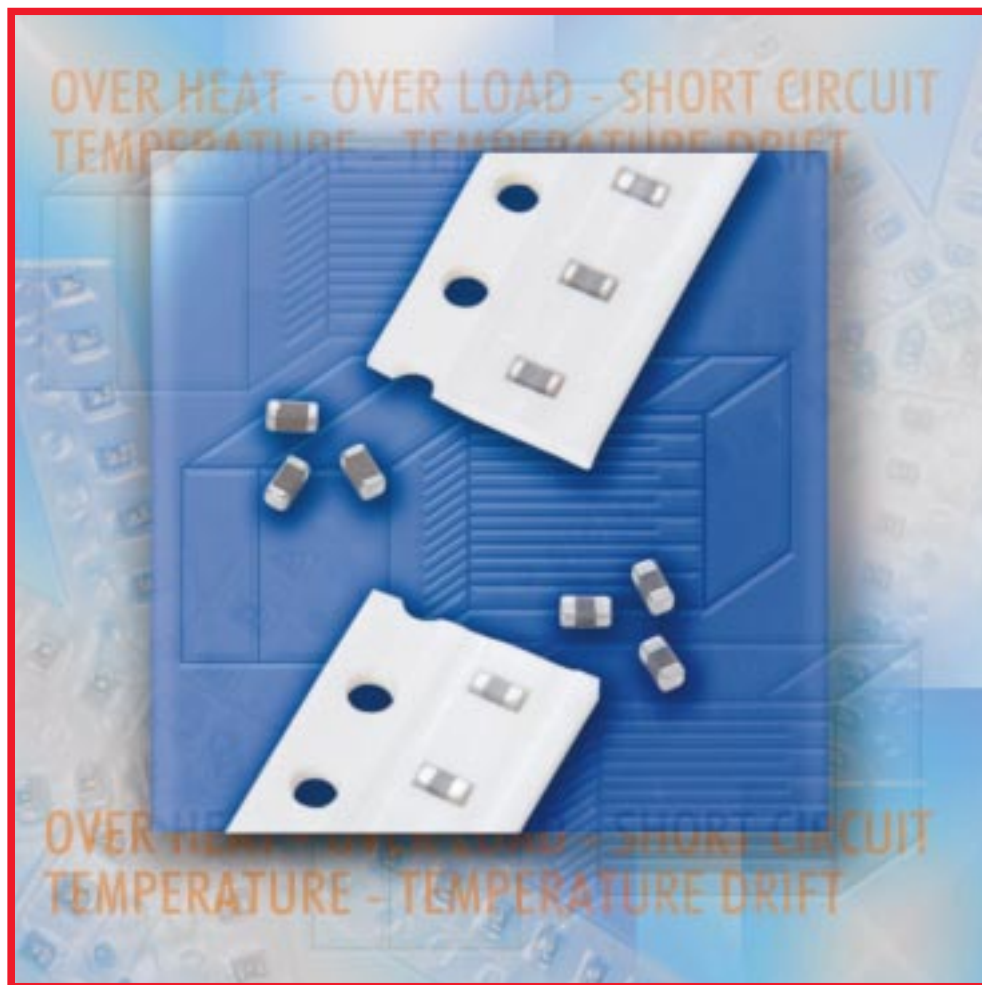


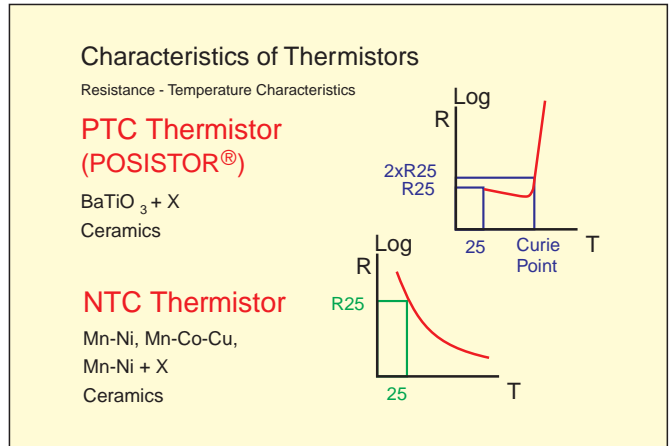
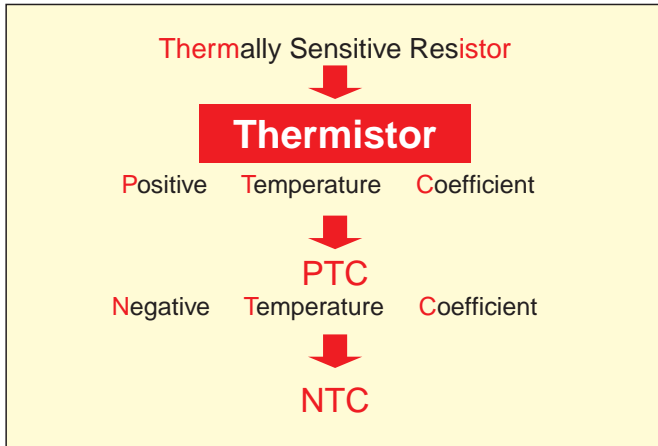
PTC - NTC for Surface Mounting Application

muRata

Innovator in Electronics



What is a Thermistor?

