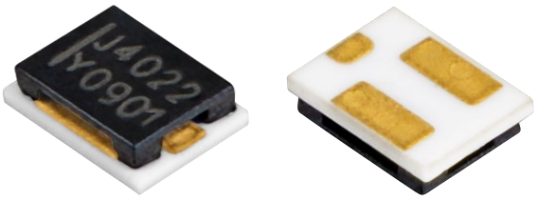


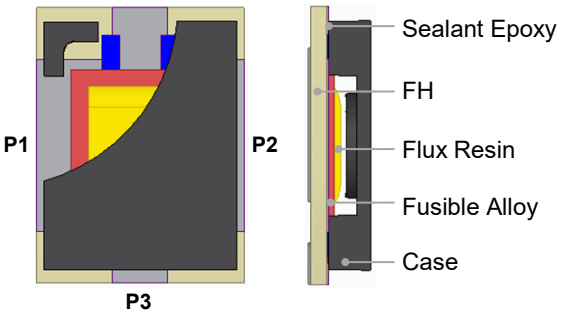
Description

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.

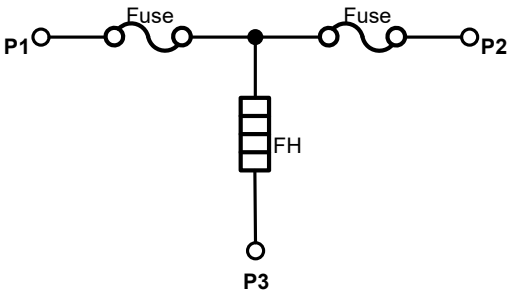
The Heat CutOff (HCO) is primarily used in secondary protection schemes for lithium battery charge and discharge circuits, providing redundant protection alongside the primary protection circuit. During the charge and discharge process of lithium batteries, if an abnormal overcurrent occurs, the fusible 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 ~ 62.9) 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）

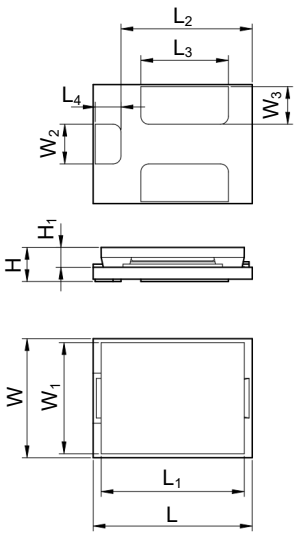
Application

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

Features

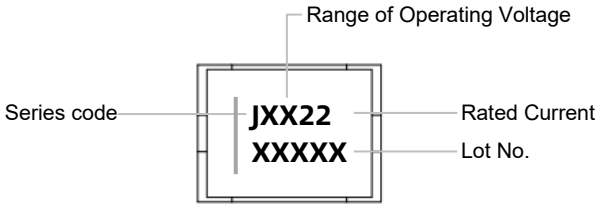
- Surface Mount
- Overcurrent Protection
- Overcharging Protection
- Low Impedance, Low Power Consumption
- Controlled Fusing Time ≤ 60 s
- Non-Resettable
- RoHS & REACH Compliant

Dimensions (Unit: mm)



L	L_1	L_2	L_3	L_4	W	W_1	W_2	W_3	H	H_1
4.0 ± 0.2	3.6 ± 0.2	3.3 ± 0.2	2.2 ± 0.2	0.65 ± 0.2	3.0 ± 0.2	2.8 ± 0.2	1.0 ± 0.2	0.95 ± 0.2	0.95 ± 0.15	0.5 ± 0.15

