Application & Solution Notes Example

PTC Thermistor (POSISTOR®)

for Overheat sensing & Over current protection

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CONTENTS

Application & Solution examples for POSISTOR® (PTC Thermistor)

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Industrial machinery & FA sensor protection using POSISTOR® (PTC Thermistor)

for Over current protection～PRG series～

PTC will be your great protector from abnormal current condition

Application Note

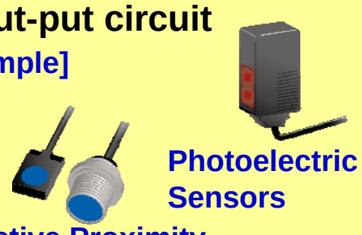
Servo Drives

★ for I/O sequence output circuit protection
★ for encoder circuit

FA Sensor

★ for sensors which have power module inside and feeder circuit.
★ for open collector out-put circuit

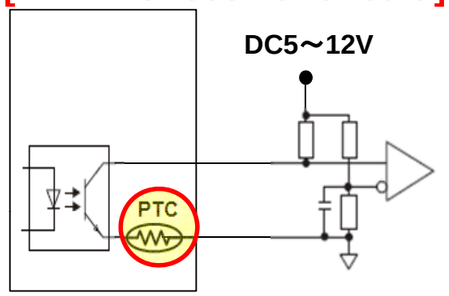
[example]



Solution Proposal

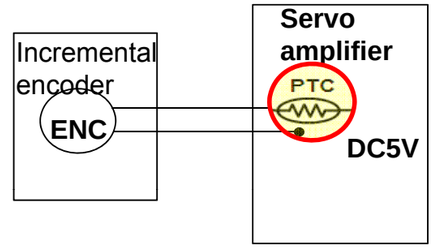
[Photo coupler output protection]

[EX: line receiver circuit]



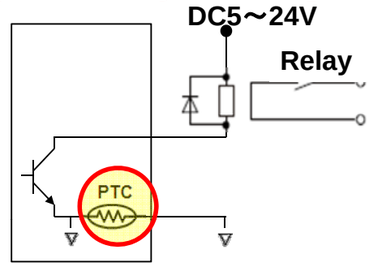
[Encoder connection circuit protection]

[EX : incremental encoder]

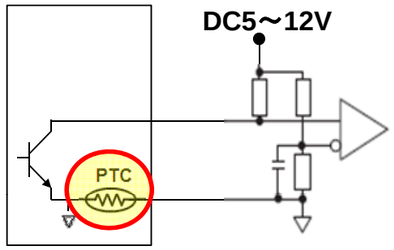


[Open collector output protection]

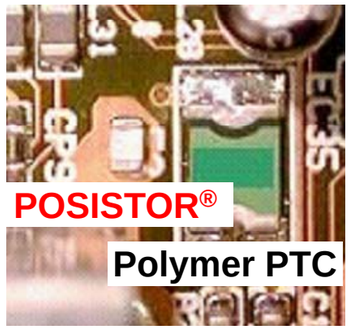
[EX: Relay circuit]



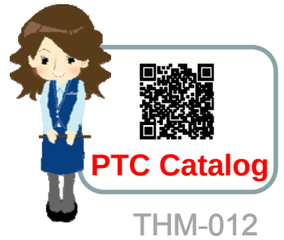
[EX: line receiver circuit]



Advantages of PTC Thermistor vs. Polymer PTC



- ✓ POSISTOR® is **smaller** than Polymer PTC.
- ✓ POSISTOR® operated **faster** than Polymer PTC.
- ✓ POSISTOR®'s reliability is **higher** than Polymer PTC.



LIB protection using
～POSISTOR® (PTC Thermistor)～
for Over current protection ～PRG series～

Do you have any troubles by short circuit for LIB?

If a terminal short-circuits, NTC and IC may be broken!

Especially it is anxious with the LIB of high current capacity.

PTC will be your great protector from over current such as terminal short–circuit.

