Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

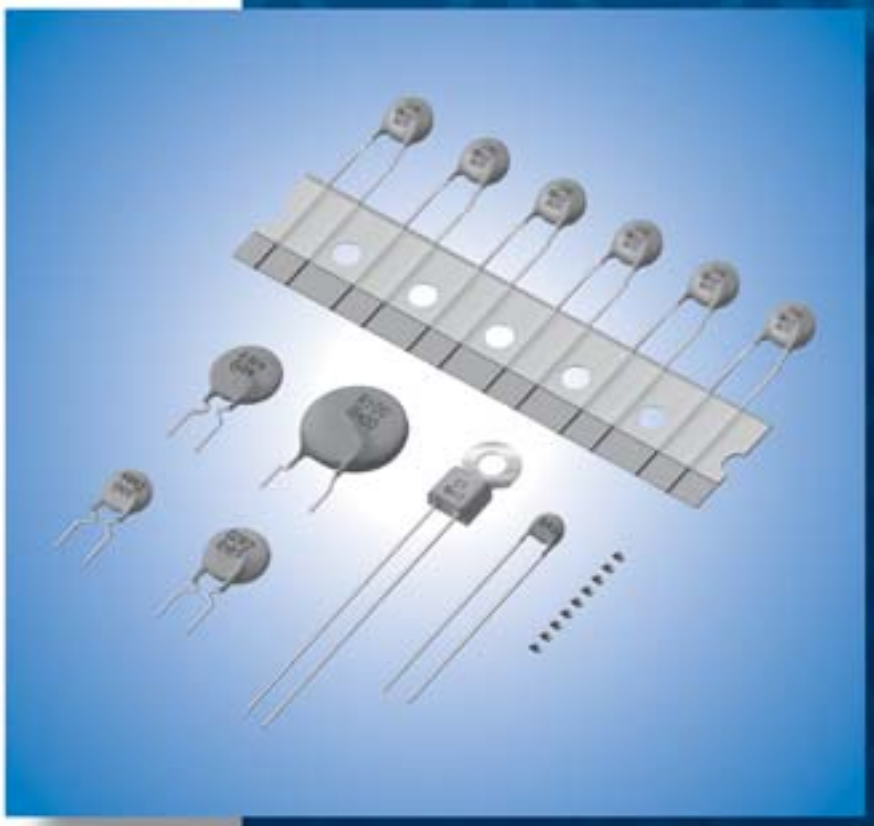
We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

R90E.pdf
Mar.4,2014

POSISTOR®
for Circuit Protection



muRata Innovator in Electronics

Murata
Manufacturing Co., Ltd.

Cat.No.R90E-14

EU RoHS Compliant

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment."
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/info/rohs.html).

CONTENTS

Part Numbering

PTC Thermistors (POSISTOR®) for Overcurrent Protection Chip Type

(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)	EIA
15	1.00×0.50mm	0402
18	1.60×0.80mm	0603
21	2.00×1.25mm	0805

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
4R7	4.7Ω
470	47Ω
471	470Ω

❻Resistance Tolerance

Code	Resistance Tolerance
M	±20%

❼Individual Specifications

Ex.

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.)
RK	Embossed Taping (4mm Pitch) (3000 pcs.)

PTC Thermistors (POSISTOR®) for Overheat Sensing Chip Type

(Part Number) PR F 18 BB 471 Q B5 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)	EIA
15	1.00×0.50mm	0402
18	1.60×0.80mm	0603
21	2.00×1.25mm	0805

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

Ex.

Code	Individual Specifications
B5	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 Overcurrent Protection / for Inrush Current Suppression / 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 Current Control (Over Current Protection · Inrush Current Suppression) 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
20	Nominal Body Diameter 20mm Series

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
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

Ex.

Code	Individual Specifications
3P51	Lead Type, others

❽Packaging

Code	Packaging
A*	Ammo Pack
B*	Bulk

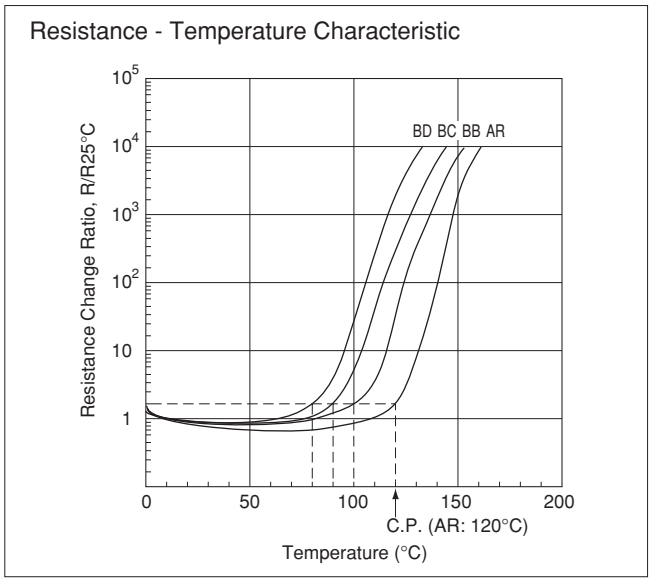
Basic Characteristics of POSISTOR®

■Basic Characteristics

POSISTOR® has three main characteristics.

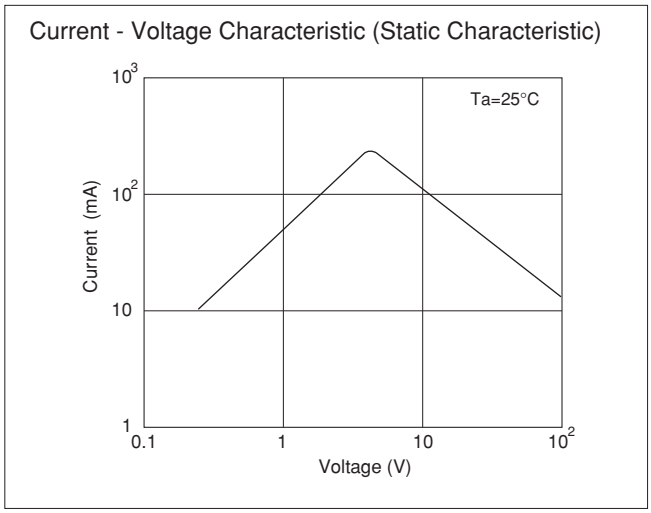
1. Resistance - Temperature Characteristics

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 the temperature at which the resistance value is twice the one at 25°C.



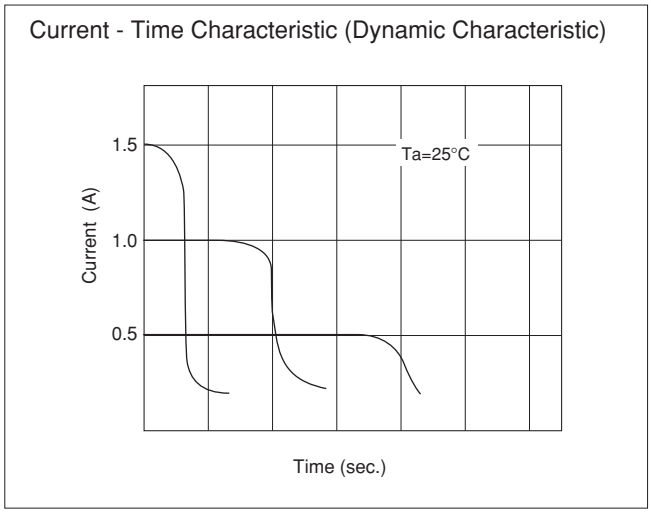
2. Current - Voltage Characteristics (Static Characteristic)

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.



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.



Basic Characteristics of POSISTOR®

Technical Terms

1. Protective Threshold Current

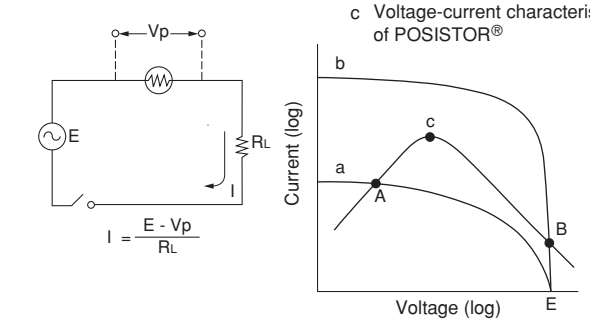
The maximum current value is called the "Protective Threshold Current" for Voltage vs. Current characteristics (static).