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

Specifications

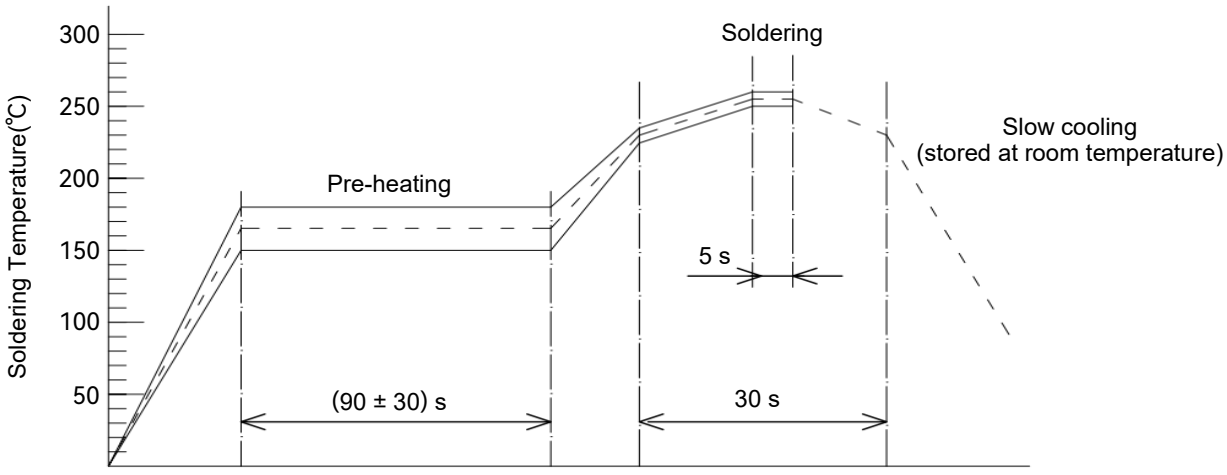
Model	I_r	U_r	Cells in Series (Selection Reference)	Breaking Capacity	Range of Operating Voltage	Resistance		Agency Information			RoHS REACH
						R_{Fuse}	R_{FH}				
	(A)	(VDC)	(Cells)	(A)	(VDC)	(mΩ)	(Ω)	UL	cUL	TUV	
SHJ-0412	12	80 / 48	1	50 / 200	3.0 ~ 5.5	≤ 3.5	0.65 ~ 1.06	●	●	●	●
SHJ-0812	12	80 / 48	2	50 / 200	4.0 ~ 9.0	≤ 3.5	1.72 ~ 2.36	●	●	●	●
SHJ-1212	12	80 / 48	3	50 / 200	6.9 ~ 13.8	≤ 3.5	4.02 ~ 5.72	●	●	●	●
SHJ-1412	12	80 / 48	4	50 / 200	9.6 ~ 19.6	≤ 3.5	8.2 ~ 11.7	●	●	●	●
SHJ-2012	12	80 / 48	5	50 / 200	11.5 ~ 23.5	≤ 3.5	12.0 ~ 17.0	●	●	●	●
SHJ-2412	12	80 / 48	6	50 / 200	13.8 ~ 28.2	≤ 3.5	17.3 ~ 24.4	●	●	●	●
SHJ-3012	12	80 / 48	7	50 / 200	16.8 ~ 32.9	≤ 3.5	24.9 ~ 36.1	●	●	●	●
SHJ-3212	12	80 / 48	8	50 / 200	18.4 ~ 37.6	≤ 3.5	30.7 ~ 44.7	●	●	●	●
SHJ-4012	12	80 / 48	9 ~ 10	50 / 200	22.5 ~ 47.0	≤ 3.5	47.9 ~ 66.0	●	●	●	●
SHJ-5012	12	80 / 48	11 ~ 13	50 / 200	27.5 ~ 62.9	≤ 3.5	82.5 ~ 107.0	●	●	●	●
SHJ-0415	15	80 / 48	1	50 / 200	3.0 ~ 5.5	≤ 3.0	0.65 ~ 1.06	●	●	●	●
SHJ-0815	15	80 / 48	2	50 / 200	4.0 ~ 9.0	≤ 3.0	1.72 ~ 2.36	●	●	●	●
SHJ-1215	15	80 / 48	3	50 / 200	6.9 ~ 13.8	≤ 3.0	4.02 ~ 5.72	●	●	●	●
SHJ-1415	15	80 / 48	4	50 / 200	9.6 ~ 19.6	≤ 3.0	8.2 ~ 11.7	●	●	●	●
SHJ-2015	15	80 / 48	5	50 / 200	11.5 ~ 23.5	≤ 3.0	12.0 ~ 17.0	●	●	●	●
SHJ-2415	15	80 / 48	6	50 / 200	13.8 ~ 28.2	≤ 3.0	17.3 ~ 24.4	●	●	●	●
SHJ-3015	15	80 / 48	7	50 / 200	16.8 ~ 32.9	≤ 3.0	24.9 ~ 36.1	●	●	●	●
SHJ-3215	15	80 / 48	8	50 / 200	18.4 ~ 37.6	≤ 3.0	30.7 ~ 44.7	●	●	●	●
SHJ-4015	15	80 / 48	9 ~ 10	50 / 200	22.5 ~ 47.0	≤ 3.0	47.9 ~ 66.0	●	●	●	●
SHJ-5015	15	80 / 48	11 ~ 13	50 / 200	27.5 ~ 62.9	≤ 3.0	82.5 ~ 107.0	●	●	●	●

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)	(A)	(VDC)	(mΩ)	(Ω)	UL	cUL	TUV	
SHJ-0422	22	80 / 48	1	50 / 200	3.0 ~ 5.0	≤ 2.2	0.52 ~ 0.81	●	●	●	●
SHJ-0822	22	80 / 48	2	50 / 200	5.4 ~ 9.4	≤ 2.2	1.82 ~ 2.62	●	●	●	●
SHJ-1222	22	80 / 48	3	50 / 200	8.1 ~ 13.8	≤ 2.2	4.11 ~ 5.90	●	●	●	●
SHJ-1422	22	80 / 48	4	50 / 200	10.8 ~ 18.8	≤ 2.2	7.7 ~ 10.7	●	●	●	●
SHJ-2022	22	80 / 48	5	50 / 200	13.5 ~ 23.5	≤ 2.2	12.5 ~ 17.2	●	●	●	●
SHJ-2422	22	80 / 48	6	50 / 200	15.6 ~ 28.2	≤ 2.2	16.3 ~ 22.5	●	●	●	●
SHJ-3022	22	80 / 48	7	50 / 200	20.3 ~ 32.9	≤ 2.2	28.5 ~ 38.7	●	●	●	●
SHJ-3222	22	80 / 48	8	50 / 200	22.4 ~ 37.6	≤ 2.2	33.4 ~ 46.1	●	●	●	●
SHJ-4022	22	80 / 48	9 ~ 10	50 / 200	26.1 ~ 47.0	≤ 2.2	49.7 ~ 66.8	●	●	●	●
SHJ-5022	22	80 / 48	11 ~ 13	50 / 200	34.1 ~ 62.0	≤ 2.2	86.0 ~ 119.0	●	●	●	●
Current Carrying Capacity	100% x I_r, no melting										
Current Fusing Time	200% x I_r the fusing time is < 1 min										
Controlled Fusing Time	In operation voltage range, the fusing time is <1min										
Endurance Test	500% x I_r power on 5 ms, power off 995 ms, 100,000 cycles										

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

Soldering Parameters

1. Reflow Soldering Method (For Reference Only)

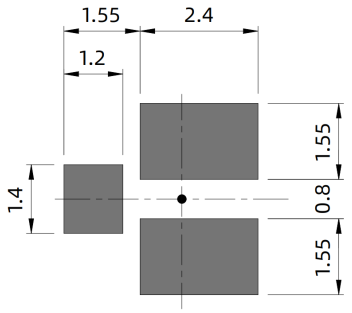


Peak Temp: (255 ± 5)°C 5 s
(230 ± 5)°C 30 s

2. Recommended Hand Soldering Parameters

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

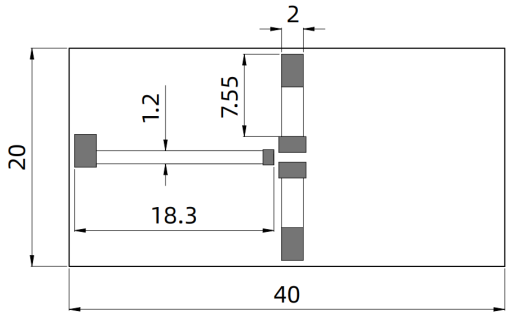
Recommended mounting size (Unit: mm)



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.

