Rechargeable Battery Safety Protection

SETsafe | SETfuse Solution

Overcharge / Over-discharge / Over-temperature / Over-voltage Protection

Personal Digital Products

Power Tools

Uninterruptible Power Supply (UPS)

Light Electric Vehicle

Electric Vehicles (EV)

Battery Energy Storage Systems

2025 year

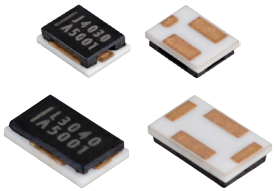
40+
The products sell well in more than 40 countries.

Providing Total Solution for High Standard Safety Circuit Protection

SETsafe | SETfuse

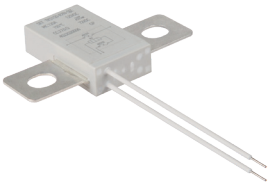
Competitive Advantages of SETfuse | SETsafe Products

Heat CutOff (HCO)



- Ultra-small size: 2.7 x 1.8 x 0.7 mm
- Maximum rated current: 75 A
- Full digital detection
- Fully automated intelligent manufacturing

idea Thermal CutOff (iTCO)



- Active protection for over temperature and over current patented technology
- Low power consumption
- High pulse current withstand capability
- Cost-effective

Low Voltage Fuses (LV Fuses)

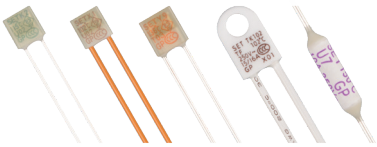
- Non-destructive manufacturing
- Intelligent manufacturing
- Higher consistency
- Cost-effective

Miniature Fuses

- Lead-free
- High breaking capacity
- Fully automated manufacturing

Competitive Advantages of SETfuse | SETsafe Products

Thermal-Link – Alloy Type (ATCO)



- Customizable solutions available
- Rated operating temperature: 76 ~ 230 °C
- Maximum rated current: 200 A
- Maximum rated voltage: 800 VAC / 850 VDC
- Customizable high surge withstanding products
- Fully automated intelligent manufacturing

Surge Protective Device (SPD)

- Available in Type 1+2 and Type 2 AC/DC SPD
- In-house laboratory is qualified by UL & TUV under the WTDP (Witnessed Test Data Program)
- In-house manufacturer of SPD components, including MOVs, GDTs, and TVS Diodes

Thermally Protected Varistors (TFMOV)

- High surge capacity
- Core materials made in-house
- Fully automated manufacturing
- No arc risk for DC/AC system

Transient Voltage Suppression (TVS Diodes) ESD TVS Diode Arrays (ESD TVS)

- Low capacitance
- Nominal surge power: 200 ~ 30000 W
- Maximum surge current (8/20 μs): 20 kA
- High-reliability glass passivation protection
- Fully automated intelligent manufacturing

Rechargeable Battery Safety Protection
SETsafe | SETfuse Solution

Personal Digital Products

Power Tools

UPS

Light Electric Vehicle

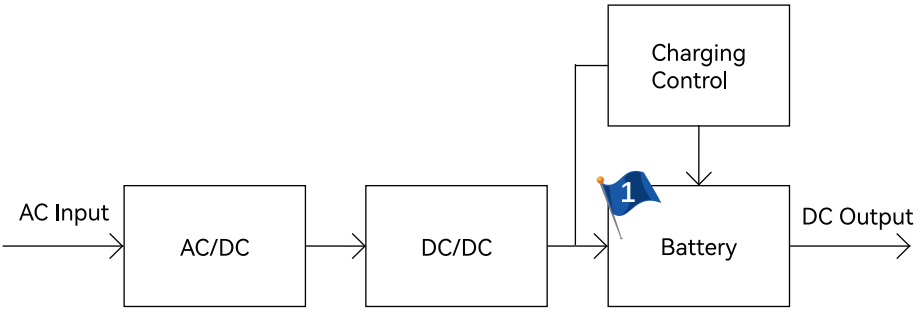
EV Electric Vehicles

Rechargeable Battery Safety Protection
SETsafe | SETfuse Solution

Battery Energy Storage System

SETsafe | SETfuse Products Used in Personal Digital Product Safety Protection

Personal Digital Product Schematic Diagram



SETsafe | SETfuse Solution Products

1 Active Protection

1.1 Heat CutOff (HCO)

Personal Digital Products

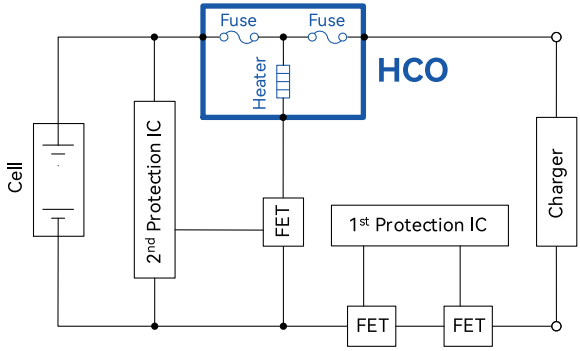
1.1 Lithium Battery Overcharge Active Protection

In the charge/discharge circuit of lithium battery packs, the risk of IGBT/MOS failure can lead to continuous current flow, causing the lithium battery to be overcharged or over-discharged, ultimately leading to further damage to the battery pack.

SETsafe | SETfuse Solution Products

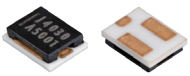
Principle: By installing a Heat CutOff (HCO) in the charge/discharge circuit, a secondary protection mechanism is established. Specifically:

1. When an abnormality causes excessive current, the internal alloy of the HCO generates heat and melts, thereby quickly cutting off the circuit and preventing further escalation of the fault;
2. In the event of an overcharge situation, the control circuit triggers the HCO to activate, immediately initiating the mechanical tripping mechanism. Relying on the mechanical tripping, the HCO internally cuts off the key components of the charge/discharge circuit, actively and rapidly disconnecting the charge/discharge path, and avoiding damage caused by battery overcharging.



SETsafe | SETfuse Solution Products · Heat CutOff (HCO)

Heat CutOff (HCO)



SHJ series

I_r : 12 / 15 / 22 / 30 A

U_r : 48 / 80 VDC

Range of Operating Voltage: 3 ~ 47 VDC

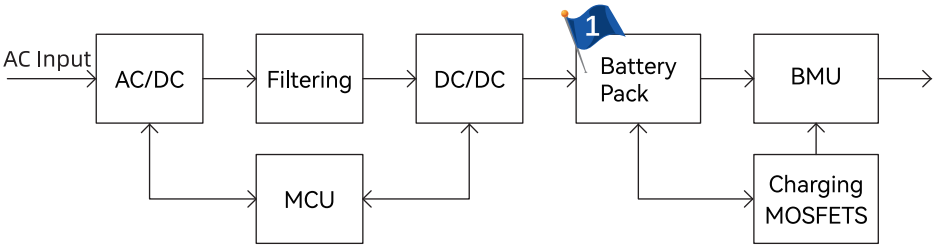
Dimension: L4.0 x W3.0 x H0.9 mm

Learn more:
https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHJ-series.html

Learn more

SETsafe | SETfuse Products Used in Power Tool Safety Protection

Power Tool Schematic Diagram



SETsafe | SETfuse Solution Products

1

Active Protection

1.1 Heat CutOff (HCO)

Over Current Protection

1.2 Miniature Fuses

Power Tools

2.1 Lithium Battery Overcharge Active Protection

In the charge/discharge circuit of lithium battery packs, the risk of IGBT/MOS failure can lead to continuous current flow, causing the lithium battery to be overcharged or over-discharged, ultimately leading to further damage to the battery pack.

SETsafe | SETfuse Solution Products

Principle: By installing a Heat CutOff (HCO) in the charge/discharge circuit, a secondary protection mechanism is established. Specifically:

1. When an abnormality causes excessive current, the internal alloy of the HCO generates heat and melts, thereby quickly cutting off the circuit and preventing further escalation of the fault;
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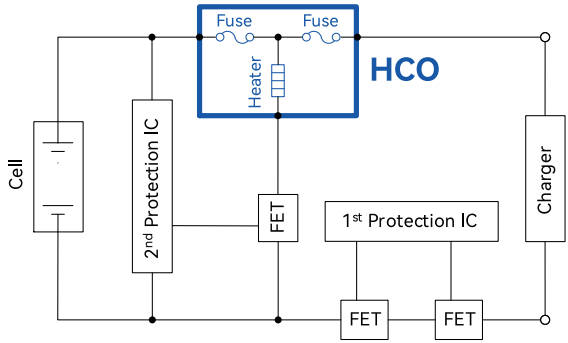
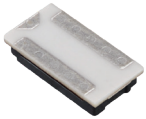


Heat CutOff (HCO)



SHP series

I_r : 30 / 45 / 60 / 75 A

U_r : 100 VDC

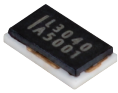
Range of Operating Voltage: 4 ~ 92 VDC

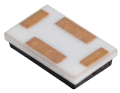
Dimension: L9.5 x W5.0 x H1.9 mm

Learn more

https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHP-series.html

Learn more





SHL series

I_r : 12 / 15 / 30 / 40 A

U_r : 80 VDC

Range of Operating Voltage: 4 ~ 62 VDC

Dimension: L5.4 x W3.2 x H1.1 mm

Learn more

https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHL-series.html

Learn more

SHJ series

I_r : 12 / 15 / 22 / 30 A

U_r : 48 / 80 VDC

Range of Operating Voltage: 3 ~ 47 VDC

Dimension: L4.0 x W3.0 x H0.9 mm

Learn more:

https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHJ-series.html

Learn more

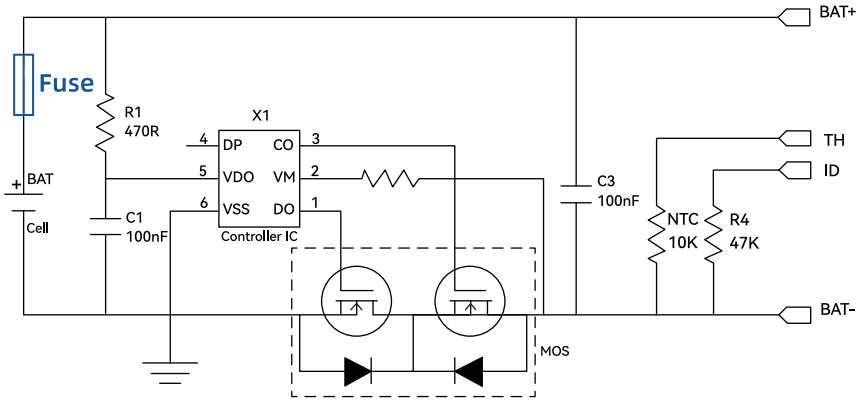
Power Tools

2.2 Lithium Battery Over Current Protection

When power tools operate under high load, the current demand exceeds the battery's bearing capacity, causing the battery to heat up and accelerate aging, and may even damage the internal structure of the battery.

