

セラミックPTC リセットブルヒューズのご紹介

過電流保護用 チップPTCサーミスタ
～ PRGシリーズ ～



Murata Manufacturing Co., Ltd.

<http://www.murata.com/ja-jp/products/thermistor/ptc/prg>



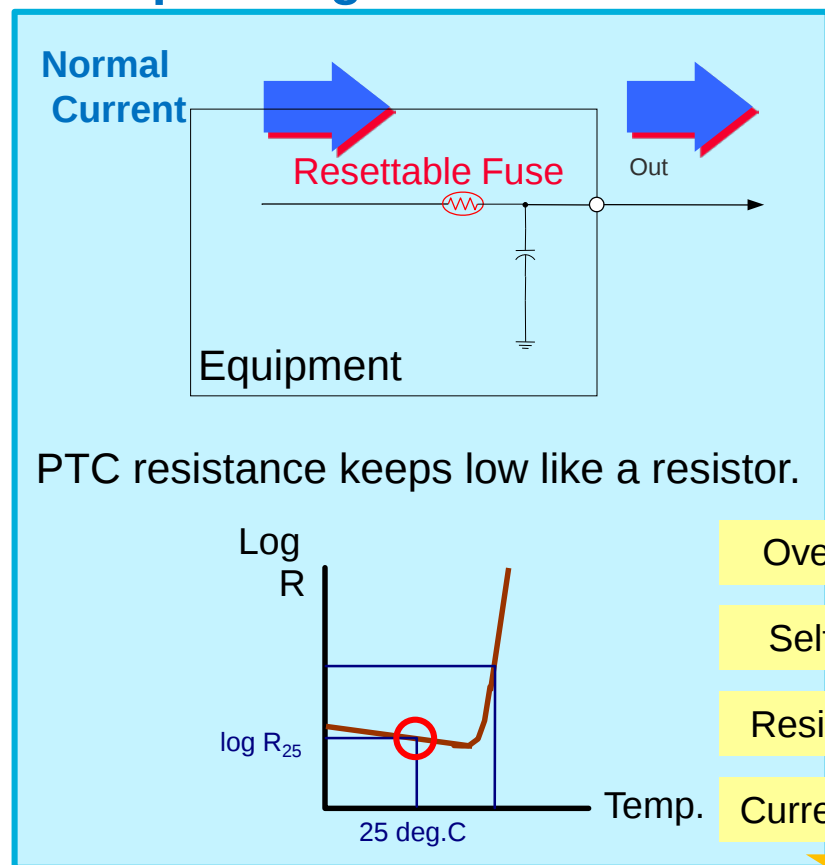
リセッタブルヒューズとは



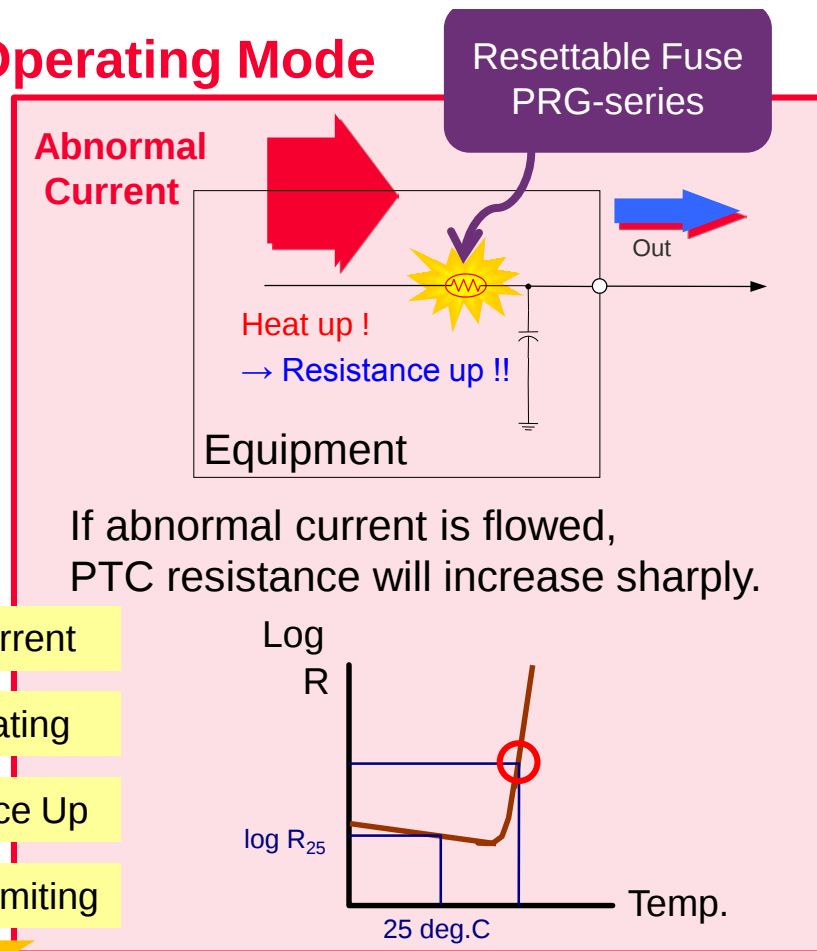
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誤接続や短絡などによる過電流発生時に動作して回路保護を行い、過電流が取り除かれると自動的に元の状態に復帰し、繰り返し使えます。

Non-Operating Mode



Operating Mode



Over-Current
Self-Heating
Resistance Up
Current Limiting

Resettable Function, and prevent Over-current by itself !

リセッタブルヒューズの種類



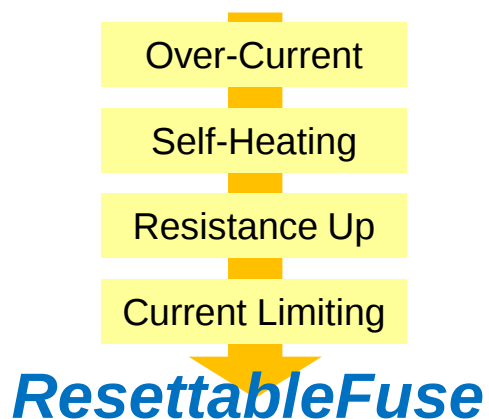
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ポリマーPTCタイプとセラミックPTCタイプの2種類があります。

1)Polymer type

Polymer PTC

- > Unstable characteristic
- > Higher current and higher voltage



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)

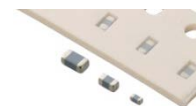


Murata Technology

- > Stable characteristic
- > Higher current and higher voltage

It means Murata can resolve,
the technical issue of polymer PTC as unstable characteristic

ムラタのセラミックPTCの特長



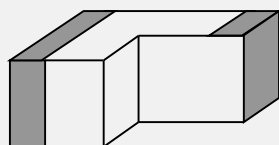
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PRGシリーズは積層構造により、高耐圧性大電力容量を実現しています。

