TAYAO

NTC Thermistor

INDEX

NTC Thermistor

Power Thermistor

NTC Thermistor Glossary

Zero Power Resistance (R_T)

The Zero Power Resistance is the DC Resistance value of a thermistor measured at a specified temperature with Zero electrical power dissipation. For purposes of measurement, the power dissipation in the thermistor so that any further decrease in power will result not more than ± 0.01% change in resistance.

Standard Reference Temperature

The standard reference temperature is the temperature of the thermistor body at specified (25℃ ± 0.03℃ ,Unless otherwise specified).

Resistance-Temperature Characteristic

The zero-power resistance-temperature characteristics is the relationship between the zero-power resistance of a thermistor and its body temperature. This characteristic may be approximated by the classical thermistor formula:

$$R_T = R_{T0} \times e^{B(1/T - 1/To)} \quad \text{.....(1)}$$

$$T_1 \leqq T \leqq T_2 \text{ or } T_1 \leqq T_0 \leqq T_2$$

B Constant

The B is the material constant of a thermistor although B increases slightly with increasing temperature in may be considered constant over limited temperature spans of approximately 30℃ to 0℃, depending upon the thermistor material and the absolute temperature which the center of the span is located. The B of a thermistor may be determined from equations (1). Unless otherwise specified, B is derived from measurements at 0℃ and 50℃ or 25℃ and 85℃ or 25℃ and 125℃ as follows:

$$B = \frac{Ln(R_2/R_1)}{1/(273.15+T_2)-1/(273.15+T_1)} \quad \text{..... (2)}$$

Temperature Coefficient of Resistance (α)

The zero-power temperature coefficient of resistance is the ratio at specified zero-power resistance with temperature to temperature (T), of the rate of change of the zero-power resistance of the thermistor:

$$\alpha(T) = (1/R_T) \times (dR_T/d_T) \quad \text{.....(3)}$$

Dissipation Constant (δ)

The dissipation constant is the ratio, at a specified ambient temperature, of the power dissipated in a thermistor to the resultant change in its body temperature. Since the temperature rise in the thermistor due to dissipated power depends on the rate at which heat is transferred away from it, the dissipation constant depends on the method of mounting the unit as well as the medium or environment in which the unit is located. Unless otherwise specified, the dissipation constant is given for the thermistor in still air at an ambient temperature of 25℃, within a test chamber having a volume greater than 1,000 times the volume of the thermistor under test. Usually, the power dissipated is taken as the power required to raise the body temperature of the thermistor by 50℃ (from 25℃± 0.2℃ to 75℃± 0.2℃). The dissipation constant is generally specified as minimum value.

$$P = V_T \cdot I_T = \delta (T - T_A) \quad \text{Unit as: (mW/℃)} \quad \text{.....(4)}$$

Thermal Time Constant (τ)

The thermal time constant is the time required for a thermistor to change 63.2% of the difference between its initial and final body temperatures, when subjected to a step function change in constant depends upon the rate of heat transfer between the thermistor and its surroundings, the method of mounting the unit as well as the surrounding medium must be specified. The test conditions are usually the same as those used for obtaining the dissipation constant, and the tests can be performed sequentially. In practice, with the thermistor stabilized at 75℃ (after the dissipation constant has been determined), the power is switched to its "zero-power" level and the time required for the thermistor to cool to 43.4℃ is its time constant.
Therefore, the thermistor's temperature from a given value (T_{a1}) to another value (T_{a2}) is associated with the following relationship between thermal capacitance (C_{th}) and dissipation constant (δ)of the thermistor

Resolving this equation gives $C_{th}\, dT = \delta\,(T_{a1} - T_{a2})\, dt$ .....(5)

Where is the time; C_{th} / δ and T the temperature of the thermistor at that time.
The expression (τ) in equation (6) is termed the "thermal time constant". If t = τ , above equation (6) becomes:

$$T - T_{a2} = (T_{a1} - T_{a2}) \times e^{(t/\tau)} \quad \cdots\cdots(6)$$

Therefore, τ can be determined by measuring the time required for the thermistor's intrinsic temperature to change by 63.2% . The table below shows the relationship between the time and the rate at which the thermistor's intrinsic temperature changes from T_{a1} to approximate to the temperature value T_{a2} . Table of thermal time

$$T = T_{a2} + (T_{a1} - T_{a2})\, e^{-1} = (T_{a2} - T_{a1})\ (1 - e^{-1}) + T_{a1} \quad \cdots\cdots(7)$$

constant:

t (sec.)	$\frac{T-T_{a1}}{T_{a2}-T_{a1}}$
τ	63.2%
2τ	86.5%
3τ	95.0%
4τ	98.2%
5τ	99.4%

Static Voltage-Current Characteristic

The static voltage - current characteristic is the relationship, at a specified ambient temperature, between the voltage across a thermistor and the current through it under conditions of thermal equilibrium. For very small currents, for which the power dissipation is low, this characteristic approximates the linear relationship given by Ohm's Law (V = IR). As self-heating of the thermistor is progressively increased the slope of the characteristic, dV / dI, continues to decrease until it becomes negative. In this region, the thermistor is said to exhibit a negative resistance characteristic.

Current-Time Characteristic

The current-time characteristic is the relationship, at a specified ambient temperature, between the current through a thermistor and the time elapsed from the application of a step function of voltage. Unless otherwise specified, the test temperature shall be 25℃±0.2℃ and the mounting and test conditions shall be as specified under dissipation constant.

Maximum Operating Temperature

The maximum operating temperature is the maximum body temperature at which the thermistor will operate an extended period of time with acceptable stability of its characteristics.
The temperature is the result of internal or external heating, or both, and should exceed the maximum value specified.

Maximum Power Rating

The maximum power rating of a thermistor is the maximum power which a thermistor will dissipate for an extended period of time with acceptable stability of its characteristics.

Ordering Code

NTC Thermistor

FT/TS/GD/GR Series

FT □□□–□□□ □ □□□ □ □ □□□□□

- Product Style: FT
- Size: □□□
- Zero Power Resistance (Ω) at 25 ℃: □□×10□
- Resistance Tolerance: □
  - F : ± 1 %
  - G : ± 2 %
  - H : ± 3 %
  - J : ± 5 %
- B-Constant (25/85): □□□
- B- Constant Tolerance: □
  - F : ± 1 %
  - G : ± 2 %
  - H : ± 3 %
  - J : ± 5 %
- L : RoHS Compliance: □
- Internal Controlling Code: □□□□□

ST Series

ST □□□–□□□ □ □□□ □ □ □□□□□

- Product Style: ST
- Size: □□□
  - 010 : 0402
  - 016 : 0603
  - 020 : 0805
- Zero Power Resistance (Ω) at 25 ℃: □□×10□
- Resistance Tolerance: □
  - F : ± 1 %
  - G : ± 2 %
  - H : ± 3 %
  - J : ± 5 %
- B-Constant (25/85): □□□
- B- Constant Tolerance: □
  - F : ± 1 %
  - G : ± 2 %
  - H : ± 3 %
  - J : ± 5 %
- L : RoHS Compliance: □
- Internal Controlling Code: □□□□□

Sensor Series

SS □□□–□□□ □ □□□ □ □ □□□□□

- Product Style: SS
- NTC Thermistor Type: □
- Terminal Code: □
- Wire Code: □
- Zero Power Resistance (Ω) at 25 ℃: □□×10□
- Resistance Tolerance: □
  - F : ± 1 %
  - G : ± 2 %
  - H : ± 3 %
  - J : ± 5 %
- B-Constant (25/85): □□□
- B- Constant Tolerance: □
  - F : ± 1 %
  - G : ± 2 %
  - H : ± 3 %
  - J : ± 5 %
- L : RoHS Compliance: □
- Internal Controlling Code: □□□□□

TC Series

TC □□□–□□□ □□□□ □ □ □ □□□□

- Product code：For different dimension，appearance，etc
- Appearance: S：Straight Lead I:Inner Kink Lead
- L：RoHS Compliance
- B-Constant Tolerance: J ：± 5%, K：± 10%, L ：± 15%
- B-Constant(25/85)
- Resistance Tolerance: J ：± 5%, K：± 10%, L ：± 15%, M：± 20%
- Zero Power Resistance(Ω) at 25℃: □□×10□
- Disk Size
- Product Style

SC Series

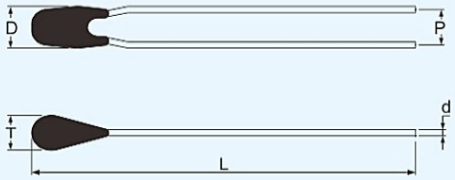
SC □□□–□□□ □□ □ □ □ □□□□

- Product code：For different dimension，appearance，etc
- Appearance: S：Straight Lead, I：Inner Kink Lead
- L：RoHS Compliance
- Resistance Tolerance: L ：± 15%, M：± 20%, N ：± 25%
- Maximum Steady State Current(A)
- Zero Power Resistance(Ω) at 25℃ Decimal Point is expressed by "R"
- Disk Size
- Product Style

Humidity Sensor

HS □□□–□□□ □ □ □ □ □□

- Internal Controlling Code
- Packing Type
- L：RoHS Compliance
- Electrode Type
- Tolerance: H：± 3%, J ：± 5%
- Resistance(Ω) at 25℃,60 ±3%RH,1kHz: □□×10□
- Curve Type
- Product Style



DIMENSIONS

Unit:mm

Chip ϕ	D max.	L	d nor.	P nor.	T max.
3.0	3.0	12 , 32	0.45 ± 0.05	2.54 ± 0.50	3.0

SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (KΩ)	Tolerance of Resistance (±%)	B-Value (25/85) (K)	Tolerance of B-Value (±%)	Thermal Dissipation Constant (mW/°C)	Thermal Time Constant (sec)	Operating Temperature Range (°C)
FT003-202□397*	2	1,2,3,5,10	3970	1,2,3	≧3	≦12	-40～+120
FT003-302□372*	3	1,2,3,5,10	3720	1,2,3	≧3	≦12	-40～+120
FT003-302□397*	3	1,2,3,5,10	3970	1,2,3	≧3	≦12	-40～+120
FT003-472□372*	4.7	1,2,3,5,10	3720	1,2,3	≧3	≦12	-40～+120
FT003-502□352*	5	1,2,3,5,10	3520	1,2,3	≧3	≦12	-40～+120
FT003-502□397*	5	1,2,3,5,10	3970	1,2,3	≧3	≦12	-40～+120
FT003-682□397*	6.8	1,2,3,5,10	3970	1,2,3	≧3	≦12	-40～+120
FT003-103□343*	10	1,2,3,5,10	3435	1,2,3	≧3	≦12	-40～+120
FT003-103□397*	10	1,2,3,5,10	3977	1,2,3	≧3	≦12	-40～+120
FT003-103□414*	10	1,2,3,5,10	4145	1,2,3	≧3	≦12	-40～+120
FT003-153□414*	15	1,2,3,5,10	4145	1,2,3	≧3	≦12	-40～+120
FT003-203□397*	20	1,2,3,5,10	3970	1,2,3	≧3	≦12	-40～+120
FT003-203□420*	20	1,2,3,5,10	4200	1,2,3	≧3	≦12	-40～+120
FT003-303□420*	30	1,2,3,5,10	4200	1,2,3	≧3	≦12	-40～+120
FT003-473□399*	47	1,2,3,5,10	3990	1,2,3	≧3	≦12	-40～+120
FT003-503□399*	50	1,2,3,5,10	3990	1,2,3	≧3	≦12	-40～+120
FT003-683□440*	68	1,2,3,5,10	4400	1,2,3	≧3	≦12	-40～+120
FT003-104□439*	100	1,2,3,5,10	4390	1,2,3	≧3	≦12	-40～+120
FT003-154□440*	150	1,2,3,5,10	4400	1,2,3	≧3	≦12	-40～+120
FT003-204□440*	200	1,2,3,5,10	4400	1,2,3	≧3	≦12	-40～+120

Note1: □Tolerance of Resistance : F=±1%, G=±2%, H=±3%, J=±5%, K=±10%

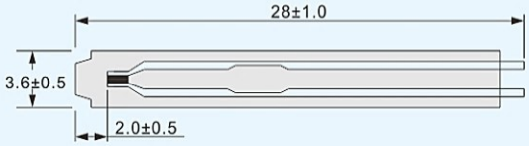
Note2: ＊Tolerance of B-Value F=±1%, G=±2%, H=±3%

Note3: Please contact us for special spec.

Reliability Test

Item	Conditions	Specification
Solderability	After dipping the terminal of the lead wire to a depth of approximately 3mm (.118") from the body in a soldering bath of 230℃ for three seconds, the terminal shall be visually examined.	Almost all the surface should be covered with solder uniformly.
Resistance to soldering heat	The terminal shall be dipped into a soldering bath having a temperature of 260℃ to a point 3mm (.118") from the body of the unit and then be held there for three seconds. The change of R_{25} and mechanical damage shall be examined.	$\triangle R_{25} / R_{25} \leqq \pm 3\ \%$ $\triangle B / B \leqq \pm 3\ \%$ No outstanding damage
High temperature storage	The specimen shall be subjected to 125℃ for 1000 hours in a thermostatic bath without load and then stored at room temperature and humidity for one to two hours. Thereafter, the change of R_{25} shall be measured.	$\triangle R_{25} / R_{25} \leqq \pm 3\ \%$ $\triangle B / B \leqq \pm 3\ \%$
Humidity	The specimen shall be subjected to 45℃ 90 to 95% R.H.for 1000 hours without load and then stored at room temperature and humidity for one to two hours. Thereafter, the change of R_{25} shall be measured.	$\triangle R_{25} / R_{25} \leqq \pm 3\ \%$ $\triangle B / B \leqq \pm 3\ \%$
Thermal shock	The temperature cycle shown below shall be repeated five times and then stored at room temperature and humidity for one to two hours. The change of R_{25} as well as mechanical damage shall be examined. Step / Temperature / Period 1 / -40 / 30min. 2 / +125 / 30min.	$\triangle R_{25} / R_{25} \leqq \pm 3\ \%$ $\triangle B / B \leqq \pm 3\ \%$
Solder Iron Test	The inspected unit is tested by solder iron under 380±10℃ with 5±1 sec.	$\triangle R_{25} / R_{25} \leqq \pm 3\ \%$ $\triangle B / B \leqq \pm 3\ \%$

DIMENSIONS

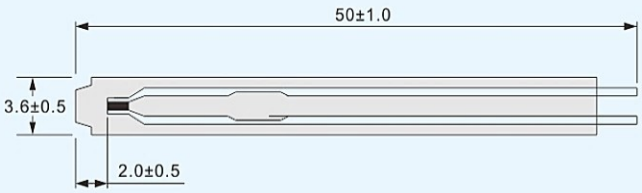


SPECIFICATIONS

Unit:mm

Part No.	Zero Power Resistance at 25°C (KΩ)	Tolerance of Resistance (±%)	B-Value (25/85) (K)	Tolerance of B-Value (±%)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Operating Temperature Range (℃)
TS001-103□343*	10	1,2,3,5	3435	1,2,3	≧0.7	≦5.0	-40~+90
TS001-103□397*	10	1,2,3,5	3977	1,2,3	≧0.7	≦5.0	-40~+90
TS001-104□397*	100	1,2,3,5	3977	1,2,3	≧0.7	≦5.0	-40~+90

DIMENSIONS



SPECIFICATIONS

Unit:mm

Part No.	Zero Power Resistance at 25°C (KΩ)	Tolerance of Resistance (±%)	B-Value (25/85) (K)	Tolerance of B-Value (±%)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Operating Temperature Range (℃)
TS001-103□343*	10	1,2,3,5	3435	1,2,3	≧0.7	≦5.0	-40~+90

Note1: □Tolerance of Resistance：F=±1%, G=±2%, H=±3%, J=±5%, K=±10%
Note2: *Tolerance of B-Value F=±1%, G=±2%, H=±3%
Note3: Please contact us for special spec.