Application Note

★ **LIB of high current capacity type**

○Power Tool

○Codeless cleaner

○e-bike

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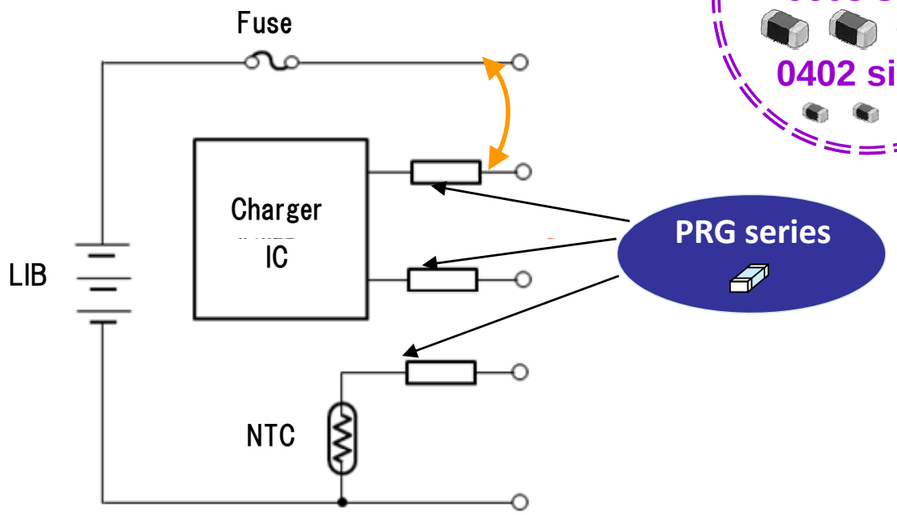
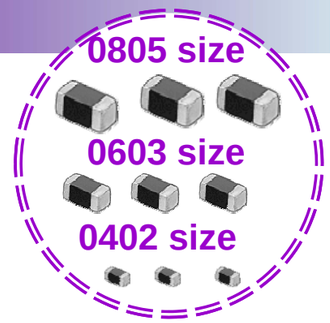
Solution Proposal

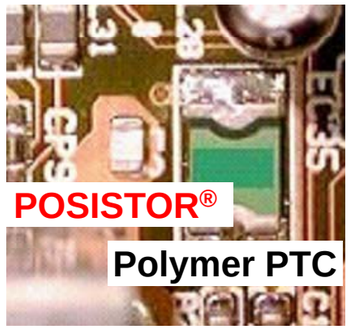
☆Circuit example





Whenever be troubled by over current, Murata will help you!!

Advantages of PTC Thermistor vs. Polymer PTC



- ✓ POSISTOR® is **smaller** than Polymer PTC.
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Telecom protection using ～POSISTOR®(PTC Thermistor)～

for Over current protection ～PRG series～

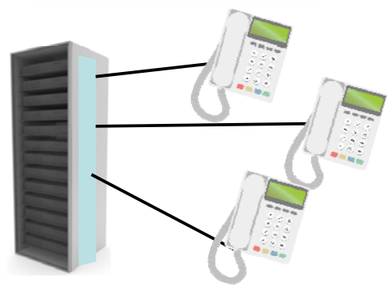
Do you have any troubles by miss-wiring?

- ✓Equipments may be broken!
- ✓Human body may be affected by breaking!

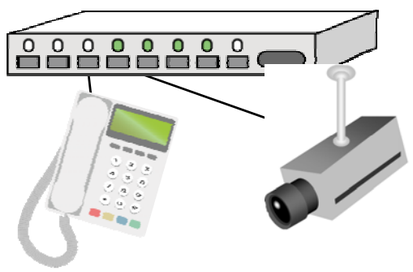
PTC will be your great protector from abnormal current condition.