セラミックス材料を用いることから、信頼性に優れ、過電流発生から保護までの時間が短く、機器のメンテナンスフリー・安全性向上に貢献します。

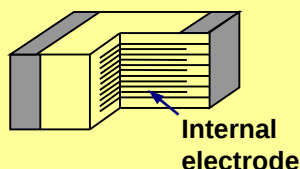
Legacy technology

Bulk structure

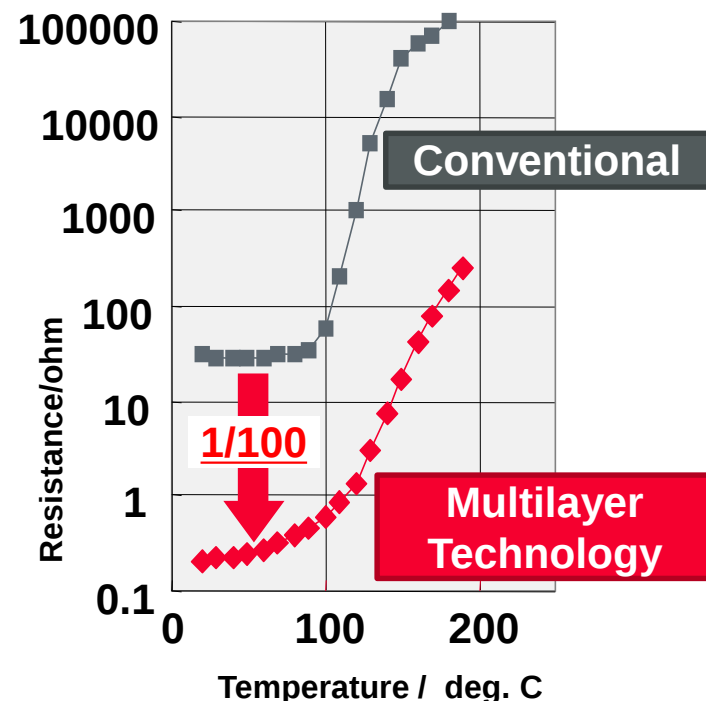


- Lower voltage
- Lower Hold Current (up to 20mA with 30V)

Murata Technology

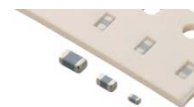


- ★ Multi Layers structure ★
- ✓ Over 30V max.
- ✓ Higher Hold current (260mA)



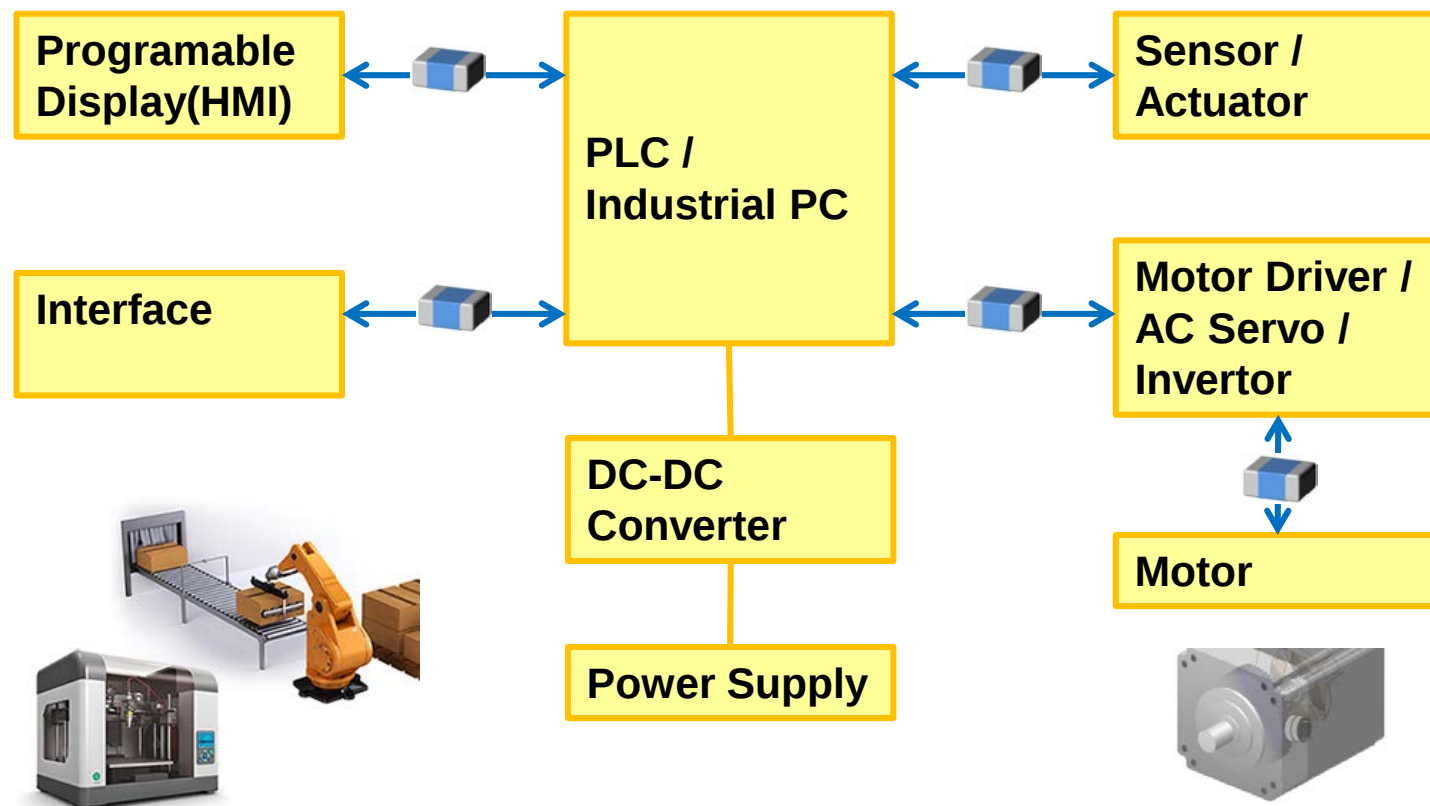
Multi Layers technology **reduce Resistance drastically.**

