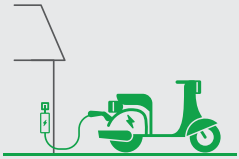
Battery Protection New Solution, Safety for Both People and Property

CPC
Circuit Protection Components

Rechargeable Battery Safety Protection

SETsafe | SETfuse Solution

EV



Light Electric Vehicle

Energy Storage Systems

2024

Providing a Total Solution for High Standard Safety Circuit Protection

SETsafe | SETfuse

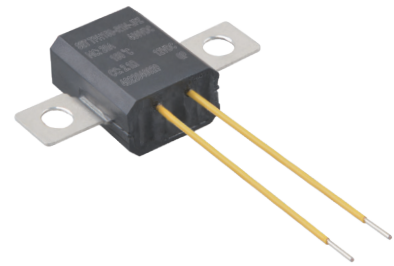
idea Thermal CutOff (iTCO)

UNIQUE

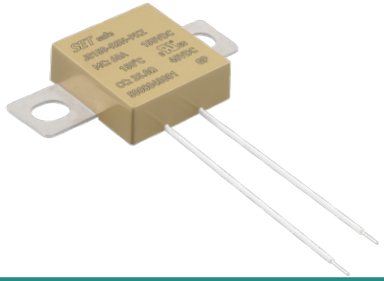
Function:

When the charge and discharge control element is short circuited, the idea Thermal CutOff (iTCO) can actively cut off the battery circuit to avoid continuous overcharging or over-discharging, to prevent battery short circuit.

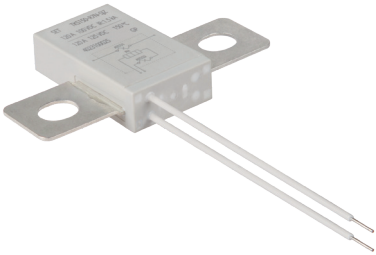
SETsafe | SETfuse's idea Thermal CutOff (iTCO) covers Rated Current (20 ~ 270) A, Rated Voltage (80 ~ 500) VDC, Rated Functioning Temp. (145 ~ 150) ℃, with UL, cUL, TUV Approvals and RoHS, REACH compliant.



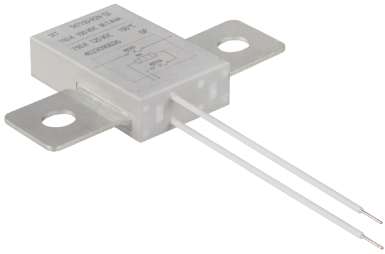
TPHxxx-R series



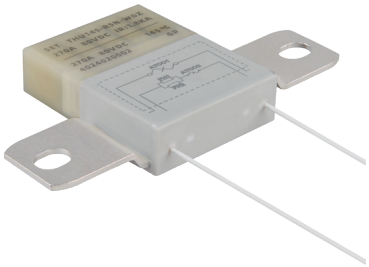
JSxxx-R series



TKSxxx-R series



TKTxxx-R series

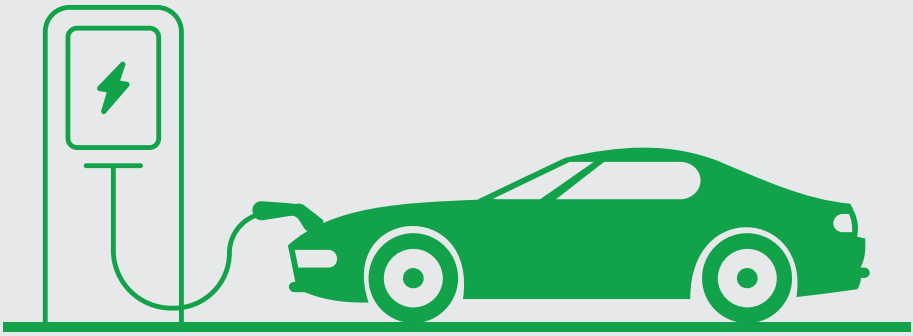


THUxxx-R series

EV Battery Protection SETsafe | SETfuse Solutions

Light Electric Vehicle Battery Protection SETsafe | SETfuse Solutions

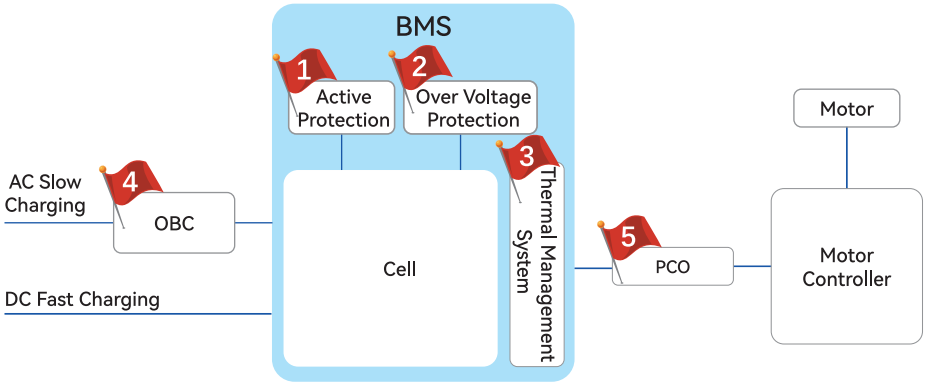
Energy Storage System Battery Protection SETsafe | SETfuse Solutions



EV Battery Protection
SETsafe | SETfuse Solutions

SETsafe | SETfuse Products Used in EV Battery Protection Safety Applications

EV Three-Electric Schematic Diagram



SETsafe | SETfuse Solution Products

1 Active Protection

1.1 idea Thermal CutOff (iTCO)

2 Over Voltage Proteciton

2.1 Transient Voltage Suppression (TVS Diodes)

3 Over Temperature Protection

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

4 Over Voltage Proteciton

4.1 Gas Discharge Tube (GDT) - DIP Type

4.2 Metal Oxide Varistor (MOV) - Standard Type

Over Current Protection

4.3 Miniature Fuses

5 Active Protection

5.1 Pyro CutOff (PCO)

EV Battery Management System (BMS) Active Protection

The battery safety of EV cannot be ignored, especially the battery fire accidents caused by short circuit and overcharge during battery charging seriously damage the personal safety and property safety of the car owner. The thermal cut-off protector iTCO developed by SETsafe | SETfuse can cooperate with the electric vehicle BMS system to trigger the action when the car has over current or overcharge, thus avoiding the fire and explosion of lithium batteries.

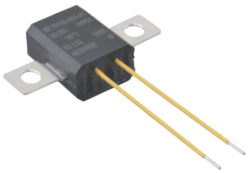
SETsafe | SETfuse Solution Products

Principle: Add an ideal Thermal cutoff (iTCO) 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, the thermal cutoff protector can be triggered to start the heater and cut off the circuit actively.

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

idea Thermal CutOff (iTCO)

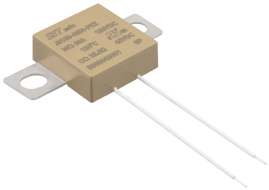


TPHxxx-R series

MC I_r : 20 A
MC U_r : 400 VDC
CC U_r : 12 / 24 / 36 / 48 VDC
T_f : 150 ℃

Learn more

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



JSxxx-R series

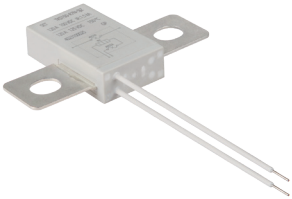
MC I_r : 60 A
MC U_r : 150 VDC
CC U_r : 12 / 24 / 36 / 48 / 72 VDC
T_f : 150 ℃

MC I_r : 100 A
MC U_r : 100 VDC
CC U_r : 12 / 24 / 36 / 48 / 72 VDC
T_f : 150 ℃

Learn more

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

idea Thermal CutOff (iTCO)

