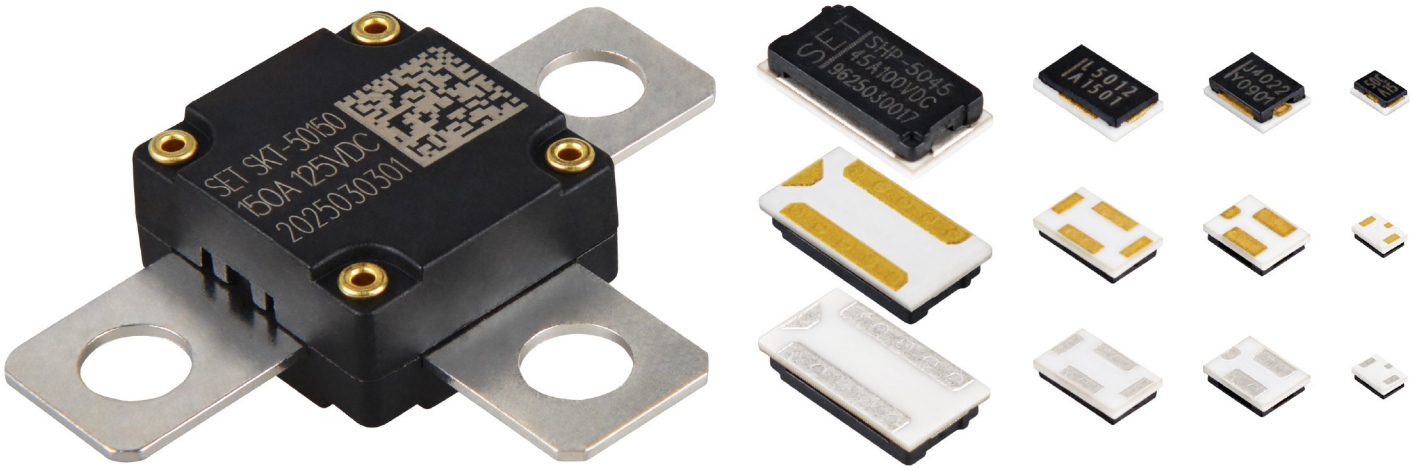
# Heat CutOff

HCO

- Non-Resettable
- Overcurrent Protection
- Overcharging Protection
- Controlled Fusing Time ≤ 60 s
- Low Impedance, Low Power Consumption
- Halogen free and RoHS compliant

Please refer to the datasheet of each series.




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

2026

SET safe | SET fuse

Providing Total Solution for High Standard Safety Circuit Protection

# Heat CutOff (HCO)

Heat CutOff (HCO), also known as a three-terminal fuse, is an actuating component designed with overcurrent and overcharge protection functions. The main body of an HCO consists of FH, Fusible Alloy, Flux Resin, Case and Sealant Epoxy.

The Heat CutOff (HCO) is primarily used in secondary protection schemes for lithium battery charge and discharge circuits, providing redundant protection alongside the primary protection circuit. During the charge and discharge process of lithium batteries, if an abnormal overcurrent occurs, the fusible alloy self-heats and melts, disconnecting the charge and discharge circuit to achieve overcurrent protection. In the event of an overcharge, if the primary protection circuit's IC or the FET in the charge and discharge path fails, the secondary protection IC activates and energizes the Heater of the HCO. This causes the fusible alloy to melt due to the generated heat, disconnecting the charge and discharge circuit to provide overcharge protection. This mechanism ensures dual protection against both overcurrent and overcharge conditions.

The key features of SETsafe | SETfuse Heat CutOff (HCO) products include: Rated Currents of (5 / 12 / 15 / 22 / 30 / 45 / 60 / 75 / 120 / 150) A, Rated Voltages of (36 / 48 / 80 / 100 / 125) VDC, and an  Operating Voltage Range of (2.5 ~ 125.0) VDC. These products have obtained UL, cUL and TUV certifications and comply with RoHS and REACH directives.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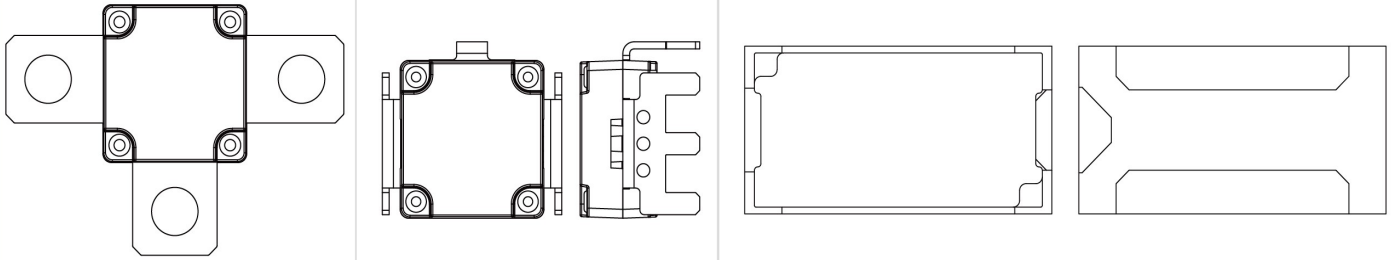
## Heat CutOff (HCO) Features & Model List Overview

| Rated Operation Voltage (V) | SKT (Page 4) | | | | SHP (Page 15) | | | |
|---|---|---|---|---|---|---|---|---|
| | Model | | | | | | | |
| 96 | SKT-96120 | SKT-96150 | SKT-96120P | SKT-96150P | ○ | ○ | ○ | ○ |
| 84 | SKT-84120 | SKT-84150 | SKT-84120P | SKT-84150P | SHP-8430 | SHP-8445 | SHP-8460 | SHP-8475 |
| 72 | SKT-72120 | SKT-72150 | SKT-72120P | SKT-72150P | SHP-7230 | SHP-7245 | SHP-7260 | SHP-7275 |
| 60 | SKT-60120 | SKT-60150 | SKT-60120P | SKT-60150P | ○ | ○ | ○ | ○ |
| 50 | SKT-50120 | SKT-50150 | SKT-50120P | SKT-50150P | SHP-5030 | SHP-5045 | SHP-5060 | SHP-5075 |
| 48 | ○ | ○ | ○ | ○ | SHP-4830 | SHP-4845 | SHP-4860 | SHP-4875 |
| 40 | SKT-40120 | SKT-40150 | SKT-40120P | SKT-40150P | SHP-4030 | SHP-4045 | SHP-4060 | SHP-4075 |
| 32 | ○ | ○ | ○ | ○ | ○ | SHP-3245 | SHP-3260 | SHP-3275 |
| 30 | SKT-30120 | SKT-30150 | SKT-30120P | SKT-30150P | SHP-3030 | SHP-3045 | SHP-3060 | SHP-3075 |
| 24 | ○ | ○ | ○ | ○ | SHP-2430 | SHP-2445 | SHP-2460 | ○ |
| 20 | SKT-20120 | SKT-20150 | SKT-20120P | SKT-20150P | SHP-2030 | SHP-2045 | SHP-2060 | SHP-2075 |
| 18 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 14 | SKT-14120 | SKT-14150 | SKT-14120P | SKT-14150P | SHP-1430 | SHP-1445 | SHP-1460 | SHP-1475 |
| 12 | SKT-12120 | SKT-12150 | SKT-12120P | SKT-12150P | SHP-1230 | SHP-1245 | SHP-1260 | SHP-1275 |
| 08 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 06 | ○ | ○ | ○ | ○ | SHP-0630 | SHP-0645 | SHP-0660 | ○ |
| 04 | ○ | ○ | ○ | ○ | SHP-0430 | SHP-0445 | ○ | ○ |
| $I_r$ (A) Rated Current | 120 | 150 | 120 | 150 | 30 | 45 | 60 | 75 |
| $U_r$ (VDC) Rated Voltage | 125 | | | | 100 | | | |
| Breaking Capacity (A) | 1000 | | | | 80 | 120 | 180 | 200 |
| Product Structure | Screw Fastening | | DIP | | SMD | | | |

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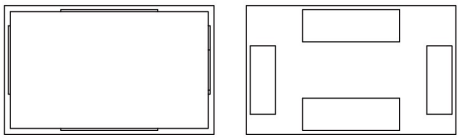
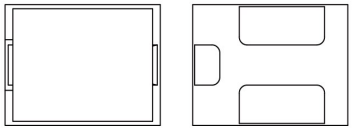
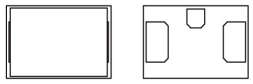
## Heat CutOff (HCO) Features & Model List Overview

| Rated Operation Voltage (V) | 31 | | | 44 | | | 57 | |
|---|---|---|---|---|---|---|---|---|
| Series | SHL | | | SHJ | | | SHG | |
| 96 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 84 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 72 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 60 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 50 | SHL-5012 | SHL-5015 | SHL-5030 | SHJ-5012 | SHJ-5015 | SHJ-5022 | ○ | ○ |
| 48 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 40 | SHL-4012 | SHL-4015 | SHL-4030 | SHJ-4012 | SHJ-4015 | SHJ-4022 | SHG-4005 | SHG-4012 |
| 32 | ○ | ○ | SHL-3230 | SHJ-3212 | SHJ-3215 | SHJ-3222 | SHG-3205 | SHG-3212 |
| 30 | SHL-3012 | SHL-3015 | SHL-3030 | SHJ-3012 | SHJ-3015 | SHJ-3022 | SHG-3005 | SHG-3012 |
| 24 | ○ | ○ | SHL-2430 | SHJ-2412 | SHJ-2415 | SHJ-2422 | ○ | SHG-2412 |
| 20 | SHL-2012 | SHL-2015 | SHL-2030 | SHJ-2012 | SHJ-2015 | SHJ-2022 | SHG-2005 | SHG-2012 |
| 18 | SHL-1812 | SHL-1815 | SHL-1830 | ○ | ○ | ○ | ○ | ○ |
| 14 | ○ | ○ | ○ | SHJ-1412 | SHJ-1415 | SHJ-1422 | SHG-1405 | SHG-1412 |
| 12 | SHL-1212 | SHL-1215 | SHL-1230 | SHJ-1212 | SHJ-1215 | SHJ-1222 | SHG-1205 | SHG-1212 |
| 08 | SHL-0812 | SHL-0815 | SHL-0830 | SHJ-0812 | SHJ-0815 | SHJ-0822 | SHG-0805 | SHG-0812 |
| 06 | SHL-0612 | SHL-0615 | ○ | ○ | ○ | ○ | ○ | ○ |
| 04 | ○ | ○ | SHL-0430 | SHJ-0412 | SHJ-0415 | SHJ-0422 | SHG-0405 | SHG-0412 |
| $I_r$ (A) Rated Current | 12 | 15 | 30 | 12 | 15 | 22 | 5 | 12 |
| $U_r$ (VDC) Rated Voltage | 80 | | | 48 / 80 | | | 36 | |
| Breaking Capacity (A) | 50 | | 80 | 200 / 50 | | | 50 | |
| Product Structure |  | | |  | | |  | |
| | | | | SMD | | | | |

Page

Model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## Glossary

| Item | Description |
|---|---|
| HCO | **Heat CutOff (HCO)**<br>With Feed Heater，A Protector that turns on a Feed Heater to cut off circuit. |
| MC | **Main Circuit (MC)**<br>All conductive components used in switching devices for closing or disconnecting circuits in a circuit. |
| CC | **Control Circuit (CC)**<br>In addition to the main circuit, all conductive parts of the switching apparatus used in the access circuit as the closing operation and / or opening operation of the switching apparatus. |
| $I_r$ | **Rated Current**<br>The current used to classify an HCO, which is the Maximum current that HCO allows to carry and is able to cut off the circuit safely. |
| $U_r$ | **Rated Voltage**<br>The voltage used to classify an HCO, which is the Maximum voltage that HCO allows to carry and is able to cut off the circuit safely. |
| FH | **Feed Heater**<br>Electric appliances that use electric energy to achieve heating effect. |
| Breaking Capacity | **Breaking Capacity**<br>Value of prospective current that a fuse-link is capable of breaking at a stated voltage under prescribed conditions of use and behavior. |
| Range of Operation Voltage | **Range of Operation Voltage**<br>Under specified conditions, the protector can operate normally to disconnect the voltage. |


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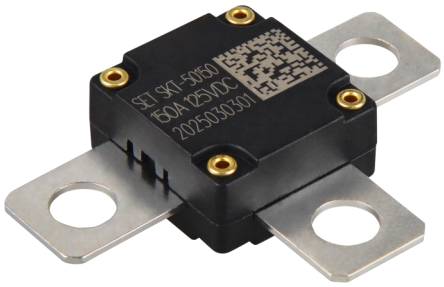


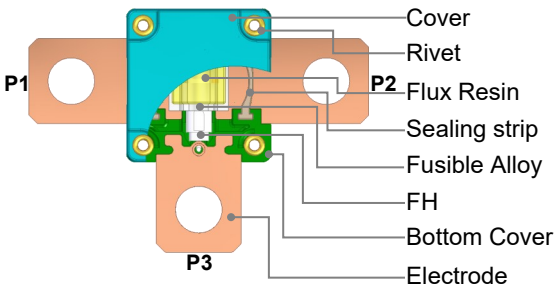

## Description

Heat CutOff (HCO), also known as a three-terminal fuse, is an actuating component designed with overcurrent and overcharge protection functions. The main body of an HCO consists of FH, Fusible Alloy, Flux Resin, Bottom Cover, Cover, Rivet, Sealing strip and Electrode.

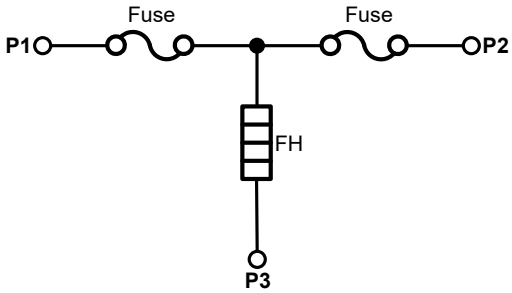
The Heat CutOff (HCO) is primarily used in secondary protection schemes for lithium battery charge and discharge circuits, providing redundant protection alongside the primary protection circuit. During the charge and discharge process of lithium batteries, if an abnormal overcurrent occurs, the fusible alloy self-heats and melts, disconnecting the charge and discharge circuit to achieve overcurrent protection. In the event of an overcharge, if the primary protection circuit's IC or the FET in the charge and discharge path fails, the secondary protection IC activates and energizes the Heater of the HCO. This causes the fusible alloy to melt due to the generated heat, disconnecting the charge and discharge circuit to provide overcharge protection. This mechanism ensures dual protection against both overcurrent and overcharge conditions.

The key features of SETsafe | SETfuse Heat CutOff (HCO) SKT series products include: Rated Currents of (120 / 150) A, Rated Voltages of 125 VDC, and an Operating Voltage Range of (8.2 ~ 125.0) VDC. These products have obtained UL, cUL and TUV certifications and comply with RoHS and REACH directives.

## Structure Diagrams




## Product Schematic




- P1 ~ P2 Main Circuit（MC）
- P1 / P2 ~ P3 Control Circuit（CC）

## Features

- Overcurrent Protection
- Overcharging Protection
- Low Impedance, Low Power Consumption
- Controlled Fusing Time ≤ 60 s
- Non-Resettable
- RoHS & REACH Compliant

## Application

- Household Energy Storage
- Electric ATV
- Electric lawn mower
- Electric Motorcycle
- UPS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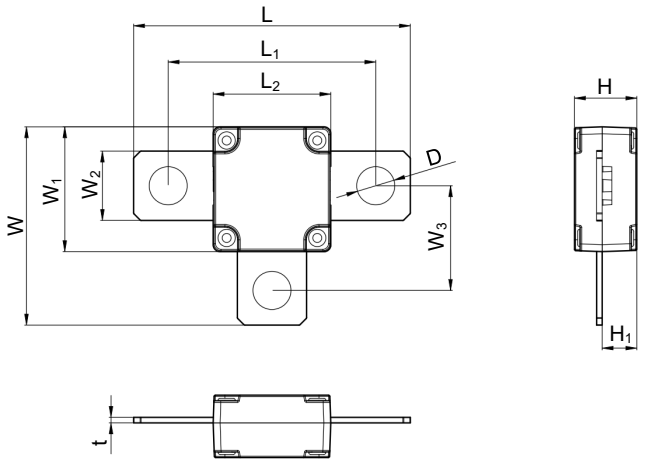
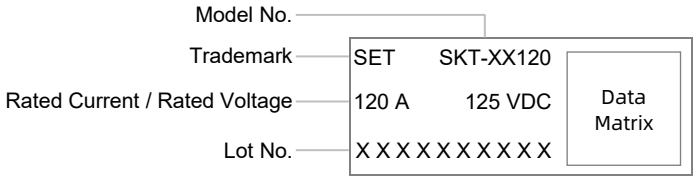
## Dimensions (Unit: mm)




| L | $L_1$ | $L_2$ | W | $W_1$ | $W_2$ | $W_3$ | t | H | $H_1$ | D |
|---|---|---|---|---|---|---|---|---|---|---|
| 40.0 ± 1.0 | 30.0 ± 0.5 | 16.8 ± 0.5 | 28.5 ± 1.0 | 17.8 ± 0.5 | 10.0 ± 0.5 | 15.1 ± 0.5 | 0.8 ± 0.15 | 9.0 ± 0.5 | 5.0 ± 0.5 | 5.5 ± 0.2 |

## Marking




## Part Number System

SKT - x x 1 2 0

**Rated Current (A)**
120, 150

**Rated Operating Voltage (VDC)**
12, 14, 20, 30, 40, 50, 60, 72, 84, 96

**Series**
SKT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## Specifications

| Model | $I_r$ | $U_r$ | Cells in Series (Selection Reference) | Breaking Capacity | Range of Operating Voltage | Resistance | | Agency Information | | | RoHS REACH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $R_{Fuse}$ | $R_{FH}$ | UL | cUL | TUV | |
| | (A) | (VDC) | (Cells) | (kA) | (VDC) | (mΩ) | (Ω) | | | | |
| SKT-12120 | 120 | 125 | 3 | 1.0 | 8.2 ~ 13.5 | 0.3 ~ 0.6 | 0.96~ 1.46 | ● | ● | ● | ● |
| SKT-14120 | 120 | 125 | 4 | 1.0 | 10.8 ~ 18.0 | 0.3 ~ 0.6 | 1.71 ~ 2.54 | ● | ● | ● | ● |
| SKT-20120 | 120 | 125 | 5 | 1.0 | 14.2 ~ 23.5 | 0.3 ~ 0.6 | 2.91 ~ 4.38 | ● | ● | ● | ● |
| SKT-30120 | 120 | 125 | 6 ~ 7 | 1.0 | 18.9 ~ 31.5 | 0.3 ~ 0.6 | 5.3 ~ 7.7 | ● | ● | ● | ● |
| SKT-40120 | 120 | 125 | 8 ~ 11 | 1.0 | 29.7 ~ 49.5 | 0.3 ~ 0.6 | 12.9 ~ 19.1 | ● | ● | ● | ● |
| SKT-50120 | 120 | 125 | 12 ~ 14 | 1.0 | 37.7 ~ 62.9 | 0.3 ~ 0.6 | 20.9 ~ 30.9 | ● | ● | ● | ● |
| SKT-60120 | 120 | 125 | 15 ~ 17 | 1.0 | 43.7 ~ 72.0 | 0.3 ~ 0.6 | 27.3~ 41.5 | ● | ● | ● | ● |
| SKT-72120 | 120 | 125 | 15 ~ 20 | 1.0 | 50.3 ~ 84.0 | 0.3 ~ 0.6 | 37.2 ~ 55.0 | ● | ● | ● | ● |
| SKT-84120 | 120 | 125 | 17 ~ 22 | 1.0 | 60.0 ~ 100.0 | 0.3 ~ 0.6 | 52.7~ 78.2 | ● | ● | ● | ● |
| SKT-96120 | 120 | 125 | 22 ~ 30 | 1.0 | 74.9 ~ 125.0 | 0.3 ~ 0.6 | 82.3~ 121.9 | ● | ● | ● | ● |
| SKT-12150 | 150 | 125 | 3 | 1.0 | 8.2 ~ 13.5 | 0.2 ~ 0.45 | 0.99~ 1.43 | ● | ● | ● | ● |
| SKT-14150 | 150 | 125 | 4 | 1.0 | 10.8 ~ 18.0 | 0.2 ~ 0.45 | 1.75~ 2.48 | ● | ● | ● | ● |
| SKT-20150 | 150 | 125 | 5 | 1.0 | 14.2 ~ 23.5 | 0.2 ~ 0.45 | 2.99 ~ 4.29 | ● | ● | ● | ● |
| SKT-30150 | 150 | 125 | 6 ~ 7 | 1.0 | 18.9 ~ 31.5 | 0.2 ~ 0.45 | 5.4 ~ 7.6 | ● | ● | ● | ● |
| SKT-40150 | 150 | 125 | 8 ~ 11 | 1.0 | 29.7 ~ 49.5 | 0.2 ~ 0.45 | 13.3~ 18.7 | ● | ● | ● | ● |
| SKT-50150 | 150 | 125 | 12 ~ 14 | 1.0 | 37.7 ~ 62.9 | 0.2 ~ 0.45 | 21.4~ 30.2 | ● | ● | ● | ● |
| SKT-60150 | 150 | 125 | 15 ~ 17 | 1.0 | 43.7 ~ 72.0 | 0.2 ~ 0.45 | 28.1~ 40.6 | ● | ● | ● | ● |
| SKT-72150 | 150 | 125 | 15 ~ 20 | 1.0 | 50.3 ~ 84.0 | 0.2 ~ 0.45 | 38.2~ 53.8 | ● | ● | ● | ● |
| SKT-84150 | 150 | 125 | 17 ~ 22 | 1.0 | 60.0 ~ 100.0 | 0.2 ~ 0.45 | 54.1~ 76.6 | ● | ● | ● | ● |
| SKT-96150 | 150 | 125 | 22 ~ 30 | 1.0 | 74.9 ~ 125.0 | 0.2 ~ 0.45 | 84.5 ~ 119.3 | ● | ● | ● | ● |
| Current Carrying Capacity | 100% x $I_r$, no melting | | | | | | | | | | |
| Controlled Fusing Time | In operation voltage range, the fusing time is <1min | | | | | | | | | | |
| Current Fusing Time | 200% x $I_r$ the fusing time is < 1 min | | | | | | | | | | |
| Endurance Test | 500% x $I_r$ power on 5 ms, power off 995 ms, 100,000 cycles | | | | | | | | | | |
| Working Temperature Range | -20 ~ 85 ℃ | | | | | | | | | | |

Note:
1. For P1 - P2, please refer to the structure diagram.


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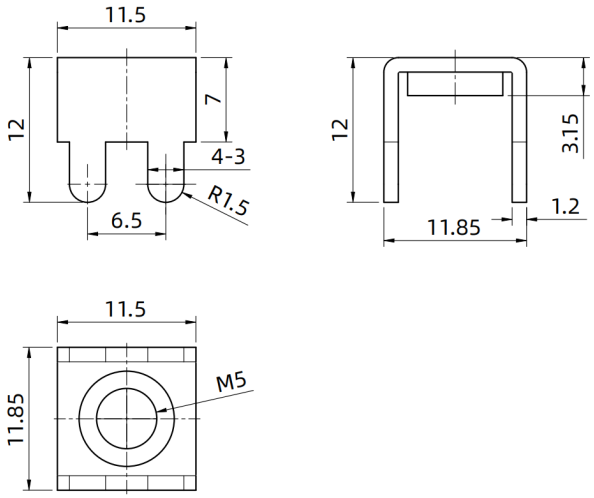
## Recommended test connection terminal (Unit: mm)





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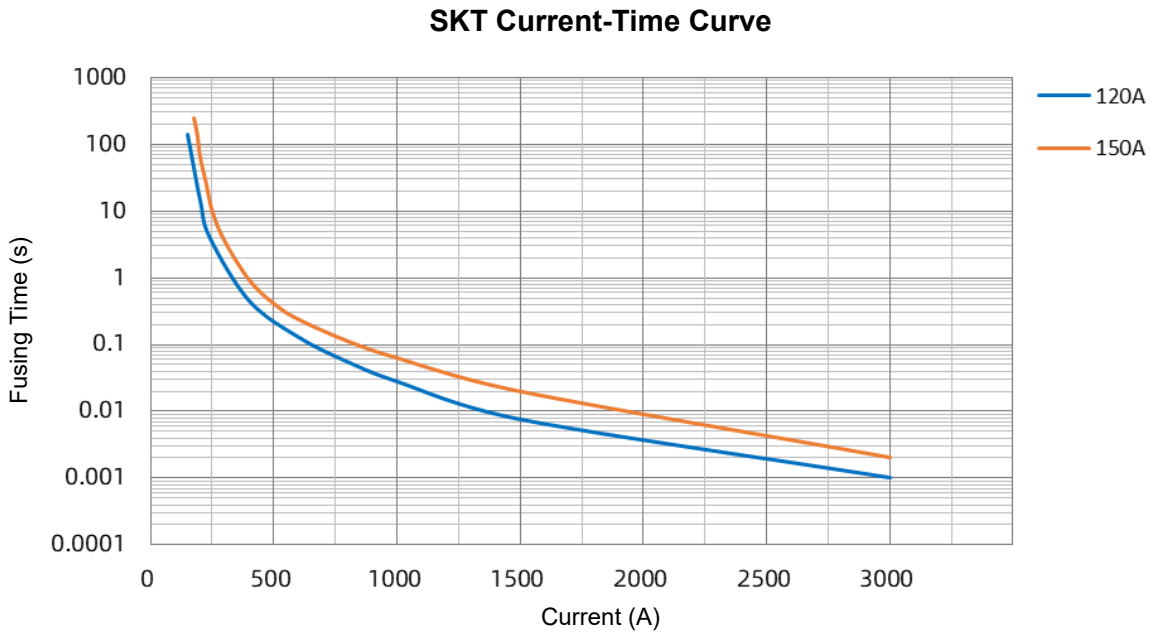
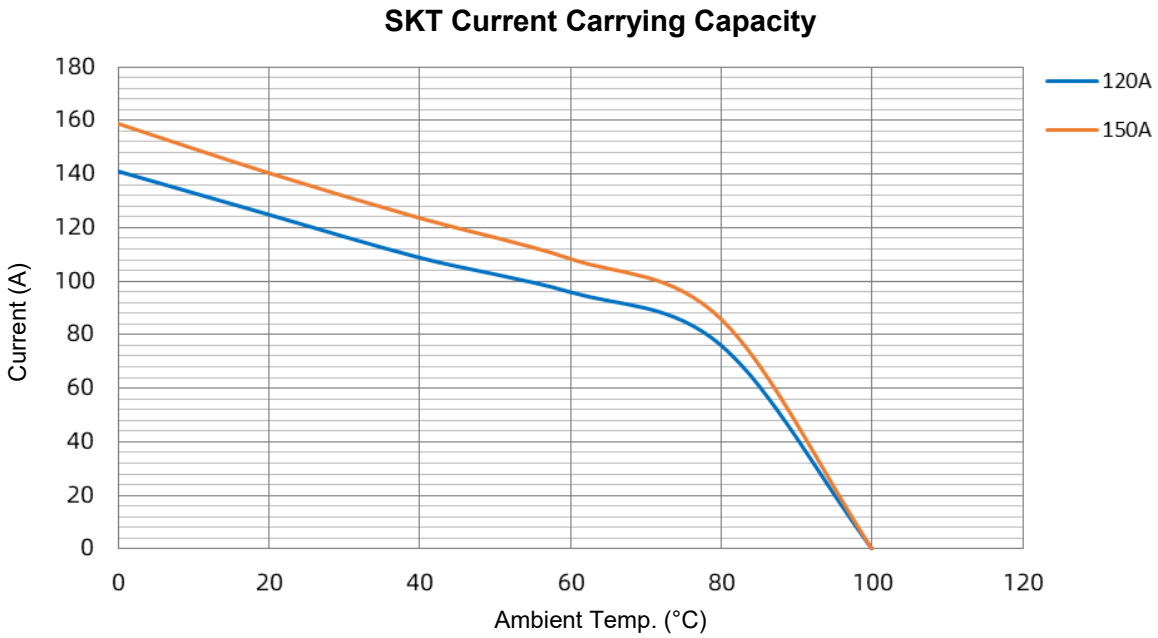
## Current-Time Curve (Reference)

The Current-Time curve shows functioning time at multi-times rated current at room temperature.