FA機器への応用



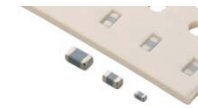
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コントローラーやモータードライブ, センサユニットなどで、
誤接続や短絡による過電流のトラブルから回路を保護します。



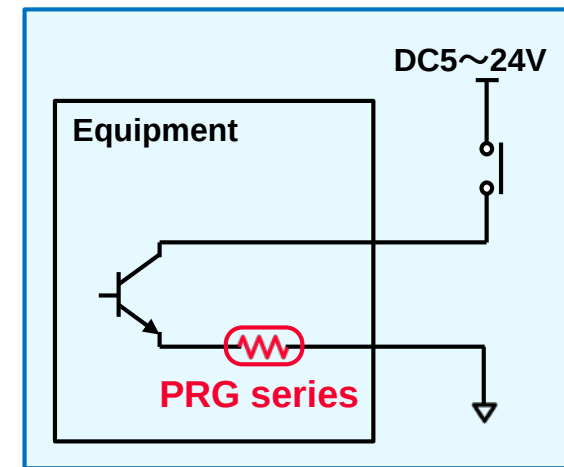
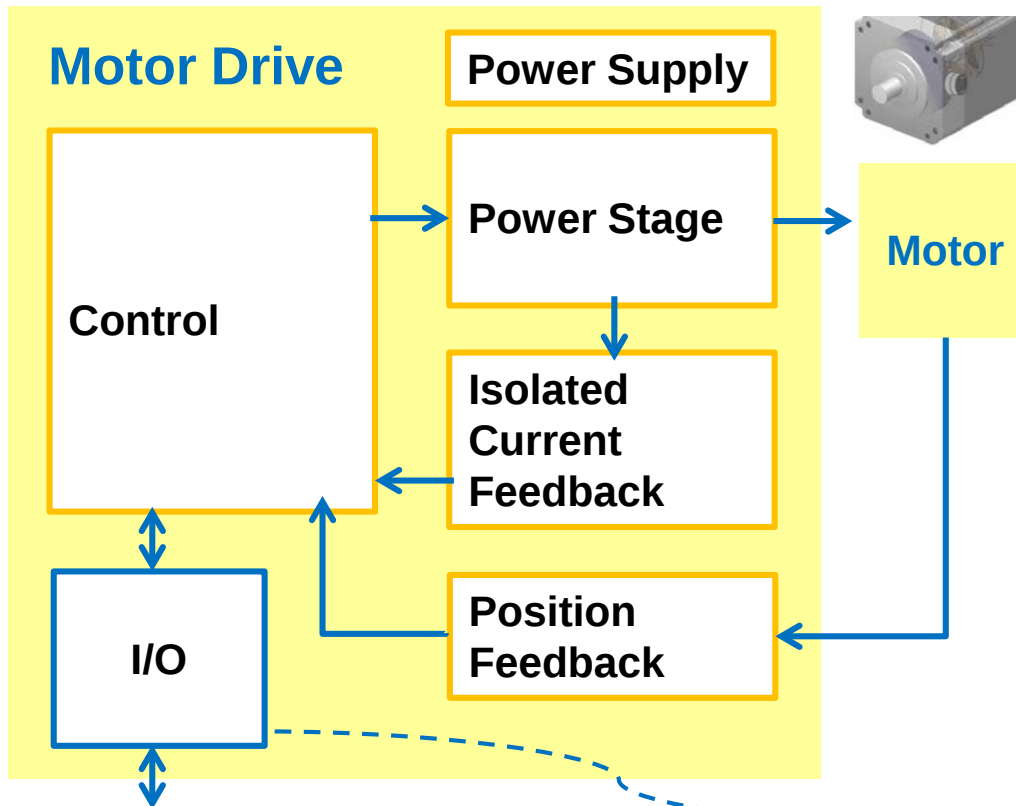
↔ Data line PRG-series

