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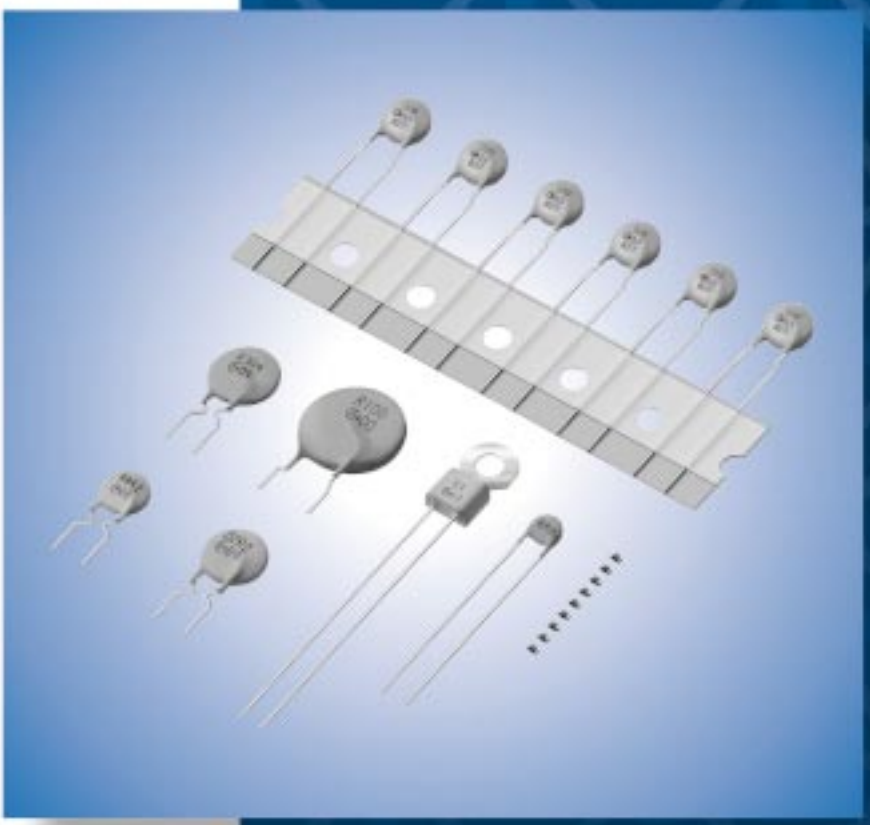
POSISTOR®
for Circuit Protection



muRata Innovator in Electronics

Murata
Manufacturing Co., Ltd.

Cat.No.R90E-9

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● Part Numbering

PTC Thermistors (POSISTOR®) for Circuit Protection

(Part Number) PR G 18 BB 470 M B1 RB
❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶Product ID

Product ID	
PR	PTC Thermistors Chip Type

❷Series

Code	Series
G	for Overcurrent Protection

❸Dimensions (L×W)

Code	Dimensions (L×W)
18	1.60×0.80mm
21	2.00×1.25mm

❹Temperature Characteristics

Code	Temperature Characteristics
BB	Curie Point 100°C
BC	Curie Point 90°C

❺Resistance

Expressed by three-digit alphanumerics. The unit is ohm (Ω). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures. If there is a decimal point, it is expressed by the capital letter "**R**". In this case, all figures are significant digits.

Ex.)

Code	Resistance
470	47Ω
471	470Ω

❻Resistance Tolerance

Code	Resistance Tolerance
M	±20%
Q	Special Tolerance

❼Individual Specifications

Code	Individual Specifications
B1	Structure, others

❽Packaging

Code	Packaging
RA	Embossed Taping (4mm Pitch) (4000 pcs.)
RB	Paper Taping (4mm Pitch) (4000 pcs.)
RK	Embossed Taping (4mm Pitch) (3000 pcs.)

PTC Thermistors (POSISTOR®) for Overheat Sensing Chip Type

(Part Number) PR F 18 BB 471 Q B1 RB
❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶Product ID

Product ID	
PR	PTC Thermistors Chip Type

❷Series

Code	Series
F	for Overheat Sensing

❸Dimensions (L×W)

Code	Dimensions (L×W)
15	1.00×0.50mm
18	1.60×0.80mm
21	2.00×1.25mm

❹Temperature Characteristics

Code	Temperature Characteristics
AR	Curie Point 120°C
AS	Curie Point 130°C
BA	Curie Point 110°C
BB	Curie Point 100°C
BC	Curie Point 90°C
BD	Curie Point 80°C
BE	Curie Point 70°C
BF	Curie Point 60°C
BG	Curie Point 50°C

❺Resistance

Expressed by three figures. The unit is ohm (Ω). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures.

Ex.)

Code	Resistance
471	470Ω

❻Resistance Tolerance

Code	Resistance Tolerance	Sensing Temp. Tolerance
Q	Special Tolerance	±5°C
R	Special Tolerance	±3°C

❼Individual Specifications

Code	Individual Specifications
B1	Structure, others

❽Packaging

Code	Packaging
RA	Embossed Taping (4mm Pitch) (4000 pcs.)
RB	Paper Taping (4mm Pitch) (4000 pcs.)
RC	Paper Taping (2mm Pitch) (10000 pcs.)

PTC Thermistors (POSISTOR®) for Circuit Protection / for Overheat Sensing Lead Type

(Part Number) **PT** **GL** **07** **AR** **220** **M** **3P51** **A0**
❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶Product ID

Product ID	
PT	PTC Thermistors

❷Series

Code	Series
FL	for Overheat Sensing Lead Type
FM	for Overheat Sensing with Lug-terminal
GL	for Circuit Protection Lead Type

❸Dimensions

Code	Dimensions
04	Nominal Body Diameter 4mm Series
05	Nominal Body Diameter 5mm Series
07	Nominal Body Diameter 7mm Series
09	Nominal Body Diameter 9mm Series
10	Nominal Body Diameter 10mm Series
12	Nominal Body Diameter 12mm Series
13	Nominal Body Diameter 13mm Series
14	Nominal Body Diameter 14mm Series
16	Nominal Body Diameter 16mm Series
18	Nominal Body Diameter 18mm Series

❹Temperature Characteristics

Code	Temperature Characteristics
AS	Curie Point 130°C
AR	Curie Point 120°C
BA	Curie Point 110°C
BB	Curie Point 100°C
BC	Curie Point 90°C
BD	Curie Point 80°C
BE	Curie Point 70°C
BF	Curie Point 60°C
BG	Curie Point 50°C
BH	Curie Point 40°C

❺Resistance

Expressed by three-digit alphanumerics. The unit is ohm (Ω). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two figures. If there is a decimal point, it is expressed by the capital letter "**R**". In this case, all figures are significant digits.

Ex.)

Code	Resistance
R22	0.22Ω
2R2	2.2Ω
220	22Ω

❻Resistance Tolerance

Code	Resistance Tolerance
H	±25%
K	±10%
M	±20%
N	±30%
Q	Special Tolerance

❼Individual Specifications

Code	Individual Specifications
3P51	Lead Type, others

❽Packaging

Code	Packaging
A0	Ammo Pack
B0	Bulk

Basic Characteristics of POSISTOR®

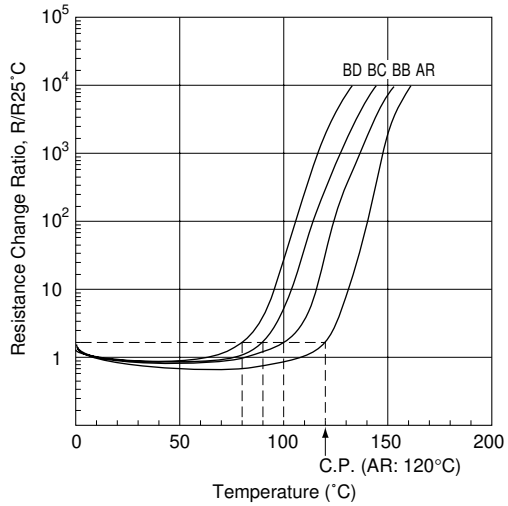
■Basic Characteristics

POSISTOR® has three main characteristics.

1. Resistance - Temperature Characteristics

Although there is a negligible difference between the normal and "Curie Point" temperature, POSISTOR® shows almost constant resistance-temperature characteristics. Yet they have resistance-temperature characteristics that cause resistance to sharply increase when the temperature exceeds the Curie Point.
The Curie Point (C.P.) is defined as temperature which the resistance value is twice the one at 25 °C.

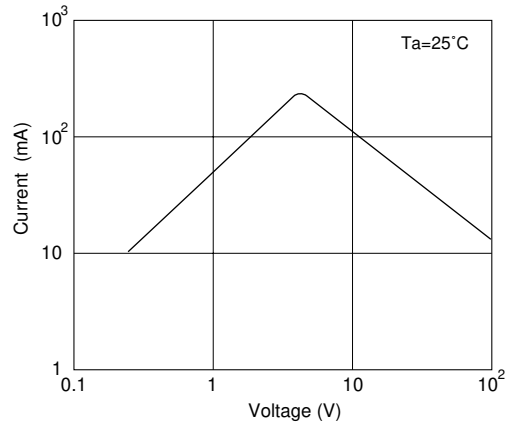
Resistance-Temperature Characteristic



2. Current - Voltage Characteristics (Static Characteristic)

This shows the relation between applied voltage when voltage applied to POSISTOR® causes balancing of inner heating and outer thermal dissipation and stabilized current. This has both a maximum point of current and constant output power.