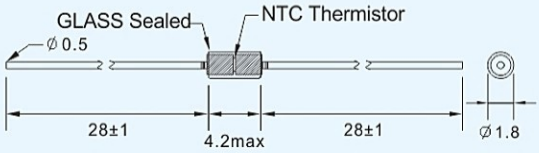
Reliability Test

Item	Conditions	Specification
High Temperature Test	Temp.=90 ± 5℃ Period=1000 ± 12hrs	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 3\%$
Low Temperature Test	Temp.=-30 ± 5℃ Period=1000 ± 12hrs	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 3\%$
Thermal Shock	The thermal shock condition shown below shall be repeated 10 times. Step / Temperature(℃) / Period(min) 1 / -30 ± 2 ℃ / 30 2 / Room Temp. / 5 3 / 90 ± 2 ℃ / 30 4 / Room Temp. / 5	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 3\%$
Humidity	Temp.=40 ± 2℃ Humidity = 95%RH Period=1000 hrs	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 3\%$

Mechanical Test

Item	Conditions	Specification
Lead Pull Test	From lead wire axis direction, hang a load of 2.0Kgf and stay for 10 sec. between lead wire and the coating.	$\triangle R_{25}/R_{25} \leqq \pm 1\%$ $\triangle B/B \leqq \pm 1\%$
Drop Test	Drop from height 50 cm 3 times	$\triangle R_{25}/R_{25} \leqq \pm 1\%$ $\triangle B/B \leqq \pm 1\%$
Solderability heat Resistance	Terminals of lead wire are immersed in solder bath Solder:SN:97.5% AG:2.5% Solder Temperature:260 ± 5℃ Dip time:10 ± 1 sec.	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 3\%$
Solderability	Terminals of lead wire are immersed in solder bath Solder:SN:97.5% AG:2.5% Solder Temperature:235 ± 5℃ Dip time:4 ± 1 sec.	More than 95% of terminal

DIMENSIONS



SPECIFICATIONS

Unit:mm

Part No.	Zero Power Resistance at 25°C (KΩ)	Tolerance of Resistance (±%)	B-Value (25/85) (K)	Tolerance of B-Value (±%)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Operating Temperature Range (℃)
GD002-202□342*	2	1,2,3,5,10	3420	1,2,3	≧3	≦12	-40～+250
GD002-502□348*	5	1,2,3,5,10	3480	1,2,3	≧3	≦12	-40～+250
GD002-103□327*	10	1,2,3,5,10	3270	1,2,3	≧3	≦12	-40～+250
GD002-103□397*	10	1,2,3,5,10	3976	1,2,3	≧3	≦12	-40～+250
GD002-103□405*	10	1,2,3,5,10	4050	1,2,3	≧3	≦12	-40～+250
GD002-203□399*	20	1,2,3,5,10	3992	1,2,3	≧3	≦12	-40～+250
GD002-503□399*	50	1,2,3,5,10	3992	1,2,3	≧3	≦12	-40～+250
GD002-104□399*	100	1,2,3,5,10	3992	1,2,3	≧3	≦12	-40～+250
GD002-204□350*	200	1,2,3,5,10	3500	1,2,3	≧3	≦12	-40～+250
GD002-234□424*	230	1,2,3,5,10	4240	1,2,3	≧3	≦12	-40～+250

Note1: □Tolerance of Resistance：F=±1%, G=±2%, H=±3%, J=±5%, K=±10%

Note2: *Tolerance of B-Value F=±1%, G=±2%, H=±3%

Note3: Please contact us for special spec.

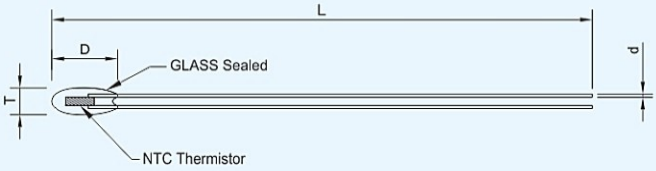
Reliability Test

Item	Conditions	Specification
High temperature storage	The specimen shall be subjected to 200℃ for 1000 hours in a thermostatic bath without load and then stored at room temperature and humidity for one to two hours. Thereafter, the change of R_{25} shall be measured.	$\triangle R_{25} / R_{25} \leqq 3\%$ $\triangle B / B \leqq 3\%$
Humidity	The specimen shall be subjected to 45℃ 90 to 95% R.H. for 1000 hours without load and then stored at room temperature and humidity for one to two hours. Thereafter, the change of R_{25} shall be measured.	$\triangle R_{25} / R_{25} \leqq 3\%$ $\triangle B / B \leqq 3\%$
Thermal shock	The temperature cycle shown below shall be repeated five times and then stored at room temperature and humidity for one to two hours. The change of R_{25} as well as mechanical damage shall be examined. Step / Temperature / Period 1 / -40 / 30 min. 2 / 200 / 30 min.	$\triangle R_{25} / R_{25} \leqq 3\%$ $\triangle B / B \leqq 3\%$

Mechanical Test

Item	Conditions	Specification
Lead Pull Test	The one lead shall fixed and then the static weight of 0.51Kgf shall be applied to the other lead for 10±1 sec.	$\triangle R_{25} / R_{25} \leqq \pm 2\%$ $\triangle B / B \leqq \pm 2\%$

DIMENSIONS



Unit:mm

Model No.	D	T	L	d
GR002	2.30±0.70	1.25±0.25	65±5.0	0.2
GR003	4.10±0.50	2.10±0.20	65±2.0	0.3

SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (KΩ)	Tolerance of Resistance (±%)	B-Value (25/85) (K)	Tolerance of B-Value (±%)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Operating Temperature Range (℃)
GR002-202□334*	2	1,2,3,5	3348	1,2,3	0.7~0.8	0.3~0.4	-50~+250
GR002-103□397*	10	1,2,3,5	3977	1,2,3	0.7~0.8	0.3~0.4	-50~+250
GR003-502□352*	5	1,2,3,5	3520	1,2,3	1.0~1.5	0.9~1.1	-50~+250
GR003-103□327*	10	1,2,3,5	3270	1,2,3	1.0~1.5	0.9~1.1	-50~+250
GR003-103□348*	10	1,2,3,5	3480	1,2,3	1.0~1.5	0.9~1.1	-50~+250
GR003-103□372*	10	1,2,3,5	3720	1,2,3	1.0~1.5	0.9~1.1	-50~+250
GR003-103□397*	10	1,2,3,5	3970	1,2,3	1.0~1.5	0.9~1.1	-50~+250
GR003-203□397*	20	1,2,3,5	3970	1,2,3	1.0~1.5	0.9~1.1	-50~+250
GR003-303□397*	30	1,2,3,5	3970	1,2,3	1.0~1.5	0.9~1.1	-50~+250
GR003-4B3□399*	49.12	1,2,3,5	3990	1,2,3	1.0~1.5	0.9~1.1	-50~+250
GR003-104□406*	100	1,2,3,5	4066	1,2,3	1.0~1.5	0.9~1.1	-50~+250
GR003-234□425*	230	1,2,3,5	4250	1,2,3	1.0~1.5	0.9~1.1	-50~+250

Note1: □Tolerance of Resistance：F=±1%, G=±2%, H=±3%, J=±5%, K=±10%
Note2: *Tolerance of B-Value F=±1%, G=±2%, H=±3%
Note3: Please contact us for special spec.

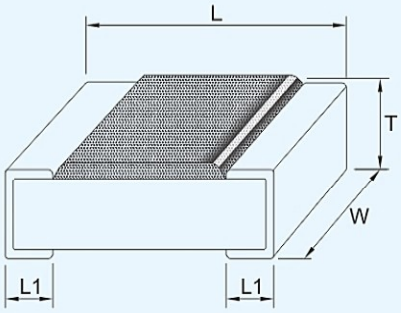
Reliability Test

Item	Conditions	Specification
High Temperature Test	Temp.= 200 ± 5℃ Period=1000 ± 12hrs	$\triangle R_{25} / R_{25} \leqq \pm 3\%$ $\triangle B / B \leqq \pm 3\%$
Low Temperature Test	Temp.= -30 ± 5℃ Period=1000 ± 12hrs	$\triangle R_{25} / R_{25} \leqq \pm 3\%$ $\triangle B / B \leqq \pm 3\%$
Thermal Shock	The thermal shock condition shown below shall be repeated 10 times. Step / Temperature(℃) / Period(mins) 1 / -30 ± 2 ℃ / 30 2 / Room Temp. / 5 3 / 200 ± 2 ℃ / 30 4 / Room Temp. / 5	$\triangle R_{25} / R_{25} \leqq \pm 3\%$ $\triangle B / B \leqq \pm 3\%$
Humidity	Temp.=60 ± 2℃ Humidity = 95%RH Period=1000 ± 12hrs	$\triangle R_{25} / R_{25} \leqq \pm 3\%$ $\triangle B / B \leqq \pm 3\%$

Mechanical Test

Item	Conditions	Specification
Lead Pull Test	From lead wire axis direction, hang a load of 0.51Kgf and stay for 30 sec. between lead wire and the coating.	$\triangle R_{25} / R_{25} \leqq \pm 1\%$ $\triangle B / B \leqq \pm 1\%$

DIMENSIONS



Unit:mm

Model No.	Size	L	W	T	L1
ST010	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.25±0.10
ST016	0603	1.60±0.15	0.80±0.15	0.50±0.10	0.30±0.20
ST020	0805	2.00±0.20	1.25±0.20	0.55±0.10	0.40±0.20

SPECIFICATIONS

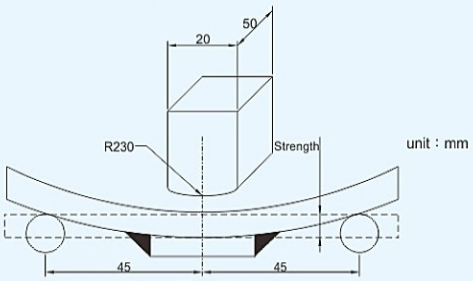
Part No.	Zero Power Resistance at 25℃ (KΩ)	Tolerance of Resistance (±%)	B-Value (25/85) (K)	Tolerance of B-Value (±%)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Operating Temperature Range (℃)
ST010-502□350*	5	1,2,3,5,10	3500	1,2,3,5	≦1.5	≦5	-40~+125
ST010-103□343*	10	1,2,3,5,10	3435	1,2,3,5	≦1.5	≦5	-40~+125
ST010-103□410*	10	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST010-473□410*	47	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST010-683□410*	68	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST010-104□410*	100	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST016-502□350*	5	1,2,3,5,10	3500	1,2,3,5	≦1.5	≦5	-40~+125
ST016-103□343*	10	1,2,3,5,10	3435	1,2,3,5	≦1.5	≦5	-40~+125
ST016-103□410*	10	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST016-473□410*	47	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST016-503□395*	50	1,2,3,5,10	3950	1,2,3,5	≦1.5	≦5	-40~+125
ST016-683□410*	68	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST016-104□410*	100	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST016-154□410*	150	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST016-204□410*	200	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST020-202□350*	2	1,2,3,5,10	3500	1,2,3,5	≦1.5	≦5	-40~+125
ST020-502□350*	5	1,2,3,5,10	3500	1,2,3,5	≦1.5	≦5	-40~+125
ST020-103□343*	10	1,2,3,5,10	3435	1,2,3,5	≦1.5	≦5	-40~+125
ST020-103□410*	10	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST020-473□410*	47	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST020-503□395*	50	1,2,3,5,10	3950	1,2,3,5	≦1.5	≦5	-40~+125
ST020-683□410*	68	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST020-104□410*	100	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST020-154□410*	150	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125
ST020-204□410*	200	1,2,3,5,10	4100	1,2,3,5	≦1.5	≦5	-40~+125

Note1: □Tolerance of Resistance：F=±1%, G=±2%, H=±3%, J=±5%, K=±10%

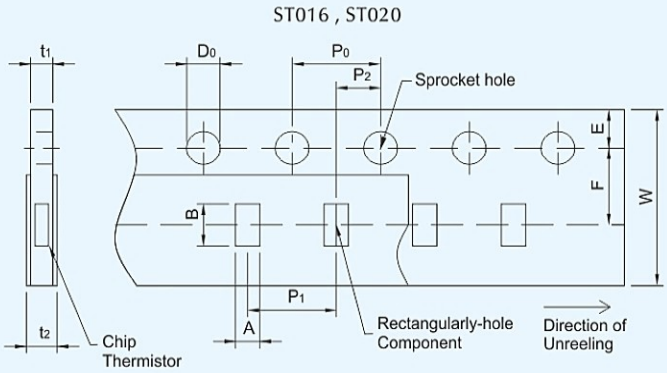
Note2: *Tolerance of B-Value F=±1%, G=±2%, H=±3%, J=±5%

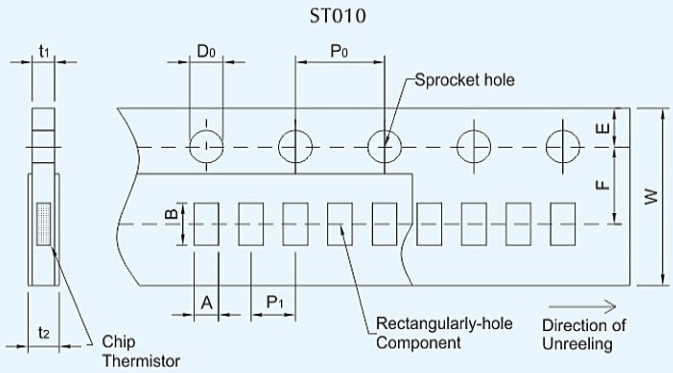
Note3: Please contact us for special spec.

