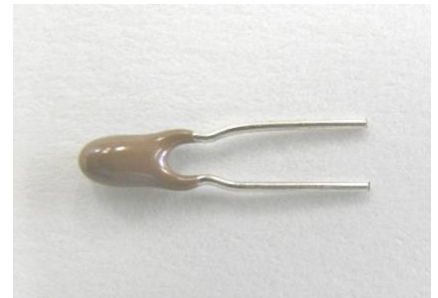


Model No. **HNT-EC**  
**Epoxy resin coated radial lead thermistor**

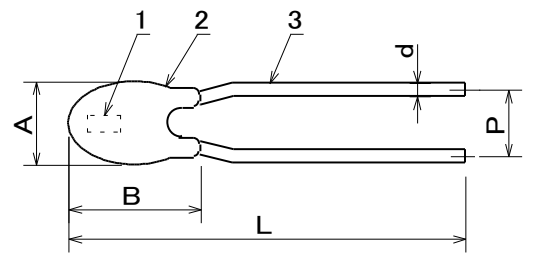
◆Features : High accuracy, Moisture proof (Boiling resistance)

◆ Applications : Air conditioner, Refrigerator, Heated toilet seat  
 Thermometer, Battery pack



HNT - EC 1 - 103 F B - A 3950 F  
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

Part number	A [mm]	B [mm]	L [mm]	d [mm]	P [mm]
HNT-EC3	3MAX	6MAX	10.5 ±1	0.4	1.81 ±0.3
Parts name		SPEC - Materials			
1	Element	NTC thermistor			
2	Coating material	Epoxy resin			
3	Lead wire	Tin coated annealed copper wire			



### <Type designations>

- ①Series code  
NTC Thermistor
- ②Type code  
Epoxy resin coated radial lead
- ③Size
- ④Resistance (R25)  
3-digit ex. 103→ $10 \times 10^3 \Omega$
- ⑤Resistance tolerance  
F : ±1%    G : ±2%  
H : ±3%    J : ±5%
- ⑥Packing  
B : Bulk
- ⑦Definition of B-constant  
A : B25/50    B : B25/85  
C : B0/100    D : B0/25  
X : Individual designation
- ⑧B-constant  
4-digit ex. 3950→3950K
- ⑨B-constant tolerance  
F : ±1%    G : ±2%  
H : ±3%    J : ±5%

### < Maximum Rating >

- ◆Rated wattage  
200mW at 25°C
- ◆Operating temperature range  
-40°C~+125°C

### <Electrical Characteristics>

- ◆Resistance R25  
2kΩ - 200kΩ  
※Refer to product list
- ◆B-constant B25/50  
3200K - 4500K  
※Refer to product list
- ◆Dissipation constant  
2.0mW/°C  
※In still air at 25°C
- ◆Thermal time constant  
3.0s MAX  
※In liquid

Made in China

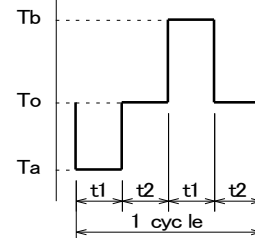
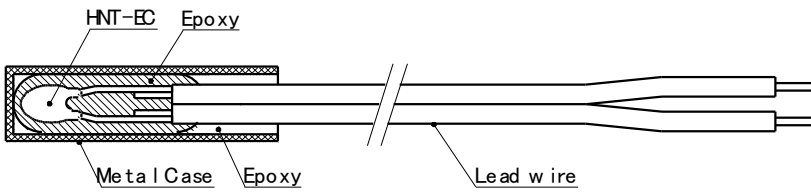
## Product list

Part Number	B25/50 [K]	B25/85 [K]	R25 [Ω]								
			1.5k	2.252k	5k	10k	15k	20k	30k	50k	100k
HNT-EC	3270	(3315)			●	●					
	3400	(3435)			●	●					
	3470	(3510)			●	●					
	3900	(3840)	●								
	3950	(4020)		●	●	●	●	●	●	●	●
	4100	(4150)				●				●	
	4200	(4250)									●
	4400	(4450)									●

B25/85 is a representative value.  
Please inquire for characteristics other than the above.

## Reliability test

### ◆HNT-EC

Item	Conditions	SPEC
1 High temp. storage test	125°C±3°C、1000hr±24h	Rate of resistance change $ \Delta R  < 1\%$
2 Low temp. storage test	-40°C±3°C、1000hr±24hr	
3 Humidity current test	40°C±2°C、90~95%RH、1000hr±24hr DC0.1mA	
4 Temp. cycle test	Ta : -40°C±3°C (air) To : 20°C±5°C (air) Tb : 125°C±3°C (air) t1=5min、t2<60s 1000cycles	 Rate of B-constant change $ \Delta B  < 1\%$
5 Boiling test	100°C、1000hr±24hr、DV5V	Rate of resistance change $ \Delta R  < 3\%$  Rate of B-constant Change $ \Delta B  < 3\%$
Boiling test is a test of the sensor structure as follows. 		