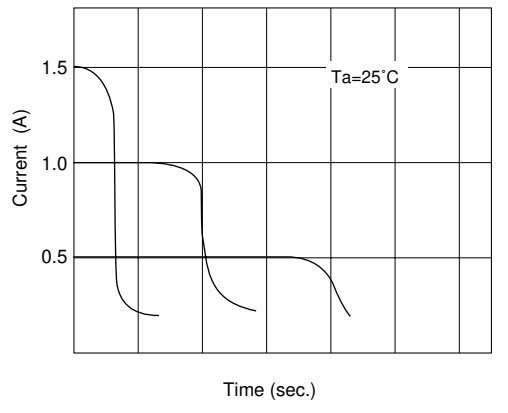
Current-Voltage Characteristic (Static Characteristic)



3. Current - Time Characteristics (Dynamic Characteristic)

This shows the relation between current and time before inner heating and outer thermal dissipation arrive at equilibrium state. This features having large initial current and abruptly continuous attenuating portion.

Current-Time Characteristic (Dynamic Characteristic)



Basic Characteristics of POSISTOR®

Technical Terms

1. Protective Threshold Current

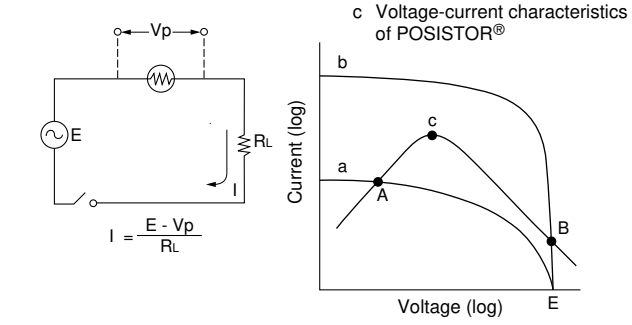
The maximum current value is called the "Protective Threshold Current" for Voltage vs. Current characteristics (static).

When smaller than the protective threshold current flows in POSISTOR®, it reaches its stability (as shown in figure on right) at the intersection (A) of the load curve (a) and voltage-current characteristics of POSISTOR®(c). And POSISTOR® works as normal fixed resistor.

However, when larger than protective threshold current flows, it stabilizes at the intersection (B) with the load curve (b).

Load Curve of Circuit and Voltage - current Characteristics of POSISTOR®

a Load curve in normal state (normal current)
b Load curve in abnormal state (abnormal current)
c Voltage-current characteristics of POSISTOR®

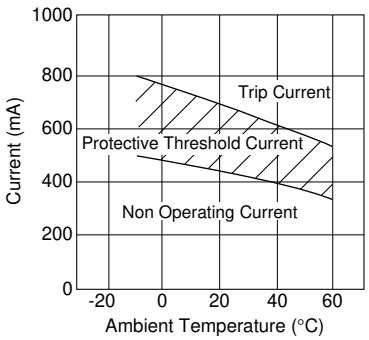


2. Protective Threshold Current Range

Protective threshold current varies depending on the ambient temperature, resistance value, temperature characteristics and shape (Figure of right) The maximum value of trip current and the minimum value of the non-operating current are in the range of ambient temperature -10 to +60°C.

That is, when a current is smaller than the non-operating current, POSISTOR® works only as a fixed resistor. When larger than the trip current flows, however, POSISTOR® protects the circuit from overload.

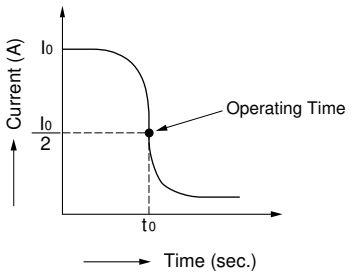
Protective Threshold Current Range



3. Operating Time

A period starting from the voltage input to the moment current itself sharply attenuates is called "Operating Time". Conventionally, operation time (t_0) is determined to be the period until inrush current (I_0) decreases to a level one half the original inrush current ($I_0/2$).

Operating Current



Selection Guide

Please confirm the parameters according to the following questions.
The best selection is the product that is satisfied with three parameters.

● **Confirmation Items**

What is the potential maximum voltage applied to POSISTOR®?	How much current flows in the circuit at normal conditions?	How much current flows in the circuit at abnormal conditions?

● **Example**

Line Voltage 140V	Usual Current 200mA	Abnormal Current 580mA

● **Selection Standards**

Line voltage ≦ Maximum voltage of POSISTOR®	Usual current ≦ Non operating current of POSISTOR®	Abnormal current ≧ Trip current of POSISTOR®

Part Number	Max. Voltage (V)	Non-operating Current at +60°C (mA)	Trip Current at -10°C (mA)	Max. Current (A)	Resistance (at 25°C) (ohm)	Body Diameter (D) (mm)	Thickness (T) (mm)
PTGL18AR4R7M6B72B0	125	360	900	1.7	4.7 ±20%	18.5	5.5
PTGL18AR3R3M6B72B0	125	420	1050	2.0	3.3 ±20%	18.5	5.5
PTGL07AR330M6A51B0	140	100	230	0.5	33 ±20%	7.4	6.0
PTGL09AR220M6C61B0	140	140	330	1.0	22 ±20%	9.6	6
PTGL10AR150M6C61B0	140	170	400	1.0	15 ±20%	11.6	
→ **PTGL12AR100M6C01B0**	140	220	510	1.0	10 ±20%	13.0	
PTGL13AR6R8M6C01B0	140	290	670	1.0	6.8 ±20%	14.0	
PTGL16AR5R6M6C01B0	140	340	780	2.0	5.6 ±20%	17.0	

PTGL12AR100M6C01B0 is the best selection in this case.

Application Matrix

Application \ Series	Over Current Protection		Overheat Sensing	
	PTGL Series	PRG Series	PTFL Series PTFM Series	PRF Series
Color TV	●	●	●	●
CRT Display	●	●		
VCR	●	●	●	●
Audio	●	●	●	●
Speaker	●			
Refrigerator	●	●	●	●
Vacuum Cleaner	●	●		
Air Conditioner	●	●		●
FAX	●	●	●	●
Personal Computer	●	●		●
USB HUB	●	●		
PDA		●		●
Lighting Equipment	●	●	●	●
STB	●	●	●	●
DSL	●	●	●	●
Exchanger	●	●		
Transceiver	●	●	●	●
Security System	●	●	●	●
Vending Machine	●	●	●	●
Automobile	●	●	●	●
Car Audio	●	●	●	●
Car Navigation	●	●	●	●
Small DC Motor	●	●	●	●
Fan Motor	●	●	●	●
Battery Pack		●		●
Power Supply	●	●	●	●
AC Adaptor	●		●	●
Small Transformer	●	●	●	●

Application Notes

■ Inrush Current Limit for Power Supply

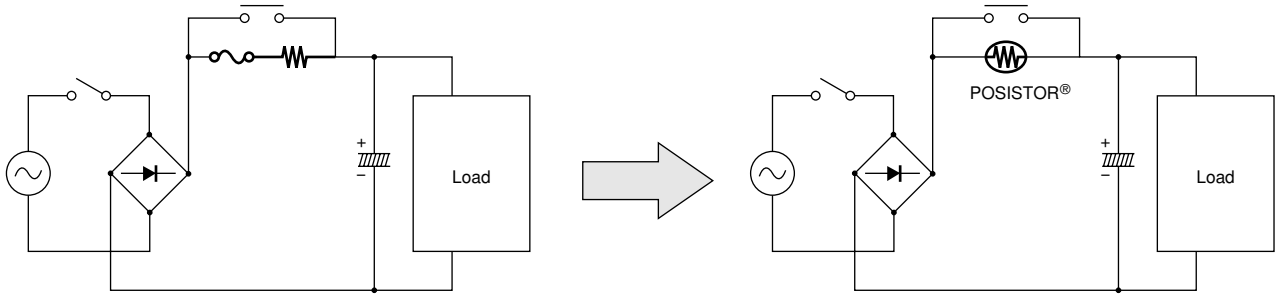
POSISTOR® Lead type: PTGL series

1. Applications

POSISTOR® is an integrated solution to work as both current limit resistor and over current fuse. It works as a stable resistor in normal operation and protects itself against over current situation.

(1) High wattage power supply (Flat display panels etc.)
(2) Power supply for fluorescent lights
(3) Other switching power supplies

Replacement idea from a resistor and fuse solution



2. Benefits

(1) Protection against over current situation
(2) Automatic reset from protective trip mode
(3) Space-saving
(4) Various characteristics to meet a suitable resistance value

3. Recommended part numbers

Choose an appropriate part number based on the resistance value required to the inrush current limit. Review the maximum voltage.

Application	Part Number	Max. Voltage (V)	Resistance (at 25 °C) (ohm)	Body Diameter (mm)	Thickness (mm)	Lead Space (mm)	Lead Diameter (mm)	More Details
For high wattage power supply	**PTGL13AR100H8B72B0**	265	10 ±25%	14.0	6.0	7.5	0.60	page 51
	PTGL12AR150H8B72B0		15 ±25%	12.5	6.0	7.5	0.60	page 51
	PTGL14AR180M9C01B0		18 ±20%	15.7	6.5	10.0	0.65	page 51
	PTGL09AR250H8B52B0		25 ±25%	10.0	6.0	5.0	0.60	page 51
	PTGL09AR390M9C61B0		39 ±20%	10.0	6.5	6.5	0.65	page 50
For power supply of electronic fluorescent ballasts	**PTGL07AR560M9B51A0**		56 ±20%	8.2	6.5	5.0	0.60	-
	PTGL07AR820M9B51A0		82 ±20%	8.2	6.5	5.0	0.60	-
	PTGL07AS121M0N51A0		120 ±20%	6.5	6.5	5.0	0.50	-
	PTGL07AS181M0N51A0		180 ±20%	6.5	6.5	5.0	0.50	-

Please ask for details.