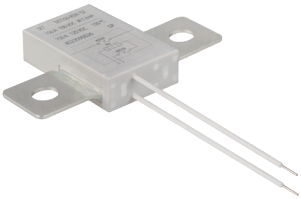


TKSxxx-R series

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

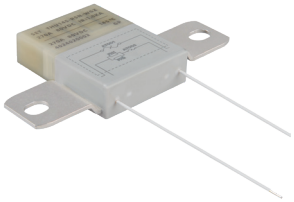


TKTxxx-R series

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

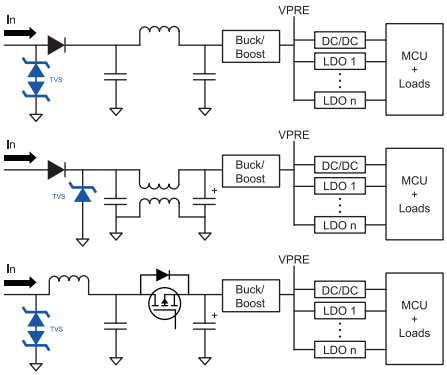
EV Battery Management System (BMS) Over Voltage Protection

According to the relevant requirements of ISO16750-2 "Environmental conditions and tests for electrical and electronic equipment of road vehicles Part 2: Electrical loads", on-board electronic products need to pass the load dump test. As one of the most core components of electric vehicles, the battery management system (BMS) may also be subjected to sudden surge voltages during operation. If there is no corresponding protection circuit in each module, when a load dump process or surge voltage event occurs, the power input module, detecting unit and communication unit are likely to be damaged by high voltage. In order to avoid the harm caused by this over voltage, corresponding TVS components can be installed in the battery management system (BMS) system for over voltage protection.

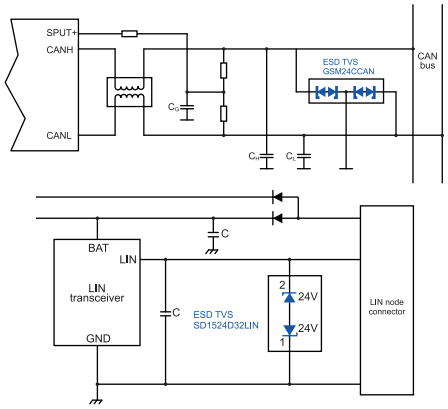
SETsafe | SETfuse Solution Products

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.

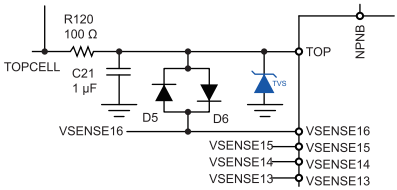
Example: over voltage protection for power ports of a BMS main control board



Example: ESD protection for a BMS signal port



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



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

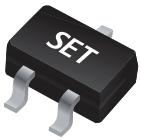
V_R : 20 ~ 43 V

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 Battery Liquid Cooling and Heating Device Overheat 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

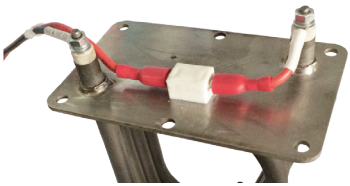
TGxxxC series

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

Real Application Picture

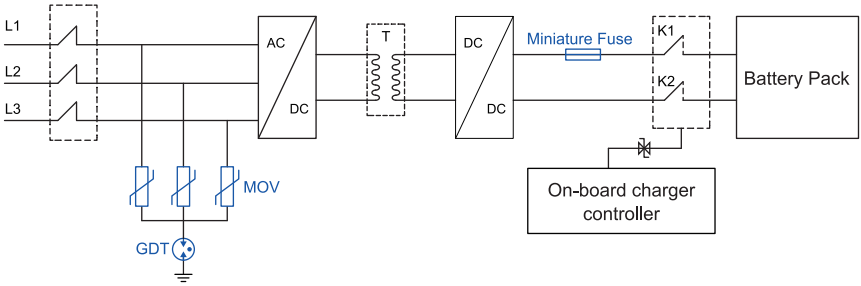


EV On-Board Charger Circuit Protection

In the technical field of EV electric vehicles, the on-board charger (OBC) plays a core role. It converts alternating current (AC) into direct current (DC) for battery charging. When the OBC receives grid power, MOV and GDT are required to eliminate electromagnetic interference and spike voltage from the grid, and the corresponding fuse needs to be connected to the output of the DC/DC to prevent overload between the OBC and the battery.

SETsafe | SETfuse Solution Products

Principle: MOV and GDT are used to absorb surge and inrush current, while Miniature Fuse is used to protect overload and short circuit for battery power output.



SETsafe | SETfuse Solution Products

- **Gas Discharge Tube (GDT) - DIP Type**
- **Metal Oxide Varistor (MOV) - Standard Type**
- **Miniature Fuses**

Gas Discharge Tube (GDT) - DIP Type

SF series

V_s : 70 ~ 4500 V
I_n (8/20 μs): 3 kA / 5 kA / 10 kA
Dimensions: Φ5.5 × 6.0 mm

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Gas-Discharge-Tube-GDT/DIP-Type/SF-series.html

Learn more

SE series

V_s : 70 ~ 4500 V
I_n (8/20 μs): 5 / 10 / 20 kA
Dimensions: Φ8.0 × 6.0 mm

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Gas-Discharge-Tube-GDT/DIP-Type/SE-series.html

Learn more

Metal Oxide Varistor (MOV) - Standard Type

SFV14D series

V_{ac} : 14 ~ 750 VAC
I_{max} : 2 ~ 6 kA
UCT : 105 °C

Learn more

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Metal-Oxide-Varistor-MOV-and-MOV-Disk/MOV-and-MOV-Disk-Standard-Type/SFV14D-series.html

SFV20D series

V_{ac} : 14 ~ 750 VAC
I_{max} : 3 ~ 10 kA
UCT : 105 °C

Learn more

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Metal-Oxide-Varistor-MOV-and-MOV-Disk/MOV-and-MOV-Disk-Standard-Type/SFV20D-series.html

SFV25D series

V_{ac} : 14 ~ 750 VAC
I_{max} : 3 ~ 20 kA
UCT : 85 °C

Learn more

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Metal-Oxide-Varistor-MOV-and-MOV-Disk/MOV-and-MOV-Disk-Standard-Type/SFV25D-series.html

Miniature Fuses

SCF632 & SCF632P series

Body Materials: Ceramic
I_n : 0.5 ~ 30 A
U_n : 250 ~ 600 VAC / VDC
Dimensions: Φ6.35 × 31.8 mm

Learn more

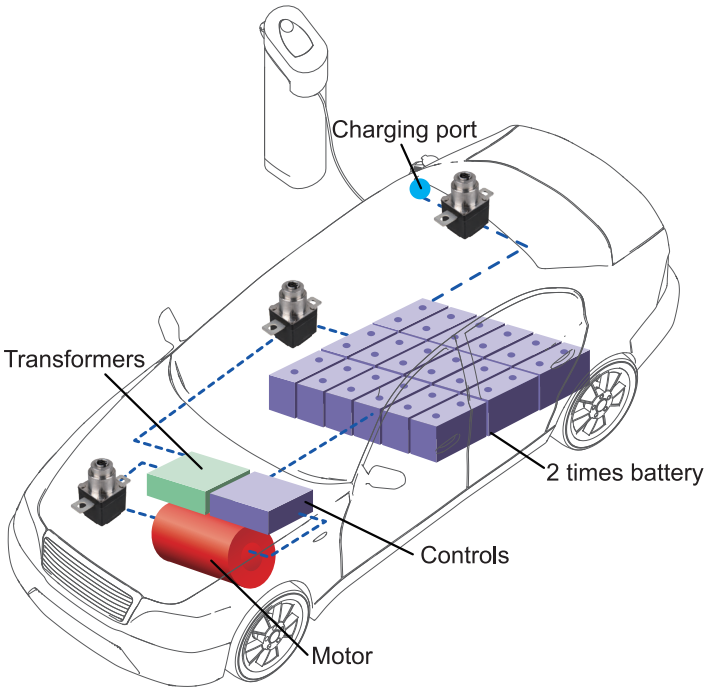
Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Cartridge-Fuse-links-CFL/SCF632-and-SCF632P-series.html

EV Sudden Collision Circuit Protection

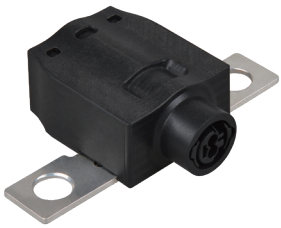
EVs are basically equipped with a sudden collision protection function, which is that when the car collides, the battery management system detects the collision signal greater than a certain threshold, and the disconnect device will cut off the electrical connection of the main circuit of the high-voltage system, so as to minimize the risk of short circuit and personnel electric shock caused by car collision. SETsafe | SETfuse's pyro cut-off device (PCO) receives an ignition signal and quickly blasts the circuit through an internal ignition device to disconnect the electrical connection of the high-voltage system.