Reliability Test

Item	Conditions	Specification
Stability	(125±3℃) x (1000+48)hrs	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 2\%$
Low temperature	(-40 ± 3℃) x (1000+48)hrs	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 2\%$
Humidity	85 ± 2℃, 85 ± 5%RH x (1000+48) hrs	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 2\%$
Thermal Shock Test	-40 ± 3℃ x 30(min)→25 ± 3℃ x 3(min) 125 ± 3℃ x 30(min)→25 ± 3℃ x 3(min) 100cycles	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 2\%$
Load humidity	85 ± 2℃, 85 ± 5%RH, rated power 90 mins on, 30 mins off for (1000+48) hrs	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 2\%$
Resistance to Soldering Heat Test	Soldering temperature : 260 ± 5℃ Duration of immersion : 10 ± 1 sec.	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ No mechanical damage
Solderability Test	Soldering temperature : 245 ± 5℃ Duration of immersion : 3 ± 0.5 sec. Preparation : Immersion in flux for 1~2 secs. Flux : rosin : methanol = 25wt% : 75wt% Solder : Sn-3.0Ag-0.5Cu	At least 95% of the electrode on each end of the ceramic chip must be covered with new solder
Solder Iron Test	The inspected unit is tested by solder iron under 380 ± 10℃ with 5 ± 1 sec.	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ $\triangle B/B \leqq \pm 3\%$
Substrate bending	Applied bending : 5mm Holding time : 10 ± 1 sec. Substrate : glass fiber base epoxy resin t=1.6mm  	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ No mechanical damage
Vibration	Applied frequency : 10~55~10Hz / 1min Amplitude : 1.5mm in each X,Y,Z directions Applied time : 2 hrs in each X,Y,Z directions	$\triangle R_{25}/R_{25} \leqq \pm 3\%$ No mechanical damage

Dimensions of Taping

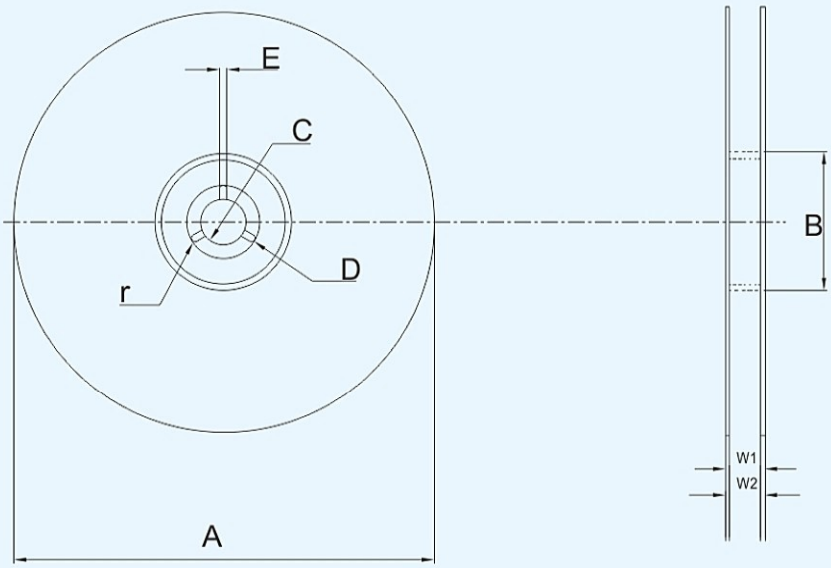




Unit:mm

Size	A	B	W	F	E	P1	P2	P0	D0	t1	t2
0402	0.65±0.1	1.15±0.1				2.00±0.05				0.50max	1.00max
0603	1.10±0.2	1.90±0.2	8.00±0.2	3.50±0.05	1.75±0.1	4.00±0.10	2.00±0.05	4.00±0.10	1.55±0.05	1.00max	1.40max
0805	1.65±0.2	2.40±0.2				4.00±0.10	2.00±0.05			1.00max	1.40max

Dimensions of Reel

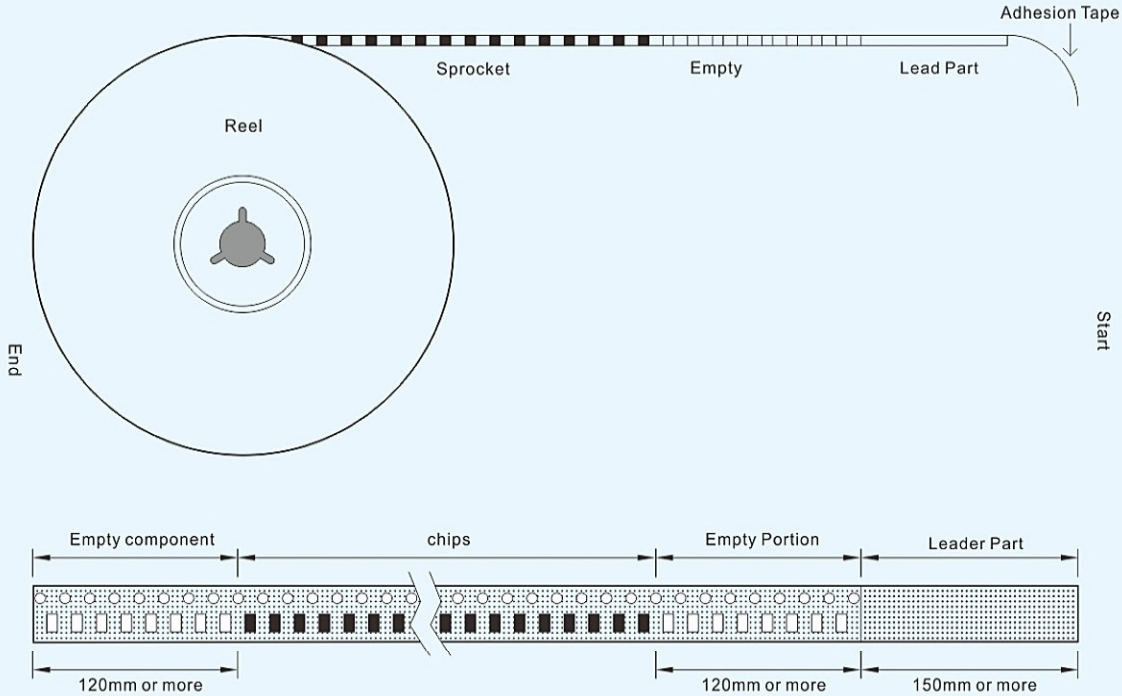


Material: Plastic

Unit:mm

Symbol	A	B	C	D	E	W1	W2	r
Dimension	ϕ180 +0 -3	ϕ60 +1.0 -0.0	ϕ13.0±0.2	ϕ21.0±0.8	2.00±0.5	9.00±0.3	11.4±1.0	0.5

Structure of Taping



Package Quantity

Size	pcs / reel
0402	10000
0603	5000
0805	5000

FEATURES

High Stability, High Accuracy, and High Reliability

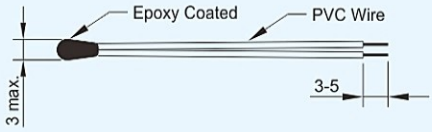
Resistance Values from 1KΩ to 200KΩ±1～5%

B-Constant 25/85 from 3000K to 4500K±1～3%

SSA SERIES

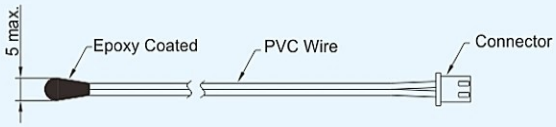
Unit:mm

Type Ⅰ (Epoxy Coating) — Battery Charger Sensor



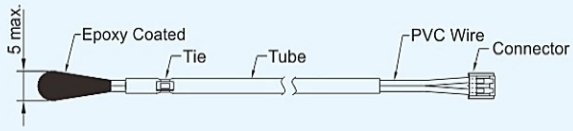
Operating Temp. Range	-40 to +100°C
Dissipation Constant	Approx. 2mW/°C (still air)
Response Time	Approx. 10 sec. (thermal bath)

Type Ⅱ (Epoxy Coating) — Air Conditioning Sensor / Quick Temperature Response



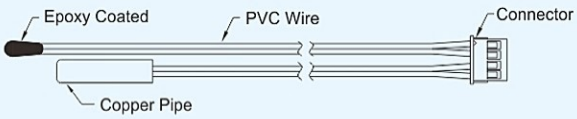
Operating Temp. Range	-40 to +100°C
Dissipation Constant	Approx. 2mW/°C (still air)
Response Time	Approx. 10 sec. (thermal bath)

Type Ⅲ (Epoxy Coating) — Air Conditioning Sensor



Operating Temp. Range	-40 to +100°C
Dissipation Constant	Approx. 2mW/°C (still air)
Response Time	Approx. 10 sec. (thermal bath)

Type Ⅳ (Epoxy Coating & Copper Pipe) — Air Conditioning Sensor



Operating Temp. Range	-40 to +100°C
Dissipation Constant	Approx. 2.5mW/°C (still air)
Response Time	Approx. 34 sec. (thermal bath)

Note1: The connector is optional.

Note2: The lead wire length can be customized.

Note3: Please contact us for special spec.

FEATURES

High Stability, High Accuracy, and High Reliability

Resistance Values from 1KΩ to 200KΩ±1～5%

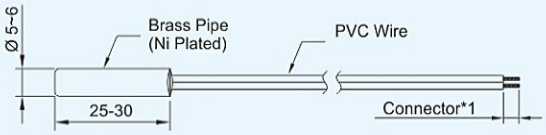
B-Constant 25/85 from 3000K to 4500K±1～3%

SSI SERIES

Unit:mm

Type I (Copper Pipe)

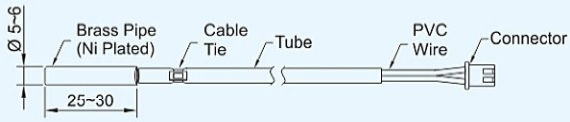
Heat Exchanger / Air Conditioning Sensor



Operating Temp. Range	-40 to +105°C
Dissipation Constant	Approx. 2.5mW/°C (still air)
Response Time	Approx. 34 sec. (thermal bath)

Type II (Copper Pipe)

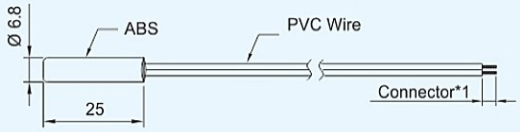
Heat Exchanger / Air Conditioning Sensor



Operating Temp. Range	-40 to +105°C
Dissipation Constant	Approx. 2.5mW/°C (still air)
Response Time	Approx. 34 sec. (thermal bath)

Type III (ABS Pipe)

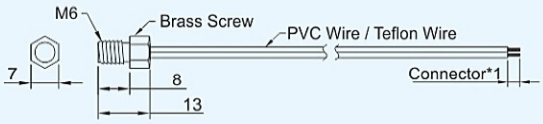
Refrigerator Sensor



Operating Temp. Range	-40 to +100°C
Dissipation Constant	Approx. 2.5mW/°C (still air)
Response Time	Approx. 40 sec. (thermal bath)

Type IV (Brass Screw)

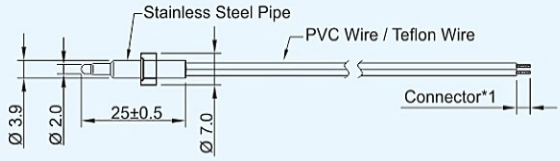
Heater Temperature Sensor



Operating Temp. Range	-40 to +200°C
Dissipation Constant	Approx. 3mW/°C (still air)
Response Time	Approx. 16 sec. (thermal bath)

Type V (Stainless Steel Pipe)

Hot Water Heater Temperature Sensor / Quick Temperature Response



Operating Temp. Range	-40 to +125°C
Dissipation Constant	Approx. 4mW/°C (still air)
Response Time	Approx. 10 sec. (thermal bath)

Note1: The connector is optional.

Note2: The lead wire length can be customized.

Note3: Please contact us for special spec.

FEATURES

High Stability, High Accuracy, and High Reliability

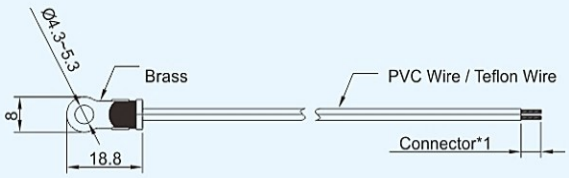
Resistance Values from 1KΩ to 200KΩ±1～5%

B-Constant 25/85 from 3000K to 4500K±1～3%

SSS SERIES

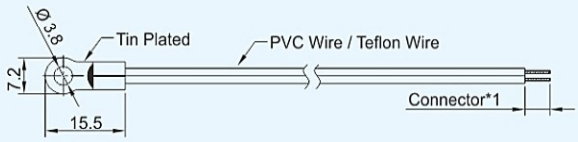
Unit:mm

Type Ⅰ (Electrical terminal) — Surface Temperature Sensor



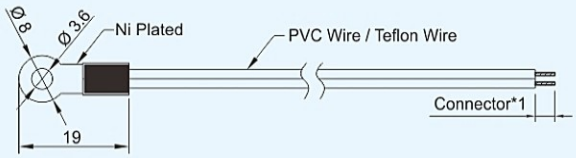
Operating Temp. Range	-40 to +125°C
Dissipation Constant	Approx. 4mW/°C (still air)
Response Time	Approx. 17 sec. (thermal bath)

Type Ⅱ (Electrical terminal) — Surface Temperature Sensor



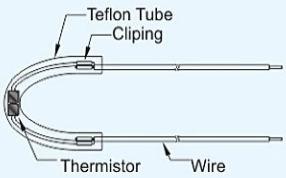
Operating Temp. Range	-40 to +125°C
Dissipation Constant	Approx. 2.5mW/°C (still air)
Response Time	Approx. 17 sec. (thermal bath)

Type Ⅲ (Electrical terminal) — Surface Temperature Sensor



Operating Temp. Range	-40 to +125°C
Dissipation Constant	Approx. 2.5mW/°C (still air)
Response Time	Approx. 17 sec. (thermal bath)

Type Ⅳ — Home Baker / Microwave Oven Sensor



Operating Temp. Range	-20 to +180°C
Dissipation Constant	Approx. 3mW/°C (still air)
Response Time	Approx. 12 sec. (thermal bath)

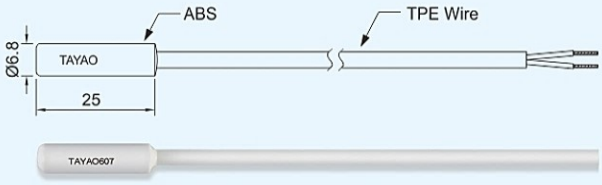
Note1: The connector is optional.

Note2: The lead wire length can be customized.

Note3: Please contact us for special spec.