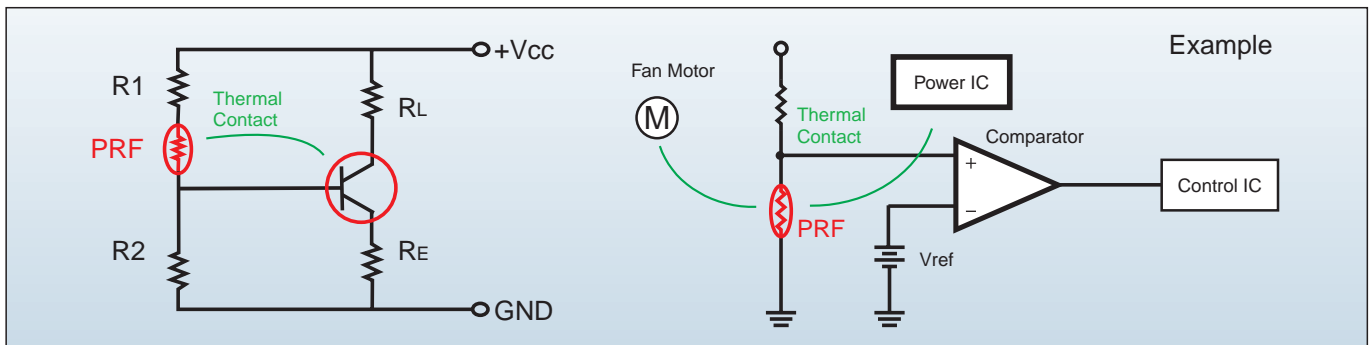


PRF15/18 Series Chip POSISTOR® for Overheat Sensing

PRF15/18 PTC Chip Thermistors detect overheating of Hybrid ICs, Power Transistors, Power Diodes and Power ICs etc.

1. 0402 and 0603 light weight
2. High gain simplifies circuit design

3. Free of contact noise and problems
4. Pb free plated terminations
5. Sturdy construction resists mechanical vibration and shock.
6. PRF18xxx5RB series is available for Reflow/Flow soldering.

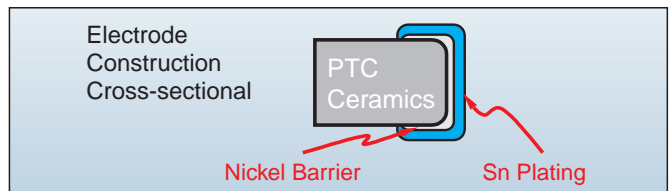
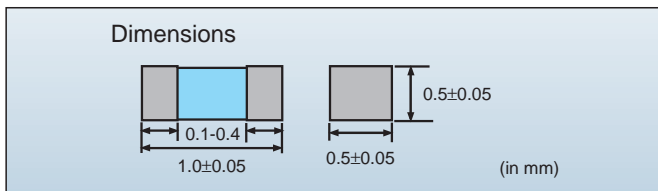


PRF15 Series Characteristics



Part Number	Sensing Temperature (at 4.7k ohm) (°C)	Maximum Voltage (V)	Resistance (at 25°C) (ohm)	Operating Temperature Range (°C)
PRF15BC471QB1RC	105 ±5°C	32	470 ±50%	-20 to 120
PRF15BB471QB1RC	115 ±5°C	32	470 ±50%	-20 to 130
PRF15BA471QB1RC	125 ±5°C	32	470 ±50%	-20 to 140

This product is applied to reflow soldering. This product is recognized by UL.



PRF18 Series Characteristics

Part Number	Sensing Temperature (at 4.7k ohm) (°C)	Sensing Temperature (at 47k ohm) (°C)	Maximum Voltage (V)	Resistance (at 25°C) (ohm)	Operating Temperature Range (°C)
PRF18BG471QB5RB	65 ±5°C	80 ±7°C	32	470 ±50%	-20 to 90
PRF18BF471QB5RB	75 ±5°C	90 ±7°C	32	470 ±50%	-20 to 100
PRF18BE471QB5RB	85 ±5°C	100 ±7°C	32	470 ±50%	-20 to 110
PRF18BD471QB5RB	95 ±5°C	110 ±7°C	32	470 ±50%	-20 to 120
PRF18BC471QB5RB	105 ±5°C	120 ±7°C	32	470 ±50%	-20 to 130
PRF18BB471QB5RB	115 ±5°C	130 ±7°C	32	470 ±50%	-20 to 140
PRF18BA471QB5RB	125 ±5°C	140 ±7°C	32	470 ±50%	-20 to 150
PRF18AR471QB5RB	135 ±5°C	150 ±7°C	32	470 ±50%	-20 to 160
PRF18AS471QB5RB	145 ±5°C	-	32	470 ±50%	-20 to 160

Chip Tight Tolerance Type

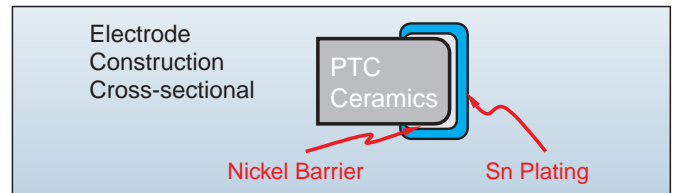
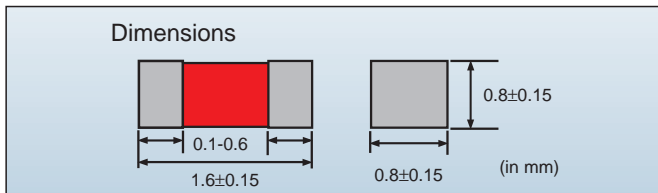
Part Number	Sensing Temperature (at 4.7k ohm) (°C)	Maximum Voltage (V)	Resistance (at 25°C) (ohm)	Operating Temperature Range (°C)
PRF18BG471RB5RB	65 ±3°C	32	470 ±50%	-20 to 80
PRF18BF471RB5RB	75 ±3°C	32	470 ±50%	-20 to 90
PRF18BE471RB5RB	85 ±3°C	32	470 ±50%	-20 to 100
PRF18BD471RB5RB	95 ±3°C	32	470 ±50%	-20 to 110
PRF18BC471RB5RB	105 ±3°C	32	470 ±50%	-20 to 120
PRF18BB471RB5RB	115 ±3°C	32	470 ±50%	-20 to 130

This product is applied to flow/reflow soldering. This product is recognized by UL.