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 a 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®

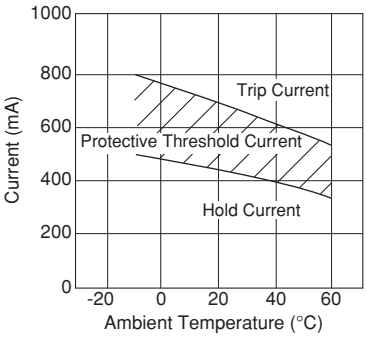


2. Protective Threshold Current Range

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

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

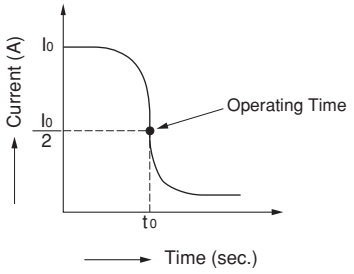
Protective Threshold Current Range



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 matches 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 ≦ Hold current of POSISTOR®	Abnormal current ≧ Trip current of POSISTOR®

Part Number	Max. Voltage (V)	Hold 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	Overcurrent Protection		Overheat Sensing	
			Chip type PRG	Lead type PTGL	Chip type PRF	Lead type PTFL, PTFM
AV equipment	Plasma TV		●	●	●	●
	LCD TV		●	●	●	●
	Projection TV		●	●	●	●
	CATV		●	●	●	
	STB		●	●	●	
	Video camera		●		●	
	Digital camera		●		●	
	DVD recorder		●	●	●	
	Audio		●	●	●	●
	Electric keyboard, Electronic music instrument		●	●	●	●
	Digital mobile audio		●		●	
	MD/CD player		●		●	
	TV game		●	●	●	
	Portable game		●		●	
Information equipment	Laptop		●		●	
	Desktop computer		●		●	
	Server		●	●	●	●
	Printer		●	●	●	●
	Scanner		●		●	
	LCD display		●	●	●	●
	USB access device		●			
	HDD				●	
	CD/DVD-ROM/RAM				●	
	Copy machine		●	●	●	●
	Electronic dictionary/databook		●		●	
	Electronic blackboard		●	●	●	●
Communications equipment	Electronic automatic exchange		●	●		
	Transmission equipment		●	●		
	PBX		●	●		
	Cordless telephone			●		
	Fax machine		●	●	●	●
	Modem		●	●	●	
	Cellular phone		●		●	
	Headset				●	
	Cellular phone base station		●	●	●	●
	Intercom		●	●		
Car electronics	Engine control ECU		●		●	
	Drive control ECU		●		●	
	Air bag		●		●	
	Anticollision radar				●	
	ABS/ESC		●		●	
	Instrument/display panel, Meter		●		●	
	Rechargeable battery for EV/HEV		●	●	●	
	Car air conditioner				●	
	HID/LED headlight, AFS		●	●	●	
	LED tail light		●	●	●	
	LED interior light		●		●	
	Retractable electric mirror		●	●		
	Door lock, trunk opener			●		
	Power seat			●		
	Shock absorber			●		
	VICS, ETC				●	
	Burglar alarm		●	●		
	Car navigation		●	●	●	
	Car audio		●	●	●	●
Home electronics Household equipment	Refrigerator		●	●	●	
	Microwave, Oven		●	●	●	
	Electric rice-cooker			●	●	
	IH cooking device			●	●	
	Air conditioner		●	●	●	
	Fan heater				●	●
	Cleaner			●	●	
	Clothes washer, cloth dryer			●		
	Ventilator			●	●	
	Hot-water pot			●	●	●
	Illumination device		●	●	●	●
	Massage chair, healthcare equipment		●	●	●	●
	Hot water spray toilet seat				●	●
	Electric power tool		●	●	●	●
Power supply	Switching supply		●	●	●	●
	Inverter power		●	●	●	●
	AC adapter, battery charger		●	●	●	

■ Inrush Current Limit for Power Supply

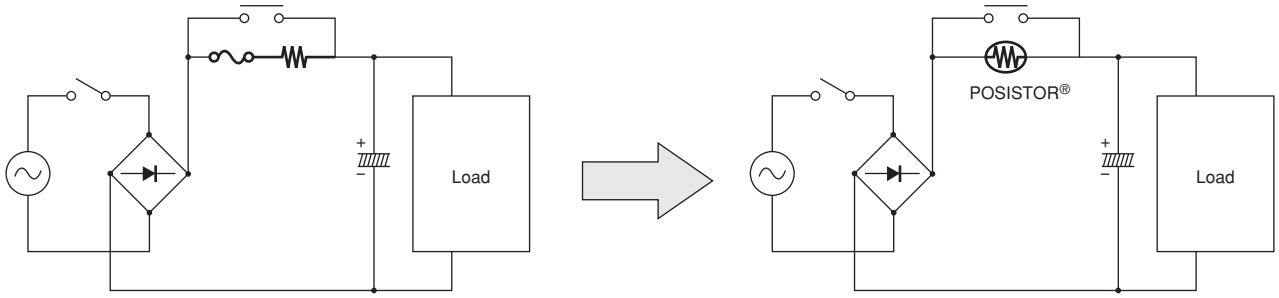
POSISTOR® Lead type: PTGL series

1. Applications

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

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

Replacement idea for a resistor and fuse solution



2. Benefits

(1) Protection against overcurrent situations
(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 57
	PTGL12AR150H8B72B0		15 ±25%	12.5	6.0	7.5	0.60	page 57
	PTGL14AR180M9C01B0		18 ±20%	15.7	6.5	10.0	0.65	page 57
	PTGL09AR250H8B52B0		25 ±25%	10.0	6.0	5.0	0.60	page 57
	PTGL09AR390M9C61B0		39 ±20%	10.0	6.5	6.5	0.65	page 56
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	280	120 ±20%	7.8	6.0	5.0	0.50	page 67
	PTGL07AS181M0N51A0		180 ±20%	7.8	6.0	5.0	0.50	page 67

Please ask for details.

Application Notes

■ Overcurrent Protection for Communication Facility

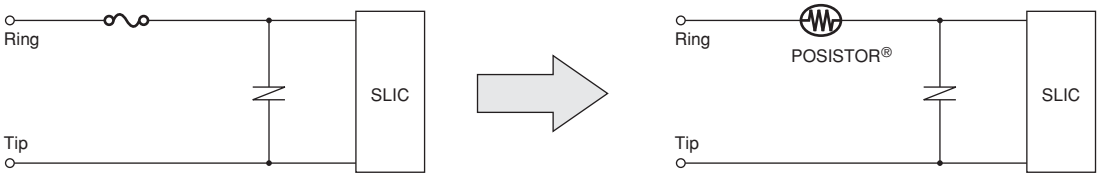
POSISTOR® Lead type: PTGL series

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 for 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 hold current and on the resistance value required to the operation current of SLIC.

Part Number	Max. Voltage (V)	Max. Current (A)	Hold 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 56
PTGL09AR390N0B52A0	250	0.6	100	280	39 ±30%	10.0	6.0	5.0	0.6	page 56
PTGL09AR250H8B52B0	265	1.0	118	330	25 ±25%	10.0	6.0	5.0	0.6	page 57

Please ask for details.

Application Notes

■ Current Limiter for LED

Chip POSISTOR®: PRG series

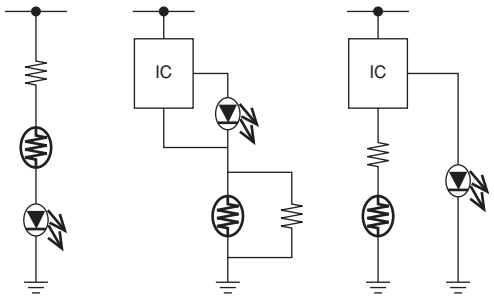
1. Applications

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

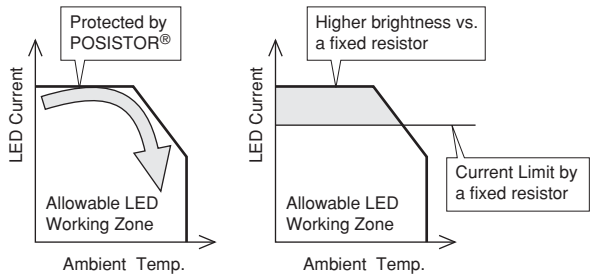
(1) LED lighting instruments

(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 LEDs is possibly reduced.

