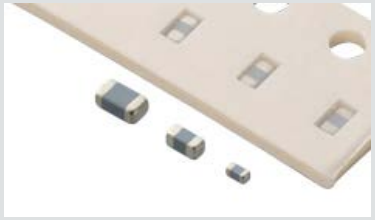
Ceramic PTC Resettable Fuse

PTC Thermistor for overcurrent protection ～ PRG Series ～



Murata Manufacturing Co., Ltd.

http://www.murata.com/en-global/products/thermistor/ptc/prg

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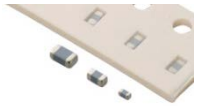
What is a “Resettable Fuse” ?



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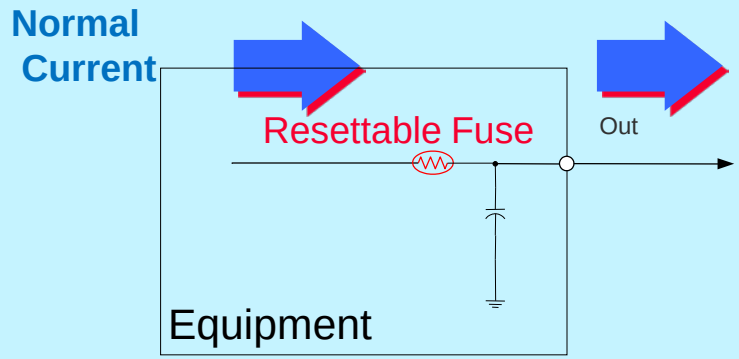
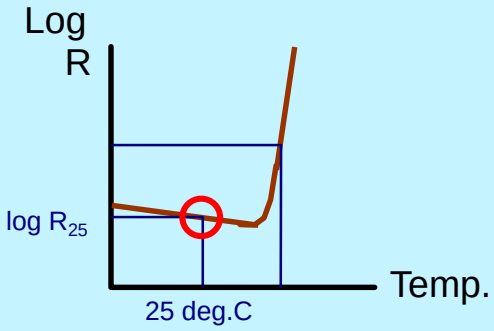
Resettable Fuse protects the circuit when over current occur by misconnection or short, it is automatically returns to Non-Operating Mode and can be used repeatedly.

Non-Operating Mode

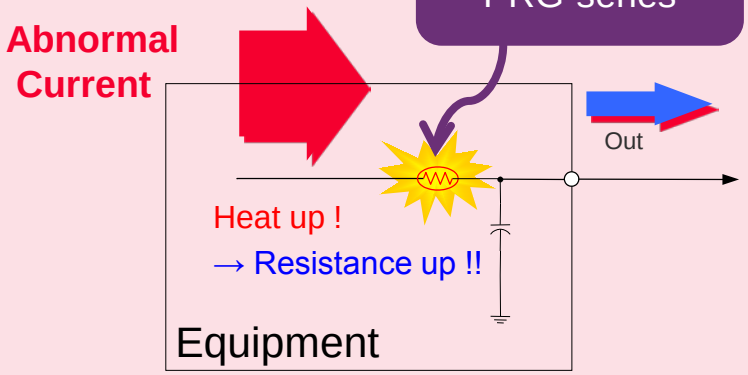


PTC resistance keeps low like a resistor.

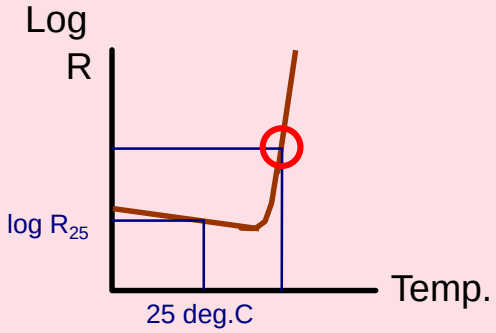


Operating Mode

Resettable Fuse PRG-series



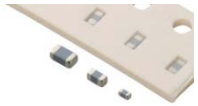
If abnormal current is flowed,
PTC resistance will increase sharply.