応用例 : Motor Drive



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※I/Oラインのスイッチング素子 (トランジスタ等)を過電流から保護



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.

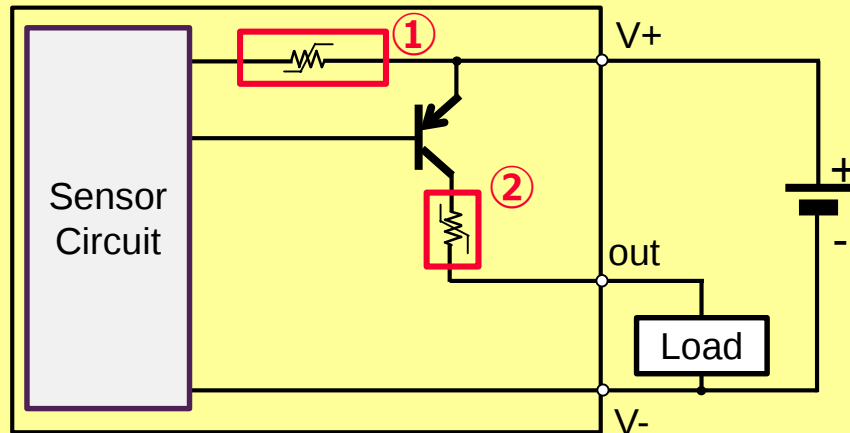
応用例：FA Sensor



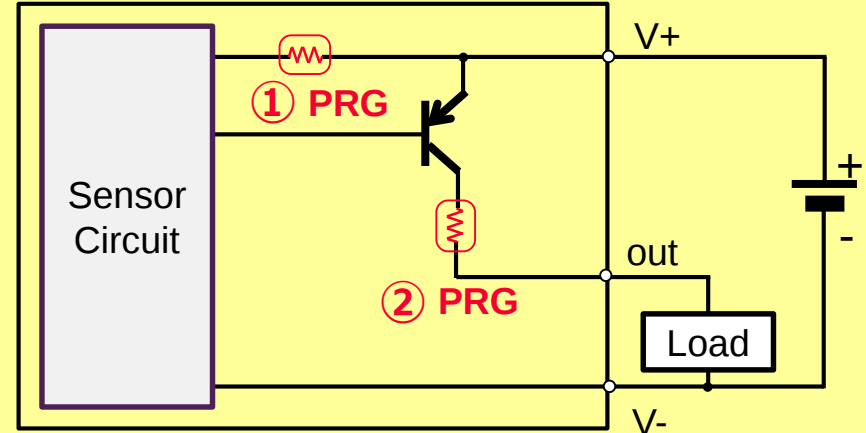
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※コスト,基板占有面積,信頼性,等においてメリット有り

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.

