Micro thin film thermistor

FT Thermistor

FT thermistors have outclassed conventional thermistors through miniaturization, featuring quick response time, high heat resistance and excellent long term reliability.

Product number explanation

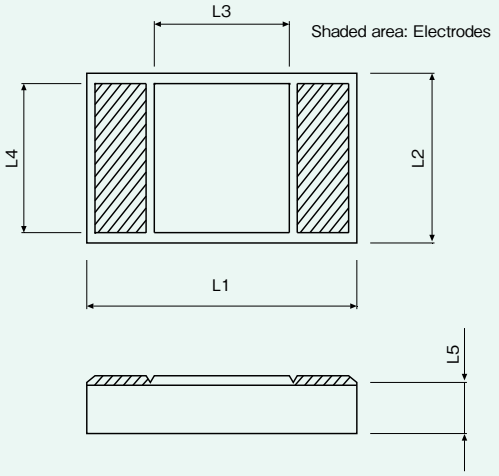
103 FT 1005 A 5P 1 — □

- T: Taping[1]
- No marking: Untaped bulk products
- Electrode type: 1 = Pt, 2 = Au/Ni, 3 = Au
- Tolerance (R_{25}): 5P = 5%
- B value: A = 3370 K, B = 3435 K, D = 3969 K
- Size: See Fig. 1
- Micro thin film thermistor
- Rated zero-power resistance at 25 ℃
- E.g.: 103 = 10 x 10^3 Ω

[1]: Taping is currently available only for 1005 size.

Dimensions

Fig. 1



Size	L1	L2	L3	L4	L5[2]
1005	1.00 ± 0.05	0.50 ± 0.05	(0.50)	(0.44)	(0.15)
0603	0.60 ± 0.05	0.30 ± 0.05	(0.15)	(0.25)	(0.15)

Unit: mm

[2]: For thinner substrates (= smaller L5 dimension) please contact SEMITEC sales staff.

Applications

High speed electrical thermometers, wearable devices, office automation, measurement instruments, medical devices, computer and mobile devices, LCDs, security devices, laser diode modules

Specifications

Product number	R_{25}[3]	R_{25} tolerance	B value[4]	Dissipation factor (mw / ℃)	Thermal time constant (s)[5]	Rated power at 25 ℃ (mW)	Operating temperature range by electrode (℃)		
							1: Pt	2: Au/Ni	3: Au
103FT1005A5P	10.0 kΩ	± 5%[6]	3370 K ± 1%	approx. 0.3	approx. 1.0	1.5	− 40 to 250 (350)	− 40 to 125	− 40 to 250
103FT1005B5P	10.0 kΩ		3435 K ± 1%						
103FT1005D5P	10.0 kΩ		3969 K ± 1%						
503FT1005A5P	50.0 kΩ		3370 K ± 1%						
503FT1005B5P	50.0 kΩ		3435 K ± 1%						
364FT1005A5P	360.0 kΩ		3370 K ± 1%						
New 364FT0603A5P	360.0 kΩ		3370 K ± 1%	approx. 0.2	approx. 0.5	1.0			

[3]: Rated zero-power resistance at 25 ℃ [4]: B value calculated from rated zero-power resistance at 25 ℃ and 85 ℃
[5]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in mid-air.
[6]: If your application requires other tolerance values please contact SEMITEC sales staff.

Reliability data

Item	Electrode type	Test conditions	Criteria
Solderability	2 = Au/Ni	5 s at 260 ℃	More than 90% soldered
Free fall	All	Three times natural fall to a maple board from 0.75 m height.	ΔR, ΔB ± 1%
Insulation resistance	All	100 V DC	Over 100 MΩ
Dry heat (1)	1 = Pt 3 = Au	1000 hours at 250 ℃	ΔR ± 5%, ΔB ± 1%
Dry heat (2)	2 = Au/Ni	1000 hours at 125 ℃	ΔR ± 3%, ΔB ± 1%
Cold	All	1000 hours at - 40 ℃	ΔR ± 3%, ΔB ± 1%
Temperature cycle (thermal shock)	All	100 cycles as below: 1. - 40 ℃ for 30 minutes 2. Room temperature for 3 minutes 3. 125 ℃ for 30 minutes 4. Room temperature for 3 minutes	ΔR ± 3%, ΔB ± 1%

Mounting method recommendations

Electrode type	Recommended method
1 = Pt	Conductive resin
2 = Au/Ni	Solder
3 = Au	Wire bonding

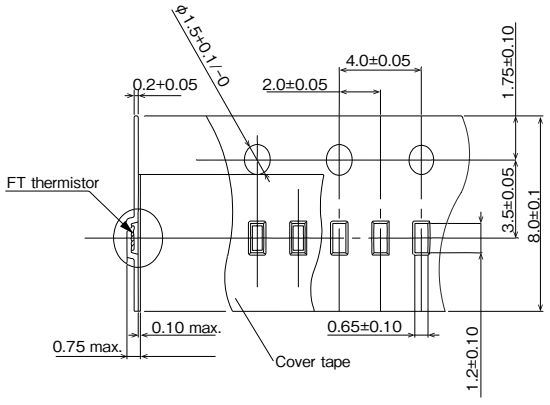
Resistance / temperature characteristics

Temperature (℃)	Product number						
	103FT1005A5P	103FT1005B5P	103FT1005D5P	503FT1005A5P	503FT1005B5P	364FT1005A5P	364FT0603A5P
− 40	187.9	200.7	351.0	939.3	1,002	6,763	6,763
− 30	110.7	117.0	185.0	553.4	584.7	3,984	3,984
− 20	67.26	70.34	100.9	336.3	351.9	2,421	2,421
− 10	42.10	43.55	57.00	210.5	217.7	1,516	1,516
0	27.08	27.71	33.33	135.4	138.5	974.8	974.8
10	17.86	18.11	20.12	89.31	90.48	643.0	643.0
20	12.07	12.12	12.53	60.33	60.58	434.4	434.4
25	10.00	10.00	10.00	50.00	50.00	360.0	360.0
30	8.332	8.299	8.038	41.66	41.50	299.9	299.9
40	5.871	5.804	5.295	29.36	29.03	211.4	211.4
50	4.216	4.139	3.575	21.08	20.70	151.8	151.8
60	3.081	3.006	2.472	15.40	15.04	110.9	110.9
70	2.288	2.220	1.746	11.44	11.11	82.36	82.36
80	1.725	1.666	1.258	8.623	8.331	62.09	62.09
85	1.505	1.451	1.075	7.527	7.257	54.19	54.19
90	1.318	1.269	0.9230	6.592	6.344	47.46	47.46
100	1.021	0.9797	0.6888	5.105	4.898	36.76	36.76
110	0.8003	0.7662	0.5220	4.002	3.829	28.81	28.81
120	0.6345	0.6064	0.4012	3.172	3.029	22.84	22.84
125	0.5671	0.5418	0.3535	2.836	2.706	20.42	20.42
130	0.5084	0.4854	0.3125	2.542	2.423	18.30	18.30
140	0.4113	0.3926	0.2465	2.057	1.960	14.81	14.81
150	0.3359	0.3207	0.1969	1.680	1.601	12.09	12.09
160						9.963	9.963
170						8.274	8.274
180						6.925	6.925
190						5.837	5.837
200						4.954	4.954
210						4.232	4.232
220						3.636	3.636
230						3.142	3.142
240						2.731	2.731
250						2.385	2.385
$B_{25/85}$	3370 K	3435 K	3969 K	3370 K	3435 K	3370 K	3370 K

Unit: kΩ

Taping dimensions

- FT: 10000 pcs / reel



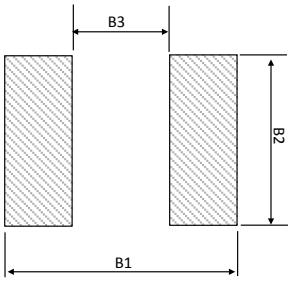
How to use the FT thermistor

- The FT thermistor can be used for both SMD type mounting and as a leaded thermistor (both axial and radial).
  If your application requires lead wires please contact SEMITEC sales staff
- With the FT thermistor it is possible to pair two sensors (e.g. one for temperature measurement and one for compensation) with very high accuracy. If your application may require thermistor pairing please contact SEMITEC sales staff.

Caution

- Please contact us when choosing the mounting method.
- Please contact us when considering an application with an environment temperature exceeding 350 ℃.

Recommended mounting pad dimensions



Size	B1	B2	B3
1005	1.20 ± 0.03	0.60 ± 0.03	0.30 ± 0.03
0603	0.72 ± 0.03	0.36 ± 0.03	0.18 ± 0.03

Micro thin film type sensor probe

Fμ Thermistor

The F micro thin film thermistor sensor probe has been developed applying SEMITEC's proprietary thin film thermistor technology, specifically with medical purposes in mind.
It is highly suited for catheter applications with its high volume production capability, robustness, reliability, accuracy and faster response than existing thermistors.

