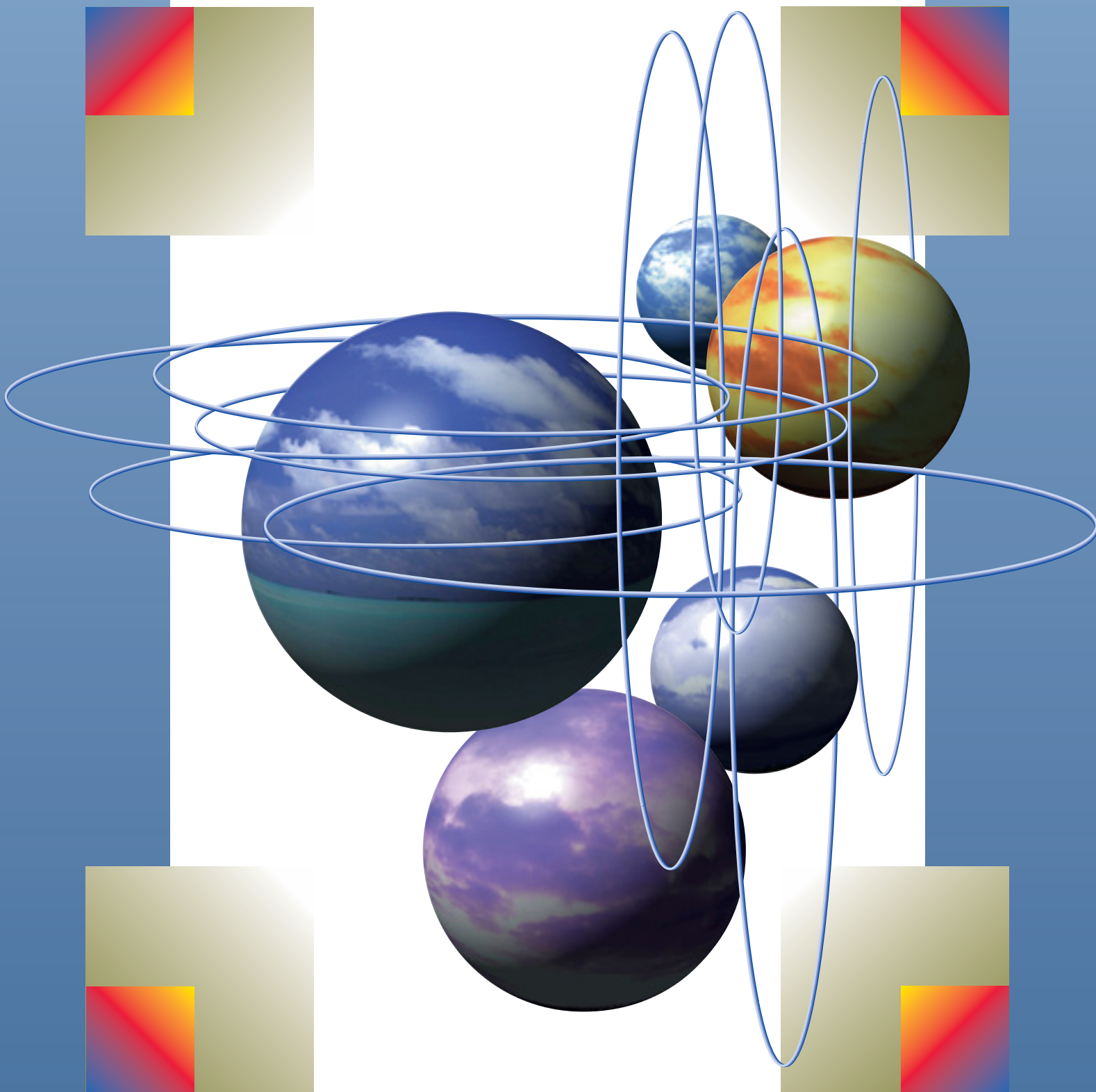
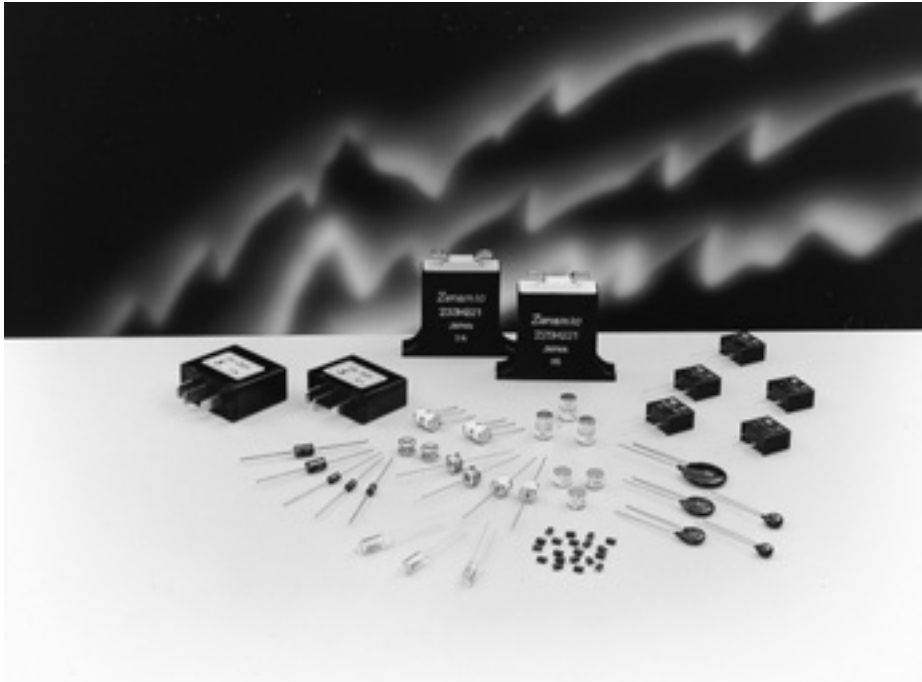


SEMITEC®

Ishizuka Electronics Corporation

PRODUCT CATALOG





SURGE ABSORBERS



THERMISTORS

New Line-Up · AP THERMISTOR · THERMOPILE · NC SENSOR	4
THERMISTOR · HIGH PRECISION SERIES · SMD SERIES · HIGH HEAT-RESISTANCE SERIES · DISK SERIES · SENSORS	7
POWER THERMISTOR · D-TYPE SERIES · MARK II SERIES · D2-TYPE SERIES	23
VRD (TRANSIENT VOLTAGE SUPPRESSOR) · LEAD TYPE SERIES · SMD SERIES	28
CRD (CURRENT REGULATIVE DIODE) · LEAD TYPE SERIES · MELF TYPE SERIES	32
ZENAMIC (METAL OXIDE VARISTOR) · LEAD TYPE SERIES · M TYPE SERIES · SURGE ABSORBER UNIT SERIES	34
GAS TUBE ARRESTER · CERAMIC TUBE SERIES · GLASS TUBE SERIES · SA-01 SERIES	40

AP THERMISTOR

The AP Thermistor features higher accuracy and higher resistance to heat than our existing high-precision thermistor.
AP Thermistor suits various types of application.

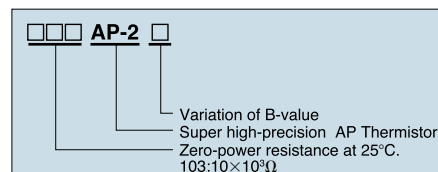
Features

- Super high-precision : Tolerance on R_{25} and $B_{25/85}$ is $\pm 0.5\%$.
- Narrow deviation in wide temperature range: Accurate temperature detecting with tolerance of $\pm 0.5^\circ\text{C}$ in -60°C to 70°C .
- High resistance to heat : Category temperature range is $-60^\circ\text{C} \sim 150^\circ\text{C}$.

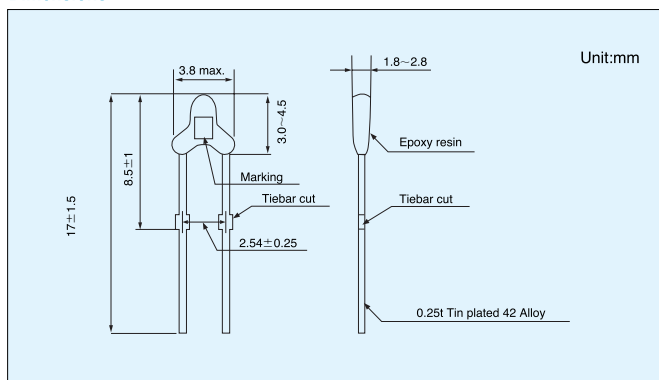
Applications

Portable devices, Battery packs, Fan motor, Automobile, Office automation equipment, Electrical household appliances, Security devices, Thermometer, Measurement equipment, Temperature detecting, etc.

Part number

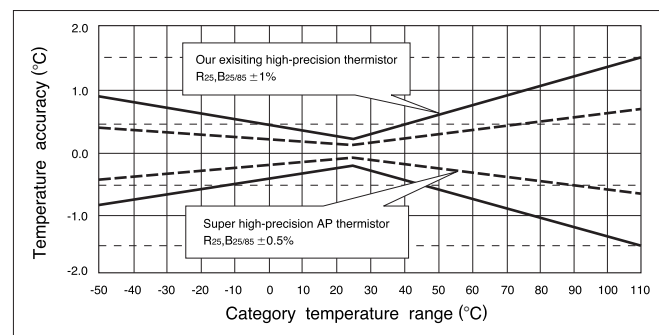


Dimensions



This products complies with RoHS

Temperature accuracy



Rating and characteristic

Part No.	R_{25}^{*1}	B value ^{*2}	Dissipation factor (mW/ $^\circ\text{C}$) Approx.	Thermal time constant(s) ^{*3} Approx.	Rated maximum power dissipation(at 25°C)(mW)	Category temperature range($^\circ\text{C}$)
202AP-2	2.00k Ω	3976K	1.2	15	6	$-60 \sim 150$
232AP-2	2.252k Ω	3976K				
502AP-2	5.00k Ω	3976K				
103AP-2	10.0k Ω	3435K				
103AP-2-A		3976K				
203AP-2	20.0k Ω	3976K				
503AP-2	50.0k Ω	4220K				
104AP-2	100k Ω	4261K				
204AP-2	200k Ω	4470K				

*1 R_{25} : Zero-power resistance value at 25°C .

*2 B-value : Calculated from the zero-power resistance values measured at 25°C and 85°C .

*3 Time when Thermistor temperature reaches 63.2% of the temperature difference. The value is measured in still air.

THERMOPILE TYPE INFRARED SENSOR

SUNSTAR传感与控制 <http://www.sensor-ic.com/> TEL:0755-83376549 FAX:0755-83376182 E-MAIL:szss20@163.com

THERMOPILE

Thermopile type Infrared sensor
utilizing own silicon micromachining
technology.

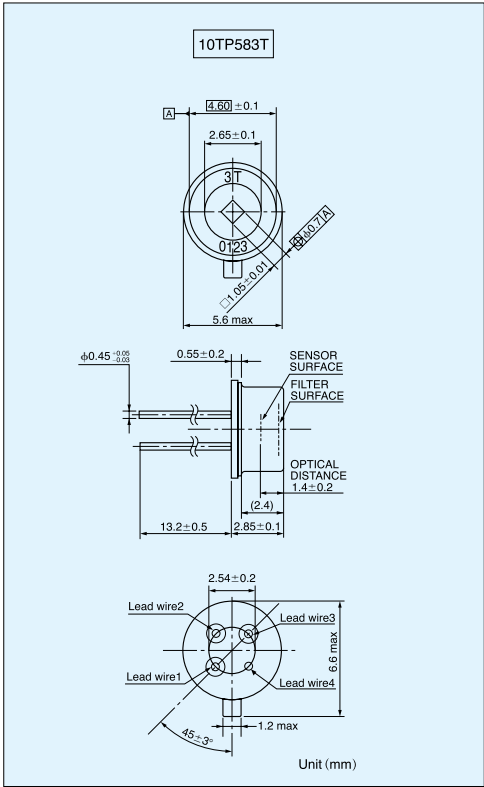
Applications: Tympanic thermometer
Microwave oven
Non contact temperature measurement



Part number

Part No.	type	Thermistor
10TP583T	TO18	Built-in

Dimensions



Ratings

Parameters	Value		Unit	Conditions
	10TP581	10TP583T		
Sensitive area	1.05×1.05		mm^2	Size of Absorbing Film
*1 Responsivity	$15 \pm 30\%$		V / W	
*1 Output Voltage	$200 \pm 30\%$		μV	
*2 Output Voltage	$1.00 \pm 30\%$		mV	
*1 Temperature Coefficient of Responsivity	0.02 ± 0.02		% / $^\circ\text{C}$	Reference
Thermopile Resistance	$65 \pm 30\%$		$\text{k}\Omega$	
Temperature Coefficient of Thermopile Resistance	± 0.1		% / $^\circ\text{C}$	
Johnson Noise Voltage	33		$\text{nV} / \sqrt{\text{Hz}}$	Johnson Noise r.m.s., 298K 1Hz Typical
*1 S/N Ratio	75.7		dB	Output Voltage/Johnson Noise, Typical
*1 Noise Equivalent Power	2.2		$\text{nW} / \text{Hz}^{1/2}$	Typical
*1 Specific Detectivity	4.7×10^7		$\text{cm} \cdot \text{Hz}^{1/2} / \text{W}$	Typical
Time Constant	15		ms	Typical
Operating Temperature range	$-20 \sim 100$		$^\circ\text{C}$	
Storage Temperature range	$-40 \sim 100$		$^\circ\text{C}$	
Filter Range	Cut on 5		μm	Standard
Field of View	± 50		deg.	Incident Angle to Achieve 50% Responsivity
Insulation Resistance	≥ 500		$\text{M}\Omega$	Application of DC25V
Sealing	$\leq 1 \times 10^{-9}$		$\text{Pa} \cdot \text{m}^3 / \text{s}$	
*3 Thermistor Resistance Value	$100 \pm 3\%$		$\text{k}\Omega$	Rated Zero-power Resistance Value at 25°C
*3 Thermistor B-Value	$3435 \pm 0.7\%$		K	
*3 Thermistor Rated Power	0.5		mW	at 25°C

*1 Test Condition
Blackbody Temperature : 500K
Sensor-Blackbody Distance : 100mm
Sensor Temperature : 298K
Aperture size : $\phi 12.7\text{mm}$

*2 Test Condition
Blackbody Temperature : 310K
Sensor Temperature : 298K

*3 Built-in Type

NC SENSOR

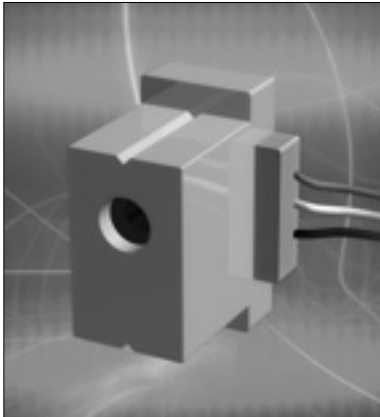
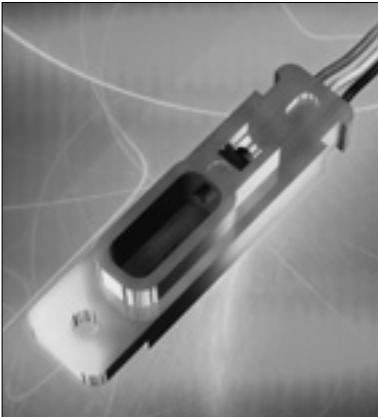
NC SENSOR is the remote temperature sensor consisting of two precision thermistors.

1.Features

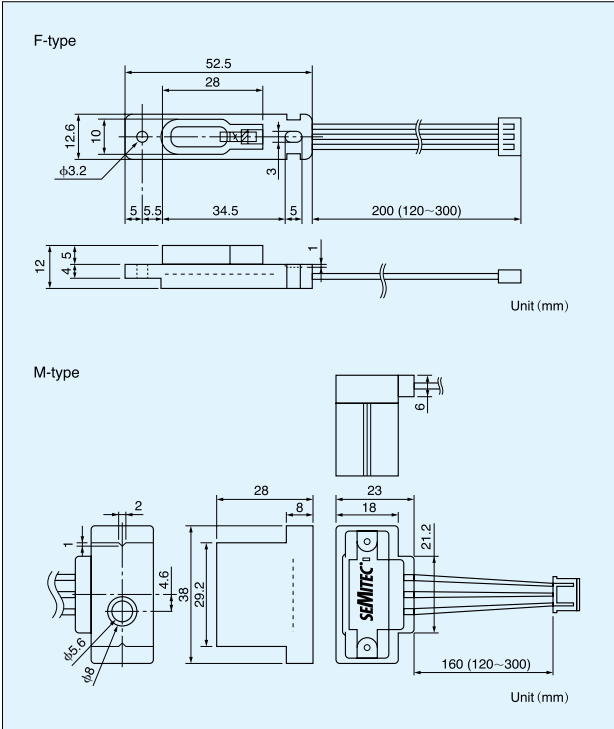
- Larger output in comparison with other IR sensors.
- Operating temperature of up 150°C.(M-type : 130°C)
- Minimum negative influence caused by a dew and/or dust.

2.Applications

- Temperature measurement of the LBP and PPC heat-roller.
- White goods such as microwave-ovens, air-conditioner, refrigerator and so on.
- Any other measurement requiring the remote-sensing.



3. Dimensions



4.Specification

Parameters	F-type (for heat-roller)		M-type (for microwave ovens)	
	Performance	Conditions	Performance	Conditions
Temperature Accuracy	$180^{\circ}\text{C}\pm 3^{\circ}\text{C}$	Blackbody Temperature : 180°C Thermal Emissivity : 0.96 Temperature compensation : 100°C Roller Size : 40mm Testing Distance : 5mm Resistor Connected : $33.0\text{k}\Omega$ Power Line Voltage : DC 5.000V	$60^{\circ}\text{C}\pm 5^{\circ}\text{C}$	Blackbody Temperature : 60°C Thermal Emissivity : 0.995 Temperature compensation : 25°C Resistor Connected : $68.0\text{k}\Omega$ Power Line Voltage : DC 5.000V
Category Temperature Range	$-10^{\circ}\text{C}\sim 150^{\circ}\text{C}$		$-10^{\circ}\text{C}\sim 130^{\circ}\text{C}$	
Temperature Detecting range	$-10^{\circ}\text{C}\sim 260^{\circ}\text{C}$		$-10^{\circ}\text{C}\sim 100^{\circ}\text{C}$	

The NC SENSOR is a custom-made product.
Please consult our sales staff.

THERMISTOR

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

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

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

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

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

Resistance-Temperature Characteristics

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

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

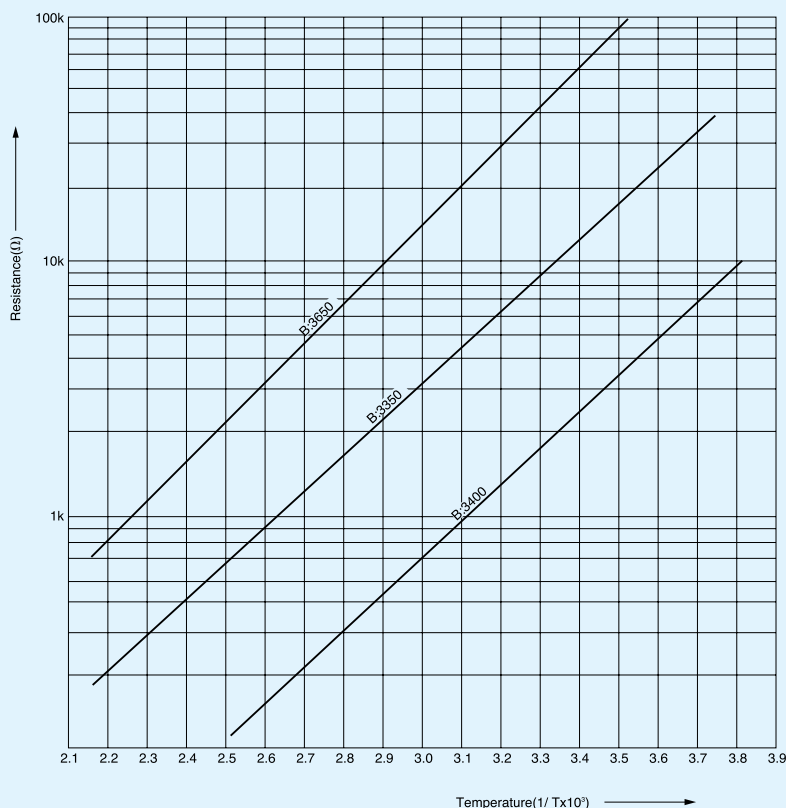
$$R_a = R_b \exp \left[B \left(\frac{1}{T_1} - \frac{1}{T_2} \right) \right]$$

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

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

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

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



Dissipation factor

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

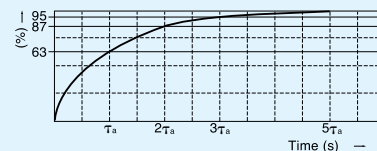
$$\delta = \frac{P}{\Delta t} \text{ (mW/}^{\circ}\text{C)}$$

P : Power (mW)

Δt : Raise temperature (°C)

Thermal time constant

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



ULTIMATE THINNESS, JT THERMISTOR

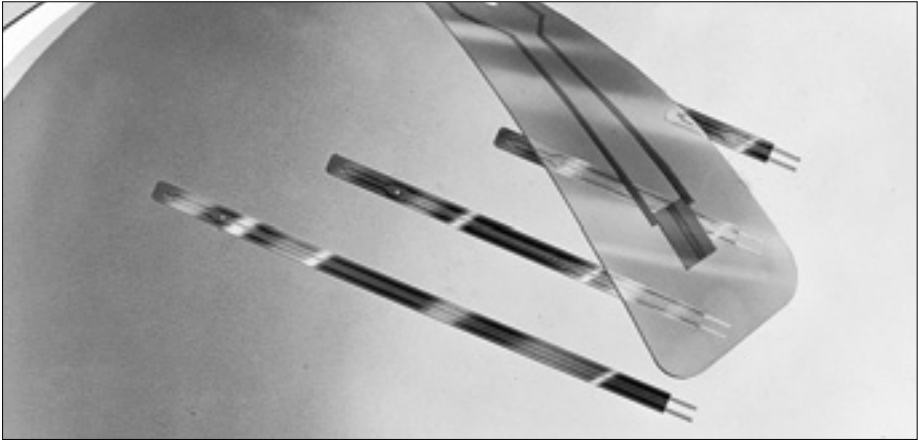
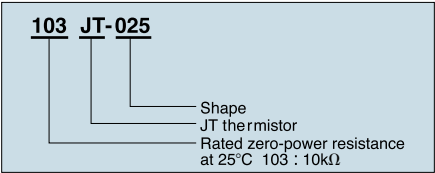
500μm only

SUNSTAR传感与控制 <http://www.sensor-ic.com/> TEL:0755-83376549 FAX:0755-83376182 E-MAIL:szss20@163.com

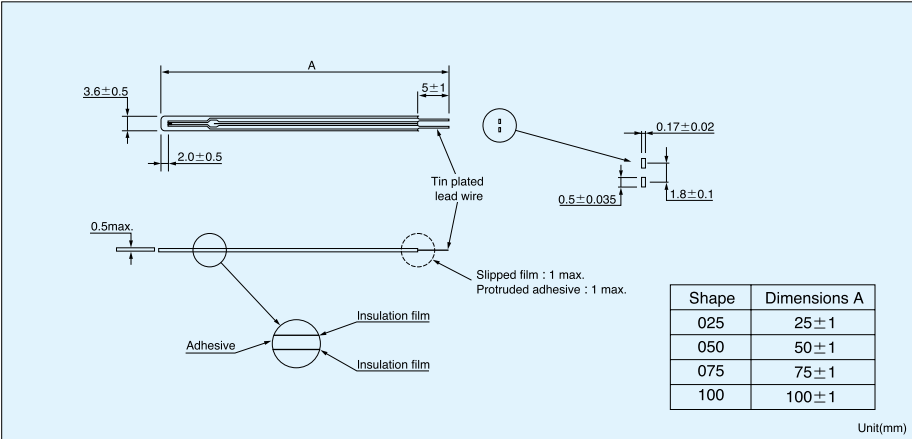
JT THERMISTOR

JT thermistors feature ultra thinness of 500μm and superior electrical insulation. It is possible to use with safety in ambience that might contact with electrodes.

Part number



Dimensions



Resistance-Temperature

Temperature (°C)	Type	
	103JT	104JT
-50	367.7	9584
-40	204.7	4572
-30	118.5	2282
-20	71.02	1191
-10	43.67	647.2
0	27.70	365.0
10	18.07	212.5
20	12.11	127.7
30	8.301	78.88
40	5.811	50.03
50	4.147	32.51
60	3.011	21.61
70	2.224	14.66
80	1.668	10.13
90	1.267	7.135
100		5.111
110		3.720
120		2.746
125		2.371

Unit(kΩ)

Specifications

Part No.	R ₂₅ *1	B value*2	Dissipation factor (mW/°C) Approx.	Thermal time constant(s)*3 Approx.	Rated maximum power dissipation(at 25°C)(mW)	Category temp. range(°C)
103JT-□□□	10kΩ±1%	3435K±1%	0.7	5	3.5	-50~90
104JT-□□□	100kΩ±1%	4390K±1%	0.7	5	3.5	-50~125

*1 R₂₅: Rated zero-power resistance value at 25°C, ±2% and 3% are also available.

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

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

AT THERMISTOR

The AT thermistor is a high-precision thermal sensing device featuring extremely small B-value tolerance and resistance.

When used as a temperature gauge, the AT thermistor requires no adjustment between the control circuit and the sensor.

