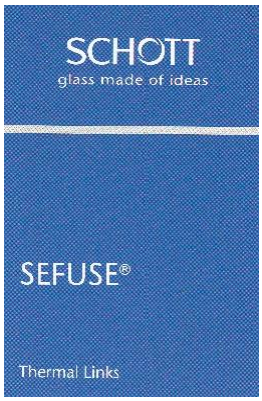
SEFUSE® SF R Series
Thermal Links

- Axial Design
- Non-resettable thermal link
- Pellet type
- RoHS and REACH compliant
- High current applications



CHATHAM COMPONENTS INC.
Authorized distributor for SEFUSE thermal links
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Specifications

Part Number*	Rated Functioning Temperature T_f (°C)	Cut-off Temperature (Operating Temperature) (°C)	Maximum Temperature Limit T_m (°C)	Holding Temperature T_h (°C)	Ampere (A)	Voltage (V)
SF70R*	73	70 ± 2	165	58	15A / 10 (resistive)	AC 250
SF76R*	77	$76^{+0,-4}$	165	62		
SF81R*	84	$81^{+3,-1}$	165	69		
SF90R*	94	90 ± 2	165	79		
SF94R*	99	94 ± 2	165	84		
SF113R*	113	108± 2	165	98		
SF119R*	121	119 ± 2	165	106		
SF129R*	133	129 ± 2	175	118		
SF139R*	142	139 ± 2	175	127		
SF144R*	144	142 ± 2	210	129		
SF150R*	152	$150^{+1,-3}$	210	137		
SF167R*	167	164 ± 2	250	153		
SF184R*	184	182 ± 2	250	174		
SF188R*	192	$188^{+3,-1}$	375	177		
SF214R*	216	$214^{+1,-3}$	375	200		
SF229R*	229	227 ± 2	380	200		
SF240R*	240	237 ± 2	380	200		

*Standard lead length suffix: (0). Long lead length suffix: (1).

*For proper operation, manufacture's installation cautions must be followed

Safety Standards

1）Part Number*	UL/cUL	VDE	CCC	KTL	2）PSE[2]	
	Thailand	Thailand	Thailand	Thailand（SU05020-****）	Thailand (JET1974-32001-****)	
					Rating 15A	Rating 10A
SF70R*	E71747	677802-1171-0015	20130102 05600209	5004	2001	1003
SF76R*						
SF81R*					2002	1002
SF90R*						
SF94R*						
SF113R*				5005	2003	1001
SF119R*				5006	2004	1004
SF129R*						
SF139R*					2005	1005
SF144R*						
SF150R*						
SF167R*				5007	2006	1006
SF184R*	3）E71747				2007	1007
SF188R*						
SF214R*				5008	2008	1008
SF229R*					2009	1009
SF240R*						

* For standard lead length type, add the suffix "0" at the end of the part number. For long lead length type, add the suffix "1" at the end of the part number.

2) With respect to the PSE standard, SF-R is separately available for 10A and 15A ratings. Please select the appropriate product rating according to the specifications of the final application.

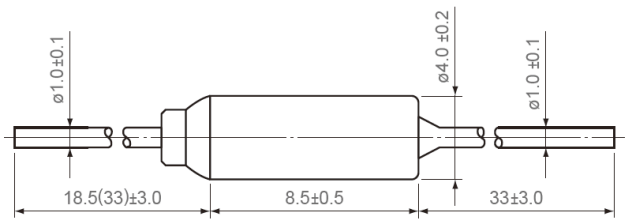
The following SF cutoffs have passed the Conductive Heat Aging Test (CHAT) specified by the UL safety standard: SF184R*, SF188R*, SF214R*, SF229R*, and SF240R*.

The electrical ratings according to the various safety standards are shown in the following table.

Electrical Ratings

RATED VOLTAGE	UL / cUL	VDE	CCC	KTL	PSE
AC120V	20A (Resistive)	-	-	-	-
AC250V	10A (Resistive)	10A	10A	10A	10A
	15A (Resistive)	15A	15A	15A	15A
	16A (Resistive)	-	-	-	-

Dimensions (mm)



Note: The dimensions for long lead devices are in parentheses.