Product number explanation

223 Fμ □

- 5183: OD = 0.5 mm, fig. 1
  3122: OD = 0.3 mm, fig. 2
- Micro thin film thermistor sensor probe
- Rated zero-power resistance at 25 ℃
  E.g.: 103 = 10 x 10^3 Ω

Applications

Medical catheters
Guide wires
Testing equipment
Handheld medical devices
Body temperature monitoring
Other applications that require very small probes

Resistance / temperature characteristics

Temperature (℃)	223Fμ[5]
−10	100.3
0	62.92
10	40.56
20	26.82
30	18.16
40	12.58
50	8.892
60	6.407
70	4.700

[5]: Resistance values for the thermistor chip without lead wires

Dimensions

Fig. 1

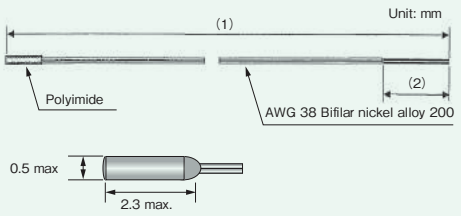
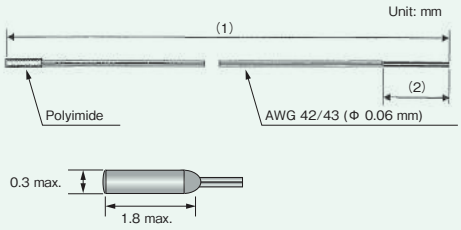


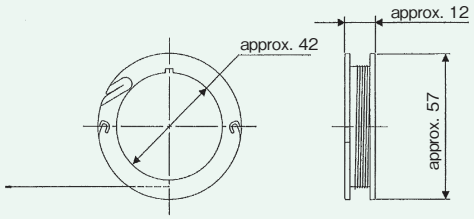
Fig. 2



(1) Lead wire length customized according to customer requirements (max. 200 cm).
(2) Bare lead wire length customized according to customer requirements.

Please contact SEMITEC sales staff for products without resin coating on the sensor head for even smaller diameter.

Spool dimensions Unit: mm



Specifications

Product number	R_{37}[1]	R_{37} tolerance	B value[2]	Dissipation factor (mW / ℃)	Thermal time constant (ms)[3]	Rated power at 25℃ (mW)	Operating temperature range (℃)
223Fμ5183	14.015 kΩ	± 0.5%[4]	3454 K ± 1%	approx. 0.35	approx. 52	1.75	− 10 to 70
223Fμ3122	14.015 kΩ	± 3%[4]	3454 K ± 1%	approx. 0.22	approx. 20	1.1	− 10 to 70

[1]: Rated zero-power resistance at 37 ℃ of the thermistor chip without lead wires
[2]: B value calculated from rated zero-power resistance at 0 ℃ and 50 ℃ without lead wires
[3]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in still water.
[4]: If your application requires other tolerance values please contact SEMITEC sales staff.

Reliability data

Item	Test conditions	Criteria
Free fall	Three times natural fall to a maple board from 1 m height.	ΔR, ΔB ± 0.5%
Dry heat	1000 hours at 70 ℃	
Damp heat	1000 hours at 70 ℃ and 90% to 95% humidity	
Temperature cycle (thermal shock)	Seven cycles as below: 1. − 20 ℃ for 12 hours 2. Room temperature for 1 minute 3. 55 ℃ for 12 hours 4. Room temperature for 1 minute	

Connection method

The lead wire can be soldered to larger wires by winding it around the larger wire and then soldering.

Please contact SEMITEC sales staff for customized bare lead wire lengths according to your application's requirements.

Caution

The F micro thermistor sensor probe is manufactured using a semiconductor process. Due to its microstructure the sensor is sensitive to electrostatic discharge (ESD) in just the same way as common integrated circuits are.

In order to prevent damage to or failure of the sensor SEMITEC recommends to take appropriate precautions against ESD when handling it.

Failure to protect the sensor against ESD may also cause damage to the equipment installed with the sensor, because electrostatic discharge can cause small parametric changes, which means that the sensor may not meet its published specification.

Thin film thermistor

JT Thermistor

The JT series thermistor features high accuracy and a thickness of less than 500 µm. The JT thermistor also has excellent electrical insulation and can be safely used in environments where it might come in contact with electrodes.

Product number explanation

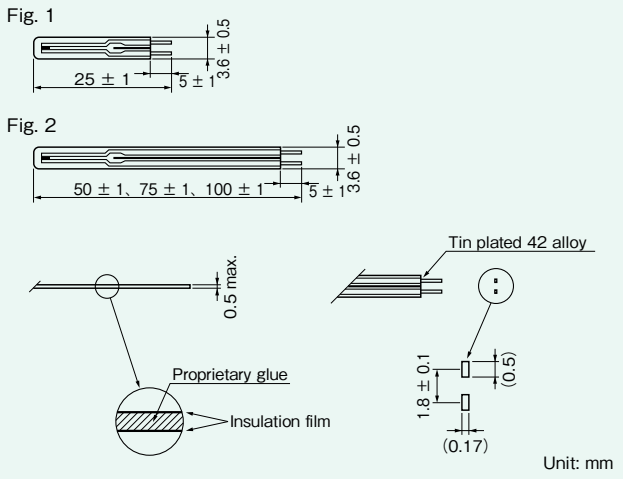
103 JT – □□□

- Shape (length) 025: 25 mm (Fig. 1)
  050: 50 mm (Fig. 2)
  075: 75 mm (Fig. 2)
  100: 100 mm (Fig. 2)
- High accuracy thin film thermistor
- Rated zero-power resistance at 25 ℃
  E.g.: 103 = 10 x 10^3 Ω

Applications

Battery packs, battery chargers, IT equipment, mobile devices, LCDs, surface temperature sensors, high sensitivity air temperature sensors

Dimensions



Unit: mm

Specifications

Product number	R_{25} [1]	R_{25} tolerance	B value [2]	Dissipation factor (mw / ℃)	Thermal time constant (s) [3]	Rated power at 25 ℃ (mW)	Operating temperature range (℃)
103JT	10.0 kΩ	± 1%	3435 K ± 1%	approx. 0.7	approx. 5	3.5	– 50 to 125
104JT	100 kΩ		4390 K ± 1%				

[1]: Rated zero-power resistance at 25 ℃ [2]: B value calculated from rated zero-power resistance at 25 ℃ and 85 ℃
[3]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in mid-air.

Reliability data

Item	Test conditions	Criteria
Resistance to soldering heat	5 s at 260 ℃	ΔR, ΔB ± 1%
Solderability	2 s at 245 ℃ Flux material: Rosin 25%, ethyl alcohol 75%	More than 90% soldered
Tensile strength (lead wire)	10 s at 1 N (horizontal pull)	ΔR, ΔB ± 1% and visual inspection
Termination bending	2.5 N, one time, 90°	
Free fall	Three times natural fall to a maple board from 0.75 m height.	
Voltage proof	100 V AC for one minute	Less than 1 mA
Insulation resistance	100 V DC	Over 100 MΩ
Dry heat	1000 hours at 125 ℃	ΔR, ΔB ± 1%
Damp heat (under electrical load)	1000 hours at 40 ℃ and 90% humidity Electrical load: 1 mA DC	
Temperature cycle (thermal shock)	100 cycles as below: 1. - 25 ℃ for 30 minutes 2. Room temperature for 3 minutes 3. 125 ℃ for 30 minutes 4. Room temperature for 3 minutes	

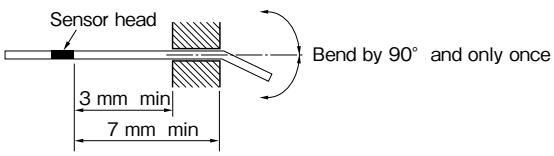
Caution

- If you plan pressing or pushing the thermistor against an object or inserting it into a tight space please contact SEMITEC sales staff.
- When soldering make sure to avoid contact of the hot part (over 150 ℃) and the sensor, because this may melt the sensor film.
- When bending the sensor make sure to not apply force on the sensor head (minimum distance from sensor: 3 mm) when fixing it. Additionally, make sure to bend the lead wire with a minimum distance of 7 mm from the sensor head.

Resistance / temperature characteristics

Temperature (℃)	Product number	
	103JT	104JT
– 50	367.7	9584
– 40	204.7	4572
– 30	118.5	2282
– 20	71.02	1191
– 10	43.67	647.2
0	27.70	365.0
10	18.07	212.5
20	12.11	127.7
25	10.00	100.0
30	8.301	78.88
40	5.811	50.03
50	4.147	32.51
60	3.011	21.61
70	2.224	14.66
80	1.668	10.13
85	1.451	8.483
90	1.267	7.135
100	0.9753	5.111
110	0.7597	3.720
120	0.5981	2.746
125	0.5331	2.371
$B_{25/85}$	3435 K	4390 K

Unit: kΩ



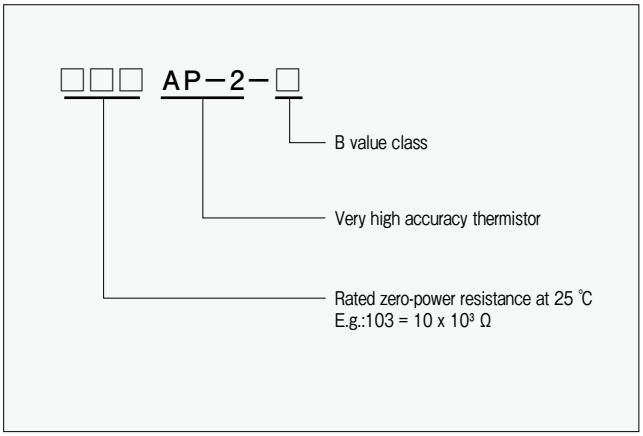
Very high accuracy thermistor

AP Thermistor

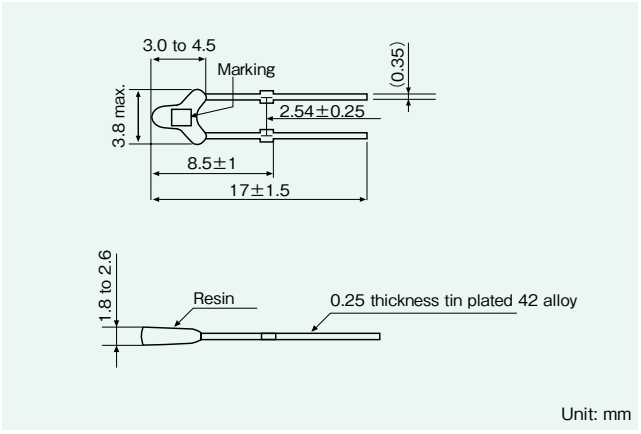
The AP series thermistor features an even higher accuracy than our high accuracy AT thermistors and is suitable for many applications.