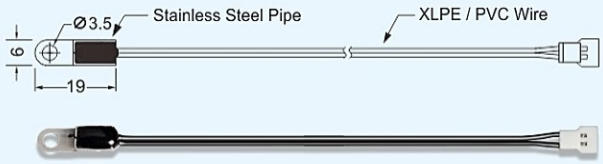
Unit:mm

Remote Temperature Controller Sensor



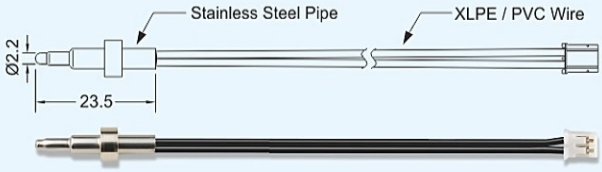
Thermal time constant	25 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +80°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Surface Temperature Sensor



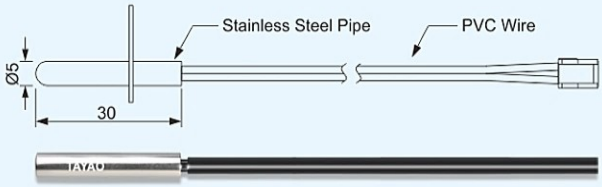
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Toilet Washlet Sensor



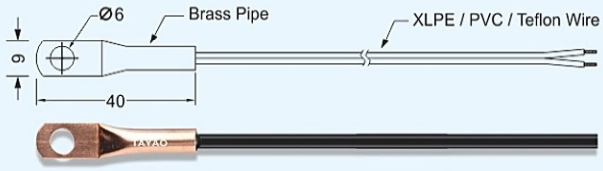
Thermal time constant	6 seconds max. (in oil)
Dissipation constant	1.3 mW/°C
Operating temperature range	-40°C ~ +125°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Washing Machine Sensor



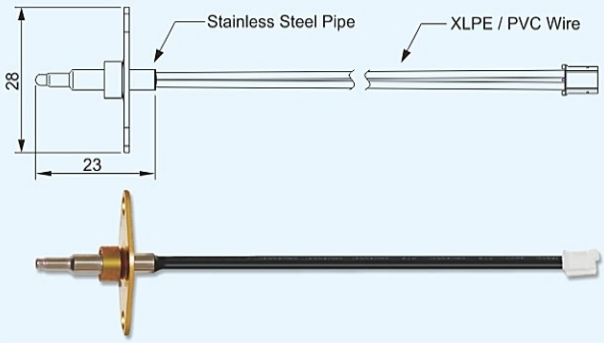
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Surface Temperature Sensor



Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +120°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

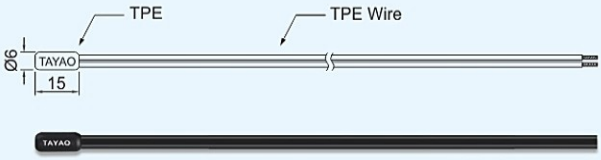
Coffee Machine Sensor



Thermal time constant	6 seconds max. (in oil)
Dissipation constant	1.3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

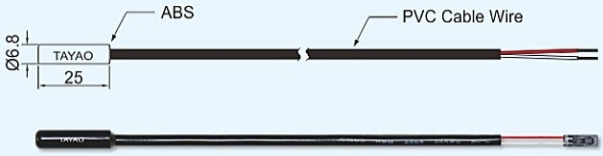
Unit:mm

Fire Alarm Sensor



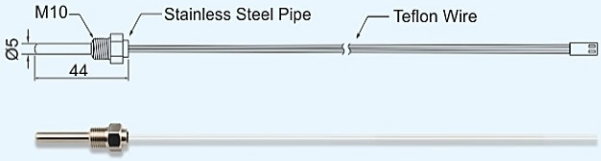
Thermal time constant	20 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Excellent Anti-humidity Sensor



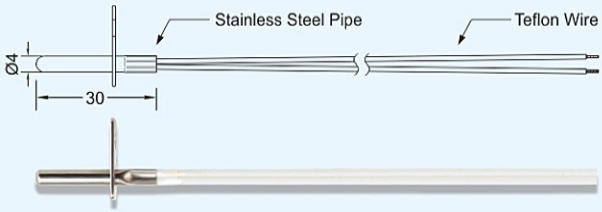
Thermal time constant	25 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +80°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

High Temperature Fryer Sensor



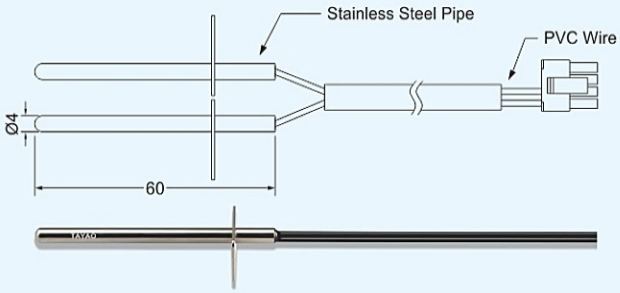
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	1.5 mW/°C
Operating temperature range	-40°C ~ +200°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Oven / Cooker Sensor



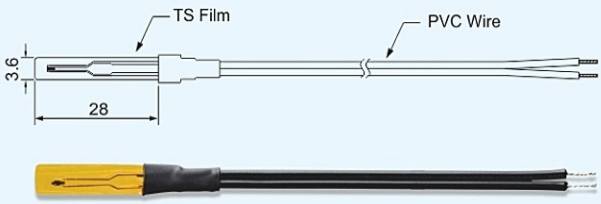
Thermal time constant	25 seconds max. (in oil)
Dissipation constant	1.5 mW/°C
Operating temperature range	-40°C ~ +250°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Coffee Machine Sensor



Thermal time constant	10 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

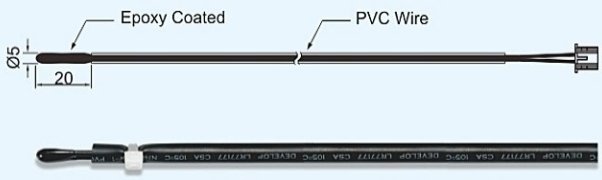
Heat Expansion Sensor



Thermal time constant	5 seconds max. (in oil)
Dissipation constant	0.7 mW/°C
Operating temperature range	-40°C ~ +80°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V

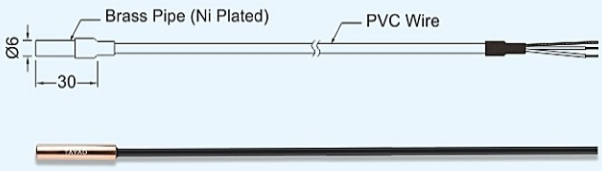
Unit:mm

Air Temperature Sensor



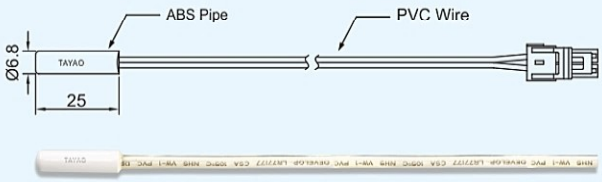
Thermal time constant	12 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Air Conditioning Sensor



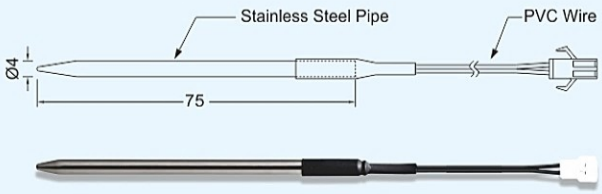
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Freezer Sensor



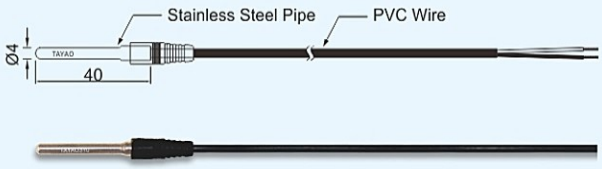
Thermal time constant	35 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +80°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Drinking Water Sensor



Thermal time constant	6 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1500V

Refrigeration Sensor



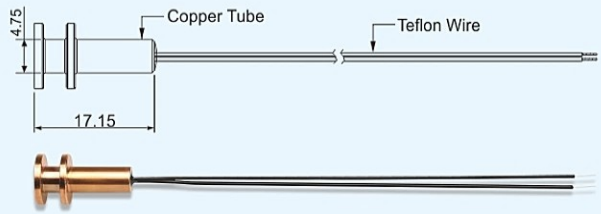
Thermal time constant	10 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1500V

Evaporator Sensor

Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1500V

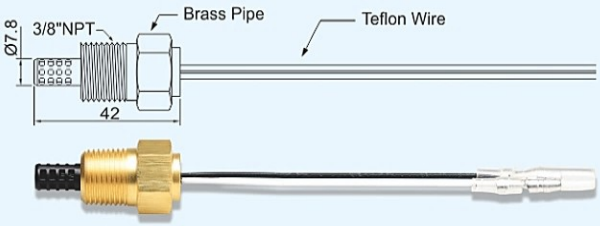
Unit:mm

Radar Temperature Sensor



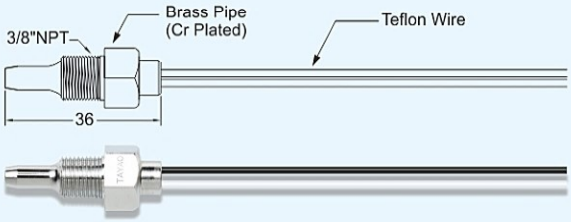
Thermal time constant	5 seconds max. (in oil)
Dissipation constant	2 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC500V

Measure Outside Air Temperature Sensor



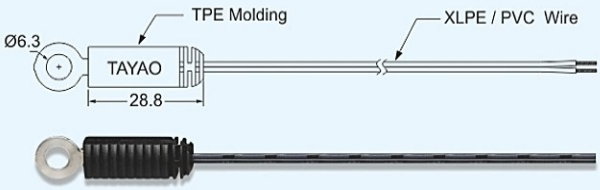
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V

Immersion Probe For Water Boilers



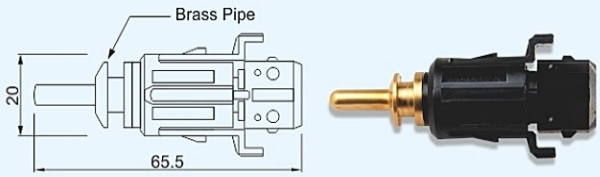
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC500V

Remote Controller Sensor



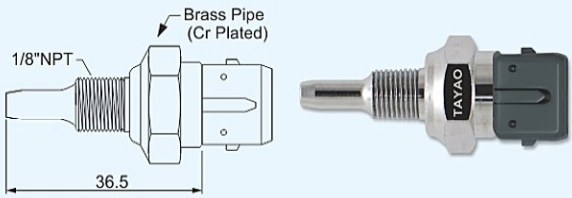
Thermal time constant	25 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC500V

Water / Oil Temperature Sensor



Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +130°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

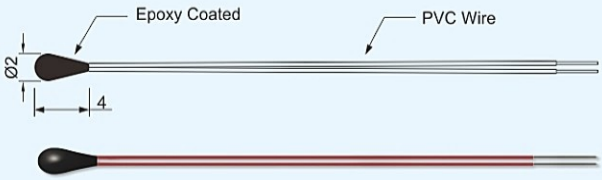
Engine Coolant Temperature Sensor



Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-20°C ~ +150°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

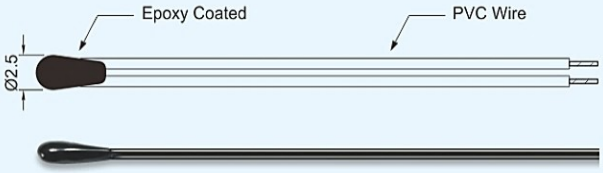
Unit:mm

Energy Saving Calculation Sensor



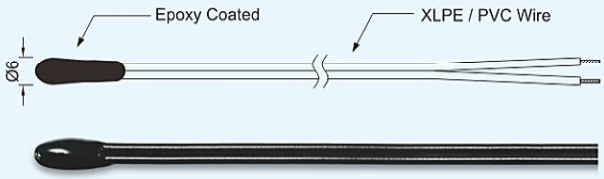
Thermal time constant	2 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC100V

3C Battery Pack Sensor



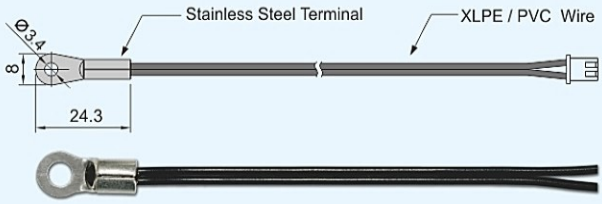
Thermal time constant	3seconds max. (in oil)
Dissipation constant	2mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC100V

Auto Battery Pack Sensor



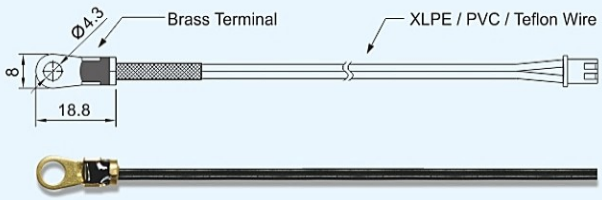
Thermal time constant	10 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Solar Heating Sensor



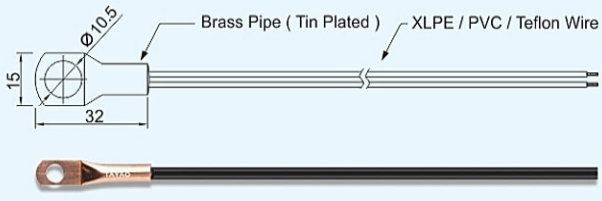
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Surface Temperature Sensor



Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

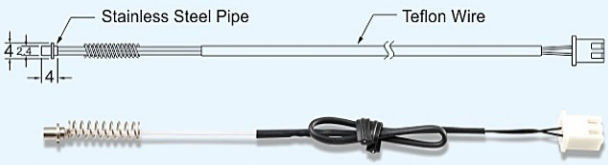
Vehicle Motor Sensor



Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +150°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

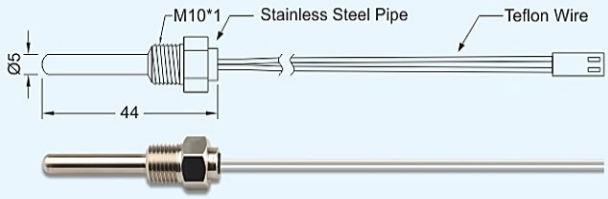
Unit:mm

Instrumentation Sensor



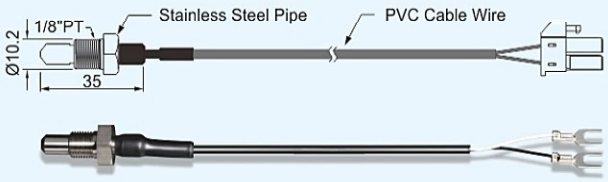
Thermal time constant	4 seconds max. (in oil)
Dissipation constant	0.8 mW/°C
Operating temperature range	-40°C ~ +180°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC500V