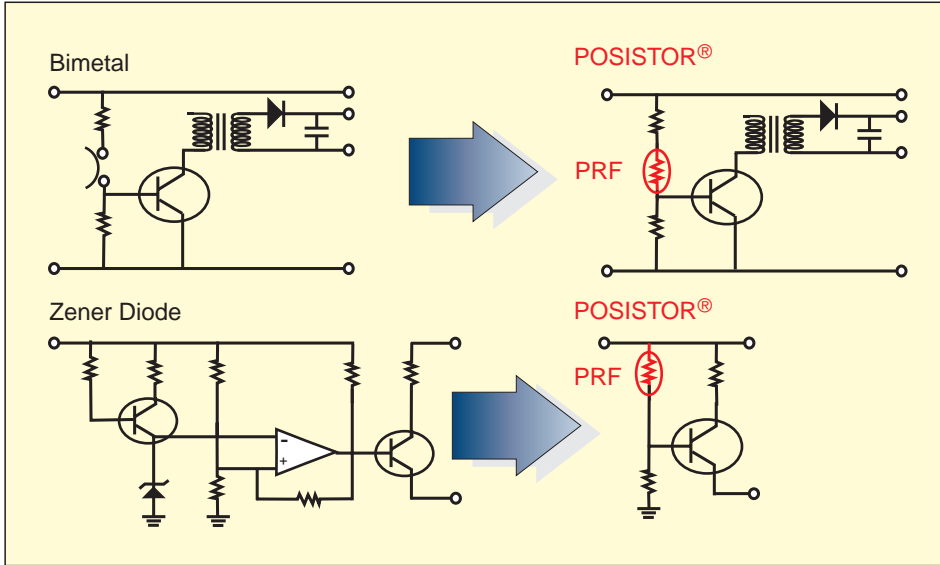


Part Number	Sensing Temperature (at 4.7k ohm) (°C)	Maximum Voltage (V)	Resistance (at +25°C) (ohm)	Operating Temperature Range (°C)
PRF18BA103QB1RB	130 ±5°C	32	10k ±50%	-20 to 140

Low Current Consumption!



Circuit Examples



The POSISTOR® has the following advantages over Bimetal devices.

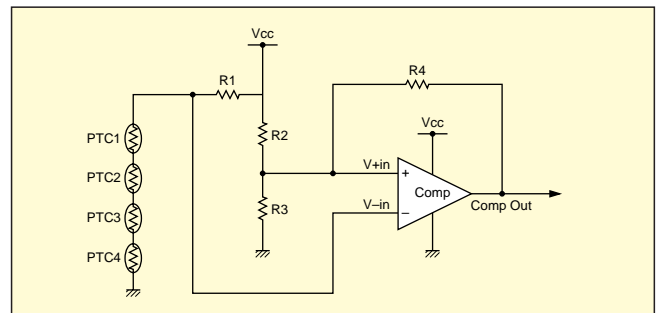
1. Noise free
2. No contact problems
3. Low price

The POSISTOR® has the following additional advantages over Zener Diodes.

1. Reduced numbers of parts used in circuits
2. Reduced process costs of mounting parts on PCBs
3. Reduces occupied space, helping high density PCB mounting