This insures temperature precision of $\pm 0.3^{\circ}\text{C}$. Temperature indicators and control instruments are now available for use with the thermistor.

Part number

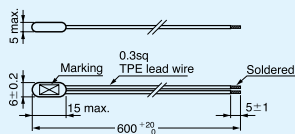
102 AT-2

Shape
High-precision AT thermistor
Rated zero-power
Resistance at 25°C 102 : 1(k Ω)

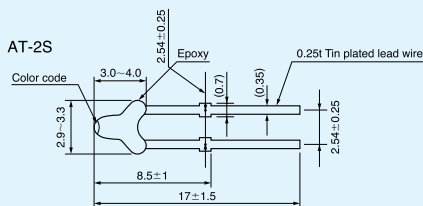


Dimensions

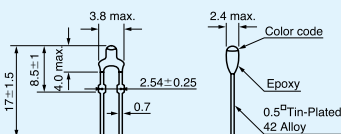
AT-11



AT-2S

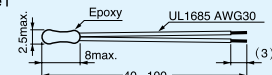


AT-2

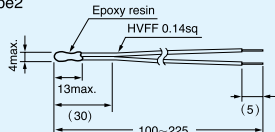


AT-4

Shape1

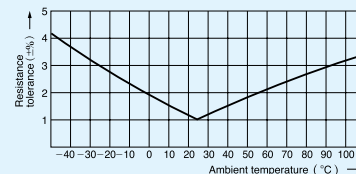


Shape2

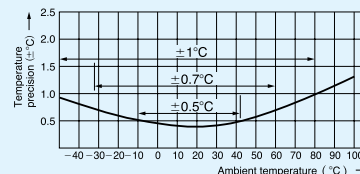


Unit (mm)

Resistance tolerance



Interchange precision



Specifications

Part No	R_{25}^{*1}	B value ^{*2}	Dissipation factor (mW/°C) Approx.	Thermal time constant (s) ^{*3} Approx.	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range($^{\circ}\text{C}$)	Color code
102AT-2	1.0k $\Omega \pm 1\%$	3100K $\pm 1\%$	2	15	10	-50~90	Black
202AT-2	2.0k $\Omega \pm 1\%$	3182K $\pm 1\%$	2	15	10	-50~90	Red
502AT-2	5.0k $\Omega \pm 1\%$	3324K $\pm 1\%$	2	15	10	-50~110	Yellow
103AT-2	10.0k $\Omega \pm 1\%$	3435K $\pm 1\%$	2	15	10	-50~110	White
203AT-2	20.0k $\Omega \pm 1\%$	4013K $\pm 1\%$	2	15	10	-50~110	None
104AT-2	100.0k $\Omega \pm 1\%$	4665K $\pm 1\%$	2	15	10	-50~110	None
102AT-11	1.0k $\Omega \pm 1\%$	3100K $\pm 1\%$	3	75	15	-50~90	None
202AT-11	2.0k $\Omega \pm 1\%$	3182K $\pm 1\%$	3	75	15	-50~90	None
502AT-11	5.0k $\Omega \pm 1\%$	3324K $\pm 1\%$	3	75	15	-50~105	None
103AT-11	10.0k $\Omega \pm 1\%$	3435K $\pm 1\%$	3	75	15	-50~105	None
103AT-4 Shape1	10.0k $\Omega \pm 1\%$	3435K $\pm 1\%$	2	10	10	-30~90	None
103AT-4 Shape2	10.0k $\Omega \pm 1\%$	3435K $\pm 1\%$	4	35	20	-30~90	None
103AT-2S	10.0k $\Omega \pm 1\%$	3435K $\pm 1\%$	1	15	5	-50~110	white

※ Other resistance is also available, please ask.

*1 R_{25} : Rated zero-power resistance value at 25°C .

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

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

AT-5 THERMISTOR

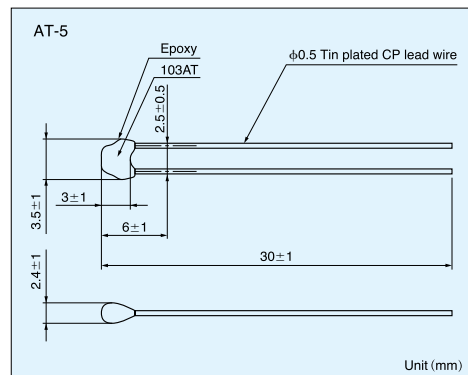
AT-5 thermistor is available in taping.

Part number

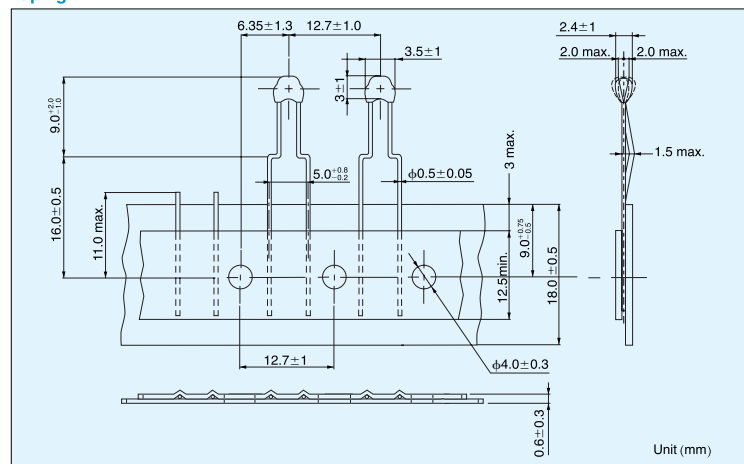
103 AT-5-FT

Taping
Shape
High-precision AT thermistor
Rated zero-power
resistance at 25°C

Dimensions

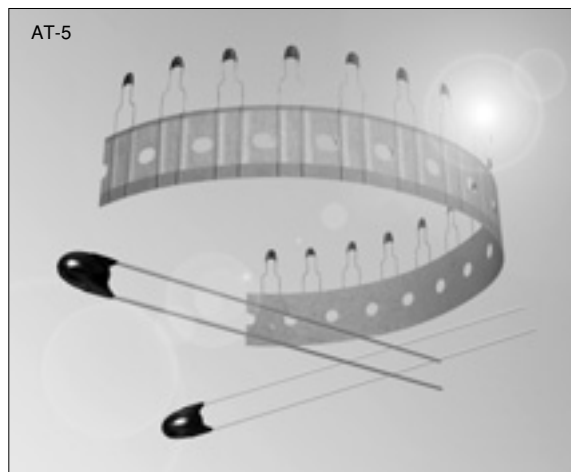


Taping



Resistance-Temperature

Temperature (°C)	Type							Temperature (°C)	Type						
	102AT	202AT	502AT	103AT	203AT	503AT	104AT		102AT	202AT	502AT	103AT	203AT	503AT	104AT
-50	24.46	55.66	154.6	329.5	1253	3168	11473	35	0.7229	1.424	3.508	6.940	13.06	32.48	60.94
-45	18.68	42.17	116.5	247.7	890.5	2257	7781	40	0.6189	1.211	2.961	5.827	10.65	26.43	48.10
-40	14.43	32.34	88.91	188.5	642.0	1632	5366	45	0.5316	1.033	2.509	4.911	8.716	21.59	38.13
-35	11.23	24.96	68.19	144.1	465.8	1186	3728	50	0.4587	0.8854	2.137	4.160	7.181	17.75	30.44
-30	8.834	19.48	52.87	111.3	342.5	872.8	2629	55	0.3967	0.7620	1.826	3.536	5.941	14.64	24.42
-25	6.998	15.29	41.21	86.43	253.6	646.3	1864	60	0.3446	0.6587	1.567	3.020	4.943	12.15	19.72
-20	5.594	12.11	32.44	67.77	190.0	484.3	1340	65	0.3000	0.5713	1.350	2.588	4.127	10.13	15.99
-15	4.501	9.655	25.66	53.41	143.2	364.6	969.0	70	0.2622	0.4975	1.168	2.228	3.464	8.482	13.05
-10	3.651	7.763	20.48	42.47	109.1	277.5	709.5	75	0.2285	0.4343	1.014	1.924	2.916	7.129	10.68
-5	2.979	6.277	16.43	33.90	83.75	212.3	523.3	80	0.1999	0.3807	0.8835	1.668	2.468	6.022	8.796
0	2.449	5.114	13.29	27.28	64.88	164.0	390.3	85	0.1751	0.3346	0.7722	1.451	2.096	5.105	7.271
5	2.024	4.188	10.80	22.05	50.53	127.5	292.5	90	0.1536	0.2949	0.6771	1.266	1.788	4.345	6.041
10	1.684	3.454	8.840	17.96	39.71	99.99	221.5	95			0.5961	1.108	1.530	3.712	5.037
15	1.408	2.862	7.267	14.69	31.36	78.77	168.6	100			0.5265	0.9731	1.315	3.185	4.220
20	1.184	2.387	6.013	12.09	24.96	62.56	129.5	105			0.4654	0.8572	1.134	2.741	3.546
25	1.000	2.000	5.000	10.00	20.00	50.00	100.0	110			0.4128	0.7576	0.9807	2.369	2.994
30	0.8486	1.684	4.179	8.313	16.12	40.20	77.81								



Specifications

Part No	R ₂₅ ^{*1}	B value ^{*2}	Dissipation factor (mW/°C) Approx.	Thermal time constant(s) ^{*3} Approx.	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range(°C)
103AT-5	10.0kΩ±1%	3435K±1%	2.5	15	10	-50~110

※Other resistance is also available, please ask.

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

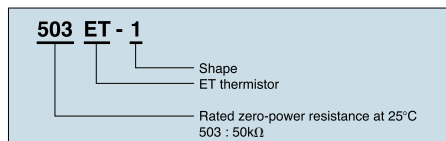
*2 B value: determined by rated zero-power resistance at 25°C and 85°C.

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

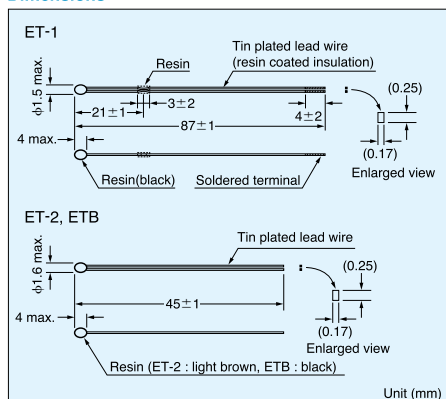
ET THERMISTOR

The ET thermistor is smaller version of the AT thermistor. Its fast response time and high reliability makes it particularly suitable for use in medical equipment and thermometers. Manufactured by full-automated production line, all ET thermistors have identical size and that makes it possible to assemble sensors automatically.

Part number



Dimensions



Specifications

Part No.	R ₂₅ *1	B value*2	Dissipation factor (mW/°C) Approx.	Thermal time constant (s)*3	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range (°C)
402ET-1(2)	4.0kΩ±3%	3100K±1%	0.7	6	3.5	-40~90
103ET-1(2)	10.0kΩ±3%	3250K±1%	0.7	6	3.5	-40~90
303ET-1(2)	30.0kΩ±3%	3760K±1%	0.7	6	3.5	-40~100
403ET-1(2)	40.0kΩ±3%	3525K±1%	0.7	6	3.5	-40~100
413ET-1(2)	41.0kΩ±3%	3435K±1%	0.7	6	3.5	-40~100
503ET-1(2)	50.0kΩ±3%	4055K±1%	0.7	6	3.5	-40~100
593ET-1(2)	59.0kΩ±3%	3617K±1%	0.7	6	3.5	-40~100
833ET-1(2)	83.0kΩ±3%	4013K±1%	0.7	6	3.5	-40~100
104ET-1(2)	100.0kΩ±3%	4132K±1%	0.7	6	3.5	-40~90
224ET-1(2)	226.0kΩ±3%	4021K±1%	0.7	6	3.5	-40~100
234ET-1(2)	232.0kΩ±3%	4274K±1%	0.7	6	3.5	-40~100
103ETB	10.0kΩ±2%	3435K±1%	0.7	6	3.5	-40~90

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

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

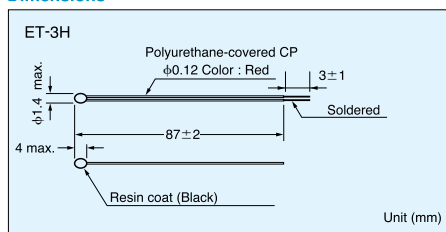
*3 Time when thermistor temperature reaches 63.2% of the temperature difference. The value is measured in the air.

Resistance-Temperature

Temperature (°C)	Type											
	402ET	103ET	303ET	403ET	413ET	503ET	593ET	833ET	104ET	224ET	234ET	103ETB
-40	57.71	170.9	810.7	833.3	772.8	1602	1318	2664	3325	7005	9046	204.7
-30	35.34	102.2	445.1	481.1	456.5	855.0	754.3	1421	1769	3784	4680	118.5
-20	22.38	63.07	253.7	287.5	277.9	474.4	445.8	788.5	977.5	2116	2515	71.02
-10	14.60	40.08	149.8	177.2	174.1	272.7	271.7	453.0	559.0	1225	1401	43.67
0	9.797	26.16	91.30	112.4	111.7	161.9	170.1	269.3	329.8	730.1	808.2	27.70
10	6.737	17.51	57.31	73.00	73.63	99.13	109.4	164.8	200.5	447.8	480.2	18.07
20	4.736	11.99	37.00	48.61	49.57	62.38	72.10	103.6	125.3	282.1	293.7	12.11
30	3.394	8.387	24.47	33.08	34.08	40.24	48.55	66.91	80.27	182.1	184.4	8.301
40	2.476	5.988	16.56	22.96	23.89	26.58	33.41	44.18	52.62	120.3	118.6	5.811
50	1.835	4.353	11.45	16.26	17.06	17.93	23.44	29.80	35.23	81.07	78.00	4.147
60	1.378	3.217	8.070	11.70	12.38	12.33	16.73	20.51	24.00	55.75	52.39	3.011
70	1.049	2.414	5.791	8.569	9.135	8.588	12.15	14.37	16.59	39.01	35.87	2.224
80	0.7997	1.836	4.222	6.367	6.838	6.064	8.951	10.24	11.64	27.78	24.99	1.668
90	0.6145	1.416	3.125	4.797	5.190	4.338	6.697	7.419	8.287	20.10	17.72	1.267
100			2.346	3.662	3.990	3.142	5.077	5.459		14.75	12.75	

Unit (kΩ)

Dimensions



Specifications

Part No.	R ₃₇ *1	B value*2	Dissipation factor (mW/°C) Approx.	Thermal time constant (s)*3	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range (°C)
503ET-3H	29.615kΩ~30.263kΩ	3944K±0.5%	0.7	0.8	3.5	-40~100

*1 R₃₇: Rated zero-power resistance value at 37°C.

*2 B value: determined by rated zero-power resistance at 30°C and 45°C.

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

Tolerance of the group : ± 0.09% /group

Group	Resistance(kΩ)	Group	Resistance(kΩ)
C	29.615/29.641/29.667	I	29.937/29.964/29.991
D	29.668/29.695/29.721	J	29.992/30.018/30.045
E	29.722/29.749/29.775	K	30.046/30.073/30.100
F	29.776/29.802/29.828	L	30.101/30.127/30.154
G	29.829/29.856/29.883	M	30.155/30.182/30.209
H	29.884/29.910/29.936	N	30.210/30.237/30.263

Notes : Min./Center/Max.

IT THERMISTOR

Our newly developed IT thermistors are axial leaded diode type packaged in high-density resin mold and featured strength against various operating environments.

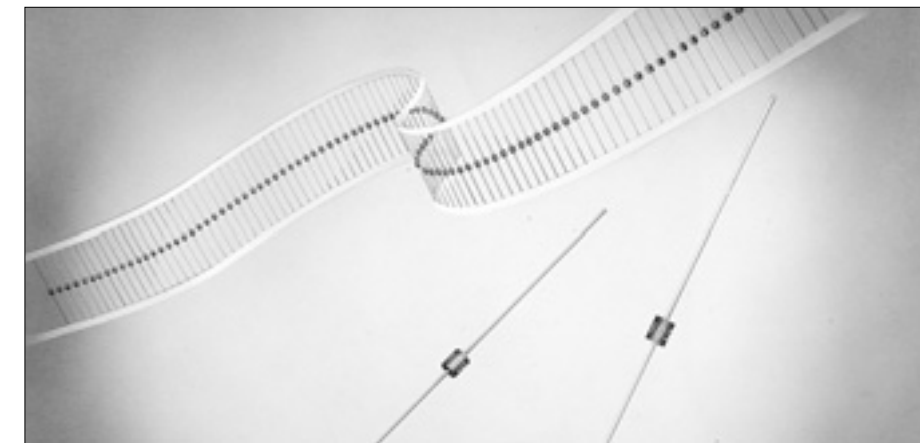
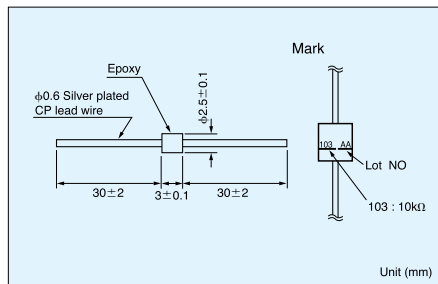
We offer IT thermistor with $\pm 2\%$ tolerance for a resistance value of 25°C and $\pm 1\%$ for B value. IT thermistors are the most appropriate device for accurate temperature control below 100°C.

Part number

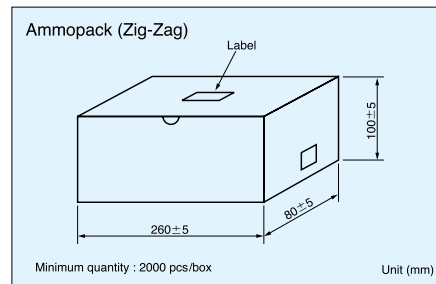
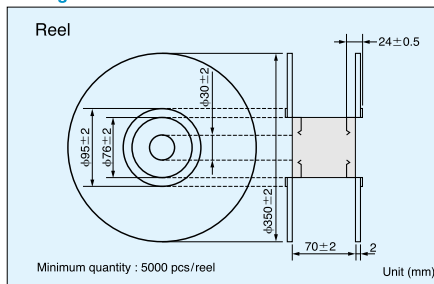
103 IT - 52

52Z : Ammpack
52R : Reel
IT thermistor
Rated zero-power resistance at 25°C 103 : 10k Ω

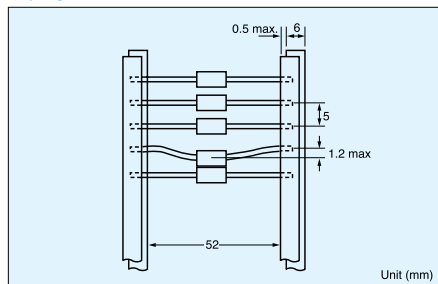
Dimensions



Package



Taping



Specifications

Part No.	R ₂₅ *1	B value*2	Dissipation factor (mW/°C) Approx.	Thermal time constant(s)*3	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range(°C)
302IT	3.0k $\Omega \pm 2\%$	3860K $\pm 1\%$	3.6	13.5	18.0	-50~125
502IT	5.0k $\Omega \pm 2\%$	3860K $\pm 1\%$	3.6	13.5	18.0	-50~125
103IT	10.0k $\Omega \pm 2\%$	3435K $\pm 1\%$	3.6	13.5	18.0	-50~100
203IT	20.0k $\Omega \pm 2\%$	3760K $\pm 1\%$	3.6	13.5	18.0	-50~125
303IT	30.0k $\Omega \pm 2\%$	3760K $\pm 1\%$	3.6	13.5	18.0	-50~125
503IT	50.0k $\Omega \pm 2\%$	4055K $\pm 1\%$	3.6	13.5	18.0	-50~125
104IT	100.0k $\Omega \pm 2\%$	4390K $\pm 1\%$	3.6	13.5	18.0	-50~125

*1 R₂₅ : Rated zero-power resistance value at 25°C, $\pm 1\%$ and 3% are also available.

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

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

Resistance-Temperature

Temperature (°C)	Type							Temperature (°C)	Type						
	302IT	502IT	103IT	203IT	303IT	503IT	104IT		302IT	502IT	103IT	203IT	303IT	503IT	104IT
-50	182.1	303.4	367.7	1026	1539	3135	9584	50	1.109	1.849	4.147	7.632	11.45	17.93	32.51
-40	93.35	155.6	204.7	540.5	810.8	1602	4572	60	0.7744	1.291	3.011	5.380	8.070	12.33	21.61
-30	49.85	83.09	118.5	296.7	445.1	855.0	2282	70	0.5513	0.9189	2.224	3.861	5.792	8.588	14.66
-20	27.75	46.25	71.02	169.2	253.8	474.4	1191	80	0.4000	0.6667	1.668	2.815	4.223	6.064	10.13
-10	16.02	26.70	43.67	99.85	149.8	272.7	647.2	90	0.2951	0.4918	1.267	2.083	3.125	4.338	7.135
0	9.541	15.90	27.70	60.87	91.31	161.9	365.0	100	0.2210	0.3683	0.9753	1.564	2.346	3.142	5.111
10	5.876	9.793	18.07	38.21	57.32	99.13	212.5	110	0.1680	0.2800		1.190	1.785	2.302	3.720
20	3.728	6.214	12.11	24.66	36.99	62.38	127.7	120	0.1295	0.2158		0.9159	1.374	1.705	2.746
30	2.431	4.051	8.301	16.31	24.47	40.24	78.88	125	0.1142	0.1903		0.8067	1.210	1.472	2.371
40	1.623	2.705	5.811	11.04	16.56	26.58	50.03								

Unit (k Ω)

SURFACE MOUNT TYPE THERMISTOR

SUNSTAR传感与控制 <http://www.sensor-ic.com/> TEL:0755-83376549 FAX:0755-83376182 E-MAIL:szss20@163.com

HT THERMISTOR

HT thermistors are entirely new type of thermistor for surface mounting (by reflow soldering) and were acquired from advanced technology.

Our HT thermistors are adapted metal electrodes packaged in a resin mold, unlike conventional chip thermistors, and can offer $\pm 2\%$ tolerance for a resistance value at 25°C.

HT series (SMD Thermistor) is not only compact-surface mounting type but also highly accurate and reliable.

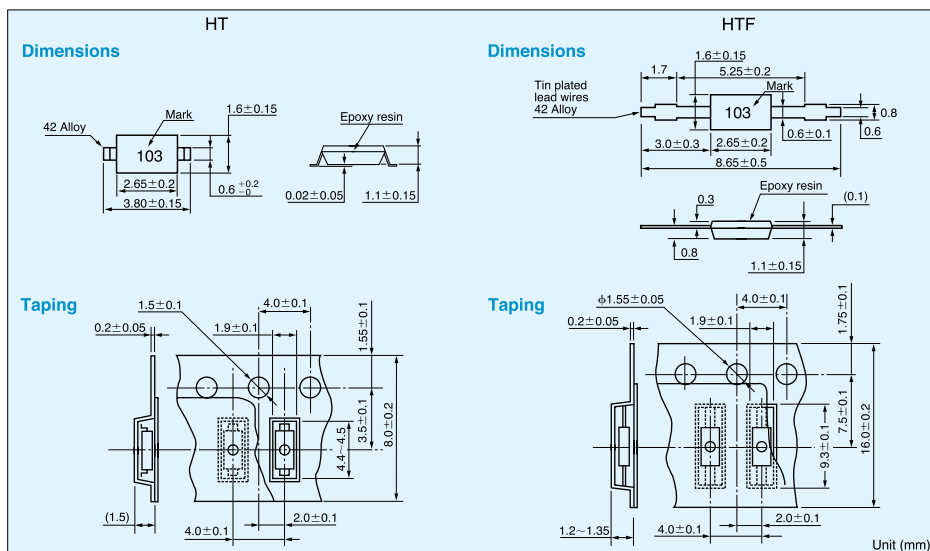
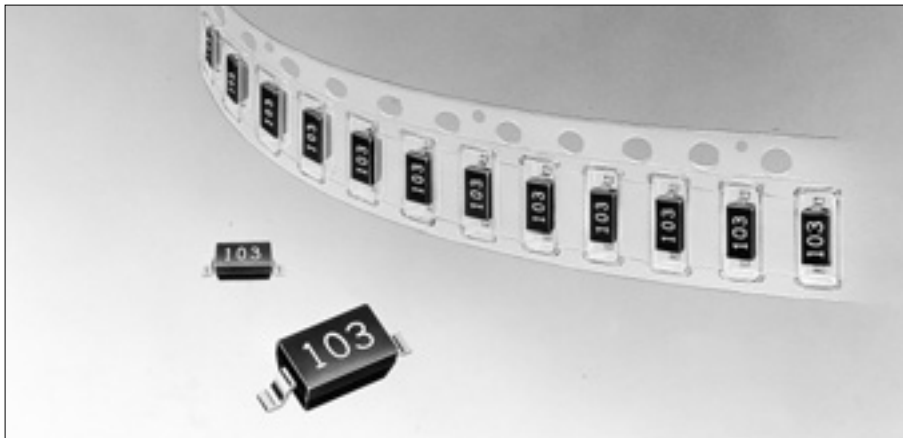
Part number

103 HT-TP

— Taping HTF only

— Shape

— Rated zero-power resistance at 25°C 103:10k Ω



Specifications

Minimum quantity: 3000pcs/reel

Part No.	R ₂₅ *1	B value*2	Dissipation factor (mW/°C) Approx.	Thermal time constant(s)*3	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range(°C)
302HT(F)	3.0k $\Omega \pm 2\%$	3860K $\pm 1\%$	1.0	8.0	5.0	-50~125
502HT(F)	5.0k $\Omega \pm 2\%$	3860K $\pm 1\%$	1.0	8.0	5.0	-50~125
103HT(F)	10.0k $\Omega \pm 2\%$	3435K $\pm 1\%$	1.0	8.0	5.0	-50~100
203HT(F)	20.0k $\Omega \pm 2\%$	3760K $\pm 1\%$	1.0	8.0	5.0	-50~125
303HT(F)	30.0k $\Omega \pm 2\%$	3760K $\pm 1\%$	1.0	8.0	5.0	-50~125
503HT(F)	50.0k $\Omega \pm 2\%$	4055K $\pm 1\%$	1.0	8.0	5.0	-50~125
104HT(F)	100.0k $\Omega \pm 2\%$	4390K $\pm 1\%$	1.0	8.0	5.0	-50~125

*1 R₂₅: Rated zero-power resistance value at 25°C, $\pm 1\%$ and 3% are also available.

