



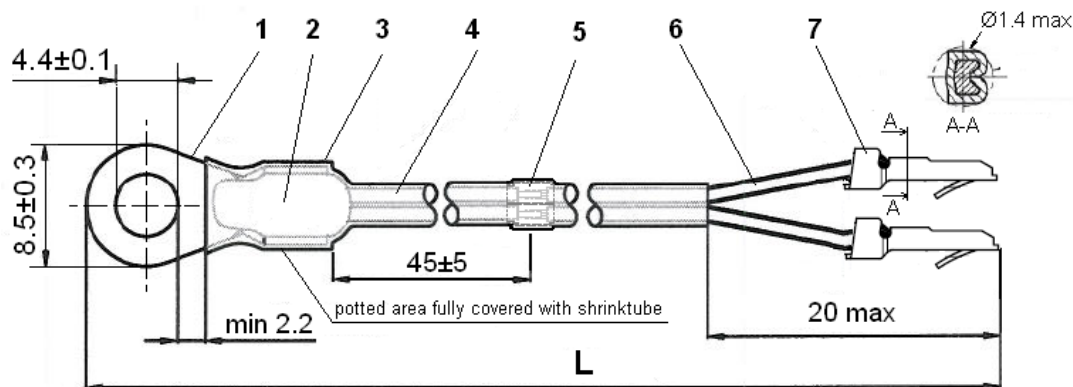
NTC thermistors for temperature measurement

NTC Probes

Series/Type: M703/10k/2%
Ordering code: B57703M0103A025
Date: 2009-09-08
Version: 3

Application High-accuracy surface temperature measurement, e.g. on housings and pipes

Version Thermistor with Ag-plated Ni-wire AWG30 encapsulated in metal-tag case (material: brass, tinned) with extension wire Ag-plated Cu wire AWG26.



L = 220 +10/-5 mm

Dimensions in mm; Tolerances acc. to DIN ISO 2768-m unless otherwise specified

No.	Item	Material	Property	Remarks
1	Ringtongue	Brass, tinned	thickness 0.5 mm	
2	Thermistor	Ceramics	epoxy coated	S861/10k
3	Shrinktube	Polyolefine	Raychem CGPT	UL-file E35586
4	NTC wire	Ni, Ag-plated	AWG30; PTFE insulated	blue
5	Shrinktube	Polyolefine	Sumitube B2	UL-file E48762
6	Wire	Cu, Ag-plated	AWG26 (7x0.16); PTFE insul.	black
7	Contacts	Brass, tinned	Stocko RSB 7918.001 V 1,2-0,35	

Ratings and characteristics

Climatic category (IEC 60068-1)

Lower category temperature

Upper category temperature

Rated resistance R_N // Tolerance

Rated temperature

B-value : $B_{(25/100)}$ // Tolerance

R/T-Curve no. // R_{25}

Max power rating at 25°C

Dissipation factor (in air)

Thermal time constant (water)

Insulation resistance

Test voltage ($t=1$ s)

(between NTC and metal-tag case)

* typical values, depends on mounting situation

** 100% production test with 2880 Vac/1s

			: 40/125/56
		[°C]:	- 40
		[°C]:	+125
R_N	[Ω // %]:		10000 // ±2
T_N	[°C]:		25
B_N	[K//%]:		3988 // ±1
	[n//Ω]:		8016
P_{25}	[mW]:		150
δ_{th}	[mW/K]:		approx. 3.5 *
τ_a	[s]:		approx. 3 *
R_{is}	[MΩ]:		> 100
V_{is}	[V _{AC}]:		2880 **

Remarks: --

NTC-RESISTANCE-TEMPERATURE-CURVE

R/T-Curve = 8016 / A01
B(25/100) = 3988 K ± 1 %
R at 25°C = 10000 Ω
R_N at 25 °C = 10000 Ω ± 2 %