Application Note

★ Key Telephone



★ PoE



- ★ **POSISTOR® can protect over current such as improper connection!**
- ★ **POSISTOR® is resettable fuse, so maintenance-free is realized!**

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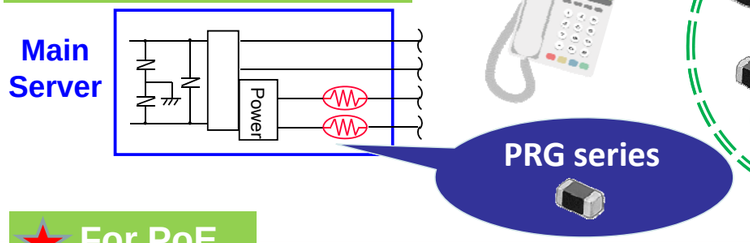
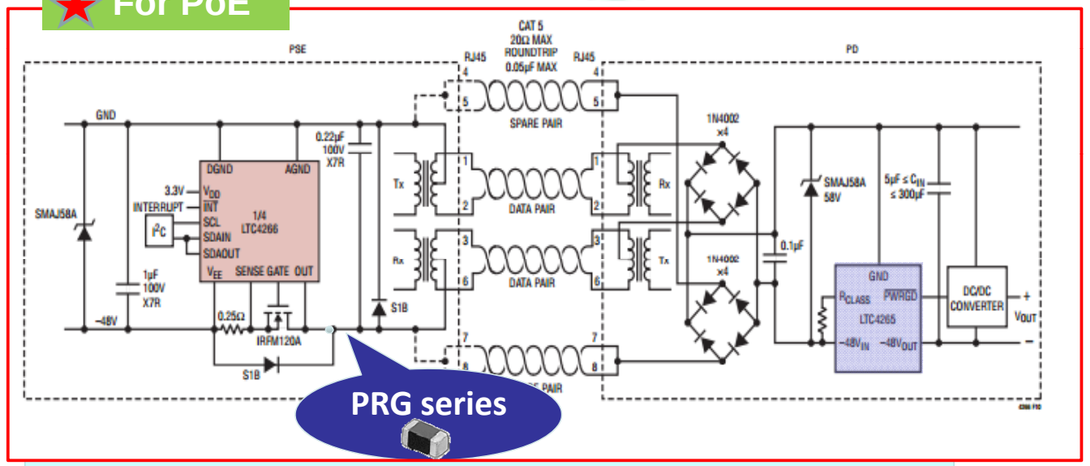
Solution Proposal

★ For Key Telephone

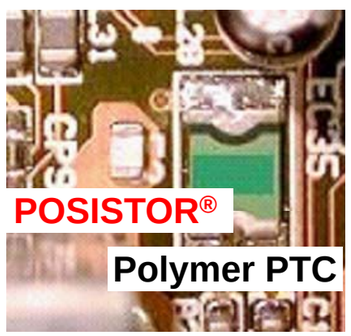


★ For PoE



Whenever be troubled by over current, Murata will help you!!

Advantages of PTC Thermistor vs. Polymer PTC



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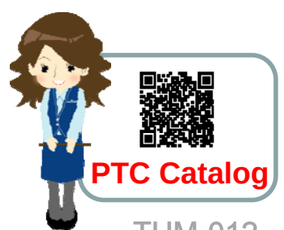

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Smartphone protection using ~POSISTOR® (PTC Thermistor)~

for Overheat sensing & Overcurrent protection~PRF series~

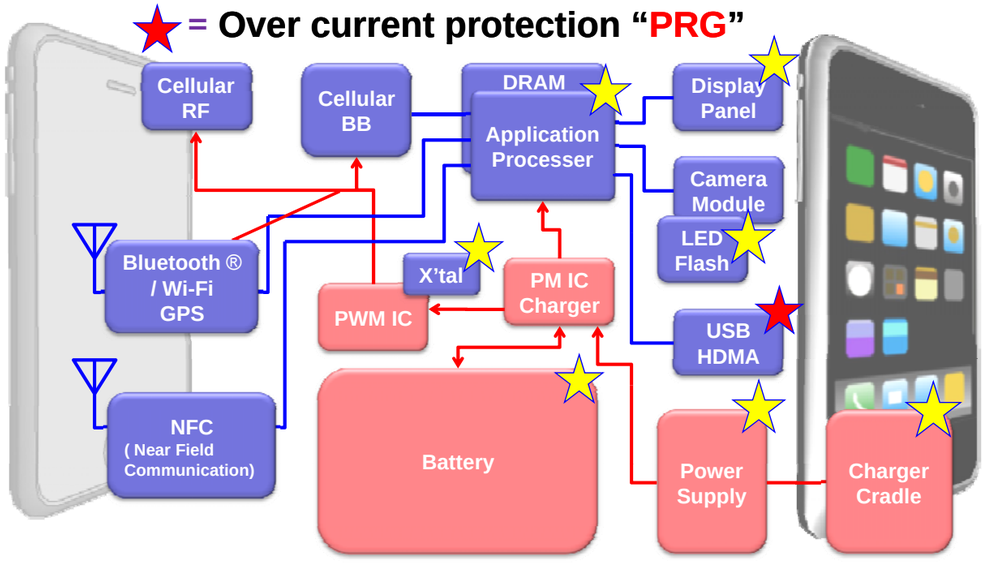
Do you have any thermal troubles by using smartphone?