Features: – Very high accuracy with tight R_{25} and $B_{25/85}$ tolerances (± 0.5%)
– High accuracy over a wide temperature range: 0.5% resistance tolerance from – 60 ˚C to + 80 ˚C

Product number explanation



Dimensions



Unit: mm

Applications

Mobile devices, battery chargers, battery packs, fan motors, automotive, office automation, home electronics, security, thermometers, measuring instruments , etc.

Specifications

Product number	R_{25}[1]	R_{25} tolerance	B value[2]	Dissipation factor (mw / ℃)	Thermal time constant (s)[3]	Rated power at 25 ℃ (mW)	Operating temperature range (℃)
202AP-2	2.00 kΩ	± 0.5%	3976 K ± 0.5%	approx. 1.2	approx. 15	6	– 60 to 150
232AP-2	2.252 kΩ		3976 K ± 0.5%				
502AP-2	5.00 kΩ		3976 K ± 0.5%				
103AP-2	10.0 kΩ		3435 K ± 0.5%				
103AP-2-A			3976 K ± 0.5%				
203AP-2	20.0 kΩ		3976 K ± 0.5%				
503AP-2	50.0 kΩ		4220 K ± 0.5%				
104AP-2	100 kΩ		4261 K ± 0.5%				
204AP-2	200 kΩ		4470 K ± 0.5%				

[1]: Rated zero-power resistance at 25 ℃ [2]: B value calculated from rated zero-power resistance at 25 ℃ and 85 ℃
[3]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in mid-air.

Reliability data

Item	Test conditions	Criteria
Resistance to soldering heat	10 s at 260 ℃ or 3.5 s at 340 ℃	ΔR, ΔB ± 0.5% and visual inspection
Solderability	2 s at 245 ℃ Flux material: Rosin 25%, ethyl alcohol 75%	More than 90% soldered
Tensile strength (lead wire)	A load of 2 N is applied to the wire terminations in vertical direction for 10 s. (See Fig. 1)	ΔR, ΔB ± 0.5% and visual inspection
Termination bending	The lead wire is bent to an angle of 90 ℃ and then back into the original position.	
Free fall	Three times natural fall to a maple board from 1 m height.	
Voltage proof	1000 V AC for one minute	Less than 1 mA
Insulation resistance	500 V DC	Over 100 MΩ
Dry heat	1000 hours at 150 ℃	ΔR, ΔB ± 0.5%
Damp heat (under electrical load)	1000 hours at 40 ℃ and 90% humidity Electrical load: 1 mA DC	
Temperature cycle (thermal shock)	100 cycles as below: 1. - 60 ℃ for 30 minutes 2. Room temperature for 3 minutes 3. 150 ℃ for 30 minutes 4. Room temperature for 3 minutes	

Caution

- When bending the lead wires using for example a radio plier make sure to have a minimum distance from the sensor head of 3 mm.
- Do not apply a mechanical load of more than 2 N in the way depicted in Fig. 1 below.

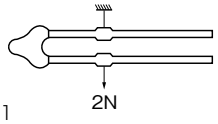


Fig. 1

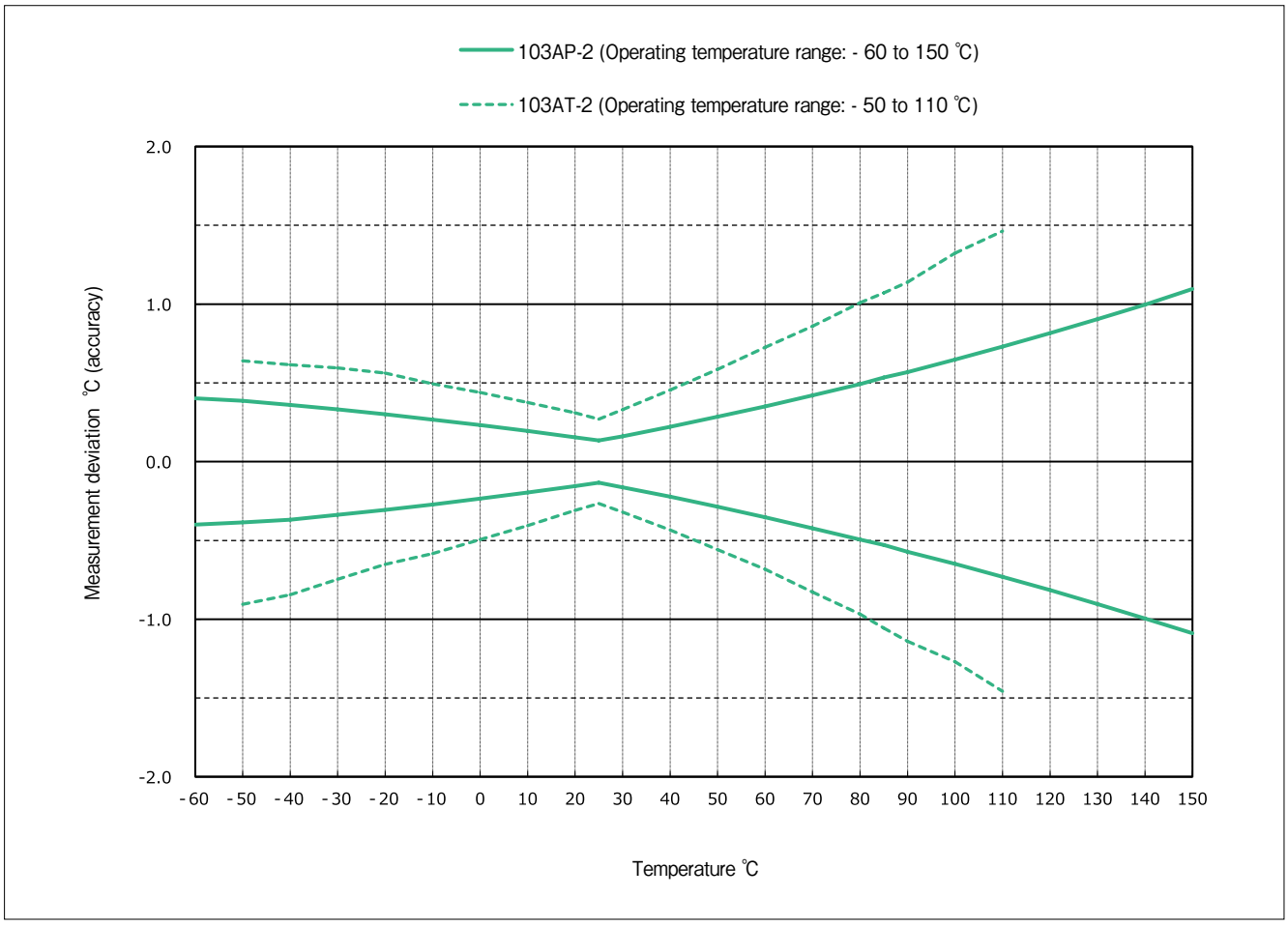
- When soldering make sure to have a minimum distance of 5 mm, use a soldering iron with 50 W and solder for maximum seven seconds at 340˚C. If you plan to cut the lead wire shorter than the above minimum distance please contact us.

Resistance / temperature characteristics

Temperature (℃)	Product number								
	202AP-2	232AP-2	502AP-2	103AP-2	103AP-2-A	203AP-2	503AP-2	104AP-2	204AP-2
− 60	207.1	233.2	560.2	600.6	1202	2497	7940	15510	
− 50	102.6	115.5	273.7	326.9	583.4	1211	3729	7339	17830
− 40	53.94	60.73	142.2	187.4	301.2	624.9	1868	3702	8750
− 30	29.69	33.44	77.18	110.9	162.3	335.8	975.9	1943	4461
− 20	17.07	19.22	43.61	67.64	90.85	187.2	528.7	1056	2359
− 10	10.16	11.44	25.55	42.39	52.76	108.1	296.7	593.7	1291
0	6.261	7.050	15.46	27.25	31.64	64.39	171.9	344.5	730.6
10	3.922	4.417	9.648	17.95	19.56	39.53	102.8	205.9	426.2
20	2.491	2.804	6.186	12.09	12.43	24.94	63.14	126.4	255.6
25	2.000	2.252	5.000	10.00	10.00	20.00	50.00	100.0	200.0
30	1.615	1.818	4.066	8.314	8.096	16.14	39.83	79.59	157.4
40	1.070	1.205	2.725	5.829	5.394	10.69	25.75	51.32	99.36
50	0.7237	0.8149	1.846	4.162	3.671	7.237	17.01	33.79	64.10
60	0.4994	0.5624	1.270	3.022	2.546	4.998	11.48	22.72	42.26
70	0.3513	0.3956	0.8884	2.229	1.783	3.516	7.905	15.57	28.42
80	0.2515	0.2832	0.6314	1.669	1.265	2.516	5.539	10.86	19.47
85	0.2142	0.2412	0.5355	1.451	1.071	2.142	4.669	9.124	16.23
90	0.1831	0.2062	0.4558	1.266	0.9098	1.830	3.949	7.697	13.57
100	0.1354	0.1525	0.3339	0.9737	0.6635	1.352	2.859	5.540	9.616
110	0.1017	0.1145	0.2480	0.7576	0.4903	1.012	2.098	4.040	6.905
120	0.07730	0.08710	0.1867	0.5961	0.3670	0.7675	1.562	2.989	5.033
130	0.05960	0.06710	0.1422	0.4741	0.2780	0.5889	1.179	2.240	3.719
140	0.04650	0.05230	0.1097	0.3808	0.2130	0.4570	0.8998	1.698	2.782
150	0.03660	0.04130	0.08550	0.3087	0.1650	0.3584	0.6946	1.301	2.105
$B_{25/85}$	3976 K	3976 K	3976 K	3435 K	3976 K	3976 K	4220 K	4261 K	4470 K

Unit: kΩ

Measurement accuracy comparison graph



High accuracy thermistor

AT Thermistor

The AT series thermistor features high accuracy with tight resistance and B-value tolerances (±1%).