Over-Current
Self-Heating
Resistance Up
Current Limiting

Resettable Function, and prevent Over-current by itself !

Types of Resettable Fuse



There are 3 types such as Polymer PTC, Ceramic PTC and Murata's ceramic PTC.

1)Polymer type

Polymer PTC

> Unstable characteristic

> Higher current and higher voltage

Over-Current

Self-Heating

Resistance Up

Current Limiting

ResettableFuse

2) Ceramic type

Ceramic PTC by Legacy Technology

> Stable characteristic

> Lower current and Lower voltage

- Cannot meet electrical spec required by FA standard (24 voltage and over 100mA)

Murata Technology

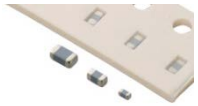
> Stable characteristic

> Higher current and higher voltage

It means Murata can resolve,

the technical issue of polymer PTC as unstable characteristic

Features of Murata's Ceramic PTC



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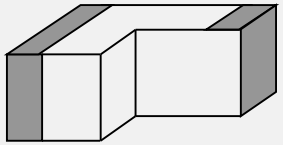
Its Multi Layers structure enables High withstand voltage and High power capacity.

Using ceramics materials, it contribute not only good reliability and short time to protect from overcurrent also maintenance-free and safety improvement.

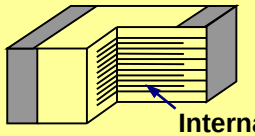
Legacy technology

Bulk structure



- Lower voltage
- Lower Hold Current (up to 20mA with 30V)

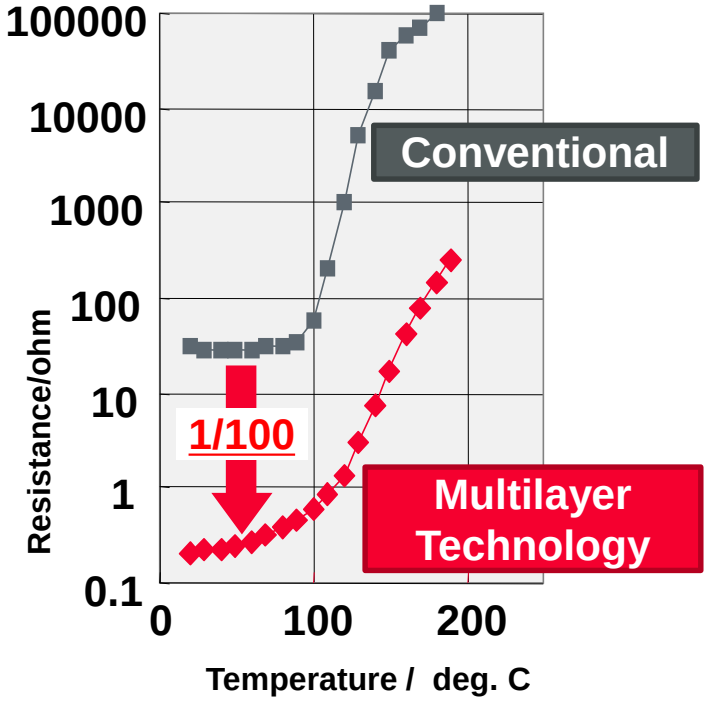
Murata Technology



★Multi Layers structure ★

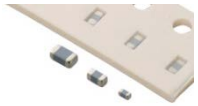
✓ Over 30V max.

✓ Higher Hold current (260mA)



Multi Layers technology reduce Resistance drastically.