SETsafe | SETfuse Solution Products

Principle: By connecting miniature fuses in series at the output end of the battery pack, the resistance of the miniature fuse is small. Under normal circuit operation, it functions as a conductor. When the circuit is unstable or experiences external interference that generates current fluctuations, it can withstand a certain range of overcurrent; only when an obvious overload or short circuit occurs in the circuit will the miniature fuse blow, thereby cutting off the overcurrent to protect the circuit.



Miniature Fuses

SCF1032 series

Body Materials: Ceramic
Characteristic: Fast Acting
I_n : 0.5 ~ 40 A
U_n : 125 ~ 250 VAC, 32 ~ 250 VDC
Dimensions: W3.2 × H3.2 × L10.3 mm

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Surface-Mount-Fuse-links-SMFL/SCF1032-series.html

Learn more

SCF6125 series

Body Materials: Ceramic
Characteristic: Fast Acting
I_n : 0.5 ~ 20 A
U_n : 125 ~ 250 VAC, 24 ~ 125 VDC
Dimensions: W2.7 × H2.7 × L6.3 mm

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Surface-Mount-Fuse-links-SMFL/SCF6125-series.html

Learn more

SCF61011 series

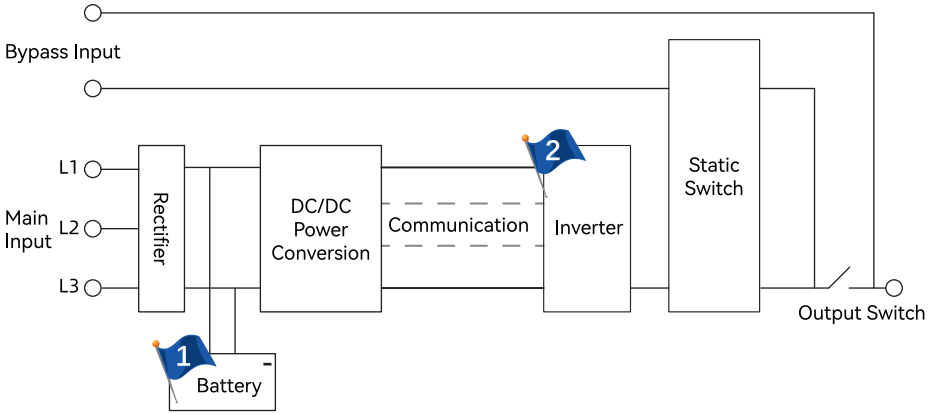
Body Materials: Ceramic
Characteristic: Fast Acting
I_n : 30 ~ 125 A
U_n : 24 ~ 125 VDC
Dimensions: W10.0 × H6.0 × L11.2 mm

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Surface-Mount-Fuse-links-SMFL/SCF61011-series.html

Learn more

SETsafe | SETfuse Products Used in UPS Safety Protection

UPS Schematic Diagram



SETsafe | SETfuse Solution Products

1

Active Protection

1.1 Heat CutOff (HCO)

1.2 idea Thermal CutOff (iTCO)

1.3 Pyro CutOff (PCO)

Over Voltage Protection

1.4 Metal Oxide Varistor (MOV)

1.5 Gas Discharge Tube (GDT)

2

Over Voltage Protection

2.1 Transient Voltage Suppressor Diode (TVS)

2.2 ESD Suppressor (ESD TVS)

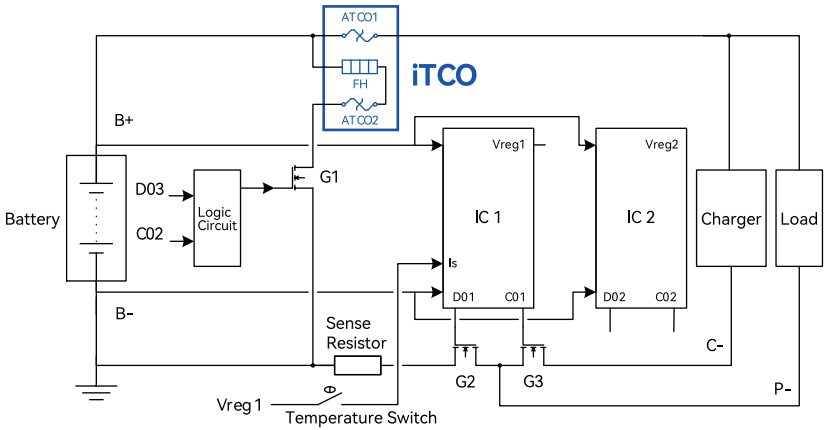
UPS

3.1 Lithium Battery Overcharge Active Protection

G2 and G3 function as charge/discharge circuit switches. Once a failure occurs and they cannot be disconnected, the battery pack will continuously charge or discharge, leading to battery overcharge or over-discharge, eventually resulting in thermal runaway. In many UPS applications, the short-circuit breaking capability of a single fuse is insufficient.

SETsafe | SETfuse Solution Products

Principle: By connecting the iTCO product in series in the charge/discharge circuit, the system monitors the voltage. Once an overvoltage is detected, G2 and G3 are immediately turned off, and G1 is triggered to turn off the control circuit. Simultaneously, the FH signal is activated, triggering ATCO1 to disconnect the charge/discharge circuit, and then ATCO2 is triggered to further disconnect the control circuit, achieving dual safety protection.



SETsafe | SETfuse Solution Products

- Heat CutOff (HCO)
- idea Thermal CutOff (iTCO)
- Pyro CutOff (PCO)

Heat CutOff (HCO)

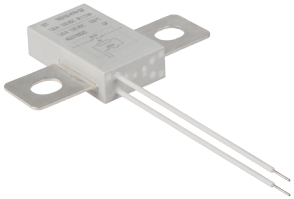
SHP series

I_r : 30 / 45 / 60 / 75 A
U_r : 100 VDC
Range of Operating Voltage: 4 ~ 92 VDC
Dimension: L9.5 x W5.0 x H1.9 mm

Learn more:
https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHP-series.html

Learn more

idea Thermal CutOff (iTCO)

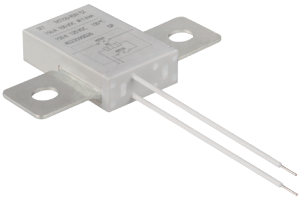


TKSxxx-R series

MC I_r : 120 A
MC U_r : 125 VDC
CC U_r : 12 / 24 / 36 / 48 / 72 / 96 VDC
T_f : 150 ℃

Learn more:
https://setsafe.com/Products/Active-Protection/idea-Thermal-CutOff-iTCO/TKSxxx-R-series.html

Learn more

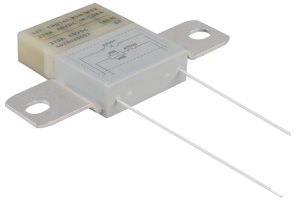


TKTxxx-R series

MC I_r : 150 A
MC U_r : 125 VDC
CC U_r : 12 / 24 / 36 / 48 / 60 / 72 / 96 VDC
T_f : 150 ℃

Learn more:
https://setsafe.com/Products/Active-Protection/idea-Thermal-CutOff-iTCO/TKTxxx-R-series.html

Learn more



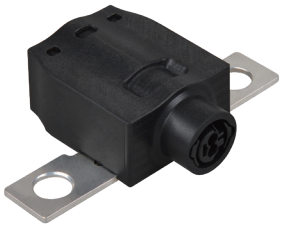
THUxxx-R series

MC I_r : 200 / 270 A
MC U_r : 80 VDC
CC U_r : 12 / 24 / 36 / 48 / 72 VDC
T_f : 145 ℃

Learn more:
https://setsafe.com/Products/Active-Protection/idea-Thermal-CutOff-iTCO/THUxxx-R-series.html

Learn more

Pyro CutOff (PCO)



PHW series

Current Carrying Capacity: 250 A
Breaking Capacity: 150 V / 2.3 KA / 7 μH
Resistance (Ambient): Before Breaking ≤ 0.2 mΩ
After Breaking ≥ 100 MΩ / 1150 V
Generator Resistance: ≥ 1.7 Ω and ≤ 2.5 Ω
Generator Trigger Current: 1.75 A / 0.5 ms or
1.20 A / 2.0 ms
Generator Safety Current: ≤ 0.4 A
Generator Insulation Resistance 1 MΩ（500 VDC / 2 s）

Learn more:
https://setsafe.com/Products/Active-Protection/Pyro-CutOff-PCO/PHW-series.html

Learn more

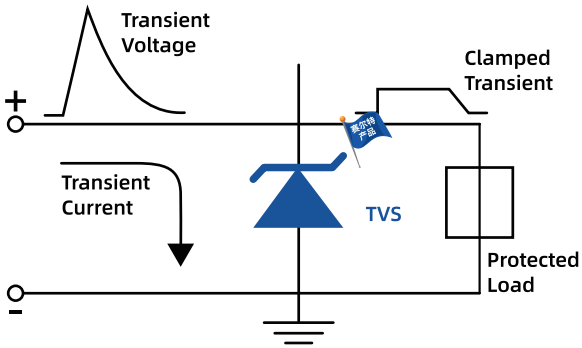
UPS

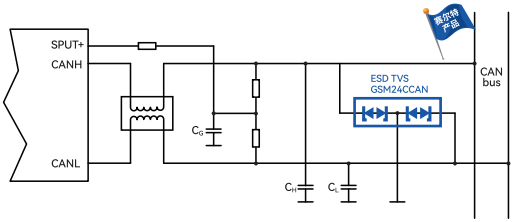
3.2 Communication Interface ESD Protection

The DC bus voltage on the inverter side may fluctuate due to faults in the preceding rectifier circuit or battery pack issues. When this voltage is excessively high, it can cause the inverter output voltage to exceed the normal range, damaging downstream equipment or the inverter itself.