Features: – Uniform shape facilitates automated assembly
– Long term reliability
– Five different standard shapes available

Product number explanation

103 AT−□−FT

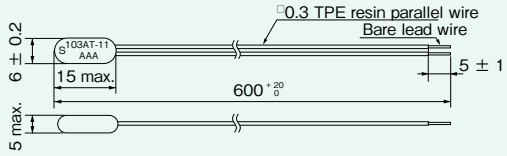
- (AT-5 only) FT: Taping; No marking: Untaped bulk products
- Shape: 11: See Fig. 1; 2: See Fig. 2; 3: See Fig. 3; 4: See Fig. 4; 5: See Fig. 5
- High accuracy thermistor
- Rated zero-power resistance at 25 ℃
- E.g.: 103 = 10 x 10^3 Ω

Applications

Office automation, measuring instruments, controllers, mobile devices, battery chargers, battery packs, fan motors, home electronics, HVAC equipment, solar systems, security, thermometers, automotive, vending machines, refrigerated display cases, agricultural equipment

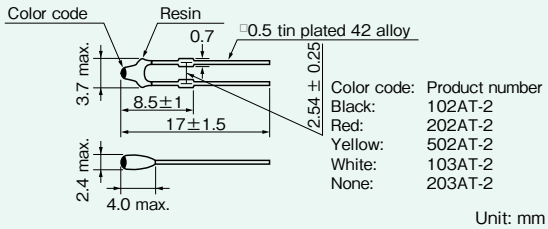
Dimensions

Fig. 1



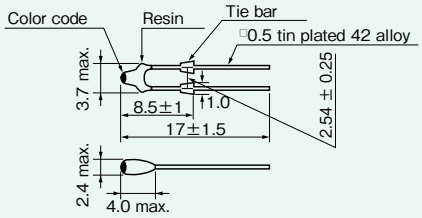
Unit: mm

Fig. 2



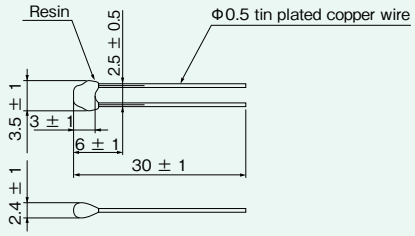
Unit: mm

Fig. 3



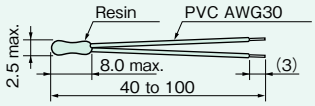
Unit: mm

Fig. 5



Unit: mm

Fig. 4



Unit: mm

Specifications

Product number	R_{25}[1]	R_{25} tolerance	B value[2]	Dissipation factor (mw / ℃)	Thermal time constant (s)[3]	Rated power at 25 ℃ (mW)	Operating temperature range (℃)
102AT-11	1.00 kΩ	± 1%	3100 K ± 1%	approx. 2.6	approx. 75	13	− 50 to 90
202AT-11	2.00 kΩ		3182 K ± 1%				
502AT-11	5.00 kΩ		3324 K ± 1%				− 50 to 105
103AT-11	10.0 kΩ		3435 K ± 1%				
203AT-11	20.0 kΩ		4013 K ± 1%				
102AT-2	1.00 kΩ		3100 K ± 1%	approx. 2.0	approx. 15	10	− 50 to 90
202AT-2	2.00 kΩ		3182 K ± 1%				
502AT-2	5.00 kΩ		3324 K ± 1%				− 50 to 110
103AT-2、3	10.0 kΩ		3435 K ± 1%				
203AT-2	20.0 kΩ		4013 K ± 1%				
103AT-4	10.0 kΩ		3435 K ± 1%		approx. 10		− 30 to 90
103AT-5	10.0 kΩ		3435 K ± 1%	approx. 2.5	approx. 15	12.5	− 50 to 110

[1]: Rated zero-power resistance at 25 ℃ [2]: B value calculated from rated zero-power resistance at 25 ℃ and 85 ℃
[3]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in mid-air.

Reliability data

Item	Test conditions		Criteria
Resistance to soldering heat	AT-2, 3, 4	10 s at 260 ℃ or 3.5 s at 350 ℃	ΔR, ΔB ± 1%
	AT-5	5 s at 260 ℃ or 1.5 s at 350 ℃	
Solderability	AT-2, 3	2 s at 245 ℃. Flux material: Rosin 25%, ethyl alcohol 75%.	More than 90% soldered
	AT-4, 5	2 s at 235 ℃. Flux material: Rosin 25%, ethyl alcohol 75%.	
Tensile strength (lead wire)	AT-11	10 s at 30 N (horizontal pull)	ΔR, ΔB ± 1% and visual inspection
	AT-2, 3	A load of 2 N is applied to the wire terminations in vertical direction for 10 s (see Fig. 1)	
	AT-4	60 s at 5 N (horizontal pull)	
	AT-5	A load of 2 N is applied to the wire terminations in vertical direction for 3 s (see Fig. 1)	
Termination bending	AT-11	5 N, ten times, 90°	
	AT-2, 3	One time, 90°	
	AT-4	1 N, five times, 90°	
	AT-5	2.5 N, two times, 90°	
Free fall	AT-11, 2, 3	Three times natural fall to a maple board from 1 m height.	
	AT-4	Three times natural fall to a maple board from 0.75 m height.	
	AT-5	One time natural fall to a maple board from 1 m height.	
Voltage proof	AT-11, 2, 3, 5	1000 V AC for one minute	Less than 1 mA
	AT-4	100 V DC for one second	
Insulation resistance	AT-11, 2, 3, 5	500 V DC	Over 100 MΩ
	AT-4	100 V DC	
Dry heat	AT-11	1000 hours at 105 ℃ (90 ℃[4])	ΔR, ΔB ± 1%
	AT-2, 3, 5	1000 hours at 110 ℃ (90 ℃[4])	
	AT-4	1000 hours at 90 ℃	
Damp heat (under electrical load)	AT-11	1000 hours at 70 ℃ and 90% humidity Electrical load: 1 mA DC	
	AT-2, 3, 4, 5	1000 hours at 40 ℃ and 90% humidity Electrical load: 1 mA DC	
Temperature cycle (thermal shock)	AT-11	100 cycles as below: 1. - 55 ℃ for 30 minutes 2. Room temperature for 3 minutes 3. 85 ℃ for 30 minutes 4. Room temperature for 3 minutes	
	AT-2, 3	100 cycles as below: 1. - 30 ℃ for 30 minutes 2. Room temperature for 3 minutes 3. 90 ℃ for 30 minutes 4. Room temperature for 3 minutes	
	AT-4	100 cycles as below: 1. - 20 ℃ for 30 minutes 2. Room temperature for 1 minute 3. 70 ℃ for 30 minutes 4. Room temperature for 1 minute	
	AT-5	100 cycles as below: 1. - 30 ℃ for 30 minutes 2. Room temperature for 3 minutes 3. 90 ℃ for 30 minutes 4. Room temperature for 3 minutes	

[4]: Conditions for 102AT-11, 202AT-11, 102AT-2, 202AT-2

Resistance / temperature characteristics

Temperature (℃)	Product number				
	102AT	202AT	502AT	103AT	203AT
− 50	24.46	55.66	154.6	329.5	1253
− 40	14.43	32.34	88.91	188.5	642.0
− 30	8.834	19.48	52.87	111.3	342.5
− 20	5.594	12.11	32.44	67.77	190.0
− 10	3.651	7.763	20.48	42.47	109.1
0	2.449	5.114	13.29	27.28	64.88
10	1.684	3.454	8.840	17.96	39.71
20	1.184	2.387	6.013	12.09	24.96
25	1.000	2.000	5.000	10.00	20.00
30	0.8486	1.684	4.179	8.313	16.12
40	0.6189	1.211	2.961	5.827	10.65
50	0.4587	0.8854	2.137	4.160	7.181
60	0.3446	0.6587	1.567	3.020	4.943
70	0.2622	0.4975	1.168	2.228	3.464
80	0.1999	0.3807	0.8835	1.668	2.468
85	0.1751	0.3346	0.7722	1.451	2.096
90	0.1536	0.2949	0.6771	1.266	1.788
100			0.5265	0.9731	1.315
110			0.4128	0.7576	0.9807
$B_{25/85}$	3100 K	3182 K	3324 K	3435 K	4013 K

Unit: kΩ

Caution

AT-2, 3, 5

- When bending the lead wires using for example a radio plier make sure to have a minimum distance from the sensor head of 3 mm.
- Do not apply a mechanical load of more than 2 N in the way depicted in Fig. 1 below. The variation of the load direction should be less then 0.3 mm (see Fig. 2).