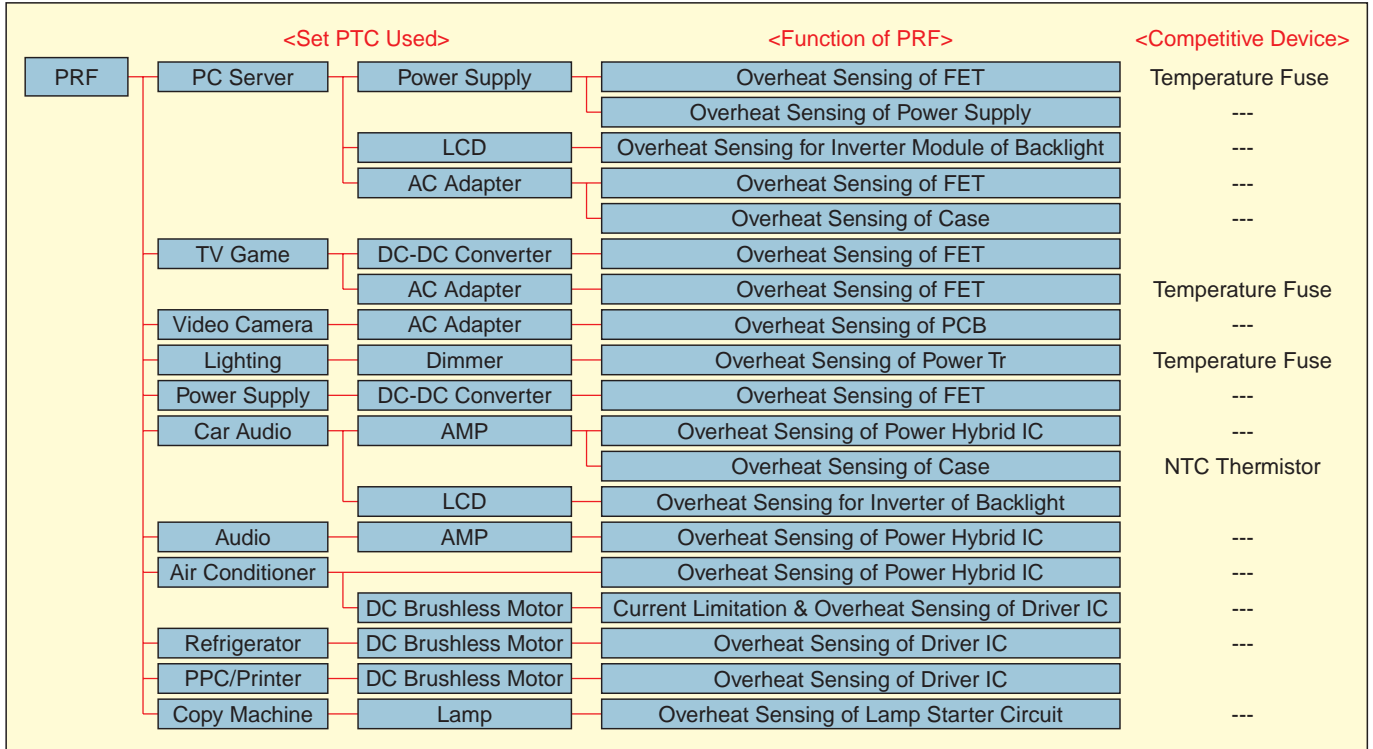
	Zener Diode		POSISTOR®	
Mounting Area	10x10 = 100mm ²		6x6 = 36mm ²	
Parts	Parts	UPS	Parts	UPS
	Diode	1	POSISTOR®	1
	Transistor	2	Transistor	1
	Resistor	7	Resistor	2
	Op. Amp.	1	Op. Amp.	0
	Total	11	Total	4

More than two pieces of POSISTOR® can cover multi hot spots working with a comparator. Fig. shows basic circuit idea to connect multiple POSISTOR® in series. When One POSISTOR® detects overheat at least, a comparator can work by the sharp temperature-resistance characteristic. It easily allows changing a number of POSISTOR® or sensing temperature in the same basic circuit design.



Connection of multiple POSISTOR®

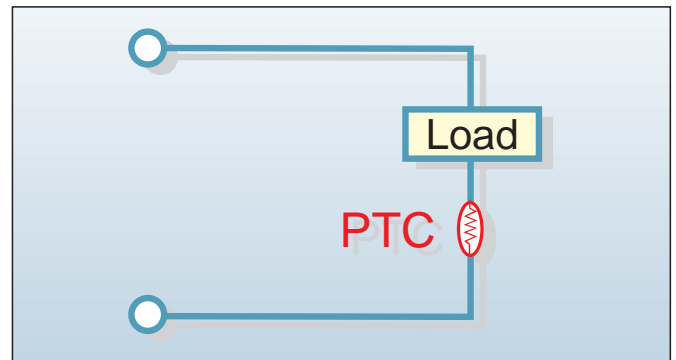
Markets & Applications of Overheat Sensing



PRG18/21 Series Chip POSISTOR® for Overcurrent Protection

Chip Thermistors prevent failure of apparatus due to excess current.

1. 0603 and 0805 light weight
2. High gain simplifies circuit design
3. Free of contact noise and problems
4. Pb free plated terminations
5. Sturdy construction resists mechanical vibration and shock.



PRG Series Characteristics

Chip Type 0603 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%
PRG18BC3R3MM1RB	12	120	180	400	480	4500	3.3 ±20%
PRG18BC2R2MM1RB	9	150	220	500	600	5000	2.2 ±20%
PRG18BC1R0MM1RB	6	220	330	740	850	7500	1.0 ±20%

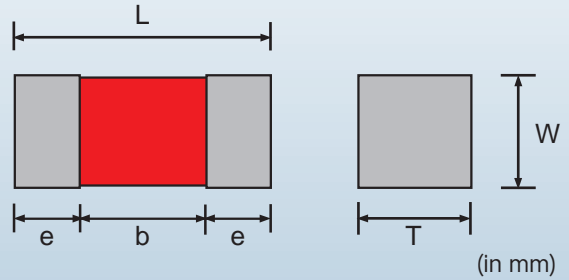
Chip Type 0805 Size

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	20	80	120	260	320	3500	6.8 ±20%
PRG21BC4R7MM1RA	20	100	155	330	400	5000	4.7 ±20%
PRG21BC3R3MM1RA	16	120	180	400	480	6000	3.3 ±20%
PRG21BC2R2MM1RA	12	150	220	500	600	6500	2.2 ±20%
PRG21BC1R0MM1RA	9	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%

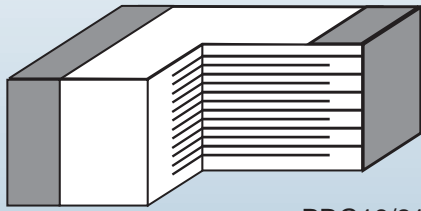
Maximum Current shows typical capacities of the transformer which can be used. Please contact us for UL recognized products.