PTC will be your great protector from various thermal problem.

Application Note

= Overheat sensing ADC less ! "PRF"

= Over current protection "PRG"



*Bluetooth is a registered trademark or trademark of Bluetooth SIG, Inc.

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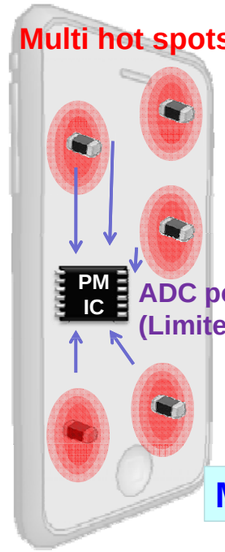
THM-012

Solution Proposal

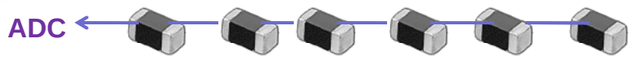
Overheat Sensor **PRF series**



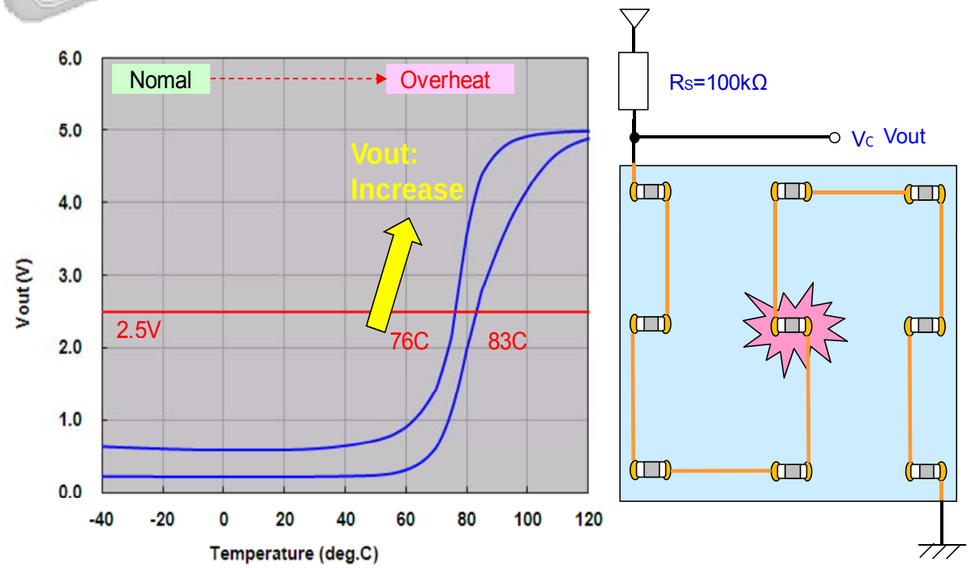
0402 size
PRF15 series

0201 size
PRF03 series
Underdevelopment

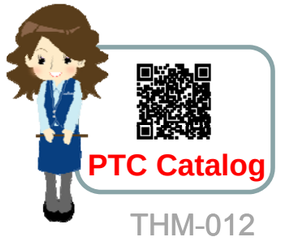
- ✓ ADC (analog-digital) port is not required for each PRF.
- ✓ Multi PRFs can be connected in series.
- ✓ Wide sensing temperature series is available form 65degC to 130degC.
- ✓ 0201 size will be available in 2014.