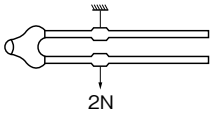


Fig. 1

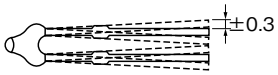
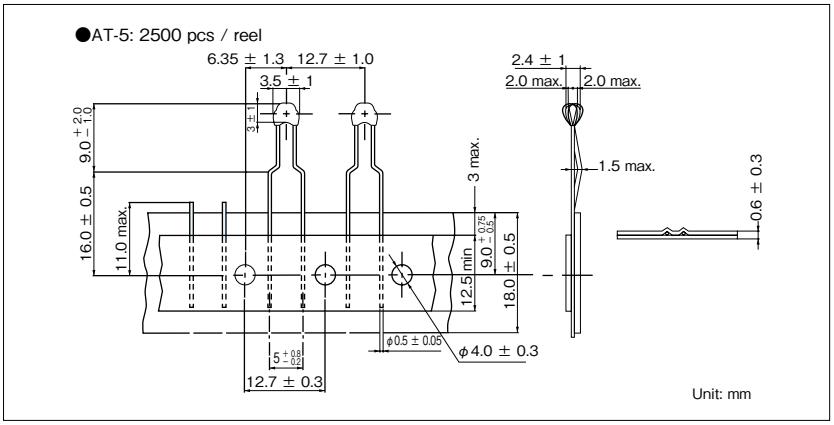


Fig. 2

- When soldering make sure to have a minimum distance of 5 mm (8.5 mm), use a soldering iron with 50 W and solder for maximum 7 (2) seconds at 340 ˚C (350 ˚C). If you plan to cut the lead wire shorter than the above minimum distance please contact us.

The values in brackets are for AT-5.

Taping dimensions



High sensitivity thermistor

ET Thermistor

The ET thermistor series features small size and high sensitivity.

Features: – Tight resistance and B-value tolerances; high accuracy
– Uniform shape facilitates automated assembly
– Long term reliability

Product number explanation

103 ET □□–□□

- R_{25} tolerance 1P: ± 1%
  none: ± 3%
  none (ETB only): ± 2%
- Shape -1: Fig. 1
  -2: Fig. 2
  B□: Fig. 2
  -3H: Fig. 3
- High sensitivity thermistor
- Rated zero-power resistance at 25 ℃
  E.g.: 103 = 10 x 10^3 Ω

Applications

Body thermometers, thermometers, medical devices, controllers, mobile devices, battery chargers, battery packs, home electronics, toilet heaters, security, LCDs, electric vehicles

Specifications

Product number	R_{25}[1]	R_{25} tolerance	B value[2]	Operating temperature range (℃)
212ET	2.10 kΩ	± 3%	3850 K ± 1%	– 40 to 90
402ET	4.00 kΩ		3100 K ± 1%	
582ET	5.80 kΩ		3614 K ± 1%	
103ET	10.0 kΩ		3250 K ± 1%	
203ET	20.0 kΩ		3450 K ± 1%	– 40 to 100
303ET	30.0 kΩ		3760 K ± 1%	
403ET	40.0 kΩ		3525 K ± 1%	
503ET	50.0 kΩ		4055 K ± 1%	
833ET	83.0 kΩ		4013 K ± 1%	
104ET	100 kΩ		4132 K ± 1%	– 40 to 90
224ET	226 kΩ		4021 K ± 1%	– 40 to 100
234ET	232 kΩ		4274 K ± 1%	
103ETB	10.0 kΩ	± 1%、± 2%	3435 K ± 1%	– 40 to 90

- Dissipation factor: 0.7 mw / ℃
- Thermal time constant[3]: approx. 3.4 s (ET-1: approx. 3.2 s)
- Rated power at 25 ℃: 3.5 mW

[1]: Rated zero-power resistance at 25 ℃
[2]: B value calculated from rated zero-power resistance at 25 ℃ and 85 ℃
[3]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in mid-air.

Product number	R_{37}[4]	R_{37} tolerance	B value[5]	Operating temperature range (℃)
503ET-3H	29.937 kΩ	± 1.08%	3944 K ± 0.5%	– 40 to 100

- Dissipation factor: 0.7 mw / ℃
- Thermal time constant[6]: approx. 0.8 s
- Rated power at 25 ℃: 3.5 mW

[4]: Rated zero-power resistance at 37 ℃
[5]: B value calculated from rated zero-power resistance at 30 ℃ and 45 ℃
[6]: Time required to reach 63.2% of temperature difference. Measured with sensor immersed in oil.

Dimensions

Fig. 1 (ET-1)

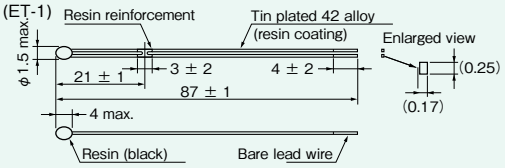


Fig. 2 (ET-2, ETB)

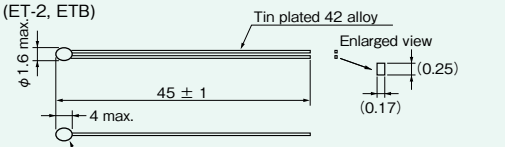
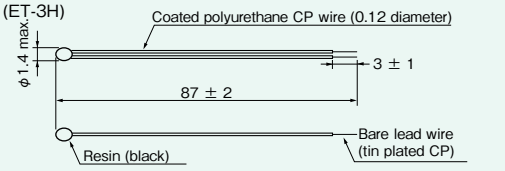


Fig. 3 (ET-3H)



Unit: mm

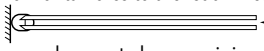
Reliability data

Item	Test conditions	Criteria
Resistance to soldering heat	10 s at 260 ℃	ΔR, ΔB ± 1%
Solderability	2 s at 245 ℃ Flux material: Rosin 25%, ethyl alcohol 75%	More than 90% soldered
Tensile strength (lead wire)	10 s at 1 N (horizontal pull)	ΔR, ΔB ± 1% and visual inspection
Free fall	Three times natural fall to a maple board from 1 m height.	
Insulation resistance	100 V DC	Over 100 MΩ
Dry heat	1000 hours at 100 ℃ (90 ℃ [7])	ΔR, ΔB ± 1% (± 2%[7])
Damp heat (under electrical load)	1000 hours at 40 ℃ and 90% humidity Electrical load: 0.1 mA DC	
Temperature cycle (thermal shock)	100 cycles as below: 1. - 20 ℃ for 5 minutes 2. Room temperature for 3 minutes 3. 100 ℃ (80 ℃ 7) for 5 minutes 4. Room temperature for 3 minutes	

[7]: The value in brackets is for 212ET to 103ET, 104ET and 103ETB

Caution

- Do not apply vertical force to the lead wires exceeding 0.3 N.
- Do not apply horizontal force to the lead wires exceeding 1 N (see drawing below).



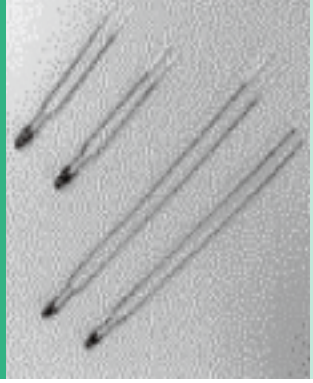
- When soldering make sure to have a minimum distance of 5 mm from the sensor head , use a soldering iron with 50 W and solder for maximum seven seconds at 340 ˚C.

Resistance / temperature characteristics

Temperature (℃)	Product number													
	212ET	402ET	582ET	103ET	203ET	303ET	403ET	503ET	833ET	104ET	224ET	234ET	103ETB	503ET-3H
– 40	64.02	57.71	127.7	170.9	402.2	810. 7	833. 3	1602	2664	3325	7005	9046	204. 7	1588
– 30	35.13	35.34	72.10	102.2	233.6	445.1	481.1	855.0	1421	1769	3784	4680	118.5	848.1
– 20	19.65	22.38	42.37	63.07	140.2	253.7	287.5	474.4	788.5	977.5	2116	2515	71.02	470.9
– 10	11.31	14.60	25.84	40.08	86.82	149.8	177.2	272.7	453.0	559.0	1225	1401	43.67	270.4
0	6.724	9.797	16.29	26.16	55.31	91.30	112.4	161.9	269.3	329.8	730.1	808.2	27.70	160.9
10	4.130	6.737	10.57	17.51	36.16	57.31	73.00	99.13	164.8	200.5	447.8	480.2	18.07	98.63
20	2.612	4.736	7.039	11.99	24.23	37.00	48.61	62.38	103.6	125.3	282.1	293.7	12.11	62.12
25	2.100	4.000	5.800	10.00	20.00	30.00	40.00	50.00	83.00	100.0	226.0	232.0	10.00	49.77
30	1.699	3.394	4.806	8.387	16.60	24.47	33.08	40.24	66.91	80.27	182.1	184.4	8.301	40.10
40	1.134	2.476	3.353	5.988	11.61	16.56	22.96	26.58	44.18	52.62	120.3	118.6	5.811	29.937[4]
50	0.7753	1.835	2.369	4.353	8.279	11.45	16.26	17.93	29.80	35.23	81.07	78.00	4.147	21.72[8]
60	0.5420	1.378	1.685	3.217	6.005	8.070	11.70	12.33	20.51	24.00	55.75	52.39	3.011	12.20
70	0.3867	1.049	1.214	2.414	4.425	5.791	8.569	8.588	14.37	16.59	39.01	35.87	2.224	8.449
80	0.2811	0.7997	0.8863	1.836	3.310	4.222	6.367	6.064	10.24	11.64	27.78	24.99	1.668	5.940
85	0.2413	0.7005	0.7610	1.610	2.877	3.626	5.517	5.120	8.700	9.807	23.58	21.00	1.451	5.009
90	0.2079	0.6145	0.6557	1.416	2.509	3.125	4.797	4.338	7.419	8.287	20.10	17.72	1.267	4.240
100					1.926	2.346	3.662	3.142	5.459		14.75	12.75		3.070
$B_{25/85}$	3850 K	3100 K	3614 K	3250 K	3450 K	3760 K	3525 K	4055 K	4013 K	4132 K	4021 K	4274 K	3435 K	3944 K[5]

[8]: Rated zero-power resistance at 45 ℃

Unit: kΩ



High sensitivity thermistor

ET-4 Thermistor

SEMITEC's ET-4 thermistor is small and highly reliable.
It is also very versatile and can be used for many applications.