SETsafe | SETfuse Solution Products

Principle: It has the function of quickly cutting off the circuit, which can effectively protect other high-value components in the same circuit from being damaged by excessive short-circuit current due to circuit failure, and the circuit fire caused by excessive temperature rise due to overload.



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

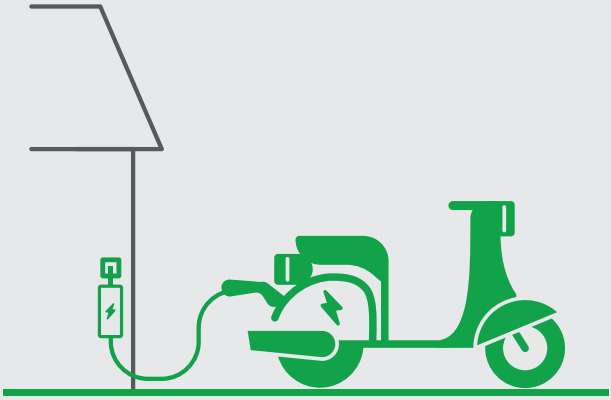
Learn more:
https://setsafe.com/Products/Active-Protection/Pyro-CutOff-PCO/PHW-series.html

PRX 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 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: 50 MΩ（500 VDC / 2 s)

Learn more

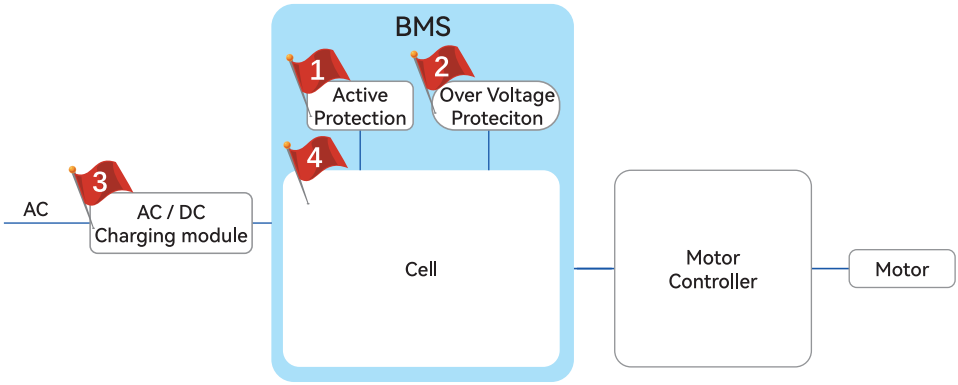
Learn more:
https://setsafe.com/Products/Active-Protection/Pyro-CutOff-PCO/PRX-series.html



Light Electric Vehicle Battery Protection SETsafe | SETfuse Solutions

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

Light Electric Vehicle Battery Drive Schematic



SETsafe | SETfuse Solution Products

1 Active Protection

- 1.1 Heat CutOff (HCO)
- 1.2 idea Thermal CutOff (iTCO)

2 Over Voltage Proteciton

- 2.1 Transient Voltage Suppression (TVS Diodes)
- 2.2 ESD TVS Diode Arrays (ESD TVS)

3 Over Voltage Proteciton

- 3.1 Gas Discharge Tube (GDT) – DIP Type
- 3.2 Metal Oxide Varistor (MOV) – Standard Type

Over Current Protection

- 3.3 Miniature Fuses

4 Over Temperature Protection

- 4.1 Thermal-Link (ATCO) – Alloy Type

Light Electric Vehicle 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 thermal cutoff protector ITCO 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

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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 Heat CutOff (HCO) / idea Theraml cutoff (iTCO), start the heater, and actively cut off the circuit.

SETsafe | SETfuse Solution Products

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

Heat CutOff (HCO)

SGP series

I_r : 30 / 45 A
U_r : 100 VDC
Range of Operating Voltage: 4 ~ 92 VDC

Learn more

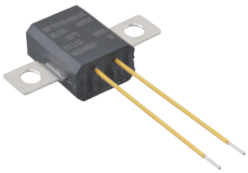
Learn more:
https://setsafe.com/Products/Active-Protection/Heat-Cutoff-HCO/SGP-series.html

SHP series

I_r : 30 / 45 / 60 / 75 A
U_r : 100 VDC
Range of Operating Voltage: 4 ~ 92 VDC

Learn more

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

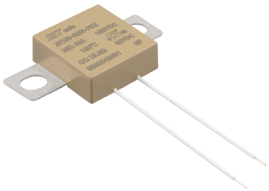


TPHxxx-R series

MC I_r : 20 A
MC U_r : 400 VDC
CC U_r : 12 / 24 / 36 / 48 VDC
T_f : 150 ℃

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

Learn more



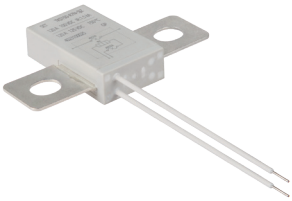
JSxxx-R series

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

MC I_r : 100 A
MC U_r : 100 VDC
CC U_r : 12 / 24 / 36 / 48 / 72 VDC
T_f : 150 ℃

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

Learn more

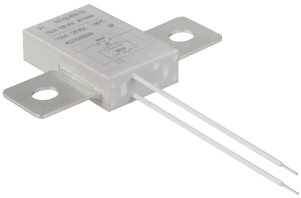


TKSxxx-R series

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

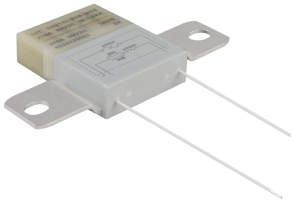


TKTxxx-R series

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

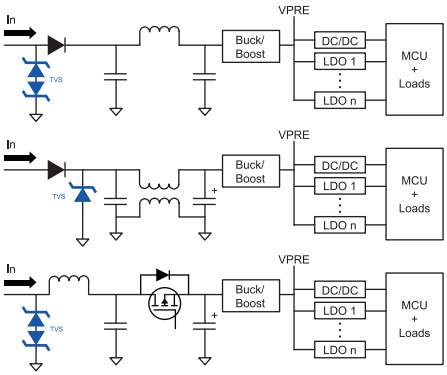
Light Electric Vehicle Battery Management System (BMS) Over Voltage Protection

According to the relevant requirements of ISO16750-2 "Environmental conditions and tests for electrical and electronic equipment of road vehicles Part 2: Electrical loads", on-board electronic products need to pass the load dump test. As one of the core components of electric vehicles, the battery management system (BMS) may also be subjected to sudden surge voltages during operation. If there is no corresponding protection circuit in each module unit, when a load dump process or surge voltage event occurs, the power input module, detecting unit and communication unit are likely to be damaged by high voltage. In order to avoid the harm caused by this over voltage, corresponding TVS components can be installed in the battery management system (BMS) system for over voltage protection.

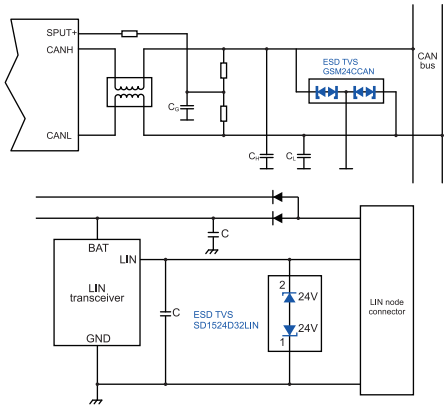
SETsafe | SETfuse Solution Products

Principle: When the circuit woeks 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.