(2) LED lifetime may be extended due to the current limiting function of the POSISTOR® in cases of overheat or overcurrent 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	Max. Voltage (V)	Max. Current (A)	Hold Current (at +60 °C) (mA)	Trip Current (at -10 °C) (mA)	Resistance (at +25 °C) (ohm)	Curie Point (°C) *	More Details
PRG21BC0R6MM1RA	6	10	285	1100	0.6 ±20%	90	page 14
PRG21BC0R2MM1RA	6	10	500	2000	0.2 ±20%	90	page 14
PRG21BC1R0MM1RA	12	10	220	850	1.0 ±20%	90	page 14
PRG21BC2R2MM1RA	16	6.5	150	600	2.2 ±20%	90	page 14
PRG21BC3R3MM1RA	20	6.0	120	480	3.3 ±20%	90	page 14
PRG21BC6R8MM1RA	30	3.5	80	320	6.8 ±20%	90	page 14
PRG21BC4R7MM1RA	30	5.0	100	400	4.7 ±20%	90	page 14

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

Application Notes

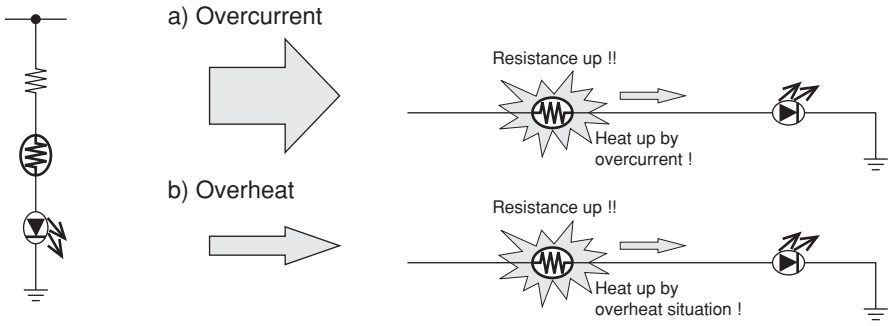
■ Overheat/Overcurrent Protection for High Brightness LED

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

1. Applications

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

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



2. Benefits

(1) Posistor installed in series with LED provides both overheat and overcurrent 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	Max. Voltage (V)	Max. Current (A)	Hold Current (at +60 °C) (mA)	Trip Current (at -10 °C) (mA)	Resistance (at +25 °C) (ohm)	Curie Point (°C) *	More Details
SMD type	**PRG21BC0R6MM1RA**	6	10	285	1100	0.6 ±20%	90	page 14
	PRG21BC0R2MM1RA	6	10	500	2000	0.2 ±20%	90	page 14
	PRG21BC1R0MM1RA	12	10	220	850	1.0 ±20%	90	page 14
	PRG21BC2R2MM1RA	16	6.5	150	600	2.2 ±20%	90	page 14
	PRG21BC3R3MM1RA	20	6.0	120	480	3.3 ±20%	90	page 14
	PRG21BC6R8MM1RA	30	3.5	80	320	6.8 ±20%	90	page 14
	PRG21BC4R7MM1RA	30	5.0	100	400	4.7 ±20%	90	page 14
Lead type	**PTGL04AS100K2N51B0**	30	1.5	122	240	10 ±10%	130	page 25
	PTGL04AS100K2B51B0	30	2.0	167	330	10 ±10%	130	page 25
	PTGL05AS3R9K2B51B0	30	3.5	269	530	3.9 ±10%	130	page 25
	PTGL07AS2R7K2B51B0	30	4.5	336	663	2.7 ±10%	130	page 25
	PTGL07AS1R8K2B51B0	30	5.0	420	829	1.8 ±10%	130	page 25
	PTGL09AS1R2K2B51B0	30	6.0	556	1097	1.2 ±10%	130	page 25
	PTGL12AS0R8K2B51B0	30	7.0	685	1352	0.8 ±10%	130	page 25
	PTGL04AS100K3B51B0	51	1.0	168	332	10 ±10%	130	page 28
	PTGL05AS6R8K3B51B0	51	1.5	197	388	6.8 ±10%	130	page 28
	PTGL07AS3R3K3B51B0	51	3.0	307	606	3.3 ±10%	130	page 28
	PTGL09AS2R2K3B51B0	51	4.0	412	814	2.2 ±10%	130	page 28
	PTGL12AS1R2K3B51B0	51	5.0	592	1168	1.2 ±10%	130	page 28
	PTGL07AR220M3P51B0	56	1.0	90	240	22 ±20%	120	page 46
	PTGL07AR8R2M3P51B0	56	1.0	130	350	8.2 ±20%	120	page 46
	PTGL09AR150M3B51B0	56	1.2	150	400	15 ±20%	120	page 46
	PTGL10AR3R9M3P51B0	56	2.0	210	550	3.9 ±20%	120	page 46
	PTGL09AR4R7M3B51B0	56	2.0	270	700	4.7 ±20%	120	page 46
	PTGL10AR3R9M3B51B0	56	2.0	300	800	3.9 ±20%	120	page 46
	PTGL14AR3R3M3B71B0	56	2.5	380	980	3.3 ±20%	120	page 46

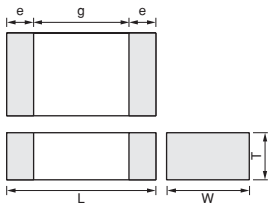
* Curie Point means the temperature at which the resistance value reaches twice the resistance at 25°C.
Please ask for details.

POSISTOR® for Circuit Protection

muRata

Overcurrent Protection Chip Type

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



Part Number	Dimensions (mm)				
	L	W	T	e	g
PRG15_RC	1.0±0.05	0.5±0.05	0.5±0.05	0.15 to 0.35	-
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. The SMD type's small size and light weight are helpful in miniaturizing the circuit.

Chip Type 0402(1005) Size

Part Number	Max. Voltage (V)	Hold Current (at +60°C) (mA)	Hold Current (at +25°C) (mA)	Trip Current (at +25°C) (mA)	Trip Current (at -10°C) (mA)	Max. Current (mA)	Resistance (at +25°C) (ohm)
PRG15BC330MM1RC	30	25	38	73	92	1200	33 ±20%
PRG15BC220MM1RC	16	28	43	90	113	1000	22 ±20%
PRG15BC180MM1RC	16	31	47	98	125	1200	18 ±20%
PRG15BC4R7MM1RC	9	60	91	172	216	2500	4.7 ±20%
PRG15BC3R3MM1RC	9	71	110	205	260	3500	3.3 ±20%
PRG15BC2R2MM1RC	6	88	134	252	318	3500	2.2 ±20%

Maximum Current shows typical capacities of the transformer which can be used.
This series is applied to reflow soldering.

Chip Type 0603(1608) Size

Part Number	Max. Voltage (V)	Hold Current (at +60°C) (mA)	Hold Current (at +25°C) (mA)	Trip Current (at +25°C) (mA)	Trip Current (at -10°C) (mA)	Max. Current (mA)	Resistance (at +25°C) (ohm)
PRG18BB471MB1RB	24	7	10	21	25	60	470 ±20%
PRG18BB221MB1RB	24	10	14	29	35	130	220 ±20%
PRG18BB101MB1RB	24	15	21	45	55	300	100 ±20%
PRG18BB470MB1RB	24	20	29	61	75	630	47 ±20%
PRG18BB330MB1RB	24	25	36	71	85	900	33 ±20%
PRG18BC6R8MM1RB	20	80	120	260	320	3500	6.8 ±20%
PRG18BC4R7MM1RB	20	100	155	330	400	5000	4.7 ±20%

Continued on the following page.

Continued from the preceding page.

Part Number	Max. Voltage (V)	Hold Current (at +60°C) (mA)	Hold Current (at +25°C) (mA)	Trip Current (at +25°C) (mA)	Trip Current (at -10°C) (mA)	Max. Current (mA)	Resistance (at +25°C) (ohm)
PRG18BC3R3MM1RB	16	120	180	400	480	6000	3.3 ±20%
PRG18BC2R2MM1RB	12	150	220	500	600	6500	2.2 ±20%
PRG18BC1R0MM1RB	6	220	330	740	850	7500	1.0 ±20%

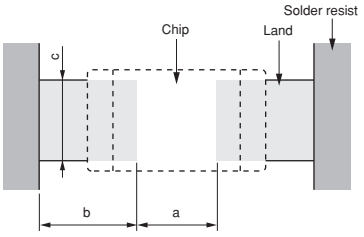
Maximum Current shows typical capacities of the transformer which can be used.
This series is applied to reflow soldering.
This series is recognized by UL.