SETsafe | SETfuse Solution Products

Principle: By connecting Transient Voltage Suppressors (TVS) in parallel on the AC output side of the inverter, the transient overvoltage on the output side is clamped, reducing the peak voltage and improving the reliability and lifespan of downstream equipment. It absorbs transient surges in the circuit, clamping the voltage to a safe level, thereby protecting the inverter.

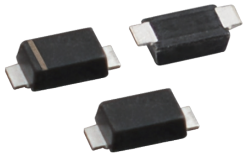




BMS Signal Terminal ESD Protection (CAN)

SETsafe | SETfuse Solution Products	· Transient Voltage Suppressor Diode (TVS) · ESD Suppressor (ESD TVS)

Transient Voltage Suppressor Diode (TVS)



SMF series

V_R : 5.0 ~ 250 V

P_{PPM} (10 / 1000 μs): 200 W

Learn more

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Standard-Type/SMF-series.html

SMAJ series

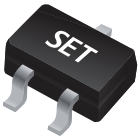
V_R : 5.0 ~ 440 V

P_{PPM} (10 / 1000 μs): 400 W

Learn more

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Standard-Type/SMAJ-series.html

ESD TVS Diode Arrays (ESD TVS)



GSM24CCAN series

V_{RWM} : 24 V

C_J : 30 pF

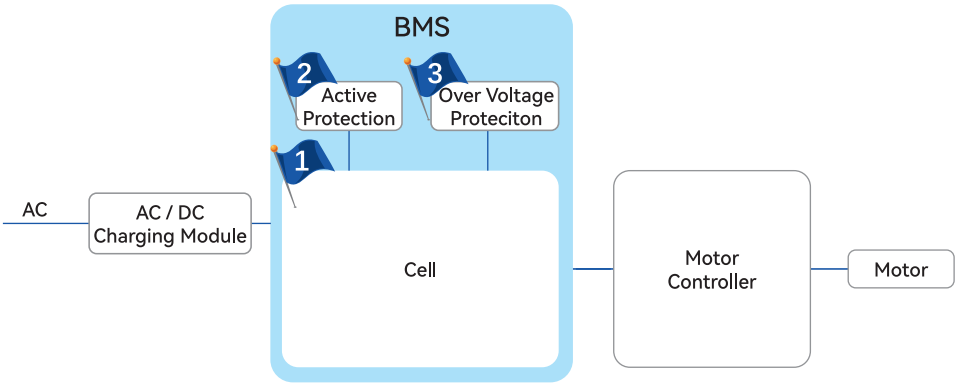
Feature: IEC61000-4-2 (ESD) ± 30 kV (air),
± 30 kV (contact)

Learn more

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/ESD-TVS-Diode-Arrays/GSM24CCAN-series.html

SETsafe | SETfuse Products Used in Light Electric Vehicle Battery Protection Safety Applications

Light Electric Vehicle Battery Drive Schematic



SETsafe | SETfuse Solution Products

1 Over Temperature Protection

1.1 Thermal-Link (ATCO) - Alloy Type

2 Active Protection

2.1 Heat CutOff (HCO)

3 Over Voltage Proteciton

3.1 Transient Voltage Suppression (TVS Diodes)

3.2 ESD TVS Diode Arrays (ESD TVS)

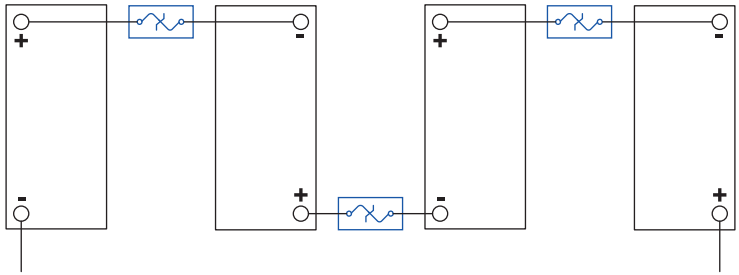
Light Electric Vehicle

4.1 Lead-acid Battery Over Temperature Protection

During rapid charging of lead-acid batteries in light electric vehicles, high voltage and current can critically increase electrolyte temperature, reducing internal resistance. This initiates a thermal runaway, where rising temperature and current mutually intensify, potentially deforming or rupturing the battery, reducing lifespan, and causing fire. A SETsafe | SETfuse thermal fuse in series at one pole is thus essential for battery longevity and fire prevention

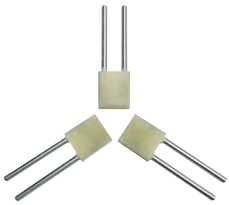
SETsafe | SETfuse Solution Products

Principle: When the lead-acid battery is overcharged or a short circuit occurs in the circuit, a high temperature rise will occur. When the temperature reaches the rated operating temperature of the thermal fuse, the alloy inside the thermal fuse will quickly shrink and disconnect, forming a safe open circuit failure.



SETsafe | SETfuse Solution Products | · Thermal-Link (ATCO) – Alloy Type

Thermal-Link (ATCO) – Alloy Type



GA series

T_f : 76 ~ 150 ℃

I_r : 50 A

U_r : 120 VDC

More information please contact: sales@SETfuse.com

Light Electric Vehicle

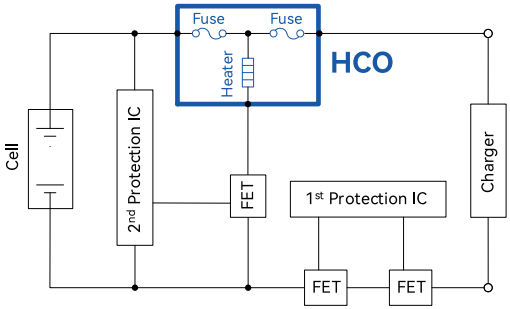
4.2 Battery Management System (BMS) Active Protection

The battery safety of light electric vehicles cannot be ignored, especially when the battery short circuit and overcharge heat cause battery fire accidents, which seriously damage the personal safety and property safety of the owner. The Heat CutOff (HCO) developed by SETsafe | SETfuse can cooperate with the electric vehicle BMS system to trigger the action when the vehicle has over current or overcharge, thus avoiding the lithium battery fire and explosion accidents.

SETsafe | SETfuse Solution Products

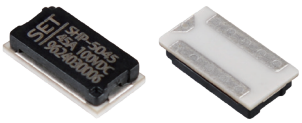
Principle: Add a Heat CutOff (HCO) in the charge discharge circuit for secondary protection:

1. When over current occurs, the internal alloy heats up and melts, cutting off the circuit;
2. In conjunction with BMS detecting information, it can trigger the HCO, start the heater, and actively cut off the circuit.



SETsafe | SETfuse Solution Products · **Heat CutOff (HCO)**

Heat CutOff (HCO)



SHP series

I_r : 30 / 45 / 60 / 75 A

U_r : 100 VDC

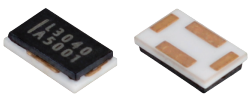
Range of Operating Voltage: 4 ~ 92 VDC

Dimension: L9.5 x W5.0 x H1.9 mm

Learn more

https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHP-series.html

Learn more



SHL series

I_r : 12 / 15 / 30 / 40 A

U_r : 80 VDC

Range of Operating Voltage: 4 ~ 62 VDC

Dimension: L5.4 x W3.2 x H1.1 mm

Learn more

https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHL-series.html

Learn more

Light Electric Vehicle

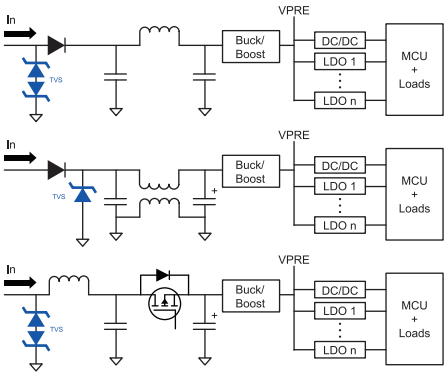
4.3 Battery Management System Over Voltage Protection

To meet ISO 16750-2 requirements, automotive electronic equipment, including the BMS in electric vehicles, undergoes load dump testing. Operating BMS units can encounter sudden surge voltages. Lacking dedicated protection, the power input, detecting, and communication units are highly susceptible to high-voltage damage from load dump processes or surge events. Consequently, incorporating TVS components into the BMS provides essential overvoltage protection.

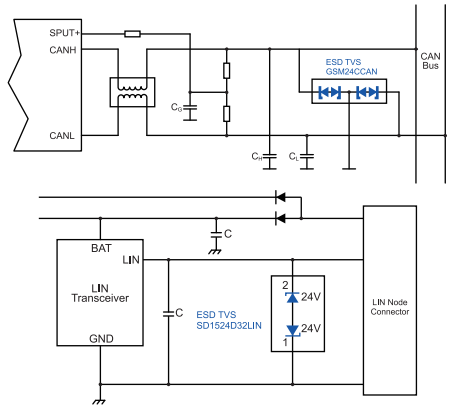
SETsafe | SETfuse Solution Products

Principle: When the circuit works normally, TVS is in the high resistance status. When abnormal overvoltge occurs and reaches the TVS breakdown voltage, TVS acts quickly from high resistance status to low resistance status and discharge the surge current to ground, at the same time, clamps the voltage to a lower level to protect the rear circuit.