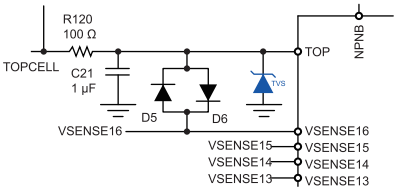
Example: over voltage protection for power ports of a BMS main control board



Example: ESD protection for a BMS signal port



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



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

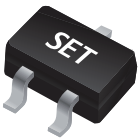
V_R : 20 ~ 43 V

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

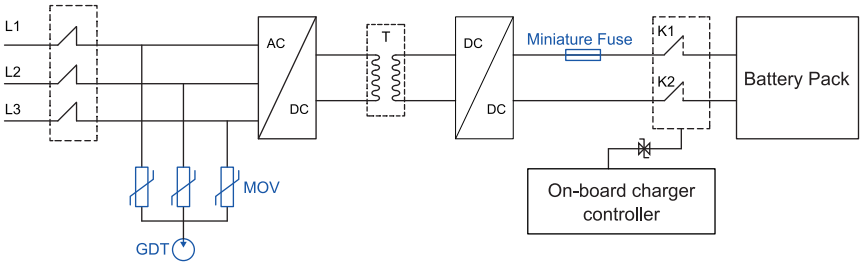
Learn more

Light Electric Vehicle Charging Module Circuit Protection

In recent years, there have been frequent fire incidents during charging of light electric vehicles. The main reason is that overcharging or power shortage or big current discharge caused during charging damage the battery and the circuits and cause fires. Therefore, overvoltage and overcurrent protection are necessary for the charging module.

SETsafe | SETfuse Solution Products

Principle: MOV and GDT are used to absorb surge and inrush current, while Miniature Fuse is used to protect overload and short circuit for battery power output.



SETsafe | SETfuse Solution Products

- Gas Discharge Tube (GDT) – DIP Type
- Metal Oxide Varistor (MOV) – Standard Type
- Miniature Fuses

Gas Discharge Tube (GDT) - DIP Type

SF series

V_s : 70 ~ 4500 V
I_n (8/20 μs): 3 kA / 5 kA / 10 kA
Dimensions: Φ5.5 × 6.0 mm

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Gas-Discharge-Tube-GDT/DIP-Type/SF-series.html

Learn more

SE series

V_s : 70 ~ 4500 V
I_n (8/20 μs): 5 / 10 / 20 kA
Dimensions: Φ8.0 × 6.0 mm

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Gas-Discharge-Tube-GDT/DIP-Type/SE-series.html

Learn more

Metal Oxide Varistor (MOV) - Standard Type

SFV14D series

V_{ac} : 14 ~ 750 VAC
I_{max} : 2 ~ 6 kA
UCT : 105 °C

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Metal-Oxide-Varistor-MOV-and-MOV-Disk/MOV-and-MOV-Disk-Standard-Type/SFV14D-series.html

Learn more

SFV20D series

V_{ac} : 14 ~ 750 VAC
I_{max} : 3 ~ 10 kA
UCT : 105 °C

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Metal-Oxide-Varistor-MOV-and-MOV-Disk/MOV-and-MOV-Disk-Standard-Type/SFV20D-series.html

Learn more

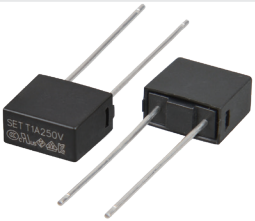
SFV25D series

V_{ac} : 14 ~ 750 VAC
I_{max} : 3 ~ 20 kA
UCT : 85 °C

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Metal-Oxide-Varistor-MOV-and-MOV-Disk/MOV-and-MOV-Disk-Standard-Type/SFV25D-series.html

Learn more

Miniature Fuses



SPT478 series

Body Materials: Plastic
Characteristic: Time-Lag
I_n : 0.1 ~ 20 A
U_n : 125 ~ 400 VAC
Dimensions: W4 × H7 × L8 mm

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Sub-miniature-Fuse-links-SFL/SPT478-series.html

Learn more

SCT520 & SCT520P series

Body Materials: Ceramic
Characteristic: Time-Lag
I_n : 0.4 ~ 30 A
U_n : 125 ~ 500 VAC / VDC
Dimensions: Φ5 × 20 mm

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Cartridge-Fuse-links-CFL/SCT520-SCT520P-series.html

Learn more

SCF632 & SCF632P series

Body Materials: Ceramic
I_n : 0.5 ~ 30 A
U_n : 250 ~ 600 VAC / VDC
Dimensions: Φ6.35 × 31.8 mm

Learn more:
https://setsafe.com/Products/Over-Current-Protection/Miniature-Fuses/Cartridge-Fuse-links-CFL/SCF632-and-SCF632P-series.html

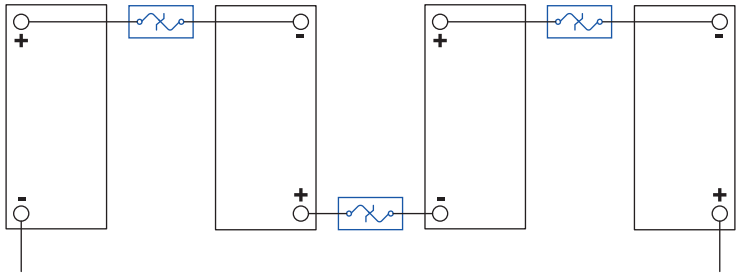
Learn more

Light Electric Vehicle Lead-acid Battery Over Temperature Protection

When the lead-acid battery of a light electric vehicle is fast charged, if the charging voltage is too high and the charging current is also large, the heat generated will increase the battery electrolyte temperature, causing the battery internal resistance to decrease; the decrease in internal resistance will increase the charging current. The battery temperature rise and excessive current will reinforce each other and eventually become uncontrollable, causing the battery to deform, crack and fail, resulting in a higher temperature rise, shortening the battery life, and in severe cases, causing a fire. Therefore, it is necessary to connect a SETsafe | SETfuse thermal fuse in series at one pole to increase the battery life and prevent the risk of fire.

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

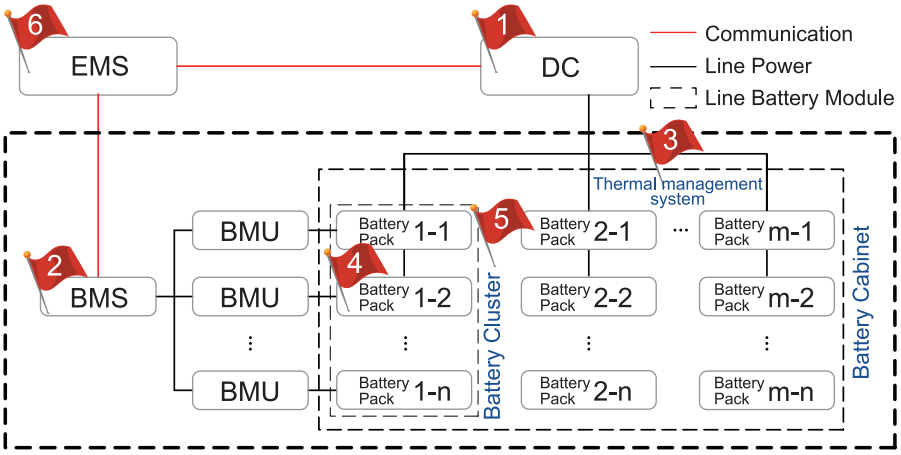
T_f : 76 ~ 150 ℃
I_r : 50 A
U_r : 120 VDC

More information please contact: sales@SETfuse.com

Energy Storage System
Battery Protection
SETsafe | SETfuse Solutions

SETsafe | SETfuse Products in Energy Storage Battery System Protection Safety Applications