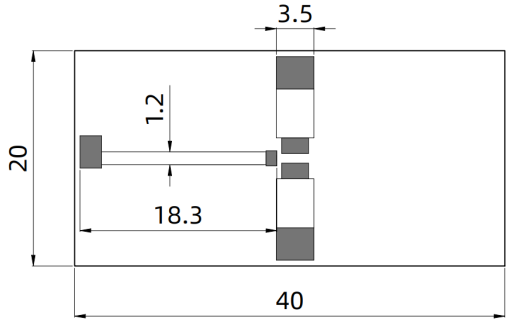
Recommended Test PCB Board

1. For rated currents 12 A



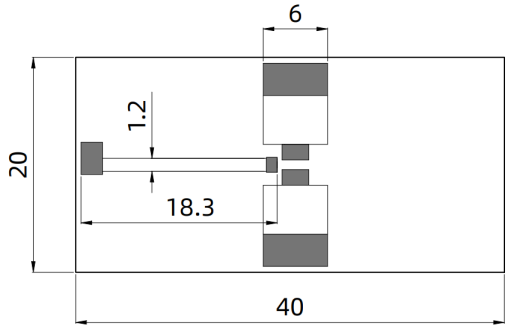
Materials	Base Thickness	Copper Width	Copper Thickness	Number Of board layers
FR-4	0.6 mm	2.0 mm	2.0 OZ (70 um)	Single Sided Board

2. For rated currents 15 A



Materials	Base Thickness	Copper Width	Copper Thickness	Number Of board layers
FR-4	0.6 mm	3.5 mm	2.0 OZ（70 um）	Single Sided Board

3. For rated currents 22 A

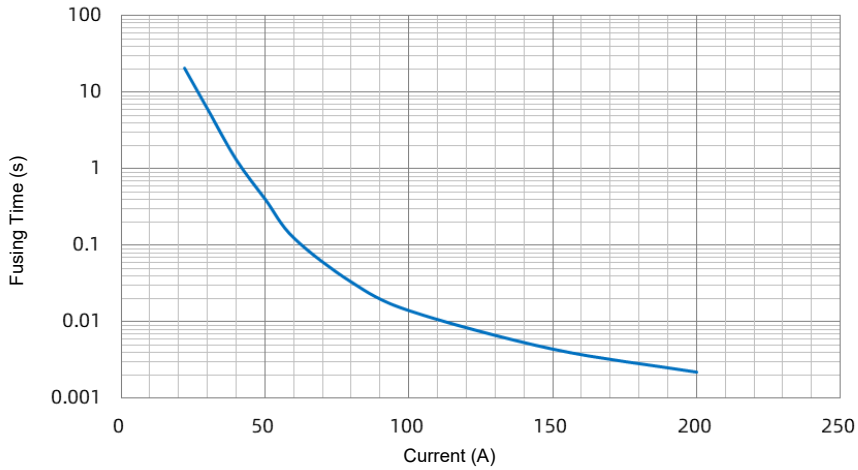


Materials	Base Thickness	Copper Width	Copper Thickness	Number Of board layers
FR-4	0.6 mm	6.0 mm	2.0 OZ（70 um）	Single Sided Board

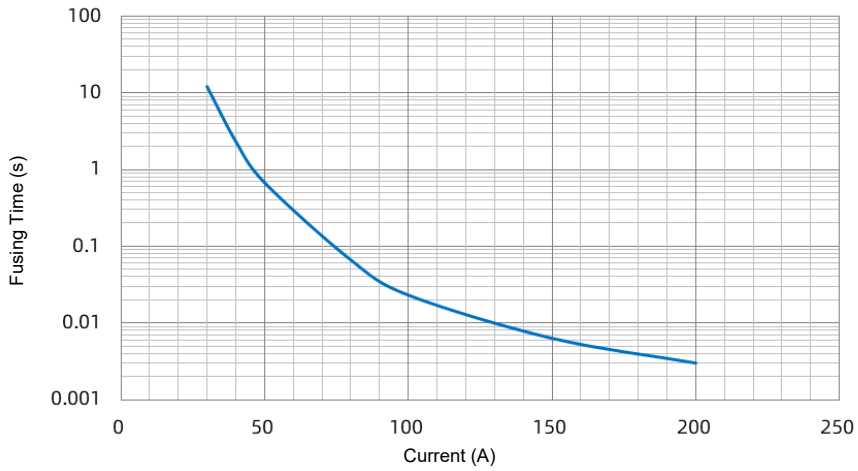
Current-Time Curve (Reference)