Application : Factory Automation



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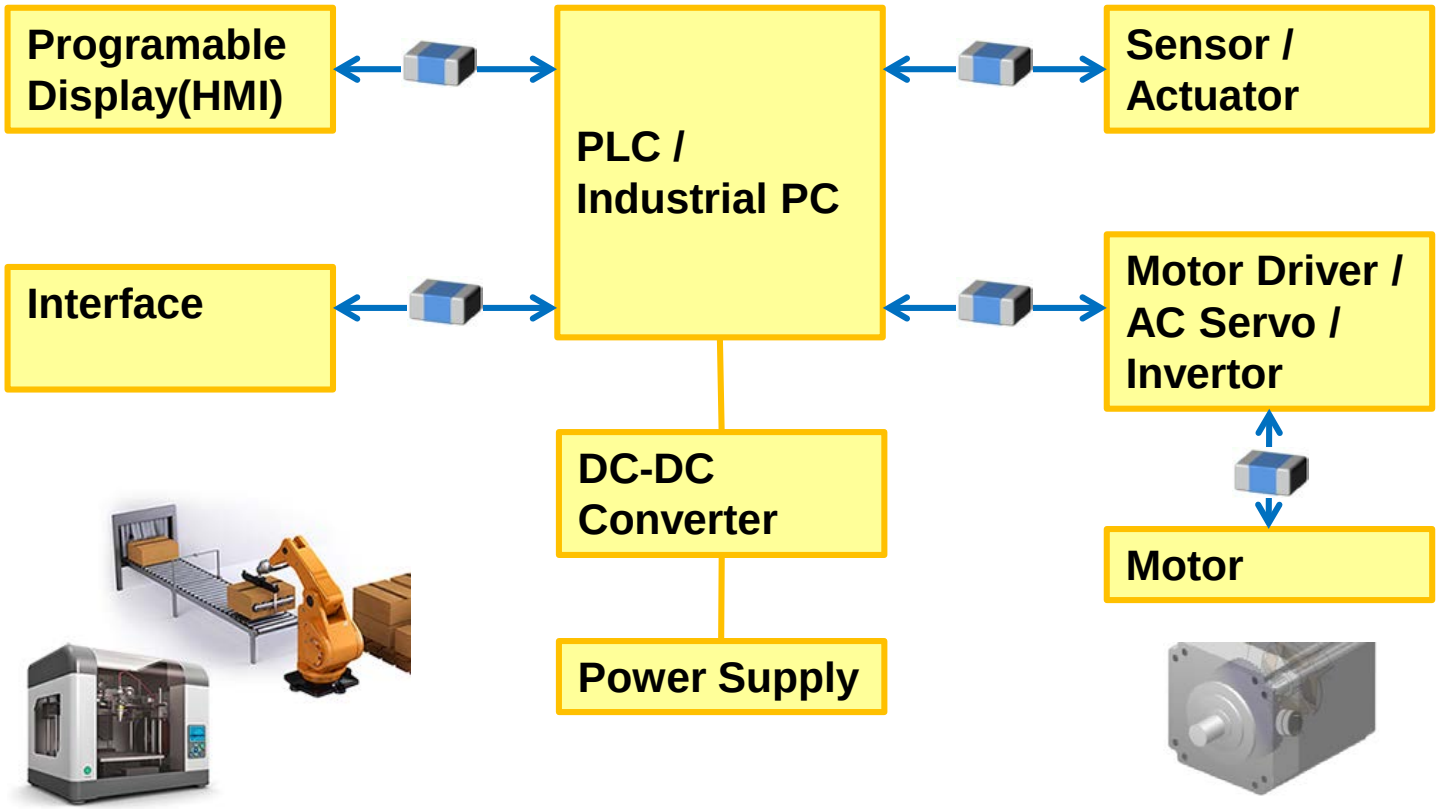
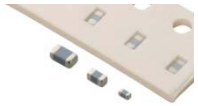
PRG series protect FA devices from trouble of overcurrent by misconnection or short .