## Current Carrying Capacity (Reference)

Under different temperatures apply test current, the surface temperature is 100 °C as the highest point, and the load value is obtained.




*Note:

1. The values in the table are typical values that we recommend to test copper rows evaluation, Reference product resistances: 0.45 mΩ (120 A), 0.33 mΩ (150 A);
2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.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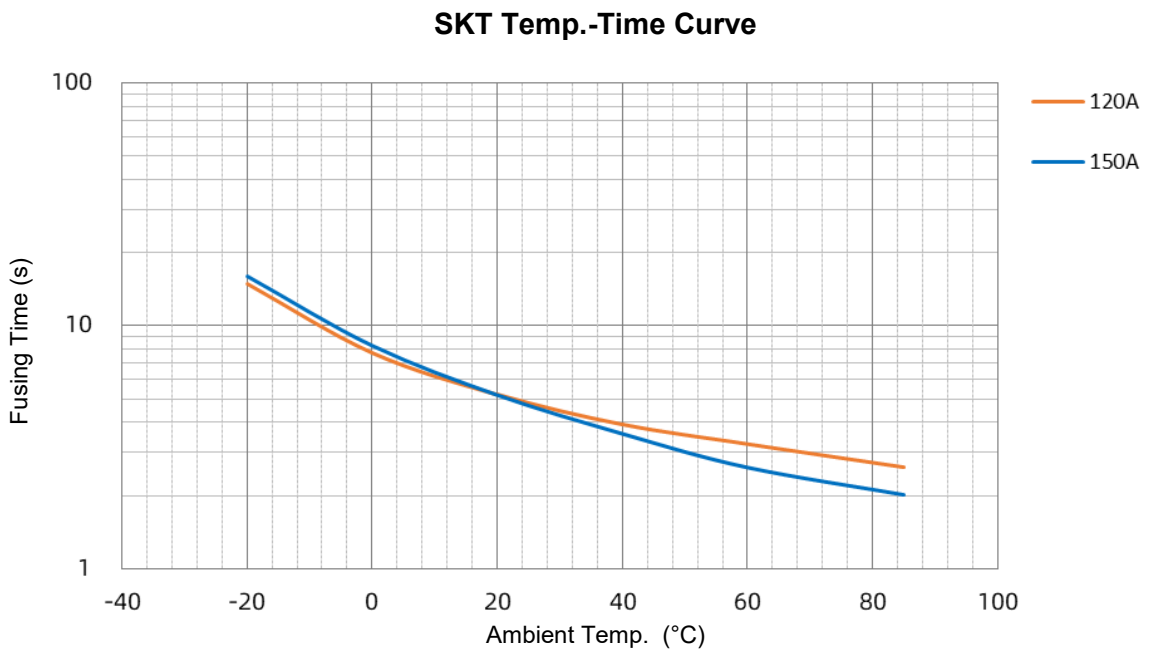
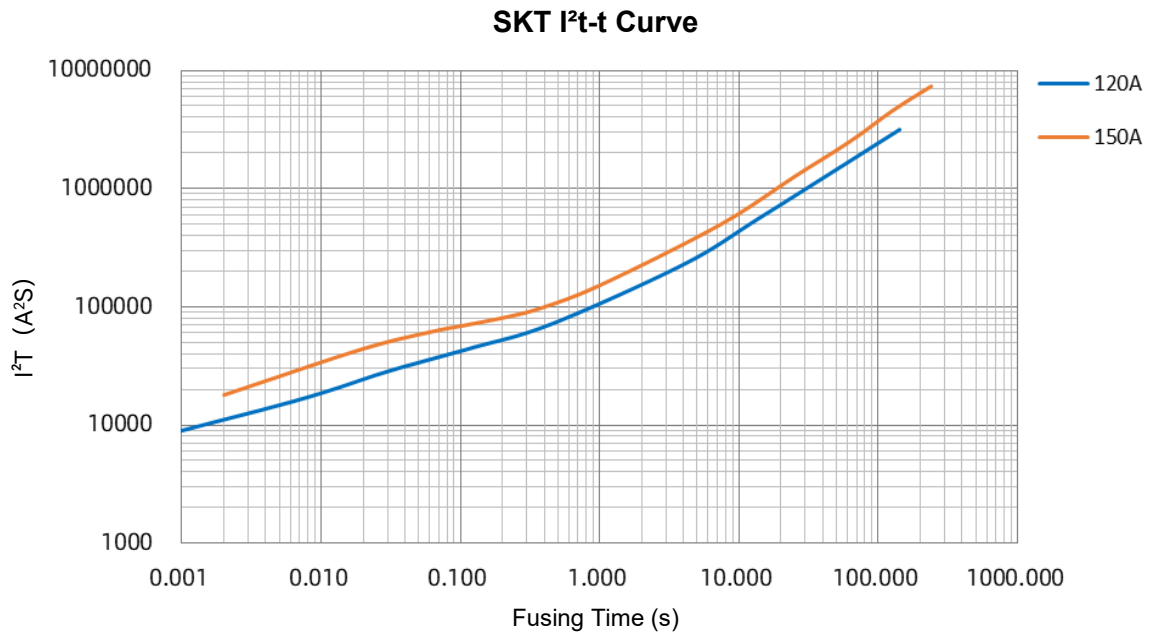
## Temp.-Time Curve (Reference)

Under different conditions, Test the disconnection time curve of P1-P2 under 2 times overload current.




## I²t-t Curve (Reference)

At room temperature, collects the disconnection time of P1 - P2 under multiples of overload current, curve obtained by the product of squared current and disconnection time.




*Note:

1. The values in the table are typical values that we recommend to test copper rows evaluation, Reference product resistances: 0.45 mΩ (120 A), 0.33 mΩ (150 A);
2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.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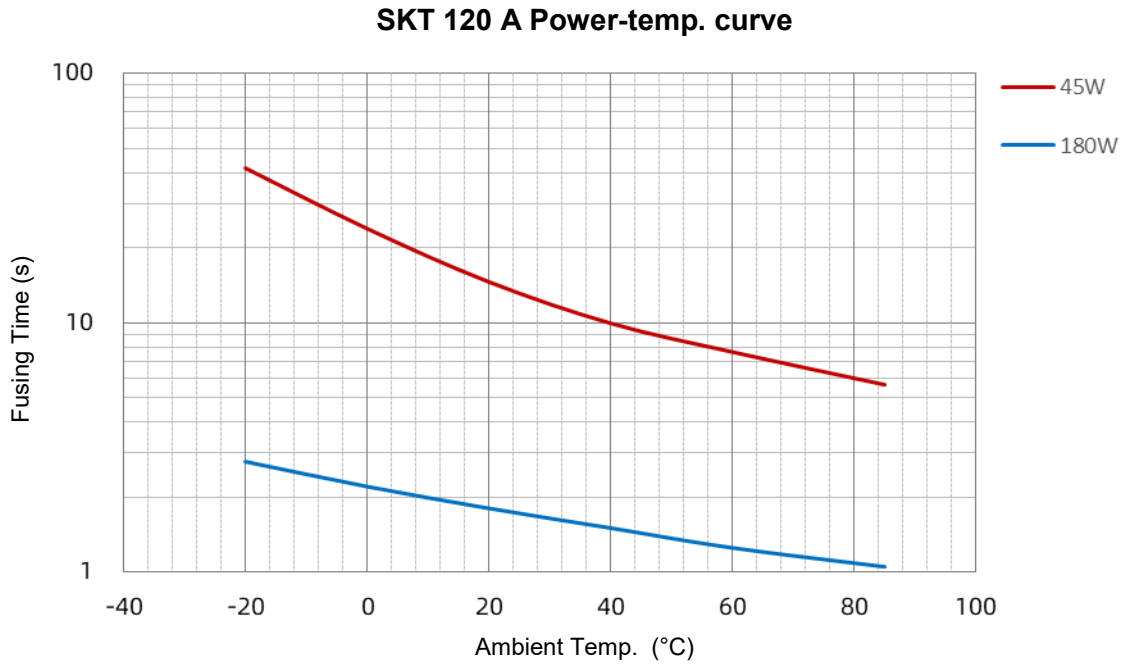
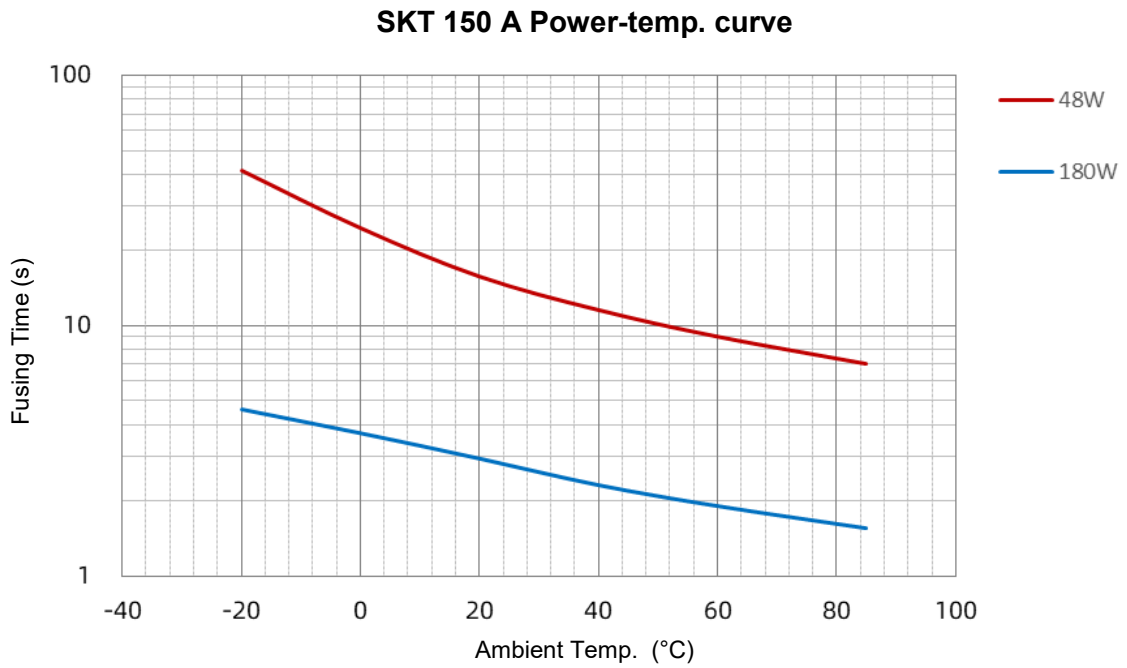
## Power-temp. curve (Reference)

At different temperatures, the heating element applies an operating voltage corresponding to the power, and collects the disconnection time of P1 - P2.





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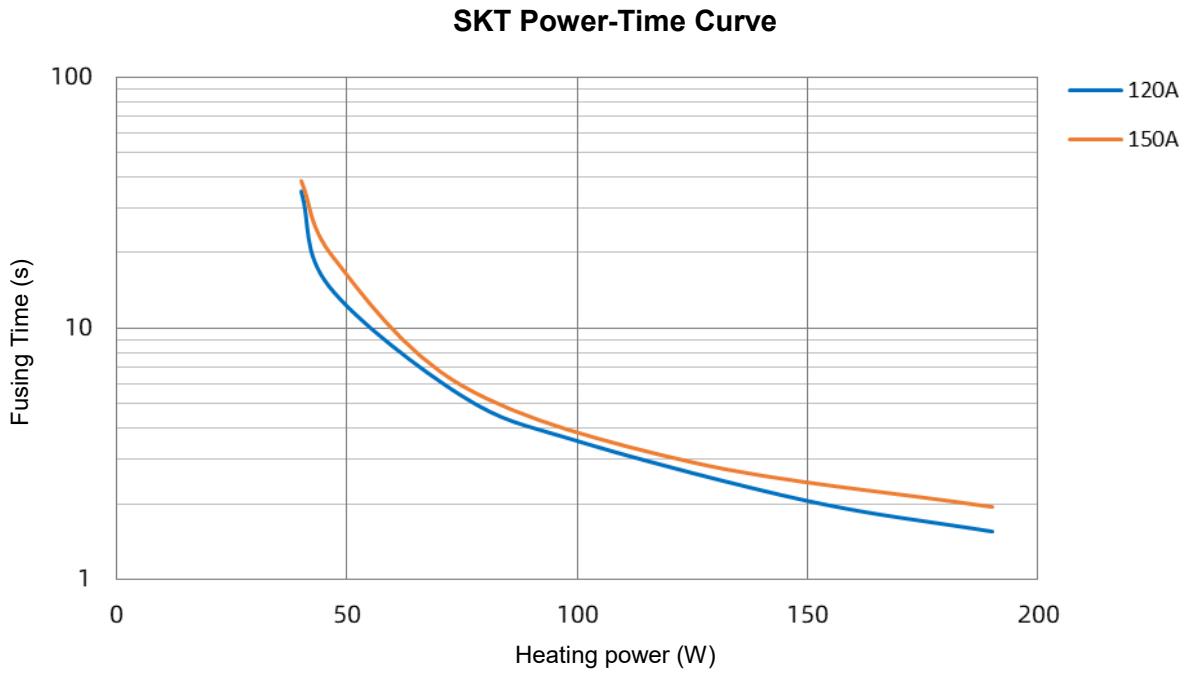
## Power-Time Curve (Reference)

At room temperature, apply the operating voltage within the power range of the heating element, and collects the disconnection time of P1 - P2.





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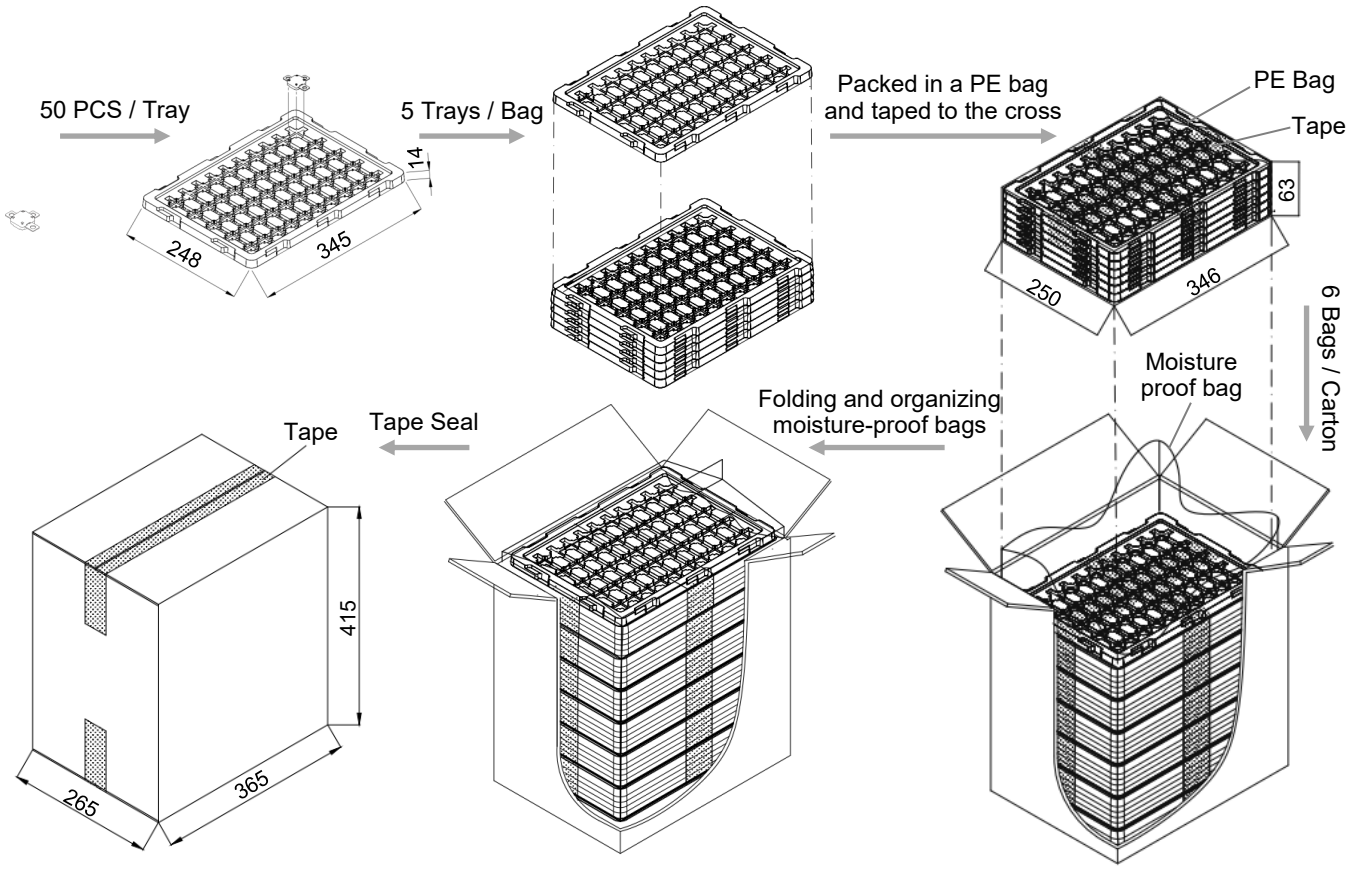
## Packaging Information

| Item | Tray | PE Bag | Carton |
|---|---|---|---|
| Dimensions (mm) | 345 × 248 ×14 | 346 × 250 × 63 | 365 × 265 × 415 |
| Quantity (PCS) | 50 | 250 | 1500 |
| Gross Weight (kg) | 0.38 ± 8 % | 1.97 ± 8 % | 12.5 ± 8 % |





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# ATTENTION

## Usage

1. When atmosphere press is from 80 kPa to 106 kPa, the related altitude shall be from 2,000 meter to -500 meter.
2. Do not touch the HCO body or electrode lead directly when power is on, to avoid burning or electric shocking.
3. It is necessary to foresee there are possibilities that “Current Carrying Capacity” and “Controlled Fusing Time” may be varied along with the condition change in the substrate thermal capacity, etc. therefore you should check it on your PCB. Generally, when thermal capacity of PCB increases, Current carrying capacity will increase accordingly and Cleaning-time will be longer.
4. This product is designed and produced for only general-use of electronics devices. Therefore, we do not suppose that it is used for the. applications [Military, Medical and so on] which may cause direct damages on life,  bodies or properties of third party.

## Installation

1. Bolt installation.
2. Do not apply mechanical stress to the protection body during or after the installation.
3. Please avoid doing resin-coating for HCO. Resin may block the pressure relief channels of the product and affect its performance, so please avoid resin-coating. These products after resin-coating will not be guaranteed.
4. If adding terminals to electrode leads, make sure the electrode without grease or other foreign matters, and use the same cross-section connection terminal, otherwise the electrode may heat abnormally.
5. If locking with screw, to prevent loosening, please add gasket and use proper screw when installing the product. Ensure that the screw tightening torque meets the requirements.


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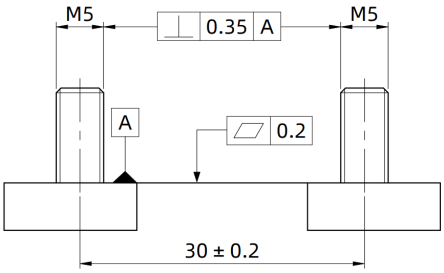
## Recommended flatness




## Replacement

HCO is a non-repairable product. For safety aspect, it shall be replaced by an equivalent HCO, and mounted in the same way.

## Storage

1. HCO must be stored in shaded area where it is not too dusty, with temp. (10 to 30) °C or less with no sudden temperature change, humidity within (30 to 70) % RH, and no corrosive gas in the air. please use them up within 1 year after receiving the goods .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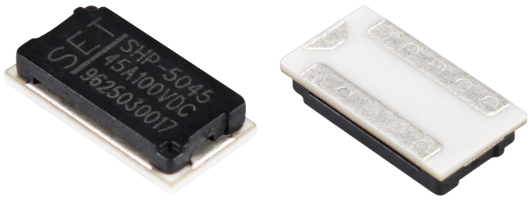


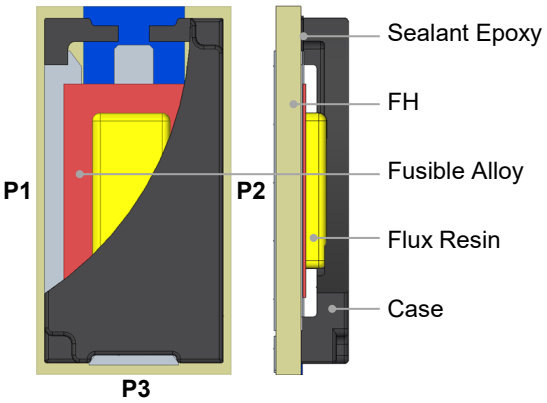

## Description

Heat CutOff (HCO), also known as a three-terminal fuse, is an actuating component designed with overcurrent and overcharge protection functions. The main body of an HCO consists of FH, Fusible Alloy, Flux Resin, Case and Sealant Epoxy.

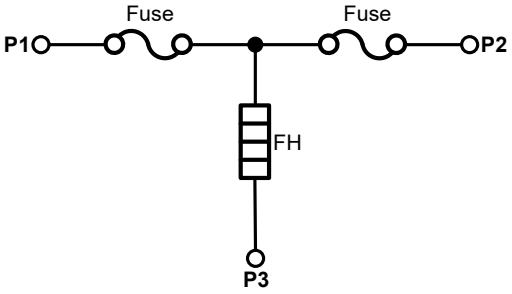
The Heat CutOff (HCO) is primarily used in secondary protection schemes for lithium battery charge and discharge circuits, providing redundant protection alongside the primary protection circuit. During the charge and discharge process of lithium batteries, if an abnormal overcurrent occurs, the fusible alloy self-heats and melts, disconnecting the charge and discharge circuit to achieve overcurrent protection. In the event of an overcharge, if the primary protection circuit's IC or the FET in the charge and discharge path fails, the secondary protection IC activates and energizes the Heater of the HCO. This causes the fusible alloy to melt due to the generated heat, disconnecting the charge and discharge circuit to provide overcharge protection. This mechanism ensures dual protection against both overcurrent and overcharge conditions.

The key features of SETsafe | SETfuse Heat CutOff (HCO) SHP series products include: Rated Currents of (30 / 45 / 60 / 75) A, Rated Voltages of 100 VDC, and an Operating Voltage Range of (4.0 ~ 100.8) VDC. These products have obtained UL, cUL and TUV certifications and comply with RoHS and REACH directives.

## Structure Diagrams




## Product Schematic




- P1 ~ P2 Main Circuit（MC）
- P1 / P2 ~ P3 Control Circuit（CC）

## Application

- Electric Tool
- Storage Battery
- Portable Power Supply
- Electric Motorcycle
- Electric Bicycle
- Household Energy Storage

## Features

- Surface Mount
- Overcurrent Protection
- Overcharging Protection
- Low Impedance, Low Power Consumption
- Controlled Fusing Time ≤ 60 s
- Non-Resettable
- RoHS & REACH Compliant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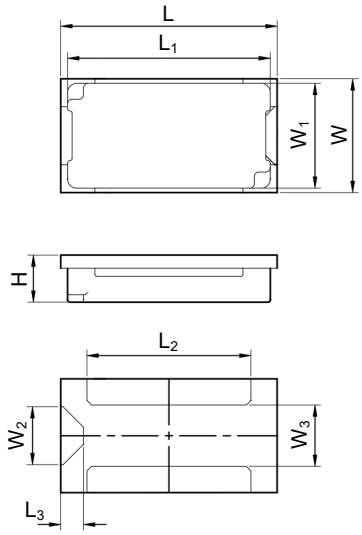
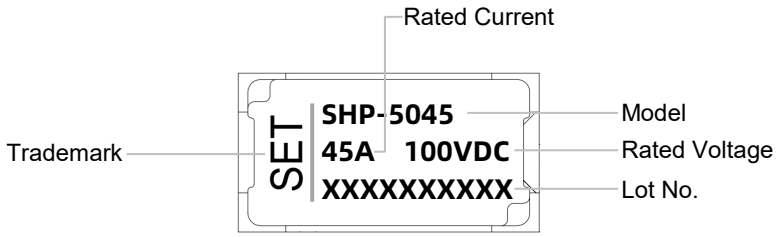
## Dimensions (Unit: mm)




| L | $L_1$ | $L_2$ | $L_3$ | W | $W_1$ | $W_2$ | $W_3$ | H |
|---|---|---|---|---|---|---|---|---|
| 9.50 ± 0.30 | 8.90 ± 0.20 | 7.20 ± 0.20 | 1.00 ± 0.20 | 5.00 ± 0.30 | 4.60 ± 0.20 | 2.55 ± 0.20 | 2.70 ± 0.20 | 1.80 ± 0.20 |