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

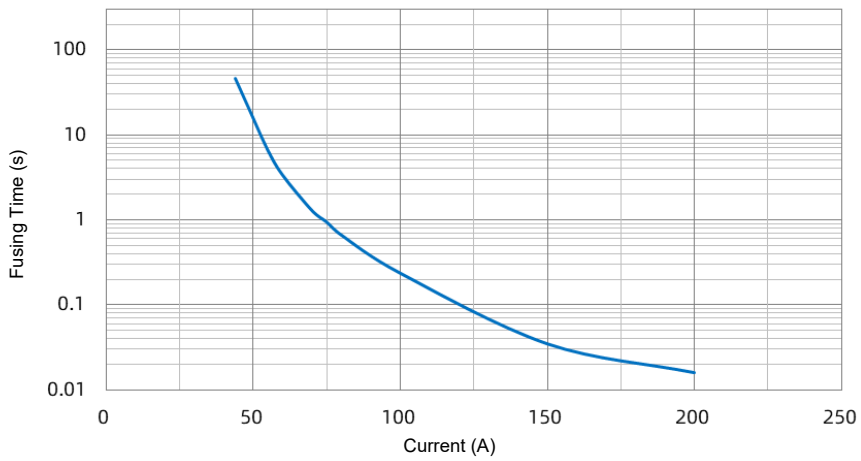
SHJ 12 A Current-Time Curve



SHJ 15 A Current-Time Curve



SHJ 22 A Current-Time Curve



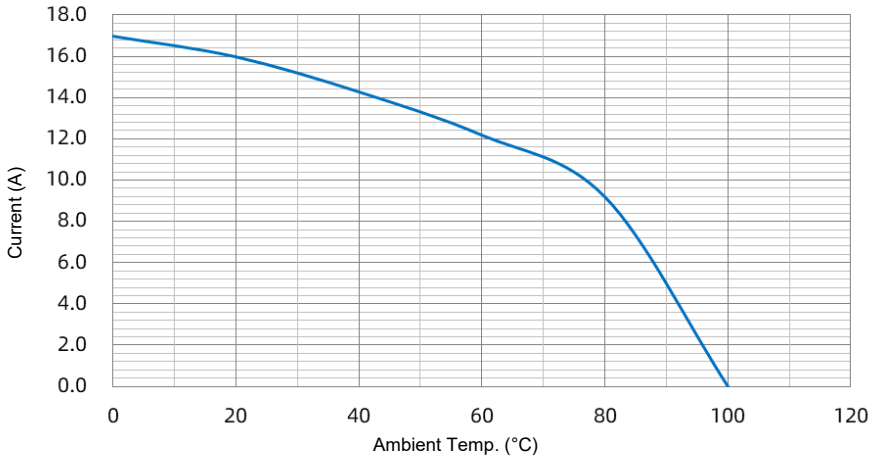
*Note:

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.

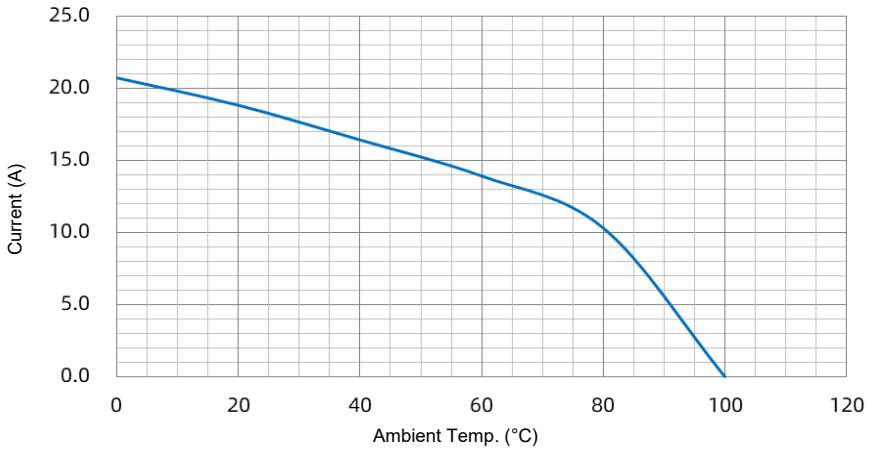
Current Carrying Capacity (Reference)

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

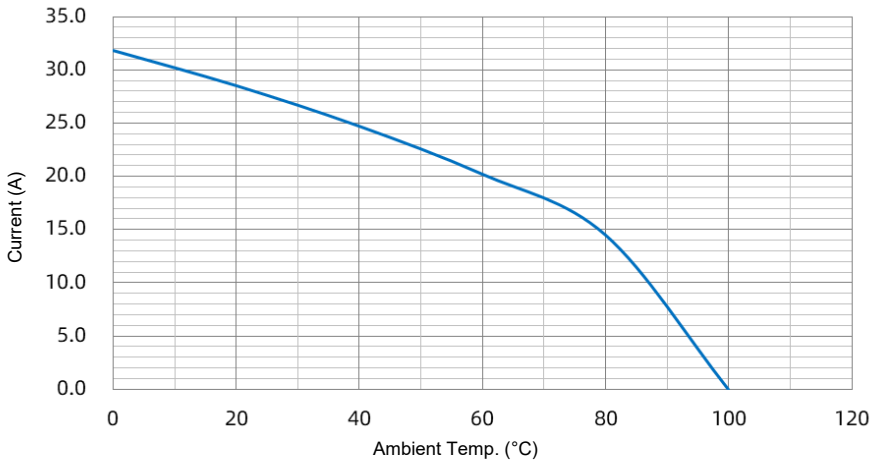
SHJ 12 A Current Carrying Capacity



SHJ 15 A Current Carrying Capacity



SHJ 22 A Current Carrying Capacity



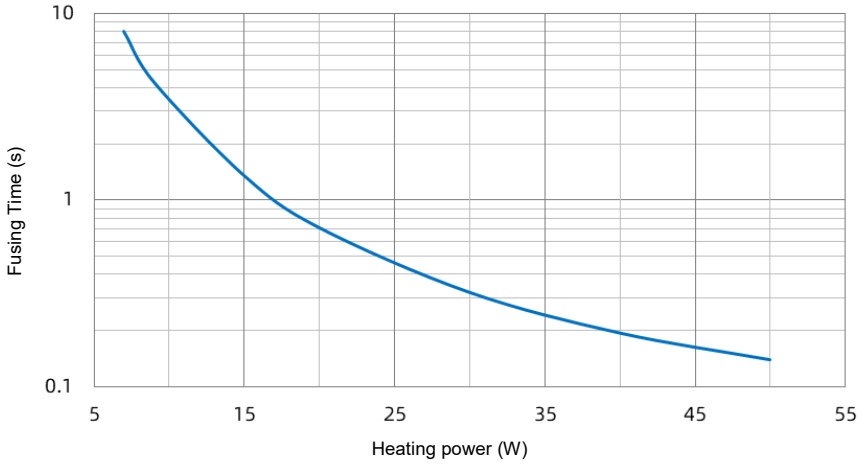
*Note:

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.