Chip Type 0805(2012) Size

Part Number	Max. Voltage (V)	Hold Current (at +60°C) (mA)	Hold Current (at +25°C) (mA)	Trip Current (at +25°C) (mA)	Trip Current (at -10°C) (mA)	Max. Current (mA)	Resistance (at +25°C) (ohm)
PRG21BB220MB1RK	20	30	44	91	110	1100	22 ±20%
PRG21BB150MB1RK	20	40	59	116	140	1600	15 ±20%
PRG21BC6R8MM1RA	30	80	120	260	320	5500	6.8 ±20%
PRG21BC4R7MM1RA	30	100	155	330	400	8000	4.7 ±20%
PRG21BC3R3MM1RA	20	120	180	400	480	6000	3.3 ±20%
PRG21BC2R2MM1RA	16	150	220	500	600	6500	2.2 ±20%
PRG21BC1R0MM1RA	12	220	330	740	850	10000	1.0 ±20%
PRG21BC0R6MM1RA	6	285	420	920	1100	10000	0.6 ±20%
PRG21BC0R2MM1RA	6	500	750	1620	2000	10000	0.2 ±20%

Maximum Current shows typical capacities of the transformer which can be used.
This series is applied to reflow soldering.
This series is recognized by UL.

■ Standard Land Pattern Dimensions

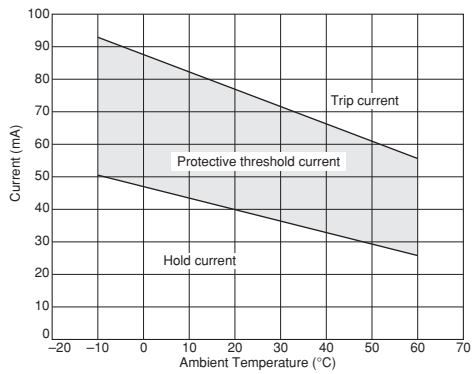


(in mm)

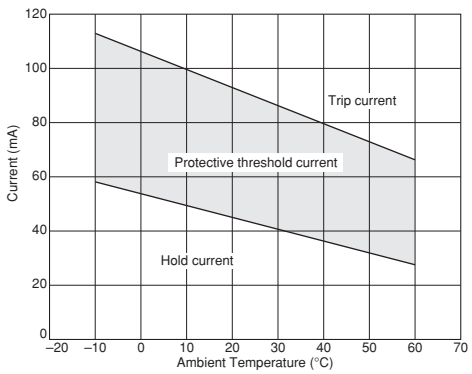
Part Number	Soldering Methods	Dimensions (mm)			
		Chip (L×W)	a	b	c
PRG15	Reflow Soldering	1.0×0.5	0.5	0.4-0.5	0.5
PRG18	Reflow Soldering	1.6×0.8	0.6-0.8	0.6-0.7	0.6-0.8
PRG21	Reflow Soldering	2.0×1.25	1.0-1.2	0.5-0.7	1.0-1.2

■ Protective Threshold Current Range

PRG15BC330MM1RC



PRG15BC220MM1RC

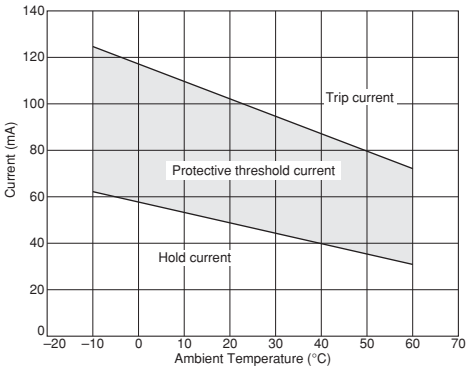


Continued on the following page.

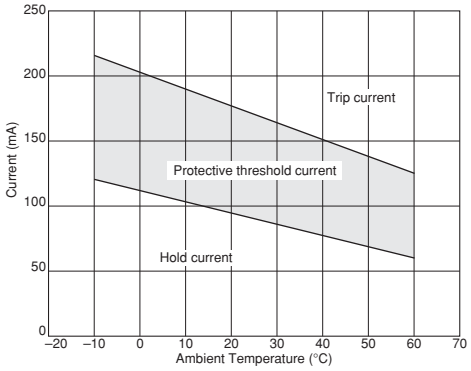
Continued from the preceding page.

■ Protective Threshold Current Range

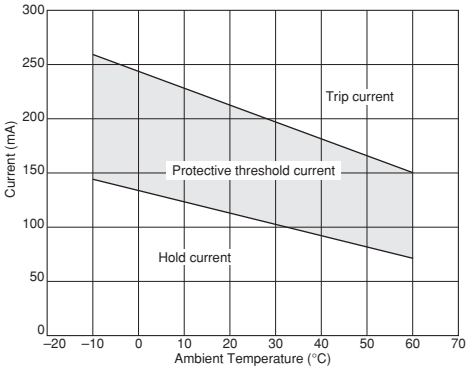
PRG15BC180MM1RC



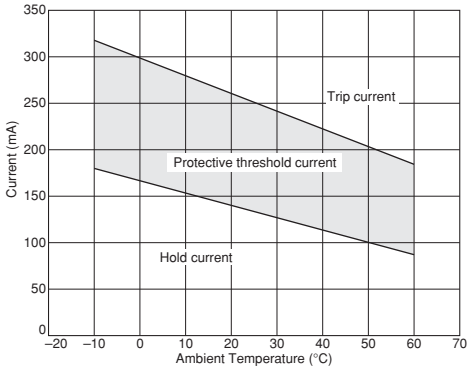
PRG15BC4R7MM1RC



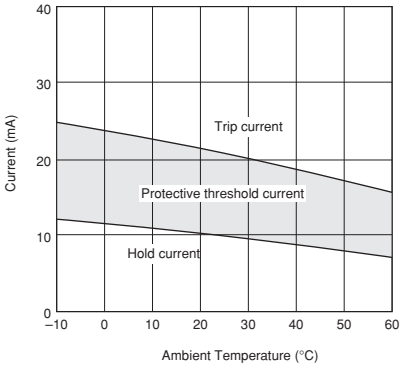
PRG15BC3R3MM1RC



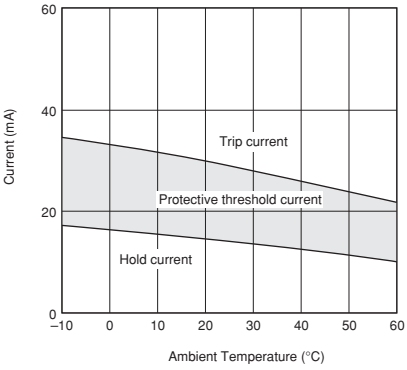
PRG15BC2R2MM1RC



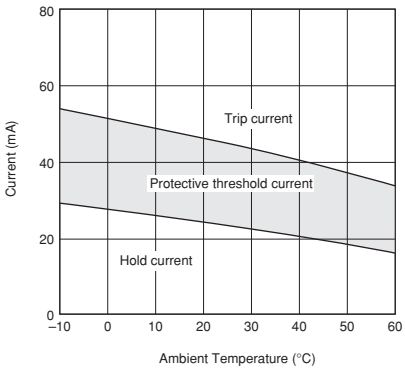
PRG18BB471MB1RB



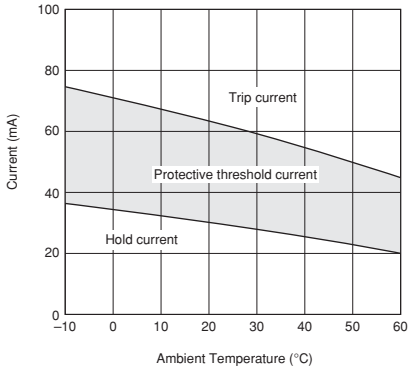
PRG18BB221MB1RB



PRG18BB101MB1RB



PRG18BB470MB1RB



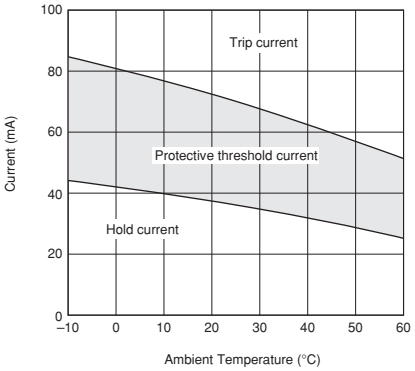
Continued on the following page.

