

THERMISTOR

"Thermistor" is the generic name given to thermally sensitive resistors.

Negative temperature coefficient thermistor is generally called as thermistor. Thermistor is a semiconducting ceramic resistor produced by sintering the materials at high temperature and made mainly from metal oxide.

Depending on the manufacturing method and the structure, there are many shapes and characteristics for various purposes such as temperature measurement, temperature compensation and etc.

The thermistor resistance values, unless otherwise specified, are classified at a standard temperature of 25°C.

B constant is calculated from the resistance values at 25°C and 85°C.

Resistance - Temperature Characteristics

The resistance of a temperature is solely a function of its absolute temperature. Since electrical power being dissipated within a temperature might heat above its ambient temperature and thereby reduce its resistance, it is necessary to test for resistance with temperature. The resistance so measured is called R_T , which means the resistance at essentially zero-power.

The mathematical expression which relates the resistance and the absolute temperature of a thermistor is as follows:

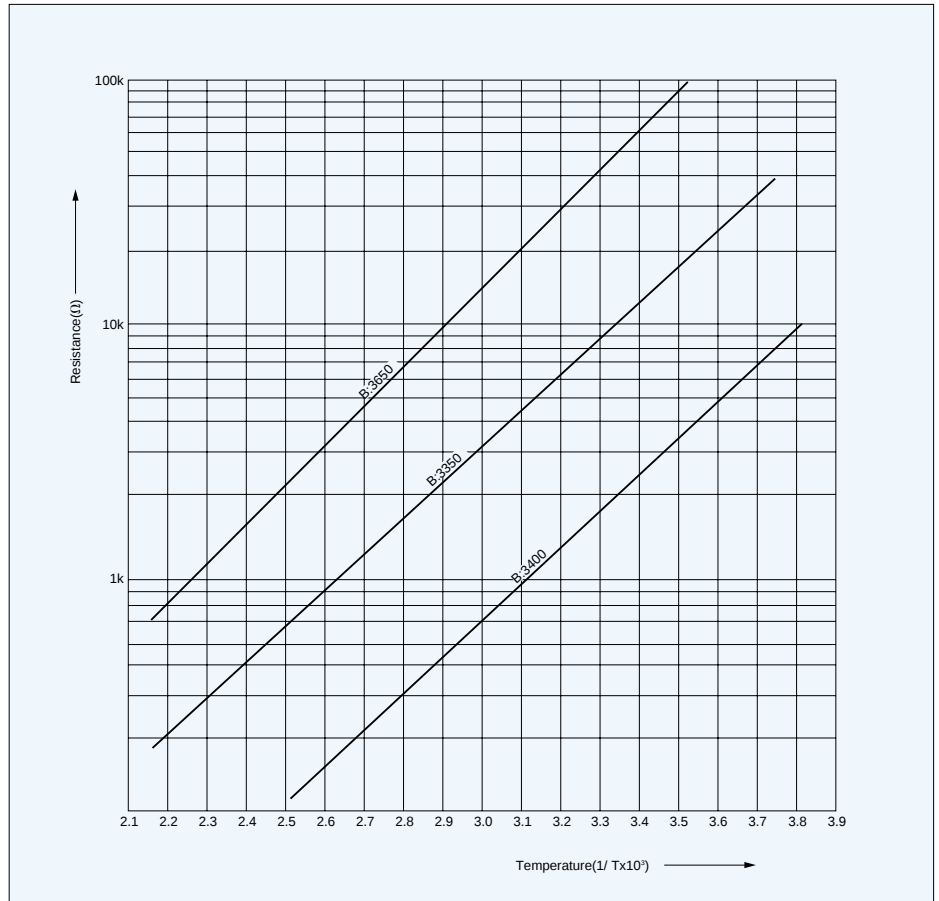
$$R_a = R_b \exp \left[B \left(\frac{1}{T_1} - \frac{1}{T_2} \right) \right]$$

Where: R_a is the resistance at absolute temperature T_1
 R_b is the resistance at absolute temperature T_2
 B is a constant which depends on the material of the thermistor

Unless otherwise specified, all values of B are determined from measurements made at 25°C and 85°C.