■ Over Current Protection for Communication Facility

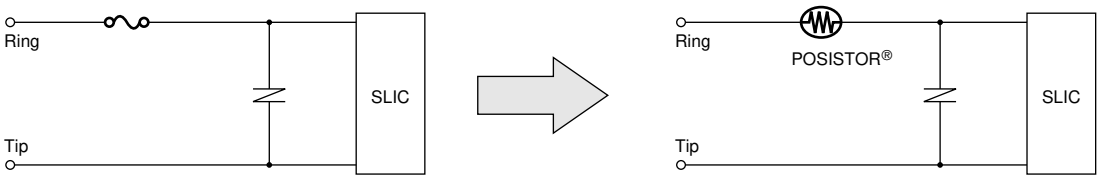
POSISTOR® Lead type: PTGL series

1. Applications

POSISTOR® is an efficient device to protect a telephone line interface (SLIC: Subscriber-Loop-Interface-Circuit) against AC line contact.

(1) Landline telephones or FAX machines
(2) Telephone interface of STB, VoIP equipment
(3) Any other equipment of communication facility having a phone line interface

Replacement idea from a current fuse.



2. Benefits

(1) Automatic reset from protective trip up to 265V AC line contact
(2) Compatible with the 600V over voltage test by UL60950
(3) High resistance to the lighting surge (*A surge absorber is still required to protect SLIC)

3. Recommended part numbers

Choose an appropriate part number based on the non-operating current and on the resistance value required to the operation current of SLIC.

Part Numbers	Max. Voltage (V)	Max. Current (A)	Non-Operating Current (at +60 °C) (mA)	Trip-Current (at -10 °C) (mA)	Resistance (at 25 °C) (ohm)	Body Diameter (mm)	Thickness (mm)	Lead Space (mm)	Lead Diameter (mm)	More Details
PTGL07BB220N0B52A0	250	0.5	90	300	22 ±30%	8.0	6.0	5.0	0.6	page 50
PTGL09AR390N0B52A0	250	0.6	100	280	39 ±30%	10.0	6.0	5.0	0.6	page 50
PTGL09AR250H8B52B0	265	1.0	118	330	25 ±25%	10.0	6.0	5.0	0.6	page 51

Please ask for details.

Application Notes

■ Current Limiter for LED

Chip POSISTOR®: PRG series

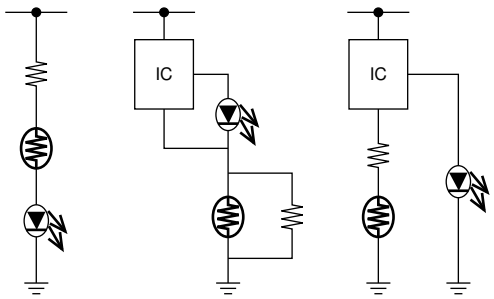
1. Applications

POSISTOR® is an effective current limit solution based on LED's allowable current and temperature characteristic.

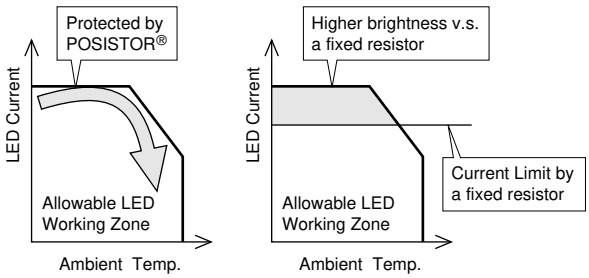
(1) LED lighting instruments

(2) LED backlight of flat displays

See below figures.



LED Driving Circuit



LED Current

2. Benefits

(1) Higher LED brightness versus a fixed resistor. LED can work in the smaller series resistance with POSISTOR® at normal operation temperature. The number of LED is possibly reduced.

(2) LED lifetime may be extended due to the current limiting function of the POSISTOR® in cases of overheat or over current situation.

(3) Small 0805 package allows the POSISTOR® to be placed close to the LED. It offers accurate detection of ambient temperature near LED and increases flexibility of packaging.

3. Recommended part numbers

Choose an appropriate part number having max. voltage and resistance value. Review the protective threshold current range based on the operating current and temperature of the LED.

Part number series	Max. Voltage (V)	Max. Current (A)	Non-Operating Current (at +60 °C) (mA)	Trip-Current (at -10 °C) (mA)	Resistance (at 25 °C) (ohm)	Curie Point (°C) *	More Details
PRG21BC0R2MM1RA	6	10	500	2000	0.2 ±20%	90	page 12
PRG21BC6R8MM1RA	20	3.5	80	320	6.8 ±20%	90	page 12
PRG21BC4R7MM1RA	20	5.0	100	400	4.7 ±20%	90	page 12

*Curie Point means the temperature when the resistance value reaches twice the resistance at 25 °C.
Please ask for details.

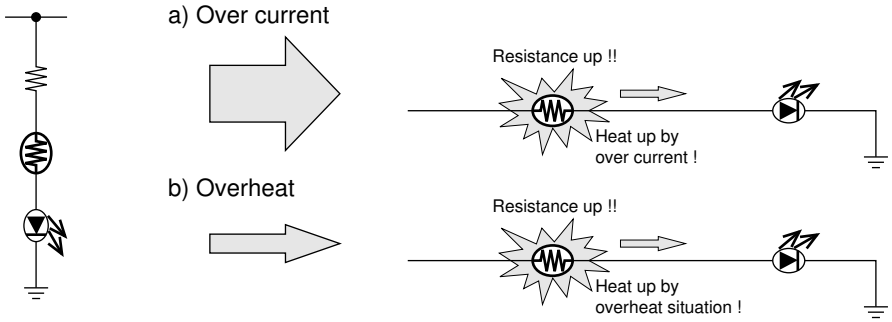
■ Overheat/Over Current Protection for High Brightness LED

Leaded POSISTOR®: PTGL series & Chip POSISTOR®: PRG series

1. Applications

POSISTOR® is an effective solution to protect the LED against overheat and over current situation.

(1) LED lighting instruments (Appliances, Automotive etc.)



2. Benefits

(1) Posistor installed in series with LED provides both overheat and over current protection
(2) No additional driver IC or software required
(3) Automatic reset from protective trip mode
(4) 0603 and 0805 SMD type available (smaller than 1/2W or 1W chip resistor)

3. Recommended part numbers

Choose an appropriate part number having max. voltage and resistance value. Review the protective threshold current range based on the operating current and temperature of the LED.

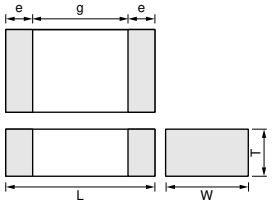
Type	Part Number Series	Max. Voltage (V)	Max. Current (A)	Non-Operating Current (at +60 °C) (mA)	Trip-Current (at -10 °C) (mA)	Resistance (at 25 °C) (ohm)	Curie Point (°C) *	More Details
SMD type	**PRG21BC0R2MM1RA**	6	10	500	2000	0.2 ±20%	90	page 12
	PRG21BC6R8MM1RA	20	3.5	80	320	6.8 ±20%	90	page 12
	PRG21BC4R7MM1RA	20	5.0	100	400	4.7 ±20%	90	page 12
	PRG18BB471MB1RB	24	0.06	7	25	470 ±20%	100	page 12
	PRG18BB221MB1RB	24	0.13	10	35	220 ±20%	100	page 12
	PRG18BB101MB1RB	24	0.3	15	55	100 ±20%	100	page 12
	PRG18BB470MB1RB	24	0.63	20	75	47 ±20%	100	page 12
	PRG18BB330MB1RB	24	0.9	25	85	33 ±20%	100	page 12
Lead type	**PTGL04AS100K2N51B0**	30	1.5	122	240	10 ±10%	130	page 19
	PTGL04AS100K2B51B0	30	2.0	167	330	10 ±10%	130	page 19
	PTGL05AS3R9K2B51B0	30	3.5	269	530	3.9 ±10%	130	page 19
	PTGL07AS2R7K2B51B0	30	4.5	336	663	2.7 ±10%	130	page 19
	PTGL07AS1R8K2B51B0	30	5.0	420	829	1.8 ±10%	130	page 19
	PTGL09AS1R2K2B51B0	30	6.0	556	1097	1.2 ±10%	130	page 19
	PTGL12AS0R8K2B51B0	30	7.0	685	1352	0.8 ±10%	130	page 19
	PTGL04AS100K3B51B0	51	1.0	168	332	10 ±10%	130	page 22
	PTGL05AS6R8K3B51B0	51	1.5	197	388	6.8 ±10%	130	page 22
	PTGL07AS3R3K3B51B0	51	3.0	307	606	3.3 ±10%	130	page 22
	PTGL09AS2R2K3B51B0	51	4.0	412	814	2.2 ±10%	130	page 22
	PTGL12AS1R2K3B51B0	51	5.0	592	1168	1.2 ±10%	130	page 22
	PTGL07AR220M3P51B0	56	1.0	90	240	22 ±20%	120	page 37
	PTGL07AR8R2M3P51B0	56	1.0	130	350	8.2 ±20%	120	page 37
	PTGL09AR150M3B51B0	56	1.2	150	400	15 ±20%	120	page 37
	PTGL10AR3R9M3P51B0	56	2.0	210	550	3.9 ±20%	120	page 37
	PTGL09AR4R7M3B51B0	56	2.0	270	700	4.7 ±20%	120	page 37
	PTGL10AR3R9M3B51B0	56	2.0	300	800	3.9 ±20%	120	page 37
	PTGL14AR3R3M3B71B0	56	2.5	380	980	3.3 ±20%	120	page 37

* Curie Point means the temperature when the resistance value reaches twice the resistance at 25 °C.
Please ask for details.