Multi PRF can be connected into one ADC port.



Vout clearly changes even if only one of Multiple PTCs detects overheat due to dynamic resistance change.



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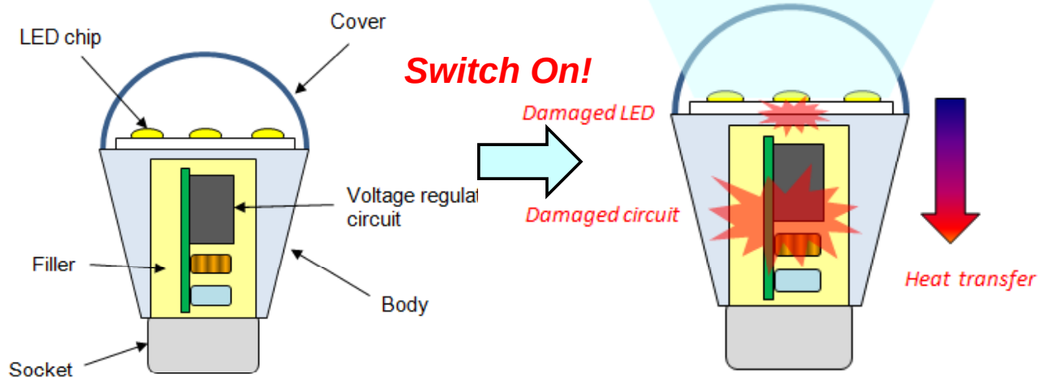
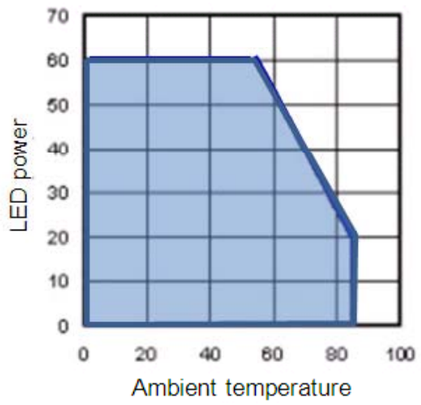
THM-012

LED light protection using ～POSISTOR®(PTC Thermistor)～

LED current control according to ambient temperature

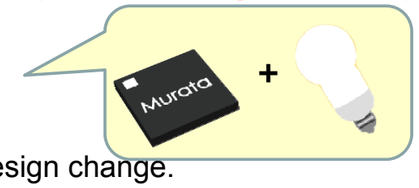
Importance of temperature management





1) LED's current should be controlled according to its permissible current.
2) By heat transfer from LED, voltage regulator and other parts are damaged.

To obtain long operating life and prevent damage, temperature management is important.



If IC is used for current control…

Y Can be severe current control

N Need custom IC by LED light design change.

We recommend PTC Thermistor solution to save the cost.

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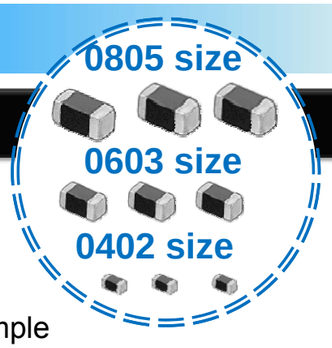
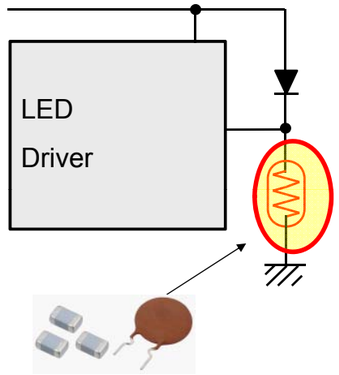
Solution Proposal

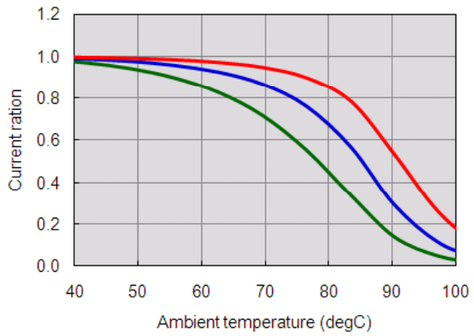
Overheat Sensor **PRF series**



[Direct LED current control method]