## Marking




## Part Number System

SHP - 5 0 4 5

**Rated Current (A)**
30, 45, 60, 75

**Rated Operating Voltage (VDC)**
04, 06, 12, 14, 20, 24, 30, 32, 40, 48, 50, 72, 84

**Series**
SHP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## Specifications

| Model | $I_r$ | $U_r$ | Cells in Series (Selection Reference) | | Breaking Capacity | Range of Operating Voltage | Resistance | | Agency Information | | | RoHS REACH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | $R_{Fuse}$ | $R_{FH}$ | UL | cUL | TUV | |
| | (A) | (VDC) | NCM / NCA | LFP | (A) | (VDC) | (mΩ) | (Ω) | | | | |
| SHP-0430 | 30 | 100 | 1 | | 80 | 4.0 ~ 6.6 | 0.2 ~ 2.0 | 0.41 ~ 0.94 | ● | ● | ● | ● |
| SHP-0630 | 30 | 100 | 2 | | 80 | 5.6 ~ 9.0 | 0.2 ~ 2.0 | 0.77 ~ 1.84 | ● | ● | ● | ● |
| SHP-1230 | 30 | 100 | 3 ~ 4 | | 80 | 8.4 ~ 19.1 | 0.2 ~ 2.0 | 3.4 ~ 4.2 | ● | ● | ● | ● |
| SHP-1430 | 30 | 100 | 4 | | 80 | 11.2 ~ 16.8 | 0.2 ~ 2.0 | 2.7 ~ 7.4 | ● | ● | ● | ● |
| SHP-2030 | 30 | 100 | 4 ~ 5 | | 80 | 10.5 ~ 23.5 | 0.2 ~ 2.0 | 5.1 ~ 6.5 | ● | ● | ● | ● |
| SHP-2430 | 30 | 100 | 5 | | 80 | 14.0 ~ 23.5 | 0.2 ~ 2.0 | 5.0 ~ 11.5 | ● | ● | ● | ● |
| SHP-3030 | 30 | 100 | 6 ~ 7 | | 80 | 19.8 ~ 31.5 | 0.2 ~ 2.0 | 9.0 ~ 23.1 | ● | ● | ● | ● |
| SHP-4030 | 30 | 100 | 8 ~ 10 | 9 ~ 11 | 80 | 20.2 ~ 46.9 | 0.2 ~ 2.0 | 19.8 ~ 24.0 | ● | ● | ● | ● |
| SHP-4830 | 30 | 100 | 10 ~ 13 | 11 ~ 15 | 80 | 27.5 ~ 56.0 | 0.2 ~ 2.0 | 28.5 ~ 44.5 | ● | ● | ● | ● |
| SHP-5030 | 30 | 100 | 11 ~ 15 | 15 ~ 17 | 80 | 28.0 ~ 62.0 | 0.2 ~ 2.0 | 34.9 ~ 46.1 | ● | ● | ● | ● |
| SHP-7230 | 30 | 100 | 13 ~ 17 | 18 ~ 21 | 80 | 36.4 ~ 76.6 | 0.2 ~ 2.0 | 53.3 ~ 77.9 | ● | ● | ● | ● |
| SHP-8430 | 30 | 100 | 18 ~ 24 | 22 ~ 24 | 80 | 52.5 ~ 100.8 | 0.2 ~ 2.0 | 96.8 ~ 137.8 | ● | ● | ● | ● |
| SHP-0445 | 45 | 100 | 1 | | 120 | 4.0 ~ 6.6 | 0.2 ~ 1.6 | 0.44 ~ 0.90 | ● | ● | ● | ● |
| SHP-0645 | 45 | 100 | 2 | | 120 | 5.6 ~ 9.2 | 0.2 ~ 1.6 | 0.85 ~ 1.36 | ● | ● | ● | ● |
| SHP-1245 | 45 | 100 | 3 | | 120 | 8.4 ~ 14.4 | 0.2 ~ 1.6 | 2.07 ~ 3.07 | ● | ● | ● | ● |
| SHP-1445 | 45 | 100 | 4 | | 120 | 11.2 ~ 18.4 | 0.2 ~ 1.6 | 3.02 ~ 5.10 | ● | ● | ● | ● |
| SHP-2045 | 45 | 100 | 5 | | 120 | 14.0 ~ 21.0 | 0.2 ~ 1.6 | 4.2 ~ 8.5 | ● | ● | ● | ● |
| SHP-2445 | 45 | 100 | 6 | | 120 | 16.7 ~ 27.0 | 0.2 ~ 1.6 | 6.6 ~ 12.1 | ● | ● | ● | ● |
| SHP-3045 | 45 | 100 | 7 | 8 | 120 | 19.6 ~ 32.0 | 0.2 ~ 1.6 | 9.3 ~ 16.7 | ● | ● | ● | ● |
| SHP-3245 | 45 | 100 | 8 ~ 9 | 9 | 120 | 22.3 ~ 37.8 | 0.2 ~ 1.6 | 13.0 ~ 21.6 | ● | ● | ● | ● |
| SHP-4045 | 45 | 100 | 10 ~ 11 | 11 ~ 12 | 120 | 28.0 ~ 48.0 | 0.2 ~ 1.6 | 20.9 ~ 34.1 | ● | ● | ● | ● |
| SHP-4845 | 45 | 100 | 11 ~ 13 | 13 ~ 15 | 120 | 30.8 ~ 55.0 | 0.2 ~ 1.6 | 27.5 ~ 41.2 | ● | ● | ● | ● |
| SHP-5045 | 45 | 100 | 13 ~ 15 | 15 ~ 17 | 120 | 33.8 ~ 67.5 | 0.2 ~ 1.6 | 40.0 ~ 54.4 | ● | ● | ● | ● |
| SHP-7245 | 45 | 100 | 16 ~ 20 | 20 ~ 22 | 120 | 47.6 ~ 85.0 | 0.2 ~ 1.6 | 68.8 ~ 94.4 | ● | ● | ● | ● |
| SHP-8445 | 45 | 100 | 21 ~ 24 | 23 ~ 24 | 120 | 58.8 ~ 100.8 | 0.2 ~ 1.6 | 96.8 ~ 138.3 | ● | ● | ● | ● |


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| Model | $I_r$ | $U_r$ | Cells in Series (Selection Reference) | | Breaking Capacity | Range of Operating Voltage | Resistance | | Agency Information | | | RoHS REACH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | $R_{Fuse}$ | $R_{FH}$ | UL | cUL | TUV | |
| | (A) | (VDC) | NCM / NCA | LFP | (A) | (VDC) | (mΩ) | (Ω) | | | | |
| SHP-0660 | 60 | 100 | 2 | | 180 | 5.6 ~ 9.0 | 0.2 ~ 1.2 | 0.77 ~ 1.25 | ● | ● | ● | ● |
| SHP-1260 | 60 | 100 | 3 | | 180 | 8.4 ~ 14.4 | 0.2 ~ 1.2 | 1.97 ~ 2.82 | ● | ● | ● | ● |
| SHP-1460 | 60 | 100 | 4 | | 180 | 11.2 ~ 18.4 | 0.2 ~ 1.2 | 3.2 ~ 5.0 | ● | ● | ● | ● |
| SHP-2060 | 60 | 100 | 5 | | 180 | 14.0 ~ 23.5 | 0.2 ~ 1.2 | 5.2 ~ 7.8 | ● | ● | ● | ● |
| SHP-2460 | 60 | 100 | 6 | | 180 | 16.7 ~ 25.2 | 0.2 ~ 1.2 | 6.0 ~ 11.2 | ● | ● | ● | ● |
| SHP-3060 | 60 | 100 | 6 ~ 7 | 8 | 180 | 19.6 ~ 31.5 | 0.2 ~ 1.2 | 9.5 ~ 15.4 | ● | ● | ● | ● |
| SHP-3260 | 60 | 100 | 8 ~ 9 | 9 ~ 10 | 180 | 22.3 ~ 37.8 | 0.2 ~ 1.2 | 13.6 ~ 19.9 | ● | ● | ● | ● |
| SHP-4060 | 60 | 100 | 10 | 11 ~ 12 | 180 | 27.5 ~ 48.0 | 0.2 ~ 1.2 | 21.5 ~ 30.3 | ● | ● | ● | ● |
| SHP-4860 | 60 | 100 | 11 ~ 12 | 12 ~ 14 | 180 | 30.0 ~ 55.0 | 0.2 ~ 1.2 | 27.5 ~ 36.0 | ● | ● | ● | ● |
| SHP-5060 | 60 | 100 | 13 ~ 15 | 15 ~ 17 | 180 | 36.4 ~ 63.0 | 0.2 ~ 1.2 | 37.8 ~ 53.0 | ● | ● | ● | ● |
| SHP-7260 | 60 | 100 | 17 ~ 20 | 20 ~ 22 | 180 | 47.6 ~ 85.0 | 0.2 ~ 1.2 | 66.3 ~ 94.4 | ● | ● | ● | ● |
| SHP-8460 | 60 | 100 | 21 ~ 24 | 23 ~ 24 | 180 | 58.8 ~ 100.8 | 0.2 ~ 1.2 | 96.8 ~ 133.0 | ● | ● | ● | ● |
| SHP-1275 | 75 | 100 | 3 | | 200 | 8.4 ~ 13.5 | 0.2 ~ 0.9 | 1.74 ~ 2.28 | ● | ● | ● | ● |
| SHP-1475 | 75 | 100 | 4 | | 200 | 12.0 ~ 18.4 | 0.2 ~ 0.9 | 3.2 ~ 4.6 | ● | ● | ● | ● |
| SHP-2075 | 75 | 100 | 5 | | 200 | 15.0 ~ 23.5 | 0.2 ~ 0.9 | 5.3 ~ 7.3 | ● | ● | ● | ● |
| SHP-3075 | 75 | 100 | 6 ~ 7 | 8 | 200 | 19.2 ~ 31.5 | 0.2 ~ 0.9 | 9.5 ~ 11.9 | ● | ● | ● | ● |
| SHP-3275 | 75 | 100 | 8 | 9 ~ 10 | 200 | 22.3 ~ 36.4 | 0.2 ~ 0.9 | 12.6 ~ 16.0 | ● | ● | ● | ● |
| SHP-4075 | 75 | 100 | 9 ~ 10 | 11 ~ 12 | 200 | 27.5 ~ 44.0 | 0.2 ~ 0.9 | 18.4 ~ 24.4 | ● | ● | ● | ● |
| SHP-4875 | 75 | 100 | 11 ~ 12 | 14 | 200 | 30.8 ~ 51.8 | 0.2 ~ 0.9 | 25.6 ~ 30.6 | ● | ● | ● | ● |
| SHP-5075 | 75 | 100 | 13 ~ 14 | 15 ~17 | 200 | 37.7 ~ 62.9 | 0.2 ~ 0.9 | 37.7 ~ 45.8 | ● | ● | ● | ● |
| SHP-7275 | 75 | 100 | 15 ~ 17 | 20 | 200 | 50.0 ~ 76.5 | 0.2 ~ 0.9 | 55.7 ~ 80.6 | ● | ● | ● | ● |
| SHP-8475 | 75 | 100 | 20 | 22 ~ 24 | 200 | 56.0 ~ 87.6 | 0.2 ~ 0.9 | 73.1 ~ 101.2 | ● | ● | ● | ● |
| Current Carrying Capacity | 100% x $I_r$, no melting | | | | | | | | | | | |
| Controlled Fusing Time | In operation voltage range, the fusing time is ≤ 60 s | | | | | | | | | | | |
| Current Fusing Time | 200% x $I_r$ the fusing time is ≤ 60 s | | | | | | | | | | | |
| Endurance Test | 500% x $I_r$ power on 5 ms, power off 995 ms, 100,000 cycles | | | | | | | | | | | |
| Working Temperature Range | -20 ~ 85 ℃ | | | | | | | | | | | |

Note:

1. For P1 - P2, please refer to the structure diagram.


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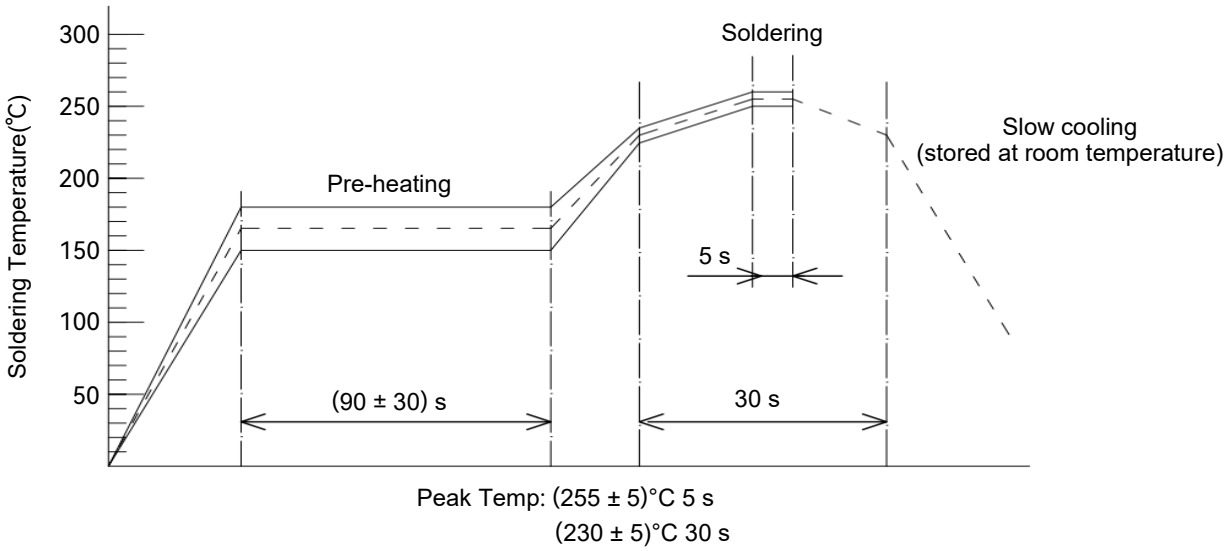
## Soldering Parameters

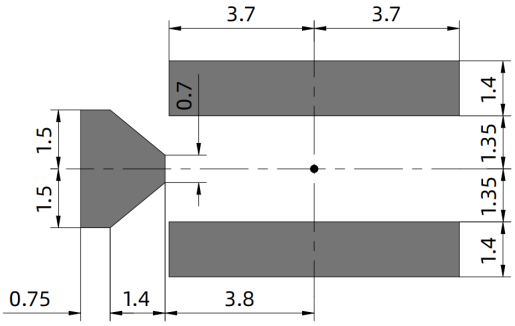
1. Reflow Soldering Method (For Reference Only)




2. Recommended Hand Soldering Parameters

Solder Iron Temp: (400 ± 5) ℃
Soldering Time: (3 ± 1) s

## Recommended mounting size (Unit: mm)




Note: This is only the recommended size and does not guarantee the mounting quality. Please verify it in combination with your company's design guidelines.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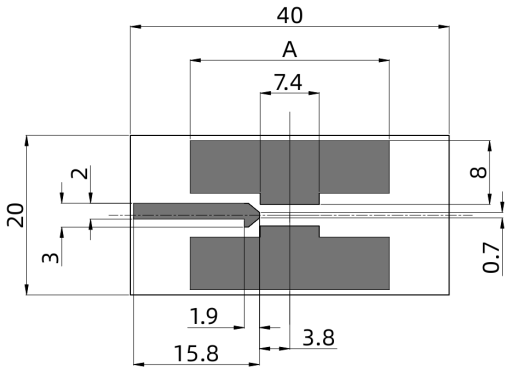
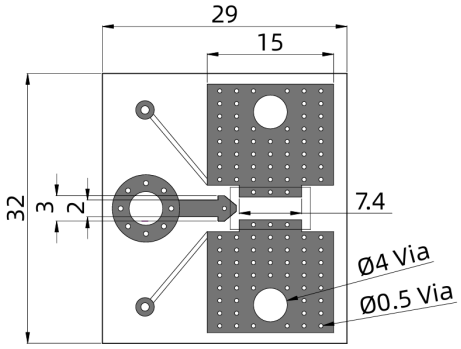
## Recommended Test PCB Board




| Rated Current | Materials | Base Thickness | Copper Width A | Copper Thickness | Number Of board layers |
|---|---|---|---|---|---|
| 30 A | FR-4 | 0.6 mm | 6.0 mm | 2.0 OZ (70 um) | Single Sided Board |
| 45 A | FR-4 | 0.6 mm | 25 mm | 3.0 OZ (105 um) | Single Sided Board |
| 60 A | FR-4 | 0.6 mm | 25 mm | 3.0 OZ (105 um) | Single Sided Board |




| Rated Current | Materials | Base Thick-ness | Copper Width A | Copper Thickness | Number Of board layers | Screw Specifica-tions |
|---|---|---|---|---|---|---|
| 75 A | FR-4 | 1.6 mm | 15 mm | 2.0 OZ (70 um) | Double Sided Board | M4 |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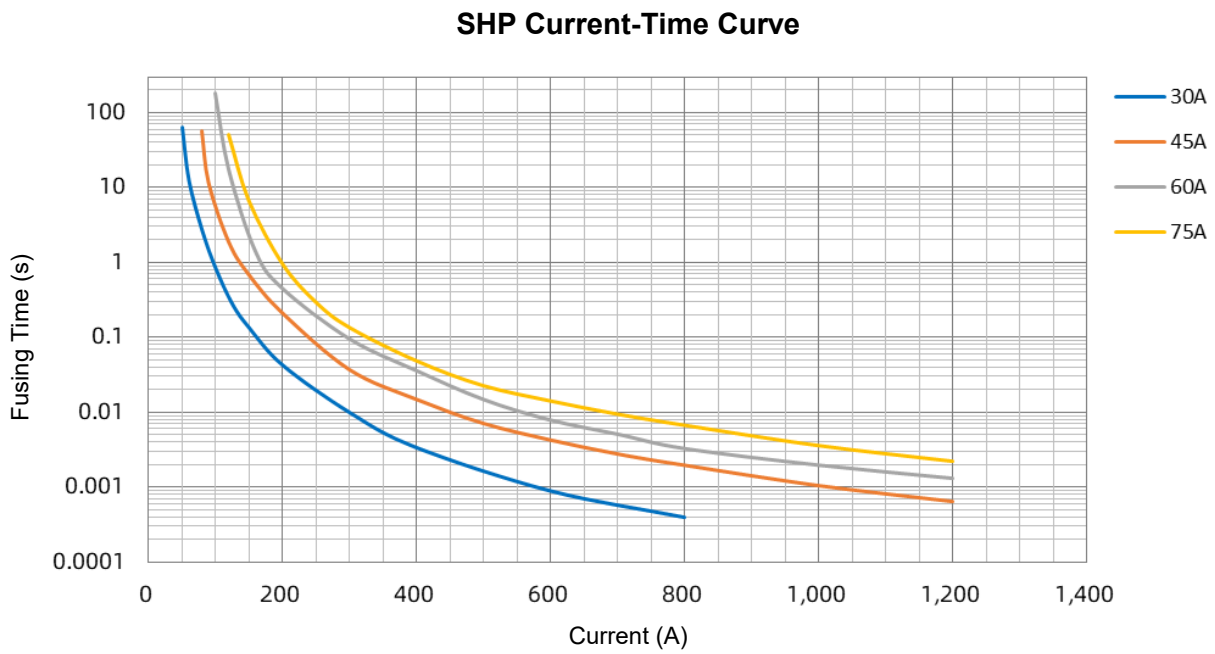
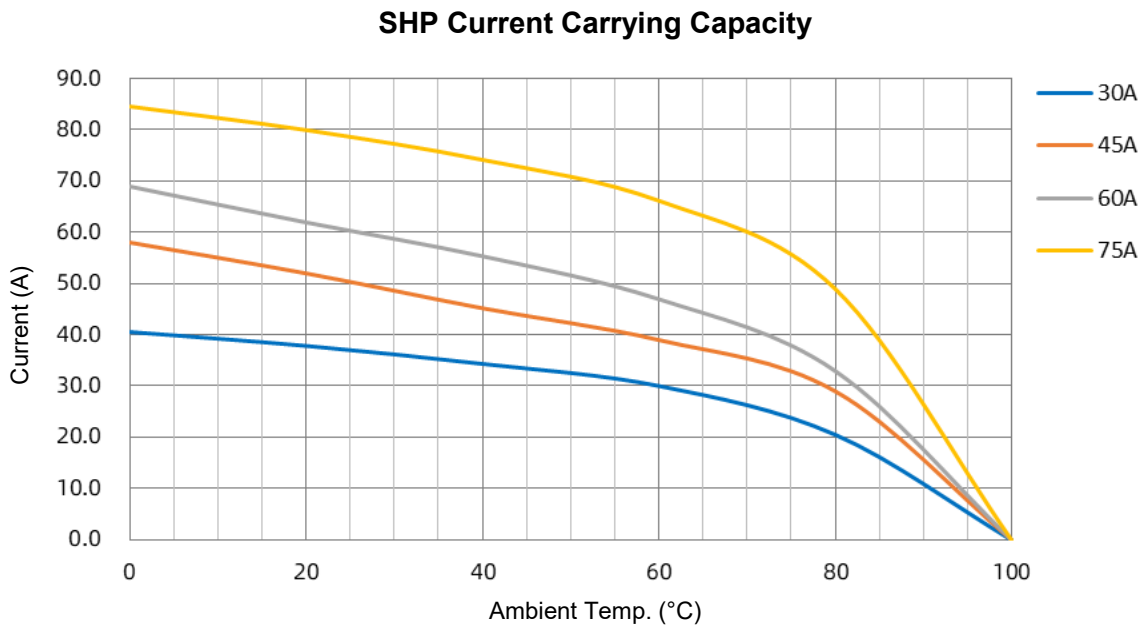
## Current-Time Curve (Reference)

The Current-Time curve shows functioning time at multi-times rated current at room temperature.




## Current Carrying Capacity (Reference)

Under different temperatures apply test current, the surface temperature is 100 °C as the highest point, and the load value is obtained.




*Note:

1. The values in the table are typical values that we recommend to test PCB board evaluation, Reference product resistances: 1.50 mΩ (30 A), 0.95 mΩ (45 A), 0.83 mΩ (60 A), 0.70 mΩ (75 A);
2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.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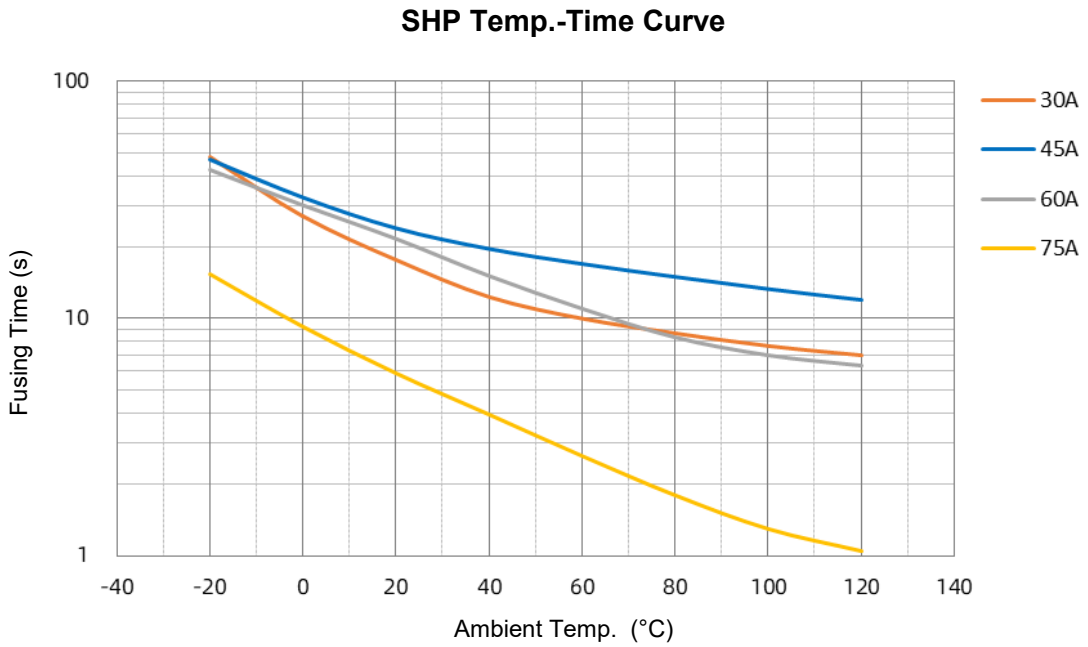
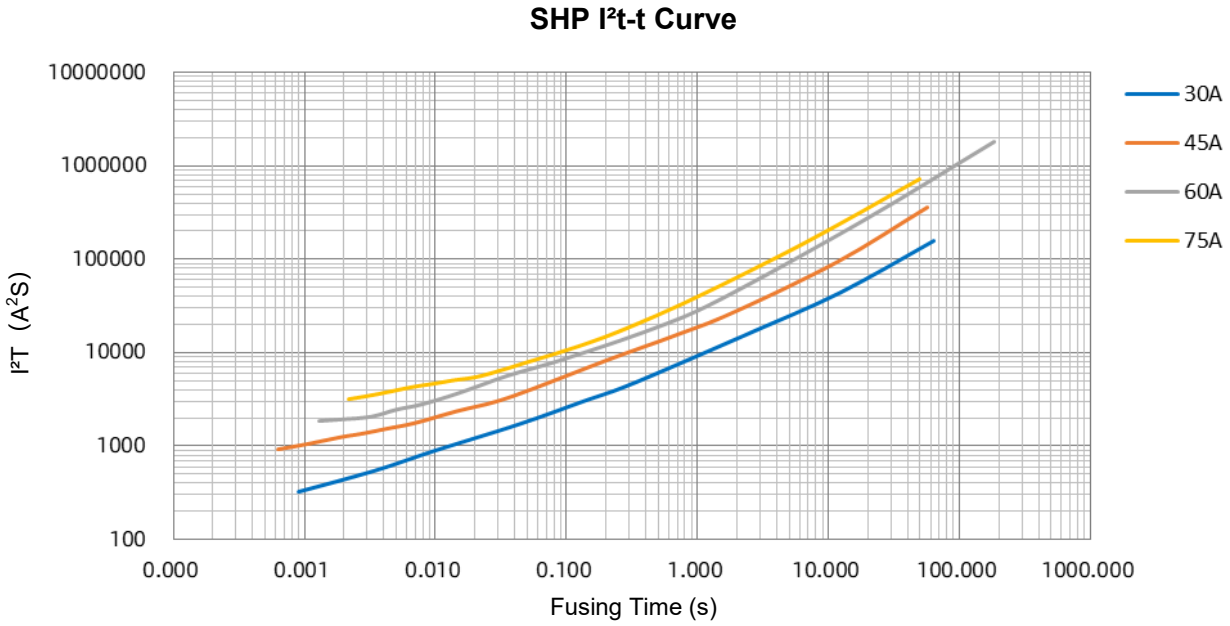
## Temp.-Time Curve (Reference)

Under different conditions, Test the disconnection time curve of P1-P2 under 2 times overload current.




## I²t-t Curve (Reference)

At room temperature, collects the disconnection time of P1 - P2 under multiples of overload current, curve obtained by the product of squared current and disconnection time.




*Note:

1. The values in the table are typical values that we recommend to test PCB board evaluation, Reference product resistances: 1.50 mΩ (30 A), 0.95 mΩ (45 A), 0.83 mΩ (60 A), 0.70 mΩ (75 A);
2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.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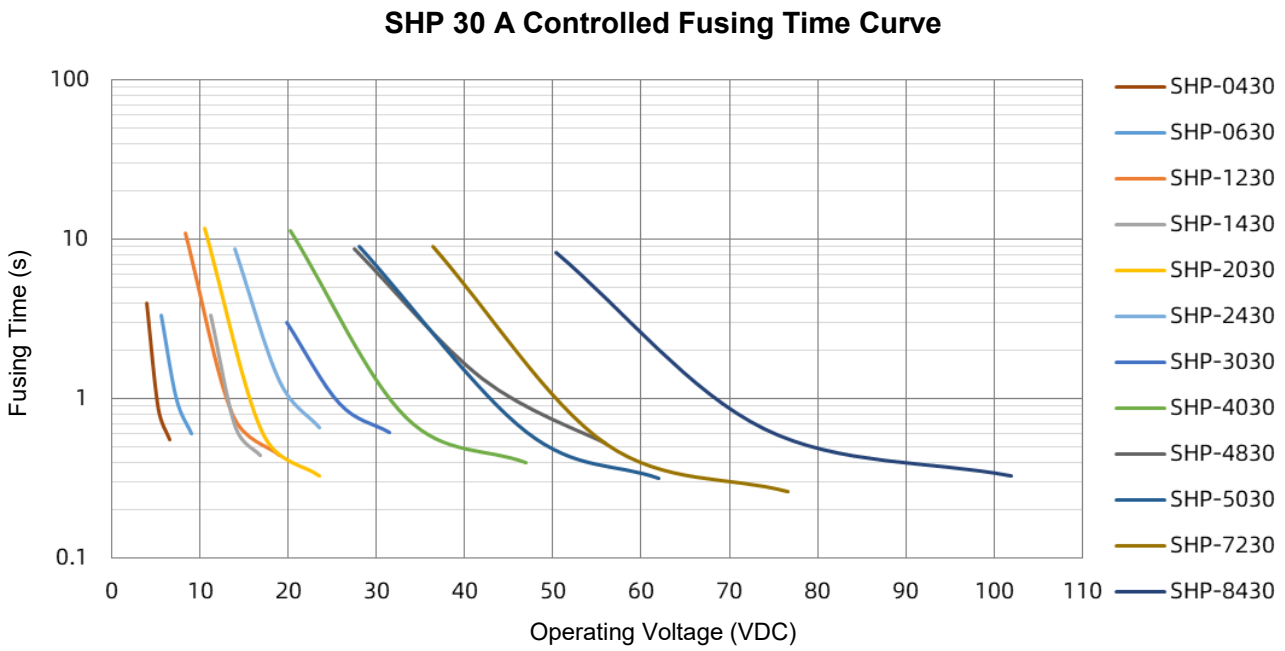
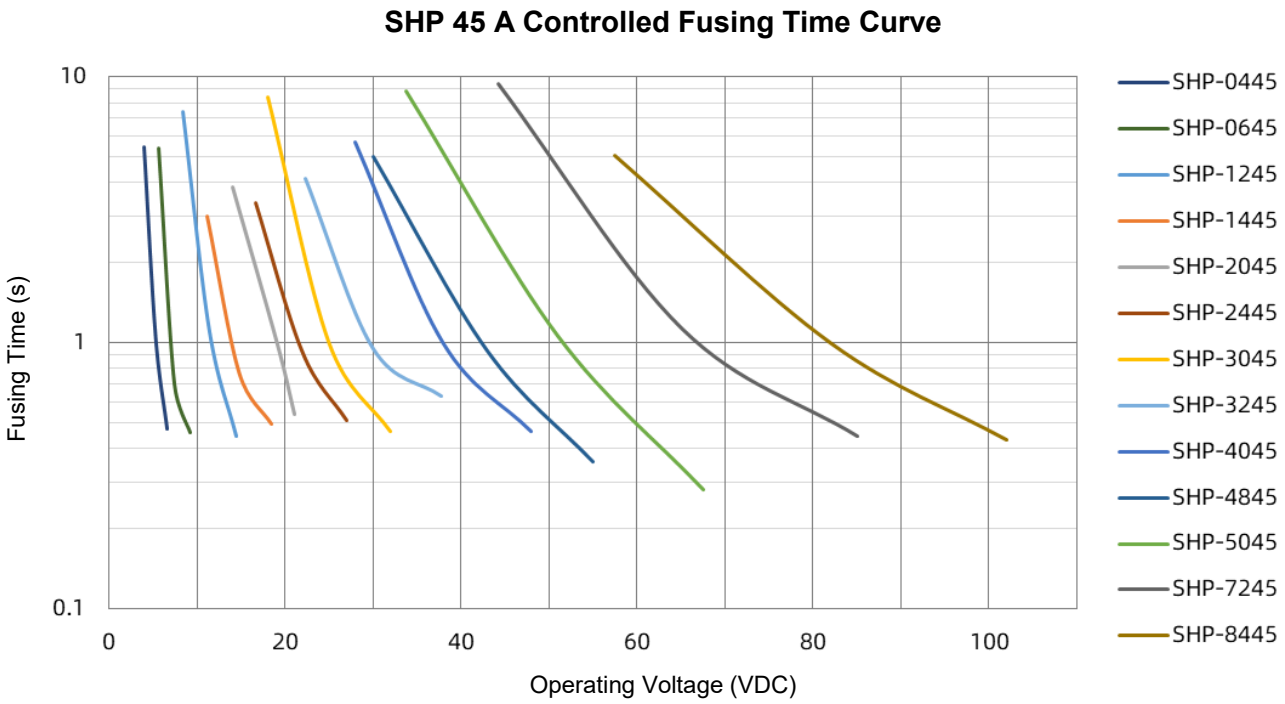
## Controlled Fusing Time Curve (Reference)

The FH applies the operating voltage at room temperature, and collects the disconnection time of P1-P2.