POSISTOR® for Circuit Protection

For Overcurrent Protection Chip Type

Overcurrent Protection device with resettable function suitable for current limiting resistor.
This product is chip type PTC thermistor for overcurrent protection which is suitable for the following:
•Countermeasure for short circuit testing
•Current limiting resistor



Part Number	Dimensions (mm)				
	L	W	T	e	g
PRG18_RB	1.6±0.15	0.8±0.15	0.8±0.15	0.1 to 0.6	-
PRG21_RA	2.0±0.2	1.25±0.2	0.9±0.2	0.2 min.	0.5 min.
PRG21_RK	2.0±0.2	1.25±0.2	1.25±0.2	0.2 min.	0.5 min.

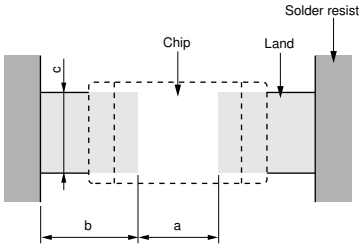
■ Features

1. Rapid operation to protect the circuit in an overcurrent condition abnormality such as a short circuit.
   By removing the overcurrent condition, these products automatically return to the initial condition and can be used repeatedly.
2. Suitable for countermeasure to short circuit test in safety standard
3. Stable resistance after operation due to ceramic PTC
4. Similar size (0603 size) is possible due to the large capacity for electric power.
5. Possible to use these products as current limiting resistors with overcurrent protection functions
6. SMD type is helpful for miniaturizing circuits because of its small size and light weight
7. Lead is not contained in the terminations

Part Number	Max. Voltage (V)	Non-operating Current (at +60°C)(mA)	Trip Current (at -10°C) (mA)	Max. Current (mA)	Resistance (at 25°C) (ohm)
PRG18BB471MB1RB	24	7	25	60	470 ±20%
PRG18BB221MB1RB	24	10	35	130	220 ±20%
PRG18BB101MB1RB	24	15	55	300	100 ±20%
PRG18BB470MB1RB	24	20	75	630	47 ±20%
PRG18BB330MB1RB	24	25	85	900	33 ±20%
PRG21BB220MB1RK	20	30	110	1100	22 ±20%
PRG21BB150MB1RK	20	40	140	1600	15 ±20%
PRG21BC6R8MM1RA	20	80	320	3500	6.8 ±20%
PRG21BC4R7MM1RA	20	100	400	5000	4.7 ±20%
PRG21BC0R2MM1RA	6	500	2000	10000	0.2 ±20%

Please contact us for UL recognized products.

■ Standard Land Pattern Dimensions

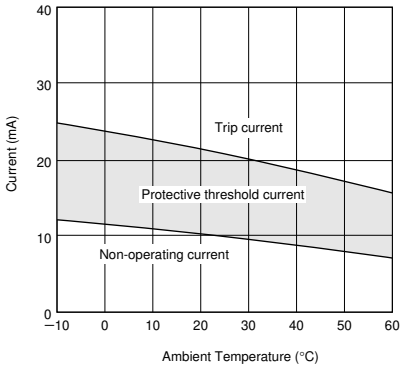


(in mm)

Part Number	Soldering Methods	Dimensions (mm)			
		Chip (L×W)	a	b	c
PRG18	Reflow Soldering	1.6×0.8	0.6-0.8	0.6-0.7	0.6-0.8
PRG21	Reflow Soldering	2.0×1.25	1.0-1.2	0.5-0.7	1.0-1.2

■ Protective Threshold Current Range

PRG18BB471MB1RB



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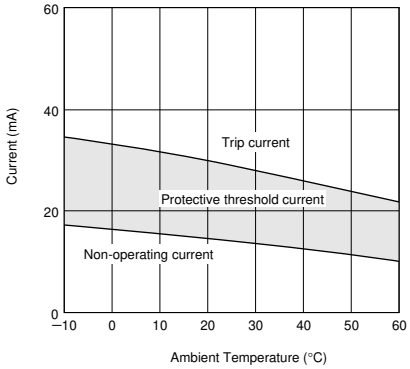

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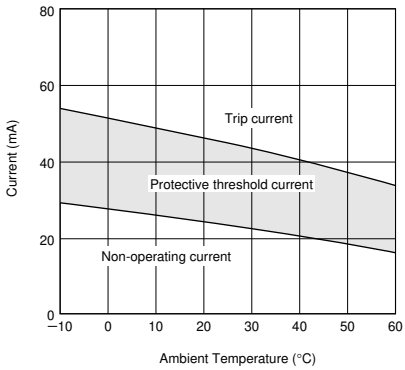

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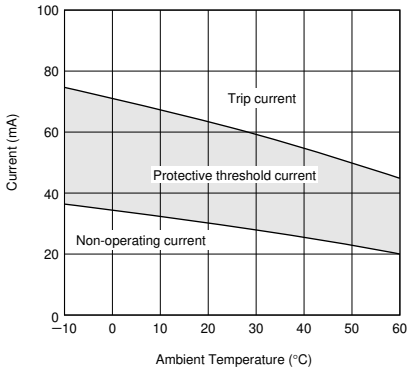

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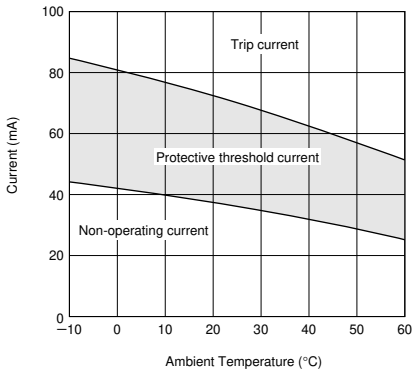

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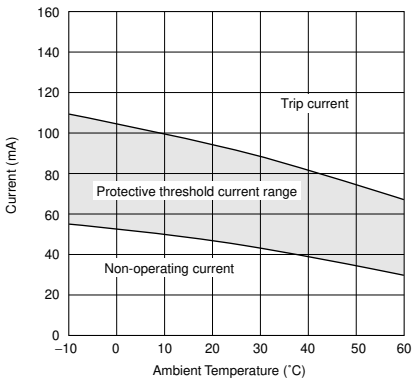

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■ Protective Threshold Current Range

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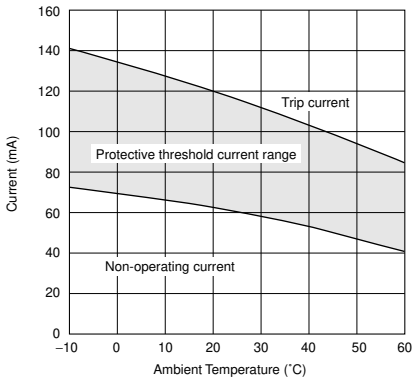

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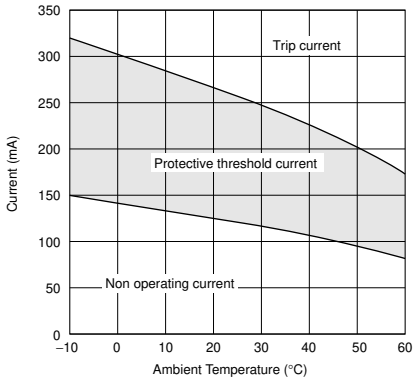

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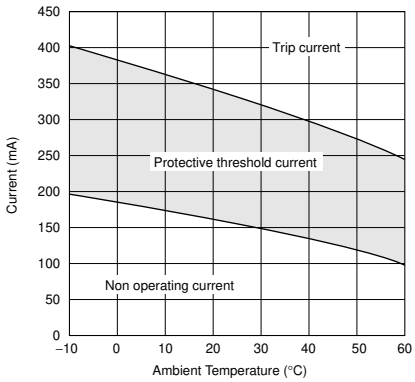

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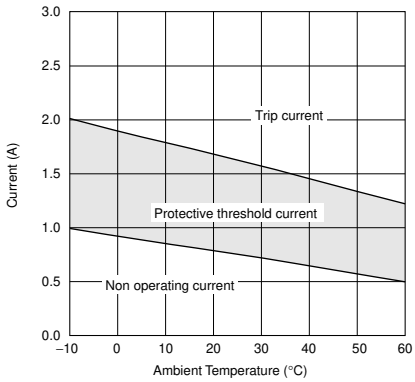
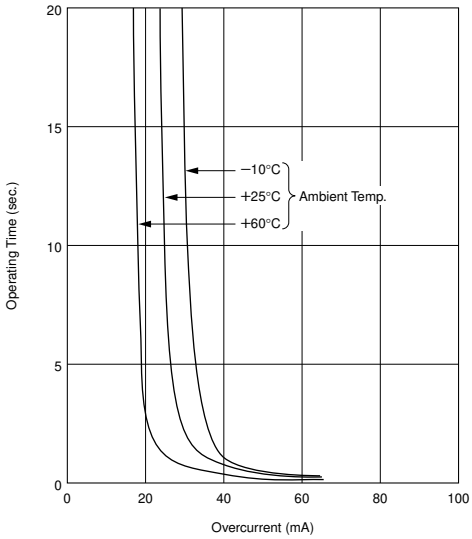


■ Operating Time (Typical Curve)

