NTC thermistors for temperature measurement

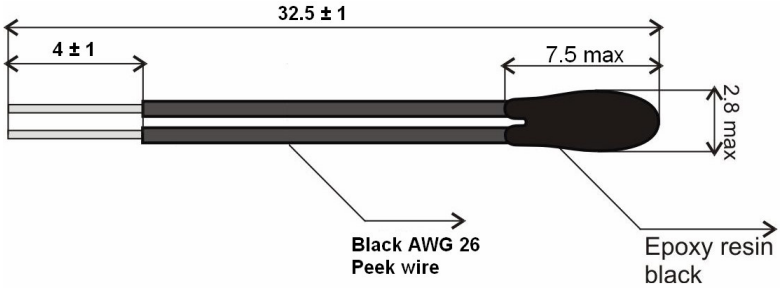
Miniature NTC

Series/Type: **S864/2.1K/2%**
Ordering code: **B57864S0212A004**

Date: 2010-04-30
Version: 1

Application

- **Temperature measurement**



Dimensions in mm

Version

NTC soldered to wire black AWG26, Ni-core, Φ0.4mm Silvered, insulated black and coated with Epoxy.

Coating: Epoxy resin, colour black.

Total Length : 32.5±1 mm

Strip ends : 4±1 mm

Head diameter: 2.8 mm max

Head length: 7.5 mm max

Ratings and characteristics

Climatic category (IEC 60068-1)			: **40/130/56**
(test without voltage)			
Lower category temperature		[°C]	: **-40**
Upper category temperature		[°C]	: **130**
Rated resistance R_N // Tolerance	R_N	[Ω // %]	: **186 // ± 2%**
Rated temperature	T_N	[°C]	: **100**
B-value : $B_{(25/100)}$ // Tolerance	B_N	[K//%]	: **3560 // ± 1**
R/T-Curve no. // R_{25}		[n//Ω]	: **1008 // 2050**
Max. power rating at 25°C	P_{25}	[mW]	: **60**
Dissipation factor (in air)	δ_{th}	[mW/K]	: **Approx. 2.2**
Thermal cooling time constant (in air)	τ_C	[s]	: **Approx. 17**
Heat capacity	C_{th}	[mJ/K]	: **Approx. 38**

Remarks

- NTC thermistor must not come in contact with conductive, aggressive media.
- There are no customer reliability requirements available at this time. For this sensor element see page 4/7 (=reliability).
- See also “Cautions and warnings”.

NTC Resistance Temperature Curve

R/T-Curve 1008 / A02 **B(25/100)** 3560 [K] ± 1 [%]

R at 25 °C 2050 [Ω] **RN at 100 °C** 186.0 [Ω] ± 2 [%]

Temp. [°C]	R Nom [Ω]	R Min [Ω]	R Max [Ω]	ΔR [±%]	ΔT [±°C]
-40	45157	41644	48670	7.8	1.4
-35	34163	31615	36711	7.5	1.3
-30	26024	24163	27885	7.2	1.3
-25	19934	18568	21301	6.9	1.3
-20	15408	14396	16421	6.6	1.3
-15	11961	11207	12715	6.3	1.3
-10	9365	8799	9930	6.0	1.3
-5	7389	6962	7817	5.8	1.2
0	5876	5550	6201	5.5	1.2
5	4695	4446	4945	5.3	1.2
10	3779	3587	3971	5.1	1.2
15	3058	2910	3207	4.9	1.2
20	2491	2375	2607	4.7	1.2
25	2050	1959	2141	4.4	1.1
30	1701	1628	1773	4.3	1.1
35	1407	1350	1464	4.1	1.1
40	1170	1125	1216	3.9	1.1
45	984.2	947.8	1021	3.7	1.1
50	831.1	801.8	860.4	3.5	1.0
55	700.4	676.9	723.9	3.4	1.0
60	593.4	574.5	612.4	3.2	1.0
65	506.6	491.2	522.0	3.0	1.0
70	434.2	421.7	446.7	2.9	0.9
75	372.9	362.7	383.1	2.7	0.9
80	321.4	313.1	329.7	2.6	0.9
85	278.6	271.8	285.4	2.4	0.9
90	242.3	236.7	247.9	2.3	0.8
95	211.9	207.3	216.6	2.2	0.8
100	**186.0**	**182.3**	**189.7**	**2.0**	**0.8**
105	163.2	159.7	166.8	2.2	0.8
110	143.7	140.4	147.0	2.3	0.9
115	126.9	123.8	129.9	2.4	1.0
120	112.3	109.4	115.1	2.5	1.1
125	99.84	97.19	102.50	2.6	1.1
130	88.99	86.54	91.45	2.8	1.2

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: 130 °C t: 1000h	< 2 %	No visible damage
Storage in damp heat, steady state with test voltage	IEC 60068-2-78	Temperature of air: 40 °C Relative humidity of air: 93 % Duration: 56 days	< 1 %	No visible damage
Rapid change of temperature	IEC 60068-2-14	Lower test temperature: -40 °C (time : 10 min) Upper test temperature: 130 °C (time : 10 min) Time to change from lower to upper temperature : < 30 sec Number of cycles: 100	< 1 %	No visible damage
Long Term stability		Temperature: 70 °C T: 1000h	< 2%	No visible damage
Immersion Test		Test voltage 0.3 VDC on NTC over protective resistor, sensors immersed into water, Temperature: 25 °C T: 1000h Switched between on: (t_{on}= 5 h) and off (t_{off}=1h)	< 3 %	No visible damage

Cautions and warnings

Storage

- Store thermistors only in original packaging. Do not open the package before storage.
- Storage conditions in original packaging: storage temperature -25℃ …+45℃, 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 housing 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 the 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 thermistors (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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