New 2017

Product number explanation

103 ET −4−□□□

- Shape 025: total length 25 mm
- Shape 050: total length 50 mm
- High accuracy thermistor
- Rated zero-power resistance at 25 ℃
- E.g.: 103 = 10 x 10^3 Ω

Applications

Mobile devices, rechargeable batteries,
high accuracy air temperature sensors

Specifications

Product number	R_{25}[1]	R_{25} tolerance	B value[2]	Operating temperature range (℃)
103ET-4	10.0 kΩ	± 1%	3435 K ± 1%	− 40 to 100

- Dissipation factor: 0.7 mw / ℃
- Thermal time constant[3]: approx. 5 s
- Rated power at 25 ℃: 3.5 mW

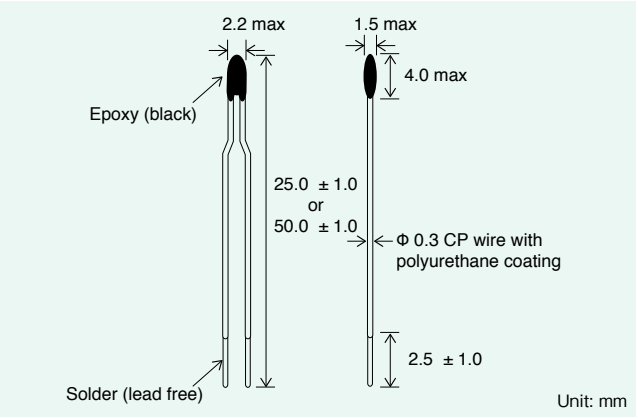
[1]: Rated zero-power resistance at 25 ℃
[2]: B value calculated from rated zero-power resistance at 25 ℃ and 85 ℃
[3]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in mid-air.

Resistance / temperature characteristics

Temperature (℃)	Resistance (kΩ)
− 40	204.7
− 30	118.5
− 20	71.02
− 10	43.67
0	27.70
10	18.07
20	12.11
25	10.00
30	8.301
40	5.811
50	4.147
60	3.011
70	2.224
80	1.668
85	1.451
90	1.267
100	0.9735

Unit: kΩ

Dimensions



Reliability data

Item	Test conditions	Criteria
Resistance to soldering heat	10 s at 260 ℃	ΔR, ΔB ± 1%
Solderability	2 s at 245 ℃ Flux material: Rosin 25%, ethyl alcohol 75%	More than 90% soldered
Tensile strength (lead wire)	10 s at 1 N (horizontal pull)	ΔR, ΔB ± 1% and visual inspection
Free fall	One time natural fall to a concrete board from 1 m height.	
Insulation resistance	100 V DC	Over 100 MΩ
Voltage proof	100 V AC for one minute	Less than 1 mA
Dry heat	1000 hours at 100 ℃	ΔR, ΔB ± 1%
Damp heat (under electrical load)	1000 hours at 40 ℃ and 90% to 95% humidity Electrical load: 0.1 mA DC	
Temperature cycle (thermal shock)	100 cycles as below: 1. - 40 ℃ for 30 minutes 2. Room temperature for 10 to 15 minutes 3. 100 ℃ for 30 minutes 4. Room temperature for 10 to 15 minutes	

Caution

- Please consult SEMITEC staff about mounting conditions when using mounting methods that may cause mechanical stress.
- When bending or cutting the lead wire always leave a distance of at least 3 mm to the thermistor head.

High accuracy, SMD chip type thermistor

KT Thermistor

The KT series SMD thermistor features high accuracy with tight resistance and B-value tolerances of ± 1%, high performance, high reliability and complies with EIAJ standards (dimensions: 1005, 1608).

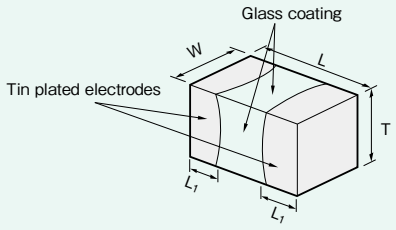
Product number explanation

103 KT 1608T−□□

- R_{25} tolerance: 1P: ± 1%, 2P: ± 2%, 3P: ± 3%
- Size according to EIAJ standard: See Fig. 1
- High accuracy SMD chip thermistor
- Rated zero-power resistance at 25 ℃
  E.g.: 103 = 10 x 10^3 Ω

Dimensions

Fig. 1



Size (Metric / EIAJ)	Size (Imperial)	L (mm)	W (mm)	T (mm)	L_1 (mm)
1005	0402	1.00 ± 0.15	0.50 ± 0.10	0.6 max.	0.15 to 0.30
1608	0603	1.60 ± 0.15	0.80 ± 0.15	0.95 max	0.20 to 0.50

Unit: mm

Applications

Office automation equipment, communication equipment, IT equipment, mobile devices, battery packs, battery chargers, LCDs, hybrid ICs, AV equipment

Specifications

Product number	R_{25}[1]	R_{25} tolerance	B value[2]	Dissipation factor (mw / ℃)	Thermal time constant (s)[3]	Rated power at 25 ℃ (mW)	Operating temperature range (℃)
103KT1608T	10 kΩ	± 1% ± 2% ± 3%	3435 K ± 1%	approx. 0.9	approx. 5	4.5	− 40 to 125
503KT1608T	50 kΩ		4055 K ± 1%				
104KT1608T	100 kΩ		4390 K ± 1%				
103KT1005T	10 kΩ		3435 K ± 1%	approx. 0.7	approx. 2.2	3.5	

[1]: Rated zero-power resistance at 25 ℃ [2]: B value calculated from rated zero-power resistance at 25 ℃ and 85 ℃
[3]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in mid-air.

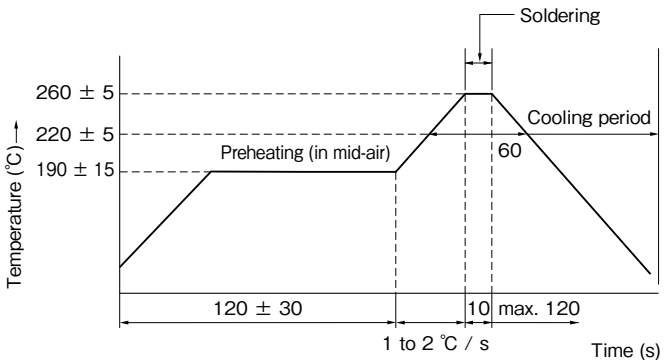
Reliability data

Item	Test conditions	Criteria
Resistance to soldering heat	10 s at 260 ℃ (wave soldering)	ΔR, ΔB ± 3%
Solderability	5 s at 235 ℃ Flux material: Rosin 25%, ethyl alcohol 75%	More than 75% soldered
Electrode connection strength vs. circuit board (horizontal)	After mounting the thermistor body is pushed horizontally with a jig with a force of 5 N for 10 s.	ΔR, ΔB ± 3% and visual inspection
Electrode connection strength vs. circuit board (vertical)	After mounting the circuit board is bent from the back side to a maximum of 2 mm for 5 s.	
Strength of NTC body	A force of 10 N is applied vertically with a jig for 10 s.	
Dry heat	1000 hours at 125 ℃	ΔR, ΔB ± 3%
Damp heat	1000 hours at 40 ℃ and 90% humidity	
Temperature cycle (thermal shock)	50 cycles as below: 1. - 25 ℃ for 30 minutes 2. Room temperature for 15 minutes 3. 100 ℃ for 30 minutes 4. Room temperature for 15 minutes	

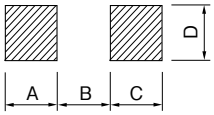
Caution

- Before and after soldering always make sure the circuit board is not bent or warped.
- The size of the soldering pad should be the same for both the left and the right side.