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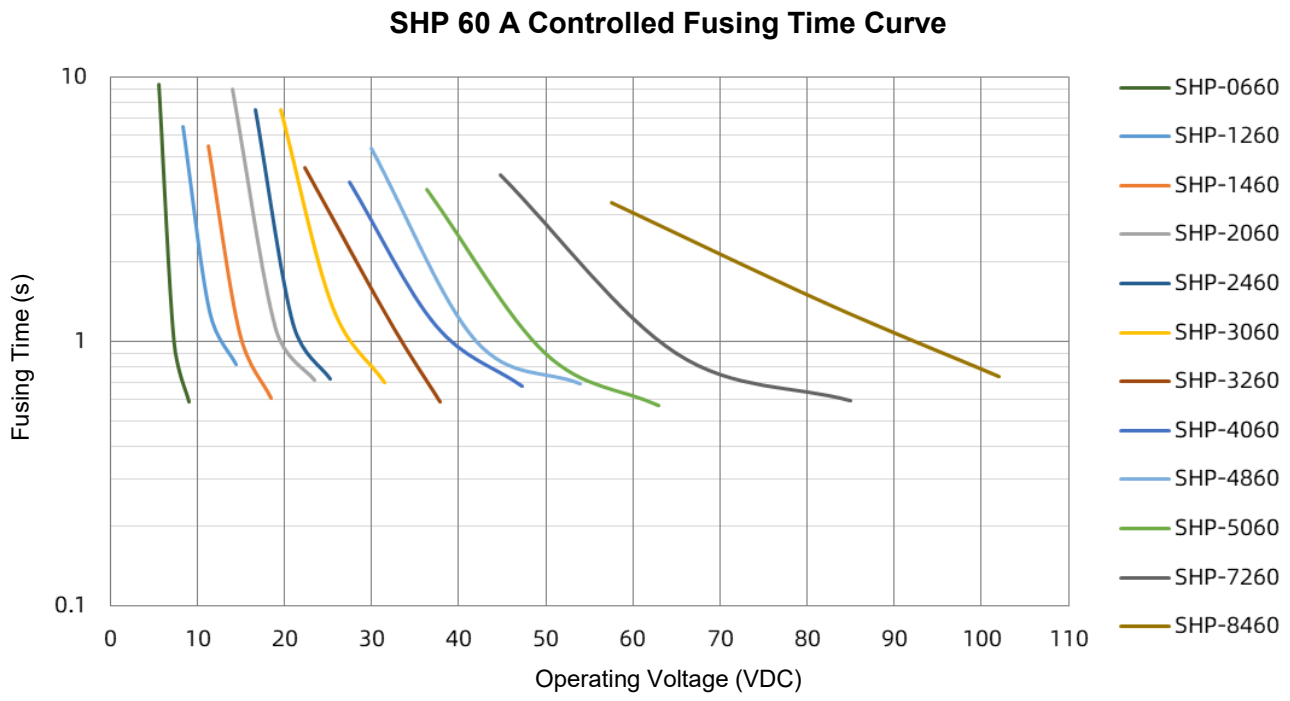
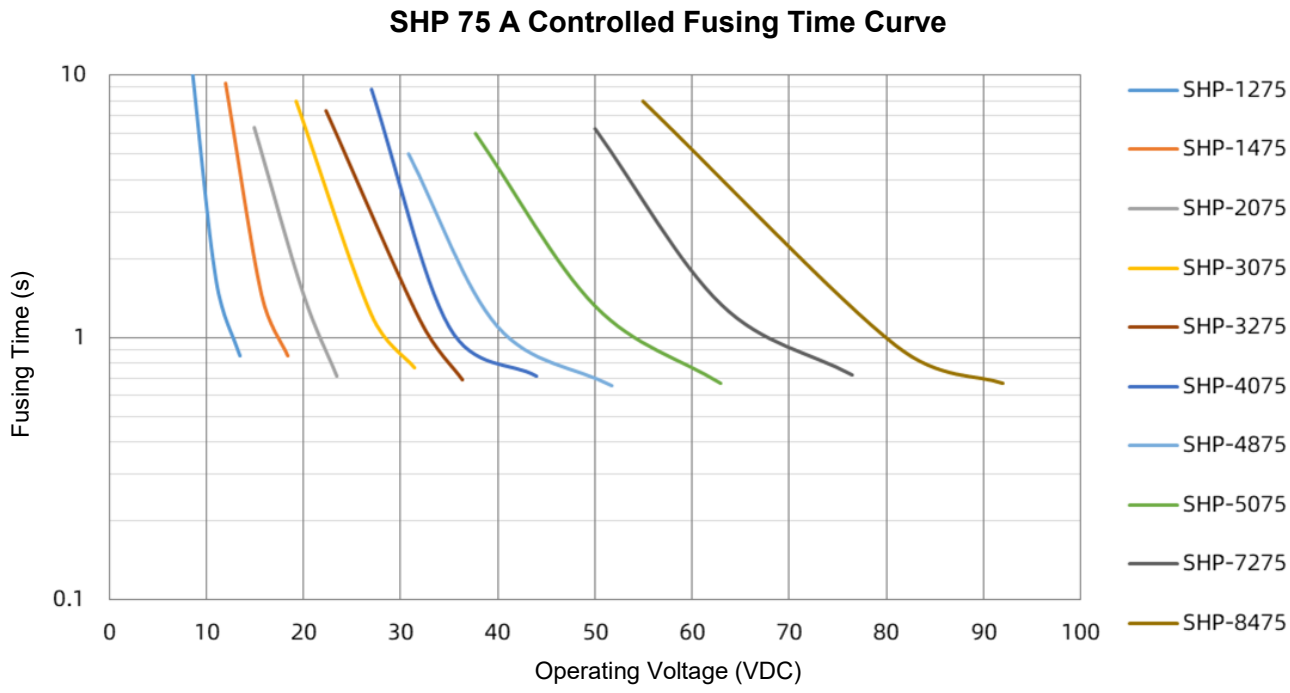
## Controlled Fusing Time Curve (Reference)

The FH applies the operating voltage at room temperature, and collects the disconnection time of P1-P2.





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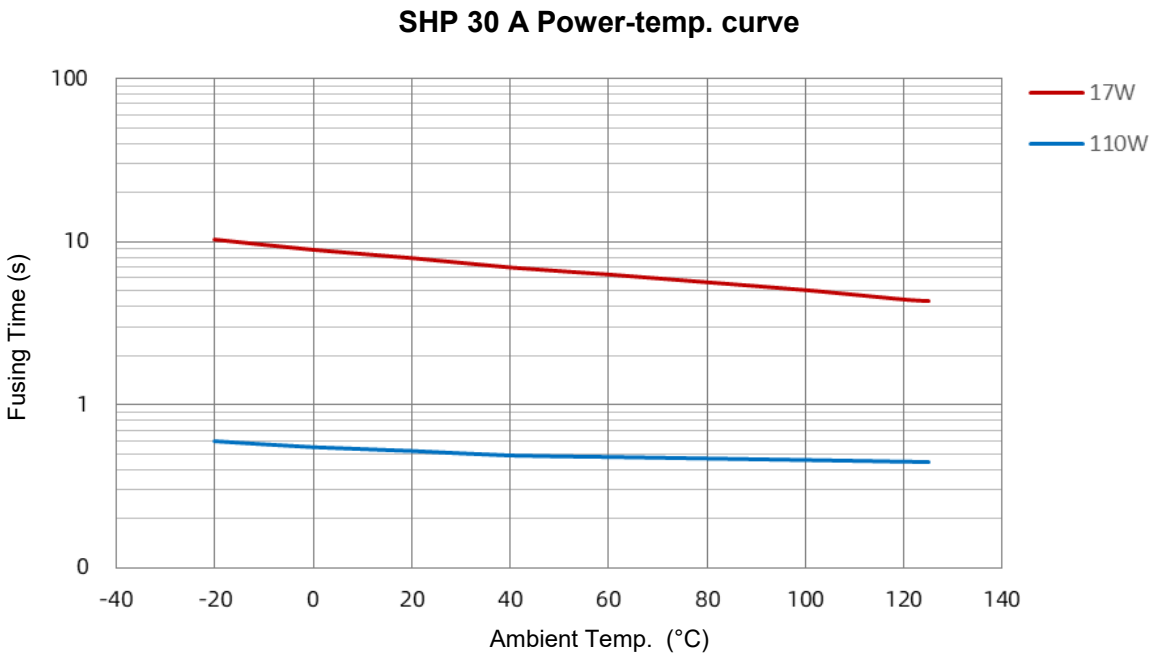
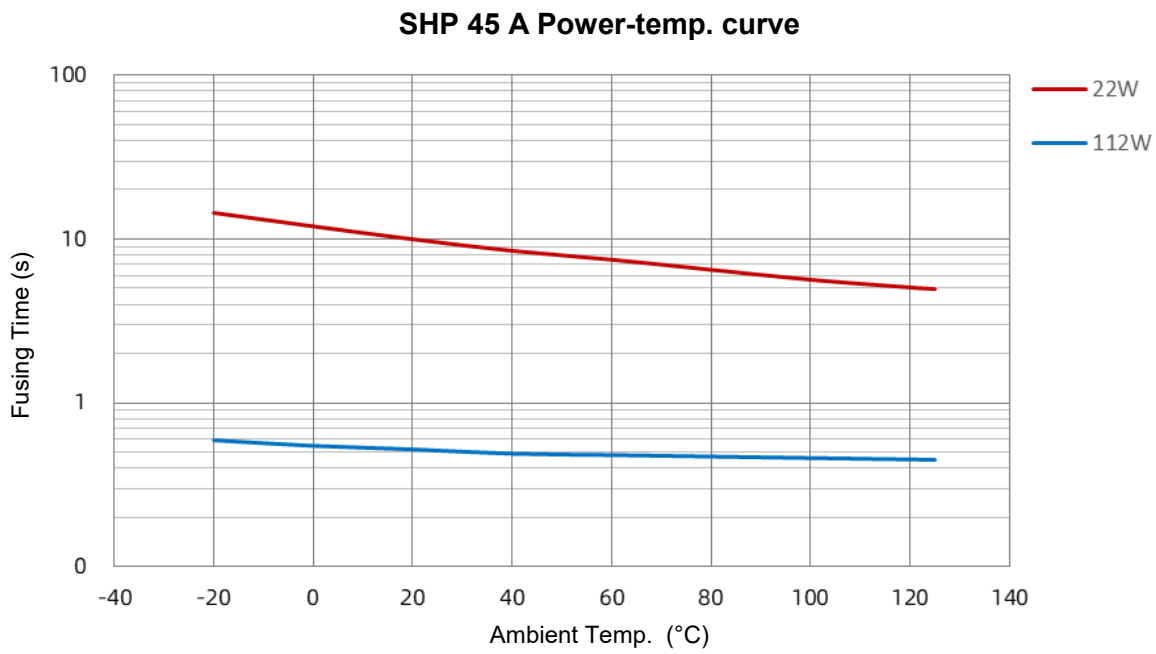
## Power-temp. curve (Reference)

At different temperatures, the heating element applies an operating voltage corresponding to the power, and collects the disconnection time of P1 - P2.





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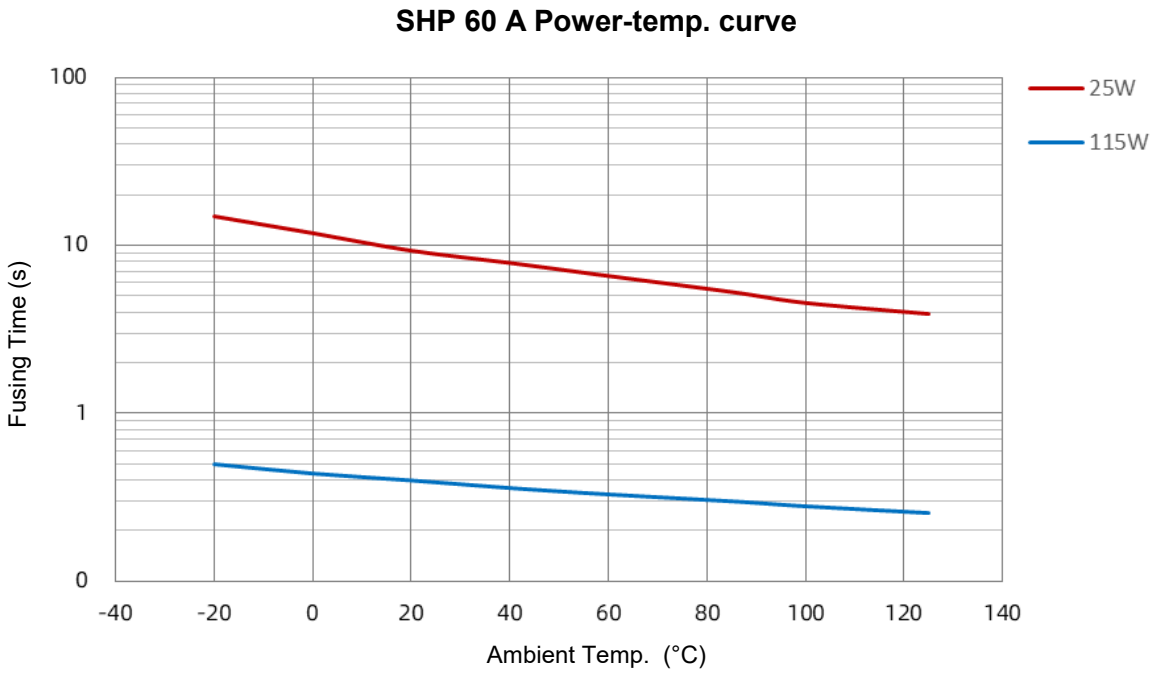
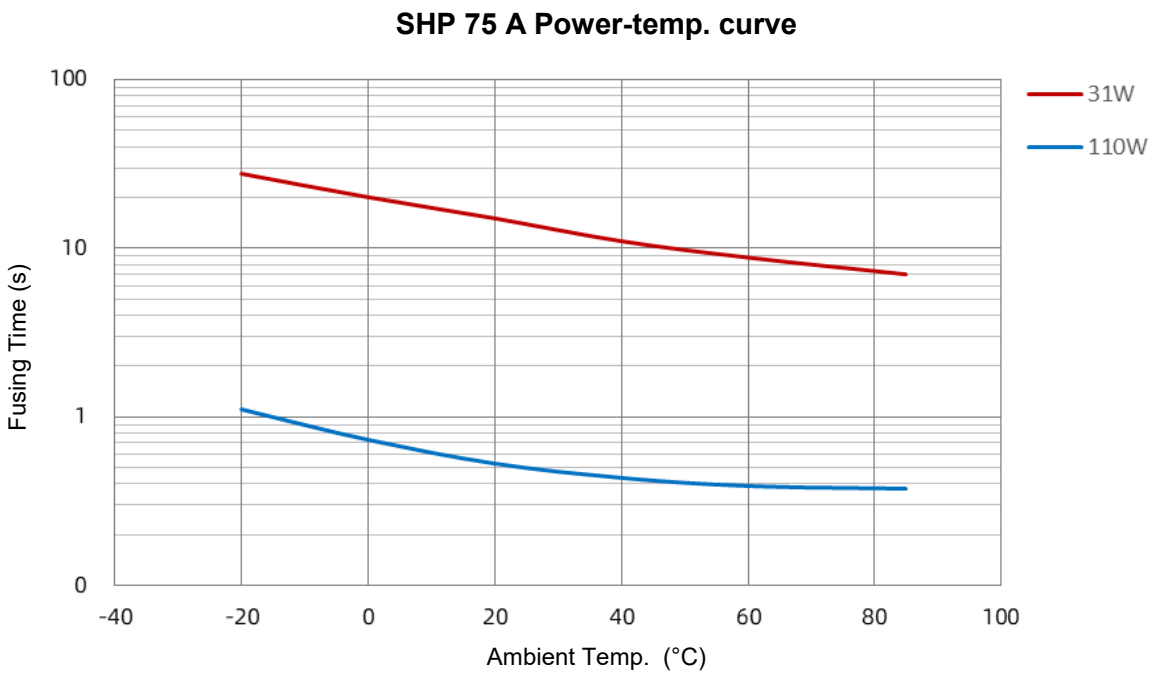
## Power-temp. curve (Reference)

At different temperatures, the heating element applies an operating voltage corresponding to the power, and collects the disconnection time of P1 - P2.





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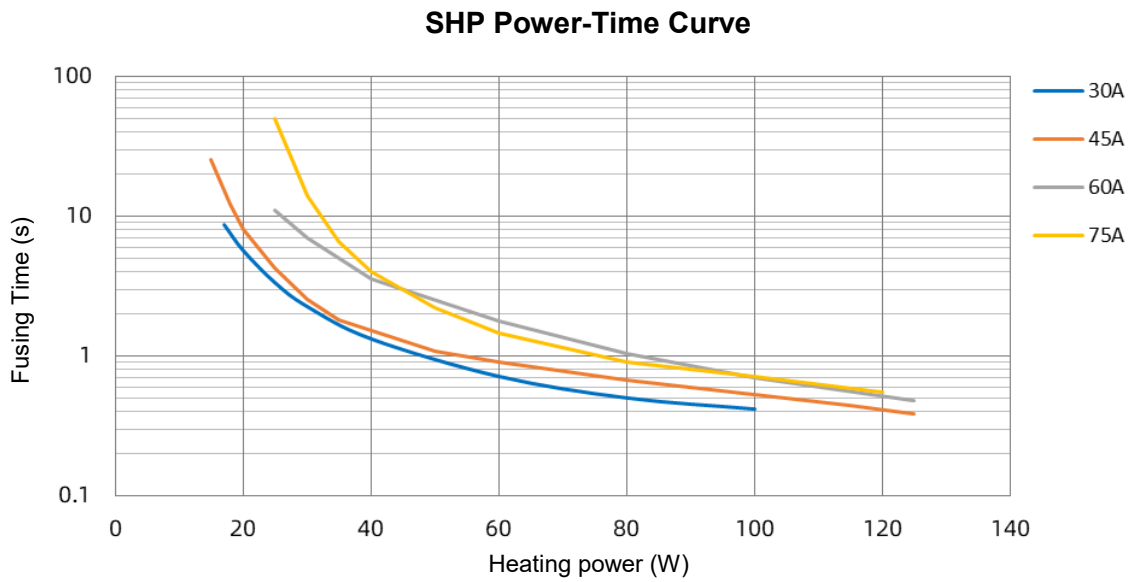
## Power-Time Curve (Reference)

At room temperature, apply the operating voltage within the power range of the heating element, and collects the disconnection time of P1 - P2.





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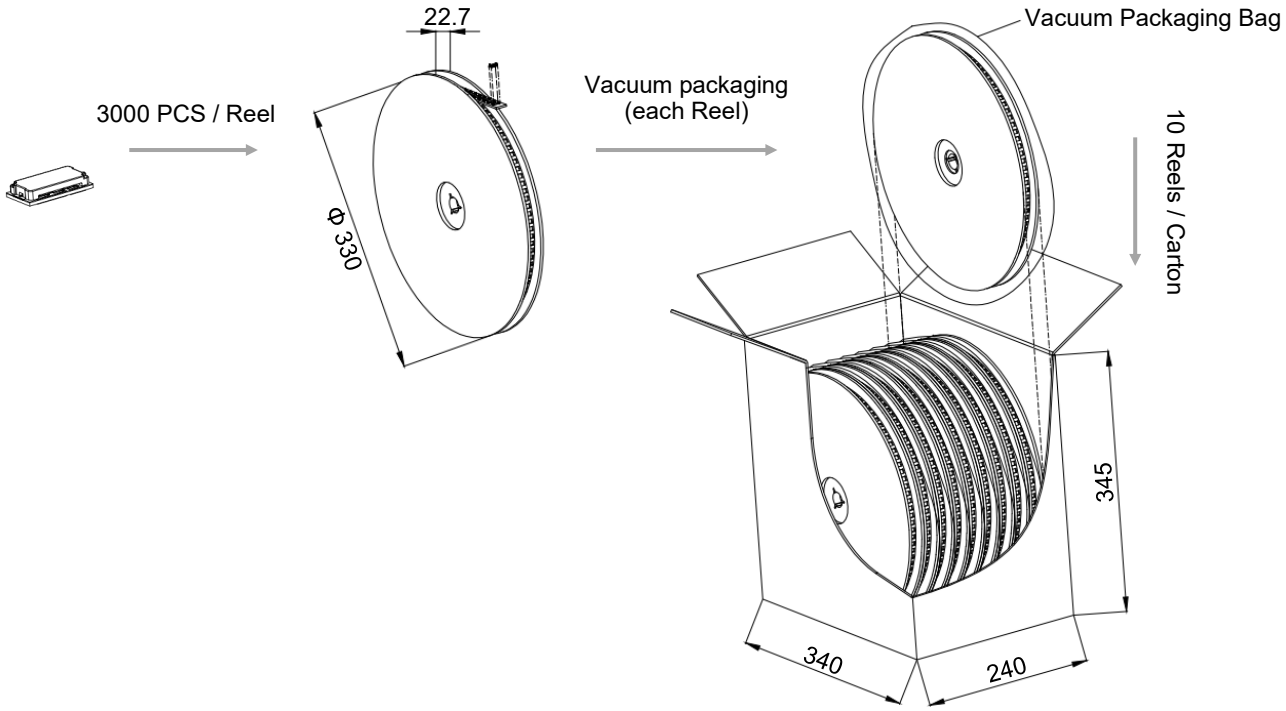
## Packaging Information

| Item | Reel | Carton |
|---|---|---|
| Dimensions (mm) | Φ 330 × 22.7 | 340 × 240 × 345 |
| Quantity (PCS) | 3000 | 30000 |
| Gross Weight (kg) | 1.0 ± 5 % | 10.6 ± 5 % |





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# ATTENTION

## Usage

1. When atmosphere press is from 80 kPa to 106 kPa, the related altitude shall be from 2,000 meter to -500 meter.
2. Do not touch the HCO body or electrode lead directly when power is on, to avoid burning or electric shocking.
3. It is necessary to foresee there are possibilities that “Current Carrying Capacity” and “Controlled Fusing Time” may be varied along with the condition change in the substrate thermal capacity, etc. therefore you should check it on your PCB. Generally, when thermal capacity of PCB increases, Current carrying capacity will increase accordingly and Cleaning-time will be longer.
4. This product is designed and produced for only general-use of electronics devices. Therefore, we do not suppose that it is used for the. applications [Military, Medical and so on] which may cause direct damages on life, bodies or properties of third party.

## Installation

1. Surface mounting.
2. Do not apply mechanical stress to the protection body during or after the installation.
3. Ultrasonic-cleaning or immersion-cleaning and so on must not be done to HCO before and after mounted. When cleaning is done, flux on element would flow, and it would not meet its specification. Moreover, a similar influence happens when the product comes in contact with cleaning-solution. These products after cleaning will not be guaranteed.
4. Please do not re-use of the HCO removed.
5. Please avoid doing resin-coating for HCO. The resin might infiltrate into the product, and it doesn’t meet the specification when the resin-coating is done to this product. These products after resin-coating will not be guaranteed.
6. Make sure that the terminals of this product are connected properly on the circuit board, and the reristance should be in the range of FH resistance between Terminal P1 - P3 and P2 - P3.


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## Replacement

HCO is a non-repairable product. For safety aspect, it shall be replaced by an equivalent HCO, and mounted in the same way.

## Storage

1. HCO must be stored in shaded area where it is not too dusty, with temp. (10 to 30) °C or less with no sudden temperature change, humidity within (30 to 70) % RH, and no corrosive gas in the air. please use them up within 1 year after receiving the goods .
2. This product's terminals use Ag plating. Ag terminals tend to easily get sulfurized or tarnished, please be cautious about their storage environment as follows.

(1) Unopen packages also must be stored under the storage condition described in Storage Section 1.

(2) After opening packages, products shall be sealed in a bag with high gas proof (e.g. aluminum laminated bag), and must be stored under the storage condition described in Storage Section 1.


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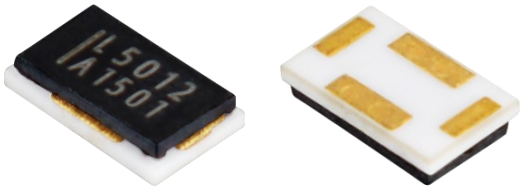


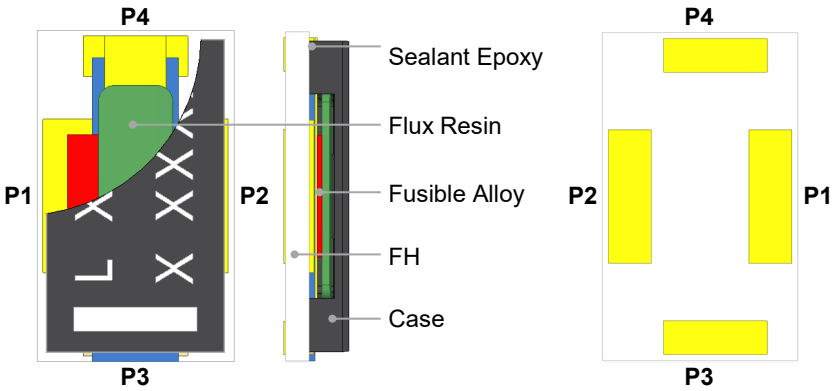

## Description

Heat CutOff (HCO), also known as a three-terminal fuse, is an actuating component designed with overcurrent and overcharge protection functions. The main body of an HCO consists of FH, Fusible Alloy, Flux Resin, Case and Sealant Epoxy.

