NTC thermistors for temperature measurement

Leadless NTCs

Series/Type: **B57220**
Date: March 2006

Applications

- Automotive electronics, e.g.
  - measurement of cooling water and oil temperature

Features

- Front surfaces silver-plated
- For clamp contacting
- UL approval (E69802)

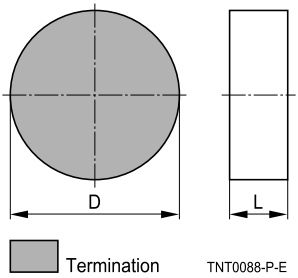
Options

Alternative resistance ratings, rated temperatures and resistance tolerances available on request

Delivery mode

Bulk

Dimensional drawing



D = 2.9 ±0.3 mm
L = 1.3 ±0.3 mm

Approx. weight 50 mg

General technical data

Climatic category	(IEC 60068-1)		55/250/21	
Max. power	(at 25 °C)	P_{25}	180	mW
Resistance tolerance		$\Delta R_R/R_R$	±5	%
Rated temperature		T_R	20	°C
Dissipation factor	(in air)	δ_{th} [1)]	approx. 2.5	mW/K
Thermal cooling time constant	(in air)	τ_c [1)]	approx. 12	s
Heat capacity		C_{th} [1)]	approx. 30	mJ/K

Electrical specification and ordering codes

R_{20} Ω	R_{25} Ω	No. of R/T characteristic	$B_{25/100}$ K	Ordering code
2.5 k	2056.9	1008	3560 ±1.5%	B57220K0212A003

1) Depends on mounting situation

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: 250 °C t: 1000 h	< 3%	No visible damage
Storage in damp heat, steady state	IEC 60068-2-78	Temperature of air: 40 °C Relative humidity of air: 93% Duration: 21 days	< 3%	No visible damage
Rapid temperature cycling	IEC 60068-2-14	Lower test temperature: −55 °C Upper test temperature: 155 °C Number of cycles: 100	< 3%	No visible damage
Endurance		P_{max}: 180 mW t: 1000 h	< 3%	No visible damage
Long-term stability (empirical value)		Temperature: 125 °C t: 10000 h	< 5%	No visible damage

R/T characteristics

	B57220K0212A003					
R/T No.	1008					
T (°C)	$B_{25/100}$ = 3560 K, R_{25} = 2057 Ω, T_R = 25 °C, $\Delta R_R/R_R$ = ± 2%					
	R_{nom}[Ω]	R_{min}[Ω]	R_{max}[Ω]	$\Delta R_R/R_R$[±%]	ΔT[±°C]	α (%/K)
−55.0	109230	96872	121590	11.3	1.8	6.1
−50.0	80872	72167	89577	10.8	1.8	6.0
−45.0	60319	54142	66495	10.2	1.8	5.8
−40.0	45314	40901	49726	9.7	1.7	5.7
−35.0	34281	31108	37455	9.3	1.7	5.5
−30.0	26114	23817	28411	8.8	1.6	5.4
−25.0	20004	18333	21675	8.4	1.6	5.2
−20.0	15462	14236	16688	7.9	1.6	5.1
−15.0	12003	11100	12905	7.5	1.5	4.9
−10.0	9397	8727	10067	7.1	1.5	4.8
−5.0	7415	6915	7915	6.7	1.4	4.7
0.0	5896	5520	6272	6.4	1.4	4.5
5.0	4712	4428	4996	6.0	1.4	4.4
10.0	3792	3577	4008	5.7	1.3	4.3
15.0	3069	2904	3234	5.4	1.3	4.1
20.0	2500	2375	2625	5.0	1.2	4.0
25.0	**2057**	**1947**	**2167**	**5.4**	**1.4**	**3.9**
30.0	1707	1610	1803	5.7	1.5	3.8
35.0	1412	1328	1496	5.9	1.6	3.7
40.0	1175	1102	1248	6.2	1.7	3.6
45.0	987.6	923.6	1052	6.5	1.9	3.5
50.0	834.0	777.7	890.2	6.7	2.0	3.4
55.0	702.8	653.7	752.0	7.0	2.1	3.3
60.0	595.5	552.4	638.6	7.2	2.2	3.2
65.0	508.3	470.3	546.3	7.5	2.4	3.1
70.0	435.7	402.1	469.3	7.7	2.5	3.1
75.0	374.2	344.6	403.9	7.9	2.7	3.0
80.0	322.5	296.3	348.8	8.1	2.8	2.9
85.0	279.6	256.2	302.9	8.4	3.0	2.8
90.0	243.2	222.4	264.0	8.6	3.1	2.8
95.0	212.7	194.0	231.3	8.8	3.3	2.7
100.0	186.6	169.9	203.4	9.0	3.4	2.6
105.0	163.8	148.8	178.8	9.1	3.6	2.6
110.0	144.2	130.7	157.6	9.3	3.7	2.5
115.0	127.3	115.2	139.4	9.5	3.9	2.4
120.0	112.7	101.8	123.6	9.7	4.1	2.4
125.0	100.2	90.31	110.1	9.9	4.2	2.3
130.0	89.30	80.35	98.25	10.0	4.4	2.3
135.0	79.65	71.54	87.76	10.2	4.6	2.2

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	R_{nom}[Ω]	R_{min}[Ω]	R_{max}[Ω]	$\Delta R_R/R_R$[±%]	ΔT[±°C]	α (%/K)
140.0	71.20	63.84	78.56	10.3	4.7	2.2
145.0	63.86	57.16	70.57	10.5	4.9	2.1
150.0	57.41	51.30	63.52	10.6	5.1	2.1
155.0	51.82	46.23	57.41	10.8	5.3	2.0
160.0	46.88	41.75	52.00	10.9	5.5	2.0
165.0	42.51	37.80	47.22	11.1	5.7	2.0
170.0	38.63	34.30	42.96	11.2	5.9	1.9
175.0	35.15	31.16	39.14	11.4	6.1	1.9
180.0	32.05	28.37	35.73	11.5	6.3	1.8
185.0	29.26	25.87	32.66	11.6	6.5	1.8
190.0	26.76	23.62	29.91	11.7	6.7	1.8
195.0	24.55	21.64	27.46	11.9	6.9	1.7
200.0	22.55	19.85	25.25	12.0	7.1	1.7
205.0	20.78	18.26	23.29	12.1	7.3	1.7
210.0	19.17	16.83	21.51	12.2	7.5	1.6
215.0	17.68	15.50	19.86	12.3	7.7	1.6
220.0	16.33	14.30	18.36	12.4	7.9	1.6
225.0	15.10	13.21	16.99	12.5	8.2	1.5
230.0	13.98	12.21	15.75	12.7	8.4	1.5
235.0	12.98	11.32	14.63	12.8	8.6	1.5
240.0	12.06	10.51	13.61	12.9	8.8	1.5
245.0	11.21	9.755	12.66	13.0	9.1	1.4
250.0	10.43	9.068	11.79	13.1	9.3	1.4

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 °C ... +45 °C, relative humidity ≤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 (SOx, 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 ot 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).

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