Recommended temperature profile for wave soldering



Recommended soldering pad size



Size (EIAJ)	A	B	C	D
1005	0.6	0.5	0.6	0.6
1608	1.0	1.0	1.0	1.2

Unit: mm

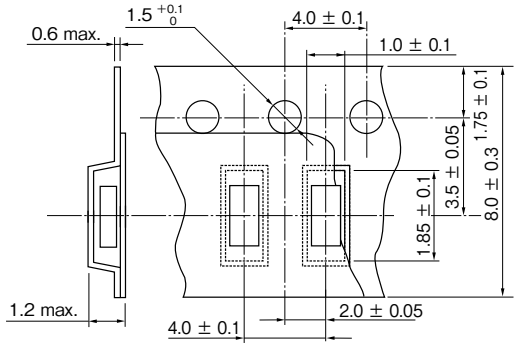
Resistance / temperature characteristics

Temperature (℃)	Product number			
	103KT1608T	503KT1608T	104KT1608T	103KT1005T
− 40	221.9	1920	5218	223.9
− 30	125.1	981.8	2530	126.1
− 20	73.38	525.2	1285	73.87
− 10	44.72	293.3	682.0	44.91
0	28.16	169.7	376.8	28.22
10	18.25	101.7	216.1	18.27
20	12.14	62.90	128.3	12.15
25	10.00	50.00	100.0	10.00
30	8.283	40.05	78.55	8.282
40	5.781	26.20	49.56	5.778
50	4.120	17.56	32.13	4.119
60	2.996	12.04	21.36	2.992
70	2.214	8.431	14.53	2.212
80	1.665	6.021	10.10	1.664
85	1.451	5.122	8.487	1.451
90	1.271	4.376	7.164	1.271
100	0.9832	3.237	5.176	0.9840
110	0.7707	2.433	3.803	0.7710
120	0.6114	1.855	2.839	0.6115
125	0.5469	1.627	2.466	0.5470
$B_{25/85}$	3435 K	4055 K	4390 K	3435 K

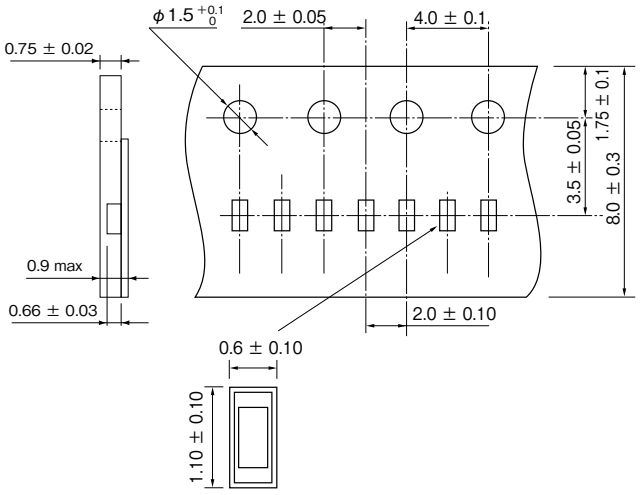
Unit: kΩ

Taping dimensions

●1608: 4.000 pcs / reel



●1005: 10.000 pcs / reel



Unit: kΩ

High temperature, high sensitivity, glass encapsulated thermistor

NT Thermistor

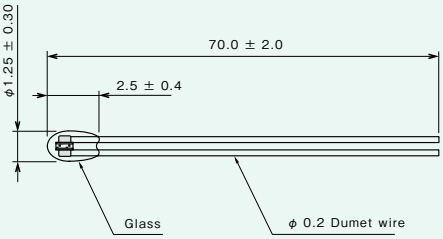
Semitec's glass encapsulated NT-4 series thermistor features high heat resistance and high sensitivity. Compared with conventional thermistors, the NT-4 thermistors are smaller, faster in response, and more reliable which makes them suitable for various applications.

Product number explanation

103 NT-4 -R□□□ H □□ G

- G: B value tolerance (G = ± 2%)
- □□: First two digits of B value (E.g. 34: $B_{25/85}$ = 3435 K)
- H: Resistance tolerance (H = ± 3%)
- □□□: R value at specified temperature (E.g. 025: 25℃)
- NT-4: High temperature thermistor
- 103: Rated zero-power resistance at 25 ℃ E.g.: 103 = 10 x 10^3 Ω

Dimensions



Unit: mm

Applications

3D printers, HVAC equipment, water heaters, microwave ovens, home appliances, hybrid vehicles, fuel cell vehicles, automotive, medical, disaster prevention, security, office automation

Specifications

Product number	Rated zero-power resistance[1]			B value temperature ℃(xx/xxx)	B value[2]	Operating temperature range (℃)
	Temperature	Resistance	Resistance tolerance			
New 502NT-4-R025H39G	25 ℃	5 kΩ	± 3%[3]	25/85	3964 K ± 2%	− 50 to 300
852NT-4-R050H34G	50 ℃	3.485 kΩ		0/100	3450 K ± 2%	
103NT-4-R025H34G	25 ℃	10 kΩ		25/85	3435 K ± 2%	
103NT-4-R025H41G	25 ℃	10 kΩ		25/85	4126 K ± 2%	
203NT-4-R025H42G	25 ℃	20 kΩ		25/85	4282 K ± 2%	
493NT-4-R100H40G	100 ℃	3.3 kΩ		0/100	3970 K ± 2%	
503NT-4-R025H42G	25 ℃	50 kΩ		25/85	4288 K ± 2%	
104NT-4-R025H42G	25 ℃	100 kΩ		25/85	4267 K ± 2%	
104NT-4-R025H43G	25 ℃	100 kΩ		25/85	4390 K ± 2%	
204NT-4-R025H43G	25 ℃	200 kΩ		25/85	4338 K ± 2%	
234NT-4-R200H42G	200 ℃	1 kΩ		100/200	4537 K ± 2%	
504NT-4-R025H45G	25 ℃	500 kΩ		25/85	4526 K ± 2%	
105NT-4-R025H46G	25 ℃	1000 kΩ		25/85	4608 K ± 2%	

• Dissipation factor: 0.8 mw / ℃ • Thermal time constant[4]: approx. 6 s • Rated power at 25 ℃: 4 mW

[1]: Rated zero-power resistance at each temperature

[2]: B value calculated from rated zero-power resistance at each temperature

[3]: If your application requires other tolerance values please contact SEMITEC sales staff.

[4]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in mid-air.

Reliability data

Item	Test conditions	Criteria
Resistance to soldering heat	10 s at 260 ℃ (wave soldering)	ΔR ± 3%, ΔB ± 1% and visual inspection
	3.5 s at 350 ℃ (soldering iron)	
Solderability	2 s at 245 ℃ Flux material: Rosin 25%, ethyl alcohol 75%	More than 90% soldered
Tensile strength (lead wire)	10 s at 1 N (horizontal pull)	ΔR ± 3%, ΔB ± 1% and visual inspection
Termination bending	0.5 N, two times, 90°	
Free fall	Three times natural fall to a maple board from 1 m height.	
Voltage proof	500 V AC for one minute	Less than 1 mA
Insulation resistance	500 V DC	Over 100 MΩ
Dry heat	1000 hours at 300 ℃	ΔR ± 3%, ΔB ± 1%
Damp heat (under electrical load)	1000 hours at 85 ℃ and 85% humidity Electrical load: 0.1 mA DC	
Temperature cycle (thermal shock)	100 cycles as below: 1. - 30 ℃ for 3 minutes in fluid 2. 150 ℃ for 3 minutes in fluid	

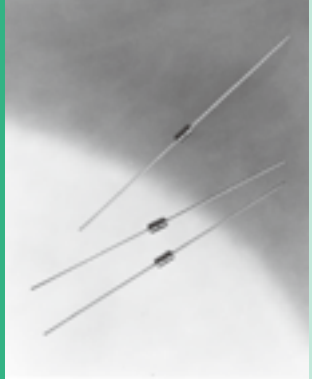
Resistance / temperature characteristics

Temperature (℃)	502NT-4 -R025H39G	852NT-4 -R050H34G	103NT-4 -R025H34G	103NT-4 -R025H41G	203NT-4 -R025H42G	493NT-4 -R100H40G	503NT-4 -R025H42G	104NT-4 -R025H42G	104NT-4 -R025H43G	204NT-4 -R025H43G	234NT-4 -R200H42G	504NT-4 -R025H45G	105NT-4 -R025H46G
− 50	339.5	346.8	394.7	830.9	1931	3376	3576	8887	10090	19040	17900	52600	110900
− 30	92.34	106.1	122.0	207.7	459.2	885.4	965.0	2156	2353	4524.0	4633.0	12290	25610
− 10	28.48	38.02	44.09	60.87	129.3	275.5	302.8	623.2	657.0	1284.0	1393.0	3396	6979
0	16.64	23.92	27.86	34.85	72.67	162.2	175.2	354.6	368.1	724.5	804.8	1887	3849
10	10.06	15.49	18.13	20.65	42.33	98.65	104.0	208.8	213.5	423.0	479.2	1084	2195
25	5.000	8.487	10.00	10.00	20.00	49.41	50.00	100.0	100.0	200.0	232.1	500.0	1000
40	2.649	4.899	5.806	5.166	10.10	26.23	25.42	50.90	49.90	100.6	119.0	245.2	484.7
50	1.790	3.485	4.144	3.437	6.613	17.70	16.69	33.45	32.42	65.72	78.46	157.3	308.4
60	1.238	2.524	3.011	2.341	4.440	12.20	11.19	22.48	21.54	43.89	52.84	103.1	200.7
80	0.6306	1.391	1.668	1.159	2.138	6.134	5.343	10.80	10.13	20.81	25.39	47.24	90.54
85	0.3591	1.209	1.451	0.9843	1.803	5.222	4.494	9.094	8.486	17.48	21.38	39.31	75.08
100	0.3455	0.8104	0.9754	0.6189	1.112	3.300	2.741	5.569	5.122	10.61	13.06	23.27	43.96
120	0.2014	0.4952	0.5920	0.3525	0.6175	1.882	1.498	3.058	2.763	5.759	7.130	12.23	22.78
140	0.1238	0.3108	0.3679	0.2121	0.3631	1.127	0.8635	1.770	1.574	3.301	4.098	6.787	12.48
160	0.07968	0.2000	0.2365	0.1339	0.2245	0.7057	0.5225	1.074	0.9414	1.985	2.466	3.957	7.188
180	0.05341	0.1325	0.1568	0.08811	0.1448	0.4592	0.3296	0.6793	0.5873	1.244	1.544	2.406	4.322
200	0.03708	0.09036	0.1068	0.06015	0.09698	0.3092	0.2158	0.4452	0.3804	0.8098	1.000	1.519	2.703
220	0.02656	0.06329	0.07467	0.04239	0.06713	0.2145	0.1459	0.3016	0.2549	0.5442	0.6674	0.9937	1.750
240	0.01956	0.04543	0.05345	0.03072	0.04784	0.1529	0.1016	0.2104	0.1760	0.3765	0.4574	0.6712	1.168
260	0.01477	0.03337	0.03907	0.02285	0.03499	0.1117	0.07261	0.1507	0.1250	0.2676	0.3210	0.4663	0.8019
280	0.01141	0.02506	0.02912	0.01743	0.02619	0.08336	0.05319	0.1105	0.09101	0.1950	0.2302	0.3317	0.5651
300	0.00900	0.01919	0.02209	0.01361	0.02003	0.06345	0.03981	0.08278	0.06772	0.1452	0.1683	0.2410	0.4074

Unit: kΩ

Caution

- When soldering make sure to have a minimum distance from the glass encapsulated sensor head of 5 mm.
- When working the lead wire make sure to fix the wire at a minimum distance from the glass encapsulated sensor head of 5 mm.