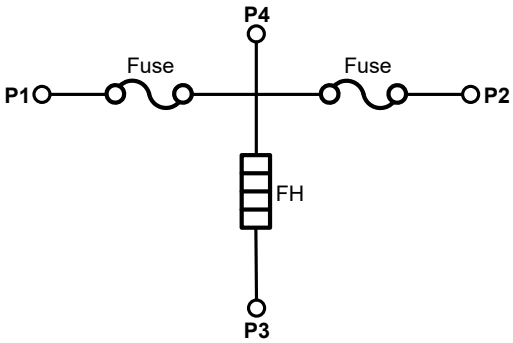
The Heat CutOff (HCO) is primarily used in secondary protection schemes for lithium battery charge and discharge circuits, providing redundant protection alongside the primary protection circuit. During the charge and discharge process of lithium batteries, if an abnormal overcurrent occurs, the fusible alloy self-heats and melts, disconnecting the charge and discharge circuit to achieve overcurrent protection. In the event of an overcharge, if the primary protection circuit's IC or the FET in the charge and discharge path fails, the secondary protection IC activates and energizes the Heater of the HCO. This causes the fusible alloy to melt due to the generated heat, disconnecting the charge and discharge circuit to provide overcharge protection. This mechanism ensures dual protection against both overcurrent and overcharge conditions.

The key features of SETsafe | SETfuse Heat CutOff (HCO) SHL series products include: Rated Currents of (12 / 15 / 30) A, Rated Voltages of 80 VDC, and an Operating Voltage Range of (3.8 ~ 62.0) VDC. These products have obtained UL, cUL and TUV certifications and comply with RoHS and REACH directives.

## Structure Diagrams




## Product Schematic




- P1 ~ P2 Main Circuit（MC）
- P1 / P2 / P4 ~ P3 Control Circuit（CC）

## Application

- Sweeping robot
- Cordless vacuum cleaner
- Power tools
- Electric bicycle
- Electric car balance

## Features

- Surface Mount
- Overcurrent Protection
- Overcharging Protection
- Low Impedance, Low Power Consumption
- Controlled Fusing Time ≤ 60 s
- Non-Resettable
- RoHS & REACH Compliant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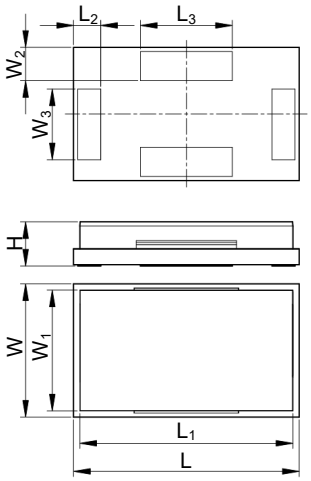
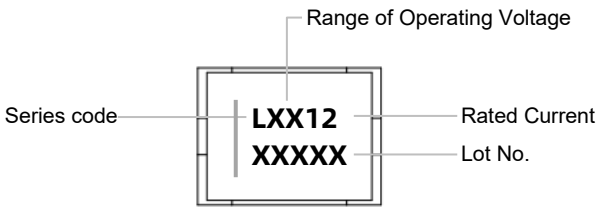
## Dimensions (Unit: mm)




| L | $L_1$ | $L_2$ | $L_3$ | W | $W_1$ | $W_2$ | $W_3$ | H |
|---|---|---|---|---|---|---|---|---|
| 5.4 ± 0.2 | 5.1 ± 0.2 | 0.65 ± 0.2 | 2.2 ± 0.2 | 3.2 ± 0.2 | 2.9 ± 0.2 | 0.8 ± 0.2 | 1.7 ± 0.2 | 1.1 ± 0.2 |

## Marking




## Part Number System

SHL - 5 0 1 2

**Rated Current (A)**
12, 15, 30

**Rated Operating Voltage (VDC)**
04, 06, 08, 12, 18, 20, 24, 30, 32, 40, 50

**Series**
SHL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## Specifications

| Model | $I_r$ | $U_r$ | Cells in Series (Selection Reference) | Breaking Capacity | Range of Operating Voltage | Resistance | | Agency Information | | | RoHS REACH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $R_{Fuse}$ | $R_{FH}$ | UL | cUL | TUV | |
| | (A) | (VDC) | (Cells) | (A) | (VDC) | (mΩ) | (Ω) | | | | |
| SHL-0612 | 12 | 80 | 1 | 50 | 4.0 ~ 7.0 | ≤ 3.5 | 1.09 ~ 1.88 | ● | ● | ● | ● |
| SHL-0812 | 12 | 80 | 2 | 50 | 4.0 ~ 9.0 | ≤ 3.5 | 1.37 ~ 1.88 | ● | ● | ● | ● |
| SHL-1212 | 12 | 80 | 3 | 50 | 7.4 ~ 13.8 | ≤ 3.5 | 4.3 ~ 6.4 | ● | ● | ● | ● |
| SHL-1812 | 12 | 80 | 4 | 50 | 10.4 ~ 19.6 | ≤ 3.5 | 8.6 ~ 12.7 | ● | ● | ● | ● |
| SHL-2012 | 12 | 80 | 5 | 50 | 14.0 ~ 24.5 | ≤ 3.5 | 13.4 ~ 22.2 | ● | ● | ● | ● |
| SHL-3012 | 12 | 80 | 6 ~ 7 | 50 | 17.4 ~ 32.9 | ≤ 3.5 | 24.1 ~ 35.6 | ● | ● | ● | ● |
| SHL-4012 | 12 | 80 | 11 ~ 12 | 50 | 26.4 ~ 48.0 | ≤ 3.5 | 51.2 ~ 77.4 | ● | ● | ● | ● |
| SHL-5012 | 12 | 80 | 13 ~ 14 | 50 | 42.0 ~ 62.0 | ≤ 3.5 | 85.5 ~ 145.7 | ● | ● | ● | ● |
| SHL-0615 | 15 | 80 | 1 | 50 | 4.0 ~ 7.0 | ≤ 3.0 | 1.09 ~ 1.88 | ● | ● | ● | ● |
| SHL-0815 | 15 | 80 | 2 | 50 | 4.0 ~ 9.0 | ≤ 3.0 | 1.37 ~ 1.88 | ● | ● | ● | ● |
| SHL-1215 | 15 | 80 | 3 | 50 | 7.4 ~ 13.8 | ≤ 3.0 | 4.3 ~ 6.4 | ● | ● | ● | ● |
| SHL-1815 | 15 | 80 | 4 | 50 | 10.4 ~ 19.6 | ≤ 3.0 | 8.6 ~ 12.7 | ● | ● | ● | ● |
| SHL-2015 | 15 | 80 | 5 | 50 | 14.0 ~ 24.5 | ≤ 3.0 | 13.4 ~ 22.2 | ● | ● | ● | ● |
| SHL-3015 | 15 | 80 | 6 ~ 7 | 50 | 17.3 ~ 32.9 | ≤ 3.0 | 24.1 ~ 35.2 | ● | ● | ● | ● |
| SHL-4015 | 15 | 80 | 11 ~ 12 | 50 | 26.4 ~ 48.0 | ≤ 3.0 | 51.2 ~ 77.4 | ● | ● | ● | ● |
| SHL-5015 | 15 | 80 | 13 ~ 14 | 50 | 42.0 ~ 62.0 | ≤ 3.0 | 85.5 ~ 145.7 | ● | ● | ● | ● |


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| Model | $I_r$ | $U_r$ | Cells in Series (Selection Reference) | | Breaking Capacity | Range of Operating Voltage | Resistance | | Agency Information | | | RoHS REACH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | $R_{Fuse}$ | $R_{FH}$ | | | | |
| | (A) | (VDC) | (Cells) | LFP | (A) | (VDC) | (mΩ) | (Ω) | UL | cUL | TUV | |
| SHL-0430 | 30 | 80 | 1 | | 80 | 3.8 ~ 5.5 | ≤ 2.5 | 0.67 ~ 1.05 | ● | ● | ● | ● |
| SHL-0830 | 30 | 80 | 2 | | 80 | 6.6 ~ 9.6 | ≤ 2.5 | 2.05 ~ 3.11 | ● | ● | ● | ● |
| SHL-1230 | 30 | 80 | 3 | | 80 | 9.5 ~ 14.4 | ≤ 2.5 | 4.7 ~ 6.6 | ● | ● | ● | ● |
| SHL-1830 | 30 | 80 | 4 | | 80 | 13.2 ~ 19.2 | ≤ 2.5 | 8.2 ~ 12.4 | ● | ● | ● | ● |
| SHL-2030 | 30 | 80 | 5 | | 80 | 17.1 ~ 24.0 | ≤ 2.5 | 12.8 ~ 20.8 | ● | ● | ● | ● |
| SHL-2430 | 30 | 80 | 6 ~ 7 | | 80 | 19.8 ~ 31.5 | ≤ 2.5 | 22.1 ~ 29.0 | ● | ● | ● | ● |
| SHL-3030 | 30 | 80 | 7 ~ 8 | | 80 | 23.0 ~ 33.6 | ≤ 2.5 | 25.1 ~ 39.1 | ● | ● | ● | ● |
| SHL-3230 | 30 | 80 | 8 | | 80 | 26.4 ~ 38.4 | ≤ 2.5 | 32.8~ 49.7 | ● | ● | ● | ● |
| SHL-4030 | 30 | 80 | 9 ~ 10 | | 80 | 34.2 ~ 48.0 | ≤ 2.5 | 67.8 ~ 89.9 | ● | ● | ● | ● |
| SHL-5030 | 30 | 80 | 12 ~ 14 | 15 ~ 16 | 80 | 40.0 ~ 62.0 | ≤ 2.5 | 85.5 ~ 114.2 | ● | ● | ● | ● |
| Current Carrying Capacity | 100% x $I_r$, no melting | | | | | | | | | | | |
| Controlled Fusing Time | In operation voltage range, the fusing time is <1min | | | | | | | | | | | |
| Current Fusing Time | 200% x $I_r$ the fusing time is < 1 min | | | | | | | | | | | |
| Endurance Test | 500% x $I_r$ power on 5 ms, power off 995 ms, 100,000 cycles | | | | | | | | | | | |
| Working Temperature Range | -20 ~ 85 ℃ | | | | | | | | | | | |

Note:
1. For P1 - P2, please refer to the structure diagram.


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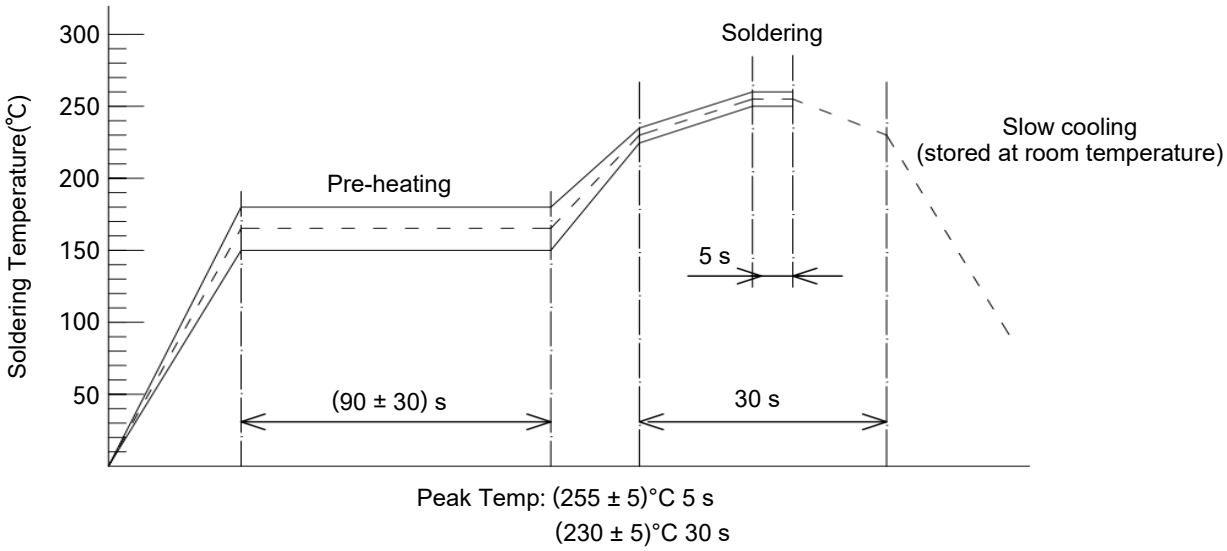
## Soldering Parameters

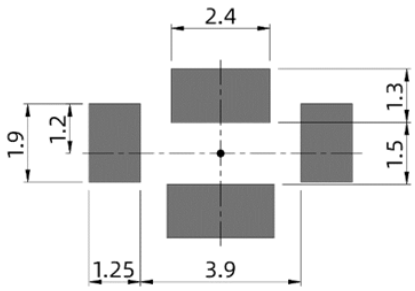
1. Reflow Soldering Method (For Reference Only)




2. Recommended Hand Soldering Parameters

Solder Iron Temp: (400 ± 5) ℃
Soldering Time: (3 ± 1) s

## Recommended mounting size (Unit: mm)




Note: This is only the recommended size and does not guarantee the mounting quality. Please verify it in combination with your company's design guidelines.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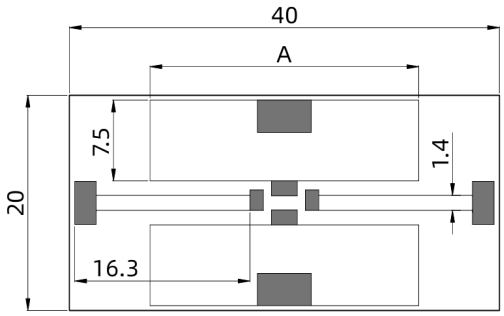
## Recommended Test PCB Board




| Rated Current | Materials | Base Thickness | Copper Width | Copper Thick-ness | Number Of board layers |
|---|---|---|---|---|---|
| 12 A | FR-4 | 0.6 mm | 2.0 mm | 2.0 OZ (70 um) | Single Sided Board |
| 15 A | FR-4 | 0.6 mm | 3.5 mm | 2.0 OZ (70 um) | Single Sided Board |
| 30 A | FR-4 | 0.6 mm | 25 mm | 2.0 OZ (70 um) | Single Sided Board |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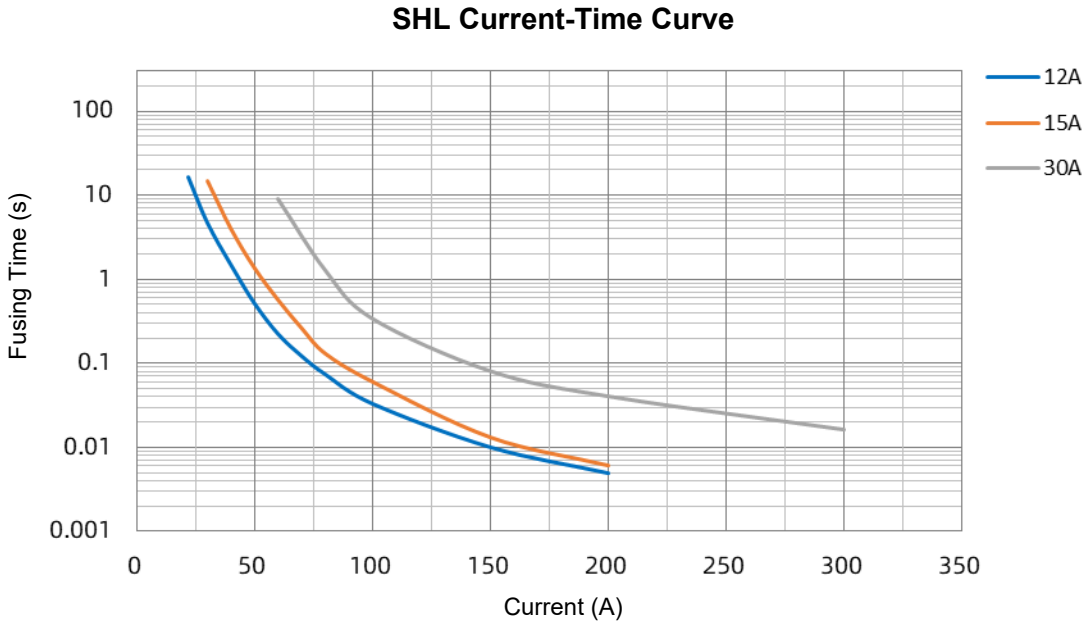
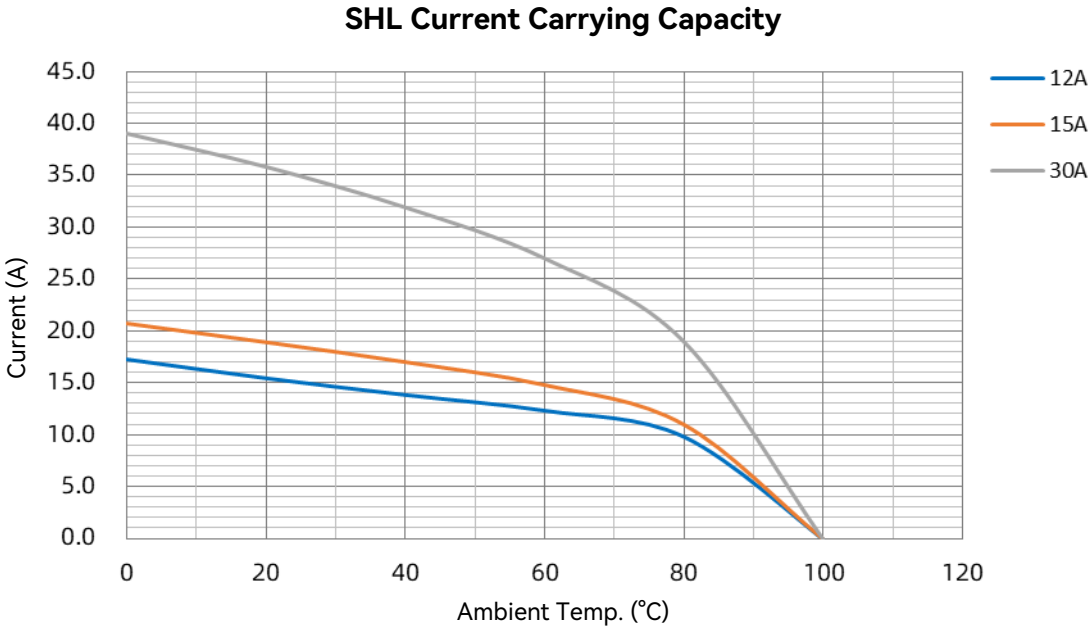
## Current-Time Curve (Reference)

The Current-Time curve shows functioning time at multi-times rated current at room temperature.




## Current Carrying Capacity (Reference)

Under different temperatures apply test current, the surface temperature is 100 °C as the highest point, and the load value is obtained.




*Note:

1. The values in the table are typical values that we recommend to test PCB board evaluation, Reference product resistances: 3.3 mΩ (12 A), 2.6 mΩ (15 A), 1.6 mΩ (30 A);
2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.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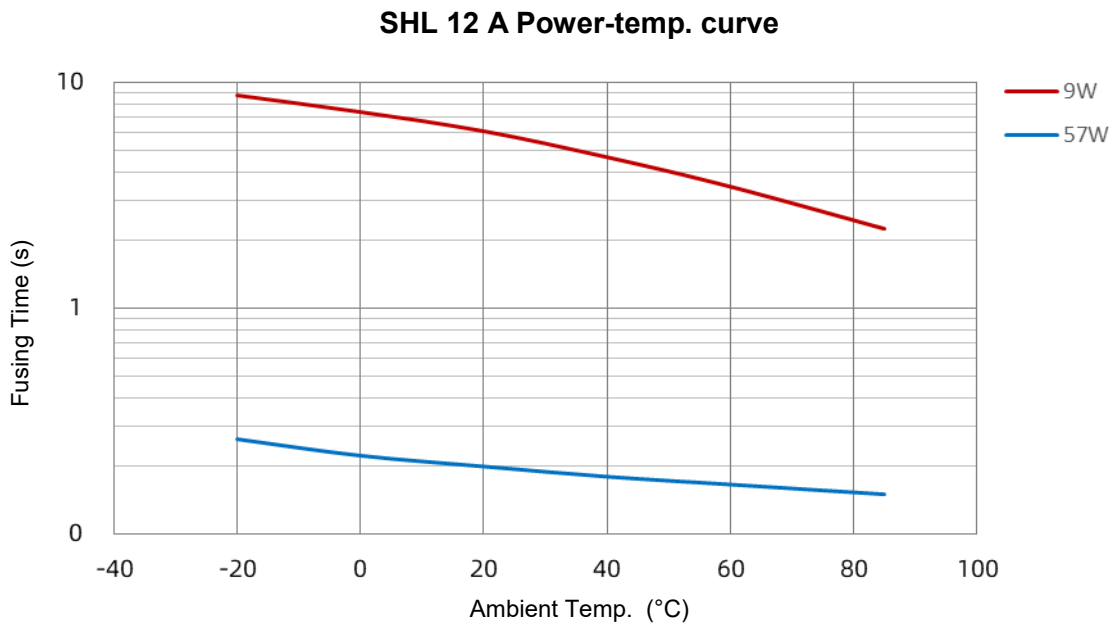
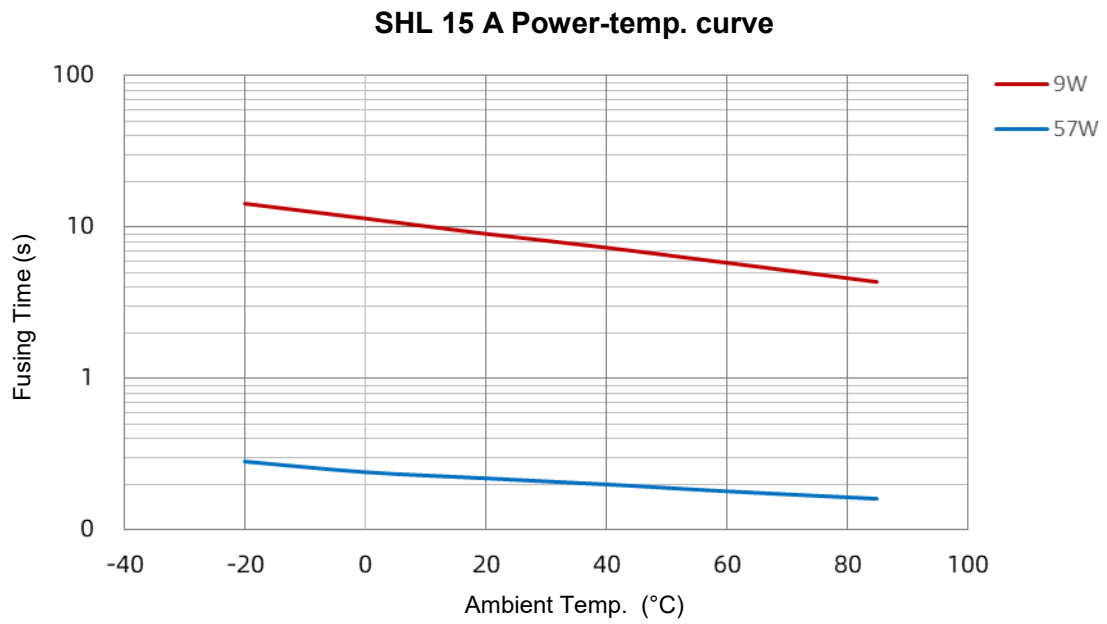
## Power-temp. curve (Reference)

At different temperatures, the heating element applies an operating voltage corresponding to the power, and collects the disconnection time of P1 - P2.





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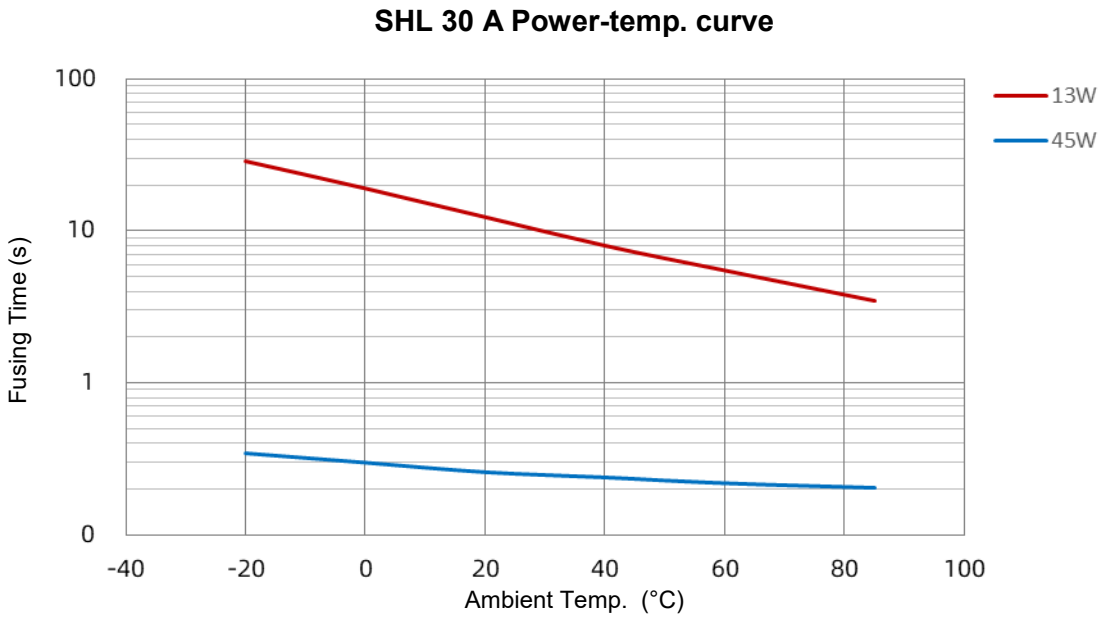
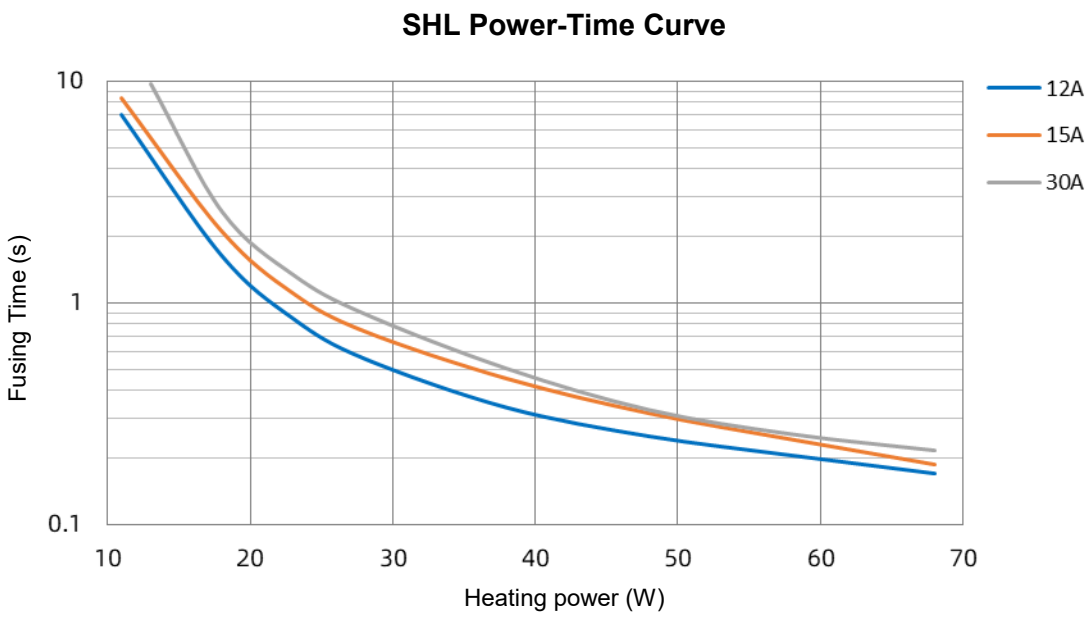
## Power-temp. curve (Reference)

At different temperatures, the heating element applies an operating voltage corresponding to the power, and collects the disconnection time of P1 - P2.




