. Do not open the package before storage.
- Storage conditions in original packaging: storage temperature $-25\text{ }^{\circ}\text{C} \dots +45\text{ }^{\circ}\text{C}$, relative humidity $\leq 75\%$ annual mean, maximum 95%, dew precipitation is inadmissible.
- Do not store SMDs where they are exposed to heat or direct sunlight. Otherwise, the packing material may be deformed or SMDs may stick together, causing problems during mounting.
- Avoid contamination of thermistors surface during storage, handling and processing.
- Avoid storage of thermistor in harmful environments like corrosive gases (SO_x, Cl etc).
- After opening the factory seals, such as polyvinyl-sealed packages, use the SMDs as soon as possible.
- Solder thermistors after shipment from EPCOS within the time specified:
SMDs: 12 months
Leaded components: 24 months

Handling

- NTC thermistors must not be dropped. Chip-offs must not be caused during handling of NTCs.
- Components must not be touched with bare hands. Gloves are recommended.
- Avoid contamination of thermistor surface during handling.

Soldering

- Use resin-type flux or non-activated flux.
- Insufficient preheating may cause ceramic cracks.
- Rapid cooling by dipping in solvent is not recommended.
- Complete removal of flux is recommended.

Mounting

- When NTC thermistors are encapsulated with sealing material or overmolded with plastic material, the precautions given in chapter "Mounting instructions", "Sealing, potting and overmolding" must be observed.
- Electrode must not be scratched before/during/after the mounting process.
- Contacts and housings used for assembly with thermistor have to be clean before mounting.
- During operation, the thermistor's surface temperature can be very high (ICL). Ensure that adjacent components are placed at a sufficient distance from the thermistor to allow for proper cooling of the thermistors.
- Ensure that adjacent materials are designed for operation at temperatures comparable to the surface temperature of the thermistor. Be sure that surrounding parts and materials can withstand this temperature.
- Make sure that thermistors (ICLs) are adequately ventilated to avoid overheating.
- Avoid contamination of thermistor surface during processing.

Operation

- Use thermistors only within the specified operating temperature range.
- Use thermistors only within the specified voltage and current ranges (ICLs).
- Environmental conditions must not harm the thermistors. Use thermistors only in normal atmospheric conditions.
- Contact of NTC thermistors with any liquids and solvents should be prevented. It must be ensured that no water enters the NTC thermistor (e.g. through plug terminals). For measurement purposes (checking the specified resistance vs. temperature), the component must not be immersed in water but in suitable liquids (e.g. Galden).
- Avoid dewing and condensation.
- Be sure to provide an appropriate fail-safe function to prevent secondary product damage caused by malfunction (e.g. use VDR for limitation of overvoltage condition).

Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of passive electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of a passive electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of a passive electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as “hazardous”)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
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