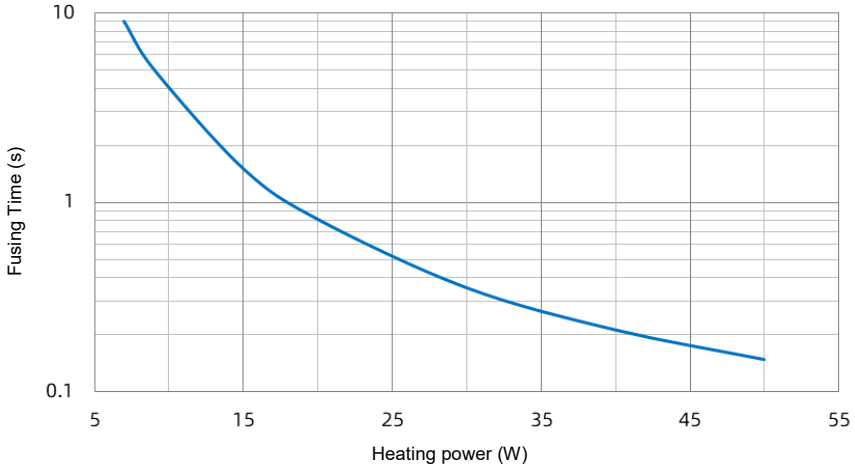
Power-Time Curve (Reference)

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

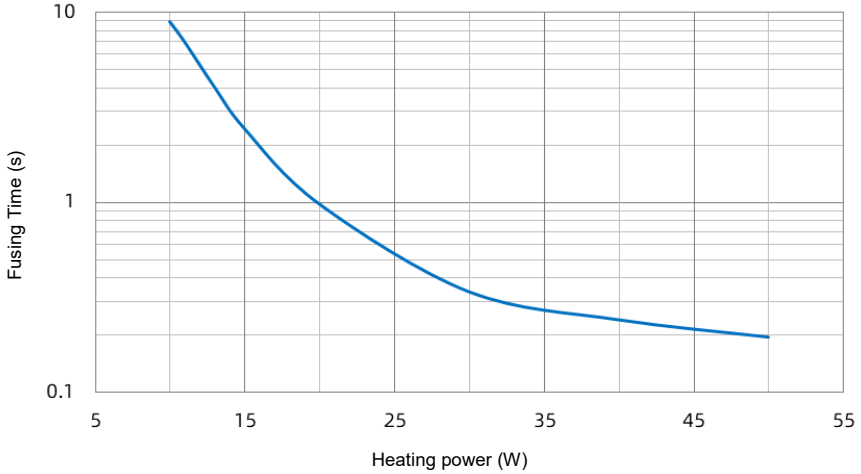
SHJ 12 A Power-Time Curve



SHJ 15 A Power-Time Curve



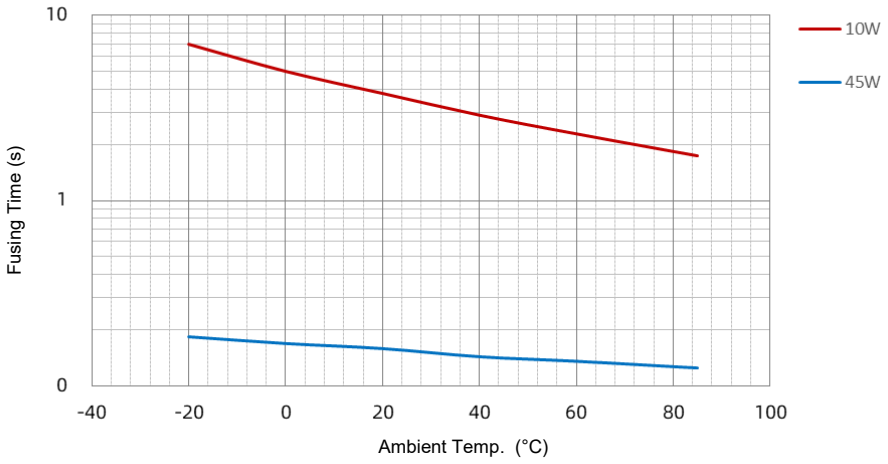
SHJ 22 A Power-Time Curve



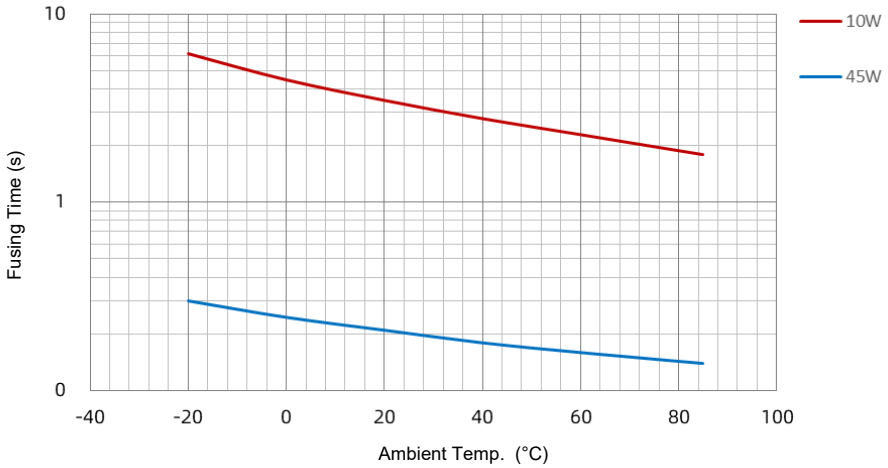
Power-temp. curve (Reference)