## Basic constant and characteristics of NTC thermistors

### 1. Resistance - temperature characteristic

Resistance - temperature characteristic can be approximated by the equation (1).

$$R_b = R_a \times \exp\{B(1/T_b - 1/T_a)\} \quad \dots \dots \dots (1)$$

- T<sub>a</sub>, T<sub>b</sub> : Absolute temperature [K]
- R<sub>a</sub>, R<sub>b</sub> : Zero load resistance at the temperature T<sub>a</sub> and T<sub>b</sub>
- B : B constant

※Zero load resistance is resistance value of thermistor at very low power consumption, resistance value variation of self-heating can be ignored.

### 2. B-constant

B-constant shows resistance variation value, can be calculated by the 2 point of resistance - temperature characteristic. B can be approximated by the equation (2)

$$B = (\ln R_b - \ln R_a) / (1/T_b - 1/T_a) \quad [K] \quad \dots \dots \dots (2)$$

### 3. Temperature coefficient of resistance

The temperature coefficient of resistance can be given by the equation (3), rate of zero load resistance per 1°C at arbitrary temperature.

$$\alpha = 1/R \cdot dR/dT \times 100 = -B/T^2 \times 100 \quad [\%] \quad \dots \dots \dots (3)$$

### 4. Dissipation constant

Shows the power to rise the thermistor temperature 1°C by self-heating at thermal equilibrium, can be calculated by the equation (4)

$$P = \delta (T_b - T_a)$$

$$\delta = P / (T_b - T_a) = I^2 R / (T_b - T_a) \quad [mW/^\circ C] \quad \dots \dots \dots (4)$$

- P : Power consumption of thermistor
- δ : Dissipation constant
- T<sub>a</sub> : Ambient temperature of thermistor
- T<sub>b</sub> : The temperature of thermistor at thermal equilibrium after temperature rose
- I : Current
- R : Resistance at temperature T<sub>b</sub>

### 5. Thermal time constant

Thermal time constant is parameter of thermal response of thermistor. When ambient temperature of thermistor is changed at zero load resistance, it is the time to changed 63.2 % of difference between initial temperature and final temperature.

$$(T - T_a) = (T_b - T_a) \{1 - \exp(-t/\tau)\} \quad \dots \dots \dots (5)$$

τ : Thermal time constant

Hereby t=τ, equation(5) is given by below.

$$(T - T_a) / (T_b - T_a) = 1 - \exp(-1) = 1 - 0.368 = 0.632$$

Also, the value of n times of thermal time constant is given by below.

$$\tau = 63.2\%、2\tau = 86.5\%、3\tau = 95.0\% \quad \dots \quad 7\tau \cong 100\%$$

**APPLICATION NOTICE**

1. Do not use the thermistor beyond operating temperature range.
2. For high temperature application of thermistors, please be careful about burns or electrical shock.
3. Thermistors may result in heat-up, fire and explode, so please keep out from explosive gas and flammable materials.
4. Under the environments affected by electrical noise, take countermeasures by shielding the thermistor and installing a protection circuit.
5. The performance may be impaired if excessive stress or heat is applied to the sensor or lead when handling the thermistor.
6. When sealing the thermistor, consider the type, amount, curing conditions, adhesion, etc. of the sealing material, and check the reliability.
7. In case thermistors are applied for wet ambient and/or stress environments, adequate protections like the sealed case or pressure case should be applied to protect the thermistor.
8. The thermistor's resistance value becomes lower at higher temperature. If there is no current control circuit, the current will increase and thermal runaway may causes destruction of the thermistor in the worst case. Therefore, please use within the range of rating.

 **NOTICE**

1. This catalogue is subject to change without notice. The data shown in this catalog is typical value, not for guarantee.  
Please confirm the conditions by exchanging the specifications before your use.
2. This catalogue shows the data as a component by itself. In the case of use with your circuits and/or sets, it is out of our guarantee.
3. These components are not expected to use under high reliabilities and safeties in the point of functions accuracies.  
In the case of these uses, users shall review the risk at user's responsibility. Please note that we do not take any responsibility. Also please take countermeasures like failsafe etc at designs that is required special safety.
4. Please refer to the general information indicated in the UL, CSA, safety regulations, for your safety design.
5. For any inquiries, please contact our sales office.