## Power-Time Curve (Reference)

At room temperature, apply the operating voltage within the power range of the heating element, and collects the disconnection time of P1 - P2.





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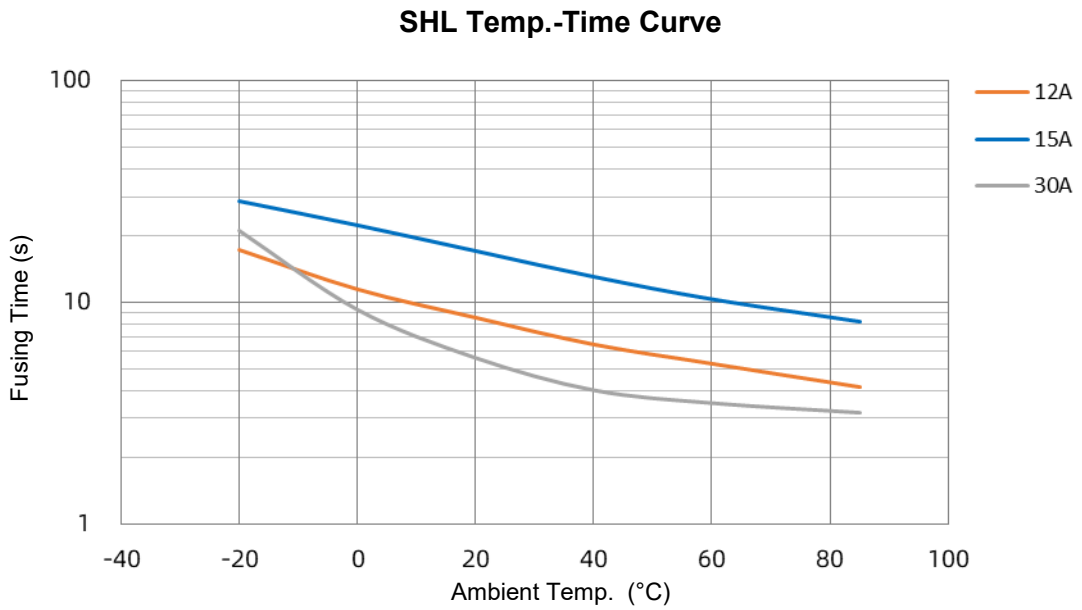
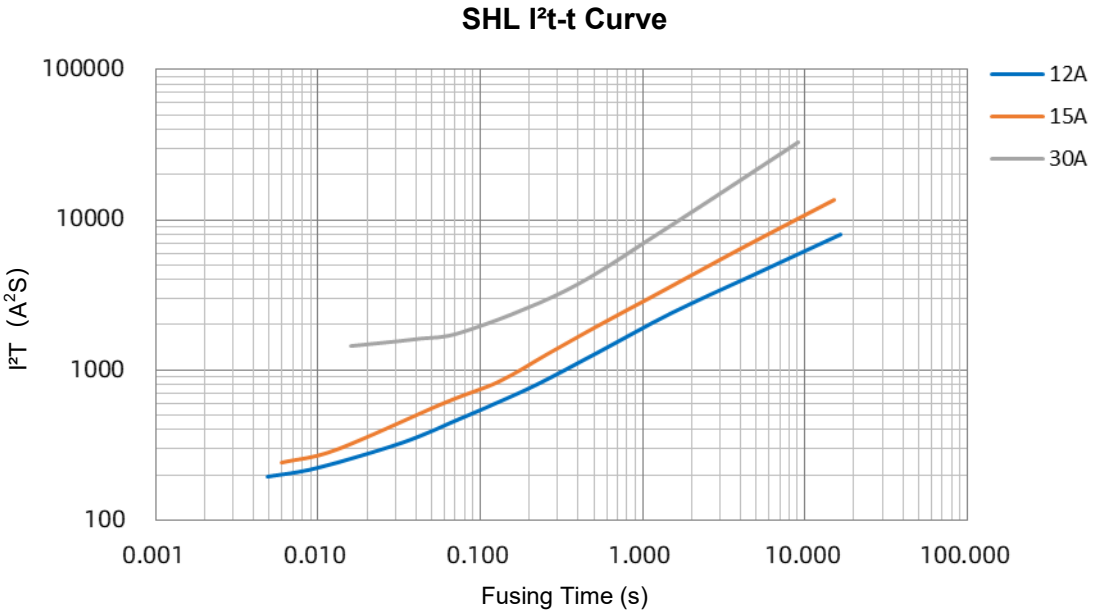
## Temp.-Time Curve (Reference)

Under different conditions, Test the disconnection time curve of P1-P2 under 2 times overload current.




## I²t-t Curve (Reference)

At room temperature, collects the disconnection time of P1 - P2 under multiples of overload current, curve obtained by the product of squared current and disconnection time.




*Note:

1. The values in the table are typical values that we recommend to test PCB board evaluation, Reference product resistances: 3.3 mΩ (12 A), 2.6 mΩ (15 A), 1.6 mΩ (30 A);
2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.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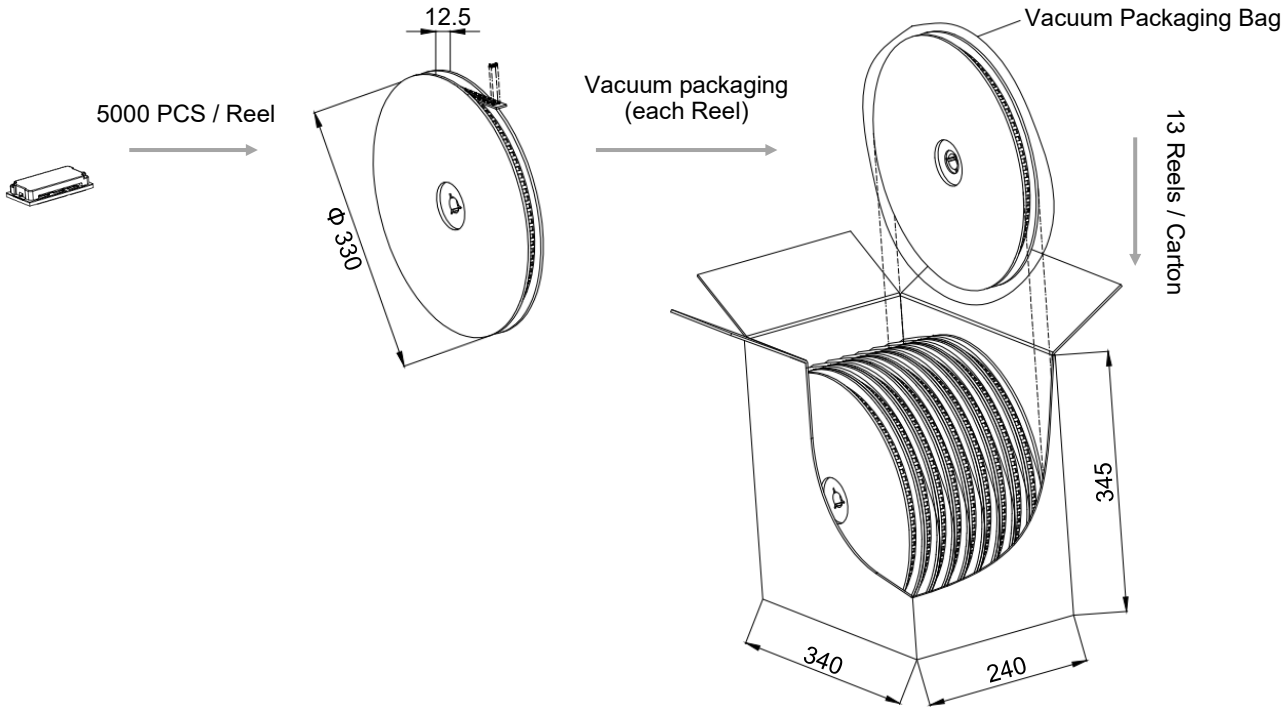
## Packaging Information

| Item | Reel | Carton |
|---|---|---|
| Dimensions (mm) | Φ 330 × 12.5 | 340 × 240 × 345 |
| Quantity (PCS) | 5000 | 65000 |
| Gross Weight (kg) | 0.69 ± 5 % | 9.4 ± 5 % |





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# ATTENTION

## Usage

1. When atmosphere press is from 80 kPa to 106 kPa, the related altitude shall be from 2,000 meter to -500 meter.
2. Do not touch the HCO body or electrode lead directly when power is on, to avoid burning or electric shocking.
3. It is necessary to foresee there are possibilities that “Current Carrying Capacity” and “Controlled Fusing Time” may be varied along with the condition change in the substrate thermal capacity, etc. therefore you should check it on your PCB. Generally, when thermal capacity of PCB increases, Current carrying capacity will increase accordingly and Cleaning-time will be longer.
4. This product is designed and produced for only general-use of electronics devices. Therefore, we do not suppose that it is used for the. applications [Military, Medical and so on] which may cause direct damages on life, bodies or properties of third party.

## Installation

1. Surface mounting.
2. Do not apply mechanical stress to the protection body during or after the installation.
3. Ultrasonic-cleaning or immersion-cleaning and so on must not be done to HCO before and after mounted. When cleaning is done, flux on element would flow, and it would not meet its specification. Moreover, a similar influence happens when the product comes in contact with cleaning-solution. These products after cleaning will not be guaranteed.
4. Please do not re-use of the HCO removed.
5. Please avoid doing resin-coating for HCO. The resin might infiltrate into the product, and it doesn’t meet the specification when the resin-coating is done to this product. These products after resin-coating will not be guaranteed.
6. Make sure that the terminals of this product are connected properly on the circuit board, P4 is a useless electrode that forms a resistance circuit with P3, but does not form a resistance circuit with P1 and P2. Attention should be paid to identification during installation.


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## Replacement

HCO is a non-repairable product. For safety aspect, it shall be replaced by an equivalent HCO, and mounted in the same way.

## Storage

1. HCO must be stored in shaded area where it is not too dusty, with temp. (10 to 30) °C or less with no sudden temperature change, humidity within (30 to 70) % RH, and no corrosive gas in the air. please use them up within 1 year after receiving the goods .


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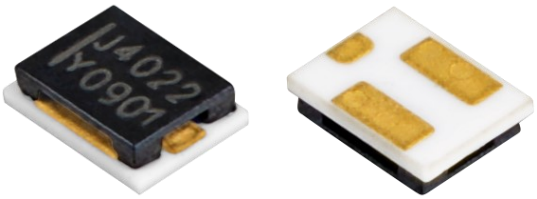


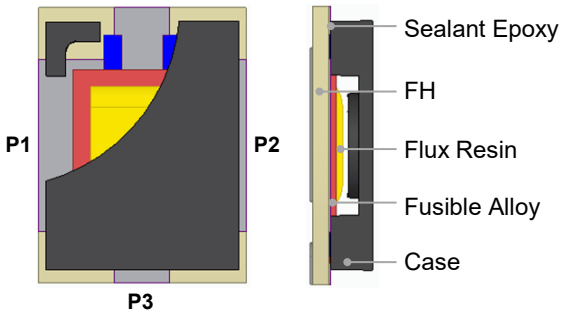

## Description

Heat CutOff (HCO), also known as a three-terminal fuse, is an actuating component designed with overcurrent and overcharge protection functions. The main body of an HCO consists of FH, Fusible Alloy, Flux Resin, Case and Sealant Epoxy.

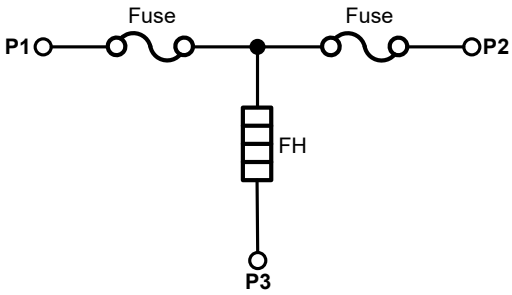
The Heat CutOff (HCO) is primarily used in secondary protection schemes for lithium battery charge and discharge circuits, providing redundant protection alongside the primary protection circuit. During the charge and discharge process of lithium batteries, if an abnormal overcurrent occurs, the fusible alloy self-heats and melts, disconnecting the charge and discharge circuit to achieve overcurrent protection. In the event of an overcharge, if the primary protection circuit's IC or the FET in the charge and discharge path fails, the secondary protection IC activates and energizes the Heater of the HCO. This causes the fusible alloy to melt due to the generated heat, disconnecting the charge and discharge circuit to provide overcharge protection. This mechanism ensures dual protection against both overcurrent and overcharge conditions.

The key features of SETsafe | SETfuse Heat CutOff (HCO) SHJ series products include: Rated Currents of (12 / 15 / 22) A, Rated Voltages of (80 / 48) VDC, and an Operating Voltage Range of (3.0 ~ 58.0) VDC. These products have obtained UL, cUL and TUV certifications and comply with RoHS and REACH directives.

## Structure Diagrams




## Product Schematic




- P1 ~ P2 Main Circuit（MC）
- P1 / P2 ~ P3 Control Circuit（CC）

## Application

- Portable Power Supply
- Smart phone
- Tablet PC
- Notebook
- Sweeping robot
- Cordless vacuum cleaner
- Power tools

## Features

- Surface Mount
- Overcurrent Protection
- Overcharging Protection
- Low Impedance, Low Power Consumption
- Controlled Fusing Time ≤ 60 s
- Non-Resettable
- RoHS & REACH Compliant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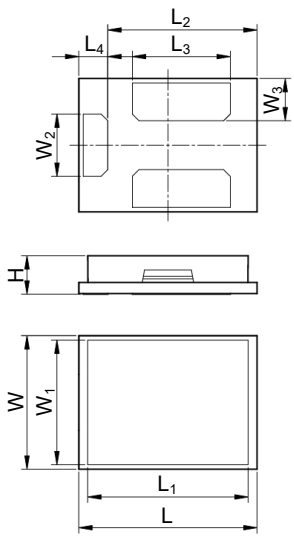
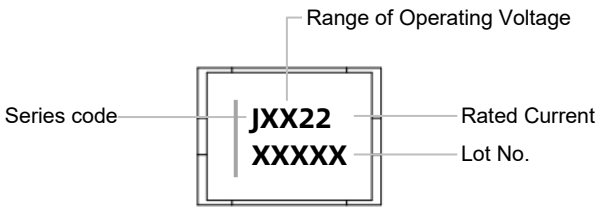
## Dimensions (Unit: mm)




| L | $L_1$ | $L_2$ | $L_3$ | $L_4$ | W | $W_1$ | $W_2$ | $W_3$ | H |
|---|---|---|---|---|---|---|---|---|---|
| 4.0 ± 0.2 | 3.6 ± 0.2 | 3.35 ± 0.2 | 2.2 ± 0.2 | 0.65 ± 0.2 | 3.0 ± 0.2 | 2.8 ± 0.2 | 1.4 ± 0.2 | 0.95 ± 0.2 | 0.95 ± 0.2 |

## Marking




## Part Number System

SHJ - 4 0 2 2

**Rated Current (A)**
12, 15, 22

**Rated Operating Voltage (VDC)**
04, 08, 12, 14, 20, 24, 30, 32, 40, 50

**Series**
SHJ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## Specifications

| Model | $I_r$ | $U_r$ | Cells in Series (Selection Reference) | Breaking Capacity | Range of Operating Voltage | Resistance | | Agency Information | | | RoHS REACH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $R_{Fuse}$ | $R_{FH}$ | UL | cUL | TUV | |
| | (A) | (VDC) | (Cells) | (A) | (VDC) | (mΩ) | (Ω) | | | | |
| SHJ-0412 | 12 | 80 / 48 | 1 | 50 / 200 | 3.0 ~ 5.5 | ≤ 3.5 | 0.67 ~ 1.06 | ● | ● | ● | ● |
| SHJ-0812 | 12 | 80 / 48 | 2 | 50 / 200 | 5.0 ~ 9.0 | ≤ 3.5 | 1.62 ~ 2.94 | ● | ● | ● | ● |
| SHJ-1212 | 12 | 80 / 48 | 3 | 50 / 200 | 7.4 ~ 13.8 | ≤ 3.5 | 4.8 ~ 6.2 | ● | ● | ● | ● |
| SHJ-1412 | 12 | 80 / 48 | 4 | 50 / 200 | 10.5 ~ 19.6 | ≤ 3.5 | 8.6 ~ 13.1 | ● | ● | ● | ● |
| SHJ-2012 | 12 | 80 / 48 | 5 | 50 / 200 | 14.4 ~ 24.0 | ≤ 3.5 | 12.8 ~ 24.4 | ● | ● | ● | ● |
| SHJ-2412 | 12 | 80 / 48 | 6 | 50 / 200 | 15.6 ~ 27.0 | ≤ 3.5 | 16.2 ~ 27.0 | ● | ● | ● | ● |
| SHJ-3012 | 12 | 80 / 48 | 7 | 50 / 200 | 18.2 ~ 31.5 | ≤ 3.5 | 22.1 ~ 36.8 | ● | ● | ● | ● |
| SHJ-3212 | 12 | 80 / 48 | 8 | 50 / 200 | 20.3 ~ 36.0 | ≤ 3.5 | 28.8 ~ 44.7 | ● | ● | ● | ● |
| SHJ-4012 | 12 | 80 / 48 | 9 ~ 10 | 50 / 200 | 27.0 ~ 47.0 | ≤ 3.5 | 49.1 ~ 79.2 | ● | ● | ● | ● |
| SHJ-5012 | 12 | 80 / 48 | 11 ~ 13 | 50 / 200 | 34.2 ~ 58.0 | ≤ 3.5 | 74.8 ~ 123.1 | ● | ● | ● | ● |
| SHJ-0415 | 15 | 80 / 48 | 1 | 50 / 200 | 3.0 ~ 5.5 | ≤ 3.0 | 0.67 ~ 1.06 | ● | ● | ● | ● |
| SHJ-0815 | 15 | 80 / 48 | 2 | 50 / 200 | 5.0 ~ 9.8 | ≤ 3.0 | 2.09 ~ 2.94 | ● | ● | ● | ● |
| SHJ-1215 | 15 | 80 / 48 | 3 | 50 / 200 | 7.4 ~ 14.6 | ≤ 3.0 | 4.8 ~ 6.4 | ● | ● | ● | ● |
| SHJ-1415 | 15 | 80 / 48 | 4 | 50 / 200 | 10.5 ~ 19.6 | ≤ 3.0 | 8.6 ~ 12.9 | ● | ● | ● | ● |
| SHJ-2015 | 15 | 80 / 48 | 5 | 50 / 200 | 12.5 ~ 24.0 | ≤ 3.0 | 12.4 ~ 17.3 | ● | ● | ● | ● |
| SHJ-2415 | 15 | 80 / 48 | 6 | 50 / 200 | 17.3 ~ 28.2 | ≤ 3.0 | 17.7 ~ 35.2 | ● | ● | ● | ● |
| SHJ-3015 | 15 | 80 / 48 | 7 | 50 / 200 | 19.6 ~ 32.9 | ≤ 3.0 | 24.1 ~ 45.2 | ● | ● | ● | ● |
| SHJ-3215 | 15 | 80 / 48 | 8 | 50 / 200 | 22.4 ~ 37.6 | ≤ 3.0 | 31.5 ~ 57.0 | ● | ● | ● | ● |
| SHJ-4015 | 15 | 80 / 48 | 9 ~ 10 | 50 / 200 | 25.0 ~ 47.0 | ≤ 3.0 | 49.1 ~ 78.1 | ● | ● | ● | ● |
| SHJ-5015 | 15 | 80 / 48 | 11 ~ 13 | 50 / 200 | 34.2 ~ 58.0 | ≤ 3.0 | 74.8 ~ 123.1 | ● | ● | ● | ● |


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| Model | $I_r$ | $U_r$ | Cells in Series (Selection Reference) | Breaking Capacity | Range of Operating Voltage | Resistance | | Agency Information | | | RoHS REACH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $R_{Fuse}$ | $R_{FH}$ | UL | cUL | TUV | |
| | (A) | (VDC) | (Cells) | (A) | (VDC) | (mΩ) | (Ω) | | | | |
| SHJ-0422 | 22 | 80 / 48 | 1 | 50 / 200 | 3.5 ~ 4.7 | ≤ 2.2 | 0.49 ~ 1.02 | ● | ● | ● | ● |
| SHJ-0822 | 22 | 80 / 48 | 2 | 50 / 200 | 6.0 ~ 9.5 | ≤ 2.2 | 1.88 ~ 3.0 | ● | ● | ● | ● |
| SHJ-1222 | 22 | 80 / 48 | 3 | 50 / 200 | 9.0 ~ 13.8 | ≤ 2.2 | 4.3 ~ 6.7 | ● | ● | ● | ● |
| SHJ-1422 | 22 | 80 / 48 | 4 | 50 / 200 | 12.0 ~ 18.5 | ≤ 2.2 | 7.7 ~ 12.5 | ● | ● | ● | ● |
| SHJ-2022 | 22 | 80 / 48 | 5 | 50 / 200 | 15.9 ~ 23.1 | ≤ 2.2 | 11.9 ~ 21.9 | ● | ● | ● | ● |
| SHJ-2422 | 22 | 80 / 48 | 6 | 50 / 200 | 16.8 ~ 27.0 | ≤ 2.2 | 16.2 ~ 25.2 | ● | ● | ● | ● |
| SHJ-3022 | 22 | 80 / 48 | 7 | 50 / 200 | 20.2 ~ 31.5 | ≤ 2.2 | 22.1 ~ 36.4 | ● | ● | ● | ● |
| SHJ-3222 | 22 | 80 / 48 | 8 | 50 / 200 | 22.4 ~ 33.6 | ≤ 2.2 | 25.1 ~ 44.8 | ● | ● | ● | ● |
| SHJ-4022 | 22 | 80 / 48 | 9 ~ 10 | 50 / 200 | 28.0 ~ 45.0 | ≤ 2.2 | 45.0 ~ 65.3 | ● | ● | ● | ● |
| SHJ-5022 | 22 | 80 / 48 | 11 ~ 13 | 50 / 200 | 34.1 ~ 54.6 | ≤ 2.2 | 66.3 ~ 103.8 | ● | ● | ● | ● |
| Current Carrying Capacity | 100% x $I_r$, no melting | | | | | | | | | | |
| Controlled Fusing Time | In operation voltage range, the fusing time is <1min | | | | | | | | | | |
| Current Fusing Time | 200% x $I_r$ the fusing time is < 1 min | | | | | | | | | | |
| Endurance Test | 500% x $I_r$ power on 5 ms, power off 995 ms, 100,000 cycles | | | | | | | | | | |
| Working Temperature Range | -20 ~ 85 ℃ | | | | | | | | | | |

Note:
1. For P1 - P2, please refer to the structure diagram.


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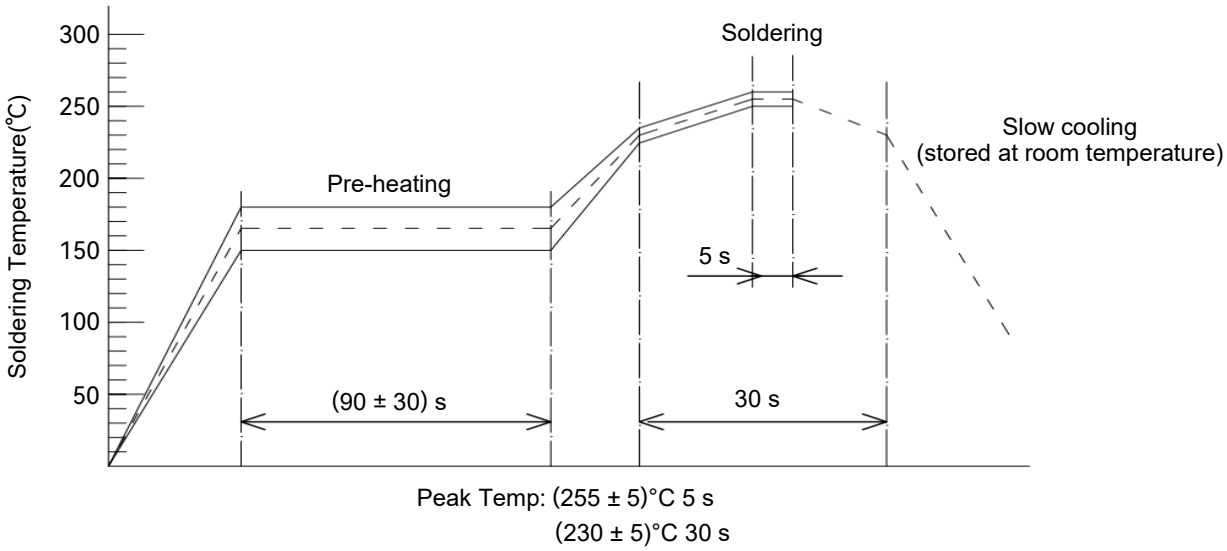
## Soldering Parameters

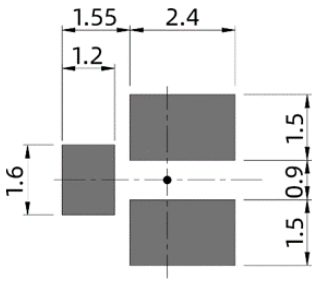
1. Reflow Soldering Method (For Reference Only)




2. Recommended Hand Soldering Parameters

Solder Iron Temp: (400 ± 5) ℃
Soldering Time: (3 ± 1) s

## Recommended mounting size (Unit: mm)




Note: This is only the recommended size and does not guarantee the mounting quality. Please verify it in combination with your company's design guidelines.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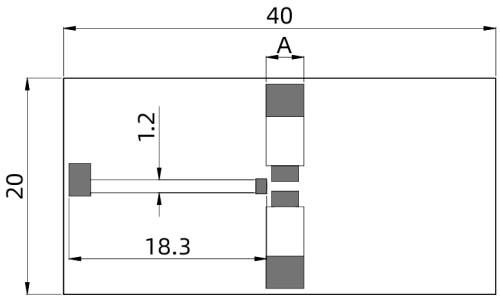
## Recommended Test PCB Board




| Rated Current | Materials | Base Thickness | Copper Width | Copper Thick-ness | Number Of board layers |
|---|---|---|---|---|---|
| 12 A | FR-4 | 0.6 mm | 2.0 mm | 2.0 OZ (70 um) | Single Sided Board |
| 15 A | FR-4 | 0.6 mm | 3.5 mm | 2.0 OZ (70 um) | Single Sided Board |
| 22 A | FR-4 | 0.6 mm | 6.0 mm | 2.0 OZ (70 um) | Single Sided Board |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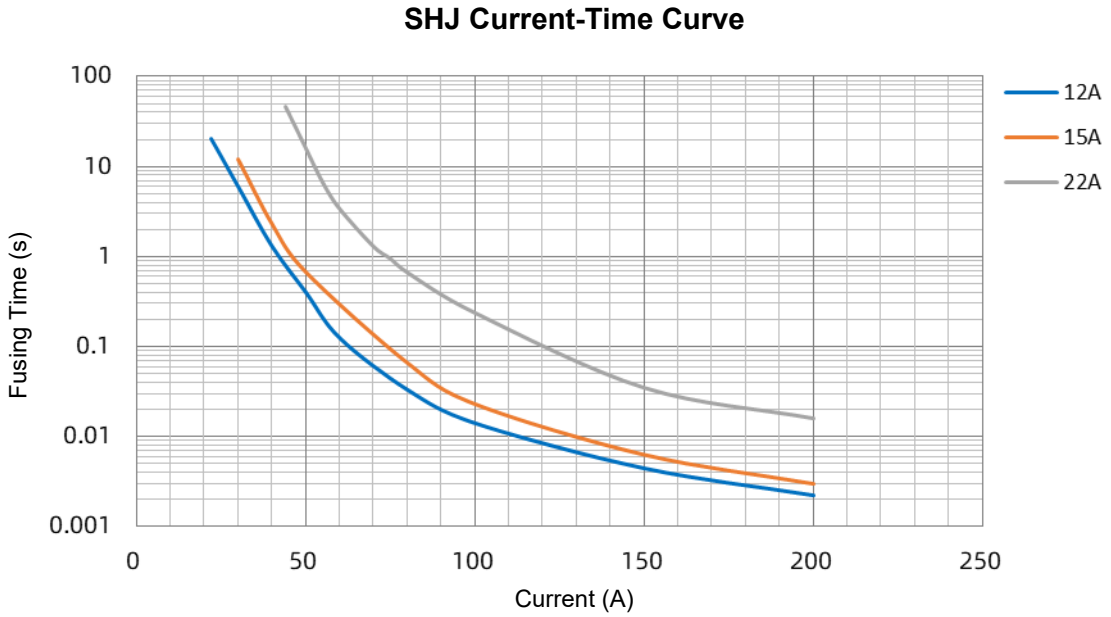
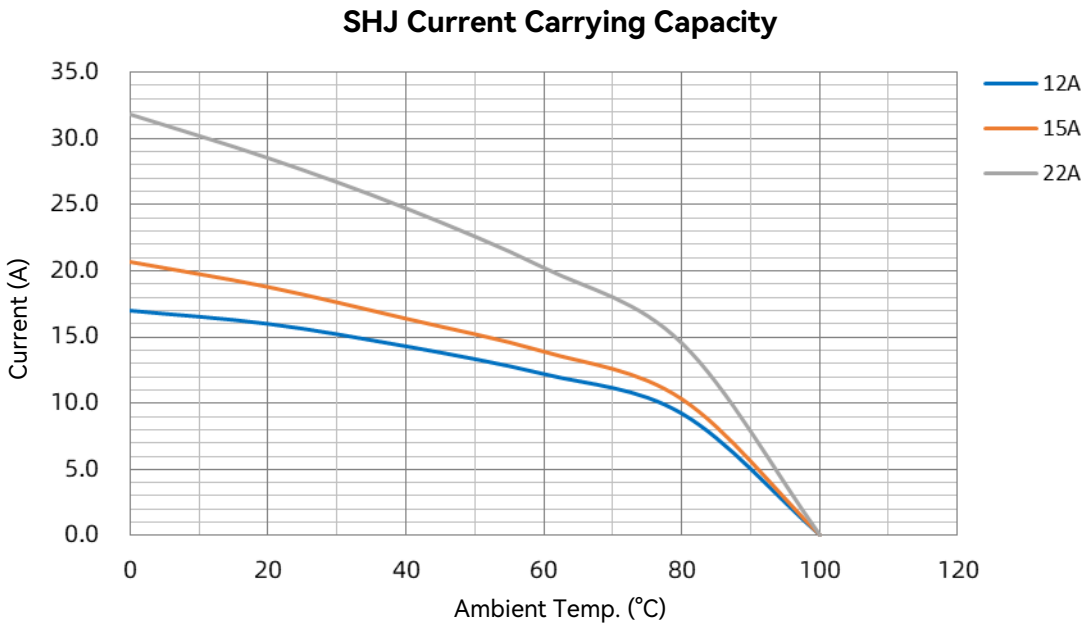
## Current-Time Curve (Reference)

The Current-Time curve shows functioning time at multi-times rated current at room temperature.