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

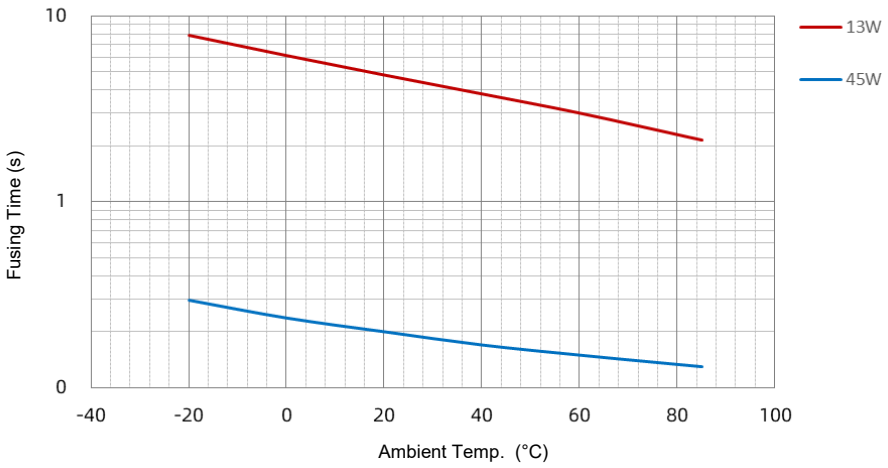
SHJ 12 A Power-temp. curve



SHJ 15 A Power-temp. curve



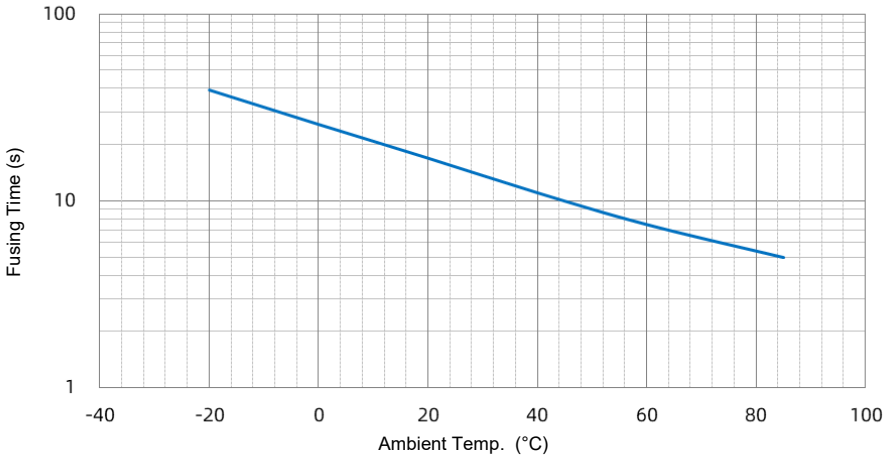
SHJ 22 A Power-temp. curve



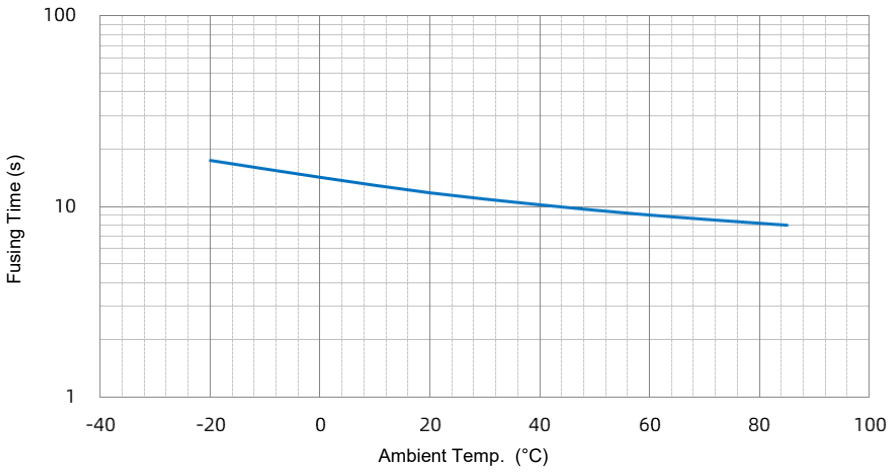
Temp.-Time Curve (Reference)

