

WAYON

Let's **Make**
electronics *Safer!*



WAY-ON

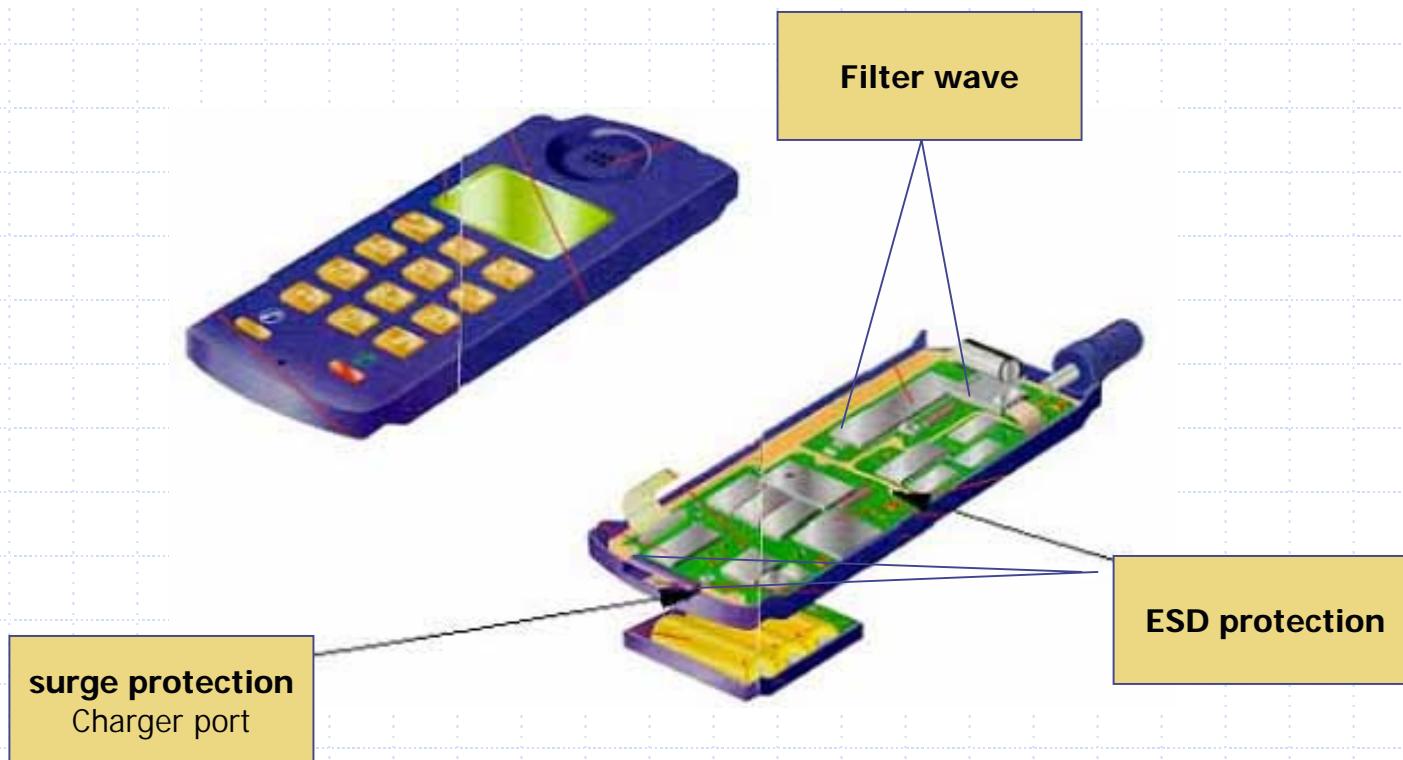
Let's make electronics safer !

Solution for portable equipment ——mainboard



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Products –Transient voltage suppressors

Transient Voltage Suppressors are ZnO based devices designed for protection of low and medium voltage electronic circuits against electrostatic discharge and voltage or current transient surges. They have nonlinear voltage-current characteristics similar to back-to-back zener diodes and their multilayer structure provide many advantages comparing with zener diodes. Their breakdown voltage can range from 4V to 470V, surge current from 30A to 400A, capacitance value from 100pF to 7.5nF, and their size from 0402 to 3225.

Applications:

- ☐ L D protection
- ☐ Sensor protection
- ☐ I/O port protection
- ☐ Interface card protection



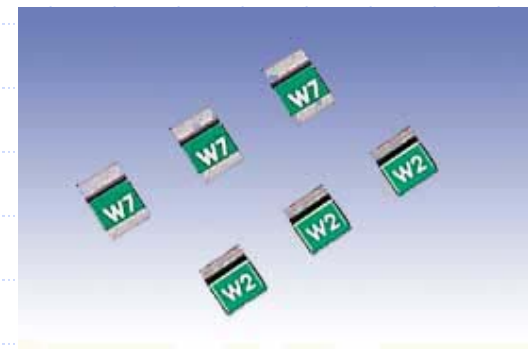
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Products –Surface mount devices

LP-NSM series:

- ☐ Very small size of 1206 only
- ☐ Fast tripping resettable circuit protection
- ☐ Surface mount packaging for automated assembly
- ☐ Agency Recognition: UL、CSA、TUV is pending



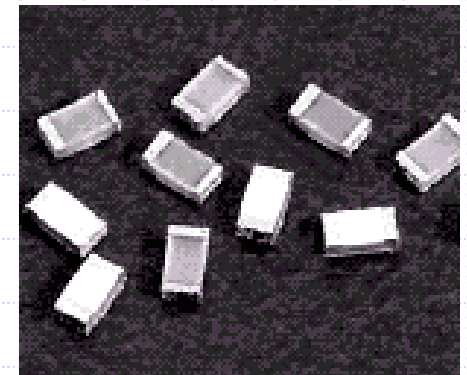
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Product –Chip FUSE

Chip Fuse:

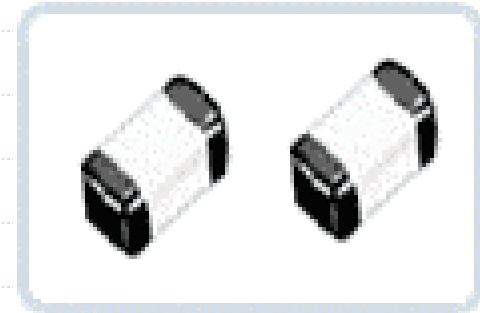
- ❑ Superior Reliability; Built to Perform in Harsh Environments
- ❑ Rugged Construction to Withstand Vigorous Board Washing, Reflow and Wave Soldering
- ❑ Industry Standard EIA Packages are Compatible with High-Speed Chip Shooters
- ❑ Wide Range of Ampere and Voltage Ratings
- ❑ Complies with EIA-PN-3757 Fuse Qualification Standard



Product –Chip Inductor

Chip Inductor:

- ❑ High self-resonant frequency.
- ❑ Ultra miniature size and weight.
- ❑ No polarity.
- ❑ Excellent solderability.



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Solution for portable equipment

——power supply



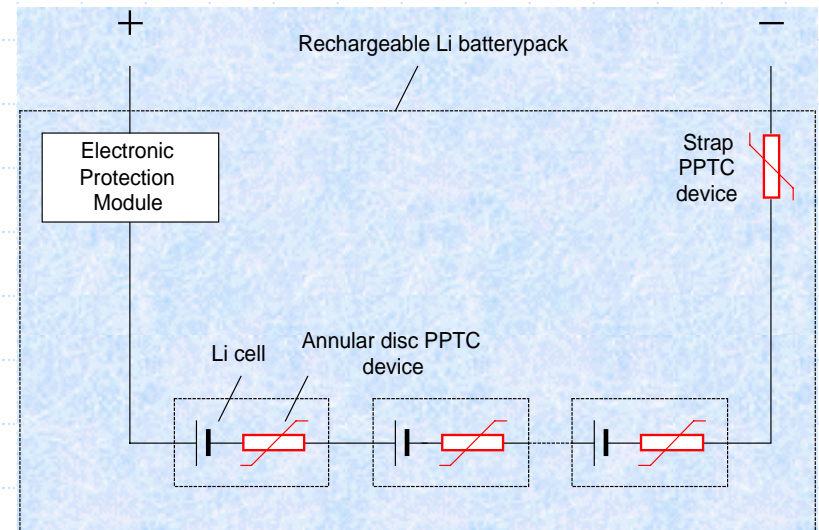
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Primary lithium cells (Such as AA and 2/3A)

LPD series

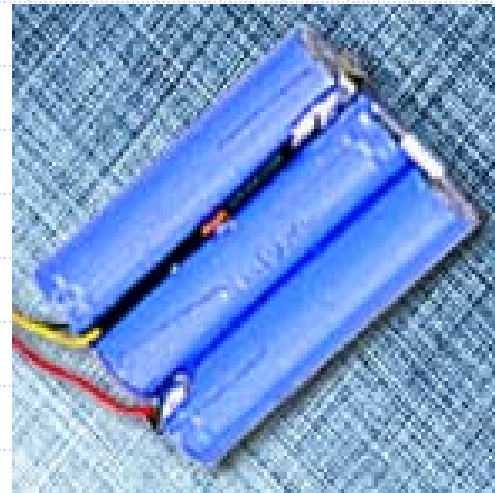
Special designing to meet customer's different demands