24V用PRGシリーズ ラインアップ



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サイズ、通常の抵抗値、動作電流など、使用部位に応じてお選びください。

size (inch)	Murata P/N	Resistance (±20%)	Voltage (V)	Hold Current (mA)				Trip Current (mA)			Mass production
				at 85°C	at 70°C	at 60°C	at 25°C	at 25°C	at -10°C	at -20°C	
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

【まとめ】



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ムラタのセラミックPTC リセッタブルヒューズ PRGシリーズの特長・用途

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.

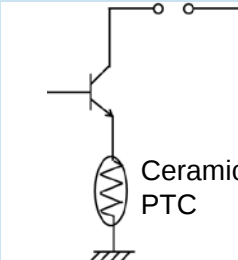
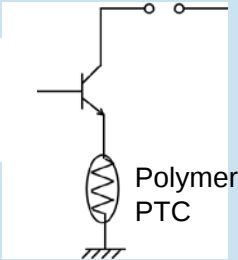
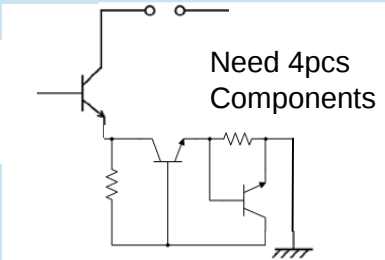
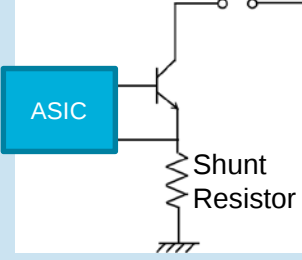
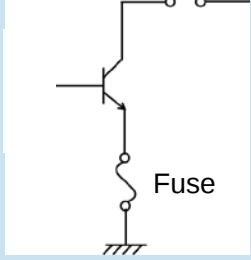
【参考】過電流保護素子/回路の種類



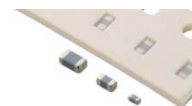
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※コスト,実装後の特性安定性,信頼性(動作安定性),復帰性,基板占有面積の比較

	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.	★★	★	★	★★★★

【参考】試験結果

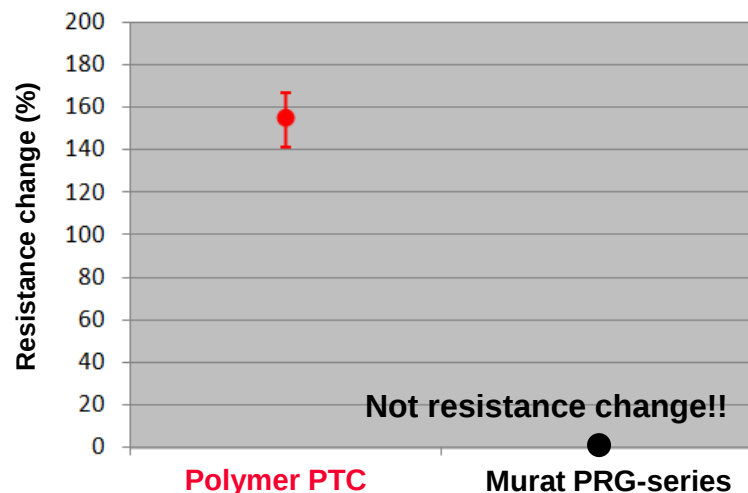


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※実装後,ON-OFF通電,湿度環境下における抵抗値の変化

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

Soldering



ON-OFF load test