PRG18BB471MB1RB



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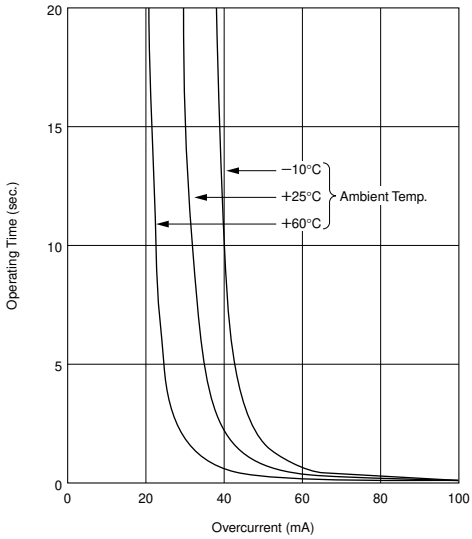

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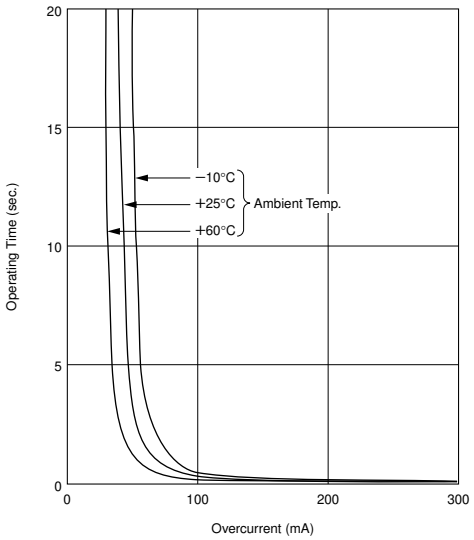
■ Operating Time (Typical Curve)

PRG18BB101MB1RB



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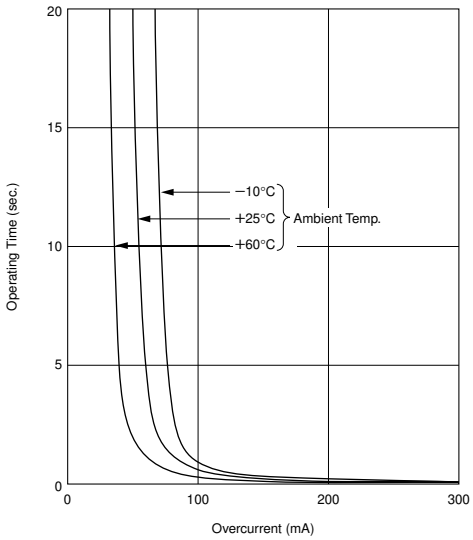

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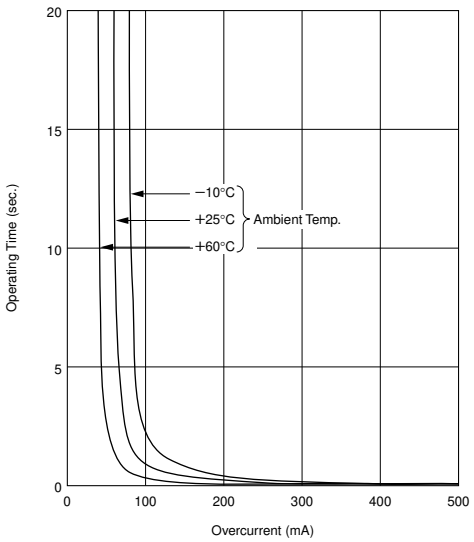

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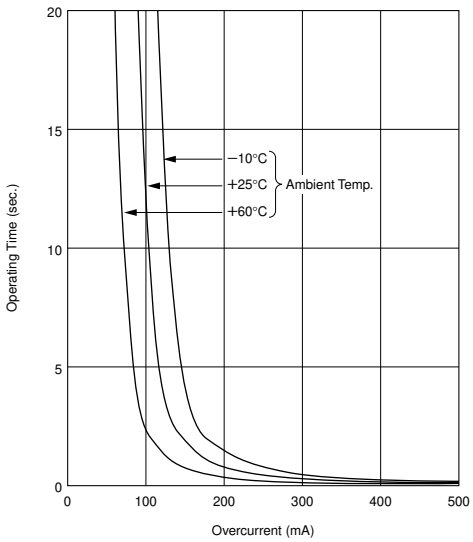

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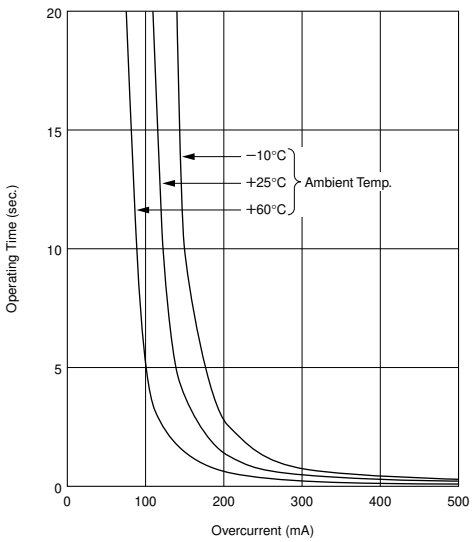

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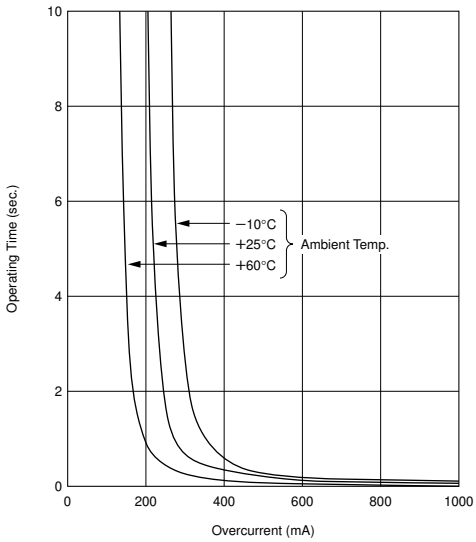

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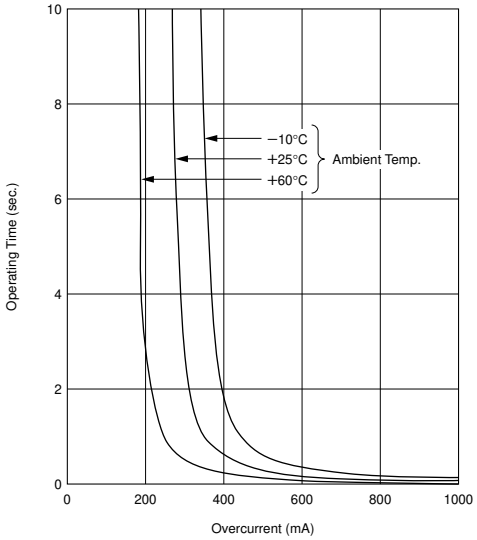
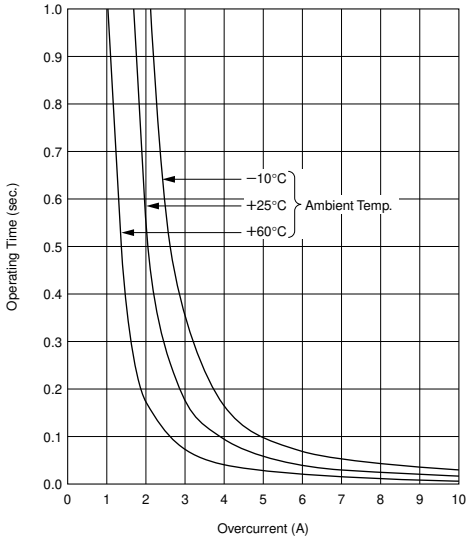
■ Operating Time (Typical Curve)

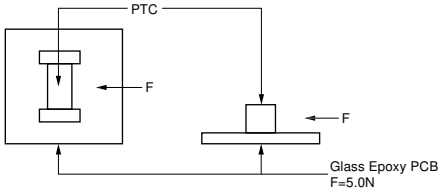
PRG21BC4R7MM1RA



PRG21BC0R2MM1RA



■ PRG18/21BB Series

No.	Item	Rating Value	Method of Examination
1	**Operating Temp.**	-10 to 60°C	Temperature range with maximum voltage applied to PTC.
2	**Resistance Value (at 25°C)**	The resistance value should be within the specified tolerance.	After applying maximum operating voltage for 3 mins. and leaving for 2 hrs. in 25°C, measured by applying voltage of less than 1.5Vdc (by a direct current of less than 10mA).
3	**Withstanding Voltage**	Without damage	We apply 120% of the maximum operating voltage to PTC by raising gradually for 180±5 secs. at 25°C. (A protective resistor is to be connected in series, and the inrush current through PTC must be limited below maximum rated value.)
4	**Adhesive Strength**	There is no exfoliation sign of electrode.	EIAJ ET-7403 term 9 Soldered PTC to PCB and add the force of 5.0N in the direction as shown below. 
5	**Vibration**	Normal appearance Resistance change: not to exceed ±20% (*)	JIS C 5102 term 8.2 Soldered PTC to PCB Vibration: A 10-55-10Hz (1 min.) Width: 1.5mm Vibrate for 2 hrs. in each of 3 mutually perpendicular planes for a total of 6 hrs.
6	**Solderability**	Min. 75% electrode is covered with new solder. Resistance change: not to exceed ±20% (*)	JIS C 5102 term 8.4 Solder: Sn 63%/Pb 37% (or 60/40%) Solder temp: 230±5°C Soaking time: 3±0.5 s. Soaking position: Until a whole electrode is soaked
7	**Solder-heatability**	Normal appearance Resistance change: not to exceed ±20% (*)	Solder: Sn 63%/Pb 37% (or 60/40%) Flux: Solder paste containing less than 0.2wt% of chlorine. Preheating: 150±5°C 3mins. Peak temp.: 260±5°C 10±5 s. (reflow) PCB: Glass Epoxy PCB (JIS C 6484)
8	**Temperature Cycling**	Normal appearance Resistance change: not to exceed ±20% (*)	JIS C 5102 term 9.3 Times: 5 cycles **Step** / **Temp. (°C)** / **Time (min.)** 1 / -20 +0, -3 / 30 2 / Room temp. / 10-15 3 / +85 +3, -0 / 30 4 / Room temp. / 10-15
9	**Humidity Test**	Normal appearance Resistance change: not to exceed ±20% (*)	JIS C 5102 term 9.5 40±2°C, 90-95%RH leave for 500±4 hrs.
10	**High Temperature Load Test**	Normal appearance Resistance change: not to exceed ±20% (*)	JIS C 5102 term 9.10 60±3°C (in air), PTC is applied maximum operating voltage for 1.5 hrs. on and 0.5 hrs. off. This cycle is repeated for 1000±10 hrs.