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

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

Resistance-Temperature

Temperature (°C)	Type							Temperature (°C)	Type						
	302HT	502HT	103HT	203HT	303HT	503HT	104HT		302HT	502HT	103HT	203HT	303HT	503HT	104HT
-50	182.1	303.4	367.7	1026	1539	3135	9584	50	1.109	1.849	4.147	7.632	11.45	17.93	32.51
-40	93.35	155.6	204.7	540.5	810.8	1602	4572	60	0.7744	1.291	3.011	5.380	8.070	12.33	21.61
-30	49.85	83.09	118.5	296.7	445.1	855.0	2282	70	0.5513	0.9189	2.224	3.861	5.792	8.588	14.66
-20	27.75	46.25	71.02	169.2	253.8	474.4	1191	80	0.4000	0.6667	1.668	2.815	4.223	6.064	10.13
-10	16.02	26.70	43.67	99.85	149.8	272.7	647.2	90	0.2951	0.4918	1.267	2.083	3.125	4.338	7.135
0	9.541	15.90	27.70	60.87	91.31	161.9	365.0	100	0.2210	0.3683	0.9753	1.564	2.346	3.142	5.111
10	5.876	9.793	18.07	38.21	57.32	99.13	212.5	110	0.1680	0.2800		1.190	1.785	2.302	3.720
20	3.728	6.214	12.11	24.66	36.99	62.38	127.7	120	0.1295	0.2158		0.9159	1.374	1.705	2.746
30	2.431	4.051	8.301	16.31	24.47	40.24	78.88	125	0.1142	0.1903		0.8067	1.210	1.472	2.371
40	1.623	2.705	5.811	11.04	16.56	26.58	50.03								

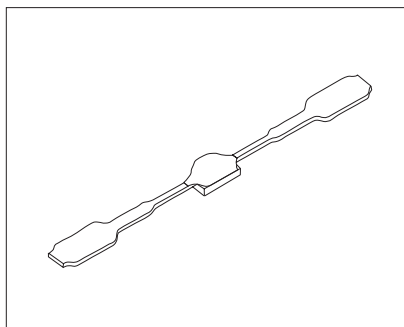
Unit (k Ω)

FL THERMISTOR

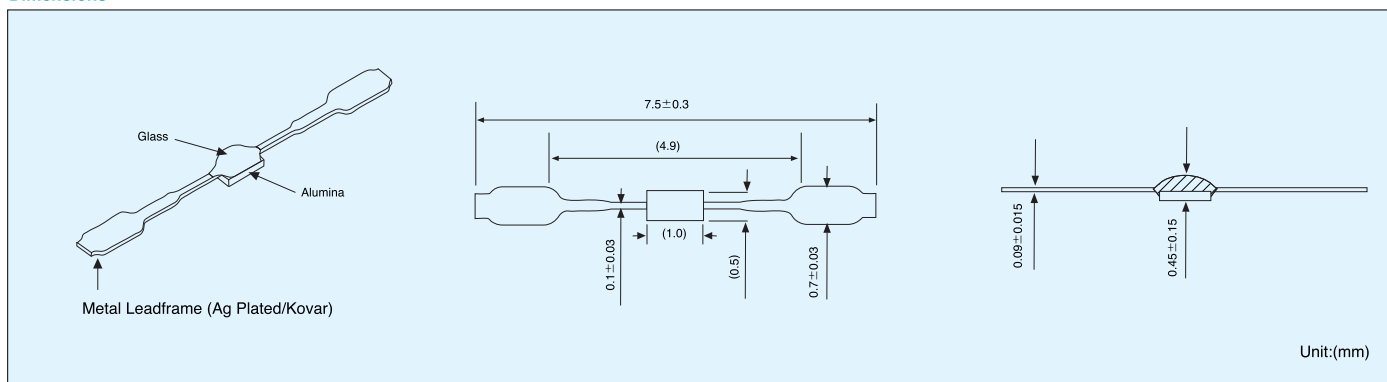
The FL Thermistor is developed on technology of the FT Thermistor. The FL Thermistor has "lead-wings" that makes mounting on the boards much easier.

Part number

503 FL	
FL	FL-type thermistor
503	Rated zero-power resistance at 25°C.:50kΩ



Dimensions



Specifications

Part No.	R	B value*1	Dissipation factor*2	Thermal time constant*2	Category temp. range
			(mW/°C) Approx.	(s) Approx.	(°C)
364FL	7kΩ±5% (at 180°C)	3370K±1.5%	0.4	1.5	-40~350
503FL	50kΩ±5% (at 25°C)				
103FL	10kΩ±5% (at 25°C)				

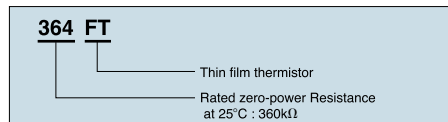
*1: B-value: determined by zero-power resistance at 25°C and 85°C

*2: in still air

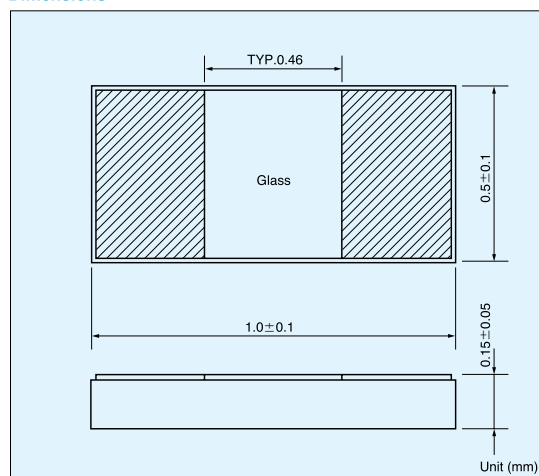
FT THERMISTOR

The FT thermistors, the highly reliable thermistors, are characterized by their fast response time, which was made possible by the miniaturization of the thermistor dimensions. FT thermistors are also heat-resistant type. FT thermistors are the most excellent products of today's chip thermistors manufacturing.

Part number



Dimensions



Electrode type	Connection method
Pt	Conductive resins
Au	Wire-bonding
Au/Ni	Solder

We can also custom-make FT THERMISTOR to better suit your applications. Please consult our sales staff.

Specifications

Part No.	R_{25}^{*1}	B value ^{*2}	Dissipation factor (mW/°C) Approx.	Thermal time constant(s) ^{*3} Approx.	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range(°C)
103FT	10kΩ ± 5%	3435K ± 1%	0.3	2.0	1.5	-40~250
103FT	10kΩ ± 5%	3370K ± 1%	0.3	2.0	1.5	-40~250
503FT	50kΩ ± 5%	3435K ± 1%	0.3	2.0	1.5	-40~250
503FT	50kΩ ± 5%	3370K ± 1%	0.3	2.0	1.5	-40~250
364FT	360kΩ ± 5%	3370K ± 1%	0.3	2.0	1.5	-40~250

*1 R_{25} : Rated zero-power resistance value at 25°C.

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

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

Resistance-Temperature

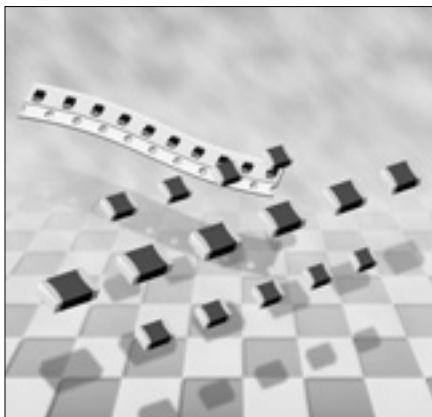
Temperature (°C)	P/N					Temperature (°C)	P/N				
	103FT		503FT		364FT		103FT		503FT		364FT
	B=3370K	B=3435K	B=3370K	B=3435K	B=3370K		B=3370K	B=3435K	B=3370K	B=3435K	B=3370K
-40	187.9	200.7	939.3	1002	6763	110	0.8003	0.7662	4.002	3.829	28.81
-30	110.7	117.0	553.4	584.7	3984	120	0.6345	0.6064	3.172	3.029	22.84
-20	67.26	70.34	336.3	351.9	2421	125	0.5671	0.5418	2.836	2.706	20.42
-10	42.10	43.55	210.5	217.7	1516	130					18.30
0	27.07	27.71	135.3	138.5	974.8	140					14.81
10	17.86	18.11	89.31	90.48	643.0	150					12.09
20	12.07	12.12	60.33	60.58	434.4	160					9.963
25	10.00	10.00	50.00	50.00	360.0	170					8.274
30	8.332	8.299	41.66	41.50	299.9	180					6.925
40	5.871	5.804	29.36	29.03	211.4	190					5.837
50	4.216	4.139	21.08	20.70	151.8	200					4.954
60	3.081	3.006	15.40	15.04	110.9	210					4.232
70	2.288	2.220	11.44	11.11	82.36	220					3.636
80	1.725	1.666	8.623	8.331	62.09	230					3.142
90	1.318	1.269	6.592	6.344	47.46	240					2.731
100	1.021	0.9797	5.105	4.898	36.76	250					2.385

Unit (kΩ)

SUNSTAR传感与控制 <http://www.sensor-ic.com/> TEL:0755-83376549 FAX:0755-83376182 E-MAIL:szss20@163.com

SMD type chip

They can be face-bonded to act as thermal compensators for ICs and they are manufactured in sizes down to 1 square mm, they can also be used to detect temperature with relatively small time constants.



103 KT 2125T - □□

- 1P:±1%,2P:±2%,3P:±3%
- Dimension(EIAJ) 2125
- Chip thermistor
- Rated zero-power resistance at 25°C 103:10kΩ

- Do not expose the thermistors to high soldering heat for more than specified time. (260°C for not longer than 10s is recommended)

Diagram illustrating the geometry of a rectangular package with dimensions W (width), L (length), and T (thickness). The package features a **Glass coating** on the top and side surfaces. The bottom surface is divided into a central **Electrode (Tin plated)** region of length L_e and two side regions of length L_s .

EIAJ	EIA	L	W	T	L ₁
1005	0402	1.00±0.15	0.50±0.10	0.6max.	0.15~0.30
1608	0603	1.60±0.15	0.80±0.15	0.95max.	0.20~0.50

Technical drawing of a 1608 type component. The drawing includes a side view on the left and a top view on the right. Dimensions are given in millimeters (mm).

Side View Dimensions:

- Top thickness: 0.3max. (0.25max.)
- Bottom thickness: 1.5max.

Top View Dimensions:

- Overall width: 4.0 ± 0.1
- Distance from left edge to first hole center: $1.5^{+0.1}_0$
- Distance between hole centers: 2.0 ± 0.05
- Distance from right edge to last hole center: 1.65 ± 0.2
- Overall height: 8.0 ± 0.3
- Distance from top edge to first hole center: 1.75 ± 0.1
- Distance between hole centers (vertical): 3.5 ± 0.05
- Distance from bottom edge to last hole center: 2.4 ± 0.2
- Distance from bottom edge to last hole center (with tolerance): (1.85 ± 0.1)

(): 1608type

Unit(mm)

The graph illustrates the temperature profile for reflow soldering. The y-axis represents Temperature, and the x-axis represents Time. The profile consists of several stages: a preheat phase (air) lasting 120s ± 30s, a heating phase at 1~2 °C/s, a soldering phase lasting 10s max, and a cooling phase. Key temperature points are 190°C ± 15°C and 260°C ± 5°C.

Part No.	R ₂₅ ⁻¹	B value*2	Dissipation factor (mW/°C) Approx.	Thermal time constant(s) ^{*3} Approx.	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range(°C)
103KT1608T	10kΩ	3435K±1%	0.9	5.0	4.5	-40~125
503KT1608T	50kΩ	4055K±1%	0.9	5.0	4.5	-40~125
104KT1608T	100kΩ	4390K±1%	0.9	5.0	4.5	-40~125
103KT1005T	10kΩ	3435K±1%	0.7	2.2	3.5	-40~125

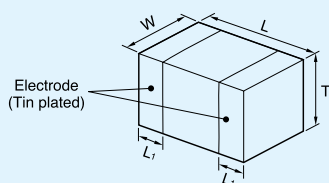
*3 Time when thermistor temperature reaches 63.2% of the temperature difference. The value is measured in the air.
Other resistance is available, please ask.

ML(Multi layer) - type

Part number

103	KT	M	1608	□	410	□
Tolerance of B Value H:±3%						
B Value ex.) 410:4100K						
Tolerance of Zero-power resistance H:±3%,J:±5%						
Dimension(EIAJ)						
Multilayer type						
Chip thermistor						
Rated zero-power resistance value at 25°C						

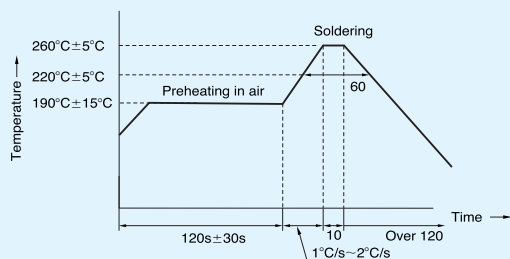
Dimensions



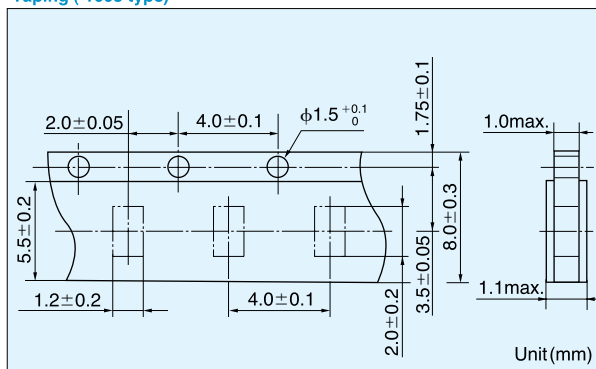
EIAJ	EIA	L	W	T	L ₁
1005	0402	1.00±0.05	0.50±0.05	0.50±0.05	0.10~0.30
1608	0603	1.60±0.10	0.80±0.10	0.80±0.10	0.20~0.50

Unit(mm)

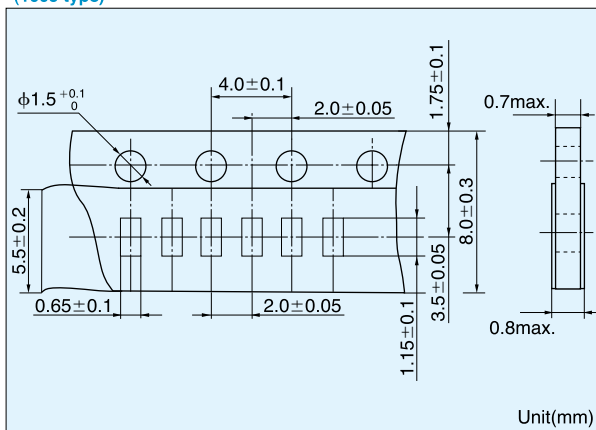
Reflow soldering profile



Taping (1608 type)



(1005 type)



Specifications

Part No.	Rating		Characteristic			
	R ₂₅ ±3%	B ₂₅ /B ₅₅ ±3%	Dissipation factor	Thermal time constant	Rated maximum power dissipation (at 25°C)	Category temperature range
	Ω	K	mW/°C Approx.(in still air)	s Approx.(in still air)	mW	°C
221KTM1005H365H	220	3650	0.7	2.2	70	-40~125
331KTM1005H365H	330					
471KTM1005H365H	470					
681KTM1005H365H	680					
102KTM1005H410H	1.0k					
152KTM1005H410H	1.5k	4100				
202KTM1005H410H	2.0k					
222KTM1005H410H	2.2k					
302KTM1005H410H	3.0k					
332KTM1005H410H	3.3k					
472KTM1005H410H	4.7k					
682KTM1005H410H	6.8k					
103KTM1005H410H	10k					
153KTM1005H410H	15k					
303KTM1005H410H	30k					
473KTM1005H410H	47k	4200				
683KTM1005H420H	68k					
104KTM1005H420H	100k					
154KTM1005H420H	150k					
204KTM1005H420H	200k					
220KTM1005H325H	22	3250	0.7		42	-40~85
330KTM1005H325H	33					
470KTM1005H325H	47					
680KTM1005H325H	68					
101KTM1005H325H	100					
151KTM1005H325H	150					

Part No.	Rating		Characteristic							
	R ₂₅ ±3% ±5%	B ₂₅ ±3%	Dissipation factor	Thermal time constant	Rated maximum power dissipation (at 25°C)	Category temperature range				
	Ω	K	mW/°C Approx.(in still air)	s Approx.(in still air)	mW	°C				
221KTM1608H365H	220	3650	0.9	5.0	90	-40~125				
331KTM1608H365H	330									
471KTM1608H365H	470									
681KTM1608H365H	680									
102KTM1608H410H	1.0k									
152KTM1608H410H	1.5k	4100								
222KTM1608H410H	2.2k									
332KTM1608H410H	3.3k									
472KTM1608H410H	4.7k									
502KTM1608H396H	5.0k	3960								
682KTM1608H410H	6.8k	4100								
103KTM1608H410H	10k									
153KTM1608H410H	15k									
303KTM1608H410H	30k									
473KTM1608H410H	47k	4200								
683KTM1608H420H	68k									
104KTM1608H420H	100k									
154KTM1608H420H	150k									
204KTM1608H420H	200k	3250			54	-40~85				
220KTM1608H325H	22									
330KTM1608H325H	33									
470KTM1608H325H	47									
680KTM1608H325H	68									
101KTM1608H325H	100									
151KTM1608H325H	150									

HIGH HEAT-RESISTANCE AND HIGH SENSITIVE THERMISTOR

SUNSTAR传感与控制 <http://www.sensor-ic.com/> TEL:0755-83376549 FAX:0755-83376182 E-MAIL:szss20@163.com

GT THERMISTOR

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

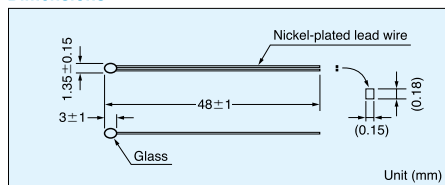
GT thermistor is made up of a high quality thermistor element and the lead wire is connected to the thermistor element by alloyed technology, and glass coating for the thermistor element.

Part number

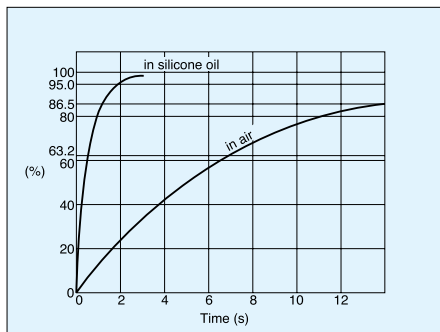
103 GT-2

Shape
GT thermistor
Rated zero-power resistance at 25°C
103 : 10kΩ

Dimensions



Time constant



Specifications

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

Resistance-Temperature

Part No.	Rated zero-power resistance	B value*2	Dissipation factor (mW/°C) Approx.	Thermal time constant(s)*3 Approx.	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range(°C)
852GT-2-20155	R50=3.485kΩ±5%	B0/100=3450K±2%	0.6	7(0.6)	3	-50~300
852GT-2-20156	R50=3.485kΩ±3%	B0/100=3450K±2%	0.6	7(0.6)	3	-50~300
493GT-2-20157	R5=127kΩ±2%	B0/100=3970K±2%	0.6	7(0.6)	3	-50~300
493GT-2-20158	R5=127kΩ±1.5%	B0/100=3970K±2%	0.6	7(0.6)	3	-50~300
493GT-2-20159	R75=7.214kΩ±3%	B0/100=3970K±2%	0.6	7(0.6)	3	-50~300
542GT-2-20184	R75=0.7331kΩ±3%	B0/100=3450K±2%	0.6	7(0.6)	3	-50~300
252GT-2-20185	R0=6kΩ±5%	B0/100=3390K±2%	0.6	7(0.6)	3	-50~300
542GT-2-20186	R0=15kΩ±3%	B0/100=3450K±2%	0.6	7(0.6)	3	-50~300
542GT-2-20187	R0=15kΩ±2.5%	B0/100=3450K±2%	0.6	7(0.6)	3	-50~300
493GT-2-20188	R40=26.06kΩ±2%	B0/100=3970K±2%	0.6	7(0.6)	3	-50~300
234GT-2-20194	R25=231.44kΩ±3%	B100/200=4537K±1%	0.6	7(0.6)	3	-50~300
234GT-2-20195	R150=3.161kΩ±3%	B100/200=4537K±2%	0.6	7(0.6)	3	-50~300
103GT-2-20196	R25=10kΩ±1%	B25/85=3435K±1%	0.6	7(0.6)	3	-50~300
252GT-2-20197	R25=2.5kΩ±2.5%	B0/100=3390K±2%	0.6	7(0.6)	3	-50~300
262GT-2-20198	R0=8kΩ±1%	B25/50=3745K±2%	0.6	7(0.6)	3	-50~300
103GT-2-20199	R25=10kΩ±5%	B25/125=3980K±2%	0.6	7(0.6)	3	-50~300
104GT-2-20201	R25=100kΩ±3%	B100/200=4300K±3%	0.6	7(0.6)	3	-50~300
145GT-2-20203	R200=4kΩ±5%	B200/300=5133K±3%	0.6	7(0.6)	3	-50~300
333GT-2-20204	R125=1.509kΩ±3%	B0/100=3570K±2%	0.6	7(0.6)	3	-50~300
303GT-2-20205	R25=30kΩ±3%	B0/100=3970K±2%	0.6	7(0.6)	3	-50~300

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

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

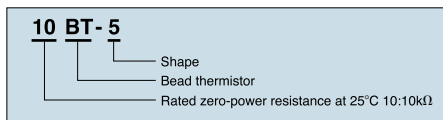
*3 Time when thermistor temperature reaches 63.2% of the temperature difference. The value is measured in the air. (silicone oil)

BT THERMISTOR

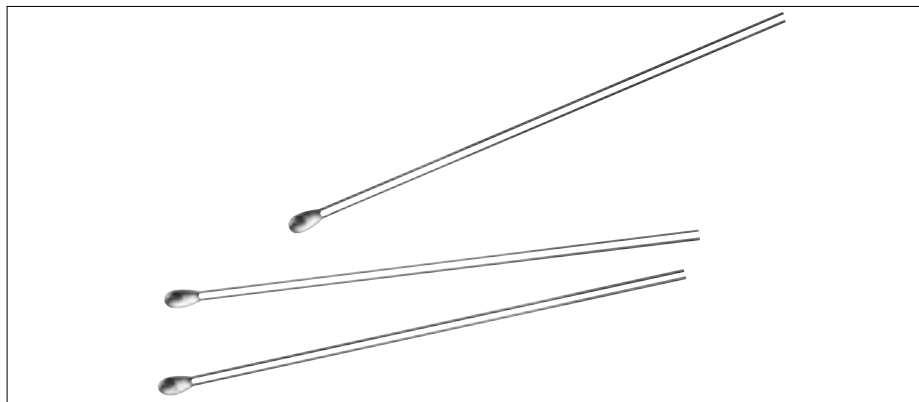
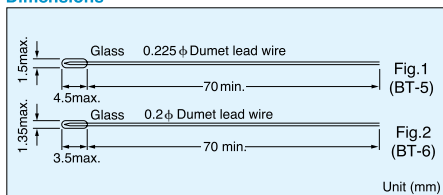
The BT thermistor is a small thermal sensing device providing high reliability, stable characteristics and a wide operating range of -50°C to 300°C .

It is used in various applications including medical apparatus, industrial equipment and home electric appliances.

Part number



Dimensions



Specifications

Part No.	R_{25}^1	B value ²	Dissipation factor (mW/ $^{\circ}\text{C}$) Approx.	Thermal time constant(s) ³ Approx.	Rated maximum power dissipation (at 25°C) (mW)	Category temp. range($^{\circ}\text{C}$)
1BT-5	$1.000\text{k}\Omega \pm 10\%$	$3,250\text{K} \pm 3\%$	0.5	4~12	2.5	$-50 \sim 150$
2BT-5	$2.000\text{k}\Omega \pm 10\%$	$3,420\text{K} \pm 3\%$	0.5	4~12	2.5	$-50 \sim 300$
5BT-5(6)	$5.000\text{k}\Omega \pm 10\%$	$3,450\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 300$
9BT-5(6)	$9.000\text{k}\Omega \pm 10\%$	$3,470\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 150$
10BT-5(6)	$10.00\text{k}\Omega \pm 10\%$	$3,250\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 300$
20BT-5(6)	$20.00\text{k}\Omega \pm 10\%$	$3,330\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 300$
30BT-5(6)	$30.00\text{k}\Omega \pm 10\%$	$3,450\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 300$
40BT-5(6)	$40.00\text{k}\Omega \pm 10\%$	$3,550\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 300$
100BT-5(6)	$100.0\text{k}\Omega \pm 10\%$	$3,750\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 300$
400BT-5(6)	$400.0\text{k}\Omega \pm 10\%$	$4,050\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 300$
500BT-5(6)	$500.0\text{k}\Omega \pm 10\%$	$3,760\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 300$
1.3MBT-5(6)	$1300\text{k}\Omega \pm 10\%$	$4,380\text{K} \pm 3\%$	0.5(0.4)	4~12(3~8)	2.5(2)	$-50 \sim 300$

*1 R_{25} : Rated zero-power resistance value at 25°C , $\pm 5\%$ are also available.