Installation Cautions - From manufacturer's (SCHOTT) catalog 8/2018
*For questions and complete cautions, please contact SCHOTT Japan Corporation

Cautions

This section describes points to note, about the design, installation and storage of SEFUSE® thermal links, so as to achieve the optimum performance of these thermal protection devices.

For optimal thermal link performance, it is recommended that customers correctly store the thermal protection devices, design appropriate circuits for the appliances and perform evaluations, mounting and testing steps as necessary. Problems arising from the inappropriate execution of the above would be the sole responsibility of the customer, and SCHOTT declines any and all responsibility.

Design

Do not use this device for any purpose other than as a thermal link.
The thermal link is designed to detect abnormal rises in temperature and open the electrical circuits as required. It is not a current fuse that cuts off excess current. If the thermal link is used as a current fuse, it may malfunction.

Do not use this device in aerospace equipment, aeronautical equipment, nuclear reactor control systems, life support equipment or systems, transportation machinery engine control or safety-related equipment.
This device is designed for use in household electrical appliances, office automation equipment, audio and video equipment, computer communications equipment, test and measurement equipment, personal electronic equipment and transportation equipment (excluding engine control).

Decisions regarding the type of thermal link, the installation location and the mounting method should be made by the customers, based upon the requirements of the final application.
It is recommended that designers test the final design with the selected thermal link under both normal conditions as well as predicted worst-case scenarios.

▼Thermal links should be mounted where it can detect abnormal heat as quickly as possible.
The thermal link operates when the thermal element within melts. Therefore, if the thermal element does not reach the operating temperature, the cutoff will not activate even if the ambient temperature has risen to the operating temperature. In addition, a short lag time might result in the event of a sudden rise in the ambient temperature or if the thermal link only detects part of the temperature increase.

▼Thermal links* should be mounted such that the temperature gradient is equal throughout the thermal link.
If lead B of the SF-type, which is caulked to the metal case, is mounted in such a way that it only conducts heat to the metal case, the temperature around the thermal pellet would always be higher than other parts in the metal case. This could lead to the thermal link opening prematurely. Hence, it is recommended that lead A, which is the resin-sealed side, be connected nearer to the heat source.
It should also be mentioned that similarly, if lead A is fixed in a location where the temperature it is exposed to is always lower than that of lead B, the thermal link could also be prematurely triggered.
* except SFH/R series

▼Cautions about Tm
Please ensure that the design of the final application does not exceed Tm (the maximum temperature limit) of the thermal link.
If used in conditions beyond the rated temperature, a dielectric breakdown could result and the thermal link could re-conduct even after opening.

▼Cautions about Th (SF-type)
Continuous exposure to temperatures close to the Th temperature of the thermal link could result in the thermal pellet reducing in size over time, thereby shortening the lifespan of the thermal link. This change in the pellet size is irreversible. Hence, it is important that designers select and test thermal links suitable for the temperature zone of the final application, based on the temperature recommendations in Table 1.
Please also note that the Th temperature test is a one-time test, not a cycle test, conducted continuously for 168 hours.

Designers of the final application should take into account the maximum surface temperature of the thermal link as shown in Table 1, and avoid exceeding this level.
If the body temperature of the thermal link is exceeded on a regular basis, the thermal link may start opening at temperatures lower than the normal operating temperature. Malfunctions may also occur. In case of using SM-type in DC rating, please kindly contact SCHOTT.

Table 1 Recommended usage temperatures

SM-type		SF-type					
		SF/R, SF/K, SF/Y series				SFH/R series	
Part Number	Fuse Body Temperature	Part Number	Fuse Body Temperature	Part Number	Fuse Body Temperature	Part Number	Fuse Body Temperature
SM072A	52°C	SF70R, K, Y	50°C	SF139R, Y	119°C	SFH106R	86°C
SM092A, B	72°C	SF76R, K, Y	56°C	SF144R	122°C	SFH109R	89°C
SM110A, B, G	90°C	SF81R	61°C	SF150R, Y	130°C	SFH113R	93°C
SM125A, B	96°C	SF90R, K, Y	70°C	SF167R, K, Y	140°C	SFH117R	97°C
SM137A, B, G	117°C	SF94R, K, Y	74°C	SF184R, Y	140°C	SFH124R	104°C
SM146A, B, G	126°C	SF96K, Y	76°C	SF188R, K, Y	140°C	SFH129R	109°C
SM150A, B	126°C	SF113R, Y	88°C	SF214R, K, Y	140°C	SFH134R	114°C
SM225A, B, G	140°C	SF119R, K, Y	99°C	SF229R, Y	140°C	SFH152R	132°C
		SF129R, Y	109°C	SF240R, Y	140°C	SFH162R	140°C
						SFH172R	140°C