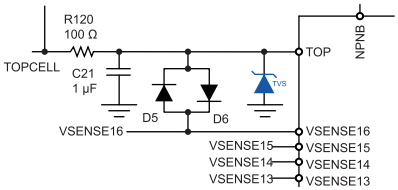
Example: over voltage protection for power ports of a BMS main control board



Example: ESD protection for a BMS signal port



Example: over voltage protection for the power port of a BMS detecting unit (AFE)



SETsafe | SETfuse Solution Products

- Transient Voltage Suppressor Diode (TVS)
- ESD Suppressor (ESD TVS)

Transient Voltage Suppression (TVS Diodes)

ASMA series

V_R : 5.8 ~ 468 V

P_{PPM} (10/1000 μs): 400 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Diodes-Automotive-Grade/ASMA-series.html

Learn more

ASMB series

V_R : 5.8 ~ 553 V

P_{PPM} (10/1000 μs): 600 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Automotive-Grade/ASMB-series.html

Learn more

ASMC series

V_R : 5.8 ~ 512 V

P_{PPM} (10/1000 μs): 1500 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Automotive-Grade/ASMC-series.html

Learn more

SM8SxxA series

V_R : 10 ~ 43 V

P_{PPM} (10/1000 μs): 6600 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Automotive-Grade/SM8SxxA-series.html

Learn more

SM8TxxA series

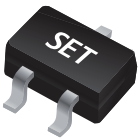
V_R : 20 ~ 43 V

P_{PPM} (10/1000 μs): 8000 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Automotive-Grade/SM8TxxA-series.html

Learn more

ESD TVS Diode Arrays (ESD TVS)



GSM24CCAN series

V_{RWM} : 24 V

C_J : 30 pF

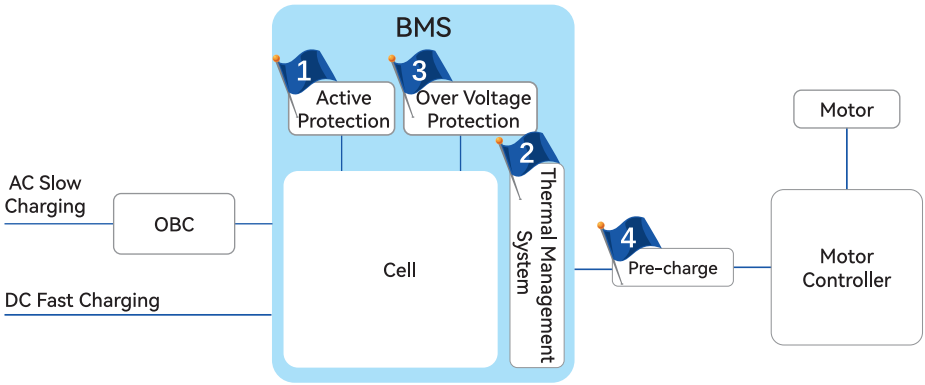
Feature: IEC61000-4-2 (ESD) ± 30 kV (air),
± 30 kV (contact)

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/ESD-TVS-Diode-Arrays/GSM24CCAN-series.html

Learn more

SETsafe | SETfuse Products Used in EV Battery Protection Safety Applications

EV Three-Electric Schematic Diagram



SETsafe | SETfuse Solution Products

1 Active Protection

1.1 Pyro CutOff (PCO)

2 Over Temperature Protection

2.1 Direct Current Thermal-Link (DC-ATCO) - Alloy Type

3 Over Voltage Proteciton

3.1 Transient Voltage Suppression (TVS Diodes)

3.2 ESD TVS Diode Arrays (ESD TVS)

4 Active Protection

4.1 Pyro CutOff (PCO)

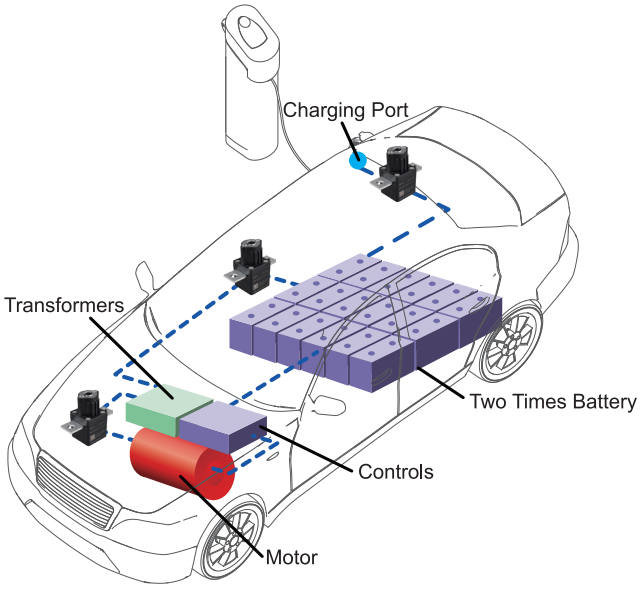
EV Electric Vehicles

5.1 Power Battery Pack Active Protection

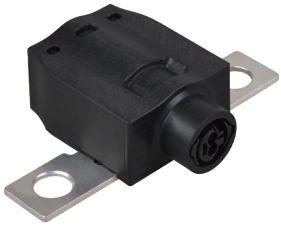
Designing safe and reliable EV power batteries is challenging. Traditional fuses are problematic: they age, can't handle multiple short-circuit impacts, and create substantial heat during normal high-current operation, increasing system cooling needs and costs. Moreover, main high-voltage fuses (400 ~ 700 A) cannot quickly clear 1 ~ 3 kA faults. In contrast, SETsafe | SETfuse's Pyro CutOff (PCO) excels by accurately sensing fault signals and quickly interrupting the circuit with its internal initiator, ensuring safe disconnection even in collision scenarios with battery pack compression, effectively averting thermal runaway.

SETsafe | SETfuse Solution Products

Principle: This system's rapid circuit disconnection protects high-value components from large short-circuit currents, Should a fault produce a high short-circuit, the EV control system triggers the internal initiator, promptly cutting off the battery connection. This minimizes the danger of battery thermal runaway, explosion, or fire.



SETsafe | SETfuse Solution Products | **· Pyro CutOff (PCO)**



PHW series

Current Carrying Capacity: 250 A
Breaking Capacity: 150 V / 2.3 KA / 7 μH
Resistance (Ambient): Before Breaking ≤ 0.2 mΩ
After Breaking ≥ 100 MΩ / 1150 V
Generator Resistance: ≥ 1.7 Ω and ≤ 2.5 Ω
Generator Trigger Current: 1.75 A / 0.5 ms or
1.20 A / 2.0 ms
Generator Safety Current: ≤ 0.4 A
Generator Insulation Resistance 1 MΩ（500 VDC / 2 s）

Learn more

Learn more:
https://setsafe.com/Products/Active-Protection/Pyro-CutOff-PCO/PHW-series.html

PWX series

Current Carrying Capacity: 400 A
Breaking Capacity: 500 V / 16 kA / 20 μH
Resistance (Ambient): Before Breaking ≤ 0.2 mΩ
After Breaking ≥ 100 MΩ / 1500 V
Generator Resistance: ≥ 1.7 Ω / ≤ 2.5 Ω
Generator Trigger Current: 1.75 A / 0.5 ms or
1.20 A / 2.0 ms
Generator Safety Current: ≤ 0.4 A
Generator Insulation Resistance: 50 MΩ（500 VDC / 2 s）

Learn more

Learn more:
https://setsafe.com/Products/Active-Protection/Pyro-CutOff-PCO/PWX-series.html

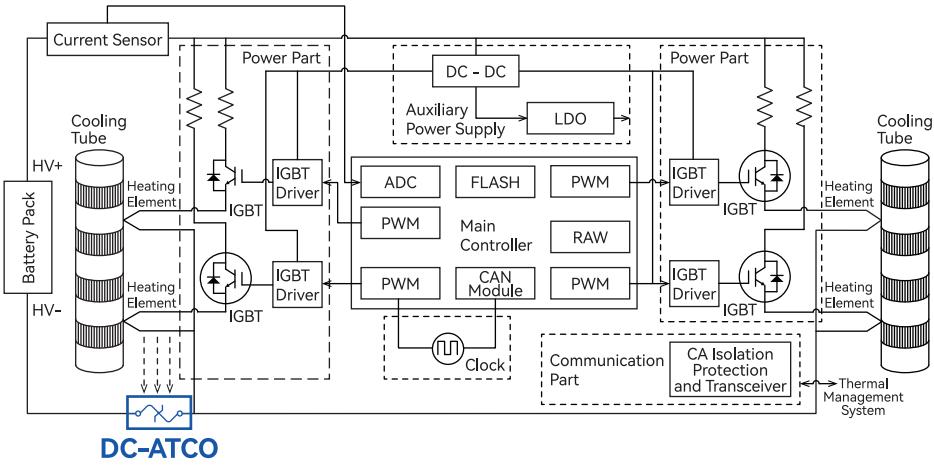
EV Electric Vehicles

5.2 Thermal Management Over Temperature Protection

1. The IGBT/MOS in the heating circuit has the risk of breakdown and short circuit, causing the heater to continue to work and heat up, uncontrolled, or affecting the power supply of the entire vehicle;
2. The heater has the risk of leakage and dry burning, causing the heating element to break down and cause the coolant to be charged.

SETsafe | SETfuse Solution Products

Principle: Direct Current Thermal-Link (DC-ATCO) - Alloy Type is installed on the heater and connected in series with the high-voltage heating circuit. When the heater is heated abnormally, the temperature reaches the melting point of the thermal fuse, which can cut off the 450 VDC circuit and the heater stops working. The ceramic package shell meets the short-term 500 ℃ temperature impulse requirement of the heater.