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

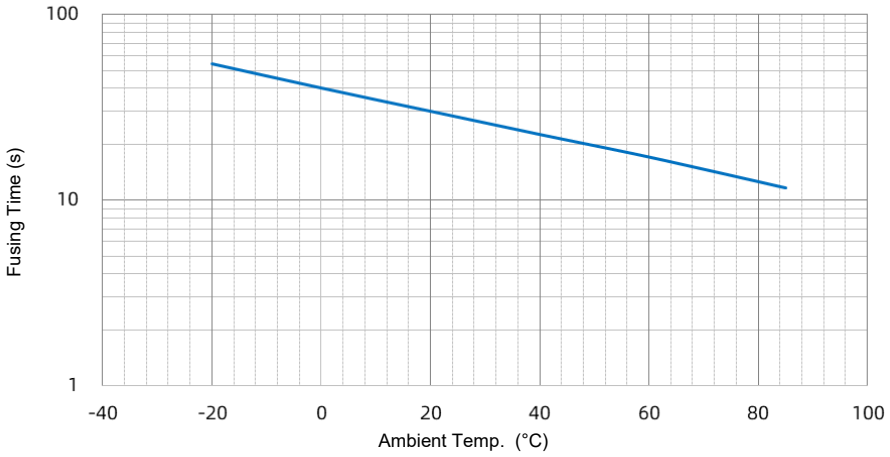
SHJ 12 A Temp.-Time Curve



SHJ 15 A Temp.-Time Curve



SHJ 22 A Temp.-Time Curve



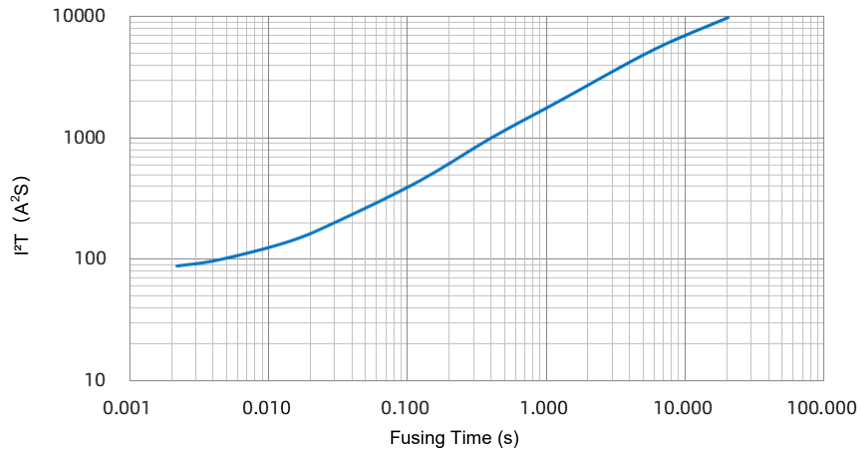
*Note:

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.

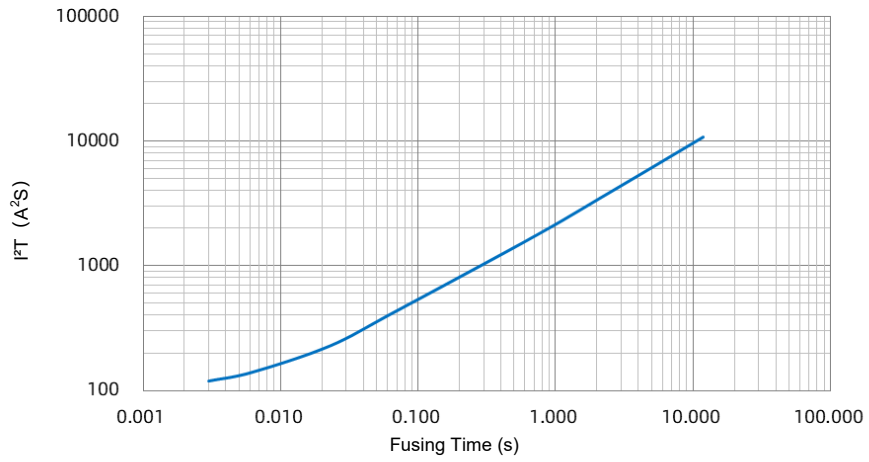
I²t-t Curve (Reference)

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.