Continued from the preceding page.

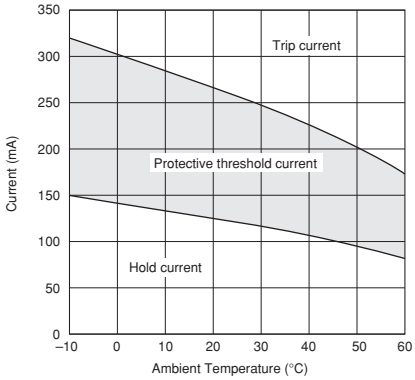
1

■ Protective Threshold Current Range

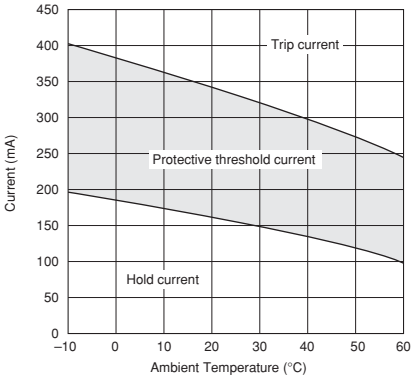
PRG18BB330MB1RB



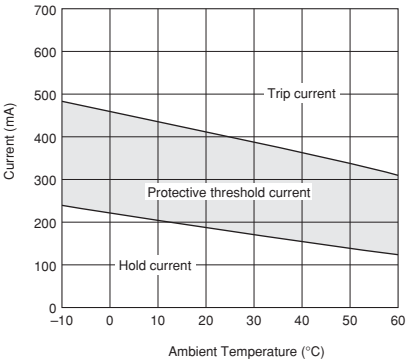
PRG18/21BC6R8M Type



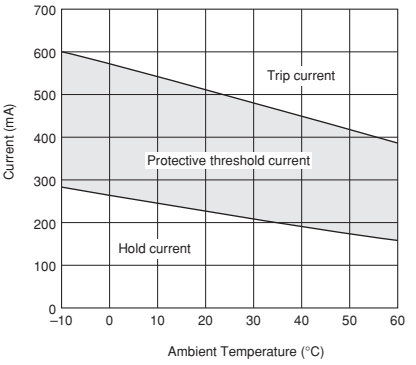
PRG18/21BC4R7M Type



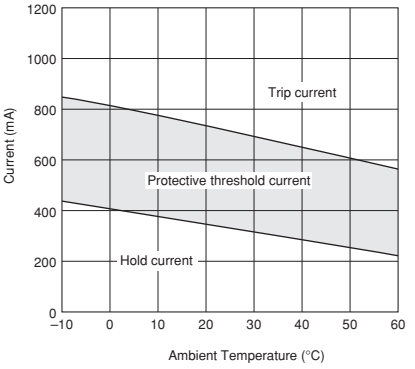
PRG18/21BC3R3M Type



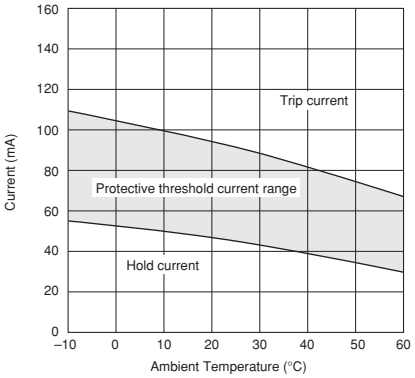
PRG18/21BC2R2M Type



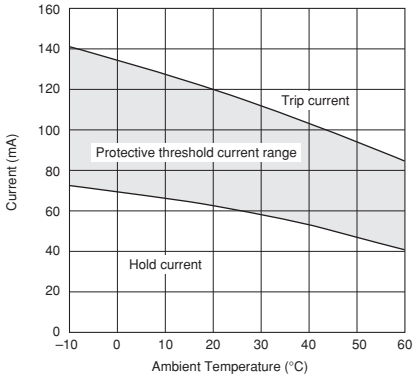
PRG18/21BC1R0M Type



PRG21BB220MB1RK



PRG21BB150MB1RK

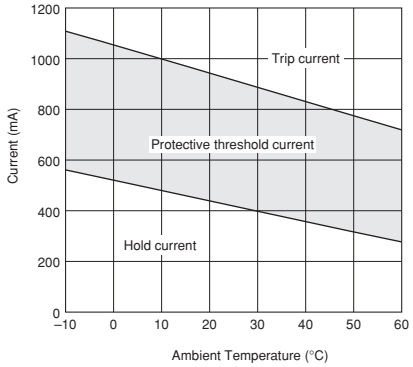


Continued on the following page.

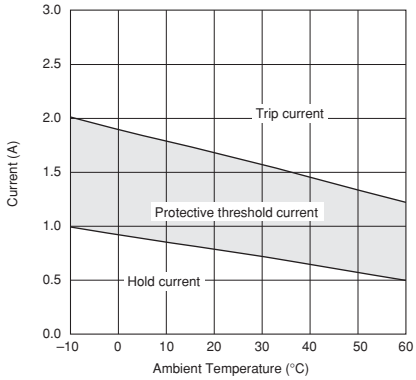
Continued from the preceding page.

■ Protective Threshold Current Range

PRG21BC0R6MM1RA

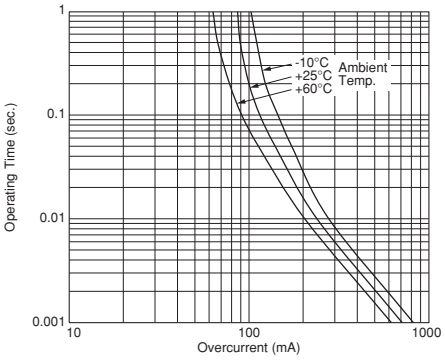


PRG21BC0R2MM1RA

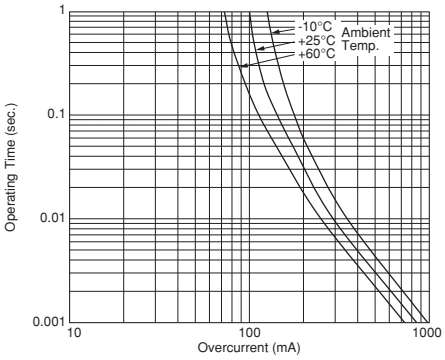


■ Operating Time (Typical Curve)