SETsafe | SETfuse Solution Products · **Direct Current Thermal-Link (DC-ATCO) - Alloy Type**

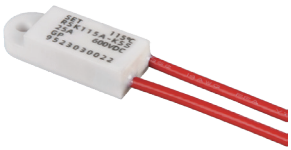
Direct Current Thermal-Link (DC-ATCO) - Alloy Type

TGH series

T_f : 102 ~ 187 ℃
I_r : 15 A
U_r : 850 VDC
I_{min} : 3 A

Learn more

Learn more:
https://setsafe.com/Products/Over-Temperature-Protection/Direct-Current-Thermal-Link-DC-ATCO-Alloy-Type/TGH-series.html



RSKxxxA series

T_f : 102 ~ 187 ℃
I_r : 25 A
U_r : 600 VDC
I_{min} : 3 A

Learn more

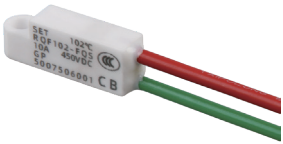
Learn more:
https://setsafe.com/Products/Over-Temperature-Protection/Direct-Current-Thermal-Link-DC-ATCO-Alloy-Type/RSKxxxA-series.html

ARL series

T_f : 86 ~ 187 ℃
I_r : 30 A
U_r : 500 VDC
I_{min} : 0 A

Learn more

Learn more:
https://www.setsafe.cn/Products/Over-Temperature-Protection/Direct-Current-Thermal-Link-DC-ATCO-Alloy-Type/ARL-series.html



RQF series

T_f : 86 ~ 187 ℃
I_r : 10 A
U_r : 450 VDC
I_{min} : 3 A

Learn more

Learn more:
https://setsafe.com/Products/Over-Temperature-Protection/Direct-Current-Thermal-Link-DC-ATCO-Alloy-Type/RQF-series.html

TGxxxC series

T_f : 86 ~ 150 ℃
I_r : 15 / 20 A
U_r : 400 / 450 VDC, 600 VAC

Learn more

Learn more:
https://setsafe.com/Products/Over-Temperature-Protection/Direct-Current-Thermal-Link-DC-ATCO-Alloy-Type/TGxxxC-series.html

EV Electric Vehicles

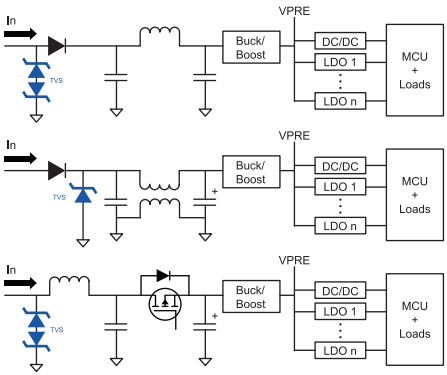
5.3 Battery Management System Over Voltage Protection

To meet ISO 16750-2 requirements, automotive electronic equipment, including the BMS in electric vehicles, undergoes load dump testing. Operating BMS units can encounter sudden surge voltages. Lacking dedicated protection, the power input, detecting, and communication units are highly susceptible to high-voltage damage from load dump processes or surge events. Consequently, incorporating TVS components into the BMS provides essential overvoltage protection.

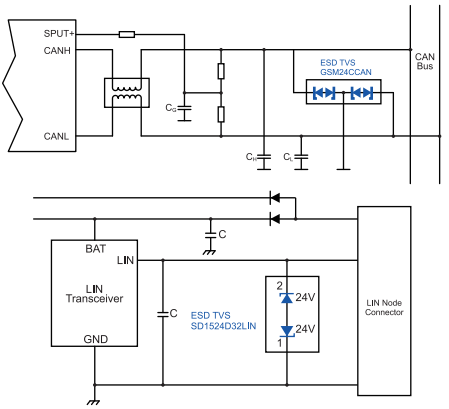
SETsafe | SETfuse Solution Products

Principle: When the circuit works normally, TVS is in the high resistance status. When abnormal overvoltge occurs and reaches the TVS breakdown voltage, TVS acts quickly from high resistance status to low resistance status and discharge the surge current to ground, at the same time, clamps the voltage to a lower level to protect the rear circuit.

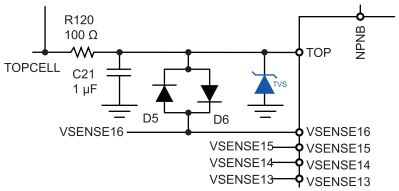
Example: over voltage protection for power ports of a BMS main control board



Example: ESD protection for a BMS signal port



Example: over voltage protection for the power port of a BMS detecting unit (AFE)



SETsafe | SETfuse Solution Products

- Transient Voltage Suppressor Diode (TVS)
- ESD Suppressor (ESD TVS)

Transient Voltage Suppression (TVS Diodes)

ASMA series

V_R : 5.8 ~ 468 V

P_{PPM} (10/1000 μs): 400 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Diodes-Automotive-Grade/ASMA-series.html

Learn more

ASMB series

V_R : 5.8 ~ 553 V

P_{PPM} (10/1000 μs): 600 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Automotive-Grade/ASMB-series.html

Learn more

ASMC series

V_R : 5.8 ~ 512 V

P_{PPM} (10/1000 μs): 1500 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Automotive-Grade/ASMC-series.html

Learn more

SM8SxxA series

V_R : 10 ~ 43 V

P_{PPM} (10/1000 μs): 6600 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Automotive-Grade/SM8SxxA-series.html

Learn more

SM8TxxA series

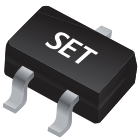
V_R : 20 ~ 43 V

P_{PPM} (10/1000 μs): 8000 W

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Automotive-Grade/SM8TxxA-series.html

Learn more

ESD TVS Diode Arrays (ESD TVS)



GSM24CCAN series

V_{RWM} : 24 V

C_J : 30 pF

Feature: IEC61000-4-2 (ESD) ± 30 kV (air),
± 30 kV (contact)

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/ESD-TVS-Diode-Arrays/GSM24CCAN-series.html

Learn more

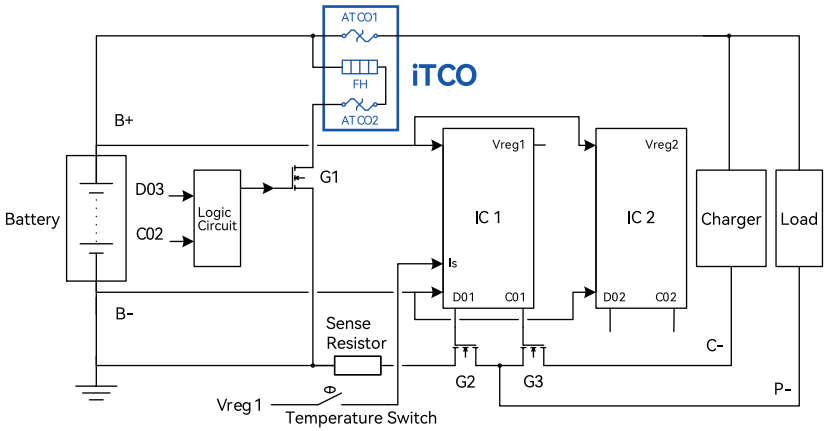
EV Electric Vehicles

5.4 Pre-charge Active Protection

Pre-charge bypass or failure poses significant risks: it shortens contactor lifespan through accelerated aging and can cause welding or sticking, alongside spark hazards during high-voltage connections. The root cause is unstable bus voltage from charging issues. Furthermore, ineffective BMS pre-charge management, coupled with electrical system abnormalities or improper vehicle usage, increases the likelihood of sparks and pre-charge failure during prolonged, frequent charging.

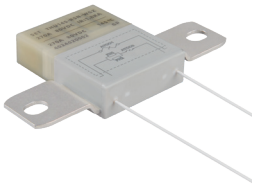
SETsafe | SETfuse Solution Products

Principle: Series connection of the iTCO product in the charge/discharge circuit enables voltage monitoring. Upon overvoltage detection, G2 and G3 are immediately disengaged, and G1 is activated to disable the control circuit. Concurrently, the FH signal initiates ATCO1 to open the charge / discharge circuit. Subsequently, ATCO2 is triggered for an additional control circuit disconnection, thereby providing redundant safety protection.



SETsafe | SETfuse Solution Products · idea Thermal CutOff (iTCO)

idea Thermal CutOff (iTCO)



THUxxx-R series

MC I_r : 200 / 270 A

MC U_r : 80 VDC

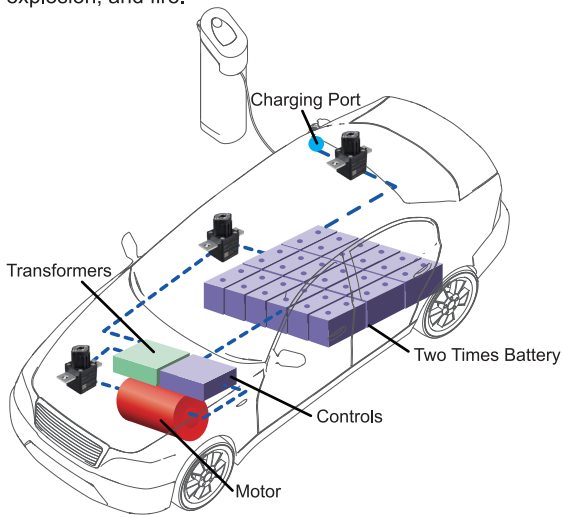
CC U_r : 12 / 24 / 36 / 48 / 72 VDC

T_1 : 145 ℃

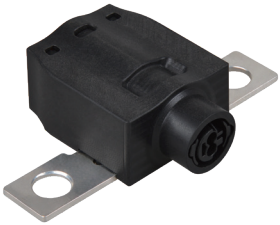
Learn more:
https://setsafe.com/Products/Active-Protection/idea-Thermal-CutOff-iTCO/THUxxx-R-series.html

Learn more

Principle: The PCO rapidly disconnects circuits, guarding the pre-charge circuit from instantaneous high short-circuit currents during faults. Upon an overcurrent or collision-induced high short-circuit, the EV control system signals the internal initiator, causing it to activate and swiftly disconnect the battery connection. This mitigates the risk of battery thermal runaway, explosion, and fire.