High Temperature Sensor



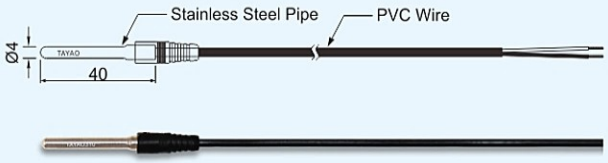
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +200°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1500V

Coolant Temperature Sensor



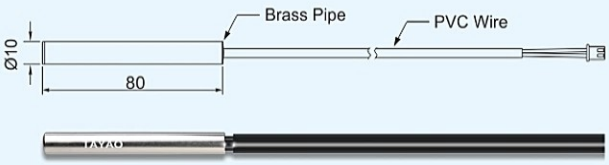
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3mW/°C
Operating temperature range	-40°C ~ +80°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Water Proof Sensor



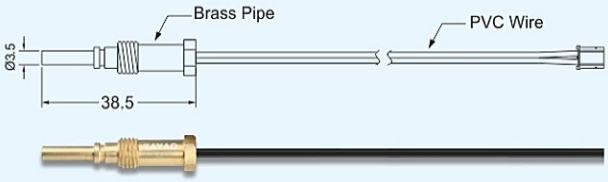
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +80°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Water Chiller Sensor



Thermal time constant	40 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

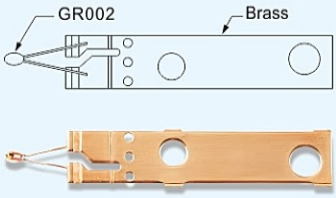
Quick Response Time Sensor



Thermal time constant	6 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC500V

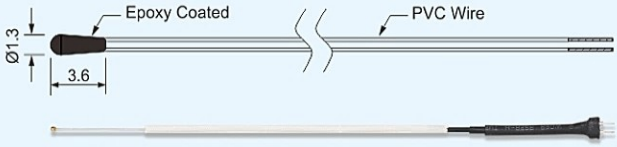
Unit:mm

Air-flow Detection Systems Sensor



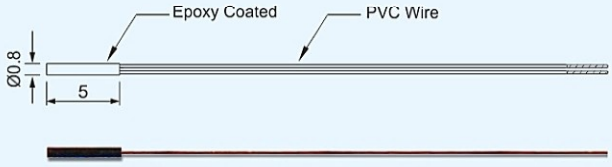
Thermal time constant	2.5 seconds max. (in oil)
Dissipation constant	0.7~0.8 mW/°C
Operating temperature range	-20°C ~ +250°C
Maximum Permissible Power	5 mW

Thermometer Sensor



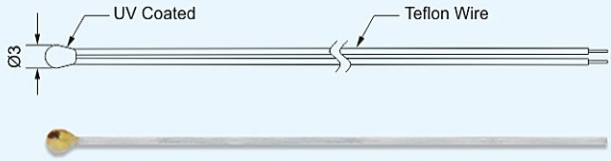
Thermal time constant	1.5 seconds max. (in oil)
Dissipation constant	1.2 mW/°C
Operating temperature range	-40°C ~ +80°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V

Catheter Sensor



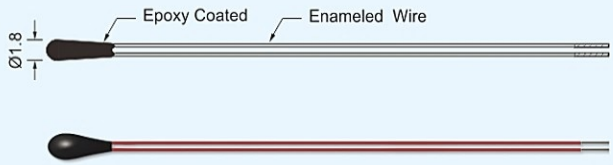
Thermal time constant	1.2 seconds max. (in oil)
Dissipation constant	0.7~0.8 mW/°C
Operating temperature range	-20°C ~ +80°C

Skin Surface Thermometer Sensor



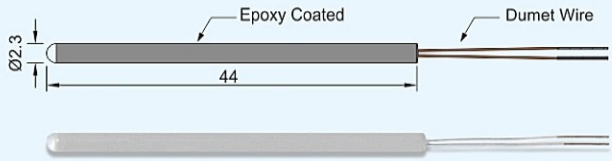
Thermal time constant	2 seconds max. (in oil)
Dissipation constant	1.2 mW/°C
Operating temperature range	-40°C ~ +80°C
Maximum Permissible Power	5 mW

Air Sensor for Small Space Temperature Sensing



Thermal time constant	2.5 seconds max. (in oil)
Dissipation constant	0.7 mW/°C
Operating temperature range	-40°C ~ +110°C
Maximum Permissible Power	5 mW
Insulation resistance	DC100V

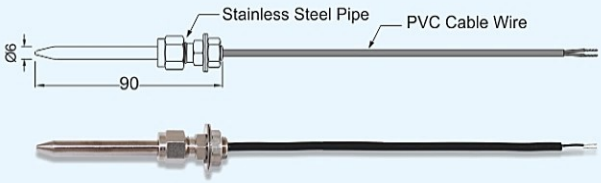
Medical Apparatus Sensor



Thermal time constant	2.5 seconds max. (in oil)
Dissipation constant	0.7 mW/°C
Operating temperature range	-40°C ~ +110°C
Maximum Permissible Power	5 mW

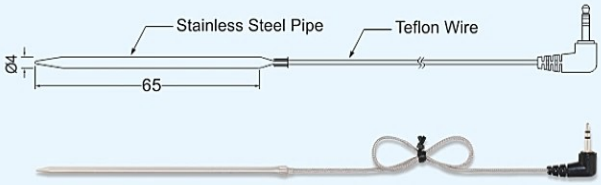
Unit:mm

Inside Pipe / Tank Sensor



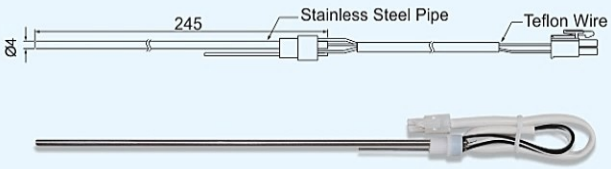
Thermal time constant	12 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +90°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

High Temp Sensor



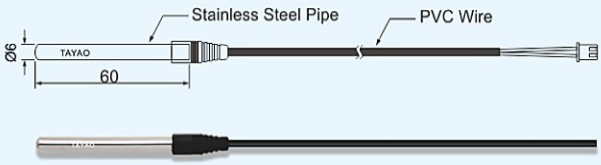
Thermal time constant	10 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +220°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Long Tube Temperature Sensor



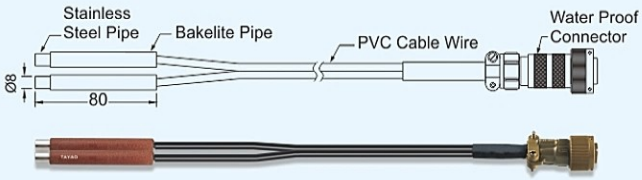
Thermal time constant	12 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

Anti-Humidity Sensor



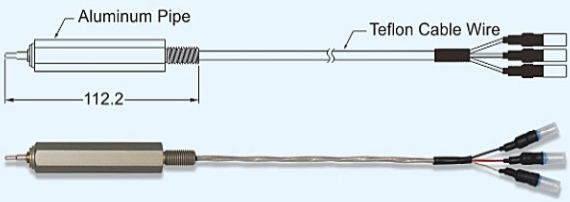
Thermal time constant	15 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

MRT Air Conditioning Sensor

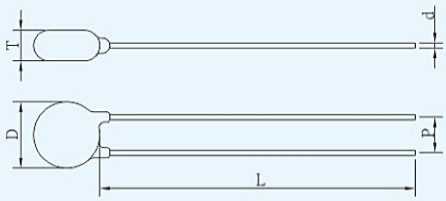


Thermal time constant	20 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +105°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V

MRT Air Conditioning Sensor



Thermal time constant	3 seconds max. (in oil)
Dissipation constant	3 mW/°C
Operating temperature range	-40°C ~ +80°C
Maximum Permissible Power	5 mW
Insulation resistance	DC500V
Hi-Pot Test	AC1000V



DIMENSIONS

Unit:mm

Disc ϕ	D max.	L max.	d nor.	P nor.	T max.
5.0	6.0	25	0.5 ± 0.05	5.0 ± 0.50	3.5

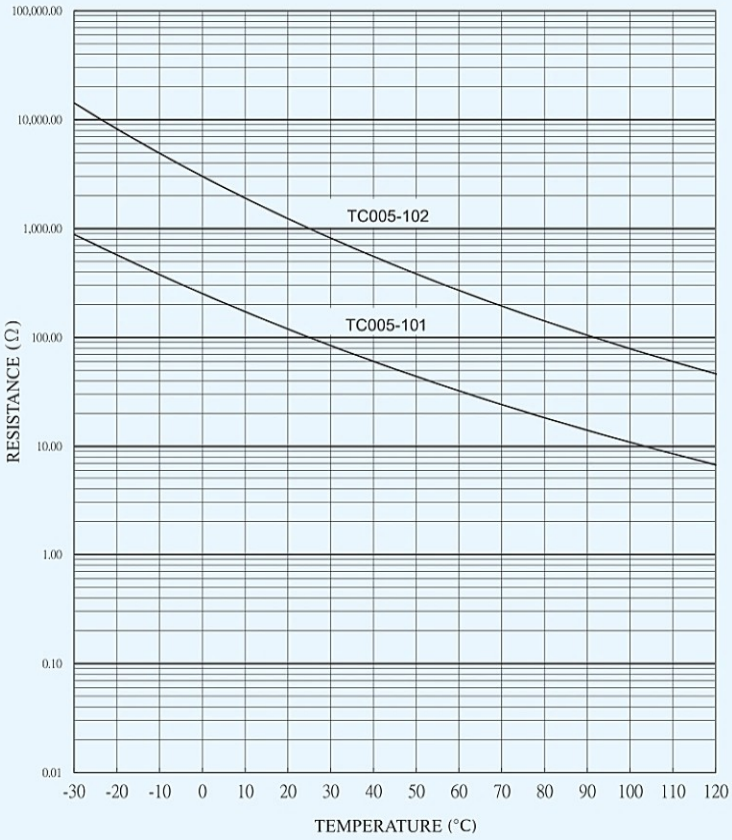
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Tolerance of Resistance (±%)	B-Value (25/85) (K)	Rated Power at 25°C (mW)	Thermal Dissipation Constant (mW/°C)	Thermal Time Constant (sec)	Operating Temperature Range (°C)
TC005-100□310*	10	5,10,15	3100	450	7.2	18	-40~+120
TC005-150□310*	15	5,10,15	3100	450	7.2	18	-40~+120
TC005-200□310*	20	5,10,15	3100	450	7.2	18	-40~+120
TC005-330□315*	33	5,10,15	3150	450	7.2	18	-40~+120
TC005-450□318*	45	5,10,15	3180	450	7.2	18	-40~+120
TC005-500□318*	50	5,10,15	3180	450	7.2	18	-40~+120
TC005-700□320*	70	5,10,15	3200	450	7.2	18	-40~+120
TC005-850□323*	85	5,10,15	3230	450	7.2	18	-40~+120
TC005-900□323*	90	5,10,15	3230	450	7.2	18	-40~+120
TC005-101□326*	100	5,10,15	3260	450	7.2	18	-40~+120
TC005-121□330*	120	5,10,15	3300	450	7.2	18	-40~+120
TC005-201□340*	200	5,10,15	3400	450	7.2	18	-40~+120
TC005-221□340*	220	5,10,15	3400	450	7.2	18	-40~+120
TC005-251□345*	250	5,10,15	3450	450	7.2	18	-40~+120
TC005-301□350*	300	5,10,15	3500	450	7.2	18	-40~+120
TC005-351□350*	350	5,10,15	3500	450	7.2	18	-40~+120
TC005-401□355*	400	5,10,15	3550	450	7.2	18	-40~+120
TC005-501□360*	500	5,10,15	3600	450	7.2	18	-40~+120
TC005-601□360*	600	5,10,15	3600	450	7.2	18	-40~+120
TC005-681□365*	680	5,10,15	3650	450	7.2	18	-40~+120
TC005-801□375*	800	5,10,15	3750	450	7.2	18	-40~+120
TC005-901□375*	900	5,10,15	3750	450	7.2	18	-40~+120
TC005-102□375*	1,000	5,10,15	3750	450	7.3	18	-40~+120
TC005-102□385*	1,000	5,10,15	3850	450	7.3	18	-40~+120
TC005-142□380*	1,400	5,10,15	3800	450	7.3	18	-40~+120

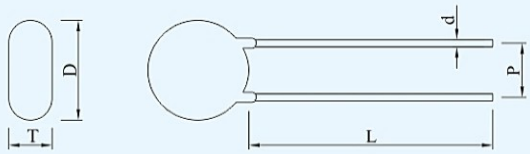
Part No.	Zero Power Resistance at 25°C (Ω)	Tolerance of Resistance (±%)	B-Value (25/85) (K)	Rated Power at 25°C (mW)	Thermal Dissipation Constant (mW/°C)	Thermal Time Constant (sec)	Operating Temperature Range (°C)
TC005-152□380*	1,500	5,10,15	3800	450	7.3	18	-40~+120
TC005-202□385*	2,000	5,10,15	3850	450	7.3	18	-40~+120
TC005-222□385*	2,200	5,10,15	3850	450	7.3	18	-40~+120
TC005-252□390*	2,500	5,10,15	3900	450	7.3	18	-40~+120
TC005-272□390*	2,700	5,10,15	3900	450	7.3	19	-40~+120
TC005-302□390*	3,000	5,10,15	3900	450	7.3	19	-40~+120
TC005-332□390*	3,300	5,10,15	3900	450	7.3	19	-40~+120
TC005-352□390*	3,500	5,10,15	3900	450	7.3	19	-40~+120
TC005-402□395*	4,000	5,10,15	3950	450	7.3	19	-40~+120
TC005-452□395*	4,500	5,10,15	3950	450	7.3	19	-40~+120
TC005-472□400*	4,700	5,10,15	4000	450	7.3	19	-40~+120
TC005-502□405*	5,000	5,10,15	4050	450	7.3	19	-40~+120
TC005-682□405*	6,800	5,10,15	4050	450	7.3	19	-40~+120
TC005-103□405*	10,000	5,10,15	4050	450	7.5	19	-40~+120
TC005-103□415*	10,000	5,10,15	4150	450	7.5	19	-40~+120
TC005-103□425*	10,000	5,10,15	4250	450	7.5	19	-40~+120
TC005-123□415*	12,000	5,10,15	4150	450	7.5	19	-40~+120
TC005-153□420*	15,000	5,10,15	4200	450	7.5	19	-40~+120
TC005-203□426*	20,000	5,10,15	4260	450	7.5	20	-40~+120
TC005-253□430*	25,000	5,10,15	4300	450	7.5	20	-40~+120
TC005-303□440*	30,000	5,10,15	4400	450	7.5	20	-40~+120
TC005-333□440*	33,000	5,10,15	4400	450	7.5	20	-40~+120
TC005-403□445*	40,000	5,10,15	4450	450	7.5	20	-40~+120
TC005-473□455*	47,000	5,10,15	4550	450	7.5	20	-40~+120
TC005-503□445*	50,000	5,10,15	4450	450	7.5	20	-40~+120
TC005-503□460*	50,000	5,10,15	4600	450	7.5	20	-40~+120
TC005-104□475*	100,000	5,10,15	4750	450	7.5	20	-40~+120
TC005-154□490*	150,000	5,10,15	4900	450	7.5	20	-40~+120
TC005-204□463*	200,000	5,10,15	4638	450	7.5	20	-40~+120
TC005-204□500*	200,000	5,10,15	5000	450	7.5	20	-40~+120
TC005-224□500*	220,000	5,10,15	5000	450	7.5	20	-40~+120
TC005-334□505*	330,000	5,10,15	5050	450	7.5	20	-40~+120
TC005-404□520*	400,000	5,10,15	5200	450	7.5	20	-40~+120
TC005-474□510*	470,000	5,10,15	5100	450	7.5	20	-40~+120
TC005-474□535*	470,000	5,10,15	5350	450	7.5	20	-40~+120
TC005-504□535*	500,000	5,10,15	5350	450	7.5	20	-40~+120

Note1: □Tolerance of Resistance： J=±5%, K=±10%, L=±15%
Note2: ＊Tolerance of B-Value H=±3%, J=±5%
Note3: Please contact us for special spec.