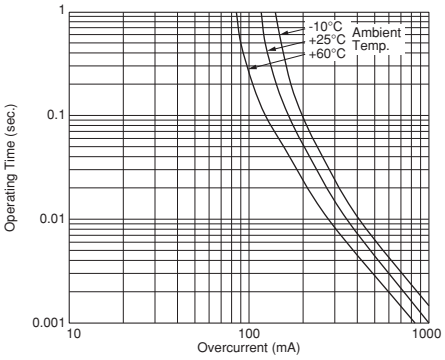
PRG15BC330MM1RC



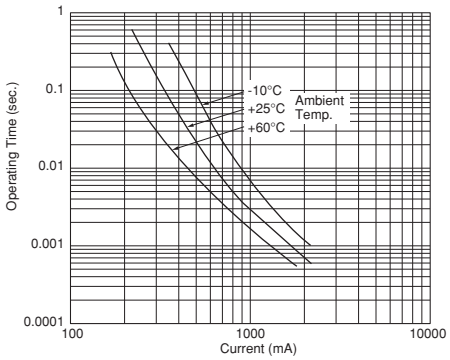
PRG15BC220MM1RC



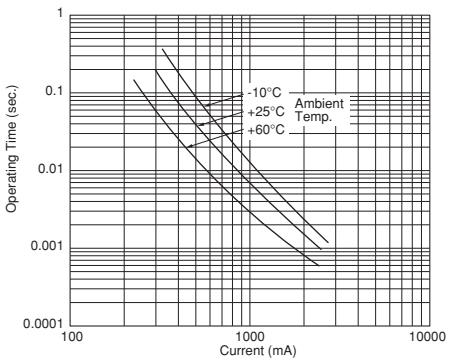
PRG15BC180MM1RC



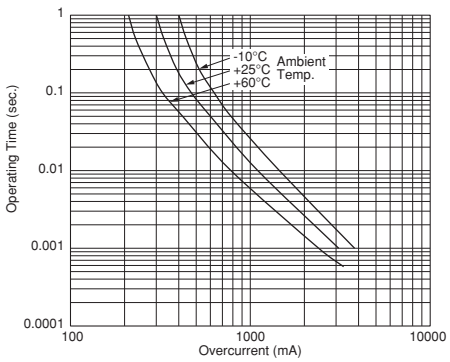
PRG15BC4R7MM1RC



PRG15BC3R3MM1RC



PRG15BC2R2MM1RC



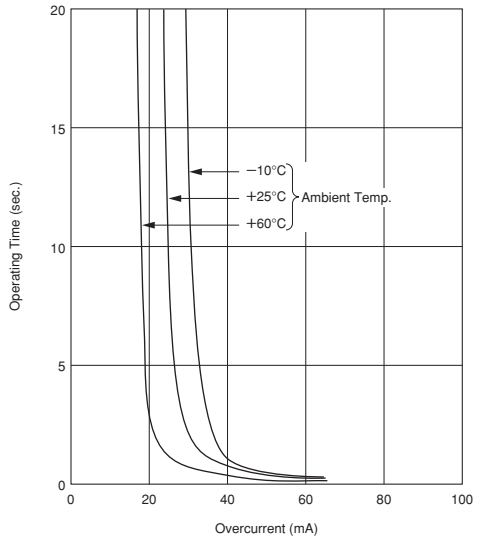
Continued on the following page.

Continued from the preceding page.

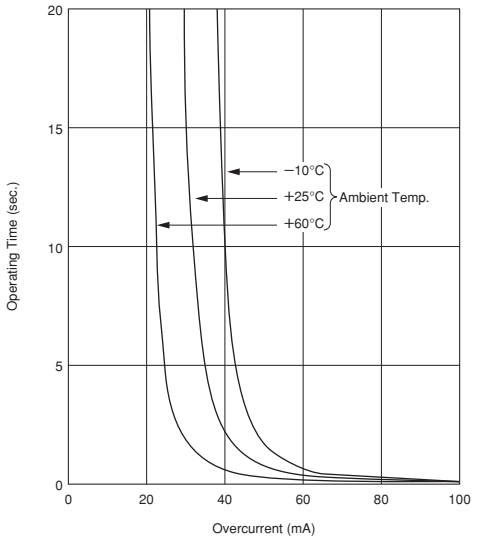
1

■ Operating Time (Typical Curve)

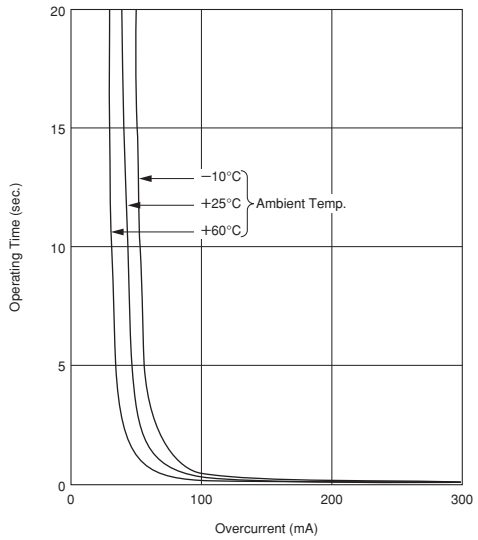
PRG18BB471MB1RB



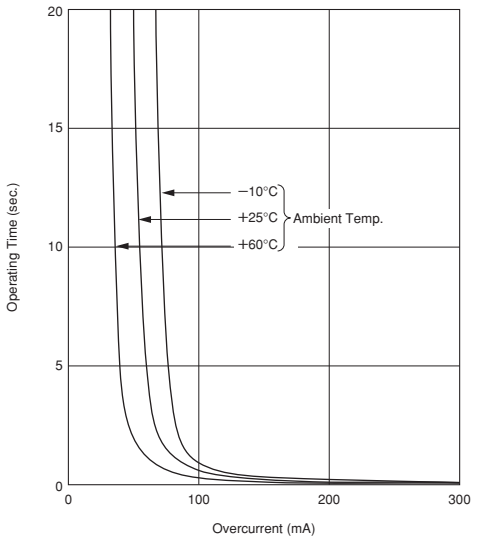
PRG18BB221MB1RB



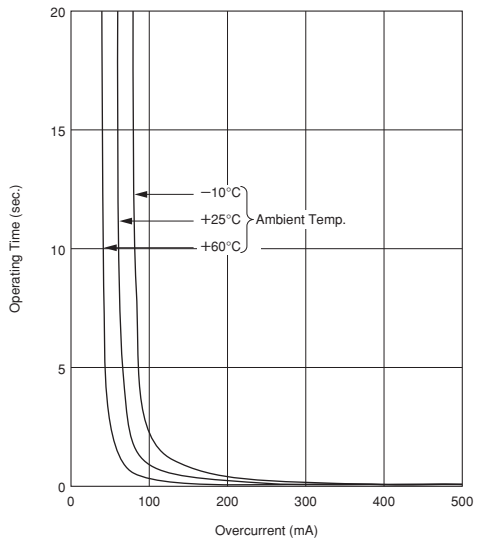
PRG18BB101MB1RB



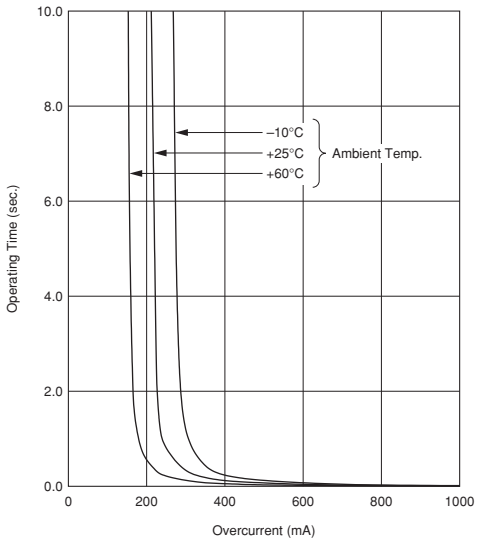
PRG18BB470MB1RB



PRG18BB330MB1RB



PRG18BC6R8MM1RB

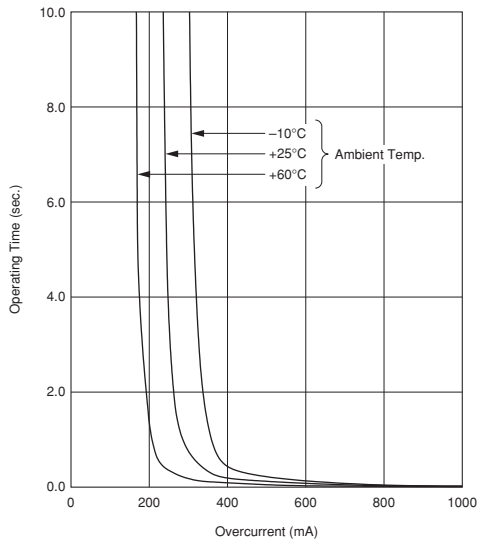


Continued on the following page.

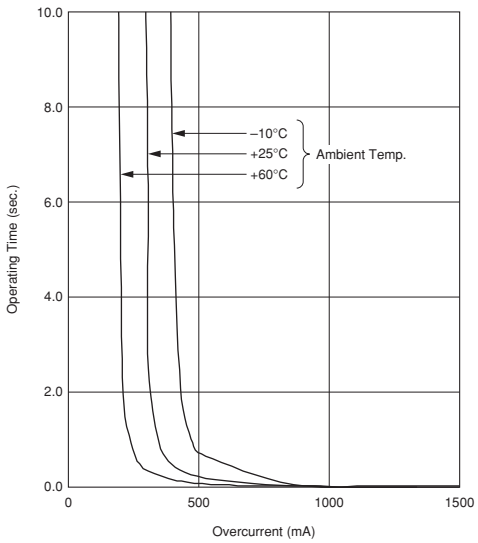
Continued from the preceding page.