Pyro CutOff (PCO)



PHW series

Current Carrying Capacity: 250 A
Breaking Capacity: 150 V / 2.3 KA / 7 μH
Resistance (Ambient): Before Breaking ≤ 0.2 mΩ
After Breaking ≥ 100 MΩ / 1150 V
Generator Resistance: ≥ 1.7 Ω and ≤ 2.5 Ω
Generator Trigger Current: 1.75 A / 0.5 ms or 1.20 A / 2.0 ms
Generator Safety Current: ≤ 0.4 A
Generator Insulation Resistance 1 MΩ（500 VDC / 2 s)

Learn more

Learn more:
https://setsafe.com/Products/Active-Protection/Pyro-CutOff-PCO/PHW-series.html

PWX series

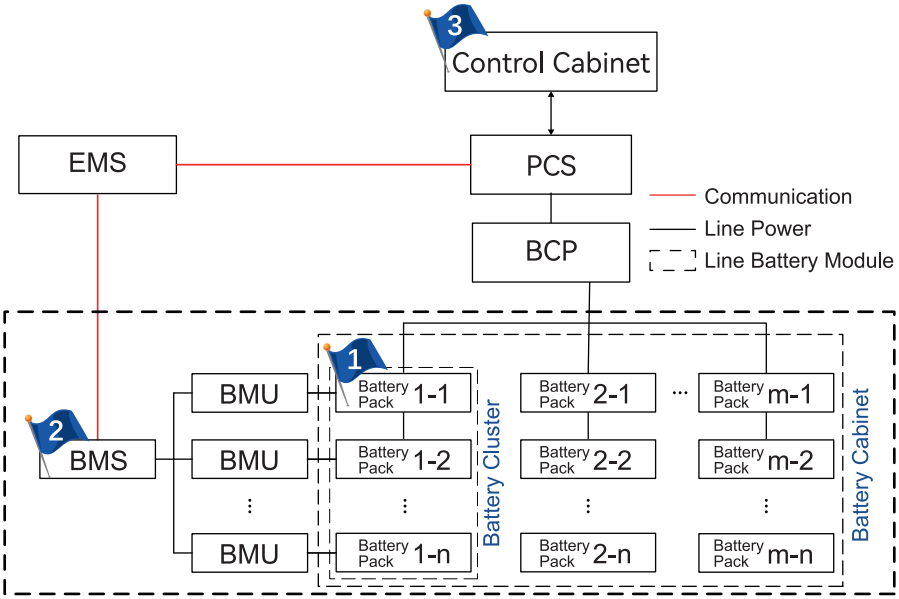
Current Carrying Capacity: 400 A
Breaking Capacity: 500 V / 16 kA / 20 μH
Resistance (Ambient): Before Breaking ≤ 0.2 mΩ
After Breaking ≥ 100 MΩ / 1500 V
Generator Resistance: ≥ 1.7 Ω / ≤ 2.5 Ω
Generator Trigger Current: 1.75 A / 0.5 ms or 1.20 A / 2.0 ms
Generator Safety Current: ≤ 0.4 A
Generator Insulation Resistance: 50 MΩ（500 VDC / 2 s)

Learn more

Learn more:
https://setsafe.com/Products/Active-Protection/Pyro-CutOff-PCO/PWX-series.html

SETsafe | SETfuse Products in Battery Energy Storage System (BESS) Safety Protection

Battery Energy Storage System Schematic Diagram



SETsafe | SETfuse Solution Products

1 Over Current Protection

1.1 Low Voltage Fuses (LV Fuses)

2 Active Protection

2.1 idea Thermal CutOff (iTCO)

3 Over Voltage Proteciton

3.1 Surge Protective Device (SPD)

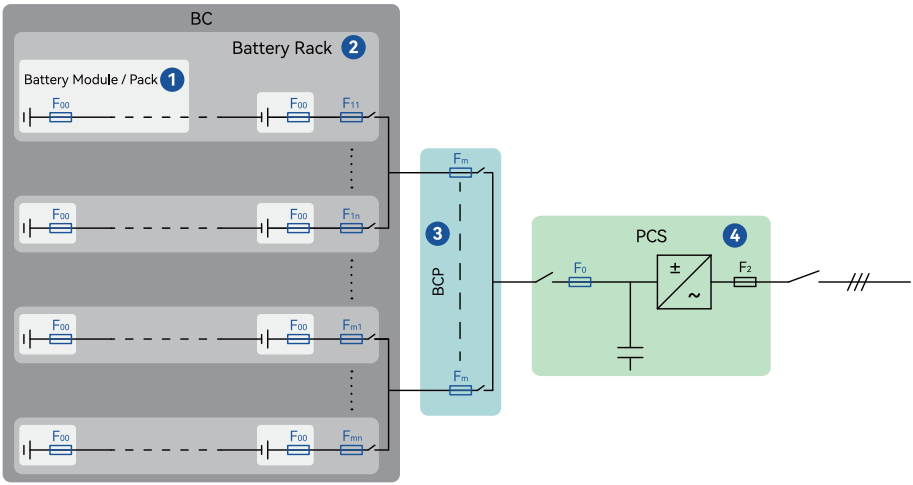
Battery Energy Storage System

6.1.1 Energy Storage System Battery Over Current Protection

Energy storage systems are prone to short circuits in modules, packs, combiner boxes,inverters and external circuits due to installation errors, operational malfunctions, or aging insulation. Such short-circuit currents can inflict mechanical and thermal damage on conductors, insulation, and system components. Therefore, integrating appropriately rated low-voltage fuses is essential to limit fault propagation and ensure overall system safety.

SETsafe | SETfuse Solution Products

Principle: Low-voltage fuses, appropriately rated, are installed at the output terminals of energy storage systems to safeguard against short-circuit currents. These currents, caused by mechanical/thermal faults or insulation failures in battery modules, packs, combiner boxes, or inverters, can damage conductors and insulation. The fuses effectively limit the fault's spread, thus ensuring overall system safety.



SETsafe | SETfuse Solution Products | · Low Voltage Fuses (LV Fuses)

1 Battery Module / Pack Over Current Protection: Low Voltage Fuses (LV Fuses)

LFR15XL1-xxxA-xx series

U_n : 1500 VDC
I_n : 100 ~ 450 A
I_1 : 50 kA
Utilization Category: aBat

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR15XL1-xxxA-xx-series.html

Learn more

LFR1-xxxA02-BB series

U_n : 250 VDC
I_n : 200 ~ 800 A
I_1 : 50 kA
Utilization Category: aBat

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR1-xxxA02-BB-series.html

Learn more

LFG35-xxxA02-BT series

U_n : 250 VDC
I_n : 100 ~ 600 A
I_1 : 50 kA
Utilization Category: aR

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFG35-xxxA02-BT-series.html

Learn more

LFR20S-xxxA-BT series

U_n : 150 VDC / 250 VAC
I_n : 32 ~ 250 A
I_1 : 50 kA @ 150 VDC / 100 kA @ 250 VAC
Utilization Category: aR & aBat

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR20S-xxxA-BT-series.html

Learn more

LFR15N-xxxA-BT series

U_n : 250 VDC
I_n : 32 ~ 180 A
I_1 : 50 kA
Utilization Category: aR & aBat

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR15N-xxxA-BT-series.html

Learn more

2 Battery Rack Over Current Protection: Low Voltage Fuses (LV Fuses)

LFR15XL3-xxxA-xx series

U_n : 1500 VDC
I_n : 400 ~ 630 A
I_1 : 250 kA
Utilization Category: aR & aBat

Learn more

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR15XL3-xxxA-xx-series.html

LFR15XL2-xxxA-xx series

U_n : 1500 VDC
I_n : 100 ~ 450 A
I_1 : 250 kA
Utilization Category: aR & aBat

Learn more

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR15XL2-xxxA-xx-series.html

LFR2-xxxA10-xx series

U_n : 1000 VDC
I_n : 630 ~ 800 A
I_1 : 50 kA
Utilization Category: aBat

Learn more

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR2-xxxA10-xx-series.html

LFR1-xxxA10-xx series

U_n : 1000 VDC
I_n : 400 ~ 630 A
I_1 : 50 kA
Utilization Category: aR

Learn more

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR1-xxxA10-xx-series.html

LFR01-xxxA10-xx series

U_n : 1000 VDC / 800 VDC
I_n : 50 ~ 450 A
I_1 : 50 kA
Utilization Category: aR

Learn more

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR01-xxxA10-xx-series.html

3 BCP & 4 PCS Over Current Protection: Low Voltage Fuses (LV Fuses)

LFR15XL4-xxxxA-FE series

U_n : 1500 VDC
I_n : 800 ~ 2000 A
I_1 : 250 kA
Utilization Category: aR

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR15XL4-xxxxA-FE-series.html

Learn more

LFR15XL5-xxxxA-FE series

U_n : 1500 VDC
I_n : 1800 ~ 3000 A
I_1 : 250 kA
Utilization Category: aR

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR15XL5-xxxxA-FE-series.html

Learn more

Battery Energy Storage System

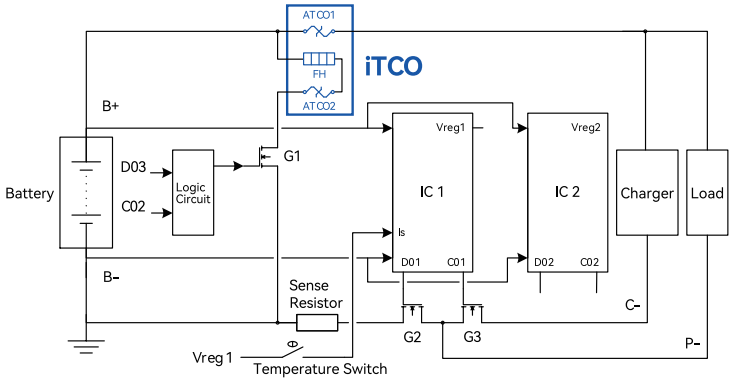
6.1.2 Energy Storage System Battery Over Charge Protection

If the thermal management of the battery energy storage system fails or the heat dissipation is poor, it may lead to uneven heat distribution within the battery modules, causing some cells to be overcharged. The monitoring and control system's imperfect judgment and untimely detection and handling of potential faults can lead to communication interruptions caused by protection system failures, making management control ineffective.