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

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

Resistance-Temperature

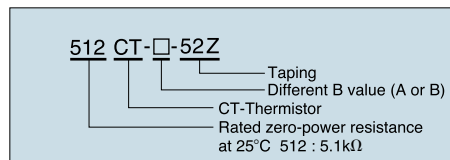
Temperature ($^{\circ}\text{C}$)	Type											
	1BT	2BT	5BT	9BT	10BT	20BT	30BT	40BT	100BT	400BT	500BT	1.3MBT
-50	29.87	70.71		344.8	284.8	686.7			4860			
-40	17.33	40.02		190.3	163.4	383.1			2599	11043		
-30	10.35	23.28		109.1	97.62	222.6			1439	6198		
-20	6.374	13.96	35.44	64.81	60.41	134.2		306.8	827.4	3573		
-10	4.038	8.640	21.84	39.70	38.63	83.61		184.7	491.1	2109		8066
0	2.629	5.513	13.87	25.15	25.45	53.75	83.80	115.0	301.4	1274	1486	4598
10	1.755	3.610	9.057	16.36	17.22	35.53	54.46	73.88	190.1	788.4	945.3	2718
20	1.200	2.421	6.060	10.92	11.92	24.09	36.37	48.77	123.1	498.7	614.7	1652
25	1.000	2.000	5.000	9.000	10.00	20.00	30.00	40.00	100.0	400.0	500.0	1300
30	0.8380	1.661	4.148	7.456	8.434	16.70	24.88	33.00	81.71	322.4	408.9	1029
40	0.5973	1.163	2.898	5.200	6.084	11.81	17.39	22.82	55.39	212.8	277.7	656.0
50	0.4338	0.8311	2.065	3.698	4.456	8.511	12.40	16.10	38.31	143.3	192.1	427.8
60	0.3205	0.6043	1.497	2.677	3.303	6.248	8.990	11.57	27.00	98.24	135.3	284.5
70	0.2407	0.4468	1.104	1.970	2.460	4.658	6.629	8.457	19.38	68.52	96.90	193.0
80	0.1834	0.3357	0.8267	1.473	1.850	3.522	4.962	6.279	14.14	48.50	70.47	133.0
90	0.1417	0.2559	0.6280	1.117	1.405	2.698	3.767	4.730	10.48	34.91	52.00	92.76
100	0.1110	0.1978	0.4836	0.8581	1.078	2.093	2.897	3.611	7.866	25.47	38.90	65.53
110	0.08789	0.1547	0.3771	0.6685	0.8355	1.640	2.255	2.792	5.968	18.83	29.49	46.91
120		0.1224	0.2975	0.5264	0.6540	1.296	1.774	2.182	4.580	14.10	22.63	34.03
130		0.09789	0.2373	0.4191	0.5171	1.027	1.410	1.727	3.551	10.68	17.55	25.02
140		0.07908	0.1913	0.3369	0.4126	0.8190	1.130	1.378	2.782	8.180	13.76	18.59
150		0.06450	0.1556	0.2735	0.3321	0.6581	0.9113	1.107	2.201	6.332	10.90	13.99
160			0.1278		0.2696	0.5327	0.7374	0.8943	1.757	4.957	8.717	10.63
170			0.1058		0.2207	0.4345	0.5997	0.7252	1.416	3.915	7.034	8.163
180			0.08836		0.1818	0.3567	0.4909	0.5915	1.150	3.120	5.722	6.336
190			0.07432		0.1508	0.2947	0.4048	0.4859	0.9418	2.508	4.692	4.965
200			0.06295		0.1258	0.2451	0.3360	0.4018	0.7770	2.032	3.876	3.926
210					0.1056	0.2052	0.2808	0.3344	0.6458	1.658	3.225	3.131
220							0.2360	0.2802	0.5403	1.363	2.702	2.517
230							0.1995	0.2361	0.4551	1.127	2.277	2.039
240							0.1695	0.2000	0.3855	0.9390	1.930	1.663
250							0.1447	0.1704	0.3286	0.7864	1.644	1.366
260							0.1243	0.1458	0.2816	0.6626	1.407	1.129
270							0.1072	0.1255	0.2426	0.5613	1.209	0.9398
280							0.09283	0.1084	0.2100	0.4780	1.041	0.7871
290							0.08078	0.09408	0.1826	0.4091	0.8995	0.6628
300							0.07060	0.08200	0.1595	0.3518	0.7810	0.5612

Unit(k Ω)

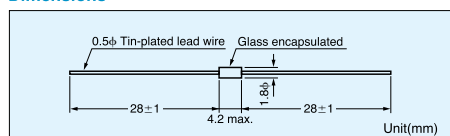
CT THERMISTOR

The CT thermistor is a thermal sensor in a DO35 package. Similar to the BT thermistor, it is highly reliable and offers a wide operating range of -50°C to (150°C) 250°C . It is primarily used in home electric appliances and features a competitive price for full-automated manufacturing system.

Part number

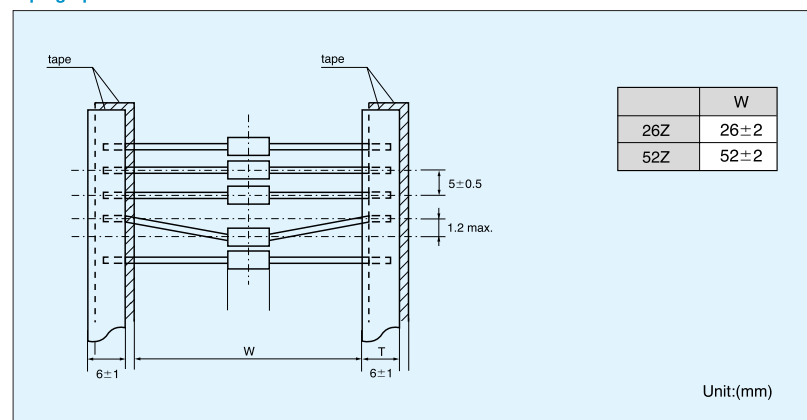


Dimensions



To allow automatic insertion, this product can be taped.

Taping Specification



Resistance-Temperature

Part No.	R_{25}^{*1}	B value ^{*2}	Dissipation factor (mW/ $^{\circ}\text{C}$) Approx.	Thermal time constant(s) ^{*3} Approx.	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range($^{\circ}\text{C}$) ^{*4}
252CT	$2.5\text{k}\Omega \pm 5\%$	$3800\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
302CT	$3.0\text{k}\Omega \pm 5\%$	$3750\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
502CT-A	$5.0\text{k}\Omega \pm 5\%$	$3450\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
502CT-B	$5.0\text{k}\Omega \pm 5\%$	$3950\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
902CT	$9.0\text{k}\Omega \pm 5\%$	$3700\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
103CT-A	$10.0\text{k}\Omega \pm 5\%$	$3700\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
103CT-B	$10.0\text{k}\Omega \pm 5\%$	$3950\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
203CT-A	$20.0\text{k}\Omega \pm 5\%$	$3700\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
203CT-B	$20.0\text{k}\Omega \pm 5\%$	$3950\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
503CT	$50.0\text{k}\Omega \pm 5\%$	$3950\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
104CT	$100.0\text{k}\Omega \pm 5\%$	$3950\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
204CT	$200.0\text{k}\Omega \pm 5\%$	$4150\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$
504CT	$500.0\text{k}\Omega \pm 5\%$	$4300\text{K} \pm 2\%$	2.0	16	250	$-40 \sim (150)250$

*1 R_{25} : Rated zero-power resistance value at 25°C .

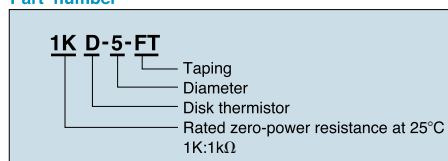
*2 B value : determined by rated zero-power resistance at 25°C and 50°C .

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

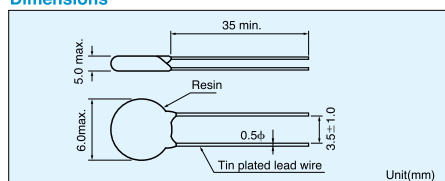
TEMPERATURE COMPENSATION D THERMISTOR

The D thermistor, based on resistance changes, is used in transistor, coil and other temperature compensating circuits found in TV's, radio, etc.

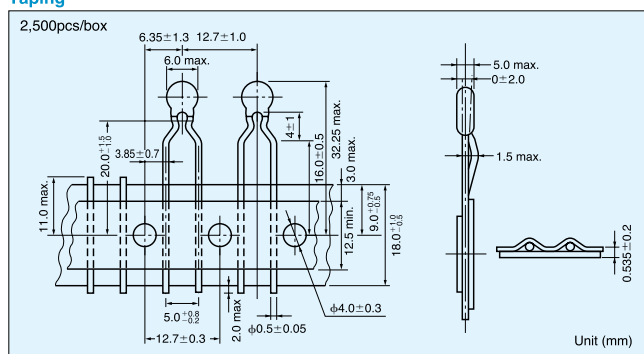
Part number



Dimensions



Taping



Specifications

Part No.	R25*1	B value*2	Dissipation factor (mW/°C) Approx.	Thermal time constant(s)*3 Approx.	Rated maximum power dissipation (at 25°C)(mW)	Category temp. range(°C)
50D-5	50.0Ω±15%	3250K±5%	3.5	13	297	-40~+110
80D-5	80.0Ω±15%	3300K±5%	3.5	13	297	-40~+110
100D-5	100.0Ω±15%	3300K±5%	3.5	13	297	-40~+110
200D-5	200.0Ω±15%	3400K±5%	3.5	13	297	-40~+110
250D-5	250.0Ω±15%	3450K±5%	3.5	13	297	-40~+110
300D-5	300.0Ω±15%	3500K±5%	3.5	13	297	-40~+110
360D-5	360.0Ω±15%	3550K±5%	3.5	13	297	-40~+110
500D-5	500.0Ω±15%	3650K±5%	3.5	13	297	-40~+110
800D-5	800.0Ω±15%	3850K±5%	3.5	13	297	-40~+110
1KD-5	1.0kΩ±15%	3950K±5%	3.5	13	297	-40~+110
1.5KD-5	1.5kΩ±15%	3950K±5%	3.5	13	297	-40~+110
2KD-5	2.0kΩ±15%	4000K±5%	3.5	13	297	-40~+110
5KD-5	5.0kΩ±15%	4100K±5%	3.5	13	297	-40~+110
8KD-5	8.0kΩ±15%	4200K±5%	3.5	13	297	-40~+110
10KD-5	10.0kΩ±15%	4200K±5%	3.5	13	297	-40~+110
15KD-5	15.0kΩ±15%	4250K±5%	3.5	13	297	-40~+110
20KD-5	20.0kΩ±15%	4300K±5%	3.5	13	297	-40~+110
25KD-5	25.0kΩ±15%	4300K±5%	3.5	13	297	-40~+110
50KD-5	50.0kΩ±15%	4650K±5%	3.5	13	297	-40~+110
100KD-5	100.0kΩ±15%	4850K±5%	3.5	13	297	-40~+110

*1 R25 : Rated zero-power resistance value at 25°C, ±10% are also available.

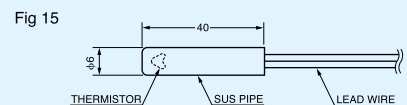
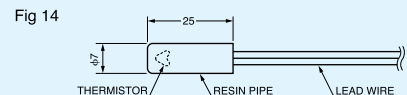
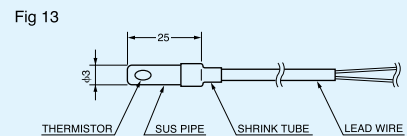
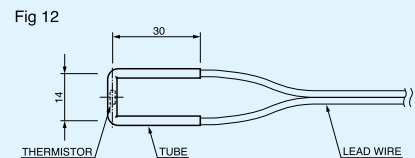
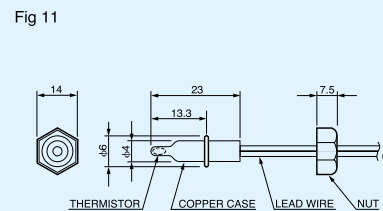
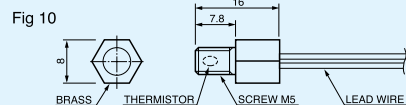
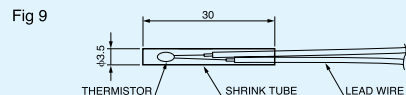
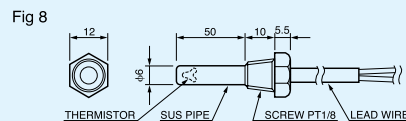
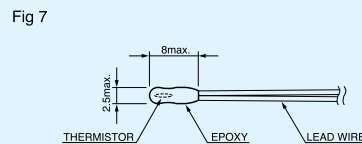
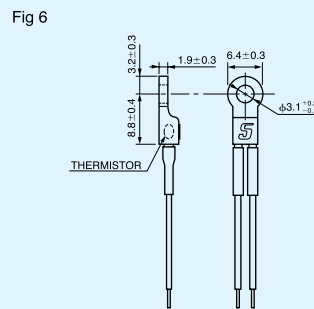
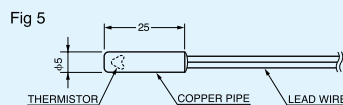
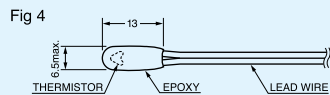
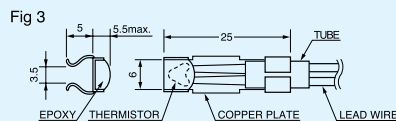
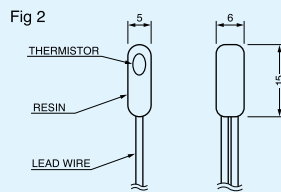
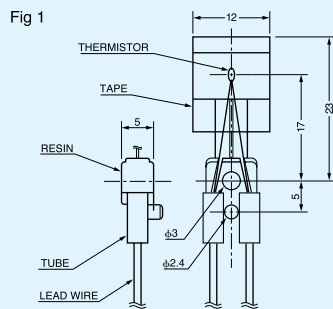
*2 B value : determined by rated zero-power resistance at 25°C and 85°C.

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

TEMPERATURE SENSOR

The TEMPERATURE SENSOR is assembled one with various parts and thermistor devices according to the required applications. Its electric characteristics are the same as those of thermistor devices. Variable type of sensor can be utilized for detecting or controlling temperature because its operating temperature range is wide from -50 to $+300^{\circ}\text{C}$. Standard TEMPERATURE SENSOR is available in accordance with the applications such as measurements of liquid, atmosphere and surface temperature.

External dimensions



Unit (mm)

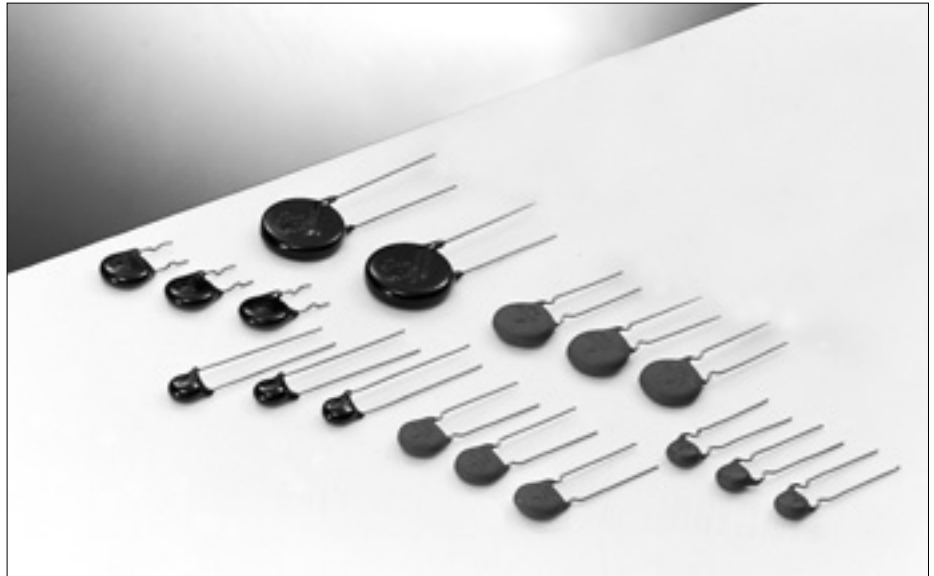
Specifications

Fig	Thermal Time constant(s)			Dissipation factor (mW/°C) Approx.	Category temperature range	Application	Thermistor
	Air	Water	Heater				
1	—	—	3	1.2	−30°C~230°C	Surface temp. sensor for OA equipment.	BT
2	75	—	—	3	−30°C~105°C	Air temp. sensor for general use.	AT
3	40	—	—	4	−30°C~105°C	Surface temp. sensor for general use.	AT
4	70	—	—	5	−30°C~110°C	Air temp. sensor for air conditioner.	AT(ET)
5	130	—	—	4	−30°C~110°C	Air temp. sensor for air conditioner.	AT(ET)
6	65	—	—	3	−40°C~110°C	Surface temp. sensor for general use.	AT
7	10	—	—	2	−30°C~90°C	Surface temp. sensor for rechargeable battery.	AT
8	—	5	—	4.5	−30°C~105°C	Water (Oil) temp. sensor for general use.	AT(ET, GT)
9	—	3	—	1.1	−50°C~200°C	For general use.	BT
10	70	—	—	5	−50°C~250°C	Inner temp. sensor for general use.	GT(BT)
11	—	1.0	—	2.7	−30°C~100°C	Fast response water temp. sensor	ET
12	30	—	—	3	−50°C~200°C	Surface temp. sensor for cooker.	CT
13	85	—	—	1.5	−30°C~100°C	Air temp. sensor for general use.	ET
14	130	—	—	2.6	−30°C~105°C	For general use.	AT(ET)
15	SINSEAR 传感与控制 http://www.sensear-ic.com/			TEL: 875518376519 FAX: 0755-83999182 E-MAIL: szszs20@163.com	AT(ET)		

POWER THERMISTOR

The POWER THERMISTOR is a device for suppressing inrush current to an electric circuit. Circuits including electric bulbs or capacitors induce a inrush current more than 100 times the normal current when the circuit switch is turned on. The POWER THERMISTOR in the circuits protects electric equipments from being damaged by limiting the inrush current.

MARK II is a NEW POWER THERMISTOR featuring smaller size and larger energy capacity to meet severe requirements in inrush current suppression. There is the tendency of miniaturization in low power switching power supply, and MARK II is effectively applicable for the needs, though the comparatively larger sized fixed resistors (ceramic coat) are used now.

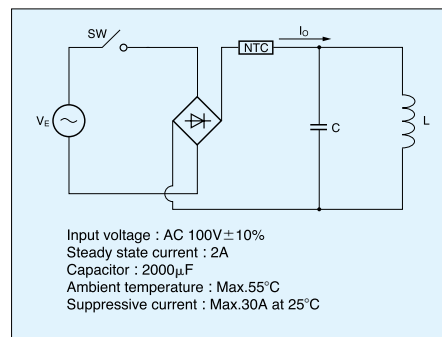


Application

The power thermistor will suppress inrush current which is caused by a capacitor, filament for a bulb, inverter for fluorescent lamp, a heater and etc., also will control fan motor speed of cooler for electric circuit.

Especially MARK II was developed to use for power supply of TV, VCR instead of cement resistor.

How to use the power thermistor



The most suitable power thermistor for the above circuit is required to fulfill the following terms and conditions.

1. The permissible current at ambient temperature of 55°C should be over 2A.
2. The thermistor resistance for suppressive current which becomes below 30A should be over 4.2 ohm from the under-mentioned formula.

$$\frac{\sqrt{2} V_E \times 1.1}{R_C + R_{25}} \leq 30$$

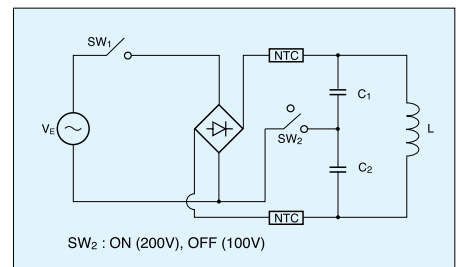
R_C : Internal resistance value in the circuit is 1 ohm (100V/100A)

R_{25} : Rated zero-power resistance at 25°C

3. Max. capacitance shall be over 2000μF at AC 100V.

Accordingly, suitable thermistors are 6D-22, 5D-18 and 8D-18, and if we consider in the points of small time constant which means a small size and large effect for suppressive current which means large rated zero-power resistance, 8D-18 is the most suitable one.

Use the following circuit in the power supply for 100V and 200V.



Thermal time constant

If ambient temperature of a thermistor is changed from T_1 to T_2 suddenly, temperature of the thermistor changes slowly.

The time constant means the time when temperature of the thermistor reaches 63% of the temperature difference.

Residual resistance

If current is flowed through a thermistor, any heat will be generated in the thermistor by which its resistance will be decreased, however, a decrease of a resistance will be stabilized at a saturation resistance value which is determined by impressed electric power and a dissipation constant. The residual resistance value means maximum saturation resistance value when the maximum permissible current is flowed through the thermistor.

Temperature coefficient α

The temperature coefficient of a thermistor is expressed by the following equation ;

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

Dissipation factor

If small voltage is applied to a thermistor, small current will flow which produce enough heat in the thermistor. Dissipation factor is electric power which make 1°C raise by heat in a thermistor.

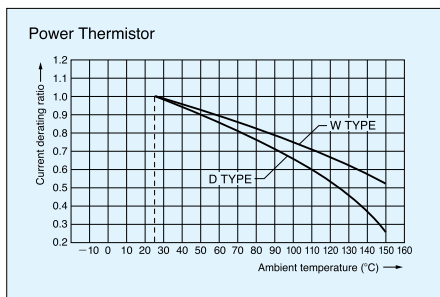
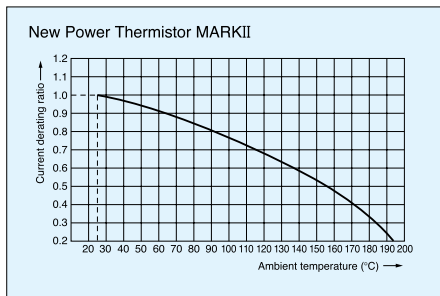
$$\delta = \frac{P}{\Delta t} (\text{mW}/^\circ\text{C})$$

P is applied electric power.

Δt is rised temperature of the thermistor.

Maximum permissible current

If the maximum permissible current flows to a thermistor at 25°C , temperature of the thermistor rises to 200°C , (160°C). When ambient temperature is above 25°C , the maximum permissible current shall be over reduced as the maximum permissible current reduction curve.

**Reliability tests****MARKII -type****Dry heat test**

Test sample is exposed in air at 200°C for 1,000 hours. $\Delta R_{25}/R_{25} \leq \pm 20\%$

Damp heat test

Test sample is exposed in atmosphere of 95%RH at 40°C for 1,000 hours. $\Delta R_{25}/R_{25} \leq \pm 10\%$

Load test

Test sample is applied the maximum rating current in air at 25°C for 1,000 hours. $\Delta R_{25}/R_{25} \leq \pm 20\%$

Change of temperature

Test sample is given 10 times of the following temperature cycle,
 $\rightarrow -40^\circ\text{C}$ for 30 minutes $\rightarrow$ room temperature for 5 minutes
 $\rightarrow 200^\circ\text{C}$ for 30 minutes $\rightarrow$ room temperature for 5 minutes.

$\Delta R_{25}/R_{25} \leq \pm 10\%$

D-type**Dry heat test**

Test sample is exposed in air at 160°C for 1,000 hours. $\Delta R_{25}/R_{25} \leq \pm 10\%$

Damp heat test

Test sample is exposed in atmosphere of 95%RH at 40°C for 1,000 hours. $\Delta R_{25}/R_{25} \leq \pm 10\%$

Load test

Test sample is applied the maximum rating current in air at 25°C for 1,000 hours. $\Delta R_{25}/R_{25} \leq \pm 10\%$

Change of temperature

Test sample is given 10 times of the following temperature cycle,
 $\rightarrow -10^\circ\text{C}$ for 30 minutes $\rightarrow$ room temperature for 5 minutes
 $\rightarrow 160^\circ\text{C}$ for 30 minutes $\rightarrow$ room temperature for 5 minutes.

$\Delta R_{25}/R_{25} \leq \pm 10\%$

D2-type**Dry heat test**

Test sample is exposed in air at 160°C for 1,000 hours. $\Delta R_{25}/R_{25} \leq \pm 15\%$

Damp heat test

Test sample is exposed in atmosphere of 95%RH at 40°C for 1,000 hours. $\Delta R_{25}/R_{25} \leq \pm 15\%$

Load test

Test sample is applied the maximum rating current in air at 25°C for 1,000 hours. $\Delta R_{25}/R_{25} \leq \pm 15\%$

Change of temperature

Test sample is given 10 times of the following temperature cycle,
 $\rightarrow -40^\circ\text{C}$ for 30 minutes $\rightarrow$ room temperature for 5 minutes
 $\rightarrow 100^\circ\text{C}$ for 30 minutes $\rightarrow$ room temperature for 5 minutes.