■ Operating Time (Typical Curve)

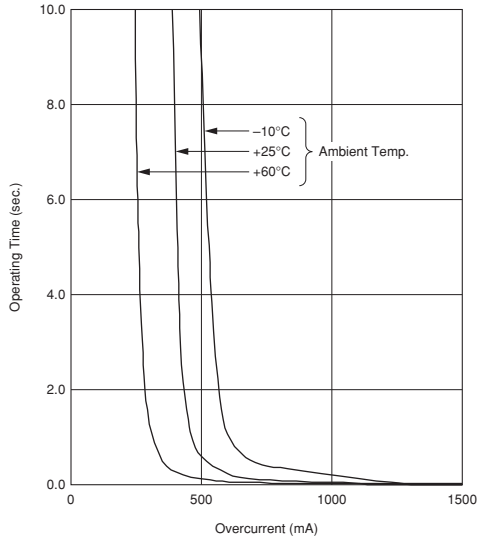
PRG18BC4R7MM1RB



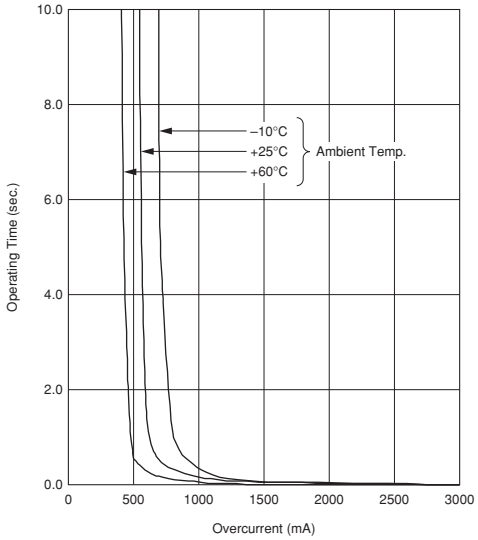
PRG18BC3R3MM1RB



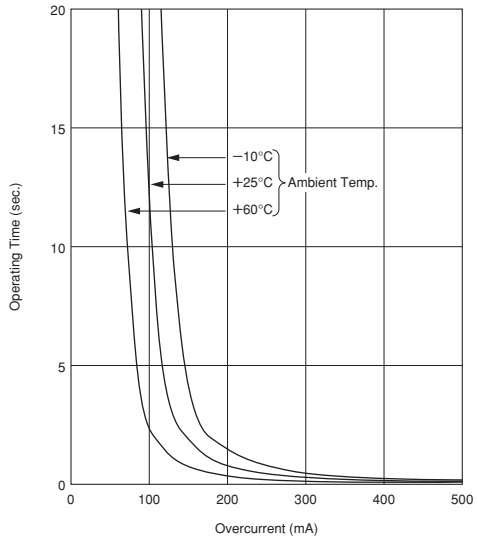
PRG18BC2R2MM1RB



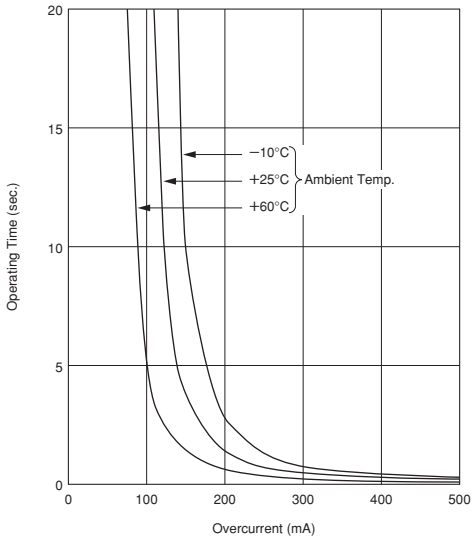
PRG18BC1R0MM1RB



PRG21BB220MB1RK



PRG21BB150MB1RK



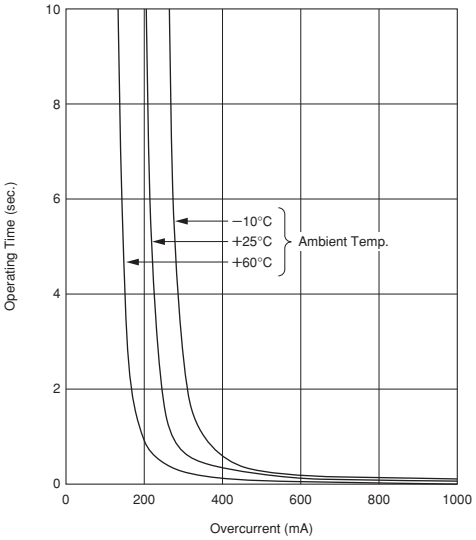
Continued on the following page.

Continued from the preceding page.

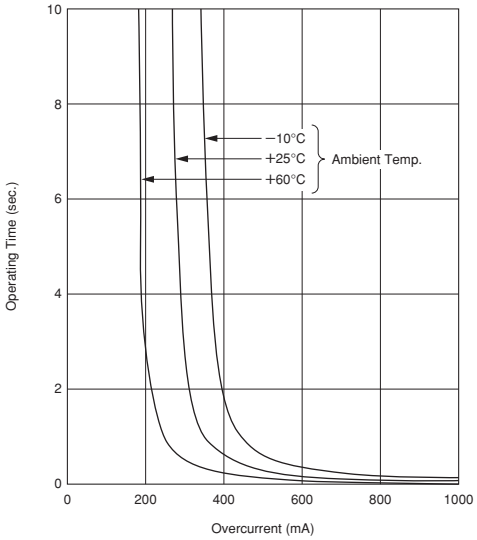
1

■ Operating Time (Typical Curve)