Dimensions

	PRG18BB	PRG21BB	PRG21BC
L	1.6±0.15	2.0±0.2	2.0±0.2
W	0.8±0.15	1.25±0.2	1.25±0.2
T			0.9±0.2
e	0.1-0.6	0.2 min.	0.2 min.
b	-	0.5 min.	0.5 min.

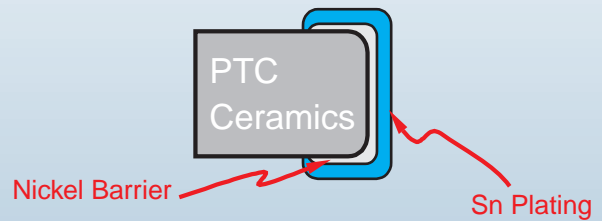


Multilayer Chip POSISTOR® for Overcurrent Protection



PRG18/21BC Type

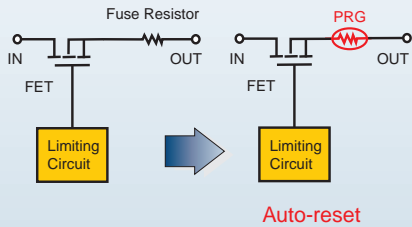
Electrode Construction Cross-sectional



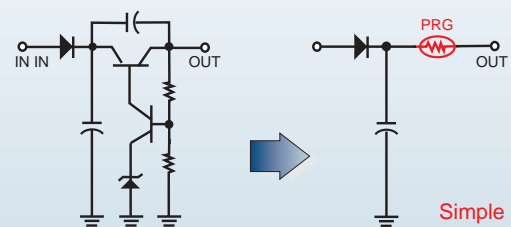
Data here are reference only. Specifications available upon request. Product to be evaluated, confirmed by the user before actual use. Description here may be revised without notice.