SETsafe | SETfuse Solution Products

Principle: The iTCO integrated into the battery pack's (module's) charge/discharge circuit offers dual overcharge protection.

1. Automatic Disconnection: In an overcurrent event, the iTCO's internal alloy melts from generated heat, breaking the circuit automatically;
2. BMS-Triggered Disconnection: Should the BMS detect an abnormal overcharge, it sends a signal to the iTCO. This energizes the iTCO's internal heater, quickly melting the alloy to actively disconnect the circuit, thereby providing robust external protection for the charge/discharge system.



SETsafe | SETfuse Solution Products | **· idea Thermal CutOff (iTCO)**

idea Thermal CutOff (iTCO)

TSW series

MC I_r : 250 A
MC U_r : 1250 VDC
CC U_r : 72 VDC
T_f : 145 ℃

More information please contact: sales@SETfuse.com

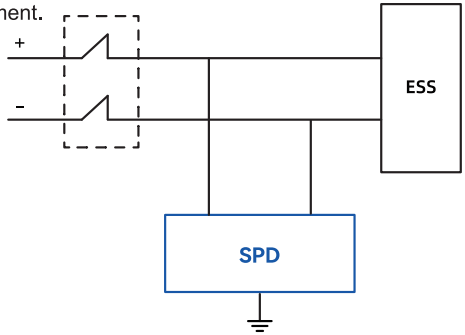
Battery Energy Storage System

6.1.3 Energy Storage System DC Input Surge Protection

The DC input voltage of energy storage systems is high. Once subjected to lightning strikes or switching surges, the resulting transient overvoltage is very likely to damage the input cables and equipment insulation, leading to system short circuits and fires.

SETsafe | SETfuse Solution Products

Principle: By installing surge protective device (SPD) at the DC input end of the energy storage system, the surge current caused by lightning strikes is discharged, clamping the voltage at the equipment's safe voltage level, protecting the energy storage system and other related equipment.



SETsafe | SETfuse Solution Products | **· Surge Protective Device (SPD)**

Surge Protective Device (SPD)

SD25TxxxL312PV series, T1+T2

U_{cpv} : 660 ~ 1500 VDC
I_{imp} (10 / 350 μs): 5.0 ~ 12.5 kA
I_n (8 / 20 μs): 25 kA
I_{max} (8 / 20 μs): 50 kA
Protection Mode: Y

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Surge-Protective-Device-SPD/SPD-for-PV-System/SD25TxxxL312PV-series.html

Learn more

SD20RxxxL312PV series, T2

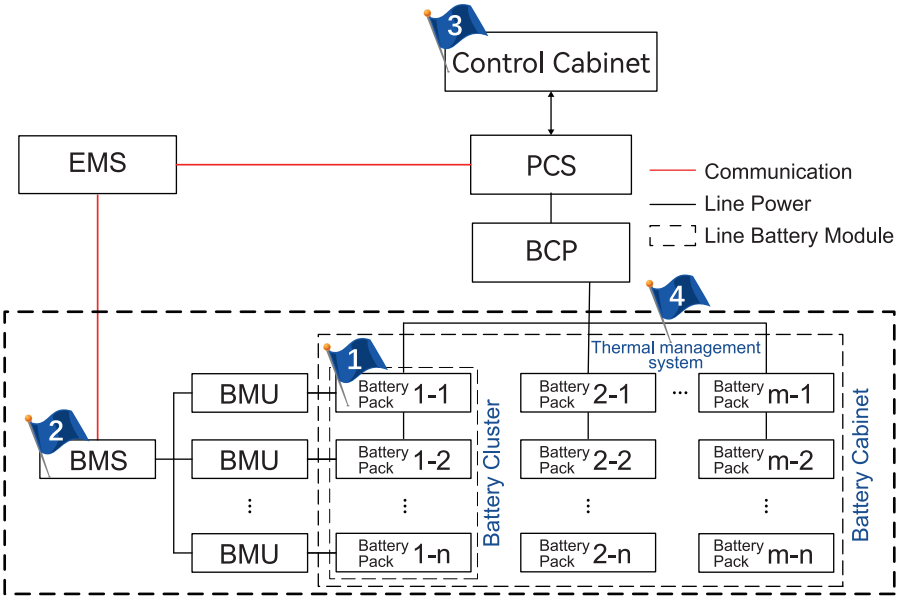
U_{cpv} : 1000 ~ 1500 VDC
I_n (8/20 μs): 20 kA
I_{max} (8/20 μs): 40 kA
Protection Mode: Y

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Surge-Protective-Device-SPD/SPD-for-PV-System/SD20RxxxL312PV-series.html

Learn more

SETsafe | SETfuse Products in Household and Mobile Energy Storage System Safety Protection

Battery Energy Storage System Schematic Diagram



SETsafe | SETfuse Solution Products

1 Over Current Protection

1.1 Miniature Fuses (Mini Fuses)

1.2 Low Voltage Fuses (LV Fuses)

2 Active Protection

2.1 Heat CutOff (HCO)

2.2 idea Thermal CutOff (iTCO)

3 Over Voltage Proteciton

3.1 Thermally Protected Varistors (TFMOV)

3.2 Thermal Fuse Varistor (TFV)

4 Over Temperature Protection

4.1 Direct Current Thermal-Link (DC-ATCO) - Alloy Type

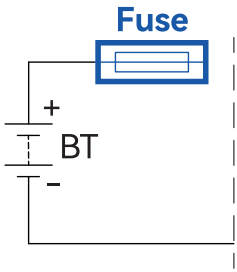
Battery Energy Storage System

6.2.1 Household and Mobile Energy Storage System Battery Over Current Protection

If the battery pack experiences an over-discharge or a short circuit occurs in the external circuit, it can cause the battery cell temperature to rise rapidly, and even lead to thermal runaway and fire. Installing fast-acting fuses at the output end of the battery pack can quickly cut off the circuit in the event of a battery pack short circuit, providing overcurrent protection and preventing battery pack thermal runaway.

SETsafe | SETfuse Solution Products

Principle: To prevent short-circuit currents from damaging the conductors or insulation of the battery energy storage system, causing mechanical or thermal faults, appropriately rated miniature fuses or chip fuses are installed at the output end of the battery pack for overcurrent protection, limiting the fault scope and ensuring system safety.



SETsafe | SETfuse Solution Products

- Miniature Fuses
- Low Voltage Fuses (LV Fuses)

Miniature Fuses

SCF1032 series

Body Materials: Ceramic
Characteristic: Fast Acting
I_n : 0.5 ~ 40 A
U_n : 125 ~ 250 VAC, 32 ~ 250 VDC
Dimensions: W3.2 × H3.2 × L10.3 mm

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Surface-Mount-Fuse-links-SMFL/SCF1032-series.html

Learn more

Miniature Fuses

SCF6125 series

Body Materials: Ceramic
Characteristic: Fast Acting
I_n : 0.5 ~ 20 A
U_n : 125 ~ 250 VAC, 24 ~ 125 VDC
Dimensions: W2.7 × H2.7 × L6.3 mm
Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Surface-Mount-Fuse-links-SMFL/SCF6125-series.html

Learn more

SCF61011 series

Body Materials: Ceramic
Characteristic: Fast Acting
I_n : 30 ~ 125 A
U_n : 24 ~ 125 VDC
Dimensions: W10.0 × H6.0 × L11.2 mm
Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Surface-Mount-Fuse-links-SMFL/SCF61011-series.html

Learn more

Low Voltage Fuses (LV Fuses)

LFR000-xxxA07-BT series

U_n : 750 VDC
I_n : 50 ~ 350 A
I_1 : 50 kA
Utilization Category: aBat
Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR000-xxxA07-BT-series.html

Learn more

LFR20MN-xxxA-BT series

U_n : 750 VDC
I_n : 32 ~ 200 A
I_1 : 50 kA
Utilization Category: aR & aBat
Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR20MN-xxxA-BT-series.html

Learn more

LFG35-xxxA02-BT series

U_n : 250 VDC
I_n : 100 ~ 600 A
I_1 : 50 kA
Utilization Category: aR
Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFG35-xxxA02-BT-series.html

Learn more

LFR20S-xxxA-BT series

U_n : 150 VDC / 250 VAC
I_n : 32 ~ 250 A
I_1 : 50 kA @ 150 VDC / 100 kA @ 250 VAC
Utilization Category: aR & aBat
Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR20S-xxxA-BT-series.html

Learn more

LFR15N-xxxA-BT series

U_n : 250 VDC
I_n : 32 ~ 180 A
I_1 : 50 kA
Utilization Category: aR & aBat
Learn more:
https://setsafe.com/Products/Over-Current-Protection/Low-Voltage-Fuses-LV-Fuses/LV-Fuses-for-Energy-Storage-System/LFR15N-xxxA-BT-series.html

Learn more

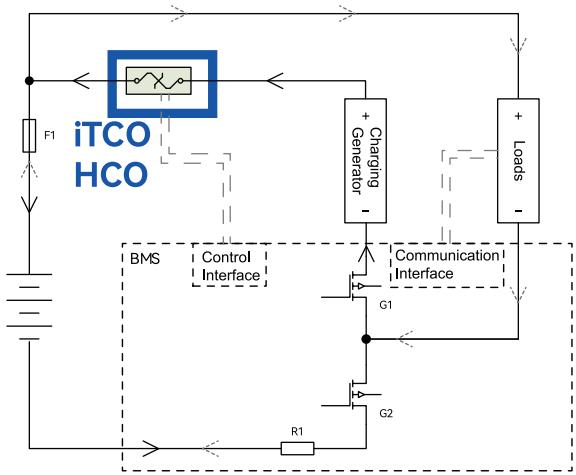
Battery Energy Storage System

6.2.2 Household and Mobile Energy Storage System Battery Overcharge Protection

Household and mobile energy storage safety is crucial. Internal short circuits, overcharging, thermal runaway, and other faults can easily lead to heat generation within the battery pack. Excessive heat can damage the battery structure, and thermal runaway can further cause rapid temperature increases, posing severe safety risks.

