NTC thermistors for temperature measurement

Probe assemblies

Series/Type: **B57703**
Date: March 2006

Applications

- Surface temperature measurement, e.g. on housings and pipes

Features

- High accuracy
- Easy mounting
- Good thermal coupling through metal tag
- Thermistor encapsulated in metal-tag case
- PTFE-insulated leads of silver-plated nickel wire, AWG 30
- UL approval (E69802)

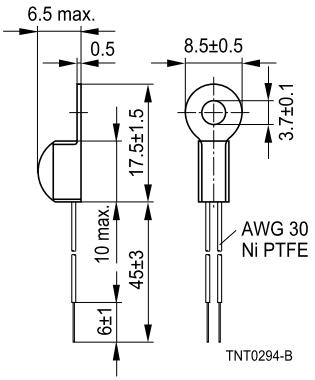
Options

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

Delivery mode

Bulk

Dimensional drawing



Dimensions in mm
Approx. weight 0.8 g

General technical data

Climatic category	(IEC 60068-1)		55/125/56	
Max. power	(at 25 °C)	P_{25}	150	mW
Resistance tolerance		$\Delta R_R/R_R$	±2	%
Rated temperature		T_R	25	°C
Dissipation factor	(in air)	δ_{th} [1)]	approx. 3	mW/K
Thermal cooling time constant	(in air)	τ_c [1)]	approx. 50	s
Heat capacity		C_{th} [1)]	approx. 150	mJ/K
Test voltage	(t = 1 s)	V_{test}	1	kVAC

Electrical specification and ordering codes

R_{25} Ω	No. of R/T characteristic	$B_{25/100}$ K	Ordering code
5 k	8016	3988 ±1%	B57703M0502G040
10 k	8016	3988 ±1%	B57703M0103G040
30 k	8018	3964 ±1%	B57703M0303G040

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: 125 °C t: 1000 h	< 1%	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: 125 °C Number of cycles: 10	< 0.5%	No visible damage
Endurance		P_{max}: 150 mW t: 1000 h	< 1%	No visible damage
Long-term stability (empirical value)		Temperature: 70 °C t: 10000 h	< 2%	No visible damage

R/T characteristics

	B57703M0502G040					
R/T No.	8016					
T (°C)	$B_{25/100}$ = 3988 K, R_{25} = 5000 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	481520	448030	515020	7.0	0.9	7.4
−50.0	335050	313120	356980	6.5	0.9	7.1
−45.0	235840	221330	250360	6.2	0.9	6.9
−40.0	168250	158530	177970	5.8	0.9	6.7
−35.0	121300	114720	127870	5.4	0.8	6.4
−30.0	88500	84008	92992	5.1	0.8	6.2
−25.0	65185	62092	68278	4.7	0.8	6.0
−20.0	48535	46386	50684	4.4	0.8	5.8
−15.0	36465	34961	37968	4.1	0.7	5.6
−10.0	27665	26606	28724	3.8	0.7	5.4
−5.0	21158	20407	21908	3.5	0.7	5.3
0.0	16325	15790	16860	3.3	0.6	5.1
5.0	12694	12311	13076	3.0	0.6	5.0
10.0	9950	9676	10224	2.8	0.6	4.8
15.0	7854	7656	8051	2.5	0.5	4.7
20.0	6245	6103	6387	2.3	0.5	4.5
25.0	**5000**	**4900**	**5100**	**2.0**	**0.5**	**4.4**
30.0	4029	3937	4120	2.3	0.5	4.3
35.0	3266	3185	3347	2.5	0.6	4.1
40.0	2664	2592	2735	2.7	0.7	4.0
45.0	2184	2121	2247	2.9	0.7	3.9
50.0	1802	1746	1857	3.1	0.8	3.8
55.0	1493	1444	1542	3.3	0.9	3.7
60.0	1244	1201	1287	3.5	1.0	3.6
65.0	1042	1004	1079	3.6	1.0	3.5
70.0	876.0	842.7	909.3	3.8	1.1	3.4
75.0	740.7	711.3	770.1	4.0	1.2	3.3
80.0	629.0	603.0	655.0	4.1	1.3	3.2
85.0	536.2	513.2	559.2	4.3	1.4	3.2
90.0	458.8	438.5	479.2	4.4	1.4	3.1
95.0	394.3	376.1	412.4	4.6	1.5	3.0
100.0	340.0	323.9	356.1	4.7	1.6	2.9
105.0	294.3	279.9	308.7	4.9	1.7	2.9
110.0	255.6	242.8	268.4	5.0	1.8	2.8
115.0	222.7	211.2	234.2	5.2	1.9	2.7
120.0	194.7	184.4	204.9	5.3	2.0	2.7
125.0	170.9	161.6	180.1	5.4	2.1	2.6