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NiCd/NiMH Battery pack

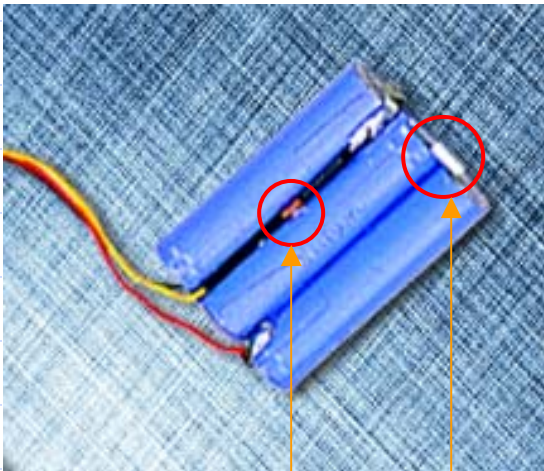


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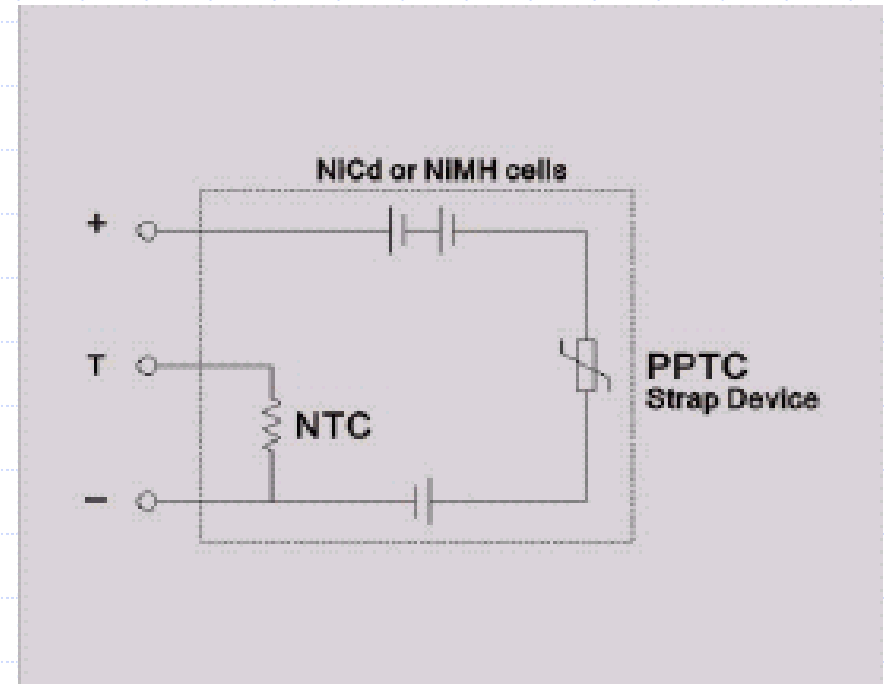
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NiMH Battery

PTC+NTC



NTC **PTC**



Rechargeable Li-ion Battery Pack

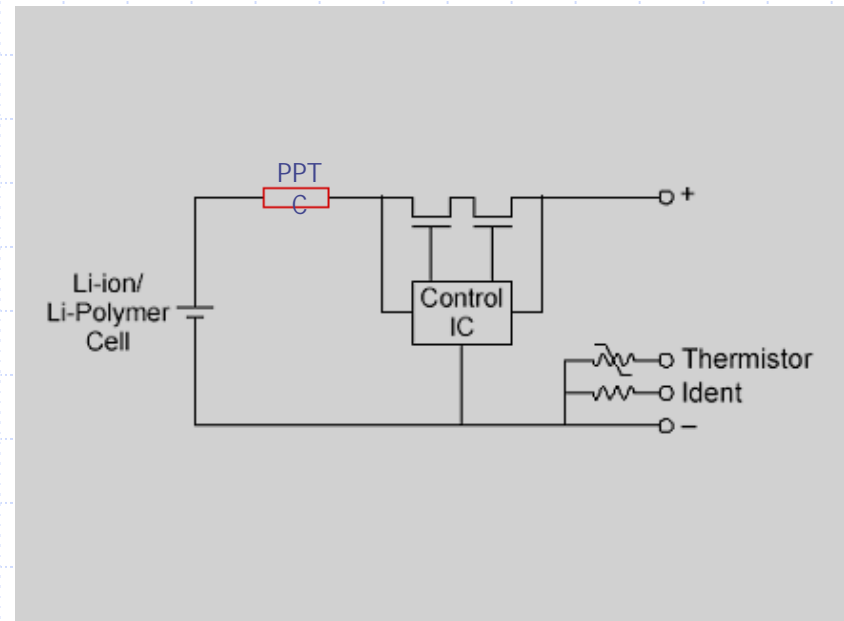


Capacity:
650mAh
Voltage:
3.6V



Capacity:
750mAh
Voltage:
3.6V

PCM+PTC



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Rechargeable Li-ion Battery Pack

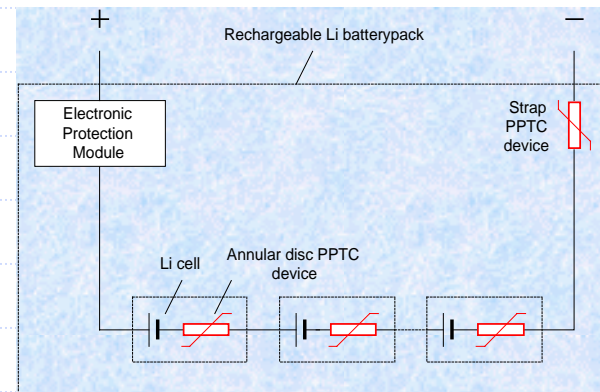


PCM+PTC



LP series
LPN series
LP-CW series
LR series
LVseries

LP-MSM series
LP-USM series
LP-NSM series



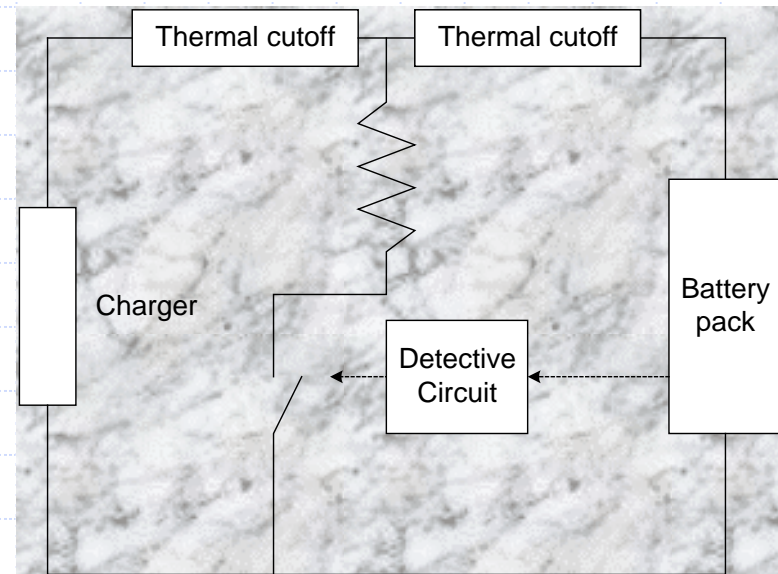
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Rechargeable Li-ion Battery Pack



PCM+Thermal cutoffs

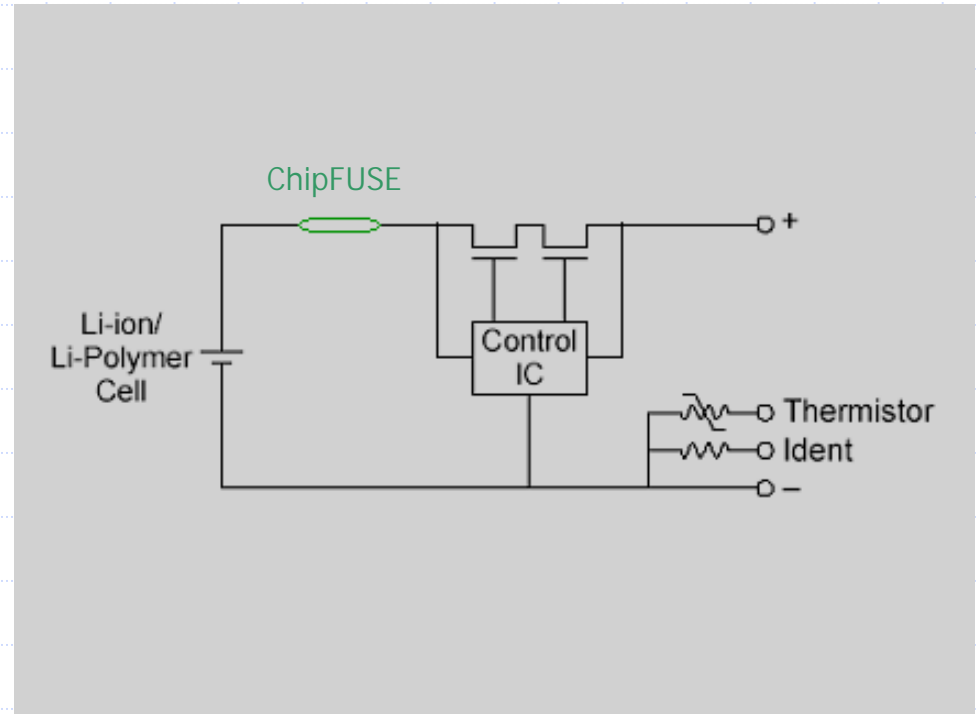
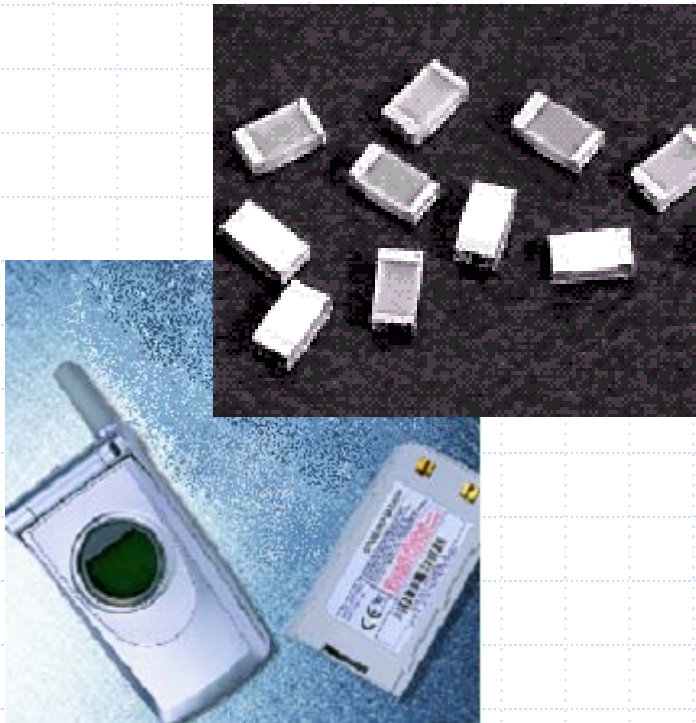