TC005 R-T CURVE



DIMENSIONS



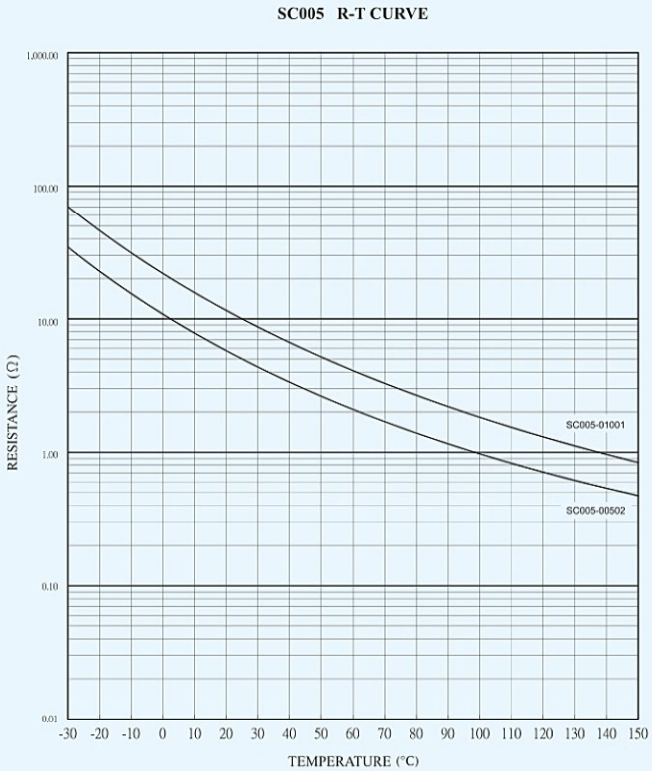
Unit:mm

Disc ϕ	D	T	L	P	d
5	6.5	4	25	5	0.6

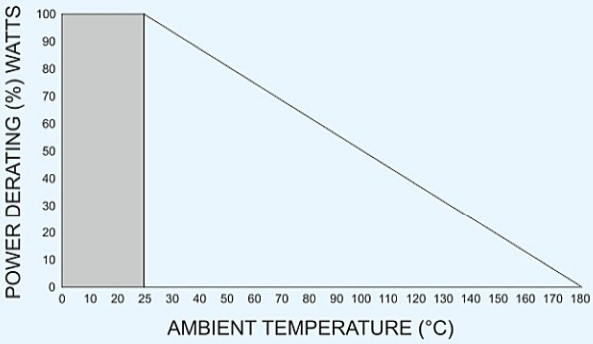
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Max.Steady State Current at 25°C (A)	Approx. Resistance at Max.Current (Ω)	B-Value $R_{(25/85)}$ ±10% (K)	Thermal Dissipation Constant (mW/°C)	Thermal Time Constant (sec)	Max. Capacitance 240 Vac. (μF)	Operating Temperature Range (°C)
SC005-00502	5	2	0.297	2850	Approx. 7	Approx. 18	Approx. 40	-40~+180
SC005-0081E	8	1.2	0.452	2900				
SC005-01001	10	1	0.565	2900				
SC005-016R8	16	0.8	0.861	2950				
SC005-022R5	22	0.5	1.183	2950				
SC005-030R3	30	0.3	1.535	3000				

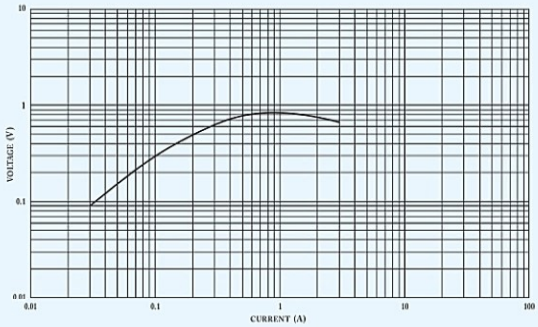
R-T CHARACTERISTIC CURVE



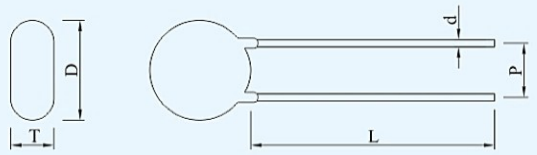
POWER DERATING CURVE



V-I CHARACTERISTIC CURVE



DIMENSIONS



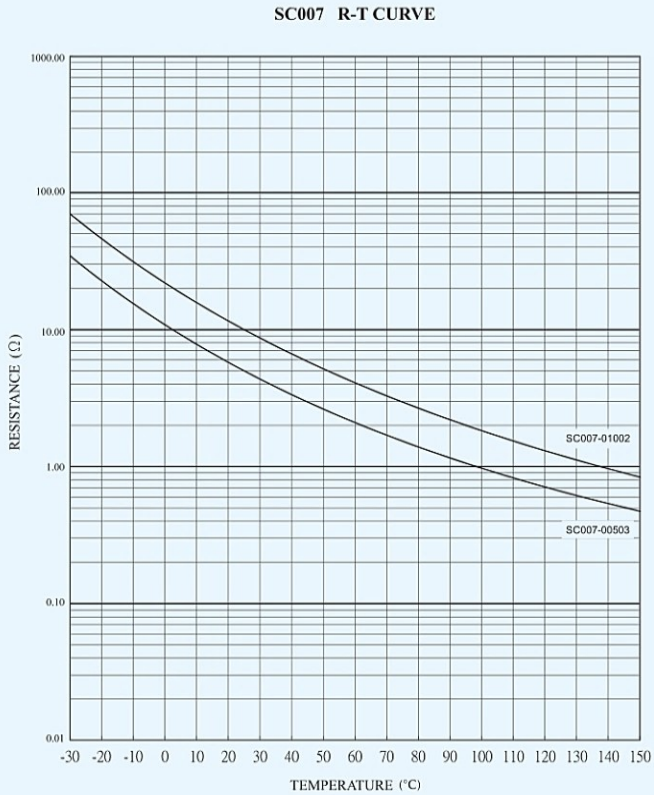
Unit:mm

Disc ϕ	D	T	L	P	d
7	8.5	5	25	5	0.6

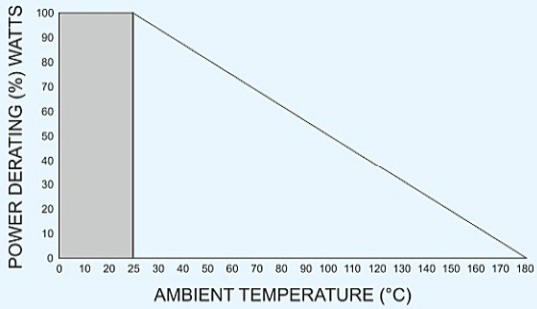
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Max.Steady State Current at 25°C (A)	Approx. Resistance at Max.Current (Ω)	B-Value R(25/85) ±10% (K)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Max. Capacitance 240 Vac. (μF)	Operating Temperature Range (℃)
SC007-2R503	2.5	3	0.127	2850	Approx. 10	Approx. 32	Approx. 80	-40~+180
SC007-00503	5	3	0.241	2900				
SC007-0082E	8	2.5	0.366	2950				
SC007-01002	10	2	0.435	3000				
SC007-01202	12	2	0.521	3000				
SC007-01602	16	2	0.660	3050				
SC007-0221E	22	1.5	0.861	3100				
SC007-03001	30	1	1.174	3100				
SC007-050E5	50	0.5	1.857	3150				

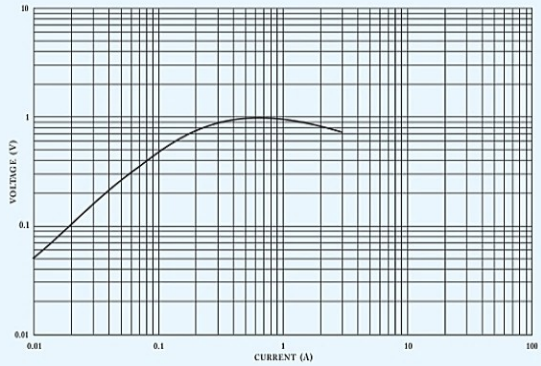
R-T CHARACTERISTIC CURVE



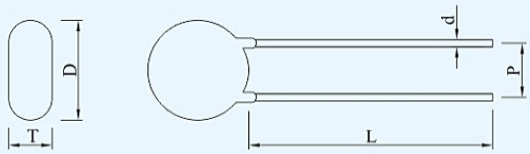
POWER DERATING CURVE



V-I CHARACTERISTIC CURVE



DIMENSIONS



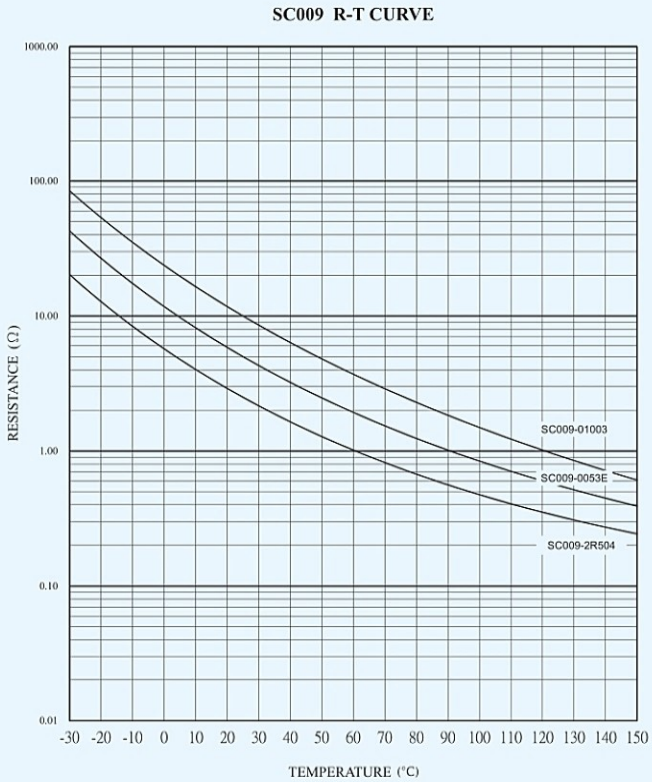
Unit:mm

Disc ϕ	D	T	L	P	d
9	10.5	5	25	5	0.6

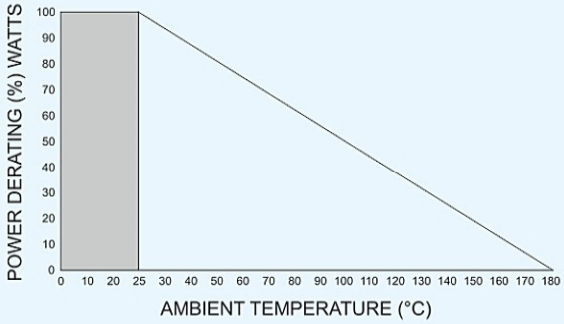
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Max.Steady State Current at 25°C (A)	Approx. Resistance at Max.Current (Ω)	B-Value R(25/85) ±10% (K)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Max. Capacitance 240 Vac. (μF)	Operating Temperature Range (℃)
SC009-2R504	2.5	4	0.110	2850	Approx. 12	Approx. 41	Approx. 160	-40~+180
SC009-00304	3	4	0.124	2900				
SC009-0053E	5	3.5	0.207	2900				
SC009-00803	8	3	0.314	2950				
SC009-01003	10	3	0.372	3000				
SC009-01203	12	3	0.446	3000				
SC009-0162E	16	2.5	0.533	3100				
SC009-01802	18	2	0.599	3100				
SC009-02202	22	2	0.686	3160				
SC009-0501E	50	1.5	1.337	3300				
SC009-40001	400	1	6.896	3700			90	