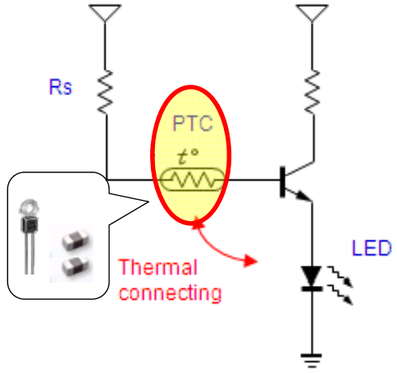


Out put example

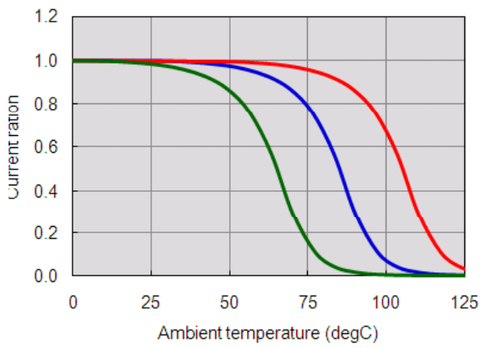


*Using **PTC Thermistor!!***

[Indirect LED current control method]



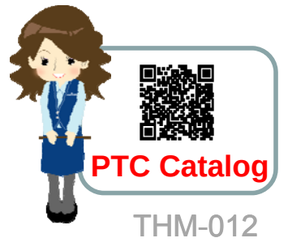
Out put example



*Using **PTC Thermistor!!***

★ LED thermal protection: No need any IC but **PTC Thermistor.**

★ Current de-rating curve can be changed by different PTC products.



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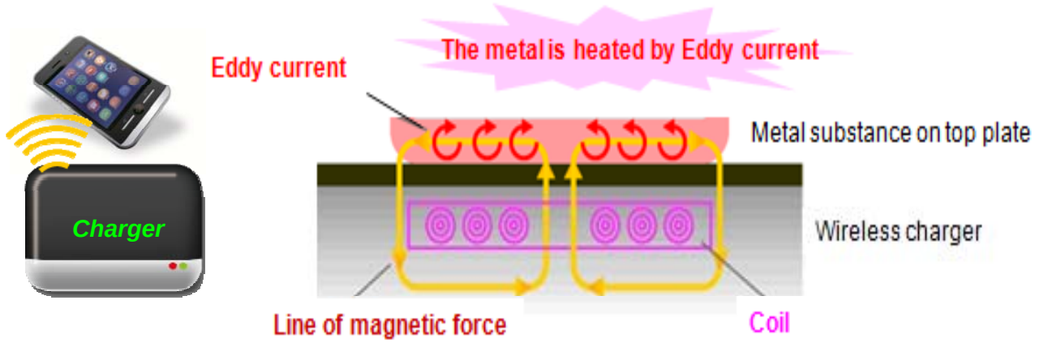
For FOD on Wireless Charger
～POSISTOR® (PTC Thermistor)～
for Overheat sensing ~PRF series~

Wireless power transfer system needs FOD system for safety.

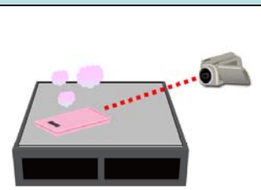
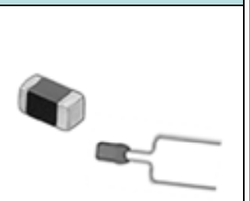
***FOD : Foreign Object Detection**



Application Note

✔ FOD in large area and high power charger is difficult.
★ Miss judgment by some noise.
★ Need much cost.