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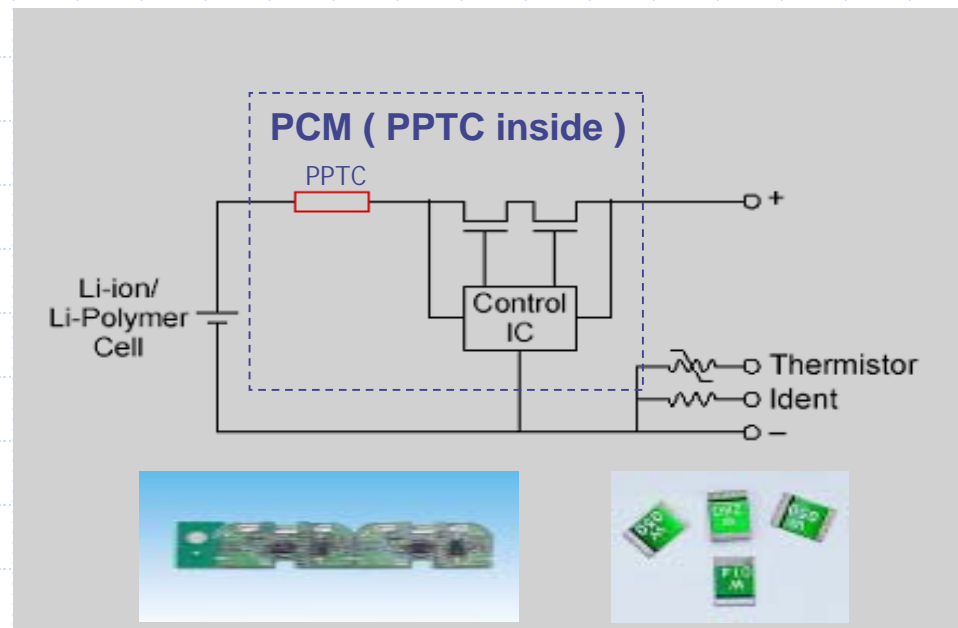
Rechargeable Li-ion Battery Pack

PCM+ chip FUSE



Li-ion Polymer

PCM+ surface mount PTC { LP-MSM series
LP-USM series
LP-NSM series



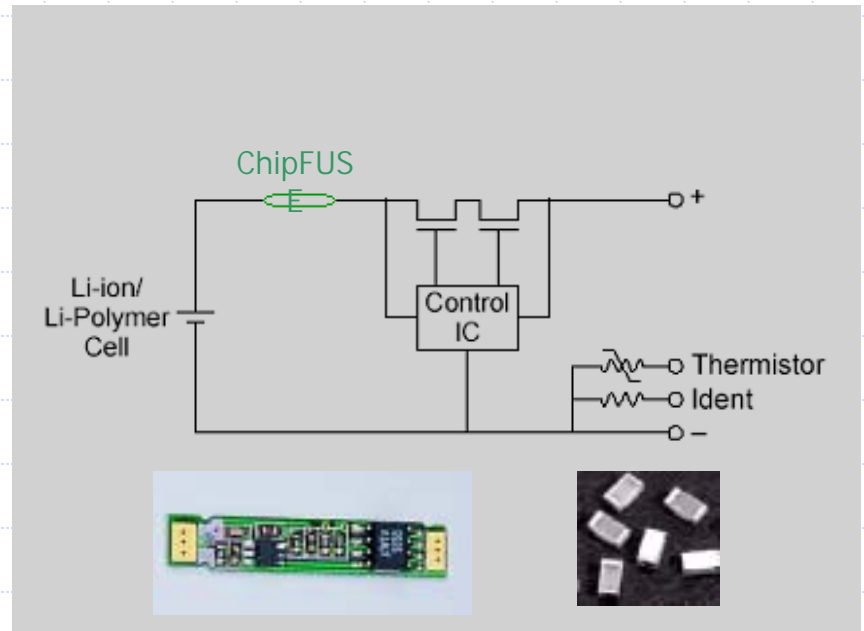
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Li-ion Polymer