Example ：Motor Drive



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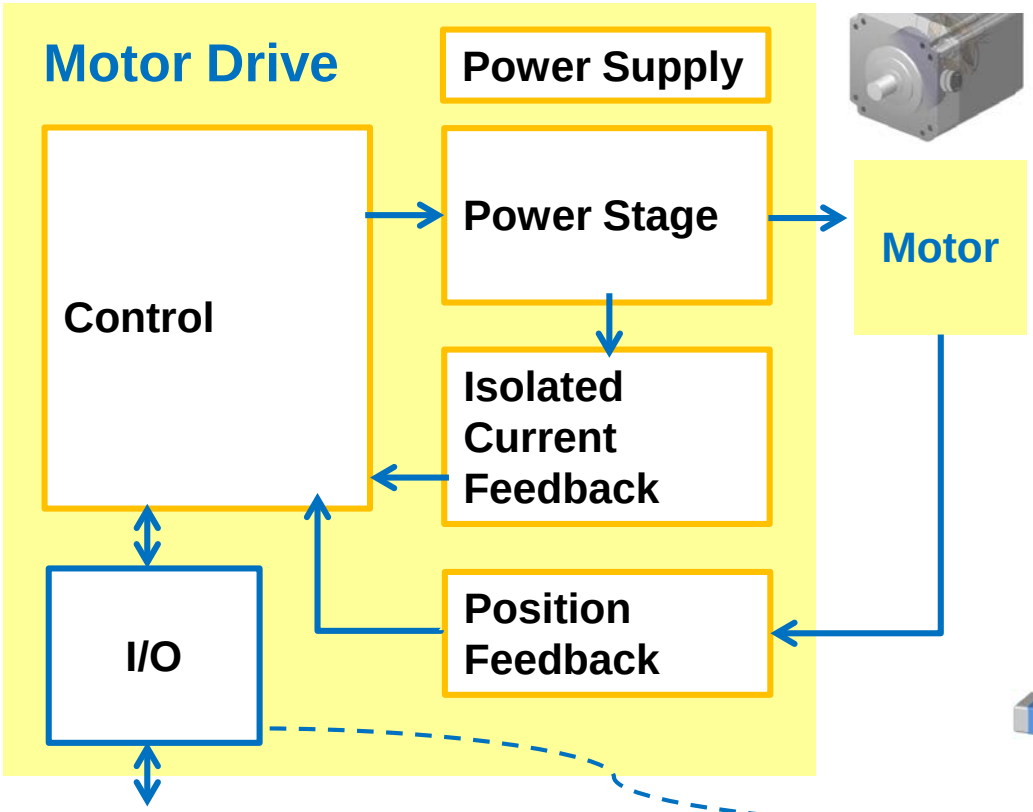
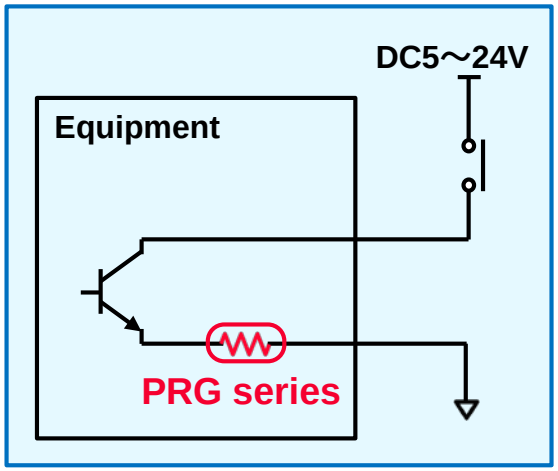
* Protect switch device such a transistor of I/O line from overcurrent.

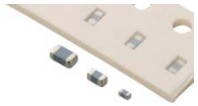




For Digital output line

- Circuit : Open-Collector Circuit.
- Voltage : 24 V (DC)
- Current : depend on equipment.
- **PRG series** is suitable for line protection in Motor Drive.