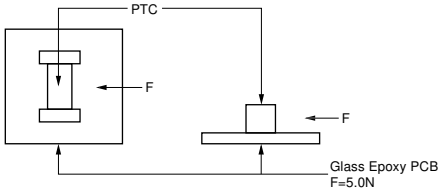
(*) Measure resistance after the test by applying voltage of less than 1.5Vdc by a direct current of less than 10mA after product is left at 25±2°C for 2 hours.

Above mentioned soldering in "4. Adhesive Strength" and "5. Vibration" is done under the following conditions at our site.
- •Glass-Epoxy PC board
- •Standard land dimension
- •Standard solder paste
- •Standard solder profile

Above conditions are mentioned in Notice.

Chip Type Specifications and Test Methods

■ PRG21BC Series

No.	Item	Rating Value	Method of Examination
1	**Operating Temp.**	-10 to 60°C	Temperature range with maximum voltage applied to PTC.
2	**Resistance Value (at 25°C)**	The resistance value should be within the specified tolerance.	After leaving for 24 hrs. or more in 25°C, it measures by 4 wire measuring methods using the direct-current terminal current of 10mA or less (0.1 or less Vdcs).
3	**Withstanding Voltage**	Without damage	We apply 120% of the maximum operating voltage to PTC by raising gradually for 180±5 secs. at 25°C. (A protective resistor is to be connected in series, and the inrush current through PTC must be limited below maximum rated value.)
4	**Adhesive Strength**	There is no exfoliation sign of electrode.	EIAJ ET-7403 term 9 Soldered PTC to PCB and add the force of 5.0N in the direction as shown below. 
5	**Vibration**	Normal appearance Resistance change: not to exceed ±20% (*)	JIS C 5102 term 8.2 Soldered PTC to PCB Vibration: A 10-55-10Hz (1 min.) Width: 1.5mm Vibrate for 2 hrs. in each of 3 mutually perpendicular planes for a total of 6 hrs.
6	**Solderability**	Min. 75% electrode is covered with new solder. Resistance change: not to exceed ±20% (*)	JIS C 5102 term 8.4 Solder: Sn 63%/Pb 37% (or 60/40%) Solder temp: 230±5°C Soaking time: 3±0.5 secs. Soaking position: Until a whole electrode is soaked.
7	**Solder-heatability**	Normal appearance Resistance change: not to exceed ±20% (*)	Solder: Sn 63%/Pb 37% (or 60/40%) Flax: Solder paste containing less than 0.2wt% of chlorine. Preheating: 150±5°C 3mins. Peak temp.: 260±5°C 10±5 secs. (reflow) PCB: Glass Epoxy PCB (JIS C 6484)
8	**High Temperature Test**	Normal appearance Resistance change: not to exceed ±20% (*)	60±3°C leave for 1000±10 hrs.
9	**Low Temperature Test**		-10±3°C leave for 1000±10 hrs.
10	**Humidity Test**		60±2°C, 90-95%RH leave for 500±4 hrs.
11	**Temperature Cycling**		JIS C 5102 term 9.3 Times: 5 cycles Step / Temp. (°C) / Time (min.) 1 / -20 +0, -3 / 30 2 / Room temp. / 10-15 3 / +85 +3, -0 / 30 4 / Room temp. / 10-15
12	**High Temperature Load Test**		60±3°C (in air), PTC is applied maximum operating voltage for 1.5 hrs. on and 0.5 hrs. off. This cycle is repeated for 500±10 hrs.

(*) The resistance measurement after the test.
After leaving for 24 hours. or more in 25±2°C, it measures by 4 wire measuring methods using the direct-current terminal current of 10mA or less (0.1 or less Vdcs).

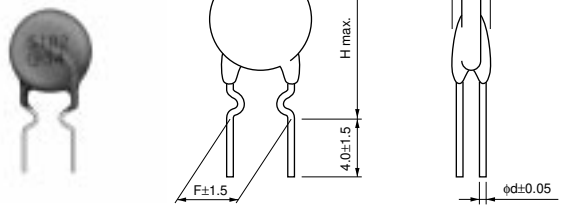
Above mentioned soldering in "4. Adhesive Strength" and "5. Vibration" is done under the following conditions at our site.
- •Glass-Epoxy PC board
- •Standard land dimension
- •Standard solder paste
- •Standard solder profile

Above conditions are mentioned in Notice.

POSISTOR® for Circuit Protection

For Overcurrent Protection Narrow Current Band 30V Series

This product is leaded type PTC thermistor for overcurrent protection which is suitable for the current limiting resistor.



(in mm)

■ Features

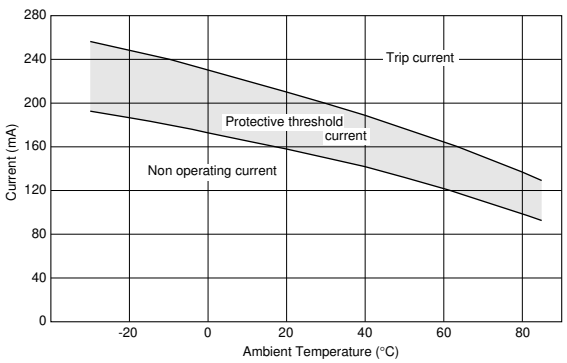
1. Small fluctuation in the circuit due to resistance tolerance +/-10%
2. Narrow current range (less than twice) between operating and non-operating current at -10 to 60 degrees C.
3. Quick operating time due to small size compared with conventional products.
4. Best suited to meet the requirements for power supply and motor protector. Error-free operations are assured by rush current.
5. Circuit is protected until current is turned off.
6. Restores the original low resistance value automatically once the overload is removed.
7. Non-contact design leads to long life and no noise. Durable and strong against mechanical vibration and shock because it is a solid element.
8. Lead (Pb) is not contained in the terminations.

Part Number	Max. Voltage (V)	Non-operating Current (at +60°C)(mA)	Trip Current (at -10°C) (mA)	Max. Current (A)	Resistance (at 25°C) (ohm)	Body Diameter (D) (mm)	Thickness (T) (mm)	Height (H) (mm)	Lead Space (F) (mm)	Lead Diameter (phi d)(mm)
PTGL04AS100K2N51B0	30	122	240	1.5	10 ±10%	4.5	3.5	9.5	5.0	0.5
PTGL04AS100K2B51B0	30	167	330	2.0	10 ±10%	4.5	3.5	9.5	5.0	0.6
PTGL05AS3R9K2B51B0	30	269	530	3.5	3.9 ±10%	5.5	3.5	10.5	5.0	0.6
PTGL07AS2R7K2B51B0	30	336	663	4.5	2.7 ±10%	7.3	3.5	12.3	5.0	0.6
PTGL07AS1R8K2B51B0	30	420	829	5.0	1.8 ±10%	7.3	3.5	12.3	5.0	0.6
PTGL09AS1R2K2B51B0	30	556	1097	6.0	1.2 ±10%	9.3	3.5	14.3	5.0	0.6
PTGL12AS0R8K2B51B0	30	685	1352	7.0	0.8 ±10%	11.5	3.5	16.5	5.0	0.6

Maximum Current shows typical capacities of the transformer which can be used.
30V Series are recognized by UL.
Taping type is also available.