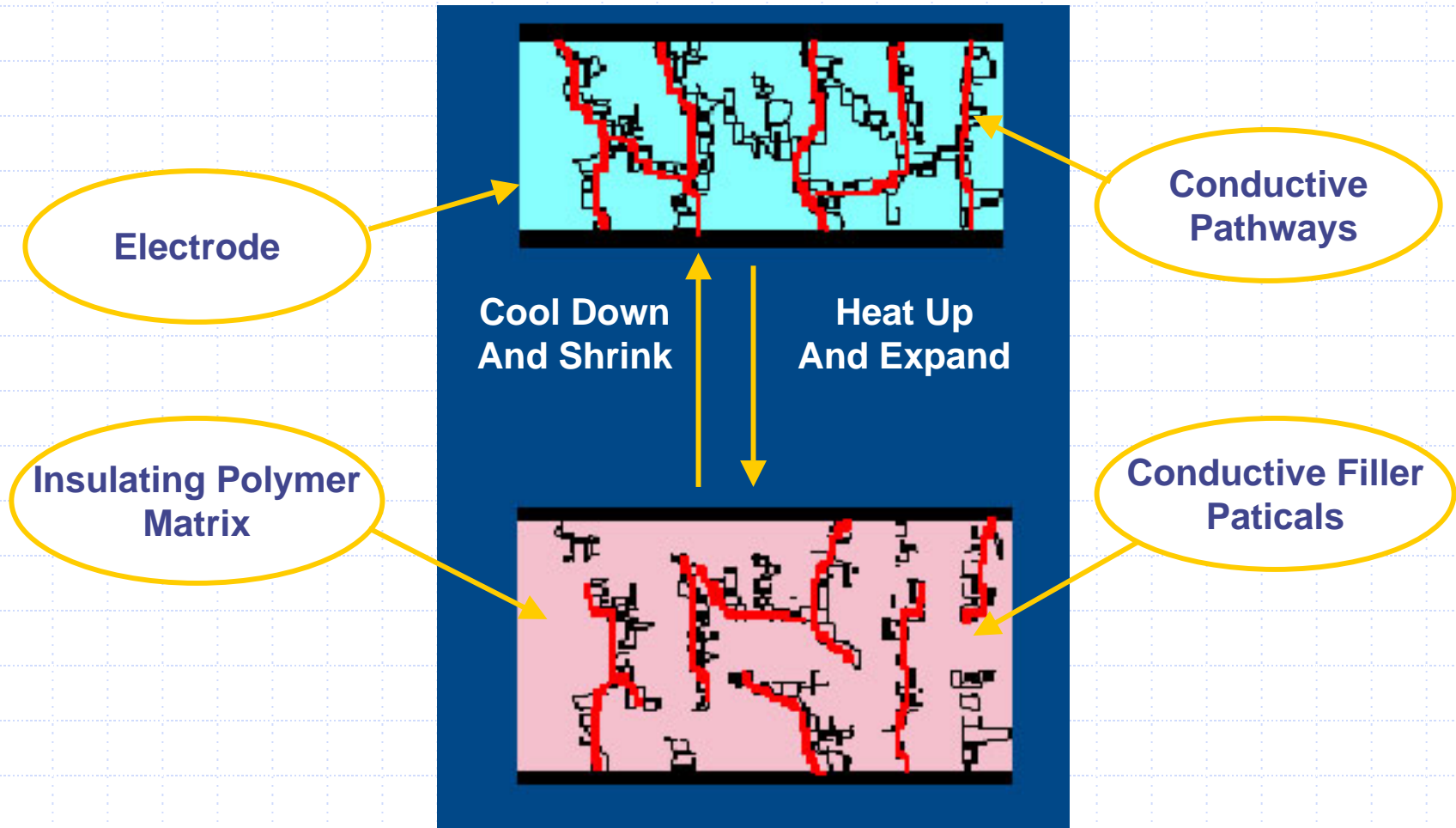
PCM+ chip FUSE



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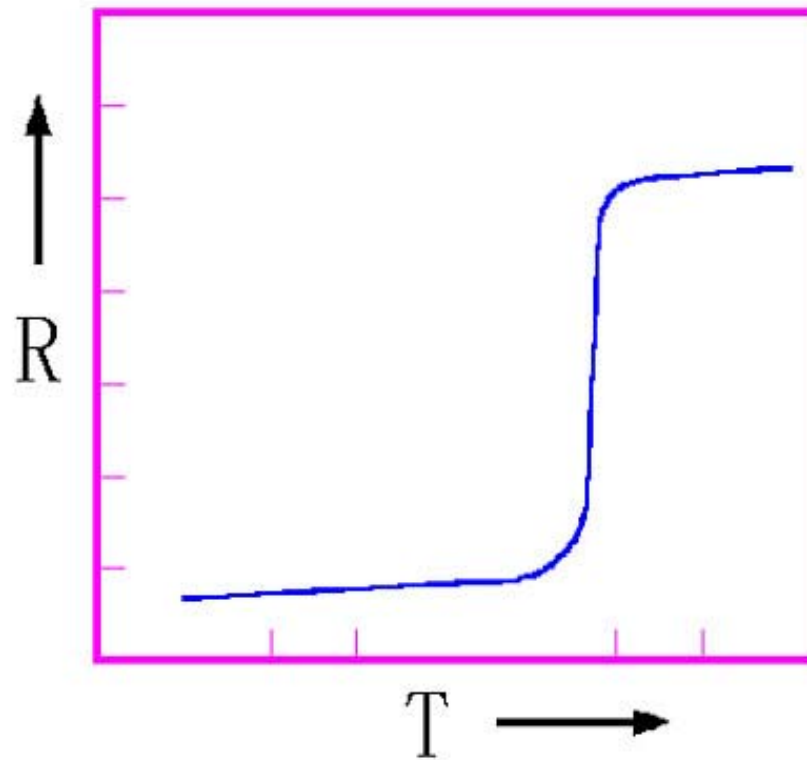
PPTC



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PPTC



PPTC

For Short Circuit Faults

$$I^2 R(T) > U(T - T_a)$$

therefore

The Device Temperature

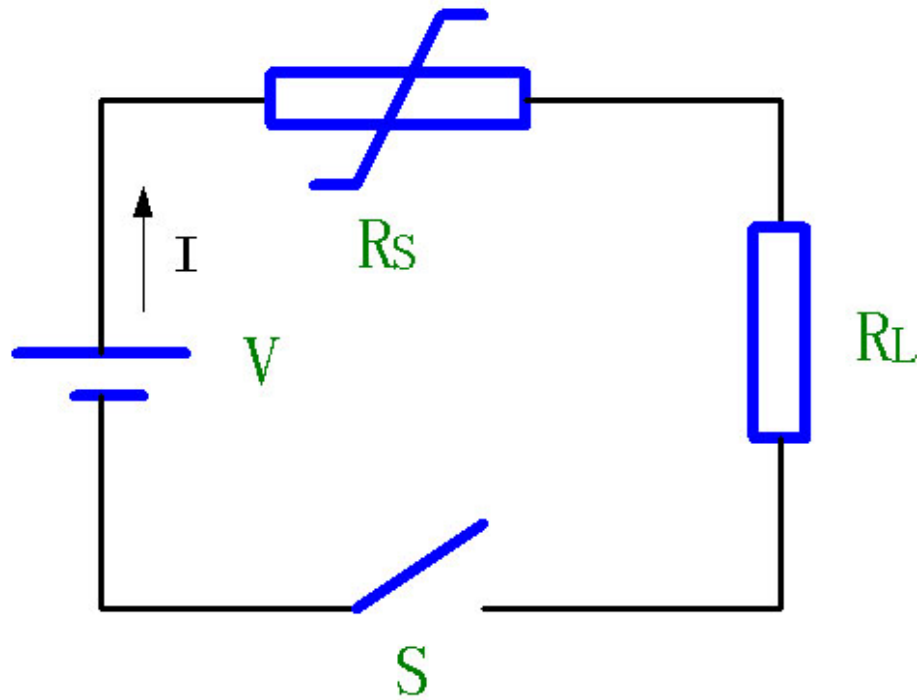
The Device Resistance

to reduce the current



PPTC

PPTC Resettable Fuse

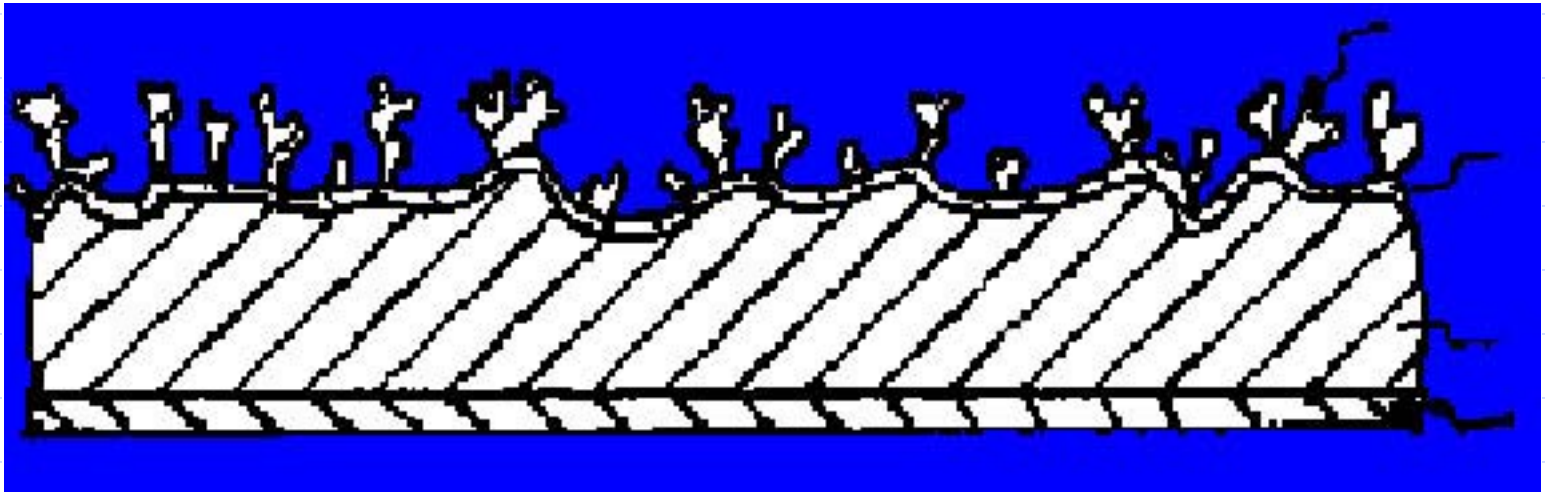


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PPTC

nickel coil



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PPTC's function in battery protection

Role of Polymeric PPTC Devices in protecting Li-ion and NIMH Battery Packs

- ❑ Why Li-ion packs need protection
- ❑ How PPTC device protect



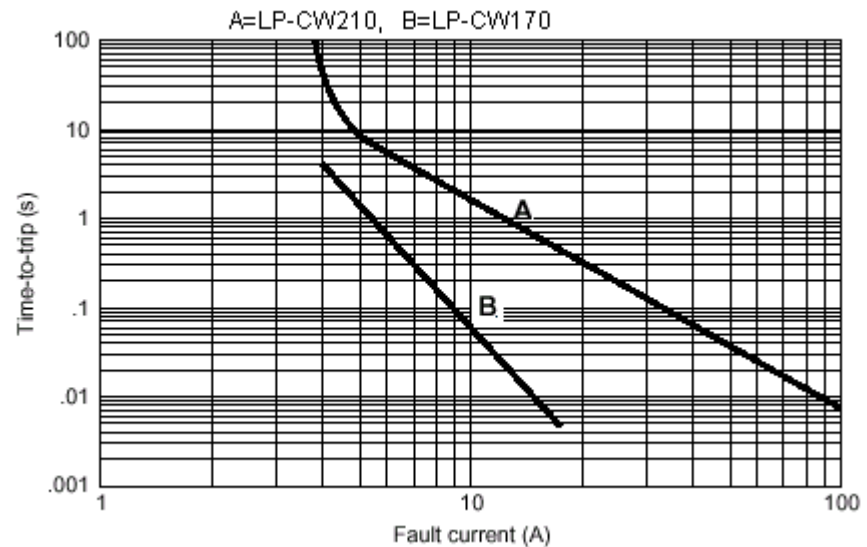
External shorting and overcharging can have serious consequences when protection is not properly applied

- ☐ High impedance ,external shorts may cause: Thermal burns, fires
- ☐ Low impedance,external shorts may cause: Destruction of the pack, Chemical burns, Thermal burns, Cell venting
- ☐ Abusive charging or overcharging may cause: Chemical burns, Thermal burns, Cell venting



Low temperature PPTC devices, such as Wayon's Lp_cw, are a reliable, effective solution to short circuit and overcharge faults

On short circuit faults, Lp_cw devices react quickly to reduce the current before the shorting element reaches high temperature

