NTC thermistors for temperature measurement

Ring NTC

Series/Type:	**K2150/700/3%**
Ordering code:	**B57150K2701H**
Date:	2010-12-15
Version:	1

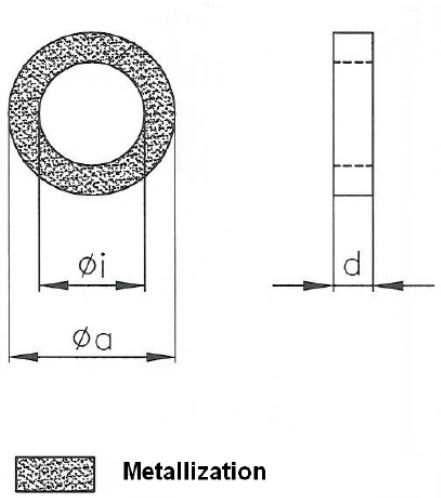
Application

- **Temperature measurement**

Version

NTC ring with silver termination
Ring-geometry:

∅a = 5,2 ± 0,3 mm
∅i = 3,2 + 0,3
d = 1,0 ± 0,3 mm



Free zone of metallization 0 – 0,2mm allowed

Ratings and characteristics

Climatic category (IEC 60068-1)		:	**55/155/21**
Lower category temperature		[°C] :	**-55**
Upper category temperature		[°C] :	**155**
Rated resistance R_N // Tolerance	R_N	[Ω // %] :	**83,00 // ± 3%**
Rated temperature	T_N	[°C] :	**80**
B-value : $B_{(25/100)}$ // Tolerance	B_N	[K//%] :	**4100 // ± 1**
R/T-Curve no. // R_{25}		[n//Ω] :	**1026 // 700,1**
Max. power rating at 25°C	P_{25}	[mW] :	**150**
Dissipation factor (in air)	δ_{th}	[mW/K] :	**Approx. 3,0**
Thermal cooling time constant (in air)	τ_C	[s] :	**Approx. 15**
Heat capacity	C_{th}	[mJ/K] :	**Approx. 45**

NTC Resistance Temperature Curve

R/T-Curve	**1026 / A01**	**B(25/100)**	**4100[K] ± 1 [%]**
R at 25°C	**700,1 [Ohm]**	**Rn at 80°C**	**83,00 [Ohm] ± 3 [%]**

Temp. [°C]	R Nom [Ω]	R Min [Ω]	R Max [Ω]	ΔR [±%]	ΔT [±°C]	α [%/K]
-55	73.973	66.402	81.544	10,2	1,4	7,5
-50	51.270	46.238	56.301	9,8	1,4	7,2
-45	35.965	32.581	39.350	9,4	1,3	7,0
-40	25.523	23.219	27.826	9,0	1,3	6,7
-35	18.314	16.728	19.899	8,7	1,3	6,5
-30	13.281	12.179	14.384	8,3	1,3	6,3
-25	9.730	8.956	10.505	8,0	1,3	6,1
-20	7.199	6.649	7.749	7,6	1,3	5,9
-15	5.376	4.983	5.770	7,3	1,3	5,7
-10	4.051	3.767	4.336	7,0	1,3	5,6
-5	3.080	2.872	3.287	6,7	1,2	5,4
0	2.361	2.208	2.513	6,5	1,2	5,2
5	1.824	1.711	1.937	6,2	1,2	5,1
10	1.420	1.336	1.504	5,9	1,2	4,9
15	1.114	1.051	1.177	5,7	1,2	4,8
20	880,1	832,4	927,9	5,4	1,2	4,6
25	700,1	663,8	736,4	5,2	1,2	4,5
30	560,6	532,7	588,4	5,0	1,1	4,4
35	451,7	430,3	473,1	4,7	1,1	4,3
40	366,2	349,6	382,8	4,5	1,1	4,1
45	298,6	285,7	311,6	4,3	1,1	4,0
50	244,9	234,8	255,0	4,1	1,1	3,9
55	202,0	194,0	209,9	3,9	1,0	3,8
60	167,4	161,1	173,7	3,7	1,0	3,7
65	139,5	134,5	144,5	3,6	1,0	3,6
70	116,8	112,8	120,7	3,4	1,0	3,5
75	98,23	95,07	101,4	3,2	0,9	3,4
80	83,00	80,51	85,49	3,0	0,9	3,3
85	70,44	68,18	72,70	3,2	1,0	3,2
90	60,03	58,01	62,06	3,4	1,1	3,2
95	51,37	49,56	53,18	3,5	1,1	3,1
100	44,14	42,52	45,76	3,7	1,2	3,0
105	38,06	36,61	39,52	3,8	1,3	2,9
110	32,95	31,64	34,25	4,0	1,4	2,9
115	28,62	27,44	29,79	4,1	1,5	2,8
120	24,94	23,89	26,00	4,2	1,6	2,7
125	21,81	20,86	22,76	4,4	1,6	2,6
130	19,14	18,28	19,99	4,5	1,7	2,6

Temp. [°C]	R Nom [Ω]	R Min [Ω]	R Max [Ω]	ΔR [±%]	ΔT [±°C]	α [%/K]
135	16,84	16,06	17,62	4,6	1,8	2,5
140	14,86	14,16	15,57	4,7	1,9	2,5
145	13,16	12,52	13,80	4,9	2,0	2,4
150	11,68	11,10	12,26	5,0	2,1	2,4
155	10,40	9,868	10,92	5,1	2,2	2,3

Reliability Data

Testing acc. to AEC Q200 Rev D by type representatives

Test	Stand	Test conditions	$\Delta R_{25}/R_{25}$ (typical)	Remarks
High Temperature Exposure (Storage) 1	MIL-STD-202 Method 108	Storage at T = + 125°C t = 1000h	< 2%	no visible damage
High Temperature Exposure (Storage) 1	MIL-STD-202 Method 108	Storage at T = + 155°C t = 1000h	< 3%	no visible damage
Biased Humidity	MIL-STD-202 Method 103	85°C / 85% / 1000h 10% rated power	< 3 %	No visible damage
Operational Life	MIL-STD-202 Method 108	1000h / 150°C rated power - steady state	< 3 %	No visible damage
Thermal Shock	MIL-STD-202 Method 107	-55°C / 125°C / 1000cycl. < 20s change / 15min dwell / Air	< 3 %	No visible damage
Test at low temperature		-55°C / 1000h / unpow.	< 2 %	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°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 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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