■ Protective Threshold Current Range

PTGL04AS100K2N51B0



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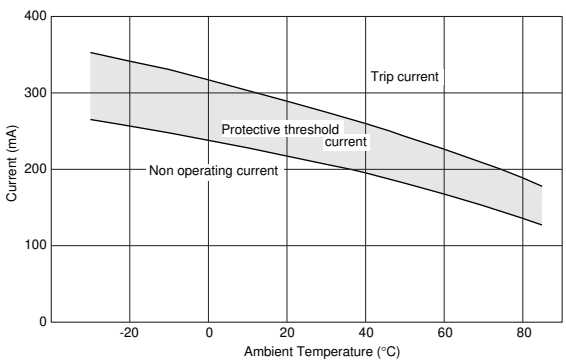

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■ Protective Threshold Current Range

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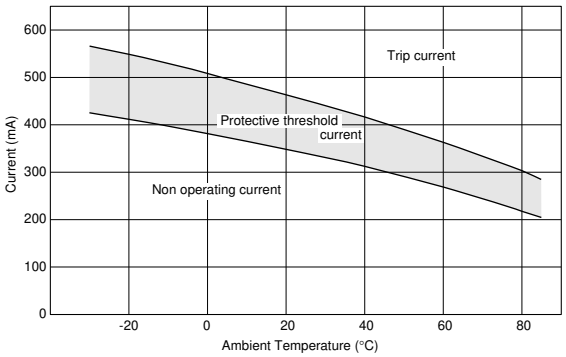

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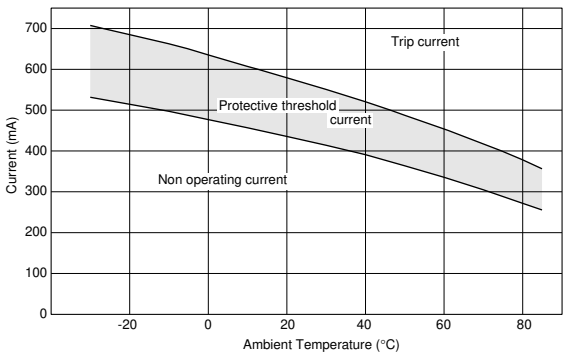

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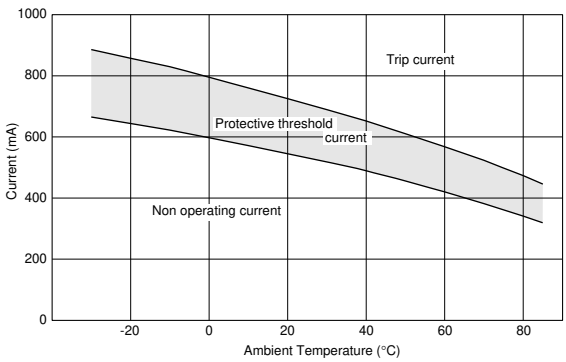

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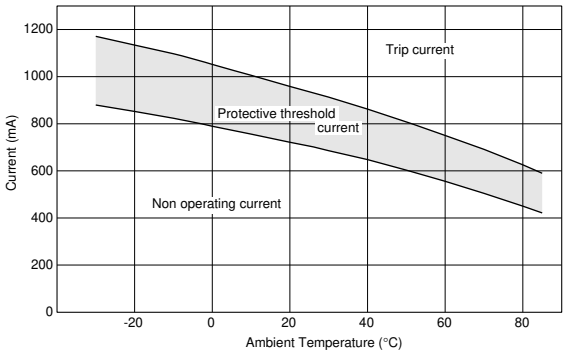

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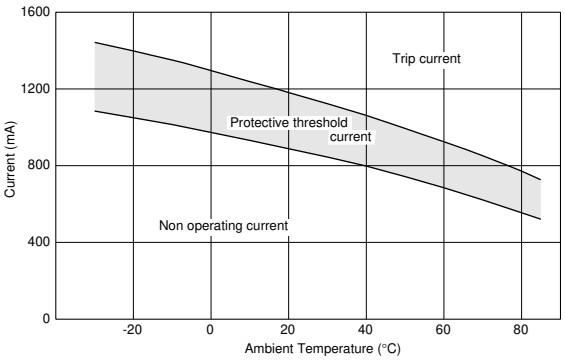
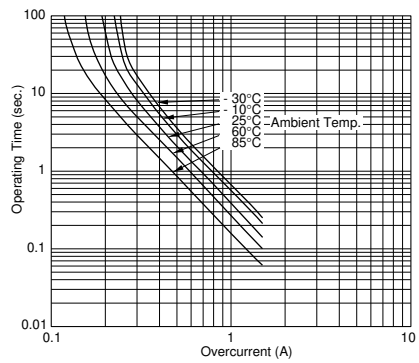


■ Operating Time (Typical Curve)

PTGL04AS100K2N51B0



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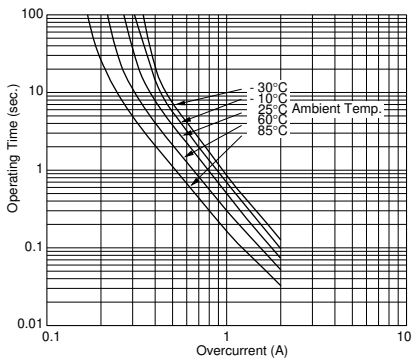

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■ Operating Time (Typical Curve)

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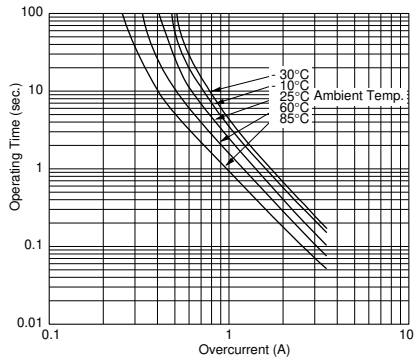

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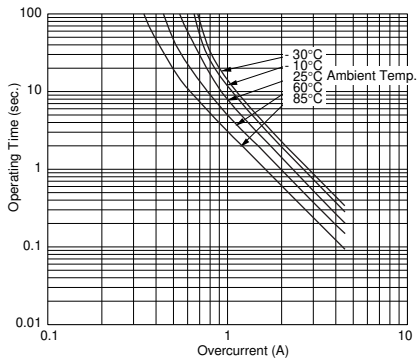

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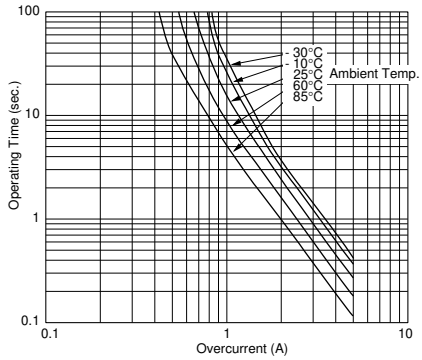

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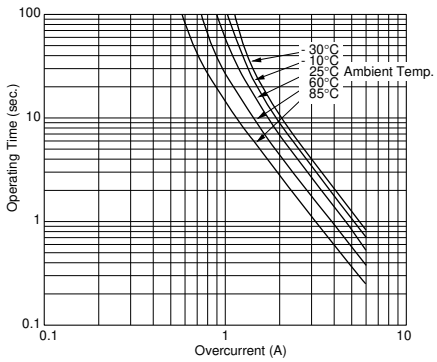

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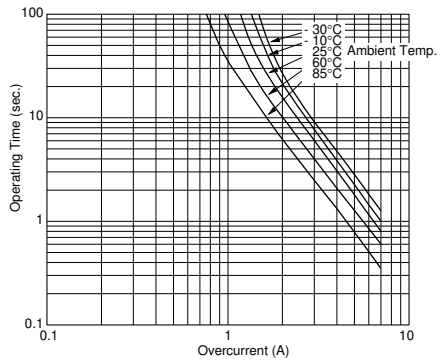
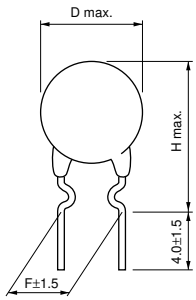
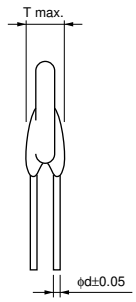


POSISTOR® for Circuit Protection

For Overcurrent Protection Narrow Current Band 51/60V Series

This product is leaded type PTC thermistor for overcurrent protection which is suitable for the current limiting resistor.





(in mm)

■ Features

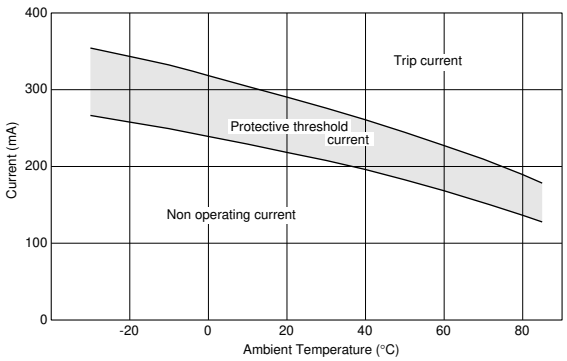
1. Small fluctuation in the circuit due to resistance tolerance +/-10%
2. Narrow current range (less than twice) between operating and non-operating current at -10 to 60 degrees C.
3. Quick operating time due to small size compared with conventional products.
4. Best suited to meet the requirements for power supply and motor protector. Error-free operations are assured by rush current.
5. Circuit is protected until current is turned off.
6. Restores the original low resistance value automatically once the overload is removed.
7. Non-contact design leads to long life and no noise. Durable and strong against mechanical vibration and shock because it is a solid element.
8. Lead (Pb) is not contained in the terminations.

Part Number	Max. Voltage (V)	Non-operating Current (at +60°C)(mA)	Trip Current (at -10°C) (mA)	Max. Current (A)	Resistance (at 25°C) (ohm)	Body Diameter (D) (mm)	Thickness (T) (mm)	Height (H) (mm)	Lead Space (F) (mm)	Lead Diameter (phi d)(mm)
PTGL04AS100K3B51B0	51	168	332	1.0	10 ±10%	4.5	3.5	9.5	5.0	0.6
PTGL05AS6R8K3B51B0	51	197	388	1.5	6.8 ±10%	5.5	3.5	10.5	5.0	0.6
PTGL07AS3R3K3B51B0	51	307	606	3.0	3.3 ±10%	7.3	3.5	12.3	5.0	0.6
PTGL09AS2R2K3B51B0	51	412	814	4.0	2.2 ±10%	9.3	3.5	14.3	5.0	0.6
PTGL12AS1R2K3B51B0	51	592	1168	5.0	1.2 ±10%	11.5	3.5	16.5	5.0	0.6
PTGL04AS220K4N51B0	60	88	175	1.0	22 ±10%	4.5	3.5	9.5	5.0	0.5
PTGL04AS220K4B51B0	60	115	226	1.0	22 ±10%	4.5	3.5	9.5	5.0	0.6
PTGL05AS100K4B51B0	60	170	335	1.5	10 ±10%	5.5	3.5	10.5	5.0	0.6
PTGL07AS5R6K4N51B0	60	186	368	2.2	5.6 ±10%	7.3	3.5	12.3	5.0	0.5
PTGL07AS5R6K4B51B0	60	229	452	3.0	5.6 ±10%	7.3	3.5	12.3	5.0	0.6
PTGL09AS3R3K4B51B0	60	333	656	4.0	3.3 ±10%	9.3	3.5	14.3	5.0	0.6
PTGL12AS2R2K4B51B0	60	439	867	5.0	2.2 ±10%	11.5	3.5	16.5	5.0	0.6

Maximum Current shows typical capacities of the transformer which can be used.
51/60V Series are recognized by UL.
Taping type is also available.