SETsafe | SETfuse Solution Products

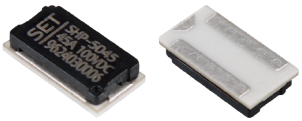
Principle: The Heat CutOff(HCO) / idea Thermal CutOff (iTCO), integrated into the charge/discharge circuit, delivers dual-layered over charge protection.
1. Automatic Cutoff: In an overcurrent event, the internal alloy of the thermal protector melts due to generated heat, automatically breaking the circuit and stopping current flow;
2. T BMS-Initiated Cutoff: In conjunction with the BMS, the thermal protector receives a trigger signal upon detecting an abnormal overcharge. Its internal heater energizes, rapidly melting the alloy to actively open the circuit, ensuring robust external protection for the charge/discharge system.



SETsafe | SETfuse Solution Products

- **Heat CutOff (HCO)**
- **idea Thermal CutOff (iTCO)**

Heat CutOff (HCO)

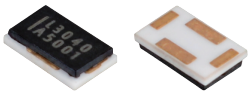


SHP series

I_r : 30 / 45 / 60 / 75 A
U_r : 100 VDC
Range of Operating Voltage: 4 ~ 92 VDC
Dimension: L9.5 x W5.0 x H1.9 mm

Learn more
https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHP-series.html

Learn more



SHL series

I_r : 12 / 15 / 30 / 40 A
U_r : 80 VDC
Range of Operating Voltage: 4 ~ 62 VDC
Dimension: L5.4 x W3.2 x H1.1 mm

Learn more
https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHL-series.html

Learn more

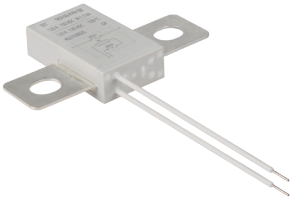
SHJ series

I_r : 12 / 15 / 22 / 30 A
U_r : 48 / 80 VDC
Range of Operating Voltage: 3 ~ 47 VDC
Dimension: L4.0 x W3.0 x H0.9 mm

Learn more:
https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SHJ-series.html

Learn more

idea Thermal CutOff (iTCO)

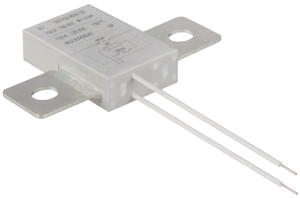


TKSxxx-R series

MC I_r : 120 A
MC U_r : 125 VDC
CC U_r : 12 / 24 / 36 / 48 / 72 / 96 VDC
T_f : 150 ℃

Learn more:
https://setsafe.com/Products/Active-Protection/idea-Thermal-CutOff-iTCO/TKSxxx-R-series.html

Learn more

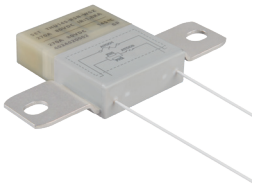


TKTxxx-R series

MC I_r : 150 A
MC U_r : 125 VDC
CC U_r : 12 / 24 / 36 / 48 / 60 / 72 / 96 VDC
T_f : 150 ℃

Learn more:
https://setsafe.com/Products/Active-Protection/idea-Thermal-CutOff-iTCO/TKTxxx-R-series.html

Learn more



THUxxx-R series

MC I_r : 200 / 270 A
MC U_r : 80 VDC
CC U_r : 12 / 24 / 36 / 48 / 72 VDC
T_f : 145 ℃

Learn more:
https://setsafe.com/Products/Active-Protection/idea-Thermal-CutOff-iTCO/THUxxx-R-series.html

Learn more

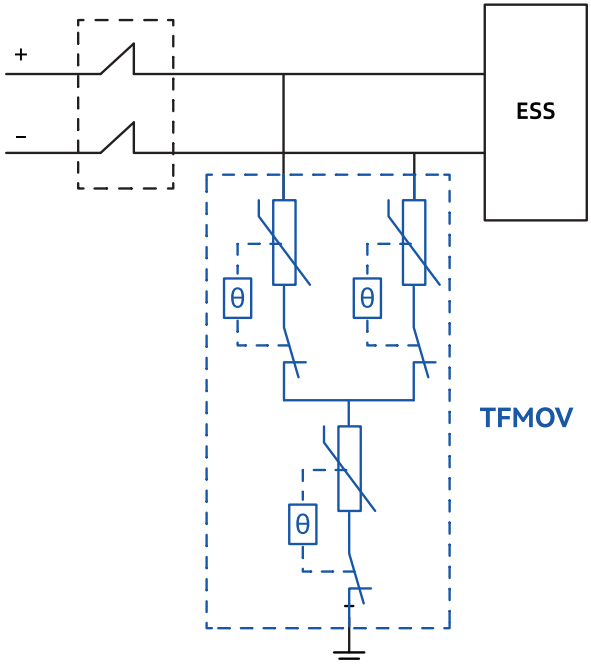
Battery Energy Storage System

6.2.3 Household and Mobile Energy Storage System DC Input Surge Protection

The DC input voltage of household and mobile energy storage systems is high. Once subjected to lightning strikes or switching surges, the resulting transient overvoltage is very likely to damage the input cables and equipment insulation, leading to system short circuits and fires.

SETsafe | SETfuse Solution Products

Principle: By installing surge protective devices at the DC input end of the household and mobile energy storage system, SET specifically recommends using board-mounted solutions to discharge surge currents caused by lightning strikes, clamping the voltage at the equipment's safe voltage level, ensuring the safe operation of the energy storage system and other related equipment.



SETsafe | SETfuse Solution Products

- Thermally Protected Varistors (TFMOV)
- Thermal Fuse Varistor (TFV)

Thermally Protected Varistors (TFMOV)

TFMOV10M series

U_C : 50 ~ 680 VAC
U_{cpv} : 500 ~ 880 VDC
I_n (8 / 20 μs): 10 kA
I_{max} (8 / 20 μs): 25 kA

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/TFV-and-TFMOV/Thermally-Protected-Varistors-TFMOV/TFMOV10M-series.html

Learn more

TFMOV20M series

U_C : 50 ~ 750 VAC
U_{cpv} : 500 ~ 1000 VDC
I_n (8 / 20 μs): 20 kA
I_{max} (8 / 20 μs): 40 kA

Learn more:
https://setsafe.com/Product/Over-Voltage-Protection/TFV-and-TFMOV/Thermally-Protected-Varistors-TFMOV/TFMOV20M-series.html

Learn more

TFMOV25M series

U_C : 385 ~ 680 VAC
U_{cpv} : 505 ~ 900 VDC
I_{imp} (10 / 350 μs): 6 ~ 7.5 kA
I_n (8 / 20 μs): 20 kA
I_{max} (8 / 20 μs): 40 kA

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/TFV-and-TFMOV/Thermally-Protected-Varistors-TFMOV/TFMOV25M-series.html

Learn more

Thermal Fuse Varistor (TFV)

TFV10S series

VAC : 50 ~ 510 V
I_{max} : 5 kA
UCT : 105 °C

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/TFV-and-TFMOV/Thermal-Fuse-Varistor-TFV/TFV10S-series.html

Learn more

TFV15S series

VAC : 50 ~ 510 V
I_{max} : 10 kA
UCT : 105 °C

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/TFV-and-TFMOV/Thermal-Fuse-Varistor-TFV/TFV15S-series.html

Learn more

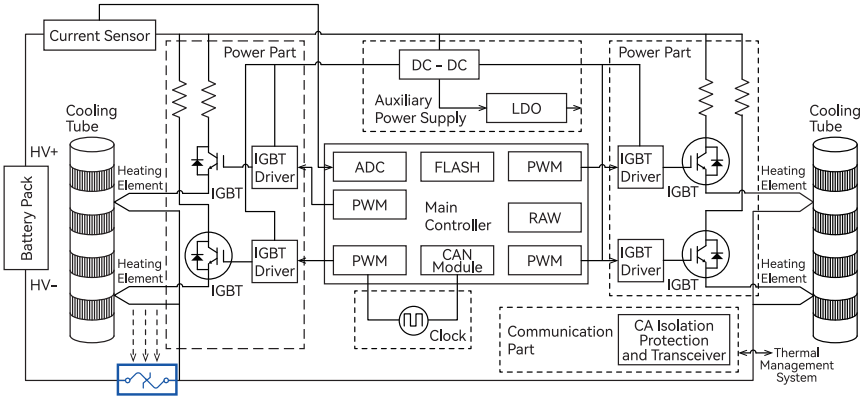
Battery Energy Storage System

6.2.4 Household and Mobile Energy Storage System Thermal Management Over Temperature Protection

Due to diverse operating temperatures, household and mobile energy storage systems can suffer localized overheating from poor thermal management, increasing internal short-circuit risk via insulation breakdown. To prevent this, temperature fuses are essential on battery cells or packs. In cases of thermal runaway or abnormal heating, these fuses rapidly melt and disconnect, interrupting current flow and halting thermal spread, ultimately guaranteeing safety.

SETsafe | SETfuse Solution Products

Principle: When the heating sheet reaches the fusing temperature of the thermal fuse, the fusible alloy of the thermal fuse shrinks and fuses rapidly under the action of the resin, resulting in a safe failure.



SETsafe | SETfuse Solution Products · **Direct Current Thermal-Link (DC-ATCO) - Alloy Type**

Direct Current Thermal-Link (DC-ATCO) - Alloy Type

U series

T_f : 76 ~ 221 ℃

I_r : 10 A

U_r : 250 VAC, 60 VDC

Body Dimensions: L=14.0 mm, ϕ=4.0 mm

Learn more:
https://setsafe.com/Products/Over-Temperature-Protection/Thermal-Link-ATCO-Alloy-Type/U-series.html

Learn more

Note

Products Links

Over Temperature Protection
https://setsafe.com/Products/Over-Temperature-Protection.html

Over Voltage Protection
https://setsafe.com/Products/Over-Voltage-Protection.html

Over Current Protection
https://setsafe.com/Products/Over-Current-Protection.html

Active Protection
https://setsafe.com/Products/Active-Protection.html

Products Datasheet Download Link

https://setsafe.com/Support/Datasheet-Download.html

SET safe | SET fuse

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