Energy Storage Battery System Schematic Diagram



SETsafe | SETfuse Solution Products

1

Over Voltage Proteciton

1.1 Thermally Protected Varistors (TFMOV)

1.2 Surge Protective Device (SPD) for PV System

2

Over Voltage Proteciton

2.1 Transient Voltage Suppression (TVS Diodes)

Over Current Protection

2.2 Miniature Fuses

Active Protection

2.3 idea Thermal CutOff (iTCO)

3

Over Temperature Protection

3.1 Thermal-Link (ATCO) - Alloy Type

4

Over Current Protection

4.1 Low Voltage Fuses (LV Fuses)

Over Temperature Protection

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

5

Over Current Protection

5.1 Low Voltage Fuses (LV Fuses)

6

Over Voltage Proteciton

6.1 Transient Voltage Suppression (TVS Diodes)

6.2 ESD TVS Diode Arrays (ESD TVS)

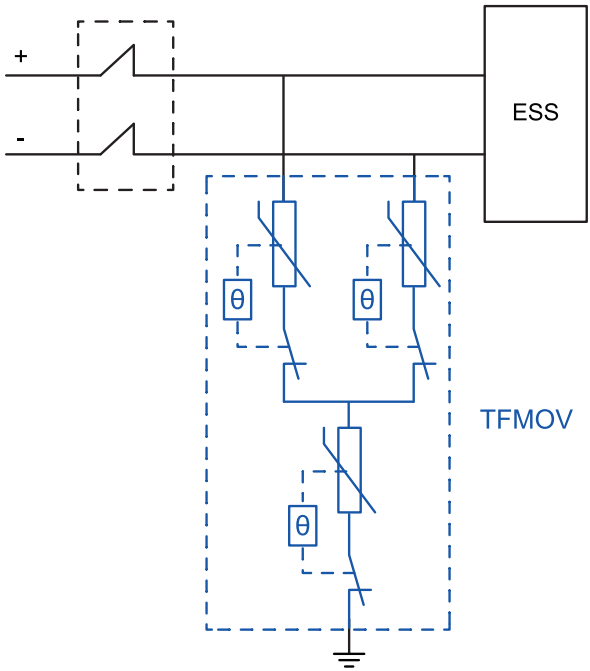
6.3 Gas Discharge Tube (GDT) - SMD Type

Energy Storage Battery System Power Input Over Voltage Protection

The DC voltage input from the energy storage system to the battery is very high. Once it is hit by a lightning surge or an abnormal system surge, it is very likely to cause insulation breakdown of the transmission lines and equipment, causing a system short circuit and a fire.

SETsafe | SETfuse Solution Products

Principle: Install a surge protector at the energy storage power input port to discharge the surge current caused by lightning strikes, lower the voltage to a safe voltage, and protect the safe operation of the lines and other equipment.



SETsafe | SETfuse Solution Products

- Thermally Protected Varistors (TFMOV)
- Surge Protective Device (SPD)

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

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

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

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

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

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

Surge Protective Device (SPD) for PV System

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

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

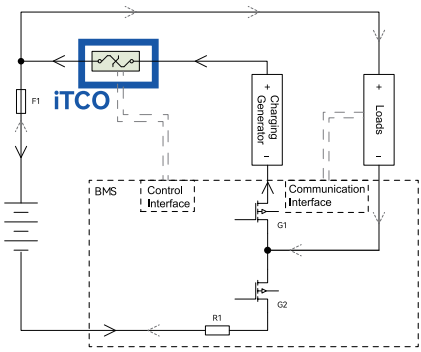
Energy Storage Battery Management System (BMS) Active Protection

In the charge/discharge circuit of the lithium battery pack, there is a risk of IGBT/MOS failure, which makes the circuit unable to be shut down, resulting in overcharge or over-discharge of the lithium battery, causing further damage to the lithium battery pack.

SETsafe | SETfuse Solution Products

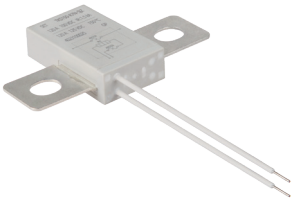
Principle: Add an idea Thermal Cutoff (iTCO) in the charge / discharge circuit for secondary protection:

1. When overcurrent occurs, the internal alloy heats up and melts, cutting off the circuit;
2. In conjunction with BMS detecting information, the thermal cutoff protector can be triggered to start the heater and actively cut off the circuit.



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

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

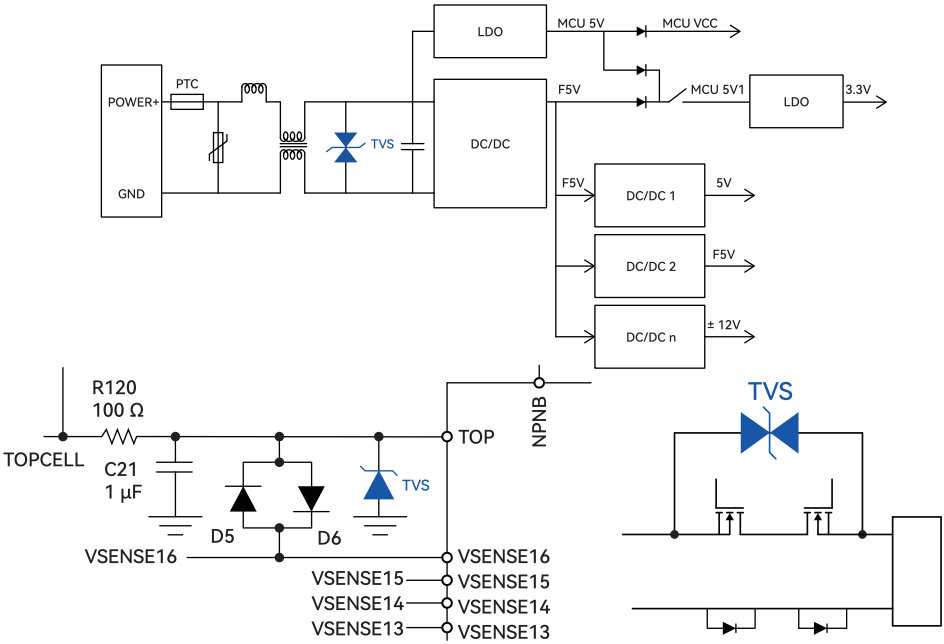
Learn more:
https://setsafe.com/Products/Active-Protection/idea-Thermal-CutOff-iTCO/TKSxxx-R-series.html

Energy Storage Battery Management System (BMS) Over Voltage Protection

The battery management system (BMS) may be subjected to sudden surge voltage during operation, which may cause its power input module, detecting unit and communication unit to be damaged by high voltage. In order to avoid the harm caused by this overvoltage, corresponding TVS components can be installed in the BMS system for overvoltage protection.In the battery management system (BMS) charging and discharging circuit, the sudden change of the switching instant current generates a drain spike voltage, which in turn damages the MOS tube. The faster the power switches, the higher the overvoltage generated. In order to prevent the MOS tube from being damaged, a high-power TVS tube will be added between the DS. At the same time, adding a low-power TVS tube between the GS can eliminate the overvoltage damage to the gate (also known as the gate) caused by the Miller capacitance effect.

SETsafe | SETfuse Solution Products

Principle: Utilizing the fast response and low clamping voltage characteristics of TVS diodes, it is activated when the circuit is affected by various surge events to provide precise overvoltage protection for sensitive components in the load.