POSISTOR® Ideas

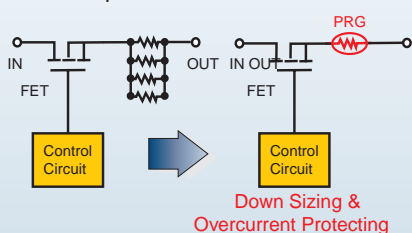
From Fuse Resistor



From Current Control Circuit



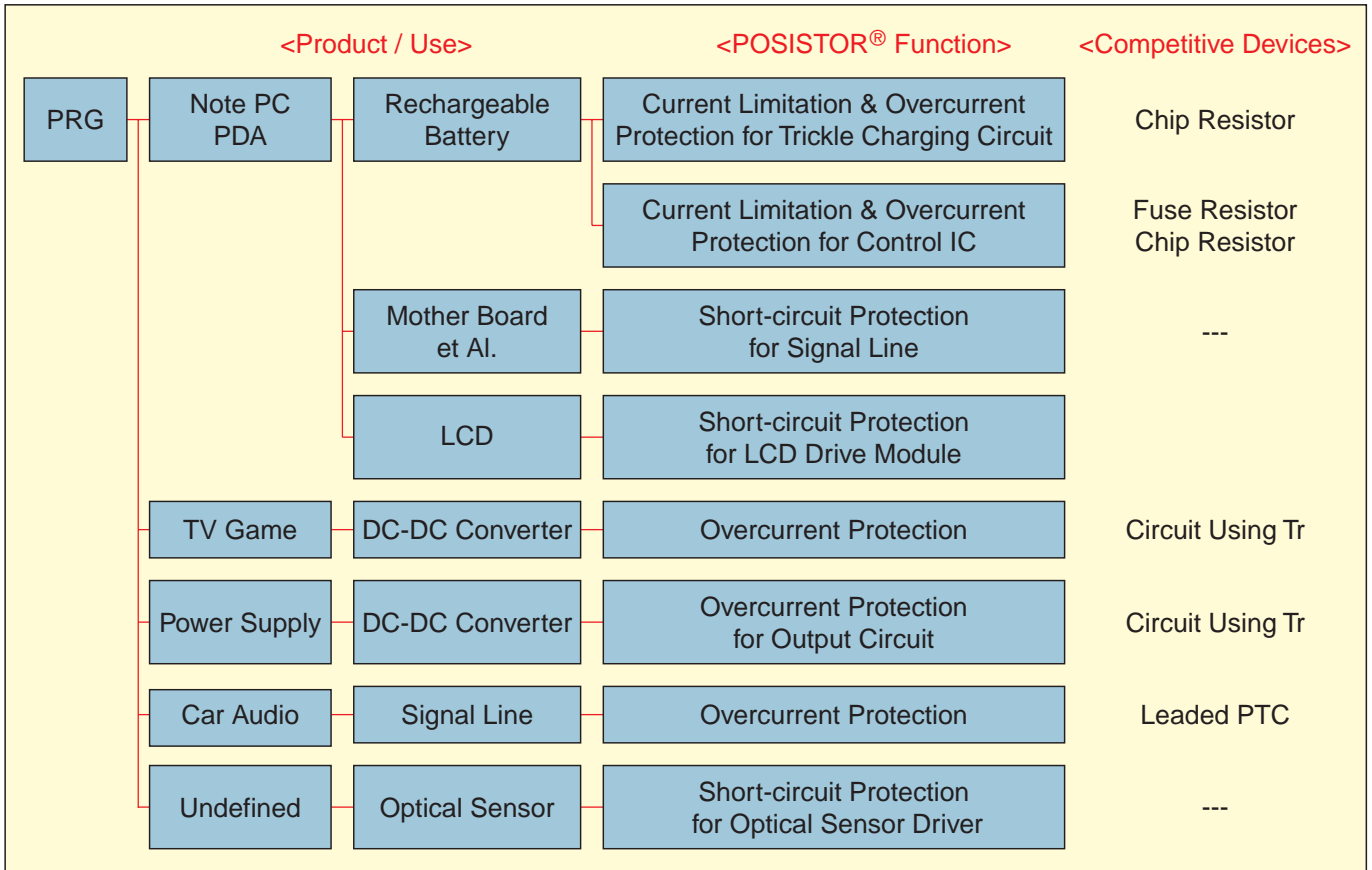
From Chip Resistor



Item	POSISTOR®	Fuse Resistor	Control Circuit	Chip Resistor
Safety	○	○	○	✗
Repeat	○	✗	○	✗
Space	○	○	✗	✗
Cost	△	△	✗	○

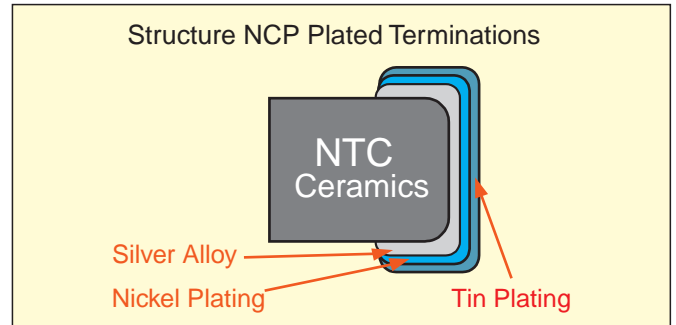
Key: Cross = Bad - Circle = Good - Triangle = Little difference

Markets & Applications for Overcurrent Protection



Chip NTC Thermistor NCP Series

1. A common relationship between Resistance and B constant in all sizes (0201/ 0402/ 0603/ 0805) offers convenience when downsizing.
2. No lead contained (Pb free).
3. Tight resistance tolerance of $\pm 1\%$ (Code F) available on 10k ohm (0201, 0402, 0603), 47k ohm (0402, 0603) and 100k ohm (0201, 0402, 0603) products.
4. High soldering heat resistant
5. High humidity resistant due to unique inner electrodes.



Dimensions	NCP03 (0201 size)	NCP15 (0402 size)	NCP18 (0603 size)	NCP21 (0805 size)
L	0.60±0.03	1.00±0.05	1.60±0.15	2.00±0.20
W				1.25±0.20
T	0.3±0.03	0.50±0.05	0.80±0.15	0.85±0.15
e	0.10-0.20	0.15-0.35	0.20-0.60	0.20-0.70

(in mm)

Line-up of Plated Termination

Resistance at 25°C	0201 size NCP03				0402 size NCP15			
	B-Constant	Part Number	B-Constant	Part Number	B-Constant	Part Number	B-Constant	Part Number
11 ohm	2750 K	NCP03YS110*	-	-	-	-	-	-
22 ohm	2750 K	NCP03YS220*	-	-	3100 K	NCP15XC220*	-	-
33 ohm	2750 K	NCP03YS330*	-	-	3100 K	NCP15XC330*	-	-
47 ohm	2750 K	NCP03YS470*	-	-	3100 K	NCP15XC470*	-	-
68 ohm	2750 K	NCP03YS680*	-	-	3100 K	NCP15XC680*	-	-
100 ohm	2750 K	NCP03YS101*	-	-	3250 K	NCP15XF101*	-	-
150 ohm	(3100 K	NCP03XC151*	-	-	3250 K	NCP15XF151*	-	-
220 ohm	(3100 K	NCP03XC221*	-	-	3500 K	NCP15XM221*	-	-
330 ohm	(3100 K	NCP03XC331*	-	-	3500 K	NCP15XM331*	-	-
470 ohm	(3100 K	NCP03XC471*	-	-	3650 K	NCP15XQ471*	-	-
680 ohm	(3100 K	NCP03XC681*	-	-	3650 K	NCP15XQ681*	-	-
1.0k ohm	3500 K	NCP03XM102*	-	-	3650 K	NCP15XQ102*	-	-
1.5k ohm	3500 K	NCP03XM152*	-	-	3950 K	NCP15XW152*	-	-
2.2k ohm	3500 K	NCP03XM222*	-	-	3950 K	NCP15XW222*	-	-
3.3k ohm	3500 K	NCP03XM332*	-	-	3950 K	NCP15XW332*	-	-
4.7k ohm	3500 K	NCP03XM472*	-	-	3500 K	NCP15XM472*	-	-
6.8k ohm	3380 K	NCP03XH682*	-	-	3950 K	NCP15XW682*	-	-
10k ohm	3380 K	NCP03XH103*	3900 K	NCP03XV103*	3380 K	NCP15XH103*	3900 K	NCP15XV103*
15k ohm	3380 K	NCP03XH153*	-	-	3950 K	NCP15XW153*	-	-
22k ohm	3380 K	NCP03XH223*	-	-	3950 K	NCP15XW223*	4485 K	NCP15WL223*
33k ohm	4250 K	NCP03WF333*	-	-	4050 K	NCP15WB333*	4485 K	NCP15WL333*
47k ohm	4050 K	NCP03WB473*	4485 K	NCP03WL473*	4050 K	NCP15WB473*	4485 K	NCP15WL473*
68k ohm	4250 K	NCP03WF683*	4485 K	NCP03WL683*	4150 K	NCP15WD683*	4485 K	NCP15WL683*
100k ohm	4250 K	NCP03WF104*	4485 K	NCP03WL104*	4250 K	NCP15WF104*	4485 K	NCP15WL104*
150k ohm	-	-	4485 K	NCP03WL154*	4500 K	NCP15WM154*	4485 K	NCP15WL154*
220k ohm	-	-	4485 K	NCP03WL224*	4500 K	NCP15WM224*	-	-
330k ohm	-	-	-	-	-	-	-	-
470k ohm	-	-	-	-	4500 K	NCP15WM474*	-	-
680k ohm	-	-	-	-	-	-	-	-
1.0M ohm	-	-	-	-	-	-	-	-
Operating Temp.	-40 to +125°C				-40 to +125°C			
Dissipation Constant	Approx. 1.0 mW/°C				Approx. 1.0 mW/°C			
P/N in End	05RL				03RC			
Packaging	15 kpcs./reel				10 kpcs./reel			
Certified UL1434	-				Done		-	