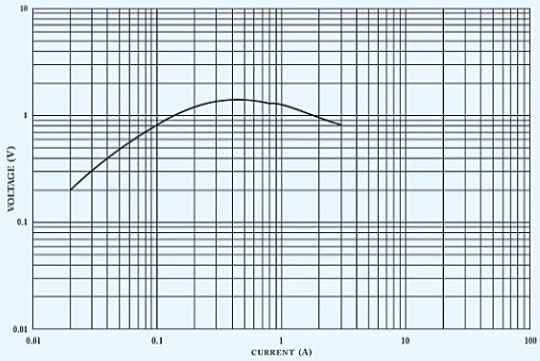
R-T CHARACTERISTIC CURVE



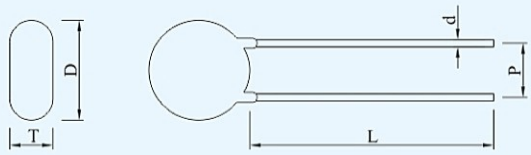
POWER DERATING CURVE



V-I CHARACTERISTIC CURVE



DIMENSIONS



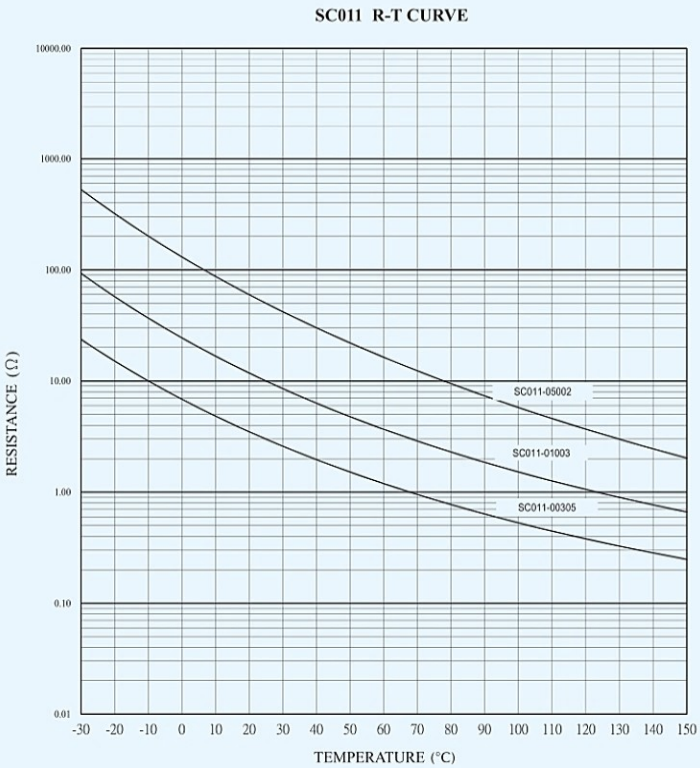
Unit:mm

Disc ϕ	D	T	L	P	d
11	11.5	5	25	7.5	0.8

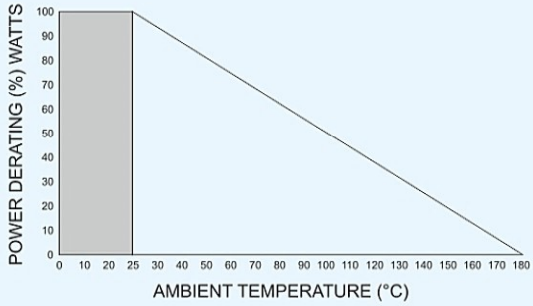
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Max.Steady State Current at 25°C (A)	Approx. Resistance at Max.Current (Ω)	B-Value R(25/85) ±10% (K)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Max. Capacitance 240 Vac. (μF)	Operating Temperature Range (℃)
SC011-00305	3	5	0.124	2900	Approx. 15	Approx. 52	Approx. 250	−40~+180
SC011-00504	5	4	0.196	2950				
SC011-0083E	8	3.5	0.297	3000				
SC011-01003	10	3	0.372	3000				
SC011-01203	12	3	0.446	3000				
SC011-0162E	16	2.8	0.563	3050				
SC011-0202E	20	2.5	0.666	3100				
SC011-0252E	25	2.5	0.788	3150				
SC011-05002	50	2	1.337	3300				

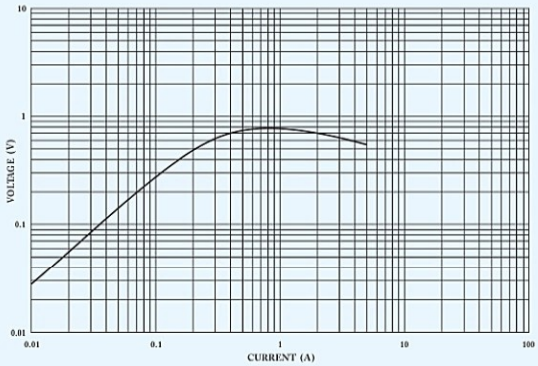
R-T CHARACTERISTIC CURVE



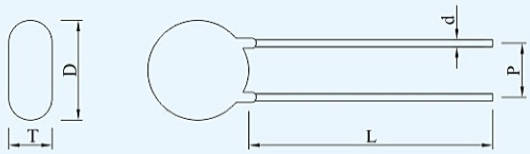
POWER DERATING CURVE



V-I CHARACTERISTIC CURVE



DIMENSIONS



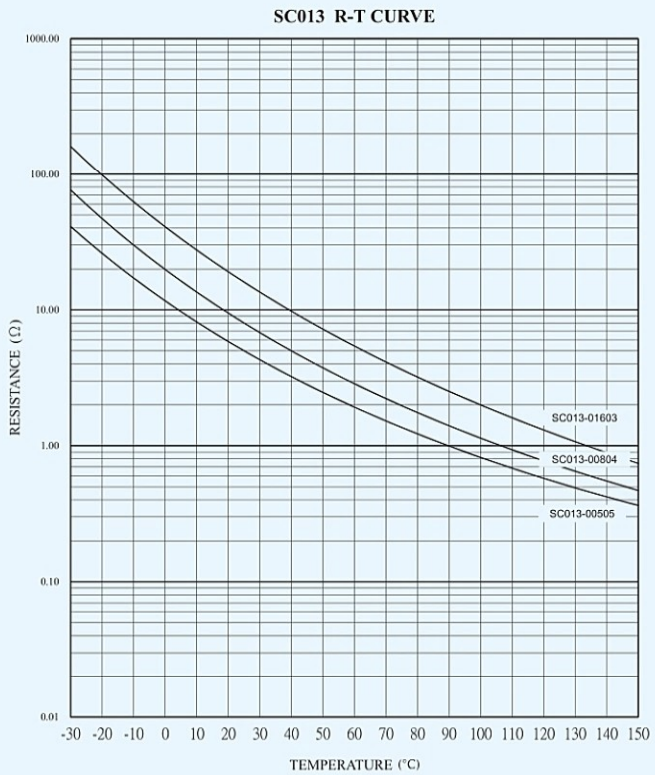
Unit:mm

Disc ϕ	D	T	L	P	d
13	14.5	6	25	7.5	0.8

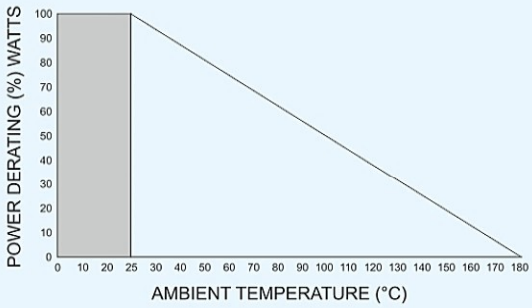
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Max.Steady State Current at 25°C (A)	Approx. Resistance at Max.Current (Ω)	B-Value R(25/85) ±10% (K)	Thermal Dissipation Constant (mW/°C)	Thermal Time Constant (sec)	Max. Capacitance 240 Vac. (μF)	Operating Temperature Range (°C)
SC013-1R307	1.3	7	0.049	2850	Approx. 18	Approx. 70	Approx. 610	-40~+180
SC013-2R506	2.5	6	0.090	2900				
SC013-00505	5	5	0.169	2950				
SC013-00804	8	4	0.256	3000				
SC013-01004	10	4	0.320	3000				
SC013-01204	12	4	0.384	3000				
SC013-01603	16	3	0.484	3050				
SC013-01803	18	3	0.514	3100				
SC013-02003	20	3	0.539	3150				
SC013-05002	50	2	1.134	3300			500	
SC013-12001	120	1	2.164	3500				

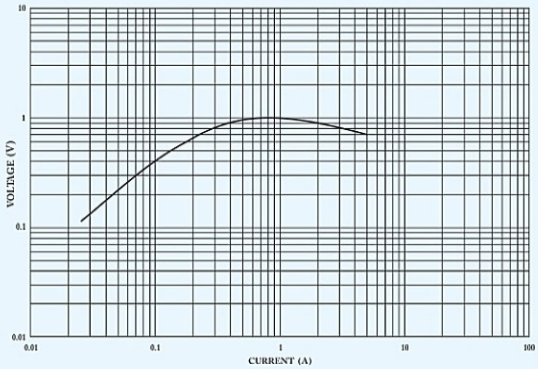
R-T CHARACTERISTIC CURVE



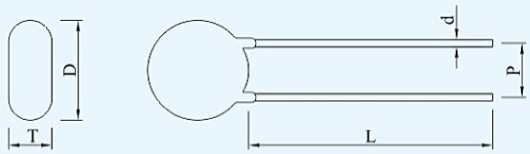
POWER DERATING CURVE

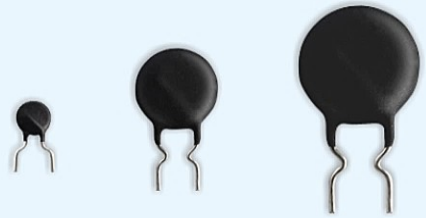


V-I CHARACTERISTIC CURVE



DIMENSIONS





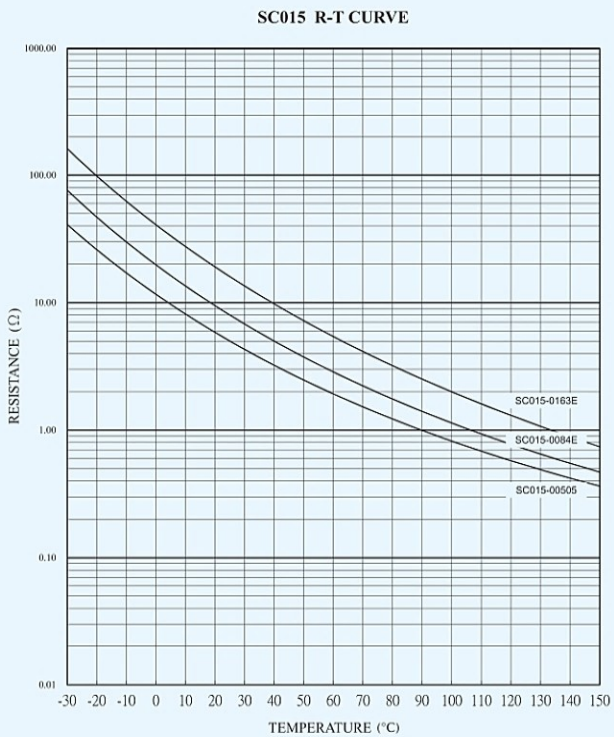
Unit:mm

Disc ϕ	D	T	L	P	d
15	16.5	6	25	7.5	0.8

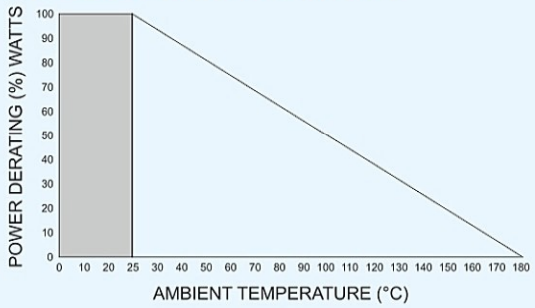
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Max.Steady State Current at 25°C (A)	Approx. Resistance at Max.Current (Ω)	B-Value R(25/85) ±10% (K)	Thermal Dissipation Constant (mW/°C)	Thermal Time Constant (sec)	Max. Capacitance 240 Vac. (μF)	Operating Temperature Range (°C)
SC015-00107	1	7	0.040	2800				
SC015-1R507	1.5	7	0.057	2850				
SC015-2R56E	2.5	6.5	0.090	2900				
SC015-00306	3	6	0.102	2950				
SC015-00505	5	5	0.160	3000				
SC015-00605	6	5	0.192	3000				
SC015-0074E	7	4.5	0.224	3000				
SC015-0084E	8	4.5	0.242	3050	Approx. 21	Approx. 81	Approx. 610	−40～+180
SC015-01004	10	4	0.285	3100				
SC015-01204	12	4	0.342	3100				
SC015-01504	15	4	0.404	3150				
SC015-0163E	16	3.8	0.407	3200				
SC015-02003	20	3	0.509	3200				
SC015-0302E	30	2.5	0.681	3300				
SC015-0402E	40	2.5	0.857	3350				
SC015-04702	47	2	1.007	3350				
SC015-1201E	120	1.5	2.428	3400			500	

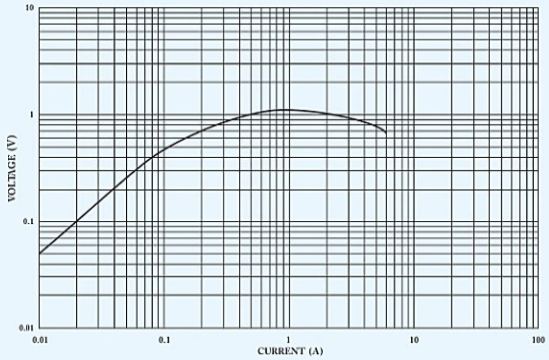
R-T CHARACTERISTIC CURVE



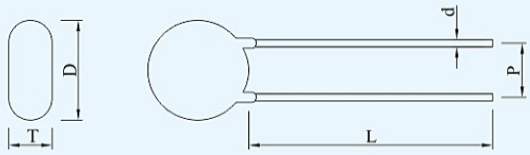
POWER DERATING CURVE



V-I CHARACTERISTIC CURVE



DIMENSIONS



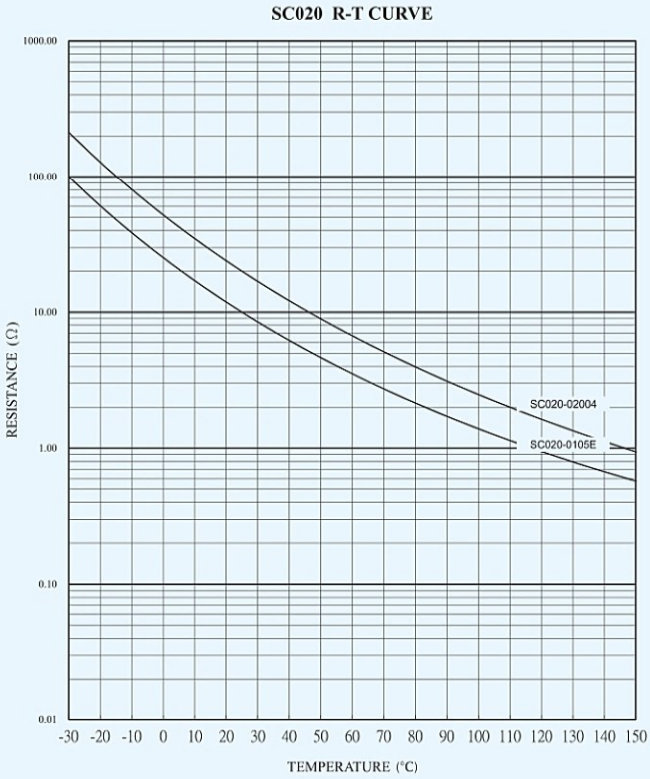
Unit:mm

Disc ϕ	D	T	L	P	d
20	23	7	25	7.5	1

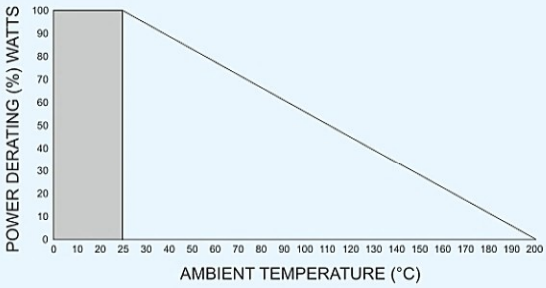
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Max.Steady State Current at 25°C (A)	Approx. Resistance at Max.Current (Ω)	B-Value R(25/85) ±10% (K)	Thermal Dissipation Constant (mW/°C)	Thermal Time Constant (sec)	Max. Capacitance 240 Vac. (μF)	Operating Temperature Range (°C)
SC020-0R712	0.7	12	0.027	2850	Approx. 26	Approx. 110	Approx. 2000	-40~+200
SC020-1R310	1.3	10	0.047	2900				
SC020-2R508	2.5	8	0.085	2950				
SC020-00507	5	7	0.160	3000				
SC020-00607	6	7	0.192	3000				
SC020-0105E	10	5.5	0.285	3100				
SC020-0125E	12	5.5	0.342	3100				
SC020-02004	20	4	0.509	3200				
SC020-12002	120	2	2.428	3400				