SETsafe | SETfuse Solution Products · Transient Voltage Suppression (TVS Diodes) - Standard Type

Transient Voltage Suppression (TVS Diodes) – Standard Type

SMBJ series

V_R : 5.0 ~ 440 V

P_{PPM} (10 / 1000 μs): 600 W

Learn more

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

SMCJ series

V_R : 5 ~ 440 V

P_{PPM} (10 / 1000 μs): 1500 W

Learn more

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

SMDJ series

V_R : 5 ~ 440 V

P_{PPM} (10 / 1000 μs): 3000 W

Learn more

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

5.0SMDJ series

V_R : 12 ~ 170 V

P_{PPM} (10 / 1000 μs): 5000 W

Learn more

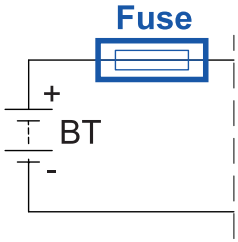
Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Transient-Voltage-Suppression-Diodes-TVS/TVS-Standard-Type/5.0SMDJ-series.html

Energy Storage Battery Management System (BMS) Over Current Protection

If a short circuit occurs during the discharge process of the battery pack, the battery pack will heat up rapidly, or even burn and cause a fire. A fast-blow fuse is set at the output end of the battery pack to protect the battery pack from short circuits, which can quickly cut off the circuit and prevent the battery from burning.

SETsafe | SETfuse Solution Products

Principle: When the current passing through the fuse is greater than the fusing current of the fuse, the special fuse element in the fuse melts and disconnects, and the greater the overload current, the faster the disconnection speed, thereby achieving effective cutting off and protecting the circuit.



SETsafe | SETfuse Solution Products · **Miniature 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

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/1821.html.html

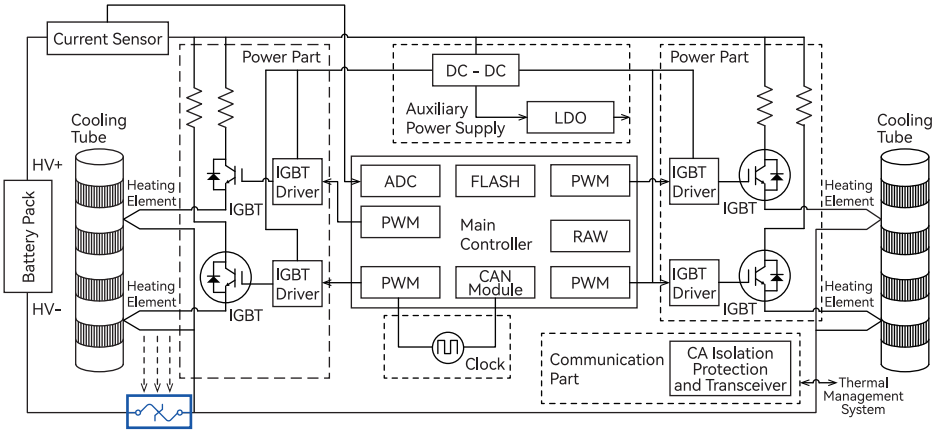
Learn more

Energy Storage Battery Thermal Management System Over Temperature Protection

When the home energy storage system is running at low temperatures, the battery will have a shortened life (capacity decay) and weaken (performance decay). If it is charged at this time, it will also have the hidden danger of sudden death (internal short circuit caused by lithium precipitation has the risk of causing thermal runaway), so the battery needs to be heated. When the battery heating system or the battery itself has thermal runaway, by connecting a thermal fuse in series with the battery silicone heating plate, when the melting temperature of the thermal fuse is reached, the fusible alloy of the thermal fuse melts, resulting in safety failure.

SETsafe | SETfuse Solution Products

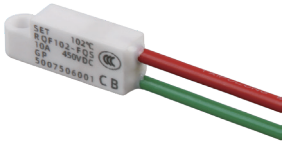
Principle: When the heating sheet reaches the fusing temperature of the thermal fuse, the fusible alloy of the thermal fuse shrinks and fuses rapidly under the action of the resin, resulting in a safe failure.



DC-ATCO

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

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



RQF series

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

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

Learn more

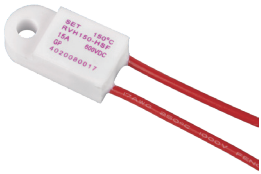
Direct Current Thermal-Link (DC-ATCO) - Alloy Type

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

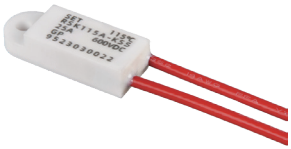


RVH series

T_f : 102 ~ 187 ℃
I_r : 15 A
U_r : 600 VDC
I_{min} : 0.5 A

Learn more

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

TGxxxC series

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

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

ARL series

T_f : 86 ~ 187 ℃
I_r : 30 A
U_r : 500 VDC

Learn more

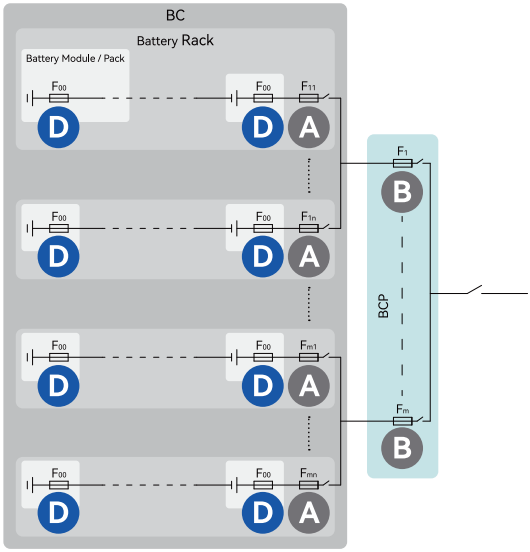
Learn more:
https://www.setsafe.cn/Products/Over-Temperature-Protection/Direct-Current-Thermal-Link-DC-ATCO-Alloy-Type/ARL-series.html

Energy Storage Battery Module / Pack Over Current Protection

During the installation, or long-term operation of the energy storage system, operating errors or insulation aging may cause external short-circuit failures in the battery pack (PACK), causing each battery pack to output a large short-circuit current. In order to prevent the short-circuit current from causing mechanical or thermal damage to the battery modules, conductors or insulation systems in the system, a suitable DC fuse is built into the output end of the battery pack for protection, limiting the scope of the accident and protecting the system safety.

SETsafe | SETfuse Solution Products

Principle: To prevent short-circuit current from causing mechanical or thermal damage to the battery modules, conductors or insulation systems in the system, a suitable DC fuse is built into the output end of the battery pack for protection, limiting the scope of the accident and protecting the system safety.



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

LFR15XL1 series

U_n : 1500 VDC
I_n : 100 ~ 450 A
I_1 : 50 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/LFR15XL1-series.html

LFR1-xxxA02-BT series

U_n : 250 VDC
I_n : 200 ~ 800 A
I_1 : 50 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/LFR1-xxxA02-BT-series.html

LFG35-xxxA02-BT series

U_n : 250 VDC
I_n : 50 ~ 600 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/LFG35-xxxA02-BT-series.html

Energy Storage Battery Connection Copper Busbar Over Temperature Protection

On a copper busbar with a narrow path, since the melting point of copper is as high as over 1000 degrees Celsius, when an over current occurs and the current value is not enough to melt the copper busbar, the narrow path of the copper busbar will have an excessive temperature rise phenomenon. Long-term overheating will cause reactions inside the battery, affecting battery safety.

SETsafe | SETfuse Solution Products

Principle: A Direct Current Thermal-Link (DC-ATCO) - Alloy Type is used as an electrical connection point at the parallel connection point of the battery cells. When overcurrent occurs, the Direct Current Thermal-Link (DC-ATCO) - Alloy Type can heat up and melt itself, meeting the UN38.3 lithium battery transportation requirements. When somewhere overheating occurs, the heat is transferred to the Direct Current Thermal-Link (DC-ATCO) - Alloy Type, which can passively cut off the connection point.

