SEMITEC®
Ishizuka Electronics Corporation

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 uses metal oxide as its main component.
Depending on the manufacturing method and the structure, there are many shapes and characteristics of thermistors, thus allowing wide range of applications such as temperature measurement, temperature compensation, etc..
The thermistor resistance values, other than those especially noted, are classified at a standard temperature of 25°C.
B constant is value calculated from the resistance values at 25°C and 85°C.

Resistance-Temperature Characteristics

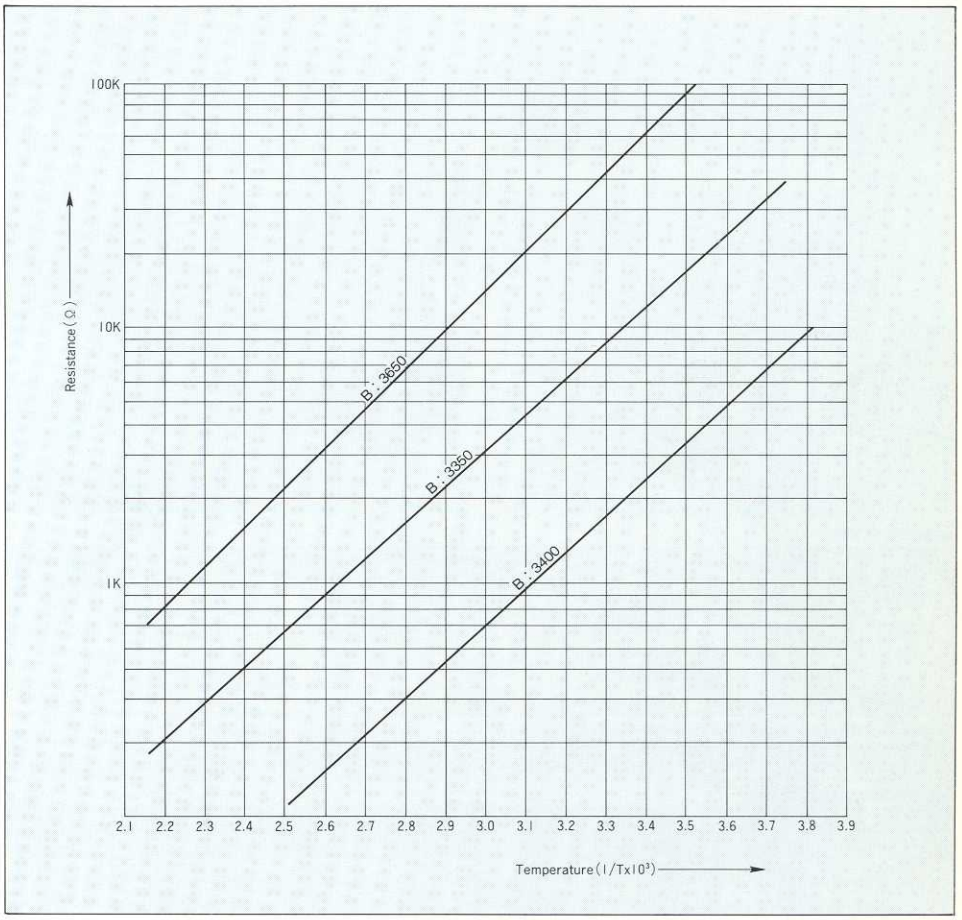
The resistance of a temperature is solely a function of its absolute temperature. Since electrical power being dissipated within a temprature might heat above its ambient temperature and thereby reduce its resistance, it is necessary to test for resistance with temperature. The resistance so measured 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:

$$R_1 = R_2 \exp\left[B\left(\frac{1}{T_1}-\frac{1}{T_2}\right)\right]$$

Where: R_1 is the resistance at absolute temperature T_1
R_2 is the resistance at absolute temperature T_2
B is a constant which depends on the material used to make 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 of a thermistor α is expressed in the following equation:

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



Dissipation factor

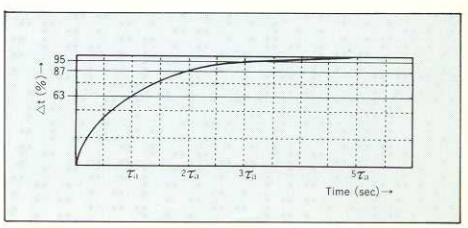
Dissipation factor (δ) is power in milliwatts required to raise thermistor temperature 1°C. Measured with thermistor suspended by its leads in a specified environment.

$$\delta = \frac{P}{\Delta t}\,(mW/°C)$$

P : Power (mW)
Δt : Raise temperature (°C)

Thermal Time constant

Thermal Time constant (τ) 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.