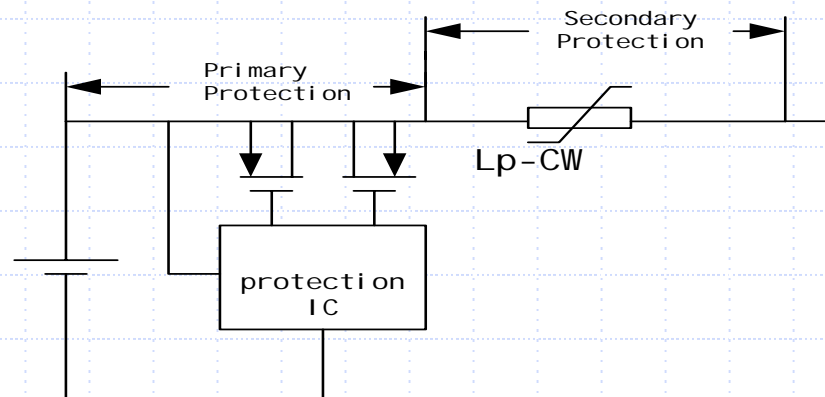


Overcharge Performance Comparison with and without PPTC Protection

- ❑ 650 mA-hr Lithium-Manganese cell
- ❑ 700 mA-hr Lithium-Polymer cell



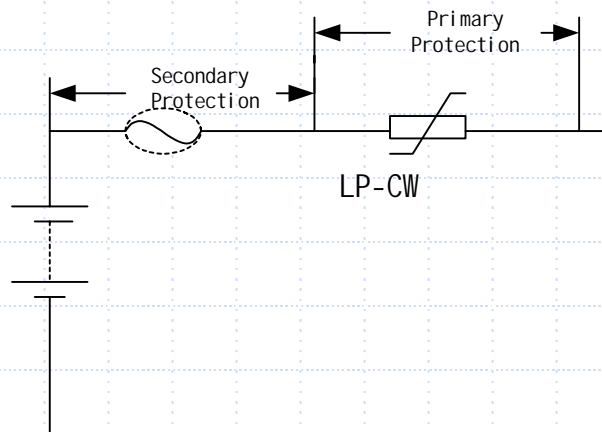
For new Li-ion chemistries, PPTC devices are used as primary overcharge protection in lieu of an active electronic circuit



**Voltage sensing IC controls dual-FET to provide primary overcharge protection;
PPTC gives secondary overcharge and short-circuit protection**



For new Li-ion chemistries, PPTC devices are used as primary overcharge protection in lieu of an active electronic circuit



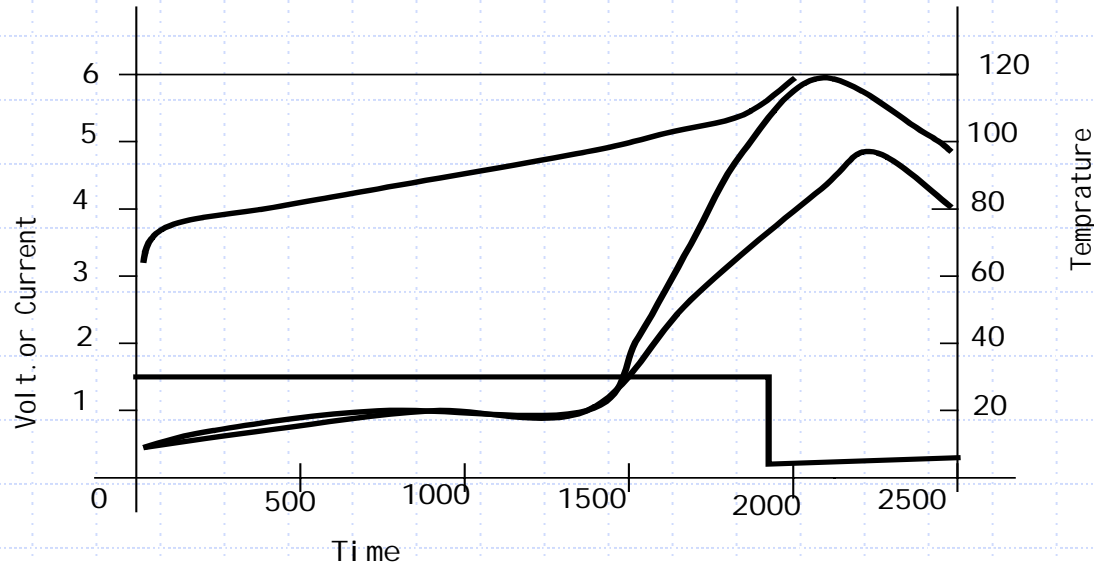
PPTC provides primary overcharge and short-circuit protection; thermal fuse included when protection required above PPTC's rated voltage



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Without PPTC, 2.5C-12V overcharge of a Li-Manganese cell results in a damaged, inoperative cell



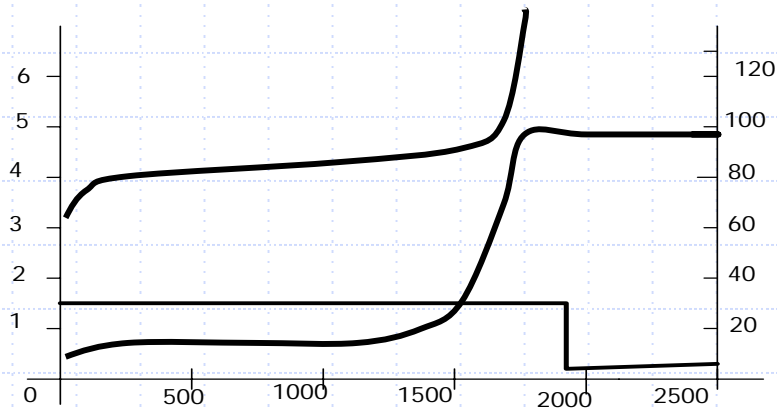
- *Steel can bulged from its original thickness of 6mm to 10mm
- *Cell surface temperature reached 118degC
- *Separator melted and permanently disabled cell



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With PPTC LP-CW210 protection, the 2.5c-12V charge is interrupted and temperature rise is minimized



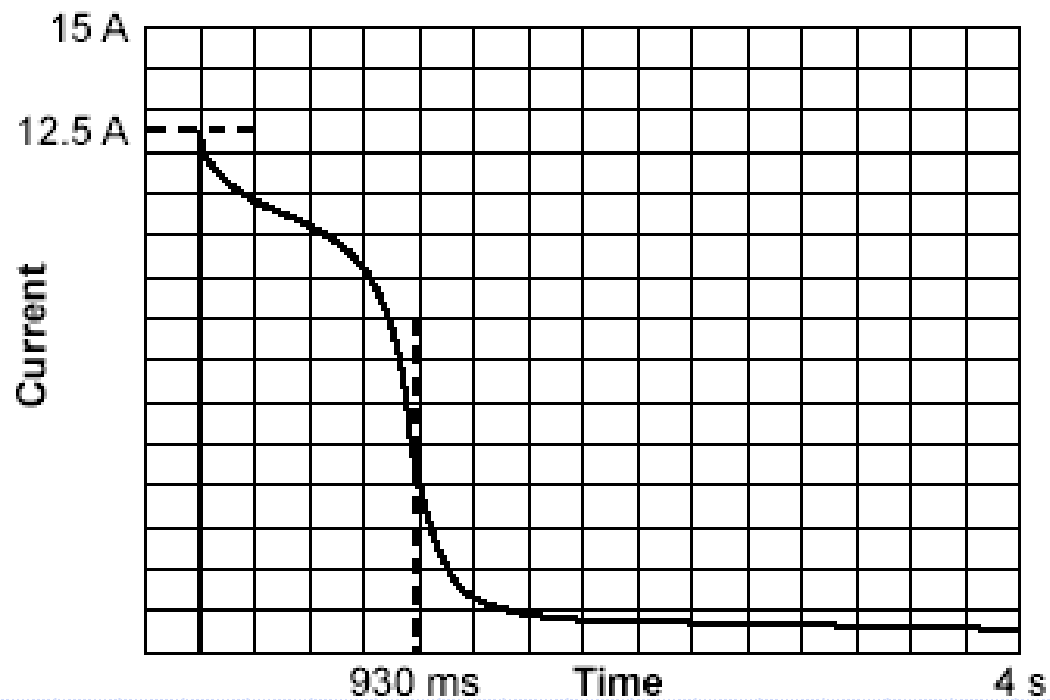
***PPTC tracks cell temperature until cell reaches 80degC at which PPTC trips and limits current**