 Recommended types

Coming soon!

* Resistance tolerance codes: F=±1%, E=±3%, J=±5%

10k ohm, 47k ohm, 100k ohm type have Tight Tolerance Type (±1%: NCP18XH103F03RB, NCP15XH103F03RC, NCP03XH103F05RL, NCP18WB473F10RB, NCP15WB473F03RC, NCP18WF104F12RB, NCP15WF104F03RC, NCP03WF104F05RL)

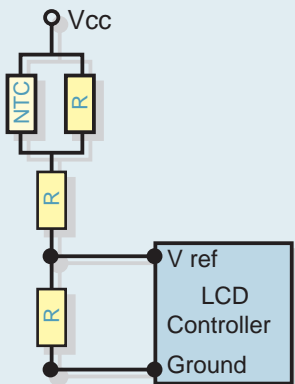
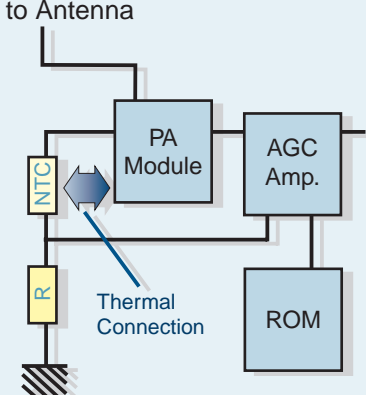
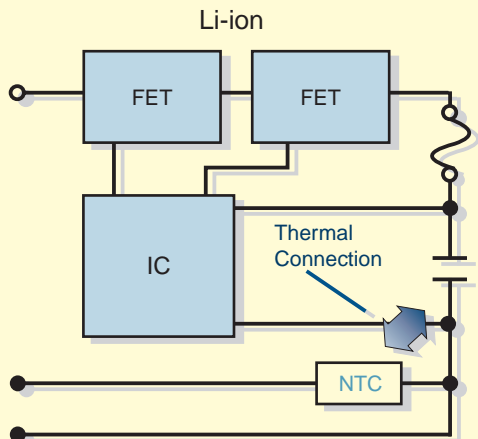
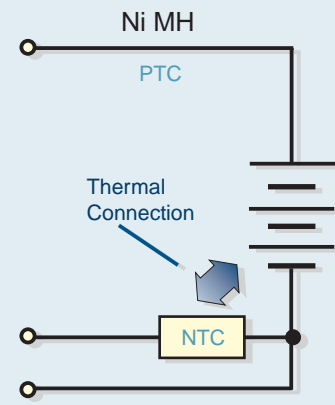
Resistance at 25°C	0603 size NCP18				0805 size NCP21	
	B-Constant	Part Number	B-Constant	Part Number	B-Constant	Part Number
11 ohm	-	-	-	-	-	-
22 ohm	-	-	-	-	-	-
33 ohm	-	-	-	-	-	-
47 ohm	-	-	-	-	-	-
68 ohm	-	-	-	-	-	-
100 ohm	3250 K	NCP18XF101*	-	-	-	-
150 ohm	3250 K	NCP18XF151*	-	-	-	-
220 ohm	3500 K	NCP18XM221*	-	-	3500 K	NCP21XM221*
330 ohm	3500 K	NCP18XM331*	-	-	-	-
470 ohm	3650 K	NCP18XQ471*	-	-	3650 K	NCP21XQ471*
680 ohm	3650 K	NCP18XQ681*	-	-	-	-
1.0k ohm	3650 K	NCP18XQ102*	-	-	3650 K	NCP21XQ102*
1.5k ohm	3950 K	NCP18XW152*	-	-	-	-
2.2k ohm	3950 K	NCP18XW222*	-	-	3950 K	NCP21XW222*
3.3k ohm	3950 K	NCP18XW332*	-	-	-	-
4.7k ohm	3500 K	NCP18XM472*	-	-	3500 K	NCP21XM472*
6.8k ohm	3950 K	NCP18XW682*	-	-	-	-
10k ohm	3380 K	NCP18XH103*	3900 K	NCP18XV103*	3900 K	NCP21XV103*
15k ohm	3950 K	NCP18XW153*	-	-	3950 K	NCP21XW153*
22k ohm	3950 K	NCP18XW223*	-	-	3950 K	NCP21XW223*
33k ohm	4050 K	NCP18WB333*	-	-	4050 K	NCP21WB333*
47k ohm	4050 K	NCP18WB473*	-	-	4050 K	NCP21WB473*
68k ohm	4150 K	NCP18WD683*	-	-	-	-
100k ohm	4250 K	NCP18WF104*	-	-	4250 K	NCP21WF104*
150k ohm	4500 K	NCP18WM154*	-	-	-	-
220k ohm	4500 K	NCP18WM224*	-	-	-	-
330k ohm	-	-	-	-	-	-
470k ohm	4500 K	NCP18WM474*	-	-	-	-
680k ohm	-	-	-	-	-	-
1.0M ohm	-	-	-	-	-	-
Operating Temp.	-40 to +125°C				-40 to +125°C	
Dissipation Constant	Approx. 1.0 mW/°C				Approx. 2.0 mW/°C	
P/N in End	03RB				03RA	
Packaging	4 kpcs./reel				4 kpcs./reel	
Certified UL1434	Done				Done	