■ Protective Threshold Current Range (51V Series)

PTGL04AS100K3B51B0



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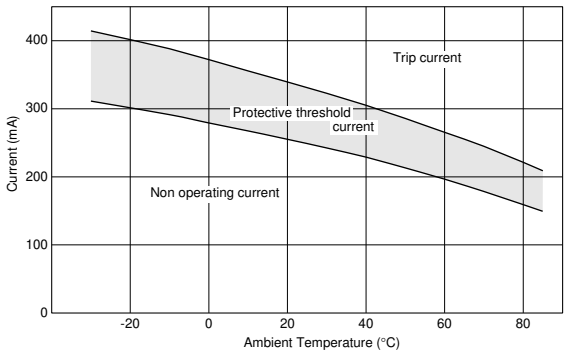

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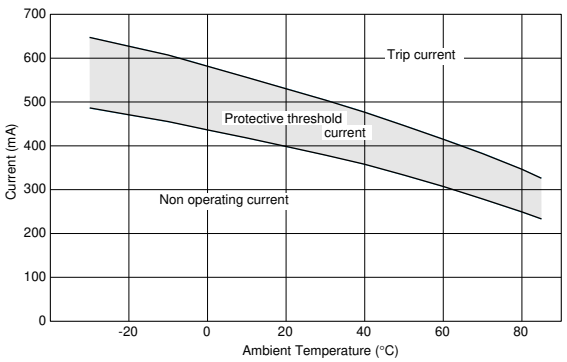

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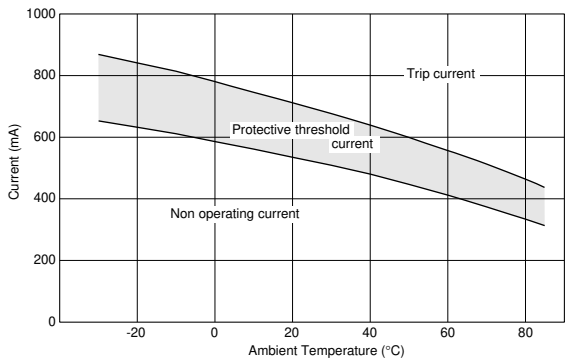
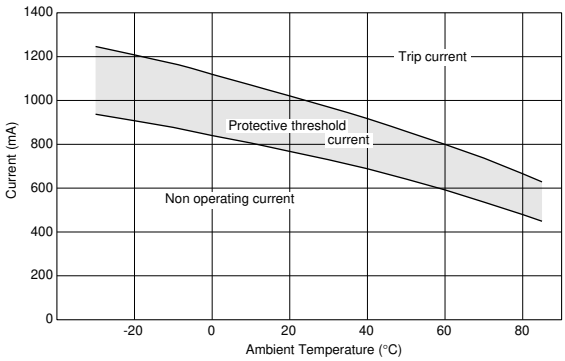
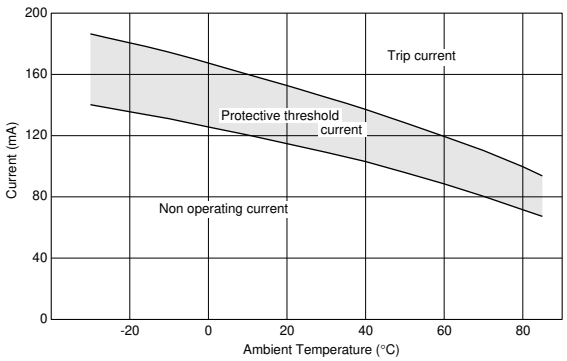


PTGL12AS1R2K3B51B0



■ Protective Threshold Current Range (60V Series)

PTGL04AS220K4N51B0



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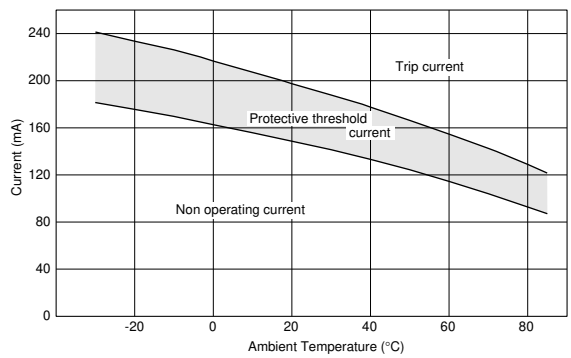

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■ Protective Threshold Current Range (60V Series)

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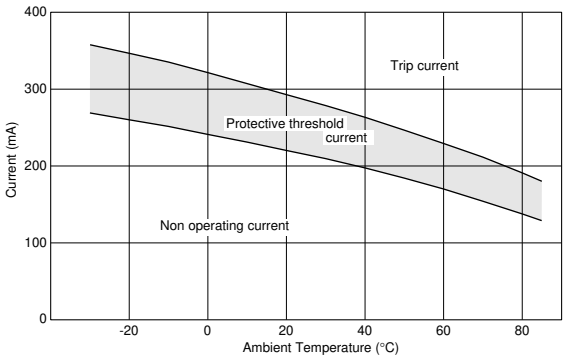

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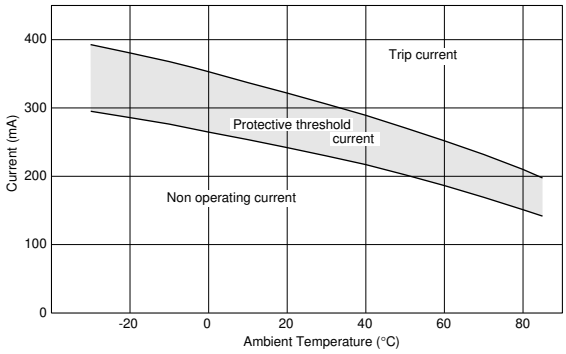

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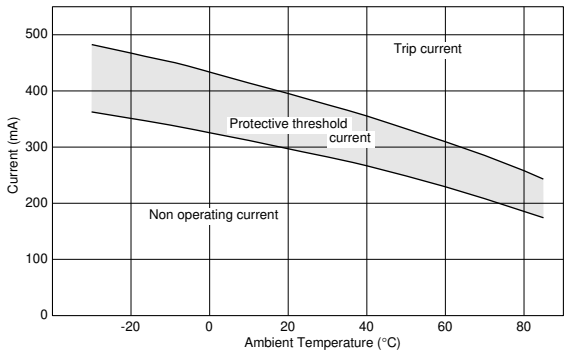

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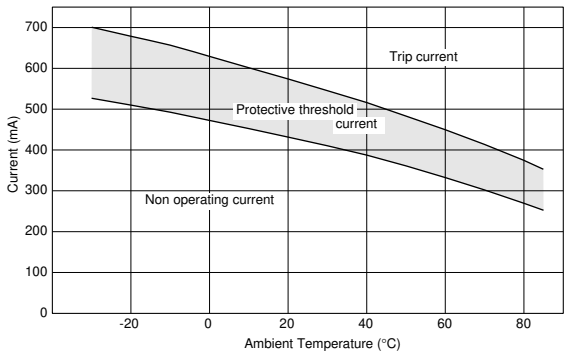

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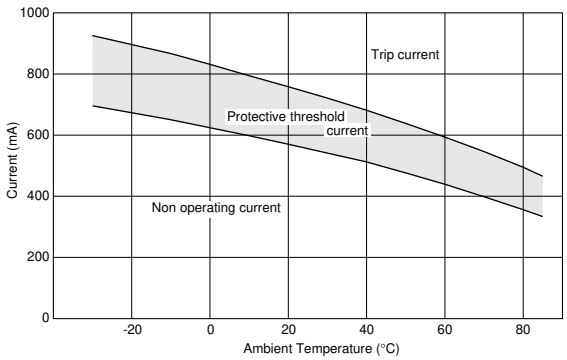
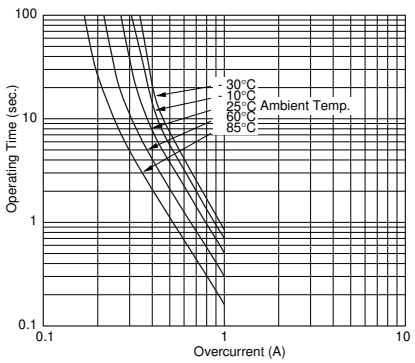


■ Operating Time 51V Series (Typical Curve)

PTGL04AS100K3B51B0



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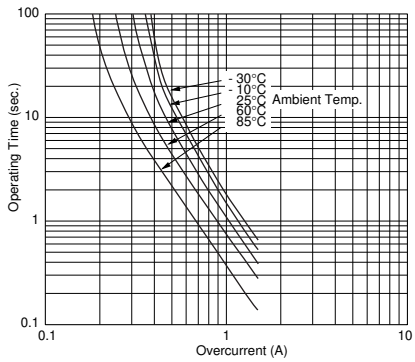

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