



## 1. The electric characteristics of NTC thermistors at zero power.

$$R_1 = R_0 \exp B (1/T_1 - T_0) \dots\dots\dots(1)$$

### B-constant

NTC thermistor is resistor with high negative temperature coefficient of resistance. The relationship between resistance and temperature can be approximated by the equation (1). Where  $R_0$  is initial resistance of the thermistor at temperature  $T_0$  measured in degrees Kelvin and  $R_1$  is resistance at temperature  $T_1$ .

$B$  is constant for a given thermistor, can be approximated by the equation (2).

$$B = (\ln R_1 - \ln R_0) / (1/T_1 - 1/T_0) \text{ (K)} \dots\dots\dots(2)$$

### $\alpha$ Temperature coefficient of resistance

The temperature coefficient of resistance  $\alpha$  can be approximated by the equation (3).

$$\alpha = \frac{1}{R} \frac{dR}{dT} = \frac{B}{T^2} \times 100 \text{ (%) } \dots\dots\dots(3)$$

## 2. The electric characteristics of NTC thermistors under loading.

### $\delta$ Dissipation constant

The relationship between the power  $P = V \times I$  applied to a thermistor at ambient temperature  $T_0$  and the consequent temperature rise  $(T_1 - T_0)$  due to self-heating can be approximated by the equation (4). Where  $\delta$  is dissipation constant, is normally measured in  $mW/^\circ C$ .

$$P = V \times I = \delta (T_1 - T_0) \dots\dots\dots(4)$$

## 3. Temperature - Time characteristics.

### $\tau$ Thermal time constant

When thermistor is cooled from  $T_1$  to  $T_0$ , actual thermistor temperature varies exponentially as shown as equation (5). Thermal constant  $\tau$  is specified as 63.2% changing time between  $T_1$  to  $T_0$ , measured in second.

$$(T - T_0) = (T_1 - T_0) \exp(-t / \tau) \dots\dots\dots(5)$$
$$T = (T_1 - T_0) \exp(-1) + T_0 = 0.368(T_1 - T_0) + T_0$$

Product Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
	NTC	Model No.		Type	Nom.resistance			R±%	B constant			B±%	Individual number							
					cf.Table-1			-2	Table -3			-2								
1. DHT Thermistor	N	D	H	1	R25				B25/85											
				2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>	<input type="checkbox"/>
2. Chip Thermistor	N	S	M	1	R25				B25/85											
				2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>	<input type="checkbox"/>
				3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>	<input type="checkbox"/>
				4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>	<input type="checkbox"/>
3. Radial lead chip thermistor	N	R	C	1	R25				B25/85											
				2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>	<input type="checkbox"/>
				3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>	<input type="checkbox"/>
4. Radial lead disc thermistor	N	R	D	3	R25				B25/85											
				5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>	<input type="checkbox"/>
				8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>	<input type="checkbox"/>

Product Group	Type	Nom.resistance			R±%	element dia.			B constant			B±%	Individual number						
		cf.Table-1			-2	Table-4			Table-3			-2							
5. Power thermistor	E	R25							B25/50										
	S	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	D	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>
	N	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/>

Table-1

Resistance notation JIS C 5201	
R10	0.10Ω
2R2	2.2Ω
100	10Ω
152	1.5kΩ

Table-2

Tolerance table JIS C 2570	
F	±1%
G	±2%
H	±3%
I	±4%
J	±5%
K	±10%
L	±15%
M	±20%
N	±30%
Y	Special

Table-3

B constant notation JIS C 2570	
353	3525~3534 K
354	3535~3544 K
410	4095~4104 K
411	4105~4114 K

Table-4

Element dia. (mm)	
06	5.5~6.4
07	6.5~7.4
08	7.5~8.4
09	8.5~9.4
10	9.5~10.4
11	10.5~11.4
12	11.5~12.4
13	12.5~13.4
14	13.5~14.4
18	17.5~18.4
20	19.5~20.4