## Current Carrying Capacity (Reference)

Under different temperatures apply test current, the surface temperature is 100 °C as the highest point, and the load value is obtained.




*Note:

1. The values in the table are typical values that we recommend to test PCB board evaluation, Reference product resistances: 3.2 mΩ (12 A), 2.6 mΩ (15 A), 1.7 mΩ (22 A);
2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.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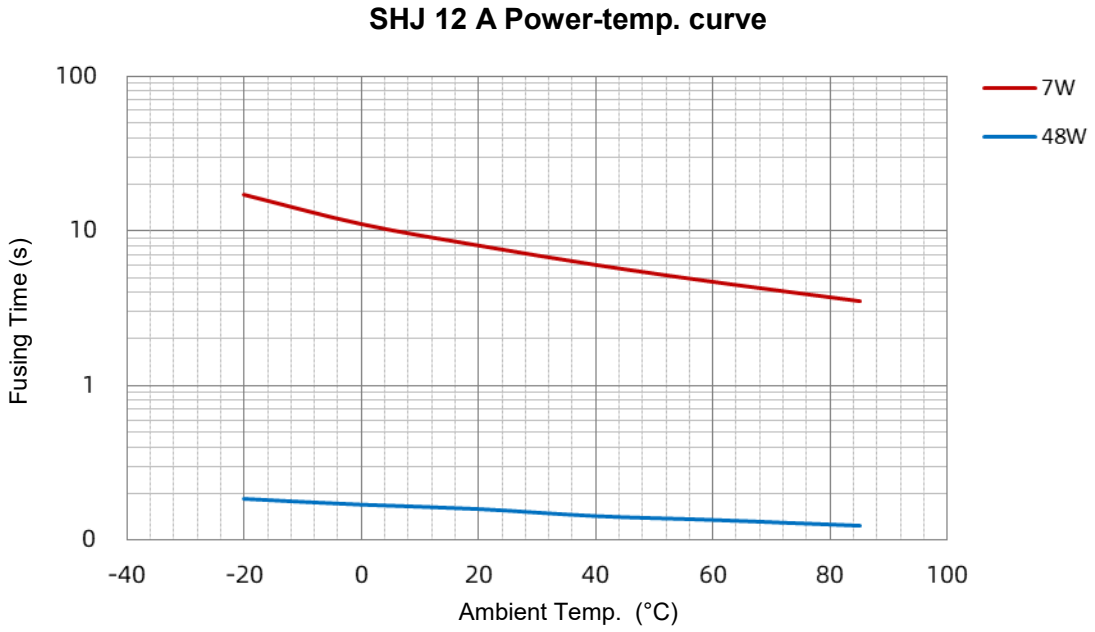
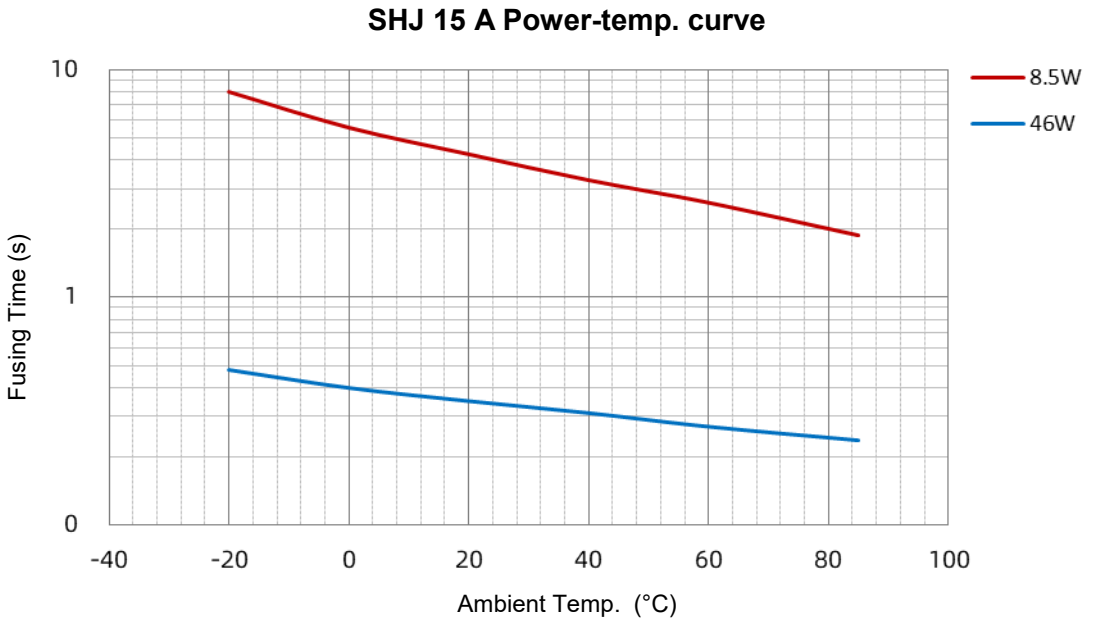
## Power-temp. curve (Reference)

At different temperatures, the heating element applies an operating voltage corresponding to the power, and collects the disconnection time of P1 - P2.





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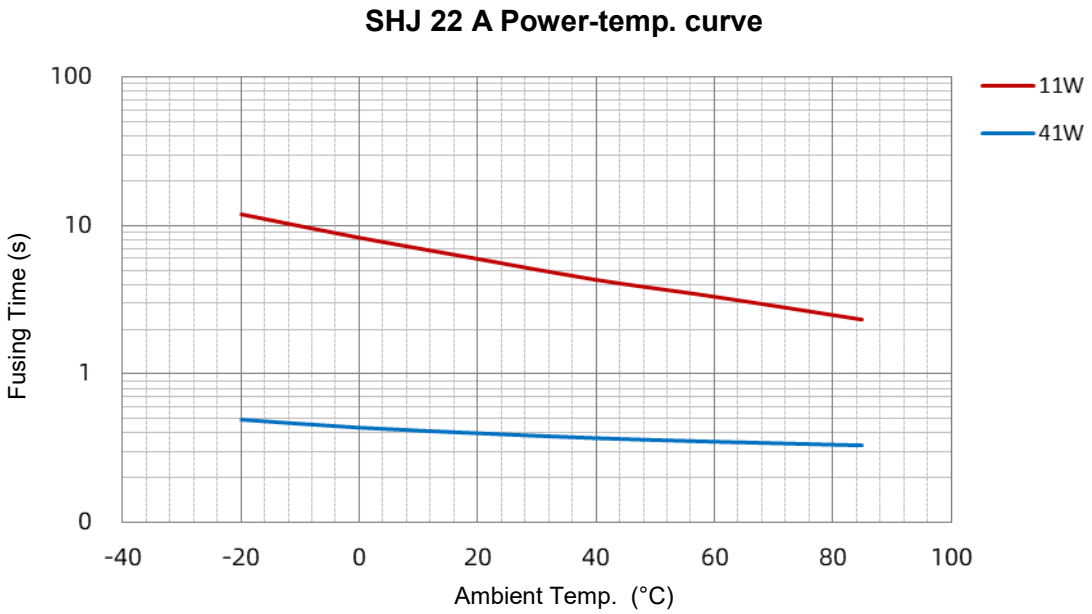
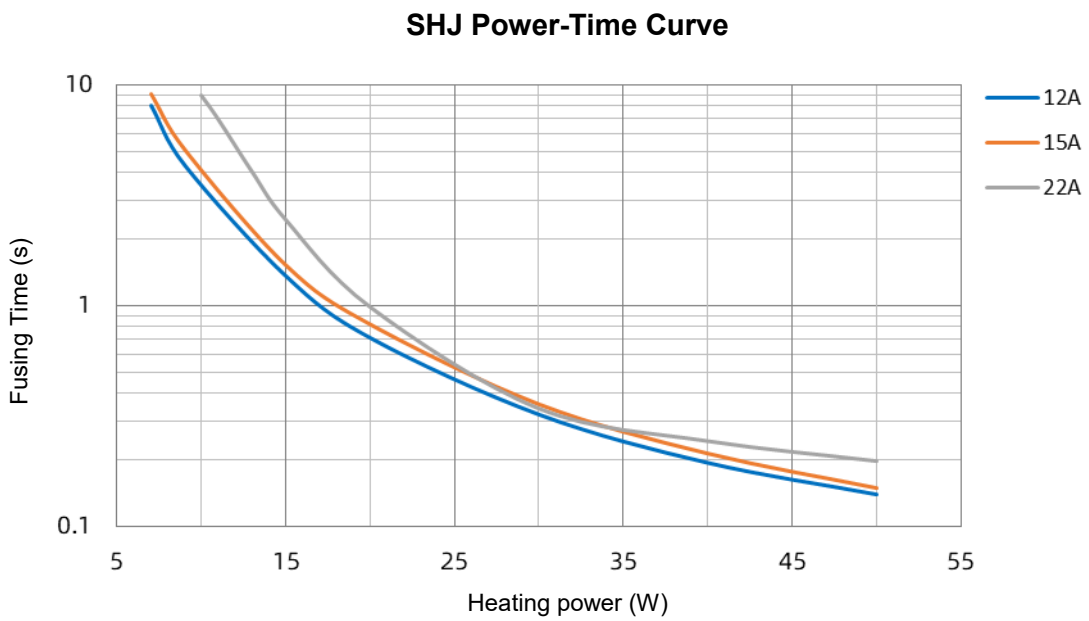
## Power-temp. curve (Reference)

At different temperatures, the heating element applies an operating voltage corresponding to the power, and collects the disconnection time of P1 - P2.




## Power-Time Curve (Reference)

At room temperature, apply the operating voltage within the power range of the heating element, and collects the disconnection time of P1 - P2.





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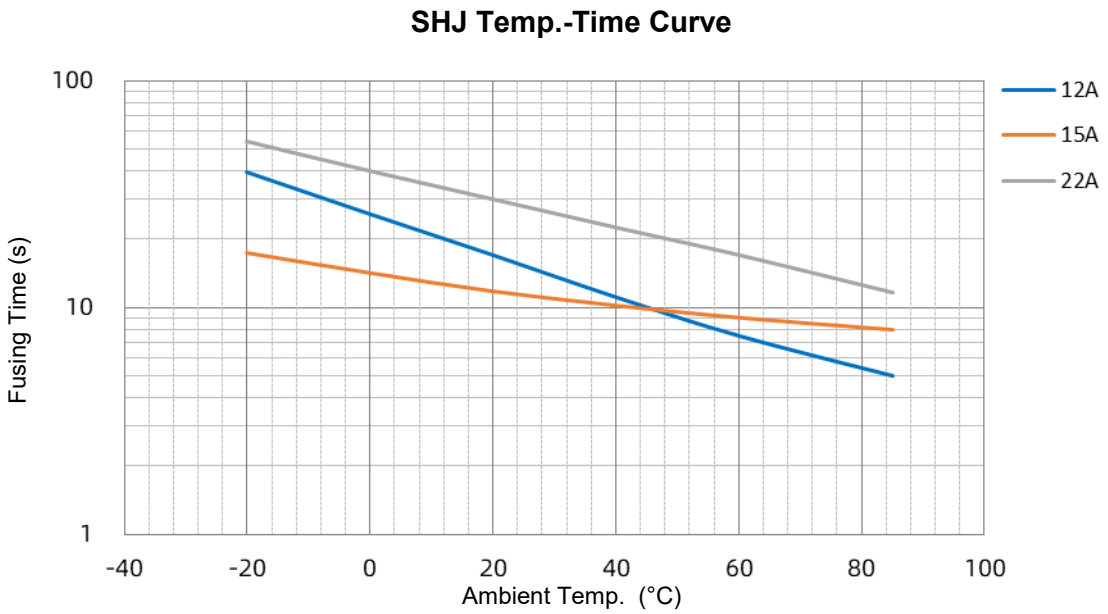
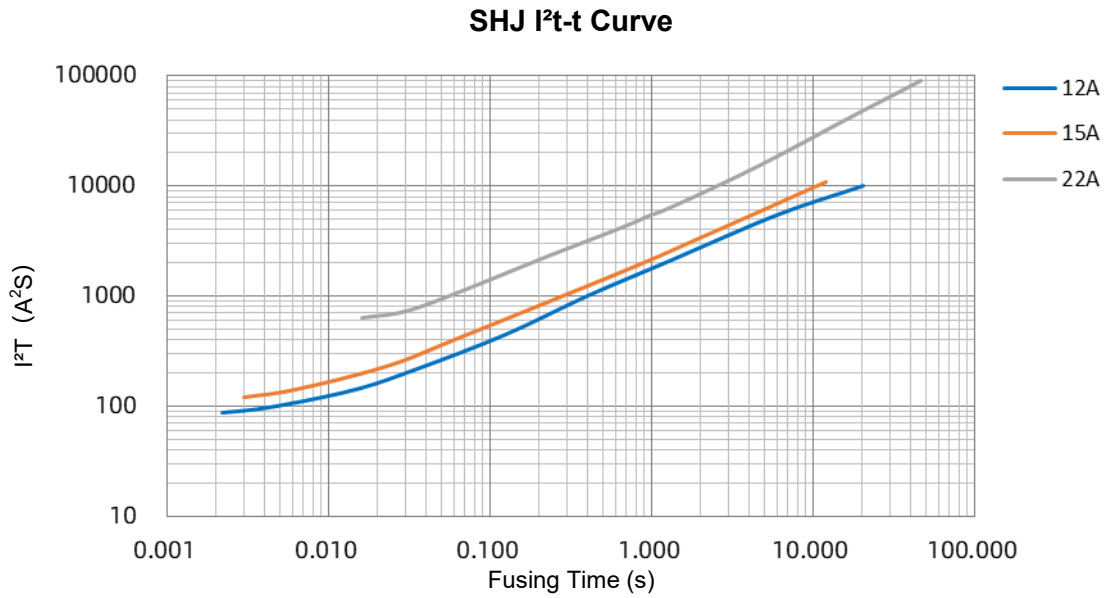
## Temp.-Time Curve (Reference)

Under different conditions, Test the disconnection time curve of P1-P2 under 2 times overload current.




## I²t-t Curve (Reference)

At room temperature, collects the disconnection time of P1 - P2 under multiples of overload current, curve obtained by the product of squared current and disconnection time.

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2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.


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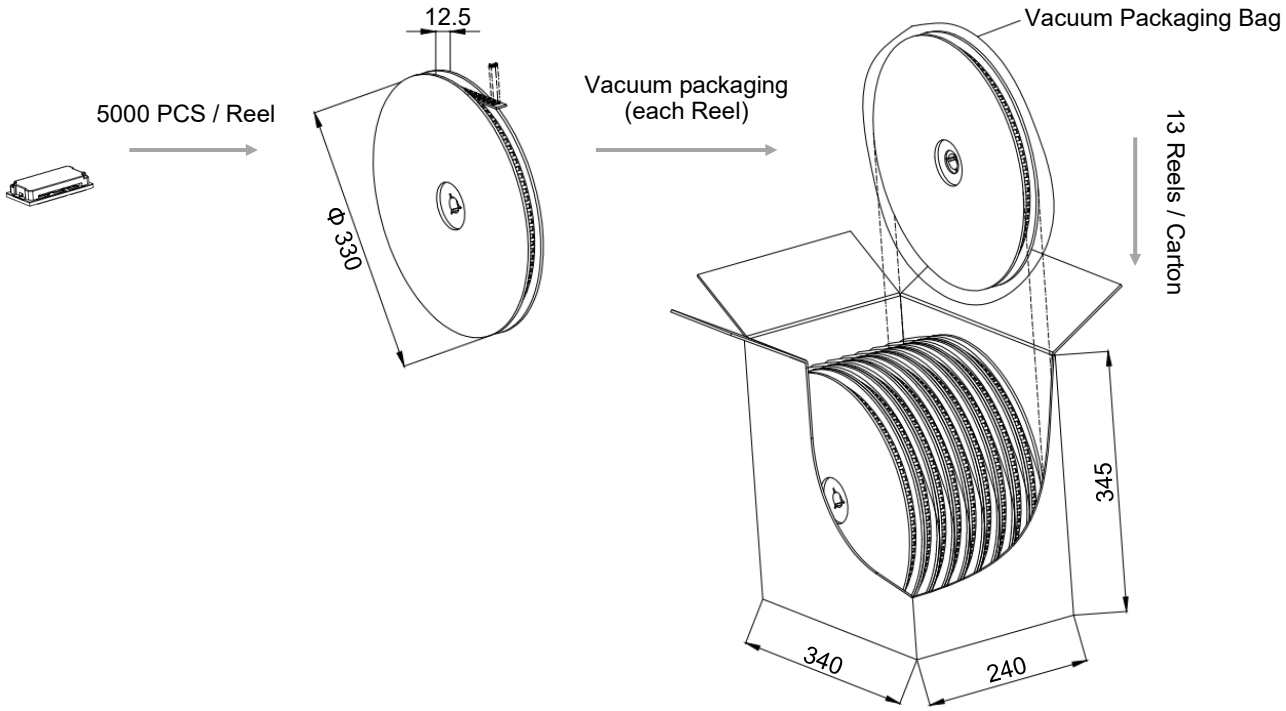
## Packaging Information

| Item | Reel | Carton |
|---|---|---|
| Dimensions (mm) | Φ 330 × 12.5 | 340 × 240 × 345 |
| Quantity (PCS) | 5000 | 65000 |
| Gross Weight (kg) | 0.58 ± 5 % | 8.1 ± 5 % |





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# ATTENTION

## Usage

1. When atmosphere press is from 80 kPa to 106 kPa, the related altitude shall be from 2,000 meter to -500 meter.
2. Do not touch the HCO body or electrode lead directly when power is on, to avoid burning or electric shocking.
3. It is necessary to foresee there are possibilities that “Current Carrying Capacity” and “Controlled Fusing Time” may be varied along with the condition change in the substrate thermal capacity, etc. therefore you should check it on your PCB. Generally, when thermal capacity of PCB increases, Current carrying capacity will increase accordingly and Cleaning-time will be longer.
4. This product is designed and produced for only general-use of electronics devices. Therefore, we do not suppose that it is used for the. applications [Military, Medical and so on] which may cause direct damages on life, bodies or properties of third party.

## Installation

1. Surface mounting.
2. Do not apply mechanical stress to the protection body during or after the installation.
3. Ultrasonic-cleaning or immersion-cleaning and so on must not be done to HCO before and after mounted. When cleaning is done, flux on element would flow, and it would not meet its specification. Moreover, a similar influence happens when the product comes in contact with cleaning-solution. These products after cleaning will not be guaranteed.
4. Please do not re-use of the HCO removed.
5. Please avoid doing resin-coating for HCO. The resin might infiltrate into the product, and it doesn’t meet the specification when the resin-coating is done to this product. These products after resin-coating will not be guaranteed.
6. Make sure that the terminals of this product are connected properly on the circuit board, and the reristance should be in the range of FH resistance between Terminal P1 - P3 and P2 - P3.


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## Replacement

HCO is a non-repairable product. For safety aspect, it shall be replaced by an equivalent HCO, and mounted in the same way.

## Storage

1. HCO must be stored in shaded area where it is not too dusty, with temp. (10 to 30) °C or less with no sudden temperature change, humidity within (30 to 70) % RH, and no corrosive gas in the air. please use them up within 1 year after receiving the goods .


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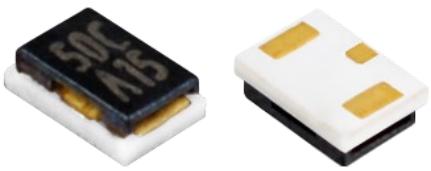

## Description

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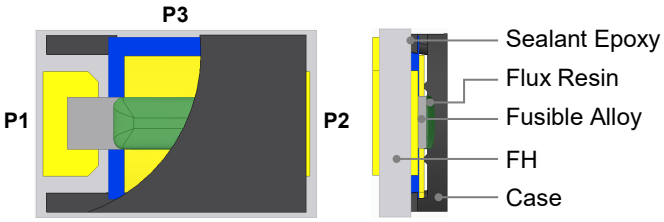
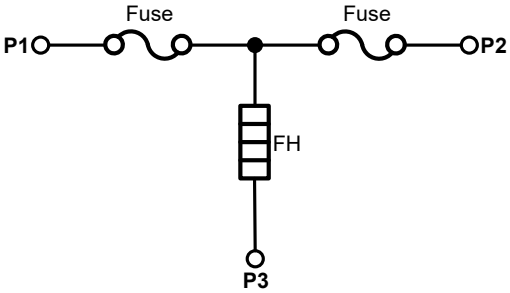
The Heat CutOff (HCO) is primarily used in secondary protection schemes for lithium battery charge and discharge circuits, providing redundant protection alongside the primary protection circuit. During the charge and discharge process of lithium batteries, if an abnormal overcurrent occurs, the fusible alloy self-heats and melts, disconnecting the charge and discharge circuit to achieve overcurrent protection. In the event of an overcharge, if the primary protection circuit's IC or the FET in the charge and discharge path fails, the secondary protection IC activates and energizes the Heater of the HCO. This causes the fusible alloy to melt due to the generated heat, disconnecting the charge and discharge circuit to provide overcharge protection. This mechanism ensures dual protection against both overcurrent and overcharge conditions.

The key features of SETsafe | SETfuse Heat CutOff (HCO) SHG series products include: Rated Currents of (5 / 12) A, Rated Voltages of 36 VDC, and an Operating Voltage Range of (2.5 ~ 45.0) VDC. These products have obtained UL, cUL and TUV certifications and comply with RoHS and REACH directives.

## Structure Diagrams




## Product Schematic




- P1 ~ P2 Main Circuit（MC）
- P1 / P2 ~ P3 Control Circuit（CC）

## Features

- Surface Mount
- Overcurrent Protection
- Overcharging Protection
- Low Impedance, Low Power Consumption
- Controlled Fusing Time ≤ 60 s
- Non-Resettable
- RoHS & REACH Compliant

## Application

- Portable Power Supply
- Smart phone
- Tablet PC
- Notebook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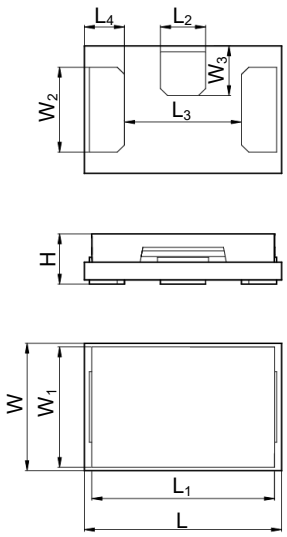
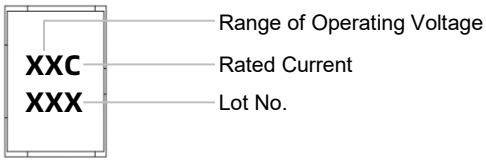
## Dimensions (Unit: mm)




| L | $L_1$ | $L_2$ | $L_3$ | $L_4$ | W | $W_1$ | $W_2$ | $W_3$ | H |
|---|---|---|---|---|---|---|---|---|---|
| 2.7 ± 0.2 | 2.5 ± 0.2 | 0.62 ± 0.2 | 1.8 ± 0.2 | 0.45 ± 0.2 | 1.8 ± 0.2 | 1.7 ± 0.2 | 1.2 ± 0.2 | 0.7 ± 0.2 | $0.75^{+0.3}_{-0.1}$ |

## Marking




## Part Number System

SHG - 0 4 0 5

**Rated Current (A)**
05, 12

**Rated Operating Voltage (VDC)**
04, 08, 12, 14, 20, 24, 30, 32, 40

**Series**
SHG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## Specifications

| Model | $I_r$ | $U_r$ | Cells in Series (Selection Reference) | Breaking Capacity | Range of Operating Voltage | Resistance | | Agency Information | | | RoHS REACH |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | $R_{Fuse}$ | $R_{FH}$ | UL | cUL | TUV | |
| | (A) | (VDC) | (Cells) | (A) | (VDC) | (mΩ) | (Ω) | | | | |
| SHG-0405 | 5 | 36 | 1 | 50 | 2.5 ~ 5.5 | ≤ 10 | 1.32 ~ 2.08 | ● | ● | ● | ● |
| SHG-0805 | 5 | 36 | 2 | 50 | 4.0 ~ 10.0 | ≤ 10 | 4.4 ~ 6.4 | ● | ● | ● | ● |
| SHG-1205 | 5 | 36 | 3 | 50 | 7.4 ~ 15.0 | ≤ 10 | 9.8 ~ 18.2 | ● | ● | ● | ● |
| SHG-1405 | 5 | 36 | 4 | 50 | 10.5 ~ 20.0 | ≤ 10 | 17.4 ~ 36.7 | ● | ● | ● | ● |
| SHG-2005 | 5 | 36 | 5 | 50 | 13.5 ~ 25.0 | ≤ 10 | 27.2 ~ 60.7 | ● | ● | ● | ● |
| SHG-3005 | 5 | 36 | 6 ~ 7 | 50 | 16.2 ~ 31.5 | ≤ 10 | 45.1 ~ 87.4 | ● | ● | ● | ● |
| SHG-3205 | 5 | 36 | 8 | 50 | 21.6 ~ 36.0 | ≤ 10 | 59.0 ~ 155.5 | ● | ● | ● | ● |
| SHG-4005 | 5 | 36 | 9 | 50 | 25.2 ~ 45.0 | ≤ 10 | 101.3 ~ 211.6 | ● | ● | ● | ● |
| SHG-0412 | 12 | 36 | 1 | 50 | 3.5 ~ 4.7 | ≤ 3.5 | 0.96 ~ 3.06 | ● | ● | ● | ● |
| SHG-0812 | 12 | 36 | 2 | 50 | 6.0 ~ 9.2 | ≤ 3.5 | 3.7 ~ 9.0 | ● | ● | ● | ● |
| SHG-1212 | 12 | 36 | 3 | 50 | 8.4 ~ 12.6 | ≤ 3.5 | 6.9 ~ 17.6 | ● | ● | ● | ● |
| SHG-1412 | 12 | 36 | 4 | 50 | 11.2 ~ 16.8 | ≤ 3.5 | 12.3 ~ 31.3 | ● | ● | ● | ● |
| SHG-2012 | 12 | 36 | 5 | 50 | 14.0 ~ 21.0 | ≤ 3.5 | 19.2 ~ 49.0 | ● | ● | ● | ● |
| SHG-2412 | 12 | 36 | 6 | 50 | 14.4 ~ 25.2 | ≤ 3.5 | 27.7 ~ 49.3 | ● | ● | ● | ● |
| SHG-3012 | 12 | 36 | 7 | 50 | 16.8 ~ 29.4 | ≤ 3.5 | 37.6 ~ 70.5 | ● | ● | ● | ● |
| SHG-3212 | 12 | 36 | 8 | 50 | 22.4 ~ 33.6 | ≤ 3.5 | 51.4 ~ 125.4 | ● | ● | ● | ● |
| SHG-4012 | 12 | 36 | 9 | 50 | 25.2 ~ 37.8 | ≤ 3.5 | 65.0 ~ 158.7 | ● | ● | ● | ● |
| Current Carrying Capacity | 100% x $I_r$, no melting | | | | | | | | | | |
| Controlled Fusing Time | In operation voltage range, the fusing time is <1min | | | | | | | | | | |
| Current Fusing Time | 200% x $I_r$ the fusing time is < 1 min | | | | | | | | | | |
| Endurance Test | 500% x $I_r$ power on 5 ms, power off 995 ms, 100,000 cycles | | | | | | | | | | |
| Working Temperature Range | -20 ~ 85 ℃ | | | | | | | | | | |

Note:
1. For P1 - P2, please refer to the structure diagram.