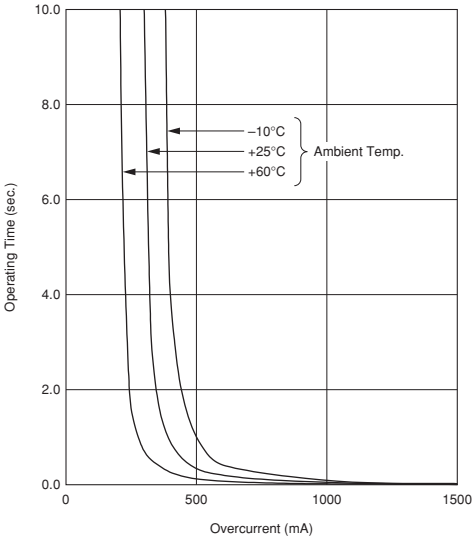
PRG21BC6R8MM1RA



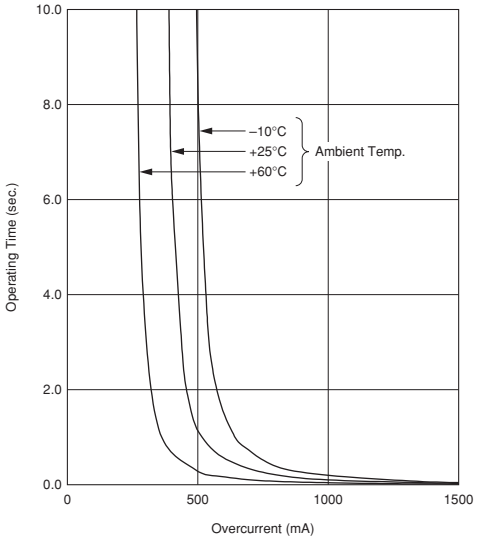
PRG21BC4R7MM1RA



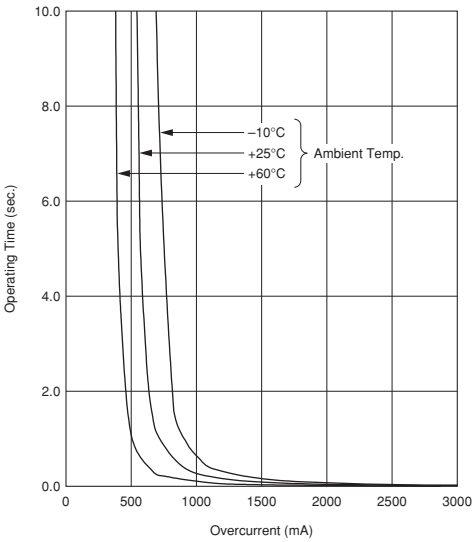
PRG21BC3R3MM1RA



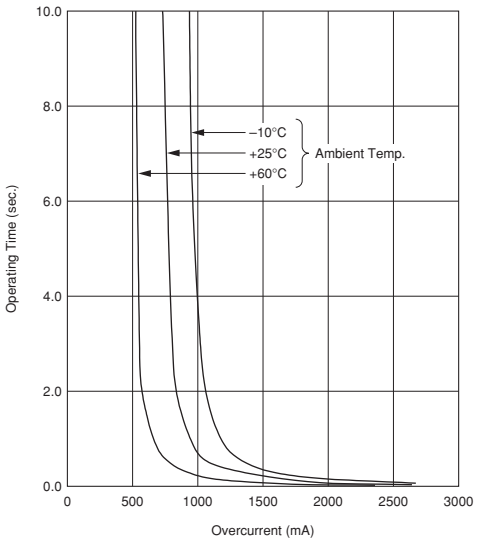
PRG21BC2R2MM1RA



PRG21BC1R0MM1RA



PRG21BC0R6MM1RA

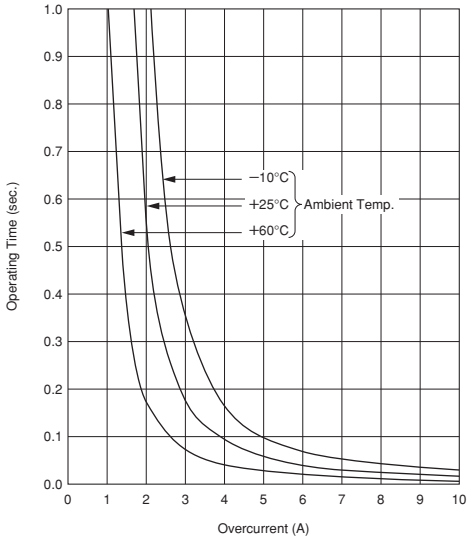


Continued on the following page.

Continued from the preceding page.

■ Operating Time (Typical Curve)

PRG21BC0R2MM1RA



Chip Type Specifications and Test Methods

■ PRG15 Series

No.	Item	Rating Value	Method of Examination
1	Operating Temp. Range	-10 to +60°C	Temperature range that permit to apply max. voltage to the Posistor®.
2	Resistance Value at 25°C	Within the specified range	It is measured by below flow. 1) Applied max. voltage for 3 min. 2) Storage 2 hrs in room temperature 3) Measured by four-terminal method with less than 1mA (DC0.1V).
3	Withstanding Voltage	Without damage	The voltage which rises gradually to 120% of the max. voltage applies to the Posistor® for 180±5 sec. at 25°C. (A protective resistor is to be connected in series, and the inrush current through Posistor® must be limited below max. rated value.)
4	Vibration	• Resistance (R25) change: Less than ±20% *1 • Appearance: No defects or abnormalities	Reference standard: IEC 60068-2-6 (1995) • Soldered PTC to PCB *2 • Frequency range: 10 to 55Hz • Amplitude: 1.5mm • Sweep rate: 1 octave/min. • Direction: X-Y-Z (3 direction) • 24 cycles in each axis
5	Solderability	Wetting of soldering area: ≧75%	Reference standard: IEC 60068-2-58 (2004) • Solder: Sn-3.0Ag-0.5Cu • Solder temp.: 245±5°C • Immersion time: 3±0.3 s
6	Resistance to Soldering Heat	• Resistance (R25) change: Less than ±20% *1 • Appearance: No defects or abnormalities	Reference standard: IEC 60068-2-58 (2004) [Reflow method] • Solder: Sn-3.0Ag-0.5Cu • Preheat: +150 to +180°C, 120±5 s • Peak temp.: 260±5°C • Soldering time: >220°C, 60 to 90 s • Reflow cycle: 1 time • Test board: Grass-Epoxy test board (FR-4) with our standard land size *2
7	High Temperature Storage		Reference standard: IEC 60068-2-2 (2007) • Soldered PTC to PCB *2 • +60±2°C • 1000+48/-0 hrs.
8	Low Temperature Storage		Reference standard: IEC 60068-2-1 (2007) • Soldered PTC to PCB *2 • -10±3°C • 1000+48/-0 hrs
9	Damp Heat, Steady State		Reference standard: IEC 60068-2-67 (1995) • Soldered PTC to PCB *2 • +40±2°C, 90±5%RH • 500+24/-0 hrs
10	Thermal Shock *3		Reference standard: IEC 60068-2-14 (2009) [Test Na] • Soldered PTC to PCB *2 • Transport time: <10 sec. • Test condition: See below table Step / Condition (°C) / Time (min.) 1 / -20±3 / 30 2 / +85±3 / 30 • Test cycle: 5 cycles
11	High Temperature Load		Reference standard: IEC 60068-2-2 (2007) • Soldered PTC to PCB *2 • +60±2°C • Applied max. voltage • 1000+48/-0 hrs.

*1: The resistance value after the test is measured by 4-terminal method with less than 10mA (DC0.1V), after storage in 25±2°C for 2 hrs.
*2: Above mentioned soldering is done following condition at our side.
• Glass-Epoxy PC board • Standard land dimension
• Standard solder paste • Standard solder profile
Above conditions are mentioned in Notice.
*3: We cannot guarantee the resistance change in Thermal Shock in case of defective mounting.

(Note)
No.11 High Temperature Load is based on Glass-Epoxy PC board which thermal dissipation coefficient of a mounting state is 2.2mW/°C.
In other condition of 2.2mW/°C, High Temperature Load characteristics may change.

■ PRG18/21BB Series

No.	Item	Rating Value	Metheod of Examination
1	Operating Temp.	-10 to 60°C	Temperature range with maximum voltage applied to PTC.
2	Resistance Value at 25°C	Within the specified range	After applying maximum operating voltage for 3 mins. and leaving for 2 hours in 25°C, measured by applying voltage less than DC1.5V. (by a direct current 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 sign of exfoliation on electrode.	Reference standard: IEC 60068-2-21 (2006) · Soldered PTC to PCB (**) · Force: 5.0N · Test time: 10 sec.
5	Vibration	· Appearance: No defects or abnormalities · Resistance (R25) change: Less than ±20% (*)	Reference standard: IEC 60068-2-6 (2007) · Soldered PTC to PCB (**) · Frequency range: 10 to 55Hz · Amplitude: 1.5mm · Sweep rate: 1 octave/min. · Direction: X-Y-Z (3 direction) · 24 cycles in each axis
6	Solderability	Wetting of soldering area: ≧75%	Reference standard: IEC 60068-2-58 (2004) · Solder: Sn-3.0Ag-0.5Cu · Solder temp.: 245±5°C · Immersion time: 3±0.3s
7	Resistance to Soldering Heat	· Appearance: No defects or abnormalities · Resistance (R25) change: Less than ±20% (*)	Reference standard: IEC 60068-2-58 (2004) [Reflow method] · Solder: Sn-3.0Ag-0.5Cu · Preheat: +150 to +180°C, 120+/-5s · Peak temp: 260+/-5°C · Soldering time: ≧220°C, 60 to 90s · Reflow cycle: 1 time · Test board: Grass-Epoxy test board (FR-4) with our standard land size
8	High Temperature Storage	· Appearance: No defects or abnormalities · Resistance (R25) change: Less than ±20% (*)	Reference standard: IEC 60068-2-2 (2007) · Soldered PTC to PCB (**) · +60±2°C · 1000+48/-0 hrs.
9	Low Temperature Storage		Reference standard: IEC 60068-2-1 (2007) · Soldered PTC to PCB (**) · -10±3°C · 1000+48/-0 hrs
10	Damp Heat, Steady State		Reference standard: IEC 60068-2-67 (1995) · Soldered PTC to PCB (**) · +40±2°C, 90±5%RH · 500+24/-0 hrs
11	Thermal Shock		Reference standard: IEC 60068-2-14 (2009) [Test Na] · Soldered PTC to PCB (**) · Transport time: <10 sec. · Test condition: See below table · Test cycle: 5 cycles
12	High Temperature Load		Reference standard: IEC 60068-2-2 (2007) · Soldered PTC to PCB (**) · +60±2°C · Applied voltage: See below table · 500+24/-0 hrs.

Step	Condition	Time
1	-20±3°C	30min.
2	+85±2°C	30min.

Step	Voltage	Time
1	Max. voltage	1.5hrs.
2	OFF	0.5hrs.

*: The resistance value after the test. It is measured by applying voltage less than DC1.5V (by a direct current less than 10mA) after left at 25±2°C for 2hrs.
**: Above mentioned soldering is done under the following conditions at our side.
· Glass-Epoxy PC board · Standard solder paste
· Standard land dimension · Standard solder profile
Above conditions are mentioned in Notice.