Example：FA Sensor



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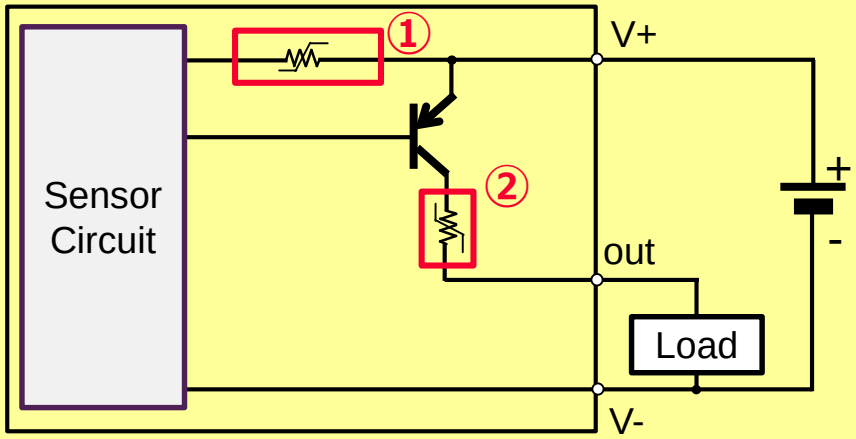
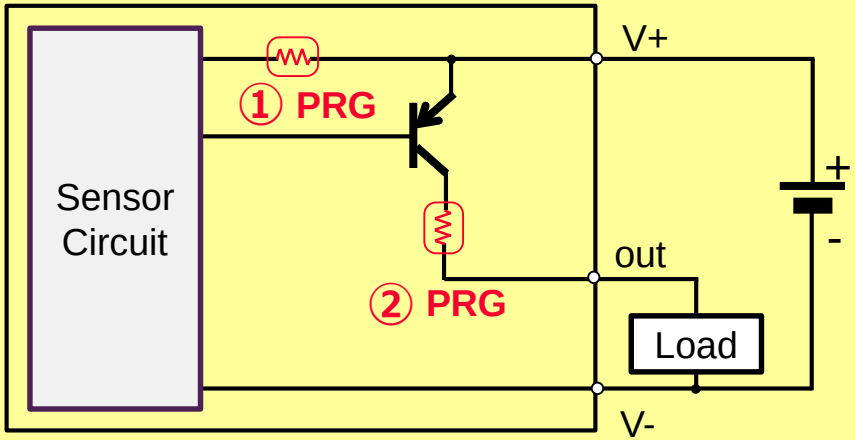
* Have advantage of Cost, Substrate occupied area, Reliability etc.

Current technology:



Change to PRG



	① Power Line	② I/O Line
Conventional Method	Polymer PTC	
Our Proposal solution	**PRG series (Ceramic PTC)**	
Customer Benefit	**・Low Cost ・Saving space on board ・Higher Reliability**	

Murata can make your sensor higher reliability and more profitable.

PRG Series Lineup for 24V line

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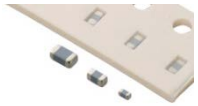
Please select best suitable product from the chart.

size (inch)	Murata P/N	Resistance (±20%)	Voltage (V)	Hold Current（mA）				Trip Current（mA）			Mass production
				at 85℃	at 70℃	at 60℃	at 25℃	at 25℃	at -10℃	at -20℃	
0805	PRG21BC2R2MM1RK	2.2Ω	27V	95	130	150	220	550	600	620	Already
	PRG21BC3R3MM1RK	3.3Ω	30V	72	100	120	180	400	480	500	Already
	PRG21BC4R7MM1RA	4.7Ω	30V	60	83	100	155	330	400	420	Already
	PRG21BC6R8MM1RA	6.8Ω	32V	50	67	80	120	260	320	335	Already
0603	PRG18BC100MM1RB	10Ω	30V	33	45	55	80	165	220	230	Already
	PRG18BC150MM1RB	15Ω	30V	27	38	45	64	135	180	190	Already
	PRG18BC220MM1RB	22Ω	30V	22	30	37	54	113	145	155	Already
0402	PRG15BC330MM1RC	33Ω	30V	15	20	25	38	73	92	100	Already
	PRG15BC470MM1RC	47Ω	30V	12	16	20	32	62	78	85	Already
	PRG15BC680MM1RC	68Ω	30V	10	14	17	26	52	65	70	Already

Murata's "Resettable Fuse"



PTC Thermistor for overcurrent protection - PRG Series -

Function

- Over load protection
  -The same function as Polymer PTC Resettable Fuse

Features

- RoHS / ELV compliant
- UL/cUL, TÜV certification (all lineup)
- Fast response to prevent abnormal current
- Maximum voltage: 6V to 32V

Benefits

- **High performance**
  - Stable Resistance characteristic against Polymer PTC after soldering, load test and thermal shock.
  - Reliable operation under coating or molding on circuit board
- **Compact device size (0402-0805)**
  - Saving board space

Applications

Factory Automation equipment / LiB protection /
Plug and connector protection / Smaller motor control /
Automotive* (LED lighting, Infotainment, car audio, electric module)
* Murata also has automotive grade.