High temperature axial type thermistor

CT Thermistor

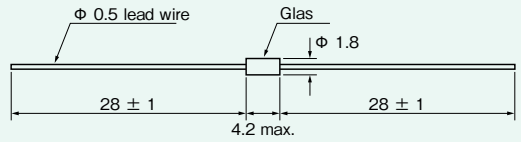
The axial glass encapsulated CT series thermistor features excellent reliability and high heat resistance.

Product number explanation

103 CT – □□□□□

- Shape
- High temperature thermistor
- Rated zero-power resistance at 25 ℃
  E.g.: 103 = 10 x 10^3 Ω

Dimensions



Unit: mm

Applications

Home electronics, HVAC equipment, water heaters, kitchen appliances, solar systems, vending machines, refrigerated display cases, batteries, refrigerators

Specifications

Product number	Rated zero-power resistance[1]			B value[2]	Operating temperature range (℃)	Lead wire
	Temperature	Resistance	Resistance tolerance			
252CT-4	25 ℃	2.5 kΩ	± 5%	3670 K ± 2%	– 50 to 250	Nickel plating
512CT-4		5.1 kΩ		3200 K ± 2%	– 50 to 200	
562CT-4		5.6 kΩ		3200 K ± 2%		
912CT-4		9.1 kΩ		3270 K ± 2%	– 50 to 250	
103CT-4		10 kΩ		3270 K ± 2%		
113CT-4		11 kΩ		3270 K ± 2%		
203CT-4		20 kΩ		3410 K ± 2%		
473CT-4		47 kΩ		3610 K ± 2%		
513CT-4		51 kΩ		3610 K ± 2%		
563CT-4		56 kΩ		3610 K ± 2%		
104CT-4		100 kΩ		3450 K ± 2%		
204CT-4		200 kΩ		3500 K ± 2%		
103CT-01006	25 ℃	10 kΩ	± 5%	3900 K ± 2%	– 30 to 150	Tin plating
103CT-21048	25 ℃	10 kΩ	± 3%	4100 K ± 2%	– 40 to 150	
503CT-91027	50 ℃	19.727 kΩ	± 2.5%	3992 K ± 2%		
104CT-90113	25 ℃	100 kΩ	± 5%	4070 K ± 2%		

• Dissipation factor: 2.1 mw / ℃ • Thermal time constant[3]: approx. 10 to 20 s
• Rated power at 25 ℃: 10.5 mW
[1]: Rated zero-power resistance at each temperature [2]: B value calculated from rated zero-power resistance at each temperature [3]: Time required to reach 63.2% of temperature difference. Measured with sensor suspended in mid-air.

Reliability data

Item	Test conditions	Criteria
Resistance to soldering heat	10 s at 260 ℃ (wave soldering)	ΔR, ΔB ± 2% and visual inspection
	3.5 s at 340 ℃ (soldering iron)	
Solderability	2 s at 245 ℃ Flux material: Rosin 25%, ethyl alcohol 75%	More than 50% soldered (More than 95% soldered)[5, 6, 7]
Tensile strength (lead wire)	10 s at 5 N (horizontal pull)	ΔR, ΔB ± 2% and visual inspection
Termination bending	2.5 N, two times, 90°	
Free fall	Three times natural fall to a maple board from 1 m height.	
Voltage proof	500 V AC for one minute	Less than 1 mA
Insulation resistance	500 V DC	Over 100 MΩ (Over 50 MΩ)[5]
Dry heat	1000 hours at 250 ℃ (200 ℃)[4] (150 ℃)[5, 7] (125 ℃)[6]	ΔR, ΔB ± 3%
Damp heat	1000 hours at 40 ℃ and 90% humidity	
Temperature cycle (thermal shock)	5 cycles as below5: 1. - 30 ℃ for 30 minutes 2. Room temperature for 3 minutes 3. 200 ℃ for 30 minutes 4. Room temperature for 3 minutes (min. temp. - 40 ℃ , max. temp. 150 ℃)[5, 7] (min. temp. - 25 ℃ to 125 ℃)[6]	

[4]: 252CT, 512CT, 562CT
[5]: 103CT-21048, 103CT-01006
[6]: 503CT-91027
[7]: 104CT-90113

Resistance / temperature characteristics

Temperature (℃)	Product number															
	252CT	512CT	562CT	912CT	103CT	113CT	203CT	473CT	513CT	563CT	104CT	204CT	103CT-21048	103CT-01006	503CT-91027	104CT-90113
– 50	120.2	137.9	151.4	278.3	305.8	336.4	604.8	1506	1634	1794	3200	6803				
– 40	65.60	81.02	88.96	159.9	175.7	193.3	350.2	867.5	941.3	1034	1863	3913	458.9		1947	
– 30	36.48	48.93	53.73	94.63	104.0	114.4	207.9	512.6	556.2	610.8	1105	2306	223.1	183.3	1010	1862
– 20	20.91	30.56	33.55	58.02	63.76	70.13	127.8	313.4	340.1	373.4	675.1	1397	114.8	98.80	547.9	1011
– 10	12.32	19.65	21.58	36.67	40.29	44.32	81.00	197.2	214.0	235.0	424.3	870.3	62.13	55.69	309.7	571.0
0	7.516	12.96	14.23	23.82	26.18	28.79	52.63	127.1	138.0	151.5	272.2	553.6	35.15	32.67	181.6	334.0
10	4.738	8.779	9.639	15.92	17.49	19.24	35.15	84.16	91.32	100.3	179.4	362.5	20.70	19.86	110.2	201.7
20	3.074	6.080	6.676	10.91	11.99	13.18	24.02	56.86	61.70	67.75	120.9	242.5	12.64	12.48	68.90	125.5
25	2.500	5.100	5.600	9.100	10.00	11.00	20.00	47.00	51.00	56.00	100.0	200.0	10.00	10.00	55.06	100.0
30	2.045	4.296	4.717	7.627	8.381	9.219	16.74	39.01	42.33	46.48	83.11	165.7	7.972	8.071	44.30	80.21
40	1.393	3.095	3.398	5.442	5.980	6.578	11.88	27.07	29.37	32.25	58.24	115.4	5.177	5.362	29.22	52.55
50	0.9698	2.267	2.489	3.952	4.342	4.777	8.570	19.05	20.68	22.70	41.52	81.91	3.453	3.649	19.73	35.23
60	0.6895	1.687	1.852	2.918	3.206	3.527	6.239	13.58	14.74	16.18	30.14	59.14	2.359	2.540	13.61	24.12
70	0.4993	1.270	1.394	2.184	2.400	2.640	4.581	9.807	10.64	11.69	22.19	43.36	1.648	1.804	9.574	16.84
80	0.3680	0.9650	1.060	1.656	1.820	2.002	3.401	7.187	7.798	8.559	16.57	32.28	1.175	1.305	6.860	11.97
85	0.3178	0.8443	0.9271	1.448	1.592	1.751	2.943	6.180	6.706	7.363	14.39	27.97	0.9988	1.118	5.844	10.16
90	0.2757	0.7402	0.8128	1.269	1.394	1.534	2.553	5.328	5.781	6.348	12.53	24.33	0.8531	0.9609	4.999	8.654
100	0.2098	0.5736	0.6298	0.9787	1.076	1.183	1.937	3.997	4.337	4.762	9.586	18.57	0.6302	0.7187	3.700	6.354
120	0.1267	0.3559	0.3908	0.5952	0.6540	0.7194	1.156	2.337	2.535	2.784	5.828	11.24	0.3601	0.4196	2.115	3.574
140	0.08028	0.2298	0.2524	0.3750	0.4121	0.4533	0.7191	1.425	1.546	1.698	3.694	7.108	0.2172	0.2577	1.127	2.115
150	0.06494	0.1870	0.2053	0.3016	0.3314	0.3646	0.5752	1.129	1.226	1.346	2.982	5.732	0.1717	0.2054	1.002	1.654
160	0.05302	0.1534	0.1684	0.2445	0.2686	0.2955	0.4638	0.9031	0.9799	1.076	2.428	4.666				
180	0.03630	0.1055	0.1158	0.1643	0.1805	0.1986	0.3091	0.5919	0.6423	0.7052	1.647	3.168				
200	0.02562	0.07445	0.08175	0.1136	0.1249	0.1374	0.2122	0.4000	0.4341	0.4766	1.150	2.216				
220				0.08063	0.08860	0.09746	0.1497	0.2780	0.3016	0.3312	0.8235	1.591				
240				0.05857	0.06436	0.07080	0.1082	0.1979	0.2148	0.2358	0.6038	1.169				
250				0.05031	0.05529	0.06082	0.09271	0.1683	0.1827	0.2006	0.5208	1.010				

Unit: kΩ

Caution

- When soldering make sure to have a minimum distance from the glass encapsulated sensor head of 5 mm.
- When working the lead wire make sure to fix the wire at a minimum distance from the glass encapsulated sensor head of 5 mm.