$\Delta R_{25}/R_{25} \leq \pm 15\%$

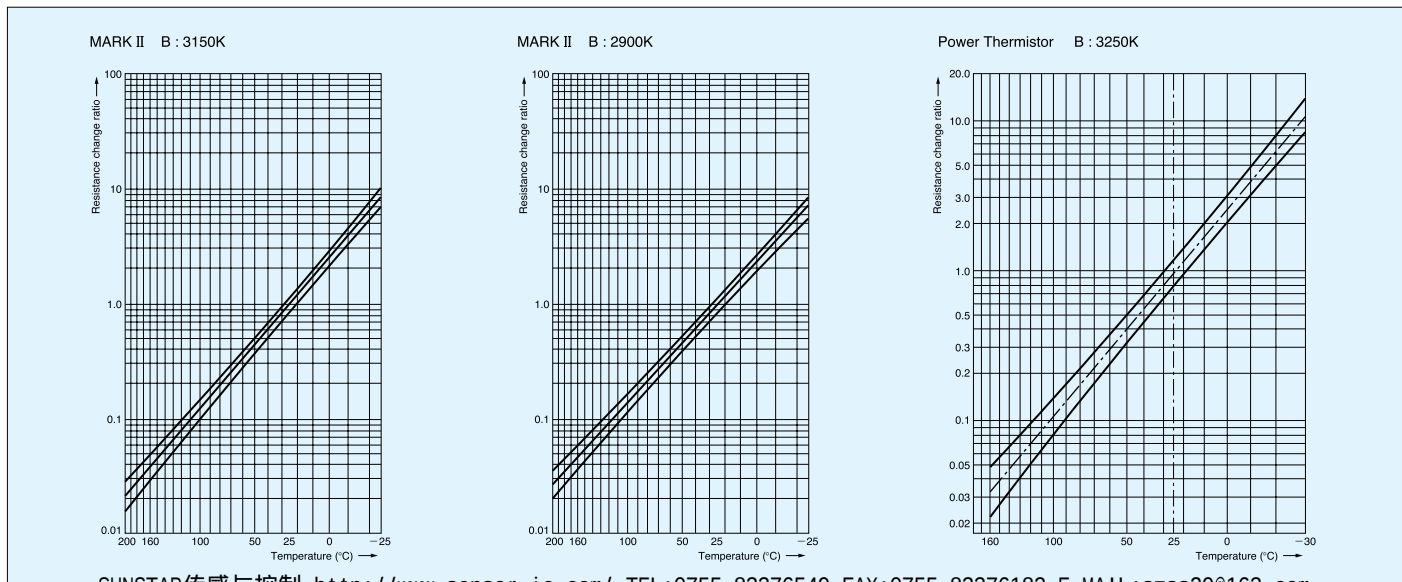
Resistance-temperature characteristics

The theoretical characteristics of a thermistor is expressed by following equation.

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

R_1 is the zero-power resistance at absolute temperature T_1
 R_2 is the zero-power resistance at absolute temperature T_2

B is 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 .

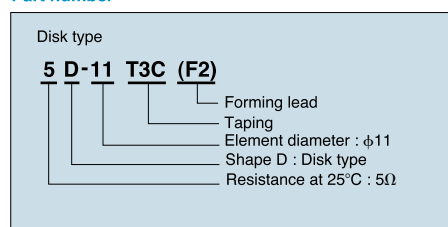




Specifications (D-type)

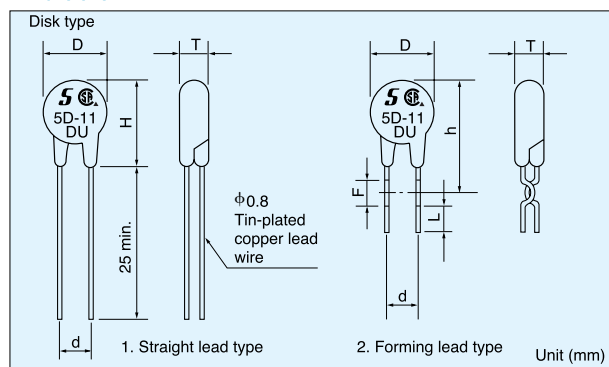
Part No.	R ₂₅ ^{*1} (Ω)	B value ^{*2} B _{25/85} (K)	Maximum energy J (W·s)	Maximum rating current at 25°C (A)	Residual resistance ^{*3} (Ω)	Dissipation factor (mW/°C) Approx.	Thermal time constant (s) Approx.	Category temp. range (°C)	Maximum capacitance (μF)			
									AC100V	AC120V	AC220V	AC240V
3D-22	3±15%	3250±5%	40.0	5.4	0.137	29.8	130	-30~160	8,500	5,900	1,700	1,470
4D-22	4±15%	3250±5%	50.0	4.7	0.182	30.7	160	-30~160	11,000	7,600	2,200	1,900
6D-22	6±15%	3250±5%	80.0	3.9	0.274	32.4	220	-30~160	17,000	11,800	3,500	2,950
4D-18	4±15%	3250±5%	9.0	4.1	0.182	22.8	100	-30~160	2,000	1,350	410	340
5D-18	5±15%	3250±5%	11.0	3.8	0.228	24.6	120	-30~160	2,500	1,700	510	430
8D-18	8±15%	3250±5%	18.0	3.1	0.365	27.2	150	-30~160	4,100	2,800	840	710
10D-18	10±15%	3250±5%	22.0	2.8	0.456	28.2	150	-30~160	5,000	3,400	1,030	860
5D-13	5±15%	3250±5%	4.0	3.4	0.228	20.1	55	-30~160	900	620	180	150
8D-13	8±15%	3250±5%	6.0	2.7	0.365	20.3	65	-30~160	1,400	970	280	240
16D-13	16±15%	3250±5%	12.0	1.9	0.730	21.4	105	-30~160	2,800	1,900	570	480
5D-11	5±15%	3250±5%	4.0	3.3	0.228	19.0	50	-30~160	900	620	180	150
8D-11	8±15%	3250±5%	6.0	2.6	0.365	19.8	70	-30~160	1,400	970	280	240
10D-11	10±15%	3250±5%	7.0	2.4	0.456	20.1	75	-30~160	1,800	1,250	370	310
10D-9	10±15%	3250±5%	2.0	2.2	0.456	17.2	40	-30~160	510	350	100	80
16D-9	16±15%	3250±5%	4.0	1.7	0.730	17.4	50	-30~160	820	560	160	140
22D-7	22±15%	3250±5%	1.0	1.4	1.003	15.7	30	-30~160	310	210	60	50

Part number

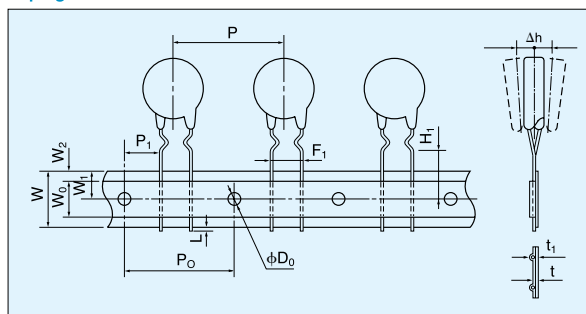


- UL approved (Disk type)
File No. E92669
Thermistor type device
- Canadian Standards (Disk type)
File No. CA97673

Dimensions



Taping



	D	T	H	h	F	L	d
D-7	9.5max.	5max.	13max.	15max.	3±0.5	3.5±0.5	6±1
D-9	11max.	6max.	15max.	17max.			7.5±1
D-11	14max.		18max.	20max.			
D-13	16max.	8max.	20max.	22max.			10±1
D-18	21max.	9max.	26max.	28max.			
D-22	25max.	8max.	30max.	32max.			

Unit (mm)

Taping

	P	P ₀	P ₁	W	W ₀	W ₁	W ₂	H ₁	L	F ₁	φD ₀	t	t ₁	Δh
D-7	15±1	15±0.3	3.75±0.7	18 ^{+1.0} _{-0.5}	5min.	9±0.5	3max.	16±0.5	1max.	7.5±0.5	4±0.3	0.6±0.3	1.6max.	0±2
D-9														
D-11														
D-13	30±1													

Unit (mm)



Specifications (MARKII-type)

Part No.	R ₂₅ ^{*1} (Ω)	B value ^{*2} B _{25/85} (K)	Maximum energy J (W·s)	Maximum rating current at 25°C (A)	Residual resistance ^{*3} (Ω)	Dissipation factor (mW/°C) Approx.	Thermal ^{*4} time constant(s) Approx.	Category temp. range (°C)	Maximum capacitance (μF)			
									AC100V	AC120V	AC220V	AC240V
M5R107	5.1±10%	2900±5%	2.0	4.6	0.18	17.0	20	-40~200	400	270	80	60
M8R207	8.2±10%	2900±5%	2.8	3.6	0.30	17.2	25	-40~200	560	380	110	90
M10007	10.0±10%	2900±5%	3.4	3.3	0.36	17.2	30	-40~200	680	470	140	110
M12007	12.0±10%	3150±5%	3.6	3.6	0.24	17.5	25	-40~200	560	380	110	90
M16007	16.0±10%	3150±5%	4.0	3.1	0.43	17.8	30	-40~200	800	550	160	130
M22007	22.0±10%	3150±5%	4.8	2.6	0.59	18.0	40	-40~200	960	660	190	160
M2R210	2.2±10%	2900±5%	8.2	7.4	0.08	18.9	40	-40~200	1,640	1,130	330	280
M3R010	3.0±10%	2900±5%	8.6	6.4	0.11	19.2	45	-40~200	1,720	1,190	350	290
M3R910	3.9±10%	2900±5%	8.0	5.6	0.11	19.5	45	-40~200	1,880	1,300	380	320
M5R110	5.1±10%	3150±5%	7.2	5.7	0.14	19.2	40	-40~200	1,440	1,000	290	250
M8R210	8.2±10%	3150±5%	7.8	4.5	0.22	19.9	50	-40~200	1,560	1,080	320	270
M10010	10.0±10%	3150±5%	8.2	4.1	0.27	20.1	60	-40~200	1,640	1,130	330	280
M1R014	1.0±10%	2900±5%	18.0	11.9	0.04	22.0	65	-40~200	3,720	2,580	760	640
M2R014	2.0±10%	2900±5%	21.0	8.6	0.07	23.4	90	-40~200	4,200	2,900	860	720
M3R014	3.0±10%	3150±5%	15.0	8.3	0.08	23.6	80	-40~200	3,080	2,130	630	530
M3R914	3.9±10%	3150±5%	17.0	7.4	0.08	24.5	95	-40~200	3,400	2,360	700	590
M5R114	5.1±10%	3150±5%	18.0	6.5	0.14	24.7	110	-40~200	3,600	2,500	740	620

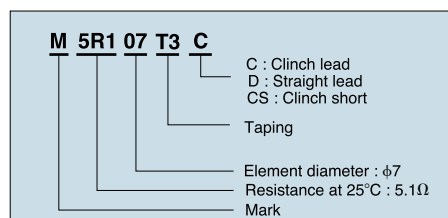
*1 R₂₅: Rated zero-power resistance value at 25°C.

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

*3 Residual resistance is the maximum value when maximum rating current is applied.

*4 Time when thermistor temperature reaches 63.2% of the temperature difference. The value is measured in the air.

Part number

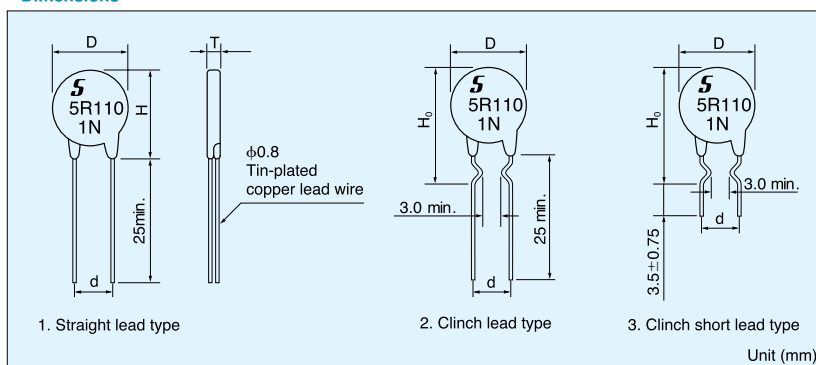


●UL approved

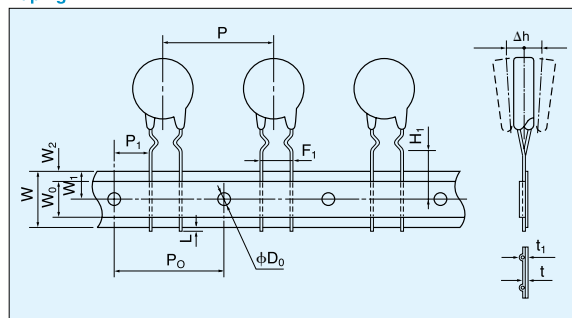
File No. E92669

Thermistor type devices

Dimensions



Taping



	D	T	H	H ₀	d
M...07	9.5max.	6max.	12max.	15max.	7.5±1
M...10	13max.		17max.	19.5max.	
M...14	17max.		20.5max.	22.5max.	

Unit (mm)

Taping

	P	P ₀	P ₁	W	W ₀	W ₁	W ₂	H ₁	L	F ₁	φD ₀	t	t ₁	Δh
M...07	15±1	15±0.3	3.75±0.7	18 ^{+1.0} _{-0.5}	5min.	9±0.5	3max.	16±0.5	1max.	7.5±0.5	4±0.2	0.6±0.3	1.5max.	0±2
M...10	15±1													
M...14	30±1													

Unit (mm)



Specifications (D2-type)

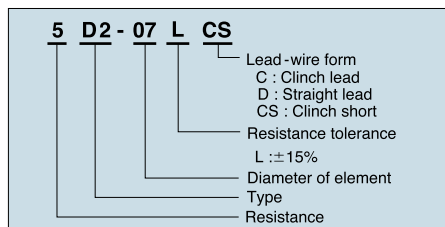
Part No.	R ₂₅ ^{*1} (Ω)	Maximum rating current at 25°C (A)	Residual resistance ^{*2} (Ω)	Dissipation factor (mW/°C) Approx.	Thermal ^{*3} time constant(s) Approx.	Category temp. range (°C)	Maximum capacitance at AC220V (μF)
5D2-07	5	3.0	0.36	30	35	-40~160	80
8D2-07	8	2.0	0.57	30	41	-40~160	110
10D2-07	10	2.0	0.71	30	45	-40~160	140
12D2-07	12	1.7	0.77	30	41	-40~160	80
16D2-07	16	2.0	1.03	30	45	-40~160	160
22D2-07	22	1.0	1.42	30	50	-40~160	190
2D2-10	2	5.0	0.14	32	50	-40~160	330
3D2-10	3	4.0	0.21	32	53	-40~160	350
5D2-10	5	4.0	0.32	32	53	-40~160	290
8D2-10	8	3.0	0.52	32	70	-40~160	320
10D2-10	10	3.0	0.65	32	75	-40~160	330
12D2-10	12	1.8	0.70	32	53	-40~160	173
16D2-10	16	1.6	0.94	32	70	-40~160	173
2D2-14	2	5.0	0.14	36	90	-40~160	860
3D2-14	3	5.0	0.19	36	80	-40~160	630
4D2-14	4	5.0	0.26	36	95	-40~160	700
5D2-14	5	4.0	0.32	36	110	-40~160	740
8D2-14	8	2.5	0.47	36	80	-40~160	289
10D2-14	10	2.2	0.58	36	95	-40~160	371
12D2-14	12	2.0	0.70	36	105	-40~160	454
16D2-14	16	1.8	0.94	36	115	-40~160	578

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

*2 Residual resistance is the maximum value when maximum rating current is applied.

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

Part number

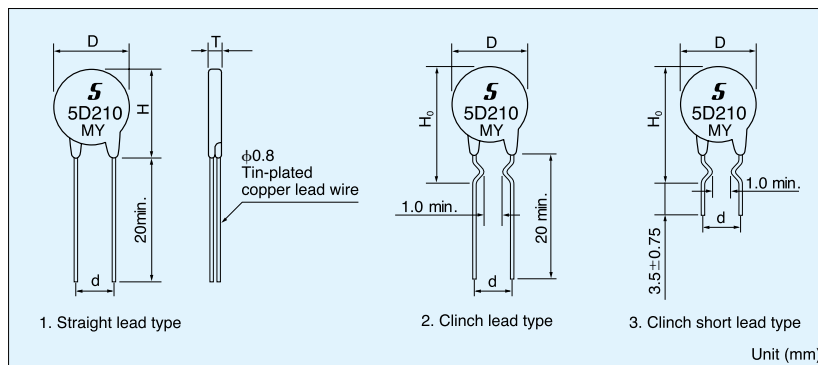


●UL approved

File No. E92669

Thermistor type devices

Dimensions



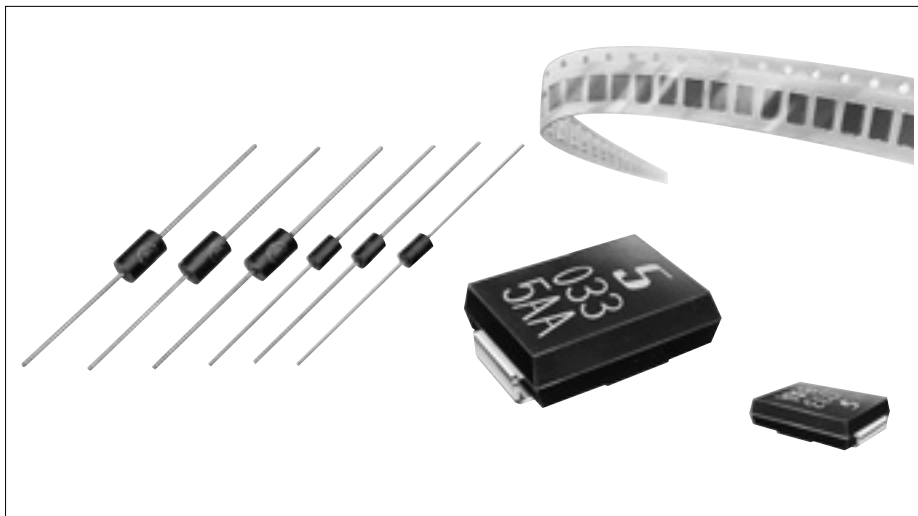
	D	T	H	H ₀	d
D2-07	11max.	9max.	13max.	16max.	5.0±1
D2-10	13max.		17max.	19.5max.	
D2-14	17max.		21max.	22.5max.	7.5±1

Unit (mm)

TRANSIENT VOLTAGE SUPPRESSOR

VRD

VRD is a transient voltage suppressor used for protecting electric circuits from surge voltage and thus preventing breakdown. VRD has superior surge suppression characteristics, such as extremely fast response time, very low clamping voltage, and high surge capacity. Unlike metal oxide varistors, VRD does not have characteristics to change with surge variations within the rated capacity. This feature comprises another superior characteristics of the VRD as a transient voltage suppressors.



Electrical characteristics

Figure 1 shows the electrical characteristics. Bipolar type has almost symmetrical breakdown Voltage (V_B). The reverse breakdown voltage of the ZD type is 200 Volts or more at 10 μ A DC.

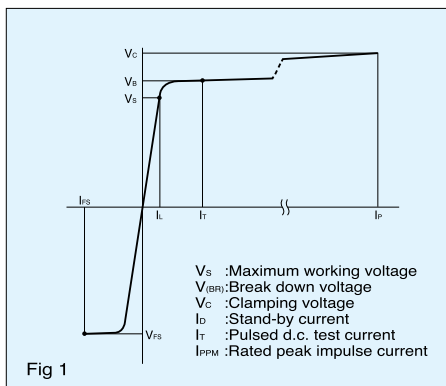


Fig 1

Taping

One of standard taping is as shown in Figure.

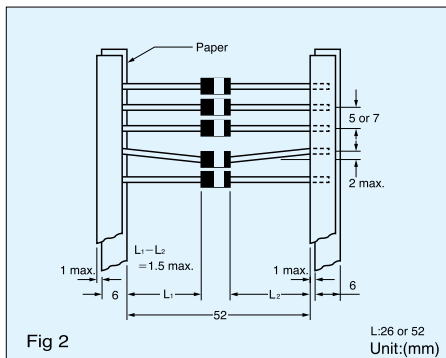


Fig 2

Surge capability

Allowable surge capability (P_{PPM}) is determined by the following equation:

$$P_{PPM} = I_{PPM} \times V_C$$

I_{PPM} : Rated peak impulse current

V_C : clamping voltage

The allowable surge capability (Rated peak impulse power dissipation P_{PPM}) of VRD is shown in following Figure 3 and the surge capability derating characteristics are shown in Figure 6.

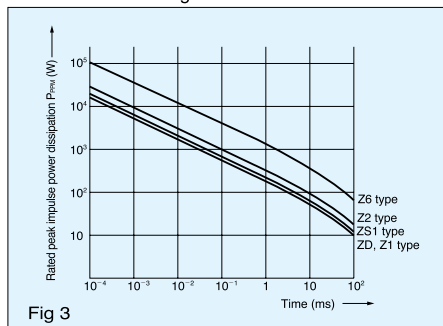


Fig 3

Surge waveform

There are many types of surge waveform depending on the source of the surge. For the VRD surge suppression characteristics test, the EXP waveform shown below is used. The EXP waveform is shown as t_a/t_b depending on the time width, however 10/1000 waveform is used as the standard test waveform.

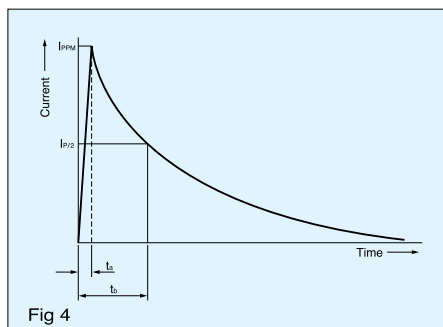


Fig 4

Surge suppression characteristics

When EXP waveform is applied, the surge suppression waveform shown in the figure 5 can be observed.

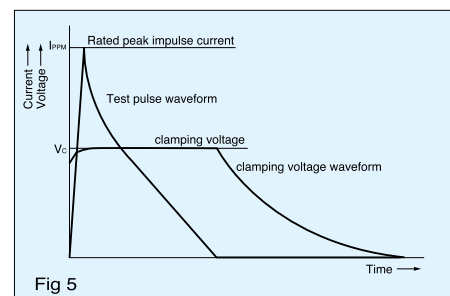


Fig 5

Power derating

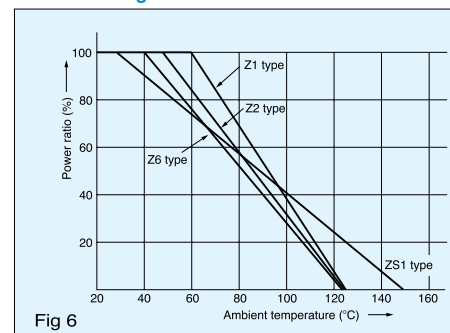


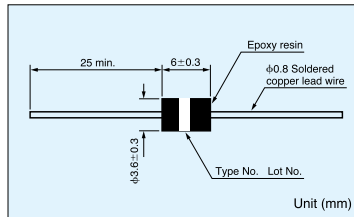
Fig 6

Z1 type VRD has bipolar electrical characteristics.

Maximum ratings

Rated peak impulse power dissipation
:250 W(10/1000 μ s)
3.00 kW(8/20 μ s)Rated average power dissipation:500 mW
Operating and storage temperature
:-40°C to 125°C

Symbol mark



Part No.		Stand-by current I _D μA	Breakdown voltage V _(BR) V	Pulsed d.c. test current I _T mA	Clamping Voltage & Rated peak impulse current				Temperature coefficient (TYP)	Capacitance (TYP) pF
Bi-polar type	Stand-off voltage V _S V				10/1000μs		8/20μs			
					V _C V	I _{PPM} A	V _C V	I _{PPM} A		
Z1015	12.1	5	13.5-16.5	1	22.0	11.3	28.4	106.0	0.075	450
Z1018	14.5	5	16.2-19.8	1	26.5	9.43	34.0	89.1	0.079	360
Z1022	17.8	5	19.8-24.2	1	31.9	7.83	41.2	73.5	0.082	290
Z1027	21.8	5	24.3-29.7	1	39.1	6.39	50.5	60.0	0.085	240
Z1033	26.8	5	29.7-36.3	1	47.7	5.24	61.7	49.1	0.087	200
Z1039	31.6	5	35.1-42.9	1	56.4	4.43	73.0	41.5	0.090	170
Z1047	38.1	5	42.3-51.7	1	67.8	3.69	88.0	34.4	0.092	140
Z1056	45.4	5	50.4-61.6	1	80.5	3.10	105.0	28.8	0.094	110
Z1068	55.1	5	61.2-74.8	1	98.0	2.55	127.0	23.8	0.096	90
Z1082	66.4	5	73.8-90.2	1	118.0	2.14	153.0	19.8	0.099	80
Z1100	81.0	5	90.0-110	1	144.0	1.73	187.0	16.2	0.101	65
Z1120	97.0	5	108-132	1	173.0	1.44	222.0	13.6	0.103	53
Z1150	121.0	5	135-165	1	215.0	1.16	277.0	10.9	0.105	42

Z2 type VRD has bipolar or unipolar electrical characteristics.

