NTC thermistors for temperature measurement

NTC Probes

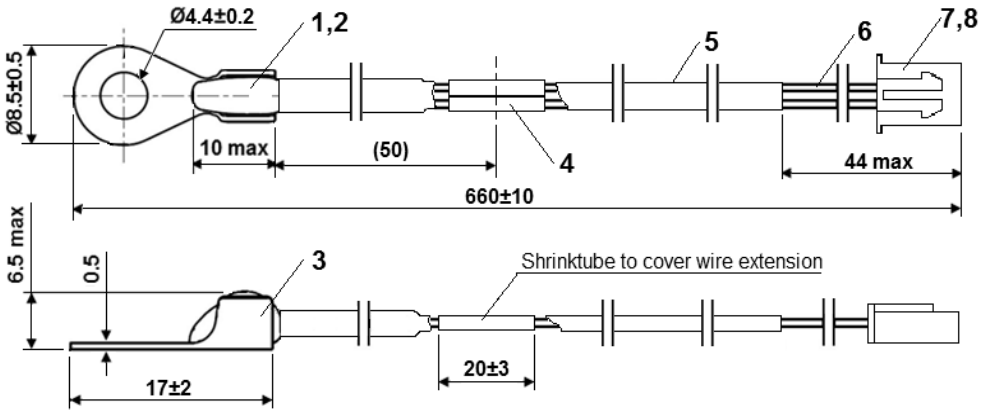
Series/Type: **M703/10k/A47**
Ordering code: **B57703M0103A047**

Date: 2015-06-22
Version: 1

EPCOS AG is a TDK Group Company.

Application

High accuracy surface temperature measurement e.g heatsink



Dimensions in mm

Materials:

No.	Item	Material	Property	Remarks
1	Thermistor	Ceramic	EPCOS NTC	
2	Potting	Epoxy		Black
3	Ring Tongue	Brass with tinned plated		
4	Shrinktube	Polyolefin		Black
5	Shrinktube	Polyolefin		Black
6	Wire	Stranded copper with silver plated, PTFE insulation	AWG 28 (19x0.07)	Blue
7	Crimp contact	Phosphor bronze with tin plated	JST SXH-002T-P0.6	
8	Plug Housing	PA 6	JST XHP-2	Natural

JST connector is specified for a maximum temperature of 85°C

Ratings and characteristics

Climatic Category (IEC 60068-1)			: **25/125/56**
(test without voltage)			
Lower category temperature		[°C]	: **-25**
Upper category temperature		[°C]	: **125 ***
Rated resistance R_N // Tolerance	R_N	[Ω // %]	: **10000 // ± 3**
Rated temperature	T_N	[°C]	: **25**
B-value : $B_{(25/100)}$ // Tolerance	B_N	[K // %]	: **3988 // ± 1**
R/T-Curve no. // R_{25}		[n // Ω]	: **8016 // 10000**

Max. power rating at 25℃	P_{25}	[mW] :	**150**
Dissipation factor (in air)	δ_{th}	[mW/K] :	**approx. 3 ****
Thermal time constant (in air)	τ_a	[s] :	**approx. 50 ****
Heat capacity	C_{th}	[mJ/K]:	**approx. 150 ****
Voltage proof // Time	V_{is}	[Vac] :	**2700** // **1sec**

Remark:

* Up to 150℃ for max 30 minutes
** Typical values, depends on mounting situation

Delivery mode
Bulk

NTC Resistance Temperature Curve

R/T-Curve	8016 / A01	B(25/100)	3988[K] ± 1 [%]
R at 25℃	10000 [Ohm]	Rn at 25℃	10000 [Ohm] ± 3 [%]

Temp. [℃]	R Nom [Ω]	R Min [Ω]	R Max [Ω]	ΔR [±%]
-20	97070	91801	102339	5.4
-15	72929	69193	76665	5.1
-10	55330	52658	58002	4.8
-5	42315	40391	44239	4.5
0	32650	31254	34046	4.3
5	25388	24369	26406	4.0
10	19900	19152	20648	3.8
15	15708	15156	16260	3.5
20	12490	12081	12899	3.3
25	**10000**	**9700**	**10300**	**3.0**
30	8057	7793	8321	3.3
35	6531	6304	6759	3.5
40	5327	5130	5524	3.7
45	4369	4199	4539	3.9
50	3603	3456	3750	4.1
55	2986	2859	3114	4.3
60	2488	2377	2599	4.5
65	2083	1987	2180	4.6

70	1752	1668	1836	4.8
75	1481	1408	1555	5.0
80	1258	1193	1323	5.1
85	1072	1016	1129	5.3
90	917.7	867.7	967.7	5.4
95	788.5	744.4	832.6	5.6
100	680.0	641.0	719.0	5.7
105	588.6	554.0	623.2	5.9
110	511.2	480.4	542.0	6.0
115	445.4	418.0	472.8	6.2
120	389.3	364.8	413.8	6.3
125	341.7	319.8	363.6	6.4
130	300.9	281.2	320.6	6.5
135	265.4	247.8	283.1	6.7
140	234.8	218.9	250.7	6.8
145	208.3	194.0	222.7	6.9
150	185.3	172.3	198.3	7.0

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	< 3 %	No visible damage
Storage in coldness	Storage at upper category temperature Temperature: -20°C; Duration: 1000 h	< 3 %	No visible damage
Storage in damp, heat, steady state	Temperature of air: 40°C Relative humidity: 93 % Duration: 56 days	< 3 %	No visible damage
Rapid temperature cycling	Lower test temperature: -20 °C Upper test temperature: +125 °C Number of cycles : 100 Medium: Air Dwell time: 10 minutes with travel time 30 s	< 3 %	No visible damage

Cautions and warnings

Storage

- Store thermistors only in original packaging. Do not open the package prior to storage.
- Storage conditions in original packaging: storage temperature –25 °C ... +45 °C, relative humidity ≤75% annual mean, <95% maximum 30 days per annum, 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 (SOx, 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.
- Washing processes may damage the product due to the possible static or cyclic mechanical loads (e.g. ultrasonic cleaning). They may cause cracks to develop on the product and its parts, which might lead to reduced reliability or lifetime.

Bending/ twisting leads

- A lead (wire) may be bent at a minimum distance of twice the wire's diameter plus 4 mm from the component head or housing. When bending ensure the wire is mechanically relieved at the component head or housing. The bending radius should be at least 0.75 mm.

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 shall 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.

This listing does not claim to be complete, but merely reflects the experience of EPCOS AG.

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