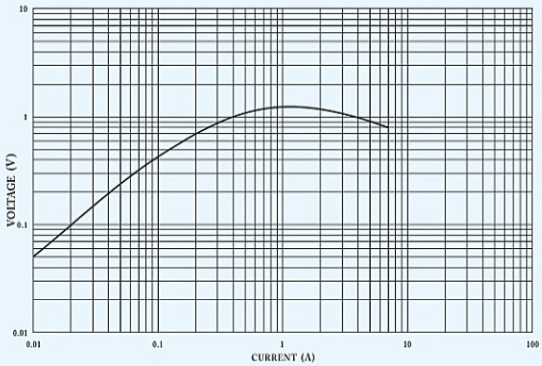
R-T CHARACTERISTIC CURVE



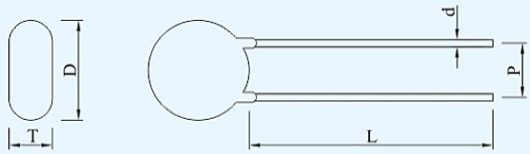
POWER DERATING CURVE



V-I CHARACTERISTIC CURVE



DIMENSIONS



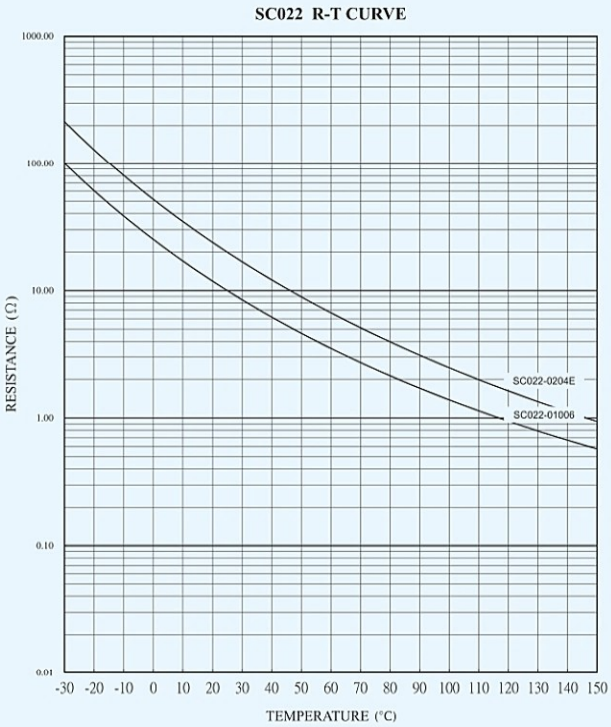
Unit:mm

Disc ϕ	D	T	L	P	d
22	24.5	9	25	10	1

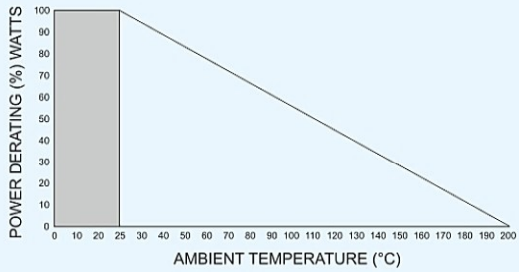
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Max.Steady State Current at 25°C (A)	Approx. Resistance at Max.Current (Ω)	B-Value R(25/85) ±10% (K)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Max. Capacitance 240 Vac. (μF)	Operating Temperature Range (℃)
SC022-00111	1	11	0.036	2900	Approx. 28	Approx. 115	Approx. 2500	−40～+200
SC022-2R58E	2.5	8.5	0.085	2950				
SC022-00308	3	8	0.096	3000				
SC022-00507	5	7	0.151	3050				
SC022-0066E	6	6.5	0.181	3050				
SC022-01006	10	6	0.269	3150				
SC022-01206	12	6	0.323	3150				
SC022-0204E	20	4.5	0.509	3200				
SC022-03003	30	3	0.721	3250				
SC022-04003	40	3	0.908	3300				

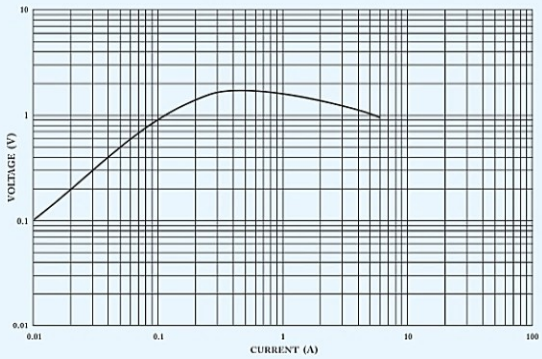
R-T CHARACTERISTIC CURVE



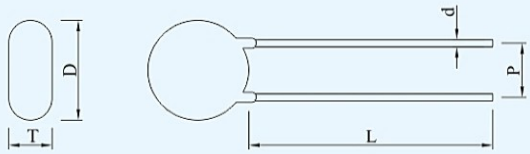
POWER DERATING CURVE

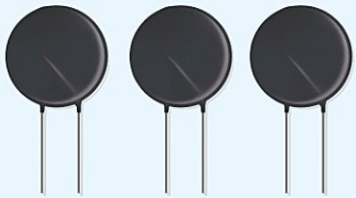


V-I CHARACTERISTIC CURVE



DIMENSIONS





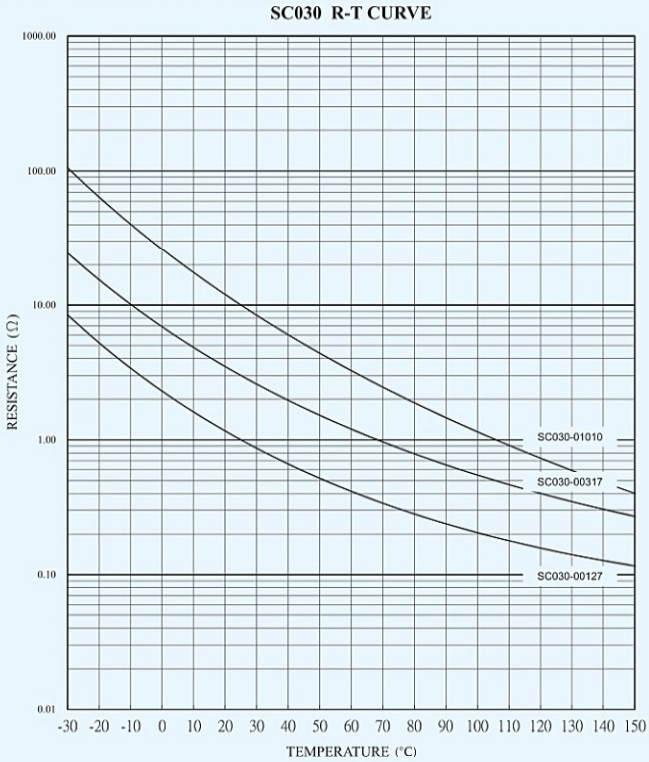
Unit:mm

Disc ϕ	D	T	L	P	d
30	32	9	25	10	1

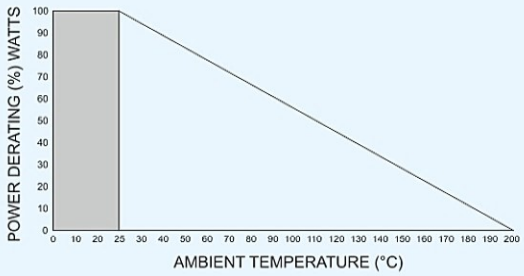
SPECIFICATIONS

Part No.	Zero Power Resistance at 25°C (Ω)	Max.Steady State Current at 25°C (A)	Approx. Resistance at Max.Current (Ω)	B-Value R(25/85) ±10% (K)	Thermal Dissipation Constant (mW/℃)	Thermal Time Constant (sec)	Max. Capacitance 240 Vac. (μF)	Operating Temperature Range (℃)
SC030-0R530	0.5	30	0.018	2900	Approx. 40	Approx. 185	Approx. 3000	-40～+200
SC030-00127	1	27	0.034	2950				
SC030-2R520	2.5	20	0.080	3000				
SC030-00317	3	17	0.086	3100				
SC030-00514	5	14	0.135	3150				
SC030-00613	6	13	0.162	3150				
SC030-01010	10	10	0.254	3200				

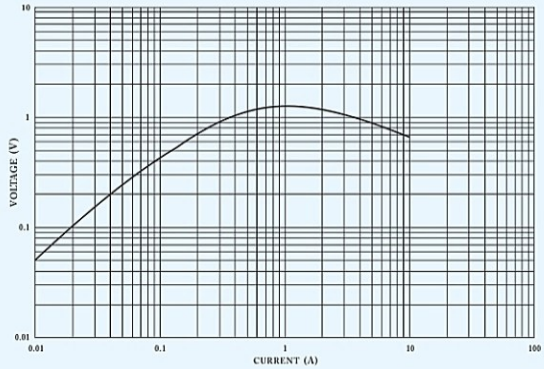
R-T CHARACTERISTIC CURVE



POWER DERATING CURVE



V-I CHARACTERISTIC CURVE



- SMD 0603 / 0805 / 1206
- Dip Type : Type C / L / MN / M / H
- Sensor Modules
- Sensor Solutions with PRTD

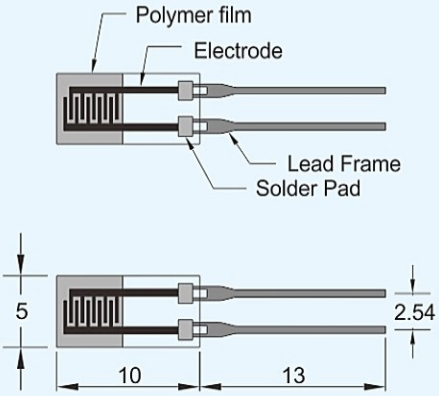
Basic values for 100 Ω platinum temperature sensors as per DIN EN 60751 (TS90) TC = 3850 ppm/K

℃	Ω	Ω / ℃	℃	Ω	Ω / ℃	℃	Ω	Ω / ℃	℃	Ω	Ω / ℃
-200	18.52	0.432	70	127.08	0.383	340	226.21	0.352	610	316.92	0.320
-190	22.83	0.429	80	130.90	0.382	350	229.72	0.350	620	320.12	0.319
-180	27.10	0.425	90	134.71	0.380	360	233.21	0.349	630	323.30	0.318
-170	31.34	0.422	100	138.51	0.379	370	236.70	0.348	640	326.48	0.317
-160	35.34	0.419	110	142.29	0.378	380	240.18	0.347	650	329.64	0.316
-150	39.72	0.417	120	146.07	0.377	390	243.64	0.346	660	332.79	0.315
-140	43.88	0.414	130	149.83	0.376	400	247.09	0.345	670	335.93	0.313
-130	48.00	0.412	140	153.58	0.375	410	250.53	0.343	680	339.06	0.312
-120	52.11	0.409	150	157.33	0.374	420	253.96	0.342	690	342.18	0.311
-110	56.19	0.407	160	161.05	0.372	430	257.38	0.341	700	345.28	0.310
-100	60.26	0.405	170	164.77	0.371	440	260.78	0.340	710	348.38	0.309
-90	64.30	0.403	180	168.48	0.370	450	264.18	0.339	720	351.46	0.308
-80	68.33	0.402	190	172.17	0.369	460	267.56	0.338	730	354.53	0.307
-70	72.33	0.400	200	175.86	0.368	470	270.93	0.337	740	357.59	0.305
-60	76.33	0.399	210	179.53	0.367	480	274.29	0.335	750	360.64	0.304
-50	80.31	0.397	220	183.19	0.365	490	277.64	0.334	760	363.67	0.303
-40	84.27	0.396	230	186.84	0.364	500	280.98	0.333	770	366.70	0.302
-30	88.22	0.394	240	190.47	0.363	510	284.30	0.332	780	369.71	0.301
-20	92.16	0.393	250	194.10	0.362	520	287.62	0.331	790	372.71	0.300
-10	96.09	0.392	260	197.71	0.361	530	290.92	0.330	800	375.70	0.298
0	100.00	0.391	270	201.31	0.360	540	294.21	0.328	810	378.68	0.297
10	103.90	0.390	280	204.90	0.358	550	297.49	0.327	820	381.65	0.296
20	107.79	0.389	290	208.48	0.357	560	300.75	0.326	830	384.60	0.295
30	111.67	0.387	300	212.05	0.356	570	304.01	0.325	840	387.55	0.294
40	115.54	0.386	310	215.61	0.355	580	307.25	0.324	850	390.48	0.293
50	119.40	0.385	320	219.15	0.354	590	310.49	0.323			
60	123.24	0.384	330	222.68	0.353	600	313.71	0.322			

Tolerances Classification

Tolerances are specified in DIN EN 60751 1996–07	Tolerances are specified in DIN EN 60751 1996–07	Temperature range
Class 1/3 B	F 0.10	0 °C to + 150 °C
Class A	F 0.15	-50 °C to + 300 °C
Class B	F 0.30	-70 °C to + 500 °C
Class 2B	F 0.60	-70 °C to + 500 °C

DIMENSIONS



Unit:mm

Part No.	HS001-233H	HS001-313H
Rated Voltage	5VAC Max.(Sine wave)	5VAC Max.(Sine wave)
Rated Power	5mW. AC (MAX)	5mW. AC (MAX)
Operating Temperature Range	-20 to 70°C	-20 to 70°C
Operating Humidity Range	95%RH or Less	95%RH or Less
Operating Frequency	100Hz ~ 10kHz	100Hz ~ 10kHz
Resistance Value	23 Kohm (at 25°C, 60 ±3%RH,1kHz)	31 Kohm (at 25°C, 60 ±3%RH,1kHz)
Storage Temperature Range	-40 ~ 85°C	-40 ~ 85°C
Storage Humidity Range	95%RH or less	95%RH or less
Hysteresis	≤ ±2%RH	≤ ±2%RH
Response Time	≤60sec (30%RH⇔90%RH)	≤60sec (30%RH⇔90%RH)

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