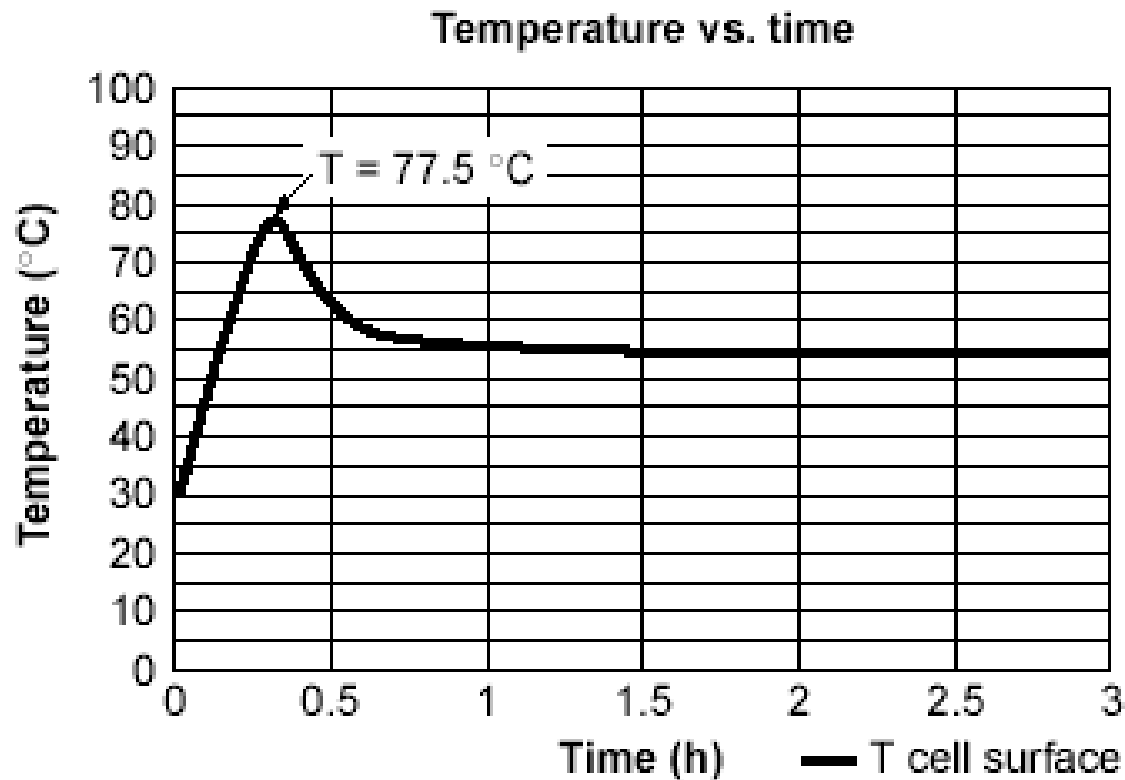
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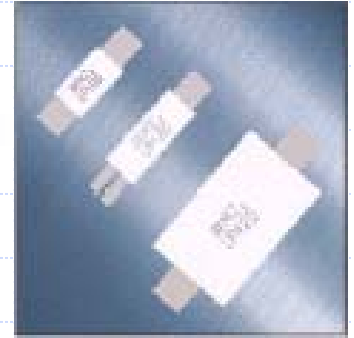
NiMH Battery Pack Short-Circuit Interrupted by PPTC resettable fuse



NiMH Battery Pack Overtemperature due to Overcharge Interrupted by LR Series PPTC Resettable Fuse



Product-- Strap devices



LP series:

- ☐ Axial leaded
- ☐ Many part numbers with different current, resistance and dimension to be selected
- ☐ Provides overcurrent protection with 125 °C trip temperature
- ☐ Available in lead-free version
- ☐ Agency recognition: UL, CSA, TUV

LPN series:

Special design to meet battery pack with very small sizes

Product-- Strap devices

LP-CW series:

- ☐ Small sizes , low initial resistance
- ☐ Provides overcurrent protection with a very low switching temperature of 85
- ☐ Available in lead-free version
- ☐ Agency recognition: UL、CSA、TUV



Product-- Strap devices

LR series:

- ☐ Smaller sizes,
- ☐ Provides overcurrent protection with even lower switching temperature of 80
- ☐ Very low initial resistances
- ☐ Available in lead-free version
- ☐ Agency recognition: UL、CSA、TUV



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Product-- Strap devices

LV series:

- ☐ Possesses the smallest dimension of all the strap devices
- ☐ The trip temperature is also only 80
- ☐ Available in lead-free version
- ☐ Agency recognition: UL、CSA、TUV

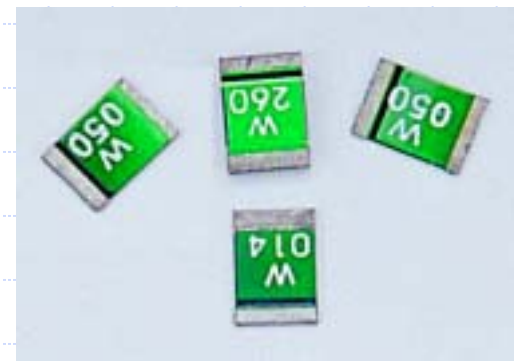


Product– Surface mount devices

LP-MSM series:

Features

- ☐ Small size of 1812
- ☐ Fast tripping resettable circuit protection
- ☐ Surface mount packaging for automated assembly
- ☐ Agency Recognition: UL、CSA、TUV

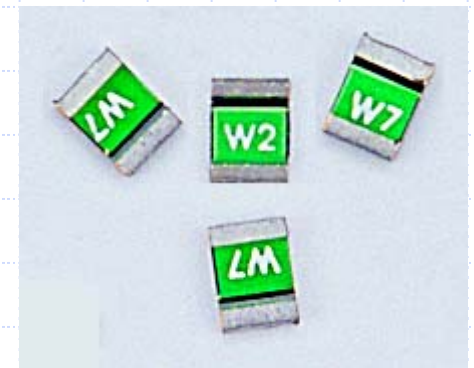


Product-- Surface mount devices

LP-USM series:

Features

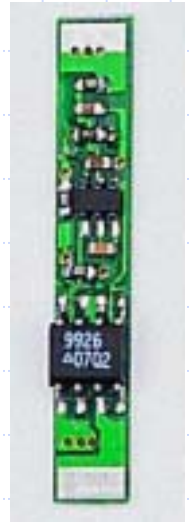
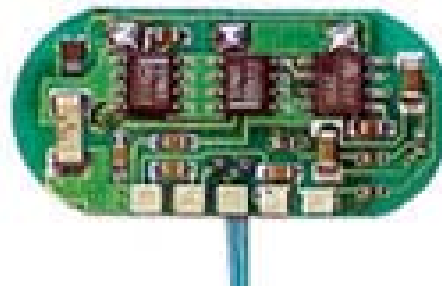
- ☐ Smaller size of 1210
- ☐ Fast tripping resettable circuit protection
- ☐ Surface mount packaging for automated assembly
- ☐ Agency Recognition: UL、CSA、TUV



Product –PCM

PCM

Protection Circuit Module is a device to protect a battery against risk of explosion, make longer its operation life and improve its performance by prevention of overcharge and over-discharge and cut-off of over-current through driving in the safe circuit at the time of charging and discharging.

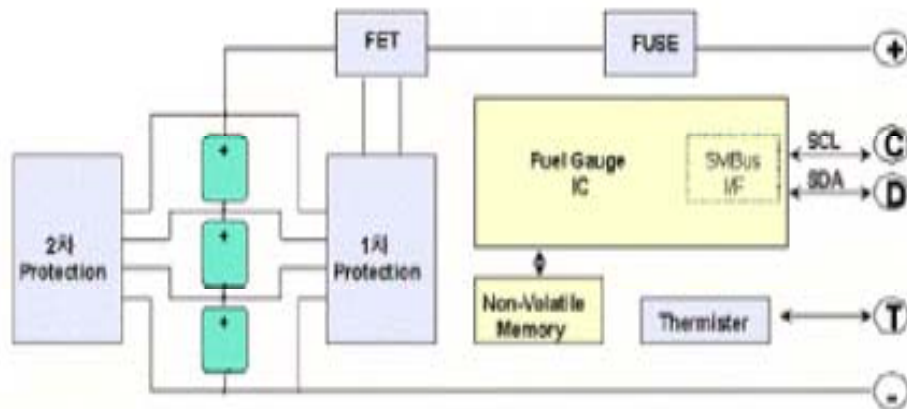


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Power Management: SCM

Smart Battery is composed of fuel gauge and protection circuit.



Fuel Gauge Circuit -- Monitoring power condition of battery and transmits data to host (notebook, PC, video camera, or cell phone)

Protection Circuit -- Providing primary and secondary protection functions to battery Code Identification,

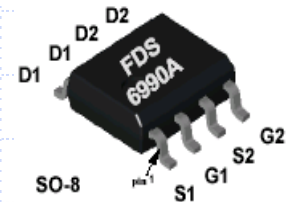
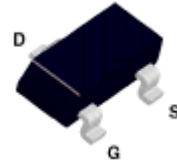
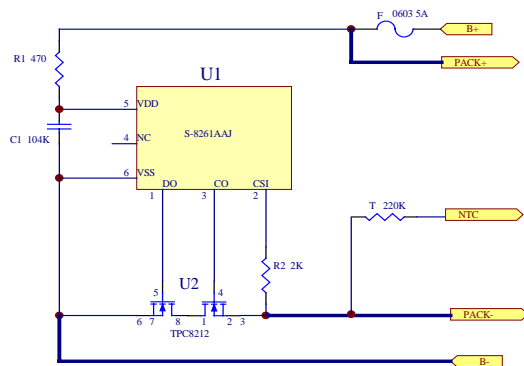
Protection-PCM

PCM is not only used to protect the cells and applications from excessive discharge and recharge current, but also to maintain the nominal operating conditions for the battery packs.