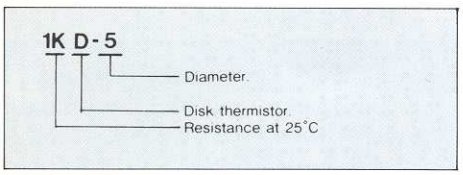


TEMPERATURE COMPENSATION

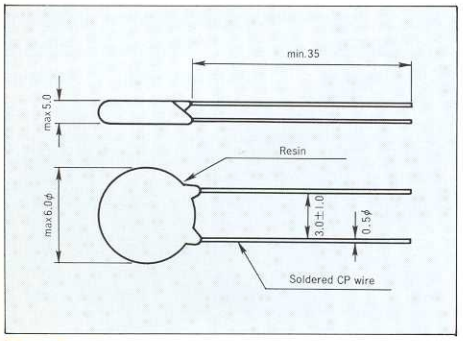
D THERMISTOR

As its resistance changes with temperature, the thermistor is used for TV, radio, and other transistor temperature compensation circuit, coil temperature compensation circuit, etc.

Type number



Dimensions

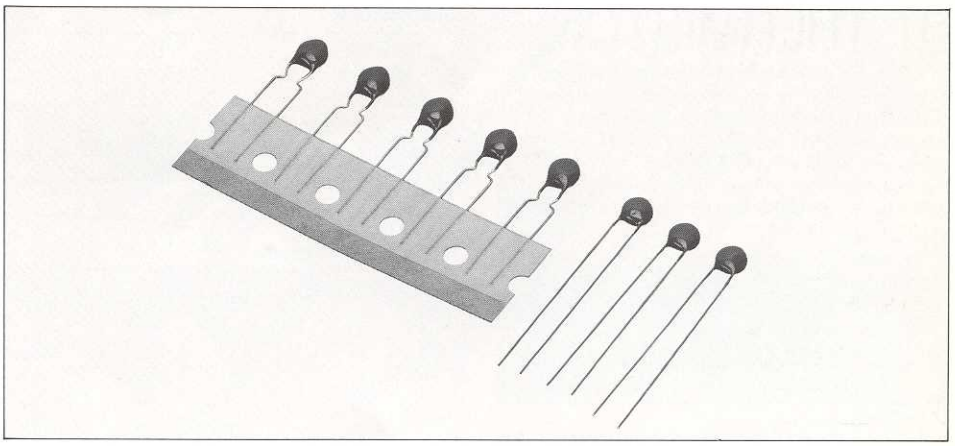


Specifications

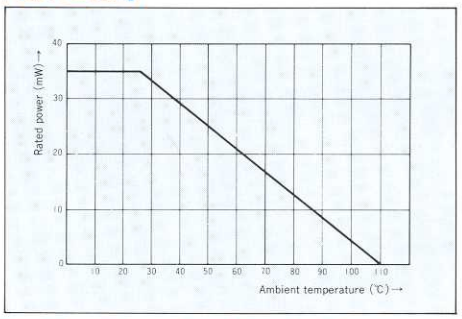
Dissipation factor	Thermal Time constant	Operating temp. range	Rated power at 25°C
3.5(mW/°C)	13 (s)	−50 ~ 110°C	297(mW)

Type	Resistance (25°C)	B constant
50D-5	50Ω	3,250 (K)
80D-5	80 〃	3,300 〃
100D-5	100 〃	3,300 〃
200D-5	200 〃	3,400 〃
250D-5	250 〃	3,450 〃
300D-5	300 〃	3,500 〃
360D-5	360 〃	3,550 〃
500D-5	500 〃	3,650 〃
800D-5	800 〃	3,850 〃
1KD-5	1kΩ	3,950 〃
1.5KD-5	1.5 〃	3,950 〃
2KD-5	2 〃	4,000 〃
5KD-5	5 〃	4,100 〃
8KD-5	8 〃	4,200 〃
10KD-5	10 〃	4,200 〃
15KD-5	15 〃	4,250 〃
20KD-5	20 〃	4,300 〃
25KD-5	25 〃	4,300 〃
50KD-5	50 〃	4,650 〃
100KD-5	100 〃	4,850 〃

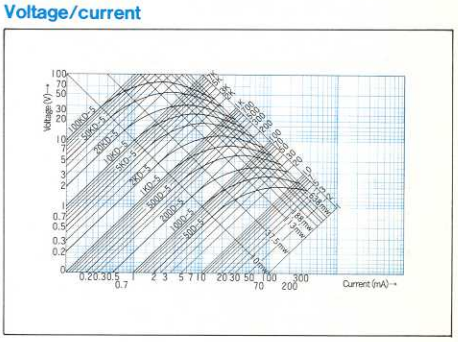
* The tolerance of resistance is ± 15% for a standard device.
* The tolerance of B value is ± 5% for a standard device.
The B value is determined by the equation : $B_{25/85} = 4.098 \log$ (R25/R85). R25 and R85 represent the thermistor resistance at 25°C and 85°C respectively.



Power derating



Voltage/current



Resistance/Temperature Characteristics