Maximum ratings

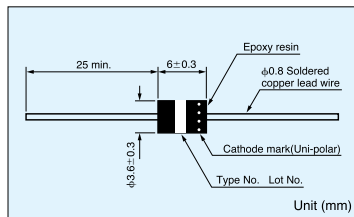
Rated peak impulse power dissipation
:500 W (10/1000 μ s)
6.00 kW (8/20 μ s)Rated average power dissipation:1W
Operating and storage temperature
:-40°C to 125°C

Symbol mark

Bi-polar



Uni-polar



Part No.		Stand-off voltage V _s V	Stand-by current I _o μA	Breakdown voltage V ^(BR) V	Pulsed d.c. test current I _T mA	Clamping Voltage & Rated peak impulse current				Temperature coefficient (TYP)	Capacitance (TYP) pF
Bi-polar type	Uni-polar type					10/1000μs		8/20μs			
						V _C V	I _{PPM} A	V _C V	I _{PPM} A		
Z2008	—	6.63	500	7.38-9.02	10	12.5	40.0	16.3	372	0.045	1200
—	Z2008U	6.63	500	7.38-9.02	10	12.5	40.0	16.3	372	0.063	2400
Z2010	—	8.10	100	9.00-11.0	1	15.0	33.4	19.5	311	0.055	950
—	Z2010U	8.10	20	9.00-11.0	1	15.0	33.4	19.5	311	0.071	1900
Z2012	—	9.72	5	10.8-13.2	1	17.3	28.9	22.7	267	0.066	790
—	Z2012U	9.72	5	10.8-13.2	1	17.3	28.9	22.7	267	0.074	1580
Z2015	—	12.1	5	13.5-16.5	1	22.0	22.7	28.4	213	0.075	640
—	Z2015U	12.1	5	13.5-16.5	1	22.0	22.7	28.4	213	0.079	1280
Z2018	—	14.5	5	16.2-19.8	1	26.5	18.8	34.0	178	0.079	520
—	Z2018U	14.5	5	16.2-19.8	1	26.5	18.8	34.0	178	0.083	1040
Z2022	—	17.8	5	19.8-24.2	1	31.9	15.7	41.2	147	0.082	420
—	Z2022U	17.8	5	19.8-24.2	1	31.9	15.7	41.2	147	0.086	840
Z2027	—	21.8	5	24.3-29.7	1	39.1	12.8	50.5	120	0.085	340
—	Z2027U	21.8	5	24.3-29.7	1	39.1	12.8	50.5	120	0.089	680
Z2033	—	26.8	5	29.7-36.3	1	47.7	10.5	61.7	98.2	0.087	280
—	Z2033U	26.8	5	29.7-36.3	1	47.7	10.5	61.7	98.2	0.092	560
Z2039	—	31.6	5	35.1-42.9	1	56.4	8.86	73.0	83.0	0.090	240
—	Z2039U	31.6	5	35.1-42.9	1	56.4	8.86	73.0	83.0	0.095	480
Z2047	—	38.1	5	42.3-51.7	1	67.8	7.37	88.0	68.9	0.092	200
—	Z2047U	38.1	5	42.3-51.7	1	67.8	7.37	88.0	68.9	0.097	400
Z2056	—	45.4	5	50.4-61.6	1	80.5	6.21	105.0	57.7	0.094	160
—	Z2056U	45.4	5	50.4-61.6	1	80.5	6.21	105.0	57.7	0.099	320
Z2068	—	55.1	5	61.2-74.8	1	98.0	5.10	127.0	47.7	0.096	130
—	Z2068U	55.1	5	61.2-74.8	1	98.0	5.10	127.0	47.7	0.100	260
Z2082	—	66.4	5	73.8-90.2	1	118.0	4.24	153.0	39.6	0.099	110
—	Z2082U	66.4	5	73.8-90.2	1	118.0	4.24	153.0	39.6	0.102	220
Z2100	—	81.0	5	90.0-110	1	144.0	3.47	187.0	32.4	0.101	90
—	Z2100U	81.0	5	90.0-110	1	144.0	3.47	187.0	32.4	0.104	180
Z2120	—	97.2	5	108-132	1	173.0	2.89	222.0	27.3	0.103	75
—	Z2120U	97.2	5	108-132	1	173.0	2.89	222.0	27.3	0.106	150
Z2150	—	121.0	5	135-165	1	215.0	2.32	277.0	21.9	0.105	60
—	Z2150U	121.0	5	135-165	1	215.0	2.32	277.0	21.9	0.107	120
Z2180	—	146.0	5	162-198	1	258.0	1.94	333.0	18.2	0.106	49
—	Z2180U	146.0	5	162-198	1	258.0	1.94	333.0	18.2	0.108	98

NOTE: Nonsuffix:bi-polar, suffix"U" : uni-polar.

Part No.		Stand-off voltage V _s V	Stand-by current I _D μA	Breakdown voltage V _(BR) V	Pulsed d.c. test current I _T mA	Clamping Voltage & Rated peak impulse current				Max. temp. coef. %/°C	Capacitance (TYP) pF
Bi-polar type	Uni-polar type					10/1000μs		8/20μs			
						V _C V	I _{PPM} A	V _C V	I _{PPM} A		
—	Z6008U	6.63	500	7.38-9.02	10	12.5	120	16.3	1120	0.063	14600
Z6010	—	8.10	200	9.00-11.0	1	15.0	100	19.5	933	0.055	5600
—	Z6010U	8.10	50	9.00-11.0	1	15.0	100	19.5	933	0.071	11200
Z6012	—	9.72	10	10.8-13.2	1	17.3	86.7	22.7	802	0.066	4400
—	Z6012U	9.72	5	10.8-13.2	1	17.3	86.7	22.7	802	0.074	8800
Z6015	—	12.1	5	13.5-16.5	1	22.0	68.2	28.4	641	0.075	3300
—	Z6015U	12.1	5	13.5-16.5	1	22.0	68.2	28.4	641	0.079	6600
Z6018	—	14.5	5	16.2-19.8	1	26.5	56.6	34.0	535	0.079	2700
—	Z6018U	14.5	5	16.2-19.8	1	26.5	56.6	34.0	535	0.083	5400
Z6022	—	17.8	5	19.8-24.2	1	31.9	47.0	41.2	442	0.082	2400
—	Z6022U	17.8	5	19.8-24.2	1	31.9	47.0	41.2	442	0.086	4400
Z6027	—	21.8	5	24.3-29.7	1	39.1	38.5	50.5	360	0.085	1700
—	Z6027U	21.8	5	24.3-29.7	1	39.1	38.4	50.5	360	0.089	3300
Z6033	—	26.8	5	29.7-36.3	1	47.7	31.4	61.7	295	0.087	1400
—	Z6033U	26.8	5	29.7-36.3	1	47.7	31.4	61.7	295	0.092	2800
Z6039	—	31.6	5	35.1-42.9	1	56.4	26.6	73.0	249	0.090	1200
—	Z6039U	31.6	5	35.1-42.9	1	56.4	26.6	73.0	249	0.095	2400
Z6047	—	38.1	5	42.3-51.7	1	67.8	22.1	88.0	207	0.092	1000
—	Z6047U	38.1	5	42.3-51.7	1	67.8	22.1	88.0	207	0.097	2000
Z6056	—	45.4	5	50.4-61.6	1	80.5	18.6	105.0	173	0.094	850
—	Z6056U	45.4	5	50.4-61.6	1	80.5	18.6	105.0	173	0.099	1700
Z6068	—	55.1	5	61.2-74.8	1	98.0	15.3	127.0	143	0.096	720
—	Z6068U	55.1	5	61.2-74.8	1	98.0	15.3	127.0	143	0.100	1440
Z6082	—	66.4	5	73.8-90.2	1	118.0	12.7	153.0	119	0.099	610
—	Z6082U	66.4	5	73.8-90.2	1	118.0	12.7	153.0	119	0.102	1220
Z6100	—	81.0	5	90.0-110	1	144.0	10.4	187.0	97.3	0.101	520
—	Z6100U	81.0	5	90.0-110	1	144.0	10.4	187.0	97.3	0.104	1040
Z6120	—	97.2	5	108-132	1	173.0	8.67	222.0	82.0	0.103	440
—	Z6120U	97.2	5	108-132	1	173.0	8.67	222.0	82.0	0.106	880
—	Z6150U	121.0	5	135-165	1	215.0	6.98	277.0	65.7	0.107	720

NOTE : Nonsuffix : Bi-polar, suffix "U" : Uni-polar.

VRD part No.	Stand-off voltage V _S V	Stand-by current I _D μA	Breakdown voltage V _(BR) V	Pulsed d.c. test current I _T mA	Clamping Voltage & Rated peak impulse current				Max. temp. coef. %/°C	Capacitance (TYP) pF
					10/1000μs		8/20μs			
					V _C V	I _{PPM} A	V _C V	I _{PPM} A		
ZD015	11.4	10	12.8-17.2	1	24.0	10.4	31.0	96.7	0.075	31.5
ZD018	13.7	10	15.3-20.7	1	28.0	8.93	36.0	83.3	0.079	31.0
ZD022	16.8	5	18.7-25.3	1	33.2	7.53	43.0	69.7	0.082	29.0
ZD027	20.6	5	23.0-31.0	1	40.0	6.25	52.0	57.7	0.085	28.2
ZD033	25.2	5	28.1-37.9	1	48.6	5.14	63.0	47.6	0.087	27.2
ZD039	29.8	5	33.2-44.8	1	57.4	4.35	74.0	40.5	0.090	26.3
ZD047	35.9	5	40.0-54.0	1	68.5	3.65	89.0	33.7	0.092	25.0
ZD056	42.8	5	47.6-64.4	1	81.0	3.08	106.0	28.6	0.094	24.1
ZD068	52.0	5	57.8-78.2	1	98.0	2.55	127.0	23.8	0.096	22.0

Z6 type VRD has bipolar or unipolar electrical characteristics.

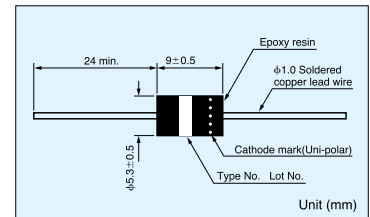
Maximum ratings

Rated peak impulse power dissipation
:1.5kW(10/1000 μs)
18.0kW(8/20 μs)

Rated average power dissipation:2W

Operating and storage temperature
: -40°C to 125°C

Symbol mark

Bi-polar Uni-polar **Low capacitance type**

Maximum ratings

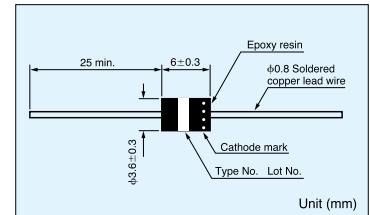
Reverse voltage:200 VDC

Rated peak impulse power dissipation
:250 W(10/1000 μs)
3.00 kW(8/20 μs)

Rated average power dissipation:500 mW

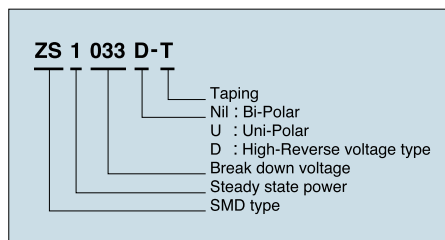
Operating and storage temperature
: -40°C to 125°C

Symbol mark

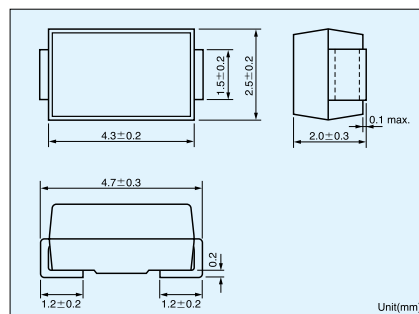


SMD VRD

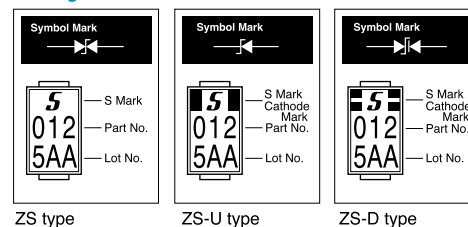
Part number



Dimensions

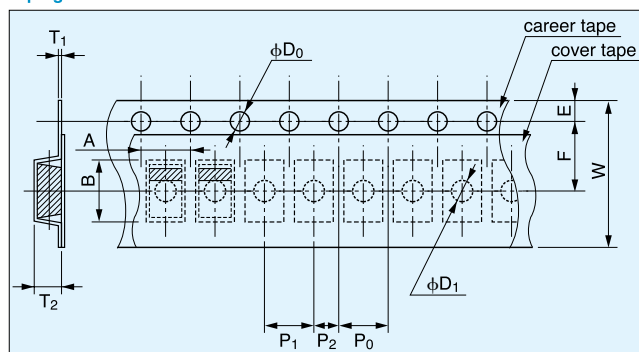


Marking



	Rating
Rated average power dissipation	1.0W
Rated peak impulse power dissipation	300W(10/1000μs)
	1200W(1.2/50μs)
	2000W(8/20μs)
Storage temp. range	-40°C~150°C

Taping



A	B	W	F	E	P ₁
3.0 ±0.1	5.2 ±0.1	12.0 ±0.3	5.5 ±0.05	1.75 ±0.1	4.0 ±0.1
P ₂	P ₀	φD ₀	φD ₁	T ₁	T ₂
2.0 ±0.1	4.0 ±0.1	1.5 +0.1 -0	1.5 +0.2 -0	0.3 ±0.05	(2.6)

Unit (mm)

Specifications

ZS type

Part No.	Breakdown voltage	Stand-off voltage	Stand-by current	Maximum clamping voltage & Maximum peak pulse current				Temperature coefficient (TYP)	Capacitance (TYP)
	V _(BR)	V _S	I _L max	V _C max/I _{PPM}					C
	It=1mA	D.C.	V _S	10/1000μs		8/20μs		25°C~50°C	
	V	V	μA	V	A	V	A	%/°C	pF
	ZS1012	12(10.8~13.2)	9.72	10	17.3	17.3	22.4	89.3	0.066
ZS1015	15(13.5~16.5)	12.1	5	22.0	13.6	28.5	70.2	0.075	465
ZS1018	18(16.2~19.8)	14.5	5	26.5	11.3	34.4	58.1	0.079	376
ZS1022	22(19.8~24.2)	17.8	5	31.9	9.40	41.4	48.3	0.082	299
ZS1027	27(24.3~29.7)	21.8	5	39.1	7.67	50.7	39.4	0.085	248
ZS1033	33(29.7~36.3)	26.8	5	47.7	6.29	61.8	32.4	0.087	198
ZS1039	39(35.1~42.9)	31.6	5	56.4	5.32	73.1	27.4	0.090	164
ZS1047	47(42.3~51.7)	38.1	5	67.8	4.42	88.0	22.7	0.092	137

ZS-U type

Part No.	Breakdown voltage	Stand-off voltage	Stand-by current	Maximum clamping voltage & Maximum peak pulse current				Temperature coefficient (TYP)	Capacitance (TYP)
	V _(BR)	V _S	I _L max	V _C max/I _{PPM}				25°C~50°C	C
	It=1mA	D.C.	V _S	10/1000μs		8/20μs			
	V	V	μA	V	A	V	A	%/°C	pF
ZS1012U	12(10.8~13.2)	9.72	10	17.3	17.3	22.4	89.3	0.066	1,102
ZS1015U	15(13.5~16.5)	12.1	5	22.0	13.6	28.5	70.2	0.075	929
ZS1018U	18(16.2~19.8)	14.5	5	26.5	11.3	34.4	58.1	0.079	751
ZS1022U	22(19.8~24.2)	17.8	5	31.9	9.40	41.4	48.3	0.082	598
ZS1027U	27(24.3~29.7)	21.8	5	39.1	7.67	50.7	39.4	0.085	497
ZS1033U	33(29.7~36.3)	26.8	5	47.7	6.29	61.8	32.4	0.087	395
ZS1039U	39(35.1~42.9)	31.6	5	56.4	5.32	73.1	27.4	0.090	328
ZS1047U	47(42.3~51.7)	38.1	5	67.8	4.42	88.0	22.7	0.092	274

ZS-D type

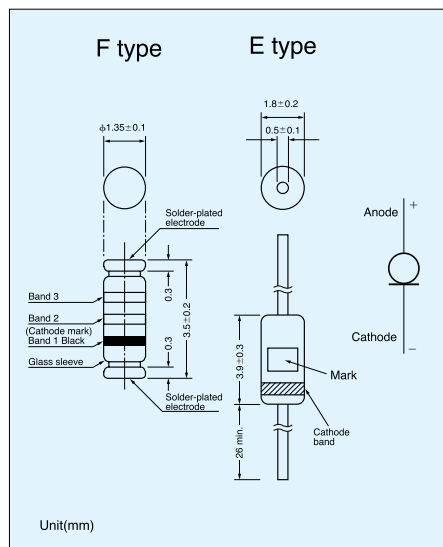
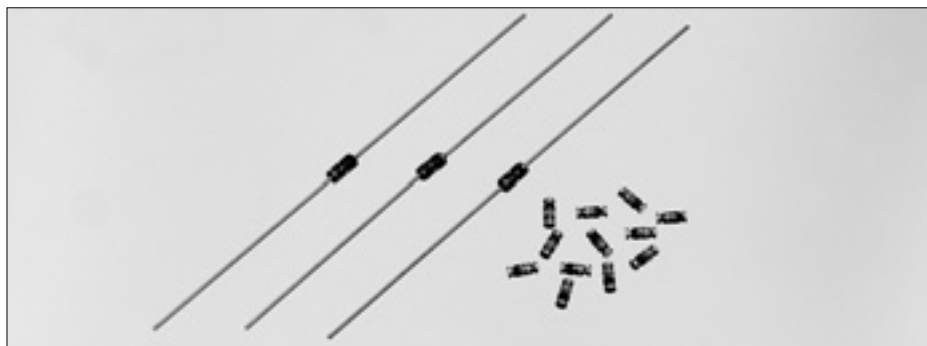
Part No.	Breakdown voltage	Stand-off voltage	Stand-by current	Maximum clamping voltage & Maximum peak pulse current				Temperature coefficient (TYP)	Capacitance (TYP)
	V _(BR)	V _S	I _L max	V _C max/PPM				25°C~50°C	C
	It=1mA	D.C.	V _S	10/1000μs		8/20μs			
	V	V	μA	V	A	V	A	%/°C	pF
ZS1012D	12(10.8~13.2)	9.72	10	17.3	17.3	22.4	89.3	0.066	30.2
ZS1015D	15(13.5~16.5)	12.1	5	22.0	13.6	28.5	70.2	0.075	29.1
ZS1018D	18(16.2~19.8)	14.5	5	26.5	11.3	34.4	58.1	0.079	28.2
ZS1022D	22(19.8~24.2)	17.8	5	31.9	9.40	41.4	48.3	0.082	27.3
ZS1027D	27(24.3~29.7)	21.8	5	39.1	7.67	50.7	39.4	0.085	26.4
ZS1033D	33(29.7~36.3)	26.8	5	47.7	6.29	61.8	32.4	0.087	25.5
ZS1039D	39(35.1~42.9)	31.6	5	56.4	5.32	73.1	27.4	0.090	24.8
ZS1047D	47(42.3~51.7)	38.1	5	67.8	4.42	88.0	22.7	0.092	24.0

CURRENT REGULATIVE DIODE

CRD

CRD is a diode which supplies constant current to an electric circuit, even when power supply voltage fluctuations or load impedance fluctuations occur.

CRD is used for current stabilization and current limiting.



Specifications

Part No.	lead less	with lead	Test Voltage	Ip(mA)	Vk(V)	I _k (mA)	Dynamic ^{*3} impedance Z _r (MΩ)	Limiting current ratio I _{100V} /I _p *I _{50V} /I _p	Temperature ^{*4} coefficient (%/°C)	Indication		
										F type		E
										Band 2	Band 3	Type
F-101L	E-101L	10V	0.01~0.06	0.4	0.8Ipmin.	8.00	1.1 max.	+2.10~-+0.10		Light blue	White	1L
F-101	E-101	10V	0.05~0.21	0.5	0.8Ipmin.	6.00	1.1max.	+2.10~-+0.10		Light blue	Pink	01
F-301	E-301	10V	0.20~0.42	0.8	0.8Ipmin.	4.00	1.1max.	+0.40~-+0.20		Light blue	Orange	03
F-501	E-501	10V	0.40~0.63	1.1	0.8Ipmin.	2.00	1.1max.	+0.15~-+0.25		Light blue	Yellow green	05
F-701	E-701	10V	0.60~0.92	1.4	0.8Ipmin.	1.00	1.1max.	0.00~-+0.32		Light blue	Blue	07
F-102	E-102	10V	0.88~1.32	1.7	0.8Ipmin.	0.65	1.1max.	-0.10~-+0.37		Yellow green	Pink	10
F-152	E-152	10V	1.28~1.72	2.0	0.8Ipmin.	0.40	1.1max.	-0.13~-+0.40		Yellow green	Orange	15
F-202	E-202	10V	1.68~2.32	2.3	0.8Ipmin.	0.25	1.1max.	-0.15~-+0.42		Yellow green	Yellow green	20
F-272	E-272	10V	2.28~3.10	2.7	0.8Ipmin.	0.15	1.1max.	-0.18~-+0.45		Yellow green	Light blue	27
F-352	E-352	10V	3.00~4.10	3.2	0.8Ipmin.	0.10	1.1max.	-0.20~-+0.47		Yellow green	Blue	35
F-452	E-452	10V	3.90~5.10	3.7	0.8Ipmin.	0.07	1.1max.	-0.22~-+0.50		Yellow green	Purple	45
F-562	E-562	10V	5.00~6.50	4.5	0.8Ipmin.	0.04	1.1max.	-0.25~-+0.53		Yellow green	White	56
F-822	E-822	10V	6.56~9.84	3.1	0.8Ipmin.	0.32	*1.0max.	-0.25~-+0.45		Yellow green	Yellow	82
F-103	E-103	10V	8.00~12.0	3.5	0.8Ipmin.	0.17	*1.0max.	-0.25~-+0.45		Orange	Pink	10
F-123	E-123	10V	9.60~14.4	3.8	0.8Ipmin.	0.08	*1.0max.	-0.25~-+0.45		Orange	White	12
F-153	E-153	10V	12.0~18.0	4.3	0.8Ipmin.	0.03	*1.0max.	-0.25~-+0.45		Orange	Light blue	15

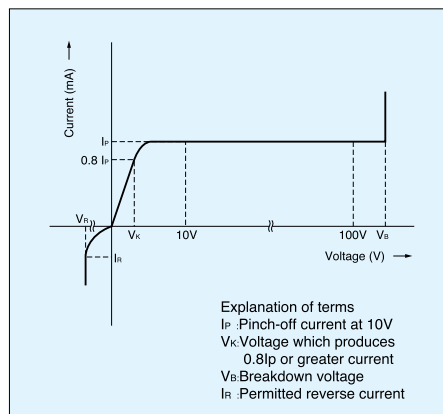
*1,2 Pinch-off current limiting current are measured by impulse wave at 25°C

*3 Z_r is minimum AC impedance when small AC signal voltage of 10KHz is added to 25 V_{bc} bias. Z_r is used as the reference value.

*4 Temperature coefficient is measured between 25°C and 50°C.

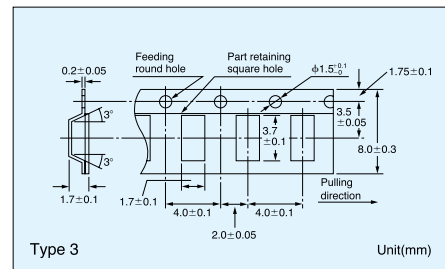
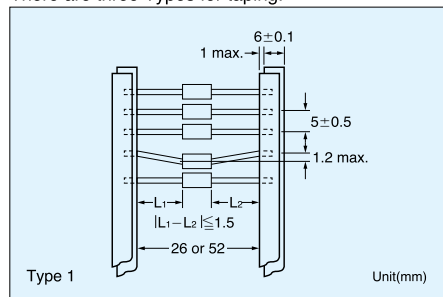
*I_{50V}/I_p

Basic characteristics



Taping

There are three Types for taping.



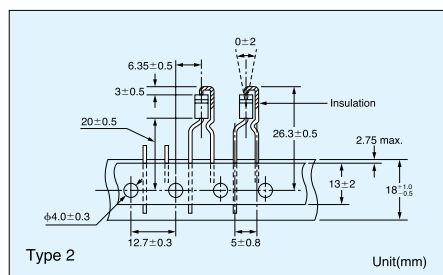
*In principal elements are set with cathode side on the round hole side.

Maximum ratings

	E type	F type
Rating power	300mW	400mW
Thermal resistance	300°C/W	150°C/W
Reverse current	50mA	
Operating temp	-30°C~150°C	

Maximum rating voltage

Part No.	Voltage	Part No.	Voltage
E101L~E-562	100V	F101L~F-562	100V
E-822	30	F-822	50
E-103	30	F-103	42
E-123	30	F-123	34
E-153	25	F-153	28



Minimum taping quantity for

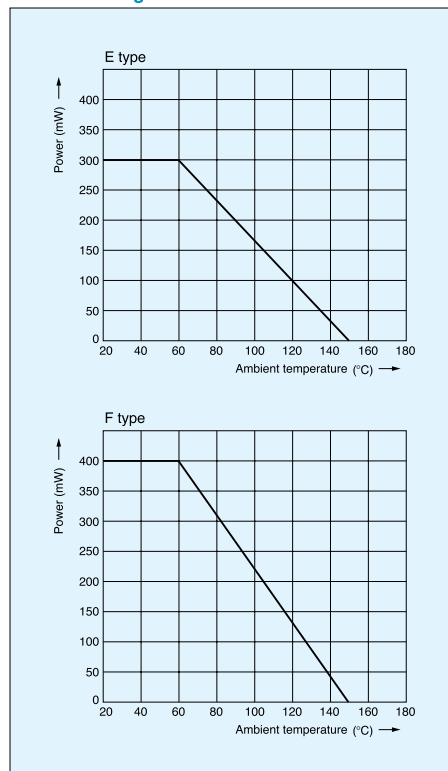
Type 1 Roll.....5000pcs

Box.....2500pcs

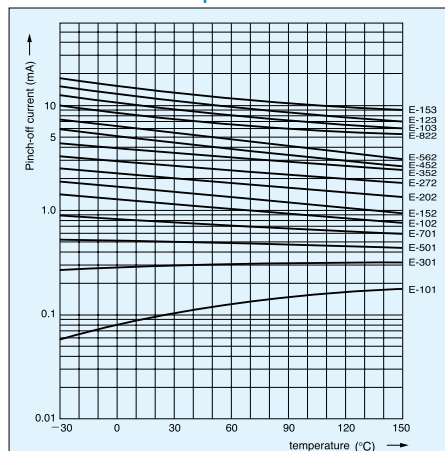
Type 2 4000pcs

Type 3 2500pcs

Power derating



Pinch-off current Temperature

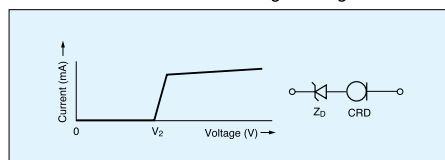


CRD in parallel

The use of CRD in parallel increases their current handling capabilities.