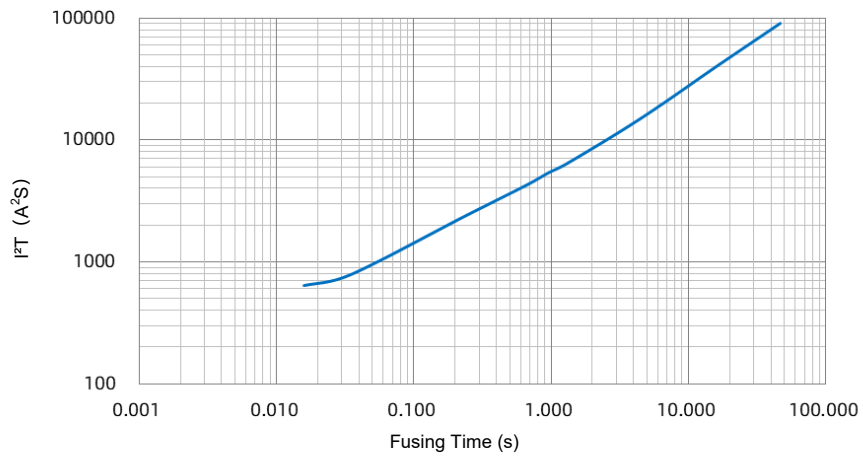
SHJ 12 A I²t-t Curve



SHJ 15 A I²t-t Curve



SHJ 22 A I²t-t Curve

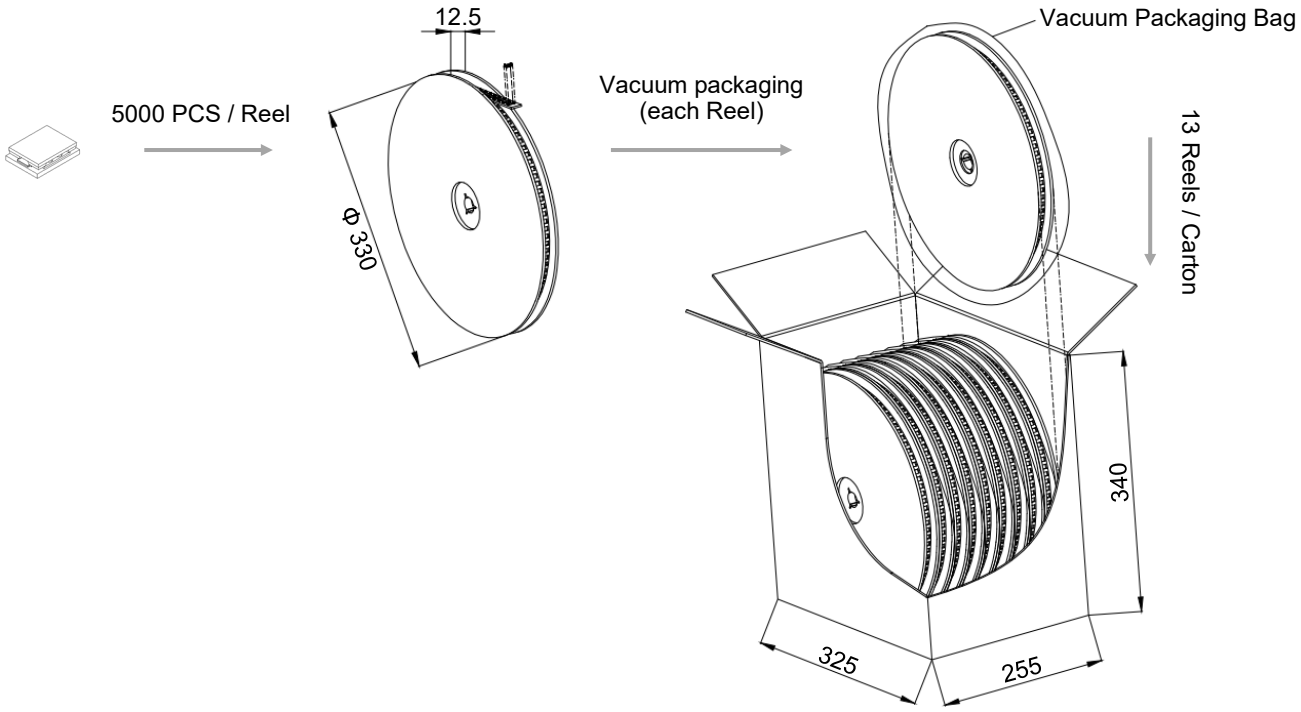


*Note:

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.

Packaging Information

Item	Reel	Carton
Dimensions (mm)	Φ 330 × 12.5	325 × 255 × 340
Quantity (PCS)	5000	65000



Glossary

Item	Description
HCO	**Heat CutOff (HCO)** With Feed Heater，A Protector that turns on a Feed Heater to cut off circuit.
MC	**Main Circuit (MC)** All conductive components used in switching devices for closing or disconnecting circuits in a circuit.
CC	**Control Circuit (CC)** 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** 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** 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** Electric appliances that use electric energy to achieve heating effect.
Breaking Capacity	**Breaking Capacity** 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** Under specified conditions, the protector can operate normally to disconnect the voltage.

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.

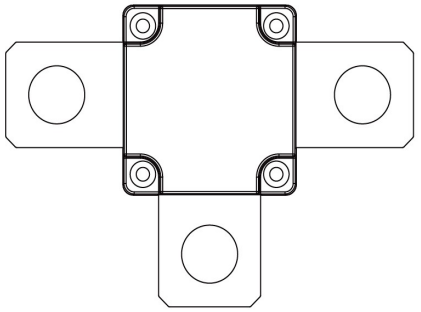
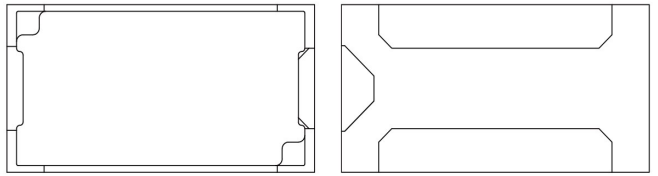
Replacement

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 .

Heat CutOff (HCO) Features & Model List Overview

Rated Operation Voltage (V)	Page						
96		SKT-96120	SKT-96150	○	○	○	○
84		SKT-84120	SKT-84150	SHP-8430	SHP-8445	SHP-8460	SHP-8475
72		SKT-72120	SKT-72150	SHP-7230	SHP-7245	SHP-7260	SHP-7275
60		SKT-60120	SKT-60150	○	○	○	○
50		SKT-50120	SKT-50150	SHP-5030	SHP-5045	SHP-5060	SHP-5075
48		○	○	SHP-4830	SHP-4845	SHP-4860	SHP-4875
40		SKT-40120	SKT-40150	SHP-4030	SHP-4045	SHP-4060	SHP-4075
32		○	○	○	SHP-3245	SHP-3260	SHP-3275
30		SKT-30120	SKT-30150	SHP-3030	SHP-3045	SHP-3060	SHP-3075
24		○	○	SHP-2430	SHP-2445	SHP-2460	○
20		SKT-20120	SKT-20150	SHP-2030	SHP-2045	SHP-2060	SHP-2075
18		○	○	○	○	○	○
14		SKT-14120	SKT-14150		SHP-1445	SHP-1460	SHP-1475
12		SKT-12120	SKT-12150	SHP-1230	SHP-1245	SHP-1260	SHP-1275
08		○	○	○	○	○	○
06		○	○	SHP-0630	SHP-0645	SHP-0660	○
04		○	○	SHP-0430	SHP-0445	SHP-0460	○
	Model						
I_r (A) Rated Current		120	150	30	45	60	75
U_r (VDC) Rated Voltage		125		100			
Product Structure		 Screw Fastening		 SMD			

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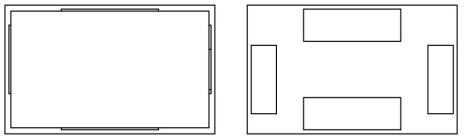
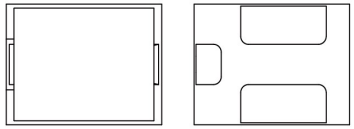
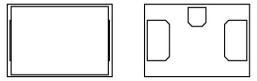
Heat CutOff (HCO) Features & Model List Overview

Rated Operation Voltage (V)	Page	Model							
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	○	○	○	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-2405	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		
Product Structure									
				SMD					

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