Recommended types

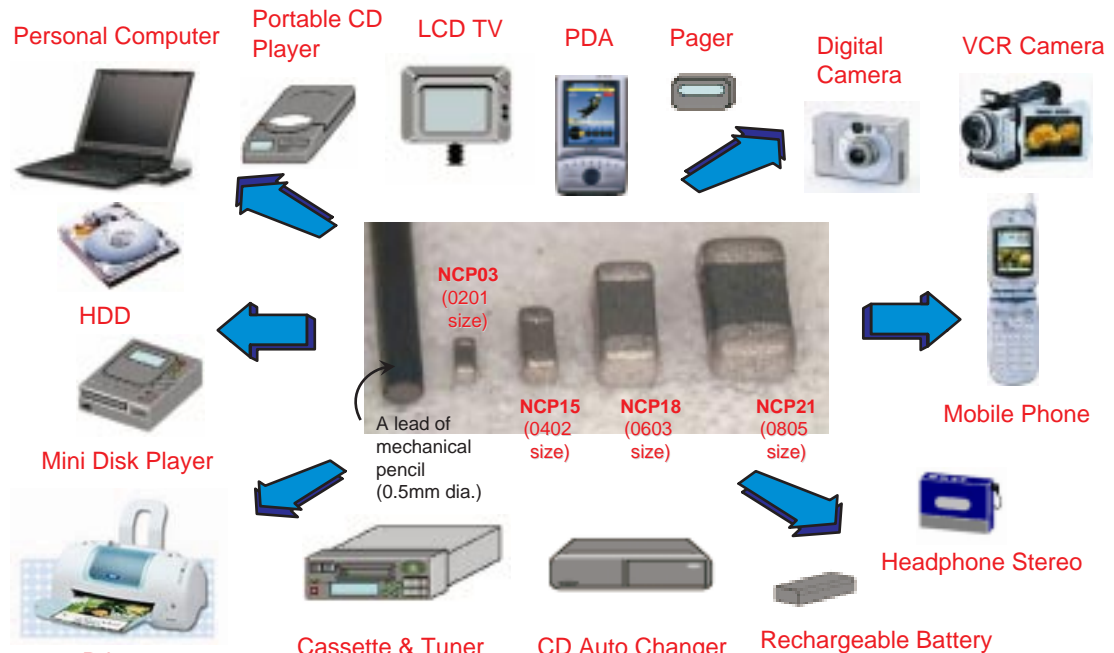
* Resistance tolerance codes: F=±1%, E=±3%, J=±5%

10k ohm, 47k ohm, 100k ohm type have Tight Tolerance Type (±1%: NCP18XH103F03RB, NCP15XH103F03RC, NCP03XH103F05RL, NCP18WB473F10RB, NCP15WB473F03RC, NCP18WF104F12RB, NCP15WF104F03RC, NCP03WF104F05RL)

Popular Applications of Chip NTC

LCD		Power Amplifier	
	<p>LCD Contrast control.</p> <p>Drive voltage is compensated utilizing NTC's temperature signal.</p> <p>High resistance values generally required, typically 33k ohms to 470k ohms</p>		<p>Temperature compensation of power amplifier (PA) module.</p>
Battery Pack (Li-ion / Ni MH)			
<p>Li-ion</p> 	<p>Ni MH</p> 	<p>Ambient temperature detection of charging time.</p> <p>Detection of battery cell heating in abnormal circumstances.</p> <p>47k ohm±5% 10k ohm±5% 10k ohm±1% ...etc.</p>	

More Popular Applications of Chip NTC



Personal Computer Portable CD Player LCD TV PDA Pager Digital Camera VCR Camera

HDD Mini Disk Player Printer

Cassette & Tuner CD Auto Changer Rechargeable Battery Mobile Phone Headphone Stereo

NCP03 (0201 size)
NCP15 (0402 size) **NCP18** (0603 size) **NCP21** (0805 size)

A lead of mechanical pencil (0.5mm dia.)

△Note:

1. Export Control

<For customers outside Japan>

No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

<For customers in Japan>

For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.

- | | |
|-----------------------------|--|
| ① Aircraft equipment | ② Aerospace equipment |
| ③ Undersea equipment | ④ Power plant equipment |
| ⑤ Medical equipment | ⑥ Transportation equipment (vehicles, trains, ships, etc.) |
| ⑦ Traffic signal equipment | ⑧ Disaster prevention / crime prevention equipment |
| ⑨ Data-processing equipment | ⑩ Application of similar complexity and/or reliability requirements to the applications listed above |

3. Product specifications in this catalog are as of Sep 2009. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.

4. Please read rating and △ CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.

5. This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

6. Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.

7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.



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