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

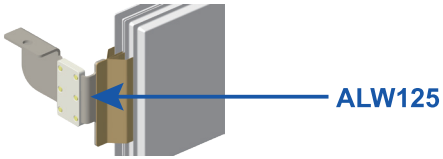
Direct Current Thermal-Link (DC-ATCO) - Alloy Type

ALW125 series

T_f : 125 ~ 187 ℃
I_r : 300 A
U_r : 100 VDC
T_h : 60 ~ 135 ℃
T_m : 200 ℃

More information please contact: sales@SETfuse.com

Real Application Picture

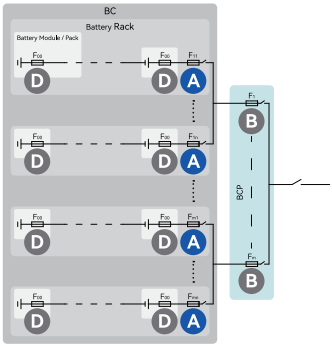


Energy Storage Battery Cluster Over Current Protection

During the installation, or operation of the energy storage system, operational errors or device aging may cause short-circuit faults between the poles of the battery cluster, causing each battery cluster to output a large short-circuit current. In order to prevent the short circuit current from causing mechanical or thermal damage to the battery modules, conductors or insulation systems in the system, suitable DC fuse protection is set in the built-in switch box of the battery cluster to limit the scope of the accident and protect the safety of the system.

SETsafe | SETfuse Solution Products

Principle: To prevent short-circuit current from causing mechanical or thermal damage to the battery modules, conductors or insulation systems in the system, a suitable DC fuse is built into the output end of the battery pack for protection, limiting the scope of the accident and protecting the system safety.



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

Low Voltage Fuses (LV Fuses)

LFR15XL2 series

U_n : 1500 VDC
I_n : 100 ~ 450 A
I_1 : 250 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/LFR15XL2-series.html

Learn more

LFR15XL3 series

U_n : 1500 VDC
I_n : 400 ~ 630 A
I_1 : 250 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/LFR15XL3-series.html

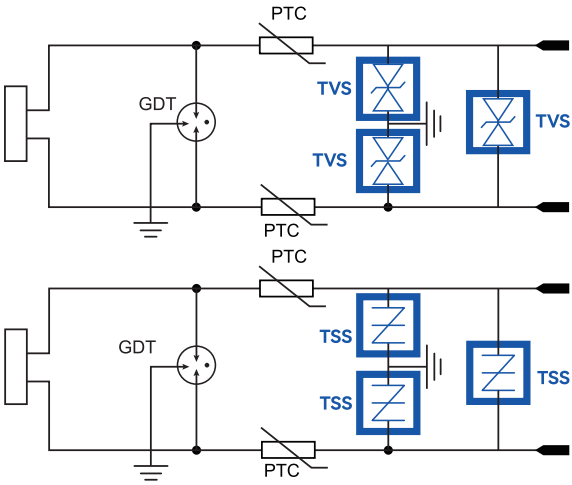
Learn more

EMC Protection for Energy Storage EMS

The energy storage EMS system collects all monitored operating parameters and status in real time and at regular intervals, processes important historical data and stores them in a database. The communication port has RS485 or Ethernet to communicate between the device and a computer or other device. In product applications, its wiring is often mixed with power supplies, power signals, etc. Due to EMC interference, the transmission of the energy storage EMS system and the authenticity of the data are affected to a certain extent. In order to eliminate the hidden dangers of energy storage EMS, relevant interference suppression and anti-sensitivity designs are required.

SETsafe | SETfuse Solution Products

Principle: According to the IEC61000-4-5 or GB17626.5 standard, the surge protection test requirements of 6 kV for common mode and 2 kV for differential mode, GDT is a three-terminal gas discharge tube that locates in the first-level protection circuit, which is used to suppress the common-mode and differential-mode surge interference on the line, and prevent the interference from affecting the next-level circuit through the signal line. The second-level protection uses TVS diodes or TSS semiconductor discharge tubes to further reduce the surge interference introduced by the front section, so as to achieve the purpose of precise protection. PTC is a thermistor that acts as a decoupling component to ensure that the gas discharge tube can be smoothly turned on, discharge a large amountof energy, so as to ensure that most of the energy flows into the ground through the gas discharge tube, and then protect the subsequent circuit.



SETsafe | SETfuse Solution Products

- Transient Voltage Suppression (TVS Diodes)
- Thyristor Surge Suppressors (TSS)

Transient Voltage Suppression (TVS Diodes)

SMCJ series

V_R : 5 ~ 440 V

P_{PPM} (10 / 1000 μs): 1500 W

Learn more

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

SMDJ series

V_R : 5 ~ 440 V

P_{PPM} (10 / 1000 μs): 3000 W

Learn more

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

Thyristor Surge Suppressors (TSS)

SP0080TBLC series

V_{DRM} : 6 V

C_J : 30 pF

Surge Rating: 4 kV @ 10/700 μs

I_{PP} (10/1000 μs): 80 A

Learn more

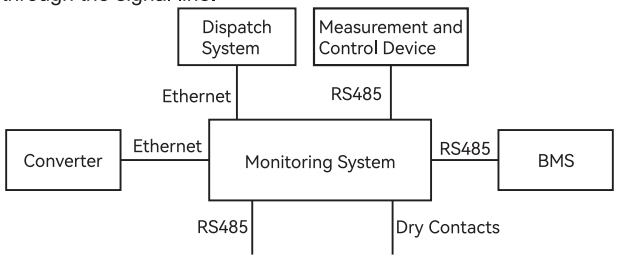
Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Thyristor-Surge-Suppressors-TSS/SP0080TBLC-series.html

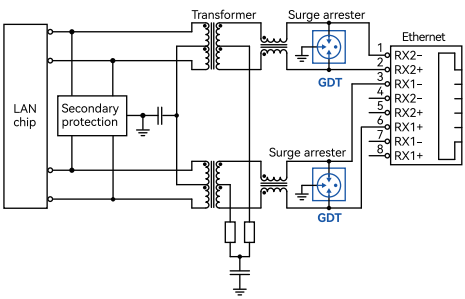
EMC Protection for Energy Storage EMS

The energy storage system connects the bidirectional energy storage inverter, battery management system (BMS), dynamic environment monitoring equipment, fire protection system, air conditioning or access control system to the monitoring system to ensure that the master station system can quickly and accurately obtain all monitoring information, and promptly feedback system anomalies and faults detected by the network to ensure rapid positioning and recovery.

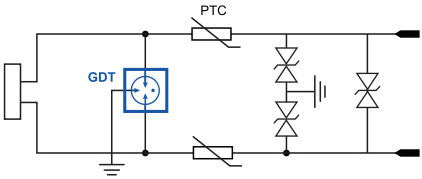
SETsafe | SETfuse Solution Products

Principle: RS485 or Ethernet is used in the communication port to communicate with computers or other devices. In product applications, the wiring is often mixed with power supply, power signals, etc. Due to EMC interference, it has a certain impact on the transmission of the system and the authenticity of the data. In order to reduce EMC risks, relevant interference suppression and anti-sensitivity designs are required. According to the common mode and differential mode lightning protection test requirements, GDT is the first-level protection circuit, which is used to suppress common mode and differential mode surge interference on the line to prevent interference from affecting the next level circuit through the signal line.





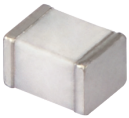
Ethernet schematic diagram



RS485 schematic diagram

SETsafe | SETfuse Solution Products | **· Gas Discharge Tube (GDT)**

Gas Discharge Tube (GDT)



SX series

V_s : 75 ~ 800 V

I_n (8/20 μs): 1 kA / 2 kA

Dimensions: L4.5 × W3.2 × H2.7 mm

Learn more

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Gas-Discharge-Tube-GDT/SMD-Type/SX-series.html

TZ (-SMD) series

V_s : 75 ~ 600 V

I_n (8/20 μs): 5 kA / 10 kA

Dimensions: L7.6 × W5.0 × H5.0 mm

Learn more

Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Gas-Discharge-Tube-GDT/SMD-Type/TZ(-SMD)-series.html

TR (-L) series

V_s : 90 ~ 600 V

I_n (8/20 μs): 10 kA / 20 kA

Dimensions: Φ8.0 × 10.0 mm

Learn more

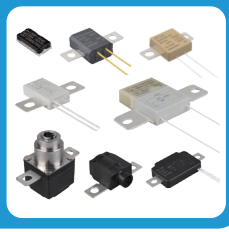
Learn more:
https://setsafe.com/Products/Over-Voltage-Protection/Gas-Discharge-Tube-GDT/DIP-Type/TR(-L)-series.html

What
can do for you

www.SETsafe.com www.SETfuse.com

PROVIDE 4 CATEGORIES OF PROTECTION COMPONENT PRODUCTS IN 2024

https://setsafe.com/products.html

Over Temperature Protection	Over Voltage Protection	Over Current Protection	Active Protection
			

MISSION

PROVIDING A TOTAL SOLUTION FOR HIGH STANDARD SAFETY CIRCUIT PROTECTION

SETsafe | SETfuse was established in 2000 in Xiamen, China. We have a presence in more than 40 countries and regions recognising our products. Some of the world's 500 fortune companies are our valuable customers. We have pioneered, innovated & developed several products exclusively. Products are compliance with CCC, UL, cUL, VDE, TUV, PSE, KC, IATF 16949, ISO 9001, ISO 14001, ISO 45001, ISO 50001, GB/T 29490 certificates. We are in one of the core participating teams for revising and setting several national & international standards in the field of Circuit Protection.