Increasing the voltage range using a zener diode

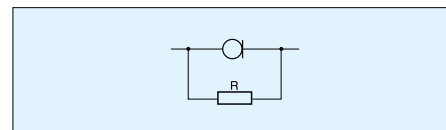
Connecting zener diodes in series with the line ensures that the current is constant in high-voltage area.



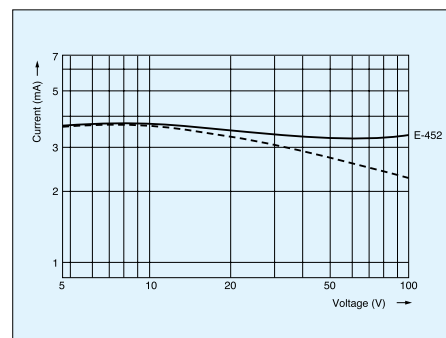
The compensation of current reduction due to self heating

Placing resistors in parallel with CRD can correct any current decrease when the applied voltage increases. The following values are typical for correction resistors.

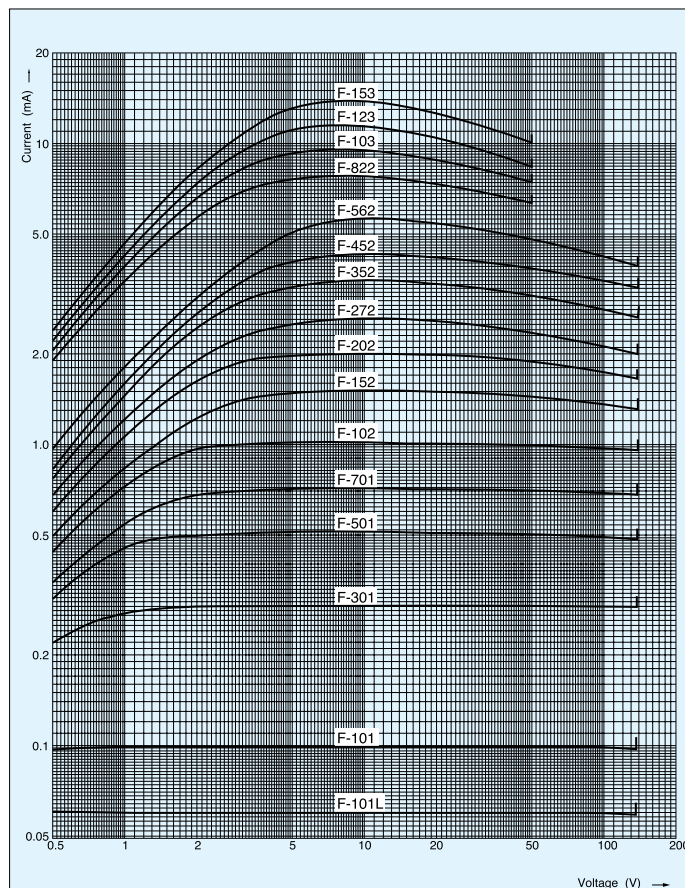
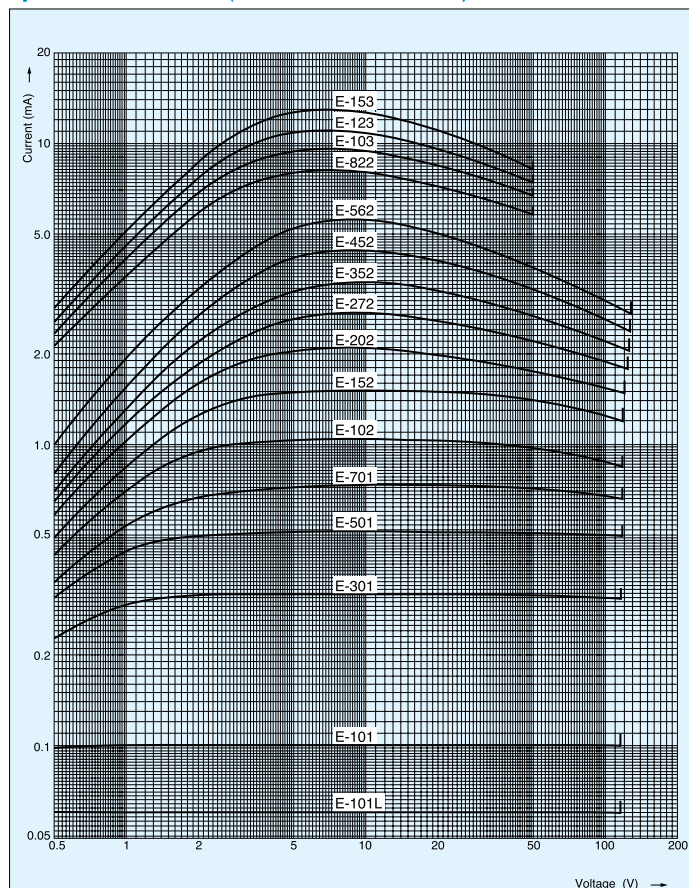
E-102	1MΩ	E-352	82kΩ
E-152	390kΩ	E-452	56kΩ
E-202	240kΩ	E-562	39kΩ
E-272	120kΩ		



Compensative resistor is not necessary if the current value is less than 1 mA.

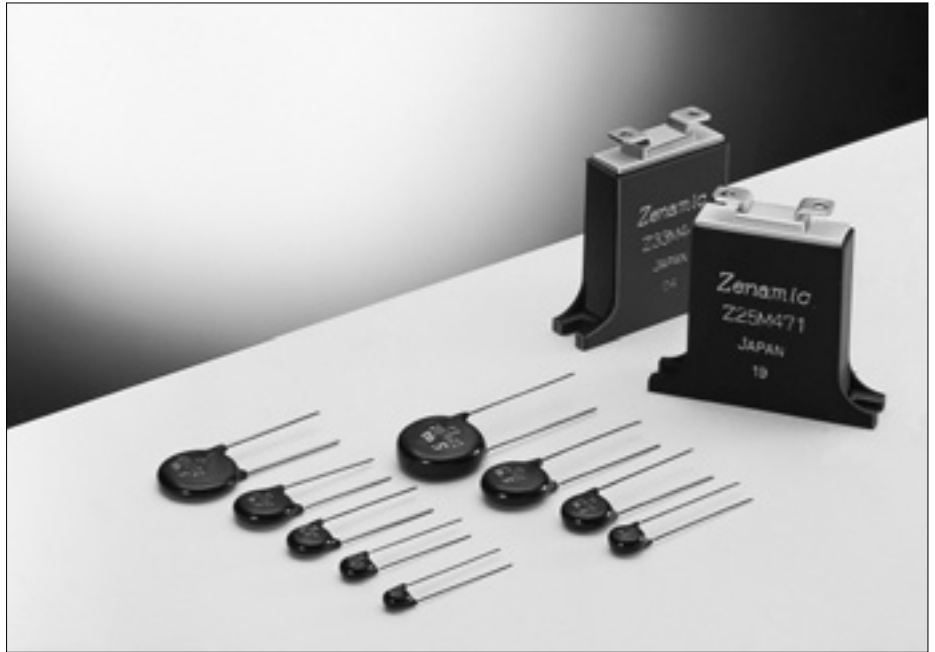


Dynamic characteristics (saturation characteristics)



METAL OXIDE VARISTOR

ZENAMIC



ZENAMIC is the product name of a metal oxide varistor.
ZENAMIC Transient/Surge Absorber, Series D is newly released through our continued research in ceramic material composition of ZnO varistor and manufacturing process, featuring large surge current handling capability and energy handling capability for absorbing transient overvoltage in compact size.

Features

- Improved in "Surge Current Handling Capability (at 8/20 μ s, 2 times)" by about 2 times over the current.
- Very large "Energy Handling Capability" absorbing transient overvoltages in compact sizes.
- Lower Clamping Voltage for better surge protection.
- Fast response to high speed transient/surge voltage.
- Wide products range for transient/surge protection on AC 100V to AC 480V nominal system with the maximum peak current ratings of 600A to 7000A (at 8/20 μ s, 2 times).

V-I characteristics

ZENAMIC has the forward-reverse symmetrical electrical characteristics as shown in the figure 1. The voltage-current curves show the varistor characteristics in the range $1\mu\text{A}$ to 10^4A , and show the resistance characteristics for the range under $1\mu\text{A}$ and over 10^4A in the figure 2. The voltage across terminals when test current (I_t : 1mA) is applied to ZENAMIC is the standard varistor voltage (V_Z), and the voltage across terminals when a standard surge (I_p) is applied represents the maximum suppression voltage (V_C).

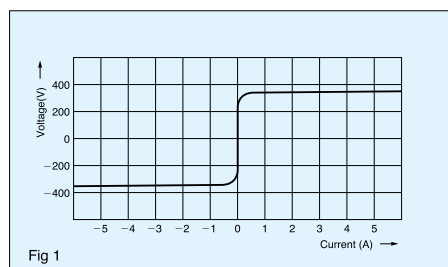


Fig 1

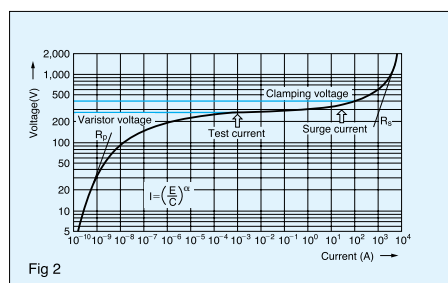


Fig 2

Temperature characteristics

In the small current range, ZENAMIC features outstanding temperature characteristics. A shunt resistance R_p of metal oxide varistor has the temperature characteristics which is determined by the following equation.

$$R_p = A_e E_g / 2kT \quad (2)$$

T: Absolute temperature
k: Boltzmann constant
A, E_g : constants

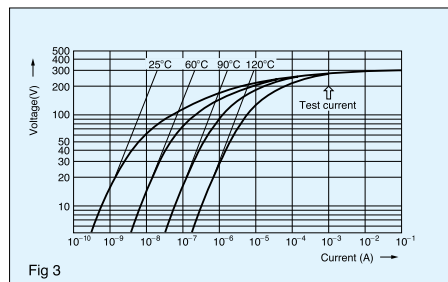


Fig 3

As shown in the figure 3, the temperature dependence characteristics are shown clearly in the low current area.

Surge waveform

A surge waveform varies according to the sources. An EXP waveform is used for surge testing of ZENAMIC, while a AC half-wave is used for the energy absorption test. The EXP waveform reaches its peak voltage (current) at $[t_a]$ as shown in the figure 5, and then decreases as time passes and reaches half of the peak voltage (current) at $[t_b]$. This type of the EXP waveform is shown as a $[t_a/t_b]$ voltage (current) waveform. For surge testing of ZENAMIC, the $8/20\mu\text{s}$ sec current waveform is used.

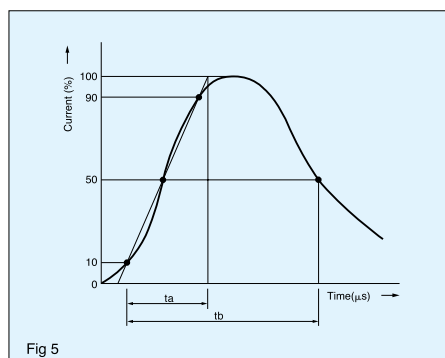


Fig 5

Part Number.

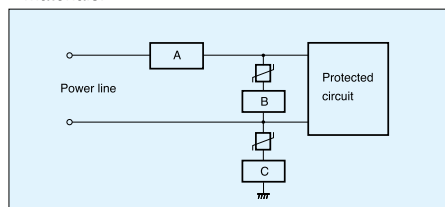
Z 10 D 221

Z: Varistor voltage
10: D series
D: Element diameter
221: ZENAMIC symbol

Application notes(General)

1. A surge excess of the specified Maximum Peak Current may cause short circuit or mechanical damage. The following measures are recommended.

- In case that ZENAMIC is used in line to ground, the ground fault circuit interrupter shall be applied in location A or thermally coupled fuse shall be applied in location C.
- ZENAMIC shall not be used near heat generating device and free from direct sunlight.
- ZENAMIC shall not be used near the flammable materials.



- 1) Location of the over current protector(circuit breaker or current fuse) shall be in the power line to the circuit(Location A) or in series with ZENAMIC (Location B).
- 2) It is recommended that a fuse listed in the table be put in location A or B.
- 3) In case that ZENAMIC is used in line to ground, the ground fault circuit interrupter should be applied in location A or thermally coupled fuse should be applied in location C.

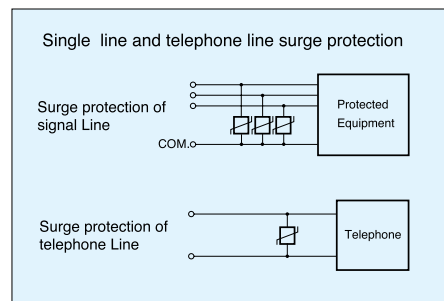
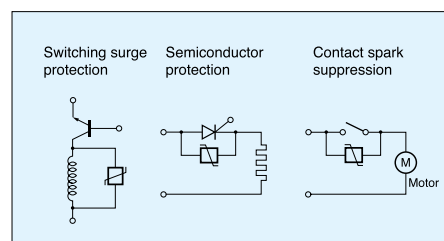
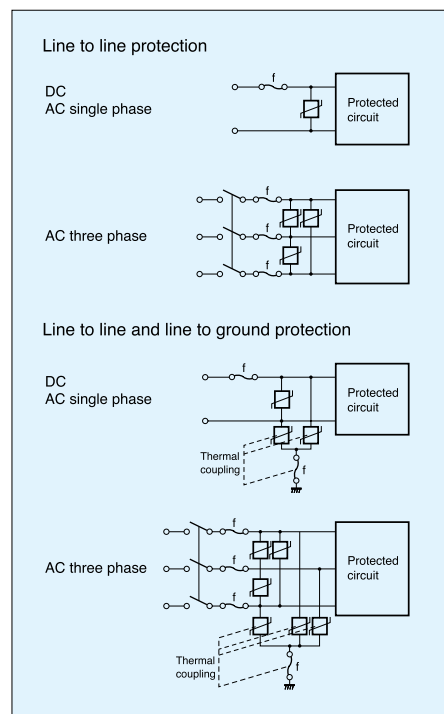
Part Number	Z5D□□□	Z7D□□□	Z10D□□□
Rating of fuse	3A max.	5A max.	7A max.

Part Number	Z15D□□□	Z21D□□□
Rating of fuse	10A max.	15A max.

Refer to the related Safety Standards.

Applications

Power lines and surge absorption units with error display (SA series).



Z7D Series

Specifications

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Rated Power	Maximum Energy		Maximum Peak Current (8/20μs) 2 times	Capacitance (TYP) 1kHz
						(10/1000μs)	(2ms)		
	V _{1mA} (V)	AC _{rms} (V)	DC(V)	V(V)	(W)	(J)	(J)	(A)	(pF)
Z7D180	18(16-20)	11	14	36 at 2.5A	0.02	1.1	0.9	250	3800
Z7D220	22(20-24)	14	18	43	0.02	1.3	1.1	250	3600
Z7D270	27(24-30)	17	22	53	0.02	1.6	1.3	250	3400
Z7D330	33(30-36)	20	26	65	0.02	2.0	1.6	250	2900
Z7D390	39(35-43)	25	31	77	0.02	2.4	1.9	250	1600
Z7D470	47(42-52)	30	38	93	0.02	2.8	2.3	250	1550
Z7D560	56(50-62)	35	45	110	0.02	3.4	2.7	250	1500
Z7D680	68(61-75)	40	56	135	0.02	4.1	3.3	250	1200
*1 Z7D820	82(74-90)	50	65	135 at 10A	0.25	7	5	1250	810
*1 Z7D101	100(90-110)	60	85	165	0.25	8.5	6	1250	700
*1 Z7D121	120(108-132)	75	100	200	0.25	10	7	1250	590
*1 Z7D151	150(135-165)	95	125	250	0.25	13	9	1250	500
*1 Z7D201	200(185-225)	130	170	340	0.25	17.5	12.5	1250	200
*1 Z7D221	220(198-242)	140	180	360	0.25	19	13.5	1250	190
*1 Z7D241	240(216-264)	150	200	395	0.25	21	15	1250	170
*1 Z7D271	270(247-303)	175	225	455	0.25	24	17	1250	150
*1 Z7D331	330(297-363)	210	270	545	0.25	28	20	1250	130
*1 Z7D361	360(324-396)	230	300	595	0.25	32	23	1250	130
*1 Z7D391	390(351-429)	250	320	650	0.25	35	25	1250	130
*1 Z7D431	430(387-473)	275	350	710	0.25	40	27.5	1250	120
*1 Z7D471	470(423-517)	300	385	775	0.25	42	30	1250	100 *2
*1 Z7D511	510(459-561)	320	410	845	0.25	45	32	1250	90 *2

1. Operating temperature range: -40 to 85°C

2. Storage temperature range: -40 to 125°C

*1 UL 1449 approved model

*2 Measured at 1MHz

Z10D Series

Specifications

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Rated Power	Maximum Energy		Maximum Peak Current (8/20μs) 2 times	Capacitance (TYP) 1kHz
						(10/1000μs)	(2ms)		
	V _{1mA} (V)	AC _{rms} (V)	DC(V)	V(V)	(W)	(J)	(J)	(A)	(pF)
Z10D180	18(16-20)	11	14	36 at 5A	0.05	2.6	2.2	500	16000
Z10D220	22(20-24)	14	18	43	0.05	3.2	2.6	500	11000
Z10D270	27(24-30)	17	22	53	0.05	3.9	3.2	500	8000
Z10D330	33(30-36)	20	26	65	0.05	4.8	4.0	500	6300
Z10D390	39(35-43)	25	31	77	0.05	5.6	4.7	500	5200
Z10D470	47(42-52)	30	38	93	0.05	6.8	5.6	500	4600
Z10D560	56(50-62)	35	45	110	0.05	8.1	6.7	500	3750
Z10D680	68(61-75)	40	56	135	0.05	9.8	8.2	500	2800
* Z10D820	82(74-90)	50	65	135 at 25A	0.4	14	10	2500	2000
* Z10D101	100(90-110)	60	85	165	0.4	17	12	2500	1700
* Z10D121	120(108-132)	75	100	200	0.4	20	14.5	2500	1400
* Z10D151	150(135-165)	95	125	250	0.4	25	18	2500	1100
* Z10D201	200(185-225)	130	170	340	0.4	35	25	2500	430
* Z10D221	220(198-242)	140	180	360	0.4	39	27.5	2500	410
* Z10D241	240(216-264)	150	200	395	0.4	42	30	2500	380
* Z10D271	270(247-303)	175	225	455	0.4	49	35	2500	350
* Z10D331	330(297-363)	210	270	545	0.4	58	42	2500	300
* Z10D361	360(324-396)	230	300	595	0.4	65	45	2500	300
* Z10D391	390(351-429)	250	320	650	0.4	70	50	2500	300
* Z10D431	430(387-473)	275	350	710	0.4	80	55	2500	270
* Z10D471	470(423-517)	300	385	775	0.4	85	60	2500	230
* Z10D511	510(459-561)	320	410	845	0.4	92	67	2500	210
* Z10D561	560(504-616)	350	450	930	0.4	92	67	2500	200
* Z10D681	680(612-748)	420	560	1120	0.4	92	67	2500	170
* Z10D751	750(675-825)	460	615	1240	0.4	100	70	2500	160
* Z10D821	820(738-902)	510	670	1355	0.4	110	80	2500	140
* Z10D911	910(819-1001)	550	745	1500	0.4	130	90	2500	120
* Z10D102	1000(900-1100)	625	825	1650	0.4	140	100	2500	110

1. Operating temperature range: -40 to 85°C

2. Storage temperature range: -40 to 125°C

* UL 1449 approved model

Z15D Series

Specifications

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Rated Power	Maximum Energy		Maximum Peak Current (8/20μs) 2 times	Capacitance (TYP) 1kHz
						(10/1000μs)	(2ms)		
	V _{1mA} (V)	AC _{rms} (V)	DC(V)	V(V)	(W)	(J)	(J)	(A)	(pF)
Z15D180	18(16-20)	11	14	36 at 10A	0.1	5.2	4.3	1000	25000
Z15D220	22(20-24)	14	18	43	0.1	6.3	5.3	1000	20000
Z15D270	27(24-30)	17	22	53	0.1	7.8	6.5	1000	16000
Z15D330	33(30-36)	20	26	65	0.1	9.5	7.9	1000	12200
Z15D390	39(35-43)	25	31	77	0.1	11	9.4	1000	7000
Z15D470	47(42-52)	30	38	93	0.1	14	11	1000	6750
Z15D560	56(50-62)	35	45	110	0.1	16	13	1000	6500
Z15D680	68(61-75)	40	56	135	0.1	20	16	1000	5500
* Z15D820	82(74-90)	50	65	135 at 50A	0.6	28	20	4500	3700
* Z15D101	100(90-110)	60	85	165	0.6	35	25	4500	3200
* Z15D121	120(108-132)	75	100	200	0.6	42	30	4500	2700
* Z15D151	150(135-165)	95	125	250	0.6	53	37.5	4500	2200
* Z15D201	200(185-225)	130	170	340	0.6	70	50	4500	770
* Z15D221	220(198-242)	140	180	360	0.6	78	55	4500	740
* Z15D241	240(216-264)	150	200	395	0.6	84	60	4500	700
* Z15D271	270(247-303)	175	225	455	0.6	99	70	4500	640
* Z15D331	330(297-363)	210	270	545	0.6	115	80	4500	580
* Z15D361	360(324-396)	230	300	595	0.6	130	90	4500	540
* Z15D391	390(351-429)	250	320	650	0.6	140	100	4500	500
* Z15D431	430(387-473)	275	350	710	0.6	155	110	4500	450
* Z15D471	470(423-517)	300	385	775	0.6	175	125	4500	400
* Z15D511	510(459-561)	320	410	845	0.6	190	136	4500	350
* Z15D561	560(504-616)	350	450	930	0.6	190	136	4500	340
* Z15D681	680(612-748)	420	560	1120	0.6	190	136	4500	320
* Z15D751	750(675-825)	460	615	1240	0.6	210	150	4500	310
* Z15D821	820(738-902)	510	670	1355	0.6	235	165	4500	280
* Z15D911	910(819-1001)	550	745	1500	0.6	255	180	4500	250
* Z15D102	1000(900-1100)	625	825	1650	0.6	280	200	4500	230

1. Operating temperature range: -40 to 85°C

* UL 1449 approved model

2. Storage temperature range: -40 to 125°C

Z21D Series

Specifications

Part No.	Varistor Voltage	Maximum Allowable Voltage		Clamping Voltage (max.)	Rated Power	Maximum Energy		Maximum Peak Current (8/20μs) 2 times	Capacitance (TYP) 1kHz
						(10/1000μs)	(2ms)		
	V _{1mA} (V)	AC _{rms} (V)	DC(V)	V(V)	(W)	(J)	(J)	(A)	(pF)
Z21D180	18(16-20)	11	14	36 at 20A	0.2	13	12	2000	40000
Z21D220	22(20-24)	14	18	43	0.2	16	14	2000	30000
Z21D270	27(24-30)	17	22	53	0.2	19	17	2000	24500
Z21D330	33(30-36)	20	26	65	0.2	24	21	2000	20000
Z21D390	39(35-43)	25	31	77	0.2	28	25	2000	13800
Z21D470	47(42-52)	30	38	93	0.2	34	30	2000	13500
Z21D560	56(50-62)	35	45	110	0.2	41	36	2000	12200
Z21D680	68(61-75)	40	56	135	0.2	49	44	2000	11500
* Z21D820	82(74-90)	50	65	135 at 100A	1.0	56	40	6500	7500
* Z21D101	100(90-110)	60	85	165	1.0	70	50	6500	6500
* Z21D121	120(108-132)	75	100	200	1.0	85	60	6500	5500
* Z21D151	150(135-165)	95	125	250	1.0	106	75	6500	4500
* Z21D201	200(185-225)	130	170	340	1.0	140	100	6500	1700
* Z21D221	220(198-242)	140	180	360	1.0	155	110	6500	1600
* Z21D241	240(216-264)	150	200	395	1.0	168	120	6500	1500
* Z21D271	270(247-303)	175	225	455	1.0	190	135	6500	1300
* Z21D331	330(297-363)	210	270	545	1.0	228	160	6500	1100
* Z21D361	360(324-396)	230	300	595	1.0	255	180	6500	1100
* Z21D391	390(351-429)	250	320	650	1.0	275	195	6500	1100
* Z21D431	430(387-473)	275	350	710	1.0	303	215	6500	1000
* Z21D471	470(423-517)	300	385	775	1.0	350	250	6500	900
* Z21D511	510(459-561)	320	410	845	1.0	382	273	6500	800
* Z21D561	560(504-616)	350	450	930	1.0	382	273	6500	750
* Z21D681	680(612-748)	420	560	1120	1.0	382	273	6500	650
* Z21D751	750(675-825)	460	615	1240	1.0	420	300	6500	600
* Z21D821	820(738-902)	510	670	1355	1.0	460	325	6500	530
* Z21D911	910(819-1001)	550	745	1500	1.0	510	360	6500	500
* Z21D102	1000(900-1100)	625	825	1650	1.0	565	400	6500	450