Reference :

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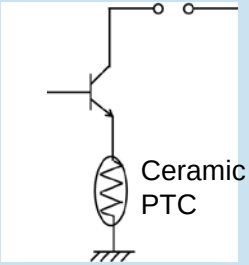
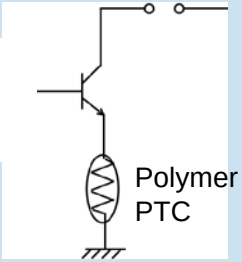
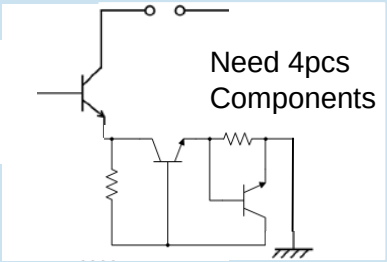
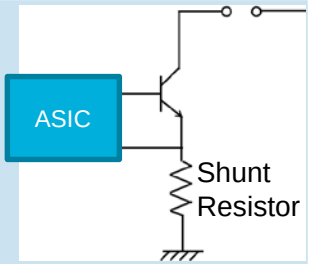
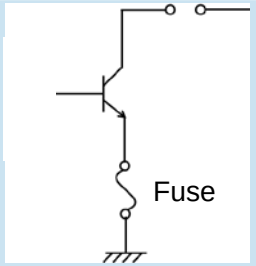
Types of over current protection device and circuit

	Murata PRG-series	Polymer PTC	Resistor + Transistor	Resistor +ASIC	Fuse
Circuit					
Reasonable Price	★★★ Less 20% than Polymer.	★★	★	★	★★★
Soldering	★★★ Not Resistance Change	★	★★★	★★★	★★
Reliability	★★★ Higher than Polymer	★	★★	★★	★
Resettable Function	★★★ No-Hysteresis	★★	★★★	★★★	(not resettable)
Saving Area on Board	★★★ Smaller than other solutions.	★★	★	★	★★★

Reference :

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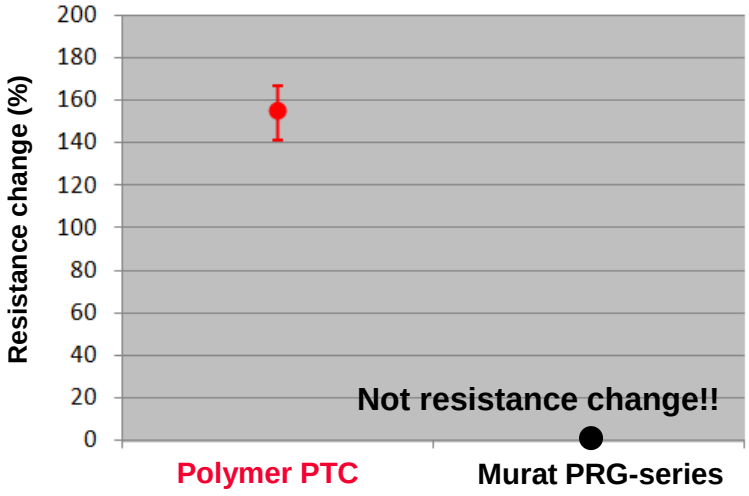
*Resistance change rate after soldering and other condition.

Evaluation	Murata PRG-series	Polymer PTC
After soldering	**NOT Resistance change**	⊿R increase **over 100%** after soldering
ON-OFF load in room temperature	**NOT Resistance change**	⊿R increase **over 1000%** after 100cycle
continuous load in humidity condition	**NOT Resistance change**	⊿R increase **over 100%** at 100 hours

Soldering



ON-OFF load test