SETsafe | SETfuse Key Markets: New Energy, Energy Storage, Telecom, Surge Protector, Power, Lighting, Home Appliances, Mobile Devices, Medical, etc.

SETsafe | SETfuse

PV System in SETsafe | SETfuse Industrial Park

SETsafe | SETfuse Benefits

23+

Over 23 years of DESIGNING, MANUFACTURING AND SELLING of circuit protection components

40+

Sold to more than 40 countries and regions

Automatic

Automatic process production

500

A brand chosen by fortune 500 companies

Test Center

Safety, Accuracy, Equity, Efficiency

https://setsafe.com/Testing-Center-Laboratory/Introduction.html

1000+

More than 1000 testing items

300+

More than 300 sets of specialized testing equipment

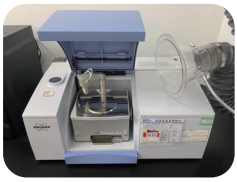
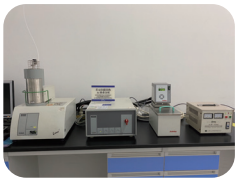
Standards

Has the testing capabilities of IEC international standards, ITU standards, EN European standards, UL standards, and national and industry standards

WTDP

The laboratory has obtained the qualification of UL under Witnessed Test Data Program(WTDP) and the accreditation qualification by TUV Rheinland

Some Test Equipment


The testing focus of the laboratory covers material analysis class, temperature test class, environmental test class, electrical test class, lightning current test class, with more than 1000 testing items.

The laboratory has the testing capabilities of IEC international standards, EN European standards, UL standards, and national and industry standards.

Test items include Marking test, Tensile test, Thrust test, Creepage distances and clearances, Dielectric strength, Insulation resistance, Holding temperature, Functioning temperature, Maximum temperature limit, Ageing, Varistor voltage, Leakage current, Voltage proof.....

WTDP

https://setsafe.com/Testing-Center-Laboratory/Witnessed-Test-Data-Program-WTDP.html

SETsafe | SETfuse Obtained Permanent Authorization:

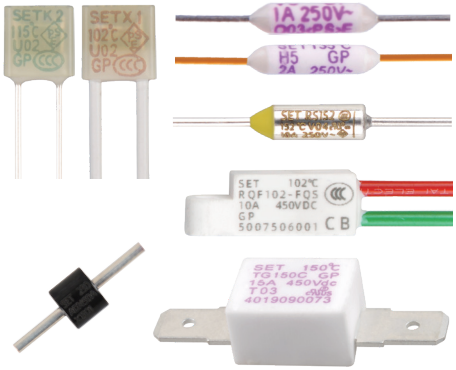
- UL 60691,CSA C22.2 NO.60691:19.
- UL 1449, EDITION 5, ISSUE DATE 01/08/2021 (Surge Protective Devices).
- UL 1434, EDTION 1, REVISION DATE 05/18/2020 (THERMISTOR-TYPE DEVICES).
- CSA Component Acceptance Service, T.I.L, Class No.9073-31, ISSUE DATE 07/09/1991.
- CSA C22.2 No.269.5, EDITION 2, ISSUE, DATE 09/2017 (Surge Protective Devices – Type 5 - Components).
- CSA C22.2 No.269.4, EDITION 2, ISSUE, DATE 03/2017 (Surge Protective Devices – Type 4 - Component Assemblies).

SETsafe | SETfuse Obtained Permanent Authorization:

- IEC 60127
- IEC 60539-1:2016
- IEC 60691:2015+A1
- EN 60691:2016+A1
- IEC 61051-1:2018
- EN IEC 61051-1:2018
- IEC 61051-2:1991+A1
- IEC 61051-2-2:1991
- IEC 62368-1:2020 Annex G.8
- EN IEC 62368-1:2020 Annex G.8
- EN 50539-11:2013+A1
- IEC 61643-11:2011
- EN 61643-11:2012+A11
- IEC 61643-21:2012
- EN 61643-21:2001+A1+A2
- IEC 61643-31:2018
- EN 61643-31:2018
- IEC61643-311

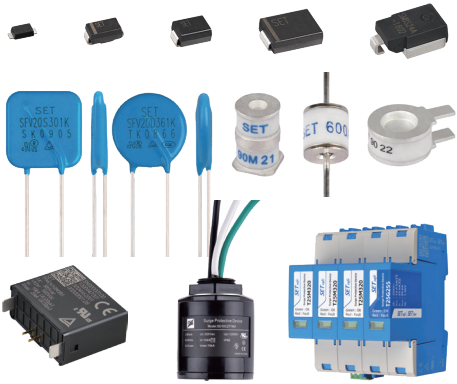
SETsafe | SETfuse Main Products

Over Temperature Protection



- Thermal-Link - Alloy Type
- Direct Current Thermal-Link - Alloy Type
- Thermal-Link - Organic Type
- Thermal Turn On - Organic Type

Over Voltage Protection



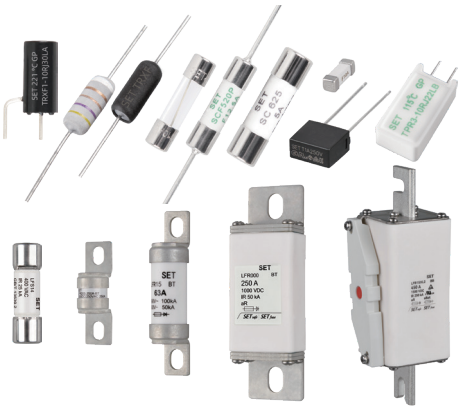
- Transient Voltage Suppression Diodes
- Thermal Protected Transient Suppression Diode
- ESD TVS Diode Arrays
- Thyristor Surge Suppressor
- Gas Discharge Tube
- Thermally Protected Gas Discharge Tube
- Metal Oxide Varistor & MOV Disk
- Thermal Fuse & MOV
- Surge Protective Devices Module
- Surge Protective Device

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

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

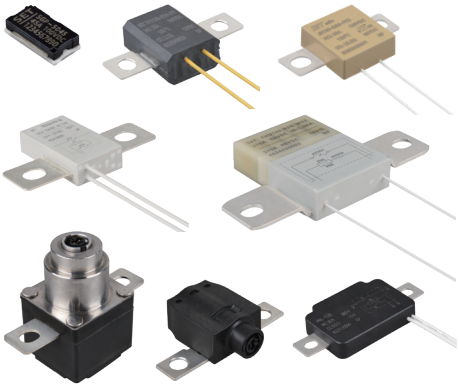
SETsafe | SETfuse Main Products

Over Current Protection



- Cartridge Fuse-links
- Sub-miniature Fuse-links
- Surface Mount Fuse-links
- Fusible Wire wound Resistor
- Thermal-Link & Fusing Resistor
- Thermally Protected Resistor
- Low Voltage Fuses

Active Protection



- Heat CutOff
- idea Thermal CutOff
- Pyro CutOff
- Mechanical CutOff

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

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

Providing a Total Solution for High Standard Safety Circuit Protection

Websites

www.SETsafe.com
www.SETfuse.com

Products Category 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

Product Datasheet Download Link

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

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Circuit Protection Components

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SETsafe | SETfuse