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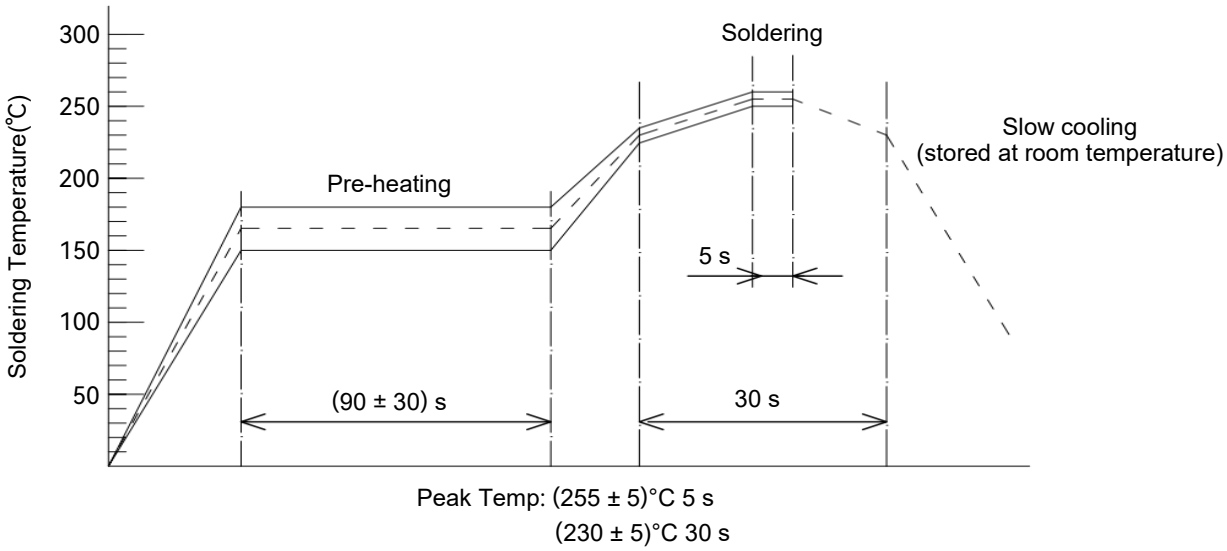
## Soldering Parameters

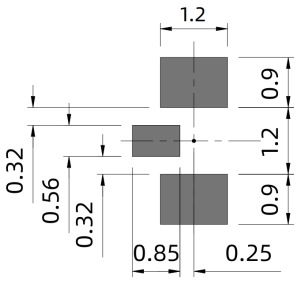
1. Reflow Soldering Method (For Reference Only)




2. Recommended Hand Soldering Parameters

Solder Iron Temp: (400 ± 5) ℃
Soldering Time: (3 ± 1) s

## Recommended mounting size (Unit: mm)




Note: This is only the recommended size and does not guarantee the mounting quality. Please verify it in combination with your company's design guidelines.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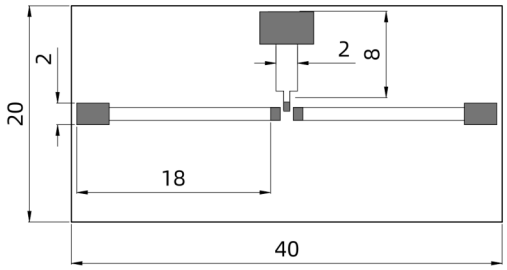
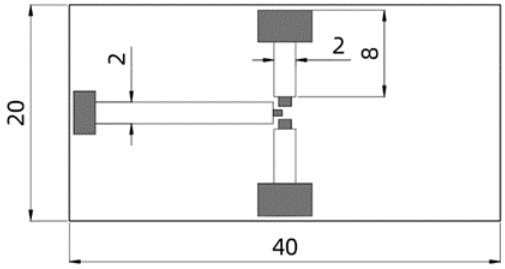
## Recommended Test PCB Board

1. For rated currents 5 A




| Materials | Base Thickness | Copper Width | Copper Thickness | Number Of board layers |
|---|---|---|---|---|
| FR-4 | 0.6 mm | 2.0 mm | 1.0 OZ (35 um) | Single Sided Board |

2. For rated currents 12 A




| Materials | Base Thickness | Copper Width | Copper Thickness | Number Of board layers |
|---|---|---|---|---|
| FR-4 | 0.6 mm | 2.0 mm | 2.0 OZ (70 um) | Single Sided Board |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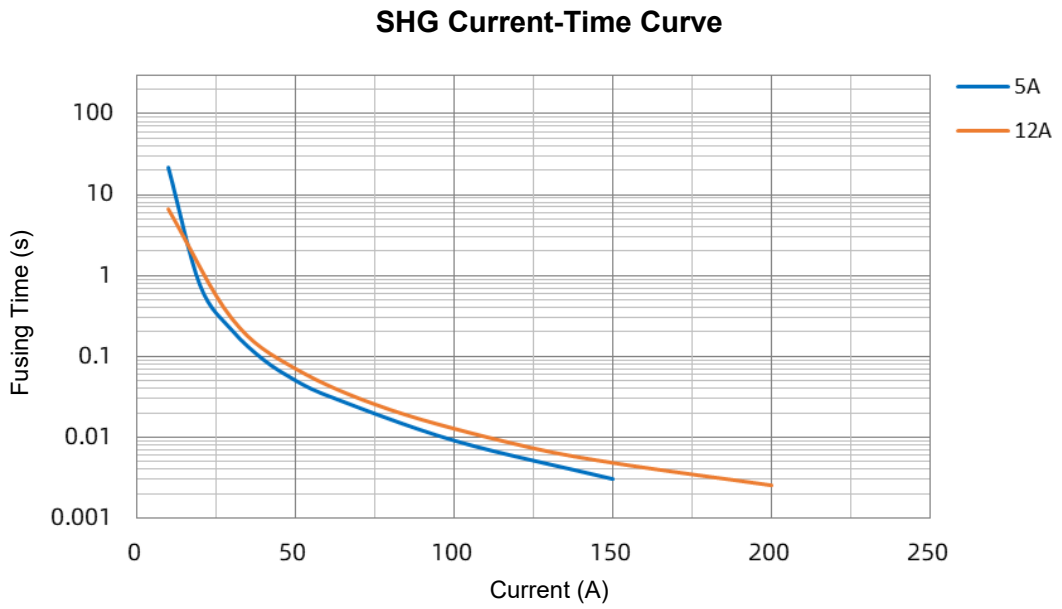
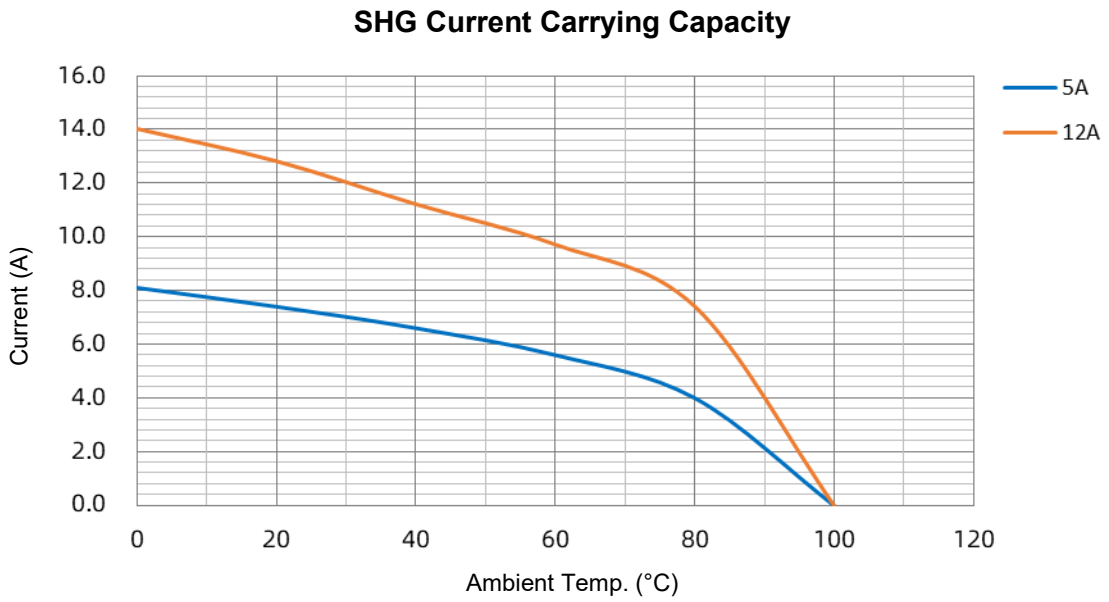
## Current-Time Curve (Reference)

The Current-Time curve shows functioning time at multi-times rated current at room temperature.




## Current Carrying Capacity (Reference)

Under different temperatures apply test current, the surface temperature is 100 °C as the highest point, and the load value is obtained.




*Note:

1. The values in the table are typical values that we recommend to test PCB board evaluation, Reference product resistances: 4.0 mΩ (5 A), 2.1 mΩ (12 A);
2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.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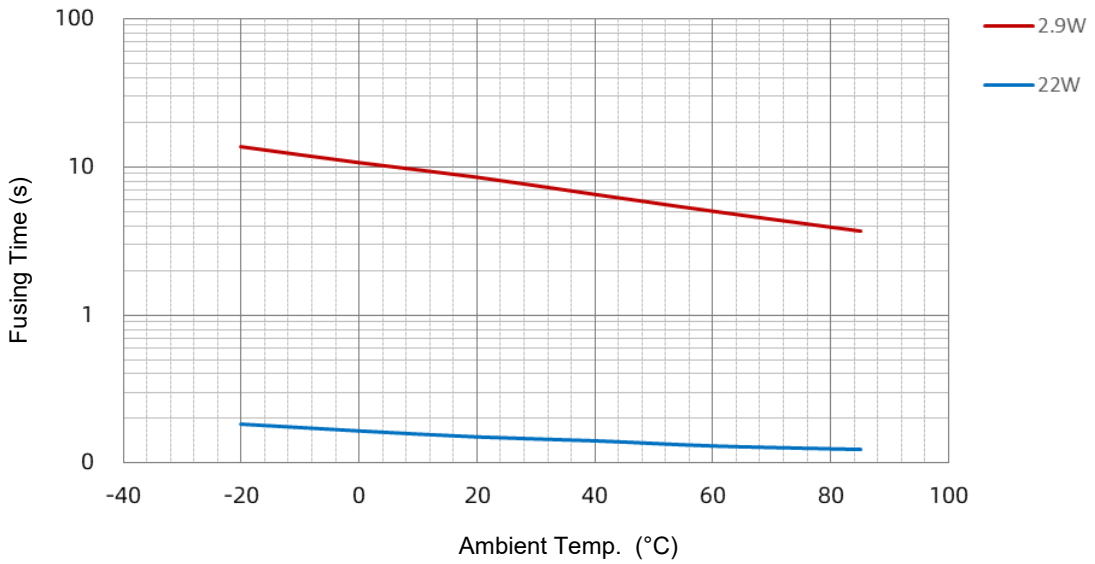
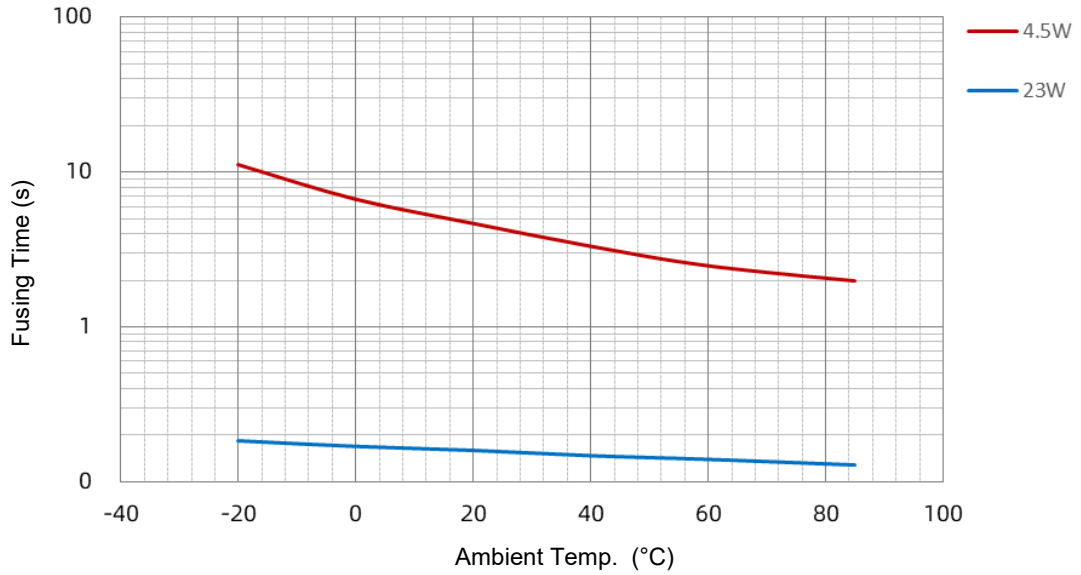
## Power-temp. curve (Reference)

At different temperatures, the heating element applies an operating voltage corresponding to the power, and collects the disconnection time of P1 - P2.

### SHG 05 A Power-temp. curve




### SHG 12 A Power-temp. curve





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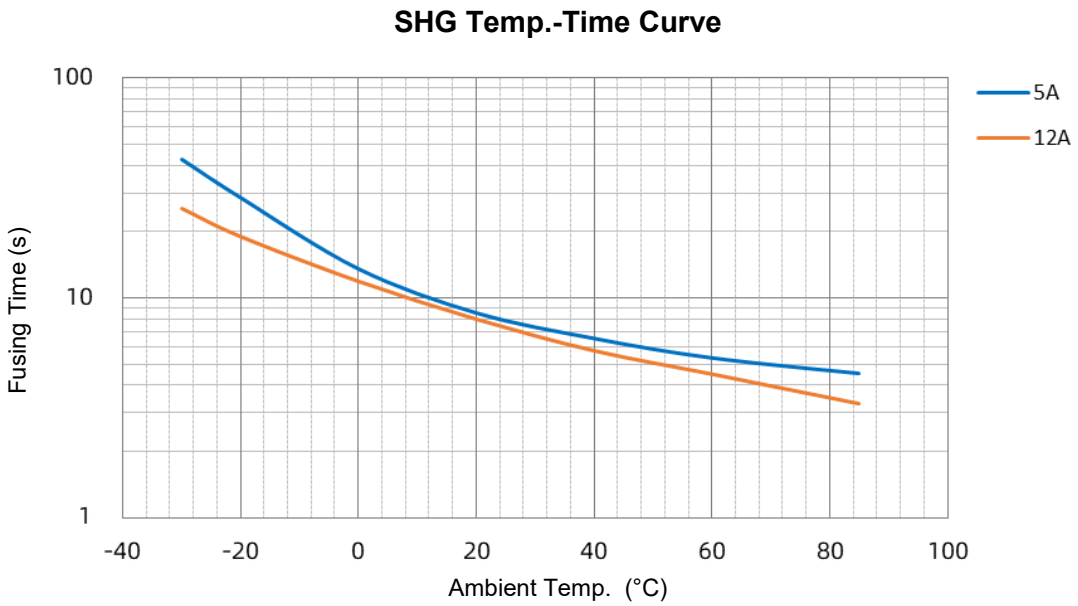
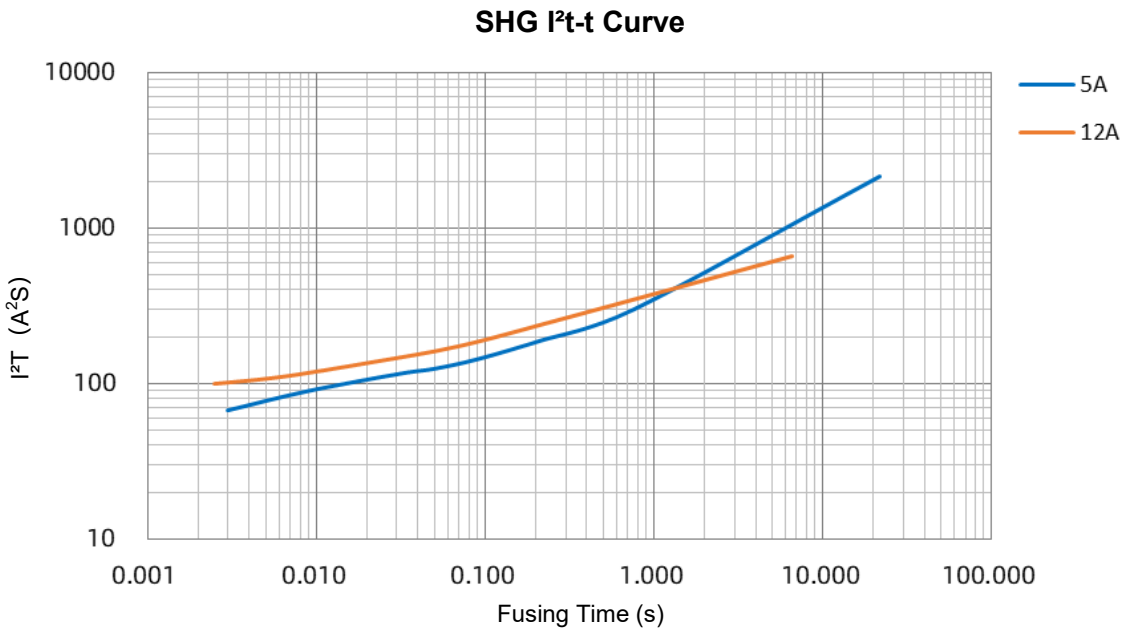
## Temp.-Time Curve (Reference)

Under different conditions, Test the disconnection time curve of P1-P2 under 2 times overload current.




## I²t-t Curve (Reference)

At room temperature, collects the disconnection time of P1 - P2 under multiples of overload current, curve obtained by the product of squared current and disconnection time.




*Note:

1. The values in the table are typical values that we recommend to test PCB board evaluation, Reference product resistances: 4.0 mΩ (5 A), 2.1 mΩ (12 A);
2. Product specifications may be adjusted due to technical upgrades or optimization requirements. Updates will not be notified separately.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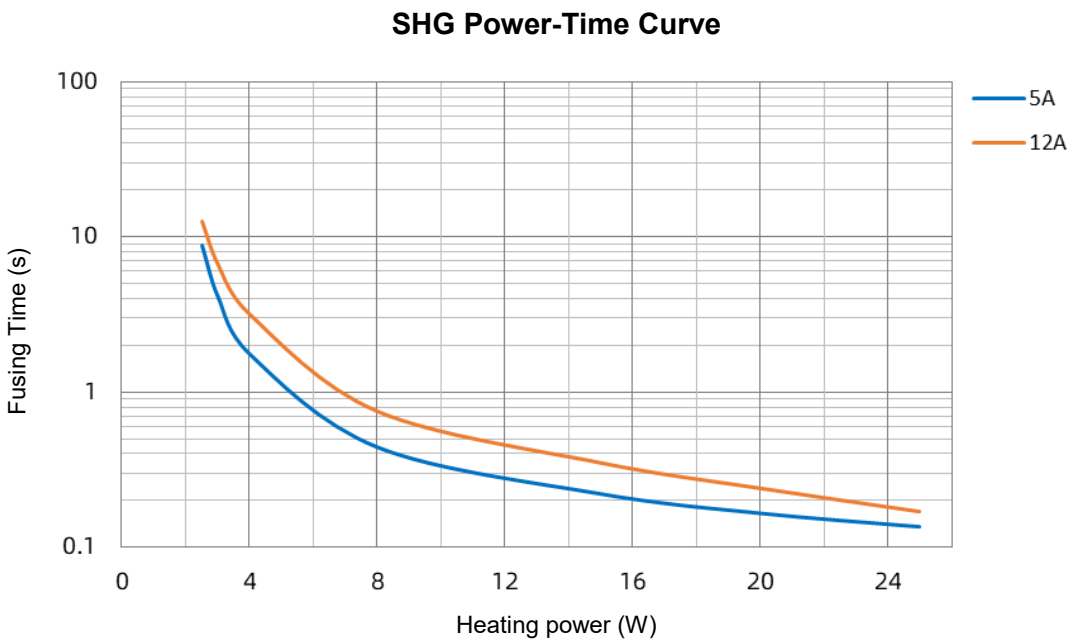
## Power-Time Curve (Reference)

At room temperature, apply the operating voltage within the power range of the heating element, and collects the disconnection time of P1 - P2.





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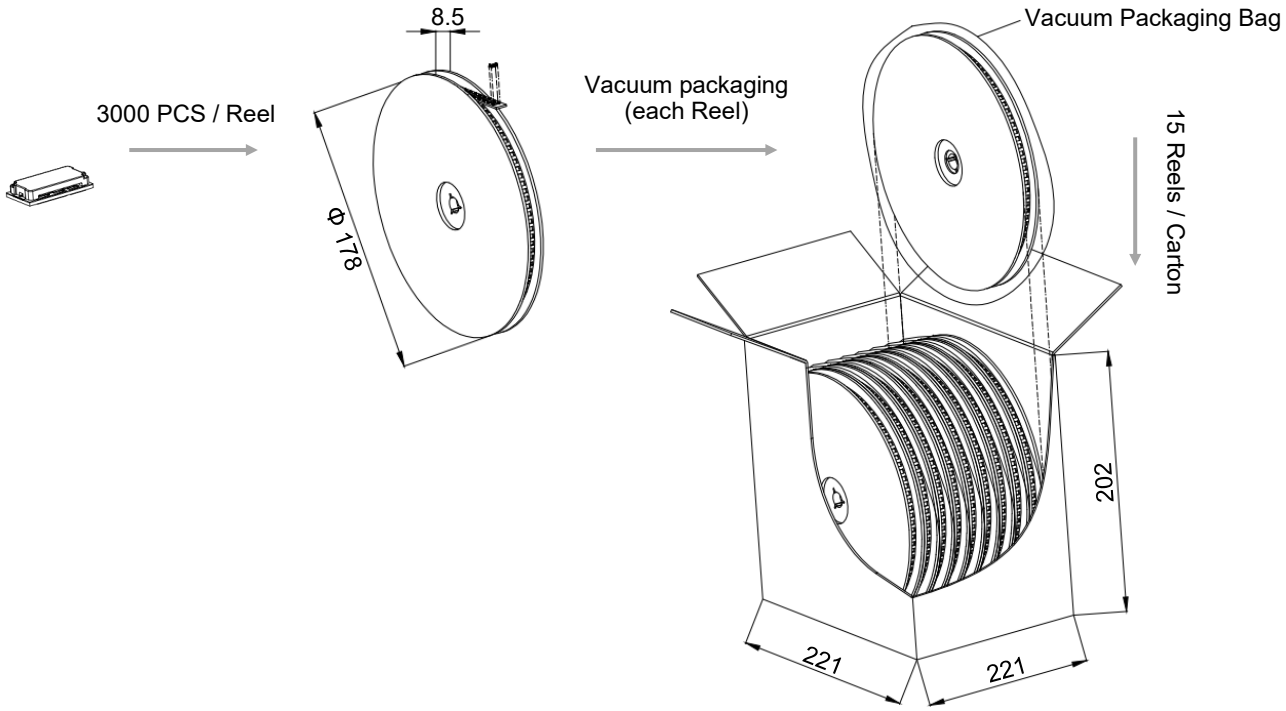
## Packaging Information

| Item | Reel | Carton |
|---|---|---|
| Dimensions (mm) | Φ 178 × 8.5 | 221 × 221 × 202 |
| Quantity (PCS) | 3000 | 45000 |
| Gross Weight (kg) | 1.3 ± 5 % | 7.9 ± 5 % |





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# ATTENTION

## Usage

1. When atmosphere press is from 80 kPa to 106 kPa, the related altitude shall be from 2,000 meter to -500 meter.
2. Do not touch the HCO body or electrode lead directly when power is on, to avoid burning or electric shocking.
3. It is necessary to foresee there are possibilities that “Current Carrying Capacity” and “Controlled Fusing Time” may be varied along with the condition change in the substrate thermal capacity, etc. therefore you should check it on your PCB. Generally, when thermal capacity of PCB increases, Current carrying capacity will increase accordingly and Cleaning-time will be longer.
4. This product is designed and produced for only general-use of electronics devices. Therefore, we do not suppose that it is used for the. applications [Military, Medical and so on] which may cause direct damages on life, bodies or properties of third party.

## Installation

1. Surface mounting.
2. Do not apply mechanical stress to the protection body during or after the installation.
3. Ultrasonic-cleaning or immersion-cleaning and so on must not be done to HCO before and after mounted. When cleaning is done, flux on element would flow, and it would not meet its specification. Moreover, a similar influence happens when the product comes in contact with cleaning-solution. These products after cleaning will not be guaranteed.
4. Please do not re-use of the HCO removed.
5. Please avoid doing resin-coating for HCO. The resin might infiltrate into the product, and it doesn’t meet the specification when the resin-coating is done to this product. These products after resin-coating will not be guaranteed.
6. Make sure that the terminals of this product are connected properly on the circuit board, and the reristance should be in the range of FH resistance between Terminal P1 - P3 and P2 - P3.


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## Replacement

HCO is a non-repairable product. For safety aspect, it shall be replaced by an equivalent HCO, and mounted in the same way.

## Storage

1. HCO must be stored in shaded area where it is not too dusty, with temp. (10 to 30) °C or less with no sudden temperature change, humidity within (30 to 70) % RH, and no corrosive gas in the air. please use them up within 1 year after receiving the goods .


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