- ☐ Overcharge Protection
- ☐ Over-discharge Protection
- ☐ Over-current Protection
- ☐ Short Circuit Protection
- ☐ Additional function : Over-temperature protection, ESD protection, Code Identification, Power management



PCM Basic Diagram

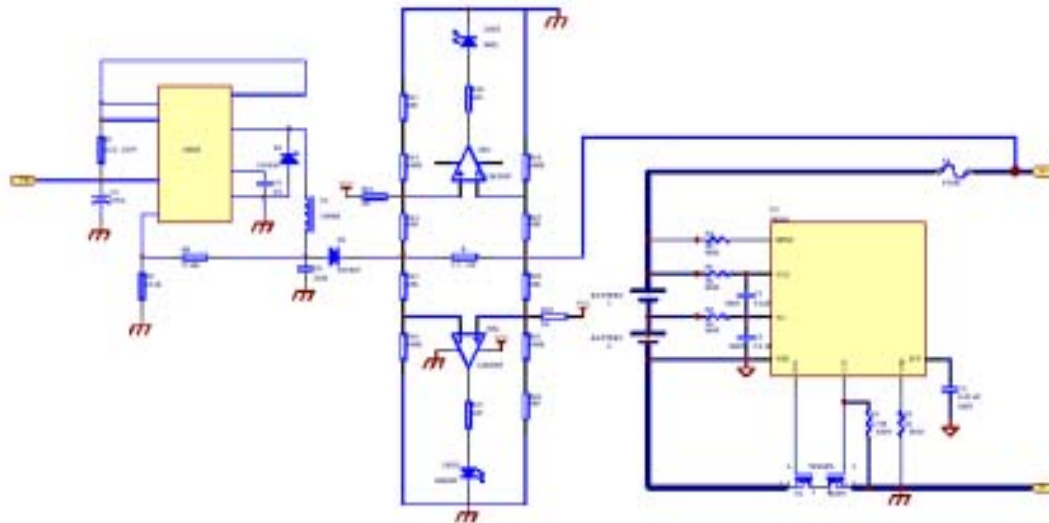


❑ MOSFET (Control Switch) turn off the charge or discharge depending on the output of the controller IC.

❑ Controller IC measures the voltage for each cell and shut off MOSFET to either prevent overcharging or over-discharging. The voltage of the control switch is measured on both ends and in order to prevent over-current, both control switches are shut off if the voltage exceeds specifications.

❑ Thermistors (optional) accurately measure the battery temperature and battery

PCM Diagram for DVD Batteries



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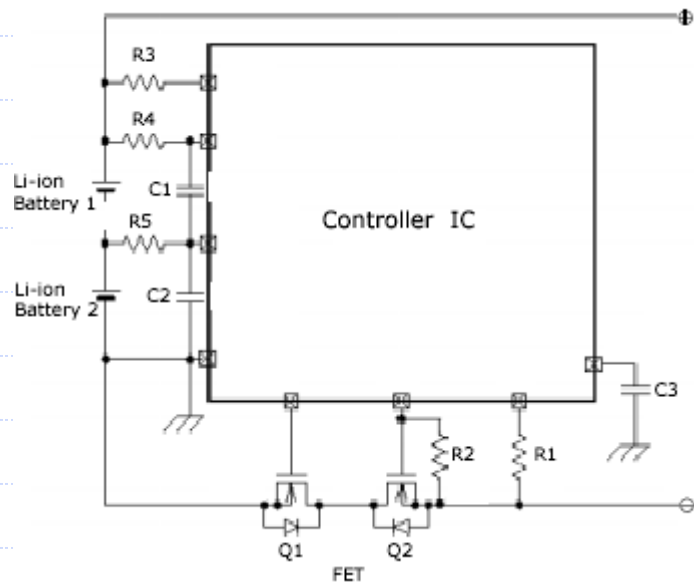
Major parts involved

- ☐ Control IC
- ☐ Rigid PCB or Flexible PCB
- ☐ MOSFET (Control Switch)
- ☐ Resistors
- ☐ Capacitors
- ☐ The following parts may be used to obtain certain functions according to different design.

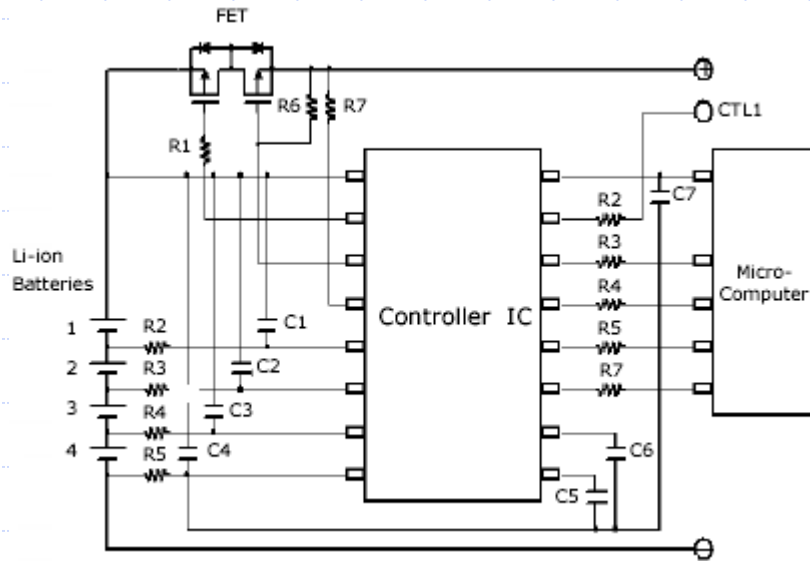
PTC, NTC, ESD, FUSE, Control IC, ID resistor, fuel Gauge Circuit, Power convert circuit etc.



PCM diagram (for 2 cells)



PCM diagram (for 4 cells)



Applications

- ❑ Lithium-ion Batteries
- ❑ Lithium-ion Polymer Batteries
- ❑ Application fields

Mobile phone, Notebook PC,
Video camera, DVD, PDA, and
other portable devices



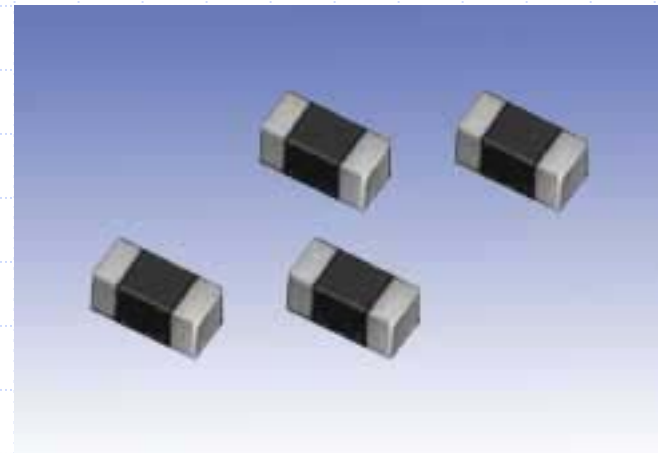
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Products introduce –NTC

NTC:

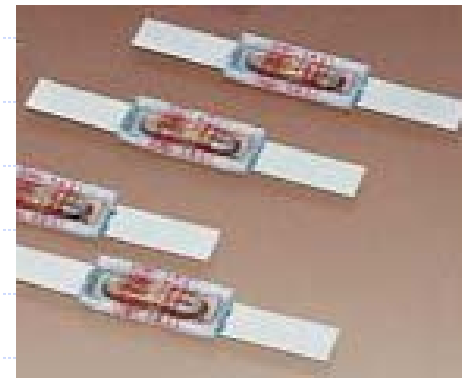
- ❑ Min nature size ,no lead,
- ❑ ideal for high density SMT installation,
- ❑ Ideal for wave or reflow soldering.
- ❑ Agency recognition: UL、 CSA、 TUV



Products introduce –Thermal cutoff

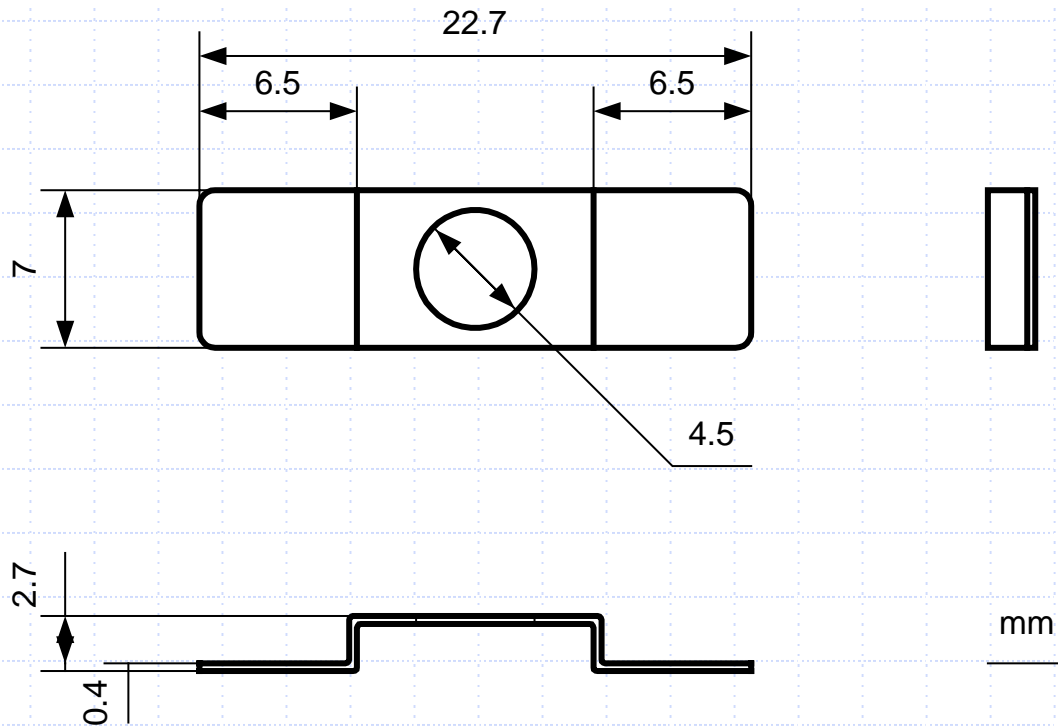
TP series:

- ❑ Realized the super slim package with less than 1mm thickness.
With smaller package, can meet the requirement of smaller battery pack
- ❑ Nickel lead terminals are corrosion-proof and durable for bending, and also available with spot-welding
- ❑ Not only provide thermal cutoff functions but also current cutoff functions



Products introduce –Fuselink

BPlink



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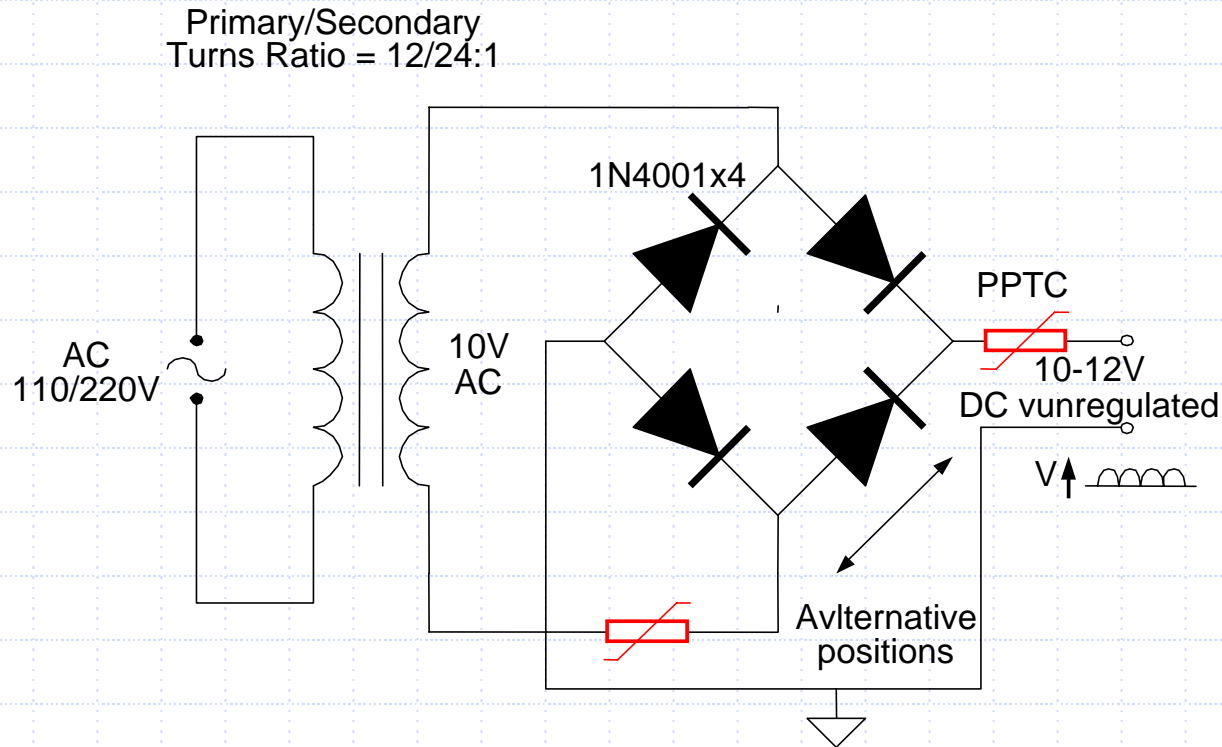
Solution for portable equipment ——charger



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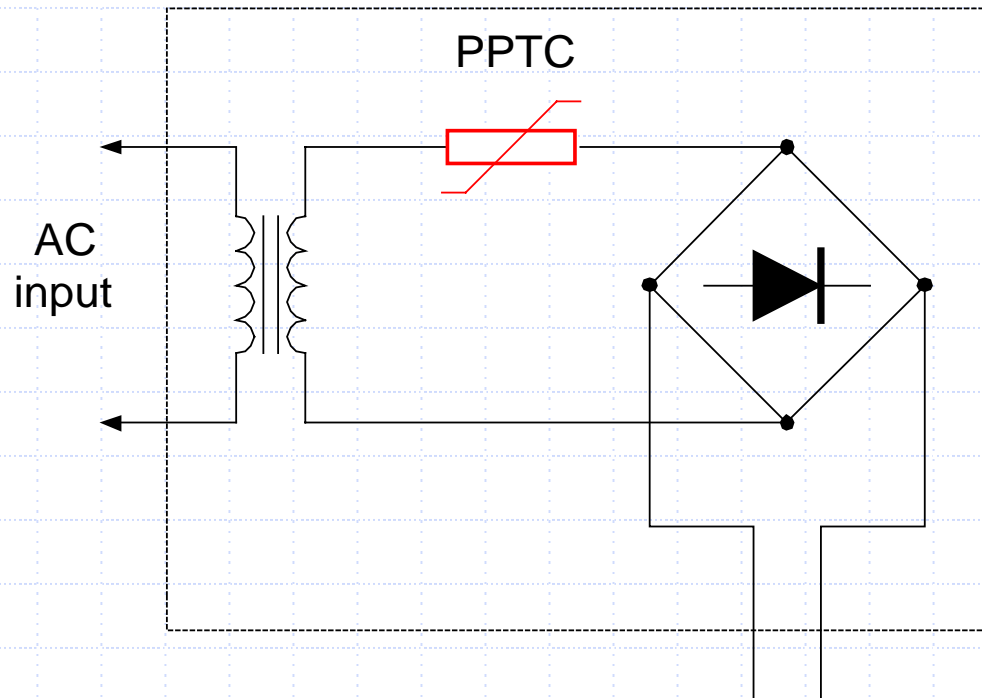
Linear AC/DC Adapter



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Transformers

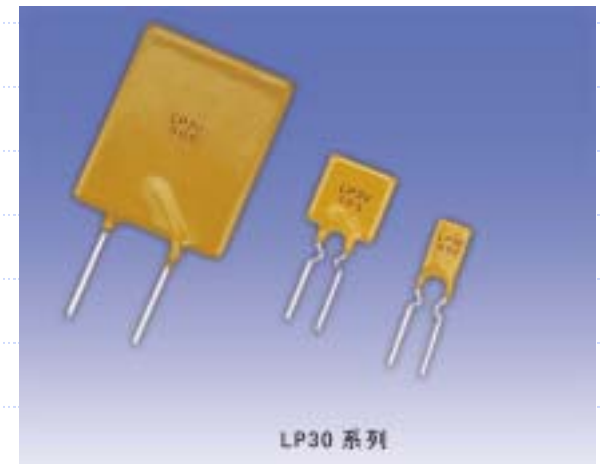


Products introduce --Strap devices

LP 30 series:

..

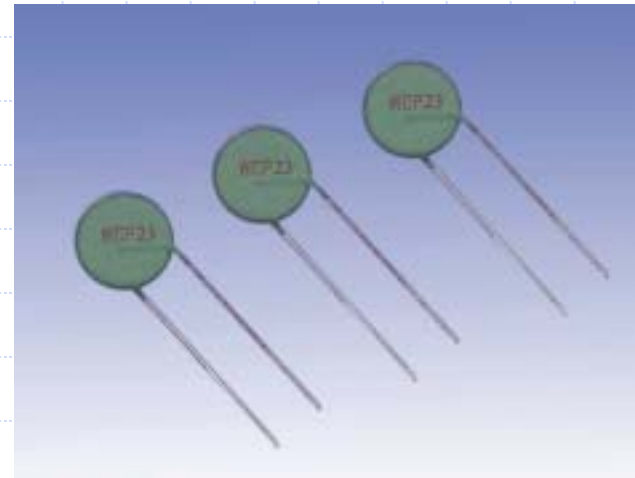
- ☐ Radial leaded devices
- ☐ Cured, flame retardant epoxy polymer insulating material meets UL94 V-0 requirements
- ☐ Agency Recognition: UL, CSA, TUV



Products introduce --Strap devices

WCP23 series:

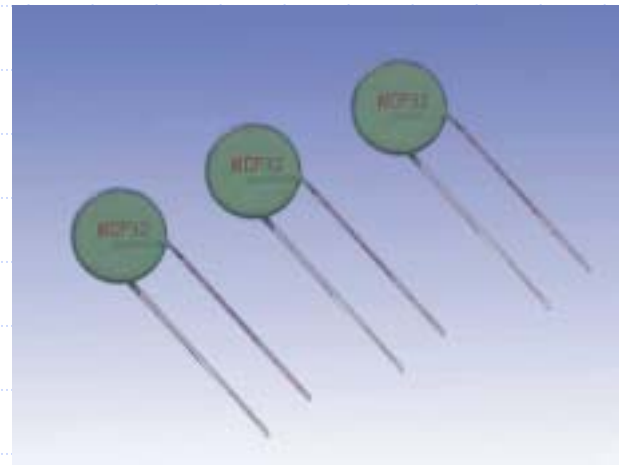
- ☐ Quick time to trip;
- ☐ Resistance is sorted and matched devices available;
- ☐ High voltage endurance;
- ☐ High current endurance



Products introduce --Strap devices

WCP32 series:

- ☐ Low resistance;
- ☐ Resistance is sorted and matched devices available;
- ☐ High current endurance



Thanks !



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