Best solution

FOD method	Optical thermometer	Temperature sensor	PTC Thermistor
Figure			
Function	***Y*** Temperature measuring	***Y*** Temperature measuring	***Y*** Only overheat detection
Influence of noise	***N*** Failure from other lights	***N*** Low immunity from noise	***Y*** High immunity
Total system cost	***N*** Equipment is expansive	***N*** Equipment is expansive	***Y*** Can use multi detection

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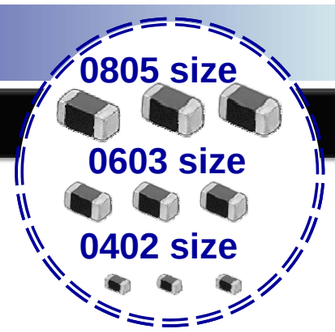
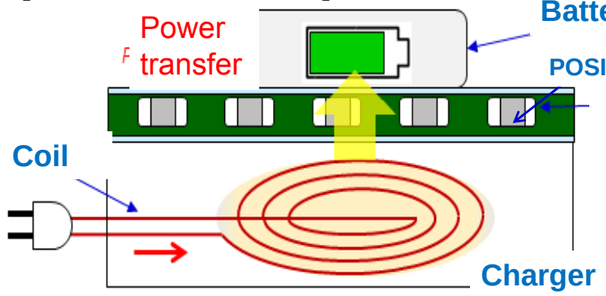
Solution Proposal

Overheat Sensor **PRF series**



[Normal condition]

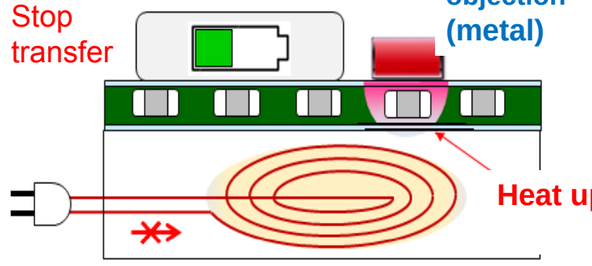


Normal condition on the charger table

The resistance of PTC Thermistors in the charger is normal.

Power transfer will continue

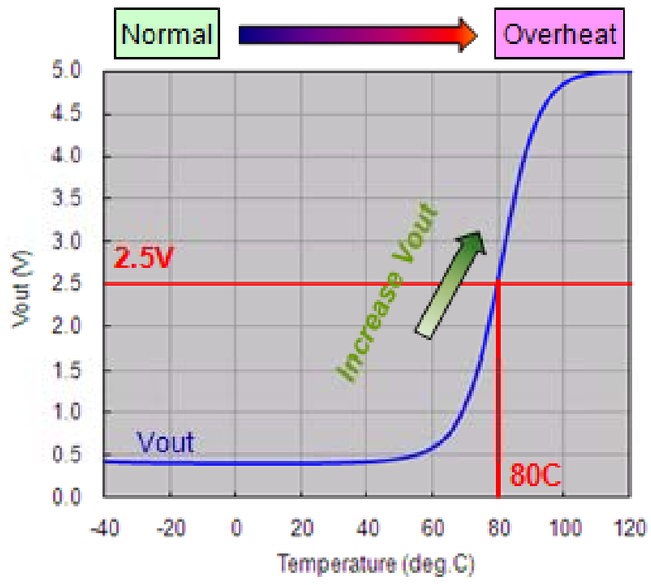
[Abnormal condition]

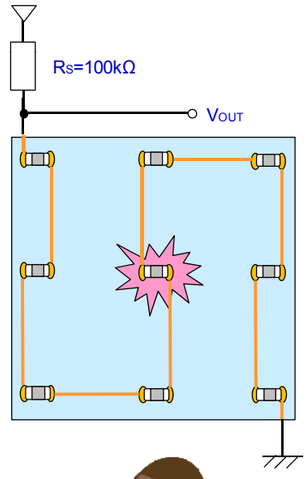


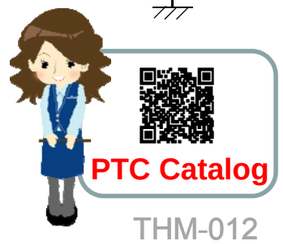
Foreign objection on the charger table

The objection is heated up by radial current

PTC Thermistor works so that power transfer will stop







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