The temperature coefficient of resistance α is expressed in the following equation:

$$\alpha = - \frac{B}{T^2} \times 100 (\%/^{\circ}\text{C})$$



Dissipation factor

Dissipation factor (δ) is power in milliwatts required to raise thermistor temperature 1°C. Measured with thermistor suspended by its leads in a specified environment.

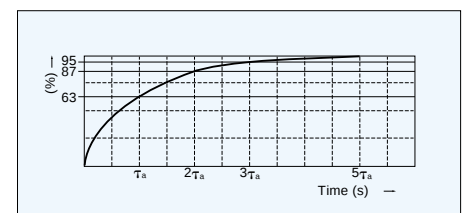
$$\delta = \frac{P}{\Delta t} \text{ (mW/}^{\circ}\text{C)}$$

P : Power (mW)

Δt : Raise temperature (°C)

Thermal time constant

Thermal time constant (τ_a) is the time required by a thermistor to change 63% of the difference between its initial and final temperature. Measured with thermistor suspended by its leads in specified environment.



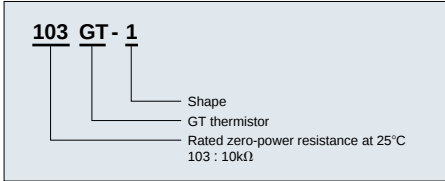
HIGH HEAT-RESISTANCE AND HIGH SENSITIVE THERMISTOR

GT THERMISTOR

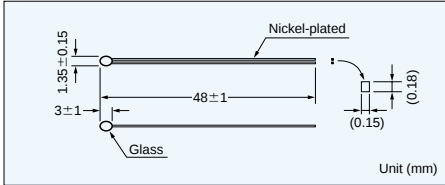
GT thermistor is combined both superior feature of BT thermistor and ET thermistor as fast response time, high reliability, wide category temperature range, high moisture proof, high accuracy and reasonable price.

GT thermistor is made up of a high quality thermistor element and the lead wire is connected to the thermistor element by alloyed technology, and glass coating for the thermistor element.

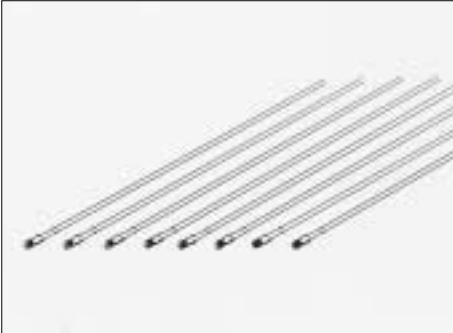
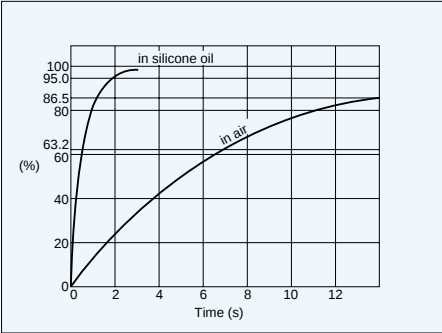
Part number



Dimensions



Time constant



Specifications

Part No.	R ₂₅ *1	B value*2	Dissipation factor (mW/°C)	Thermal time constant(s)*3	Rated power at 25°C(mW)	Operating temp. range(°C)
102GT-1	1.0kΩ±3%	3305K±2%	0.6	7(0.6)	3	-50~200
202GT-1	2.0kΩ±3%	3838K±2%	0.6	7(0.6)	3	-50~300
502GT-1	5.0kΩ±3%	3964K±2%	0.6	7(0.6)	3	-50~300
103GT-1	10.0kΩ±3%	4126K±2%	0.6	7(0.6)	3	-50~300
203GT-1	20.0kΩ±3%	4282K±2%	0.6	7(0.6)	3	-50~300
503GT-1	50.0kΩ±3%	4288K±2%	0.6	7(0.6)	3	-50~300
104GT-1	100.0kΩ±3%	4267K±2%	0.6	7(0.6)	3	-50~300
204GT-1	200.0kΩ±3%	4338K±2%	0.6	7(0.6)	3	-50~300
504GT-1	500.0kΩ±3%	4526K±2%	0.6	7(0.6)	3	-50~300
105GT-1	1000.0kΩ±3%	4608K±2%	0.6	7(0.6)	3	-50~300

*1 R₂₅ : Rated zero-power resistance value at 25°C.