	B57703M0103G040					
R/T No.	8016					
T (°C)	$B_{25/100}$ = 3988 K, R_{25} = 10000 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	963050	896070	1030000	7.0	0.9	7.4
−50.0	670100	626240	713960	6.5	0.9	7.1
−45.0	471690	442660	500710	6.2	0.9	6.9
−40.0	336500	317050	355950	5.8	0.9	6.7
−35.0	242590	229440	255740	5.4	0.8	6.4
−30.0	177000	168020	185980	5.1	0.8	6.2
−25.0	130370	124180	136560	4.7	0.8	6.0
−20.0	97070	92772	101370	4.4	0.8	5.8
−15.0	72929	69923	75936	4.1	0.7	5.6
−10.0	55330	53211	57449	3.8	0.7	5.4
−5.0	42315	40814	43816	3.5	0.7	5.3
0.0	32650	31581	33719	3.3	0.6	5.1
5.0	25388	24623	26152	3.0	0.6	5.0
10.0	19900	19351	20449	2.8	0.6	4.8
15.0	15708	15313	16103	2.5	0.5	4.7
20.0	12490	12205	12775	2.3	0.5	4.5
25.0	**10000**	**9800**	**10200**	**2.0**	**0.5**	**4.4**
30.0	8057	7874	8240	2.3	0.5	4.3
35.0	6531	6369	6694	2.5	0.6	4.1
40.0	5327	5184	5470	2.7	0.7	4.0
45.0	4369	4242	4495	2.9	0.7	3.9
50.0	3603	3492	3714	3.1	0.8	3.8
55.0	2986	2888	3084	3.3	0.9	3.7
60.0	2488	2402	2574	3.5	1.0	3.6
65.0	2083	2007	2159	3.6	1.0	3.5
70.0	1752	1685	1819	3.8	1.1	3.4
75.0	1481	1423	1540	4.0	1.2	3.3
80.0	1258	1206	1310	4.1	1.3	3.2
85.0	1072	1026	1118	4.3	1.4	3.2
90.0	917.7	876.9	958.5	4.4	1.4	3.1
95.0	788.5	752.3	824.7	4.6	1.5	3.0
100.0	680.0	647.8	712.2	4.7	1.6	2.9
105.0	588.6	559.9	617.3	4.9	1.7	2.9
110.0	511.2	485.6	536.8	5.0	1.8	2.8
115.0	445.4	422.5	468.4	5.2	1.9	2.7
120.0	389.3	368.7	409.9	5.3	2.0	2.7
125.0	341.7	323.2	360.2	5.4	2.1	2.6

	B57703M0303G040					
R/T No.	8018					
T (°C)	$B_{25/100}$ = 3964 K, R_{25} = 30000 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	2472200	2301000	2643500	6.9	1.0	7.0
−50.0	1750300	1636200	1864400	6.5	1.0	6.8
−45.0	1253200	1176400	1330100	6.1	0.9	6.6
−40.0	907060	854840	959270	5.8	0.9	6.4
−35.0	663280	627460	699090	5.4	0.9	6.2
−30.0	489810	465040	514580	5.1	0.8	6.0
−25.0	365130	347860	382390	4.7	0.8	5.8
−20.0	274640	262520	286770	4.4	0.8	5.6
−15.0	208370	199810	216940	4.1	0.8	5.4
−10.0	159410	153320	165490	3.8	0.7	5.3
−5.0	122920	118570	127260	3.5	0.7	5.1
0.0	95501	92381	98621	3.3	0.7	5.0
5.0	74745	72498	76991	3.0	0.6	4.8
10.0	58911	57288	60533	2.8	0.6	4.7
15.0	46745	45571	47919	2.5	0.6	4.6
20.0	37332	36482	38182	2.3	0.5	4.4
25.0	**30000**	**29400**	**30600**	**2.0**	**0.5**	**4.3**
30.0	24253	23702	24803	2.3	0.5	4.2
35.0	19720	19230	20209	2.5	0.6	4.1
40.0	16123	15690	16556	2.7	0.7	4.0
45.0	13252	12870	13635	2.9	0.7	3.9
50.0	10949	10612	11286	3.1	0.8	3.8
55.0	9091	8794	9388	3.3	0.9	3.7
60.0	7584	7323	7846	3.4	1.0	3.6
65.0	6356	6126	6586	3.6	1.0	3.5
70.0	5351	5148	5554	3.8	1.1	3.4
75.0	4524	4344	4703	4.0	1.2	3.3
80.0	3840	3682	3998	4.1	1.3	3.2
85.0	3273	3133	3413	4.3	1.4	3.2
90.0	2800	2676	2924	4.4	1.4	3.1
95.0	2405	2295	2515	4.6	1.5	3.0
100.0	2073	1975	2170	4.7	1.6	2.9
105.0	1792	1705	1880	4.9	1.7	2.9
110.0	1555	1478	1633	5.0	1.8	2.8
115.0	1354	1285	1424	5.1	1.9	2.7
120.0	1182	1120	1245	5.3	2.0	2.7
125.0	1036	980.0	1092	5.4	2.1	2.6

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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