1. Operating temperature range: -40 to 85°C

* UL 1449 approved model

2. Storage temperature range: -40 to 125°C

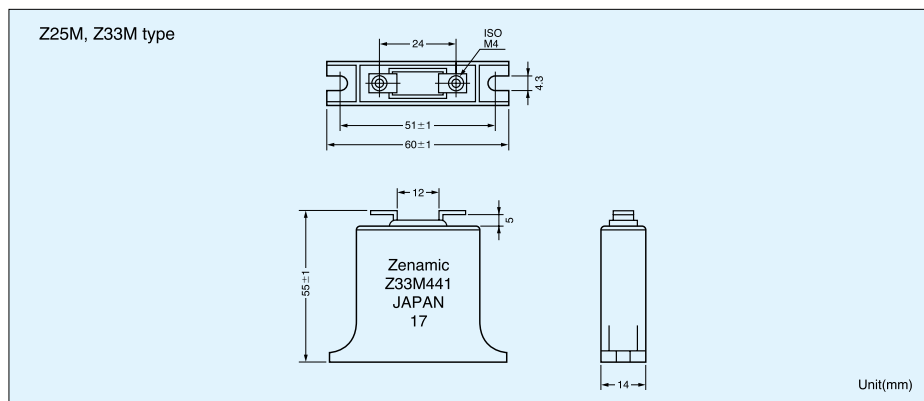
Z25M, Z33M Series

Specifications

Part No.	Varistor voltage $V_{1mA}(V)$		Maximum allowable voltage		Clamping voltage	Rated power	Maximum energy (2ms)	Withstanding surge current (8/20 μ s)	Capacitance (TYP) (1kHz)
			AC	DC					
	Min	Max	V_{rms}	V	V	W	J	2 Times	pF
Z25M221S	220(187 ~253)		120	165	380 at 150A	1.0	125	10000A	3300
Z25M271S	270(229.5~310.5)		150	210	465		155		2200
Z25M331S	330(280.5~379.5)		175	245	570		185		1900
Z25M391S	390(331.5~448.5)		210	295	675		215		1700
Z25M441S	440(374 ~506)		240	335	760		225		1500
Z25M471S	470(399.5~540.5)		250	350	810		235		1500
Z25M561S	560(476 ~644)		300	420	970		260		1400
Z25M681S	680(578 ~782)		365	510	1175		280		1250
Z25M821S	820(697 ~943)		440	615	1415		330		800
Z25M102S	1000(850 ~1,150)		520	730	1725		375		500
Z33M221S	220(187 ~253)		120	165	380 at 200A	1.2	200	20000A	5500
Z33M271S	270(229.5~310.5)		150	210	465		255		4200
Z33M331S	330(280.5~379.5)		175	245	570		310		3700
Z33M391S	390(331.5~448.5)		210	295	675		360		3200
Z33M441S	440(374 ~506)		240	335	760		370		2800
Z33M471S	470(399.5~540.5)		250	350	810		385		2600
Z33M561S	560(476 ~644)		300	420	970		425		2200
Z33M681S	680(578 ~782)		365	510	1175		460		1800
Z33M821S	820(697 ~943)		440	615	1415		580		1500
Z33M102S	1000(850 ~1150)		520	730	1725		620		1000

1. Operating temperature range: -40 to 85°C
2. Storage temperature range: -40 to 125°C

Dimensions



GASTUBE ARRESTER

Gas tube arrester(GTA)is a surge absorber featuring low capacitance and high surge absorption energy.

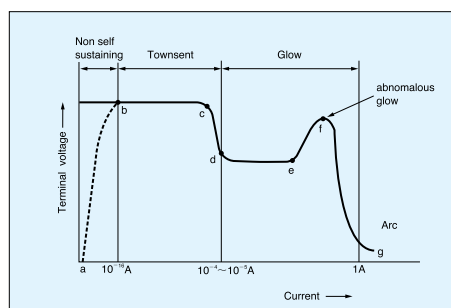
It consists of a sealed tube in which inert gas is injected and electrodes which are set at fixed intervals. The simple structure and the dimensional accuracy offer high reliability and stabilized characteristics.

Applications

1. Protection for telephone set, facsimile, telex, telephone system, CATV, computer and peripheral equipment.
2. Semiconductor circuit protection in equipment that also uses high voltage such as TV, oscilloscope, and electron microscope.
3. Automatic control of luminous energy in stroboscopic tube.
4. Generator of high-voltage for gas igniter.

Voltage-Current Characteristics

The current through the GTA is changed over the range of values of 10^{-18} to 10^2 amps which is shown as the figure below and the voltage across the GTA will also vary. The discharge characteristics are changed to various mode by the flowing current, and the final mode of the discharge characteristics is arc discharge.



When the applied voltage across the GTA exceeds the breakdown voltage (sparkover voltage), the current through the GTA increases rapidly to value of several amps or greater. The rate of current rise and level to be reached are limited by the series impedance of the circuit. The voltage across the GTA at this time is very low with typical value of 20 to 30 volts.

Electrical Characteristics

AC Discharge Current

The current is the rms value of sinusoidal alternating current of 50Hz or 60Hz which can flow through the GTA in accordance with a certain test method without substantially altering its sparkover voltage. The usual test consists of specified loads applied for 1 sec at interval of 1 min alternately. In the test of the maximum AC discharge current, the GTA is applied 9 cycles of 50Hz AC(180 ms) continuously.

Impulse Surge Life

The life is defined as the minimum number of surges of a certain current waveform the GTA can survive without deterioration of its operating specifications.

Insulation Resistance

This is defined as the resistance value across the terminal of GTA at 100V_{DC} for devices over 230V_{DC} (140V_{DC} for GTA type) breakdown voltage and 50V_{DC} for devices less than 230V_{DC}(140V_{DC} for GTA type) ratings.

DC Breakdown Voltage

The voltage is the minimum slowly rising DC voltage that will cause sparkover when applied across the terminal of the GTA. The GTA shall be placed in darkness for at least 15 min and tested in this condition using a ramp voltage waveform with 100V/s to 500V/s. The GTA shall be tested with a positive and a negative waveform. The sparkover current for DC sparkover voltage test shall be within 10 amps.

Impulse Breakdown Voltage

The GTA to be exposed to the test shall be kept in total darkness before (for at least 15 min) and during the test. Then, with a ramp voltage with 5kV/ μ s applied to the GTA, the breakdown voltage level is recorded. In case of testing with opposite polarity, using the same GTA, a minimum of 15 min shall elapse.

Maximum Single Impulse Discharge Current

This test is to determine the ability of the GTA to conduct a maximum single impulse Discharge current. The current impulse waveform is 8/20 μ s. The maximum single impulse discharge current is the crest current of the impulse.

Capacitance

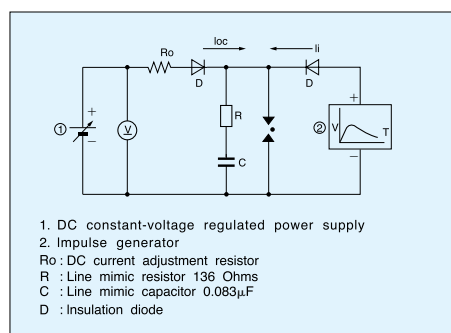
The capacitance of the GTA is defined as capacitance across terminals of the GTA at 1 kHz.

Operating Temperature Range

-20°C~65°C

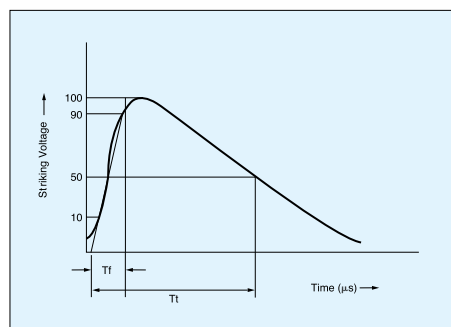
DC Holdover Voltage

This values is defined as the maximum DC voltage across the terminals of the GTA which is expected to clear and restore its high impedance state within 150 ms or less after the passage of a surge.



Impulse Waveform

Impulse breakdown voltage is the voltage at which the GTA fires when the voltage increases at rates of more than 100V/ μ s. This value may not vary even after the GTA has been stored in the dark for long period. The value of the impulse breakdown voltage increases with increasing steepness of the surge voltage as the figure below.

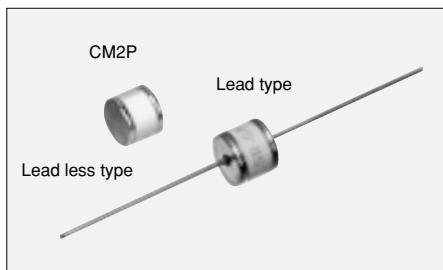
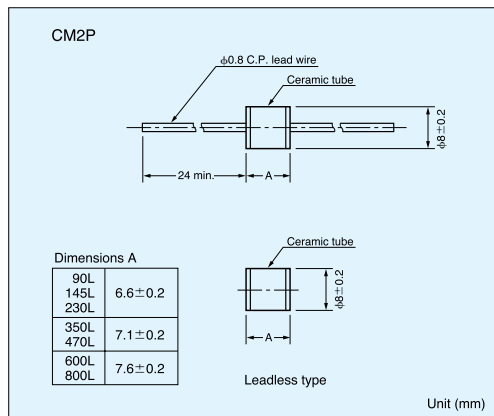


CM2P type

A ceramic tube is sealed at both side by electrodes, and inside of it is filled up by inert gas. The ceramic type gas tube arrester has superior characteristics

such as mechanical strength, surge absorption energy and stability. There are two electrodes type and three electrodes type.

Dimensions

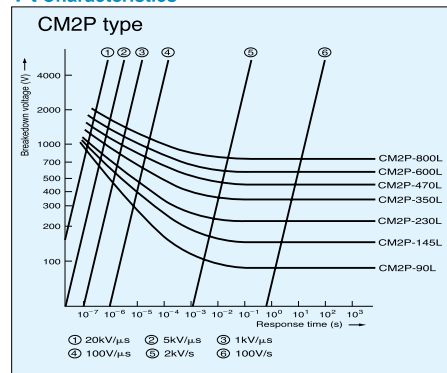


Specifications

Part No.	DC Breakdown Voltage (100V/s)	Impulse Breakdown Voltage (5kV/ μ s)	Nominal Impulse Discharge Current (8/20 μ s)	Impulse Life (10/1000 μ s)	Insulation Resistance (DC100V or 50V)	Capacitance (1kHz)
CM2P-90L	90V $\pm$ 20%	1000V max.	10000A $\times$ 2 times	500A $\times$ 600 times	10 ⁴ M Ω min.	2pF max.
CM2P-145L	145V $\pm$ 20%	1000V max.	10000A $\times$ 2 times	500A $\times$ 600 times	10 ⁴ M Ω min.	2pF max.
CM2P-230L	230V $\pm$ 15%	1000V max.	10000A $\times$ 2 times	500A $\times$ 600 times	10 ⁴ M Ω min.	2pF max.
CM2P-350L	350V $\pm$ 15%	1500V max.	10000A $\times$ 2 times	500A $\times$ 600 times	10 ⁴ M Ω min.	2pF max.
CM2P-470L	470V $\pm$ 15%	1500V max.	10000A $\times$ 2 times	500A $\times$ 600 times	10 ⁴ M Ω min.	2pF max.
CM2P-600L	600V $\pm$ 15%	1800V max.	10000A $\times$ 2 times	500A $\times$ 600 times	10 ⁴ M Ω min.	2pF max.
CM2P-800L	800V $\pm$ 15%	2000V max.	10000A $\times$ 2 times	500A $\times$ 600 times	10 ⁴ M Ω min.	2pF max.

● Suffix : L shows lead type and no-suffix shows leadless type

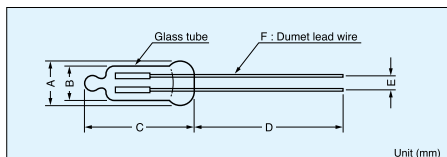
V-t Characteristics



GTA type

Electrodes are set in a sealed glass, and inert gas is filled inside.

Dimensions

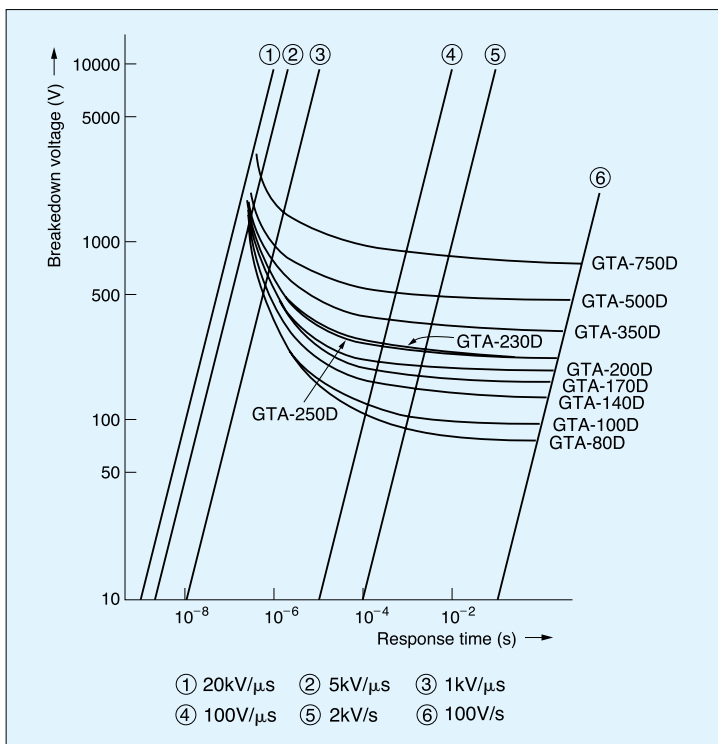


	GTA-80D~GTA-500D	GTA-750D,800D
A	6.6max.	7.0max.
B	$\phi 5.85 \pm 0.3$	$\phi 6.5 \pm 0.3$
C	19max	19max
D	25min.	25min.
E	3min.	3min.
F	$\phi 0.45$	$\phi 0.45$

Unit (mm)



V-t Characteristics



Specifications

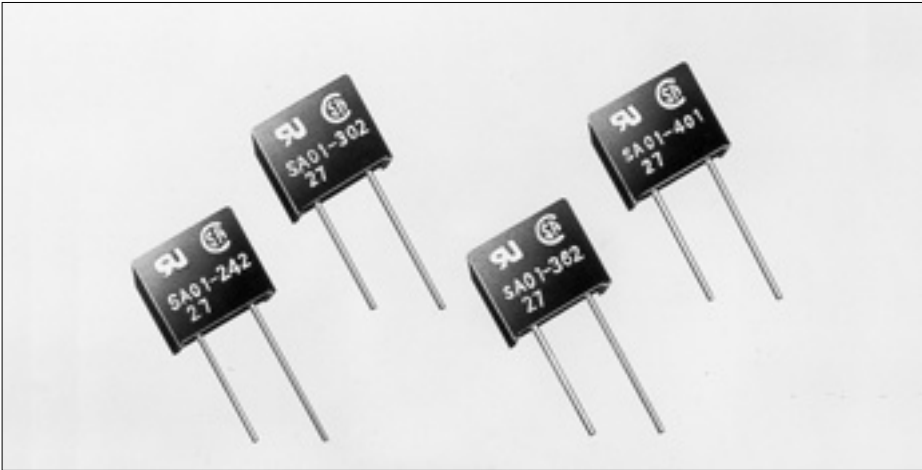
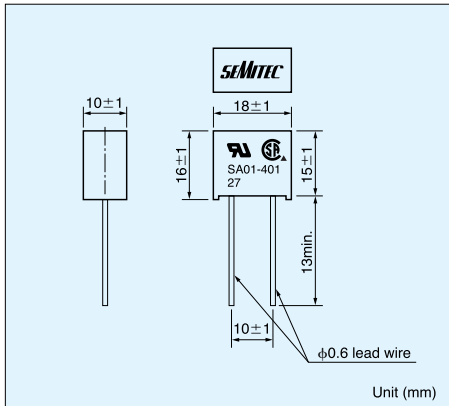
Part No.	DC Breakdown Voltage (100V/s)	Impulse Breakdown Voltage (5kV/μs)	Nominal Impulse Discharge Current (8/20μs)	Impulse Life (8/20μs)	Insulation Resistance (DC100V or 50V)	Capacitance (1kHz)
GTA-80D	80V ± 15%	1200V max.	1500A × 1 time	500A × 1000 times	10 ² MΩ min.	2pF max.
GTA-100D	100V ± 15%	1300V max.	1500A × 1 time	500A × 1000 times	10 ² MΩ min.	2pF max.
GTA-140D	140V ± 15%	1300V max.	1500A × 1 time	500A × 1000 times	10 ² MΩ min.	2pF max.
GTA-170D	170V ± 15%	1500V max.	1500A × 1 time	500A × 1000 times	10 ² MΩ min.	2pF max.
GTA-200D	200V ± 15%	1700V max.	1500A × 1 time	500A × 1000 times	10 ² MΩ min.	2pF max.
GTA-230D	230V ± 15%	1700V max.	1500A × 1 time	500A × 1000 times	10 ² MΩ min.	2pF max.
GTA-250D	250V ± 15%	1700V max.	1500A × 1 time	500A × 1000 times	10 ² MΩ min.	2pF max.
GTA-350D	350V ± 15%	2000V max.	1500A × 1 time	500A × 1000 times	10 ² MΩ min.	2pF max.
GTA-500D	500V ± 15%	2100V max.	1500A × 1 time	500A × 1000 times	10 ² MΩ min.	2pF max.

SA01 type

The SA01 is a new product which can be utilized for protecting transient voltage in power supply of equipment with earth terminal.

For the equipment in which SA01 is used, the AC withstanding voltage between power lines and earth terminal can be tested without taking off "SA01".

Dimensions



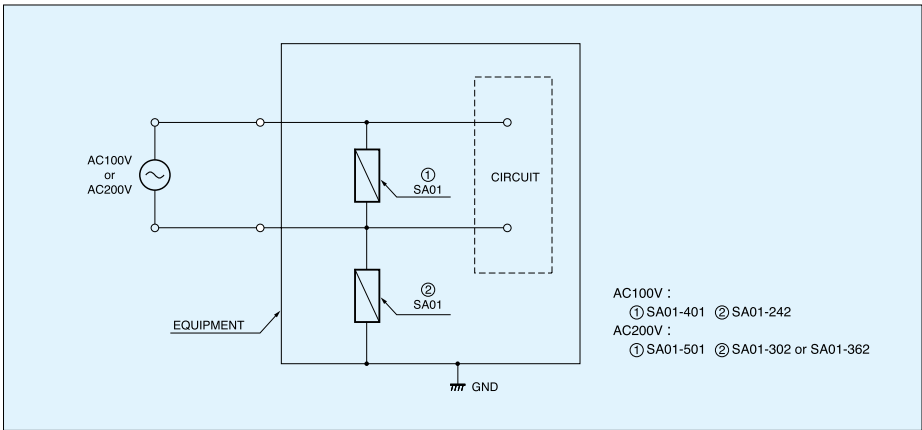
Safety Standards

Standards Name	UL	CSA	TÜV
Standards No.	UL1449	C22.2 No.1	IEC61051
File No.	E128417	LR-76099	J50015463
Mark			—

Specifications

Part No.	DC Breakdown Voltage (100V/s)	Impulse Breakdown Voltage (5kV/μs)	Nominal Impulse Discharge Current(8/20μs)	Impulse Life (8/20μs)	Insulation Resistance (DC100V)	Capacitance (1kHz)	Connection	Dielectric Withstanding Voltage
SA01-401	400V $\pm 30\%$	1000V max.	1250A×2 times	100A×300 times	10 ² MΩ min	2pF max.	AC125V (Line-Line)	—
SA01-501	500V $\pm 30\%$	1400V max.	1250A×2 times	100A×300 times	10 ² MΩ min	2pF max.	AC250V (Line-Line)	—
SA01-242	2400V $\pm 30\%$	4000V max.	1250A×2 times	100A×300 times	10 ² MΩ min	2pF max.	AC125V (Line-GND)	AC1200V 3s
SA01-302	3000V $\pm 30\%$	4500V max.	1250A×2 times	100A×300 times	10 ² MΩ min	2pF max.	AC250V (Line-GND)	AC1500V 1min
SA01-362	3600V $\pm 30\%$	5000V max.	1250A×2 times	100A×300 times	10 ² MΩ min	2pF max.	AC250V (Line-GND)	AC1800V 3s

Application Circuit



AC100V :
① SA01-401 ② SA01-242
AC200V :
① SA01-501 ② SA01-302 or SA01-362

SUNSTAR商斯达实业集团是集研发、生产、工程、销售、代理经销、技术咨询、信息服务等为一体的高科技企业,是专业高科技电子产品生产厂家,是具有 10 多年历史的专业电子元器件供应商,是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一,是一家专业代理和分销世界各大品牌IC芯片和电子元器件的连锁经营综合性国际公司。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商,已在全国范围内建成强大统一的供货和代理分销网络。我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA软件硬件、二极管、三极管、模块等,是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。**专业以现代信息产业(计算机、通讯及传感器)三大支柱之一的传感器为主营业务,专业经营各类传感器的代理、销售生产、网络信息、科技图书资料及配套产品设计、工程开发。我们的专业网站——中国传感器科技信息网(全球传感器数据库) www.SENSOR-IC.COM 服务于全球高科技生产商及贸易商,为企业科技产品开发提供技术交流平台。欢迎各厂商互通有无、交换信息、交换链接、发布寻求代理信息。欢迎国外高科技传感器、变送器、执行器、自动控制产品厂商介绍产品到 中国,共同开拓市场。**本网站是关于各种传感器-变送器-仪器仪表及工业自动化大型专业网站,深入到工业控制、系统工程计 测量、自动化、安防报警、消费电子等众多领域,把最新的传感器-变送器-仪器仪表买卖信息,最新技术供求,最新采购商,行业动态,发展方向,最新的技术应用和市场资讯及时的传递给广大科技开发、科学研究、产品设计人员。本网站已成功为石油、化工、电力、医药、生物、航空、航天、国防、能源、冶金、电子、工业、农业、交通、汽车、矿山、煤炭、纺织、信息、通信、IT、安防、环保、印刷、科研、气象、仪器仪表等领域从事科学研究、产品设计、开发、生产制造的科技人员、管理人员、和采购人员提供满意服务。**我公司专业开发生产、代理、经销、销售各种传感器、变送器、敏感元器件、开关、执行器、仪器仪表、自动化控制系统: 专门从事设计、生产、销售各种传感器、变送器、各种测控仪表、热工仪表、现场控制器、计算机控制系统、数据采集系统、各类环境监控系统、专用控制系统应用软件以及嵌入式系统开发及应用等工作。如热敏电阻、压敏电阻、温度变送器、湿度变送器、湿度传感器、气体变送器、气体传感器、压力传感器、压力变送、称重传感器、物(液)位传感器、物(液)位变送器、流量传感器、流量变送器、电流(压)传感器、溶氧传感器、霍尔传感器、图像传感器、超声波传感器、位移传感器、速度传感器、加速度传感器、扭距传感器、红外传感器、紫外传感器、火焰传感器、激光传感器、振动传感器、轴角传感器、光电传感器、接近传感器、干簧管传感器、继电器传感器、微型电泵、磁敏(阻)传感器、压力开关、接近开关、光电开关、色标传感器、光纤传感器、齿轮测速传感器、时间继电器、计数器、计米器、温控仪、固态继电器、调压模块、电磁铁、电压表、电流表等特殊传感器。同时承接传感器应用电路、产品设计和自动化工程项目。**

更多产品请看本公司产品专用销售网站:

商斯达中国传感器科技信息网: <http://www.sensor-ic.com/>

商斯达工控安防网: <http://www.pc-ps.net/>

商斯达电子元器件网: <http://www.sunstare.com/>

商斯达微波光电产品网: [HTTP://www.rfoe.net/](http://www.rfoe.net/)

商斯达消费电子产品网: <http://www.icasic.com/>

商斯达军工产品网: <http://www.junpinic.com/>

商斯达实业科技产品网: <http://www.sunstars.cn/> 传感器销售热线:

地址: 深圳市福田区福华路福庆街鸿图大厦 1602 室

电话: 0755-83607652 83376489 83376549 83370250 83370251 82500323

传真: 0755-83376182 (0) 13902971329 MSN: SUNS8888@hotmail.com

邮编: 518033 E-mail: szss20@163.com QQ: 195847376

深圳赛格展销部: 深圳华强北路赛格电子市场 2583 号 电话: 0755-83665529 25059422

技术支持: 0755-83394033 13501568376

欢迎索取免费详细资料、设计指南和光盘; 产品凡多, 未能尽录, 欢迎来电查询。

北京分公司: 北京海淀区知春路 132 号中发电子大厦 3097 号

TEL: 010-81159046 82615020 13501189838 FAX: 010-62543996

上海分公司: 上海市北京东路 668 号上海赛格电子市场 D125 号

TEL: 021-28311762 56703037 13701955389 FAX: 021-56703037

西安分公司: 西安高新开发区 20 所(中国电子科技集团导航技术研究所)

西安劳动南路 88 号电子商城二楼 D23 号

TEL: 029-81022619 13072977981 FAX: 029-88789382