*2 B value : determined by rated zero-power resistance at 25°C and 85°C.

*3 Time when thermistor temperature reaches 63.2% of the temperature difference. The value is measured in the air. (silicone oil)

Resistance-Temperature

Temperature (°C)	Type									
	102GT	202GT	502GT	103GT	203GT	503GT	104GT	204GT	504GT	105GT
-50	32.57	111.3	342.1	825.1	1901	4613	8743			
-40	18.48	61.34	175.4	405.3	909.0	2199	4218	8810		
-30	10.84	33.69	92.54	206.6	453.2	1100	2132	4436	12091	
-20	6.594	18.79	50.44	109.9	236.6	576.2	1127	2329	6268	
-10	4.144	10.82	28.49	60.72	128.3	315.1	620.0	1272	3372	6920
0	2.675	6.424	16.66	34.82	72.32	178.8	353.7	720.3	1880	3833
10	1.773	3.939	10.06	20.66	42.24	104.9	208.6	421.8	1083	2190
20	1.203	2.489	6.264	12.64	25.47	63.52	126.8	254.6	642.3	1289
30	0.8354	1.618	4.019	7.968	15.82	39.62	79.36	158.2	391.9	780.9
40	0.5918	1.080	2.651	5.164	10.10	25.37	50.96	100.8	245.4	485.2
50	0.4273	0.7390	1.792	3.436	6.620	16.64	33.49	65.85	157.5	309.0
60	0.3141	0.5170	1.239	2.341	4.444	11.16	22.51	43.99	103.3	201.2
70	0.2347	0.3695	0.8753	1.631	3.050	7.645	15.44	29.98	69.20	133.6
80	0.1782	0.2693	0.6304	1.159	2.138	5.338	10.80	20.82	47.23	90.53
90	0.1373	0.1998	0.4624	0.8391	1.527	3.795	7.686	14.71	32.84	62.49
100	0.1072	0.1507	0.3450	0.6181	1.111	2.742	5.556	10.57	23.22	43.90
110	0.08483	0.1154	0.2614	0.4626	0.8209	2.014	4.082	7.720	16.68	31.34
120	0.06787	0.08973	0.2010	0.3514	0.6160	1.501	3.043	5.720	12.15	22.69
130	0.05488	0.07068	0.1566	0.2706	0.4686	1.133	2.298	4.296	8.976	16.65
140	0.04483	0.05638	0.1236	0.2111	0.3613	0.8662	1.758	3.269	6.719	12.39
150	0.03697	0.04550	0.09865	0.1666	0.2820	0.6704	1.360	2.516	5.091	9.330
160	0.03077	0.03715	0.07967	0.1330	0.2226	0.5247	1.064	1.958	3.903	7.107
170	0.02584	0.03065	0.06501	0.1073	0.1777	0.4149	0.8414	1.539	3.024	5.472
180	0.02189	0.02556	0.05358	0.08741	0.1432	0.3314	0.6714	1.222	2.367	4.255
190	0.01869	0.02151	0.04457	0.07186	0.1166	0.2673	0.5408	0.9796	1.871	3.339
200	0.01610	0.01826	0.03741	0.05960	0.09573	0.2174	0.4393	0.7919	1.492	2.644
210			0.03167	0.04986	0.07929	0.1784	0.3597	0.6455	1.200	2.113
220			0.02703	0.04204	0.06620	0.1475	0.2969	0.5303	0.9726	1.702
230			0.02324	0.03573	0.05570	0.1230	0.2468	0.4389	0.7946	1.382
240			0.02014	0.03059	0.04722	0.1032	0.2065	0.3658	0.6539	1.131
250			0.01759	0.02640	0.04030		0.1740	0.3068	0.5418	0.9323
260							0.1475	0.2591	0.4519	0.7735
270							0.1258	0.2201	0.3793	0.6459
280							0.1079	0.1881	0.3203	0.5424
290							0.09305	0.1616	0.2720	0.4583
300							0.08065	0.1396	0.2323	0.3894

Unit (kΩ)