Temp. [°C]	R Nom [Ω]	R Min [Ω]	R Max [Ω]	ΔR [±%]	ΔT [±°C]	α [%/K]
-40	336500	317054	355947	5,8	0,9	6,7
-35	242589	229441	255737	5,4	0,8	6,4
-30	177000	168016	185984	5,1	0,8	6,2
-25	130370	124184	136556	4,7	0,8	6,0
-20	97070	92772	101368	4,4	0,8	5,8
-15	72929	69923	75936	4,1	0,7	5,6
-10	55330	53211	57449	3,8	0,7	5,4
-5	42315	40814	43816	3,5	0,7	5,3
0	32650	31581	33719	3,3	0,6	5,1
5	25388	24623	26152	3,0	0,6	5,0
10	19900	19351	20449	2,8	0,6	4,8
15	15708	15313	16103	2,5	0,5	4,7
20	12490	12205	12775	2,3	0,5	4,5
25	10000	9800	10200	2,0	0,5	4,4
30	8057	7874	8240	2,3	0,5	4,3
35	6531	6369	6694	2,5	0,6	4,1
40	5327	5184	5470	2,7	0,7	4,0
45	4369	4242	4495	2,9	0,7	3,9
50	3603	3492	3714	3,1	0,8	3,8
55	2986	2888	3084	3,3	0,9	3,7
60	2488	2402	2574	3,5	1,0	3,6
65	2083	2007	2159	3,6	1,0	3,5
70	1752	1685	1819	3,8	1,1	3,4
75	1481	1423	1540	4,0	1,2	3,3
80	1258	1206	1310	4,1	1,3	3,2
85	1072	1026	1118	4,3	1,4	3,2
90	917,7	876,9	958,5	4,4	1,4	3,1
95	788,5	752,3	824,7	4,6	1,5	3,0
100	680,0	647,8	712,2	4,7	1,6	2,9
105	588,6	559,9	617,3	4,9	1,7	2,9
110	511,2	485,6	536,8	5,0	1,8	2,8
115	445,4	422,5	468,4	5,2	1,9	2,7
120	389,3	368,7	409,9	5,3	2,0	2,7
125	341,7	323,2	360,2	5,4	2,1	2,6

RELIABILITY DATA :

Test	Test conditions	$\Delta R_{25}/R_{25}$ (typical)	Remarks
Storage in dry heat	Storage at upper category temperature Temperature: 125°C Duration: 1000 h	< 2 %	No visible damage
Storage in coldness	Storage at lower category temperature Temperature: -40°C Duration: 1000 h	< 2 %	No visible damage
Storage in damp, heat, steady state	Temperature of air: 40°C Relative humidity of air: 93 % Duration: 56 days	< 2 %	No visible damage
Rapid change of temperature in air	Lower test temperature: -40°C (time: ~10 min) Upper test temperature: 80°C (time: ~10 min) Time to change from lower to upper temperature: < 30 sec; Number of cycles: 10	< 2 %	No visible damage
Voltage proof test	2880 V _{AC} ; 1 min (type tested)	--	No flash over
Insulation test	The sensors are placed in a vessel containing metallic balls of ≤ 1 mm diameter (with total immersed head) The applied voltage is 500 V _{DC} .	--	ABOVE 100 MΩ

Cautions and warnings

Storage

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

Handling

- NTC thermistors must not be dropped. Chip-offs or any other damage must not be caused during handling of NTCs.
- Do not touch components 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

- Ensure that no thermo-mechanical stress occurs due to production processes (curing or overmolding processes) when thermistors are sealed, potted or overmolded or during their subsequent operation. The maximum temperature of the thermistor must not be exceeded. Ensure that the materials used (sealing/potting compound and plastic material) are chemically neutral.
- Electrodes/contacts must not be scratched or damaged before/during/after the mounting process.
- Contacts and housing used for assembly with the thermistor must be clean before mounting.
- 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.
- Avoid contamination of the thermistor surface during processing.
- The connections of sensors (e.g. cable end, wire end, plug terminal) may only be exposed to an environment with normal atmospheric conditions.
- Tensile forces on cables or leads must be avoided during mounting and operation.
- Bending or twisting of cables or leads directly on the thermistor body is not permissible.
- Avoid using chemical substances as mounting aids. It must be ensured that no water or other liquids enter the NTC thermistors (e.g. through plug terminals). In particular, water based substances (e.g. soap suds) must not be used as mounting aids for sensors.

Operation

- Use thermistors only within the specified operating temperature range.
- Use thermistors only within the specified power range.
- Environmental conditions must not harm the thermistors. Only use the thermistors under normal atmospheric conditions or within the specified conditions.
- Ensure that no significant thermo-mechanical stress occurs during operation due to the mounting situation. Fixtures must not overstress the sensor by an excessive mechanical preload.
- 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 unless thermistor is specified for these conditions.
- Bending or twisting of cables and/or wires is not permissible during operation of the sensor in the application.
- Be sure to provide an appropriate fail-safe function to prevent secondary product damage caused by malfunction.

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 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 an 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 an 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.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order. We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the "General Terms of Delivery for Products and Services in the Electrical Industry" published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, BAOKE, Alu-X, CeraDiode, CSMP, CSSP, CTVS, DSSP, MiniBlue, MiniCell, MKK, MLSC, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SIMID, SineFormer, SIOV, SIP5D, SIP5K, ThermoFuse, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.