Note that the temperature listed in Table 1 refers to the surface temperature of the thermal link, not the ambient temperature.

Thermal links have a limited life.
The thermal elements used are durable substances designed for long-term use. However, the longevity of the thermal link depends on the conditions in which it is exposed to. This is particularly true if the thermal protection device is frequently exposed to temperatures very close to its operating temperature.
Hence, it is recommended that designers conduct a reliability test by fixing the thermal protection device onto the actual application and simulating the expected operating conditions to assess the lifetime of the device.

The body temperature of the thermal link increases as current passes through it.
The body temperature of the thermal link could rise to levels higher than the ambient temperature current passes through the device. In addition, the body temperature could also increase depending on a number of factors such as the mounting method. Hence, it is recommended that designers measure the body temperature of the thermal link after conducting a reliability test.

Use the thermal link with a voltage and current level lower than the rated level.
If the thermal link is used with a voltage or current level higher than the rated level, the contacts may be welded together in the SF-type, causing the thermal link to malfunction. In the SM-type, the body of the thermal link may rupture.

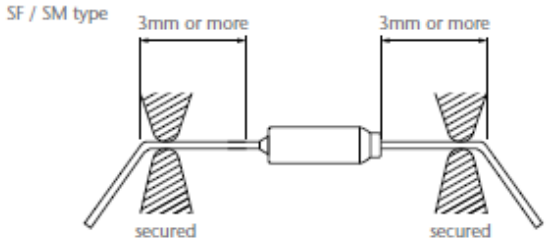
Do not use the thermal link in an atmosphere out of the standard specifications such as in environments exposed to sulfurous acid gas, nitrogen oxide gas, ammonia gas or conditions that contain formic acid. It is also not suitable for high humidity situations and submersion in a liquid.
The case of the thermal link* is made with a copper alloy. Hence, installing the thermal link in such conditions or similar, could deteriorate the sealing resin or lead to cracks in the case of the thermal link due to corrosion. The thermal link could thus operate at lower than operating temperatures or not activate even if its operating temperature is exceeded.
* SF-K series only

The thermal link corresponds to industrial waste.
The thermal link corresponds to industrial waste, and requires disposal according to governmental and provincial regulations. The services of a licensed disposal contractor could also be engaged.

The thermal link is a non-repairable device.
In case of replacement, an equivalent thermal link from the same manufacturer should be used. For general consumers who are not aware of the cautions associated with the thermal link, they should be informed not to mount, remove or replace the thermal link through a note to this effect in the user's manual and other related materials.

Lead wire process

When bending the lead wire, it is important not to apply excessive pressure to the root of the lead wire. The lead wire should be secured close to the case and bent (not twisted) at a distance 3 mm or more from the body of the fuse.



The tensile strength applied to the lead wire should be 49N or less for SF-type and 9.8N or less for SM-types.
The strength applied to the body of the thermal link should be 98N or less for SF-type, 49N or less for SM-type.
With regards to the SF-type, deformation of the case may change the location of the sliding contact during operation and could lead to the thermal link operating only at temperatures lower than the normal operating temperature range. The thermal link may also not operate even if the thermal link's operating temperature is exceeded.

Mounting

Thermal links can be mounted by soldering, caulking or welding.
The connecting position should be 5 mm or more from the body of the thermal links.

If soldering, take note that the thermal link may function because of excessive solder temperature. To prevent such malfunctions, for example, holding the lead near the case with a tool is effective for allowing the heat to escape and the soldering should be done in short intervals.
Another effective method is to use a lower solder temperature and to solder at a location that is at a distance from the case.

If caulking or welding, be careful to keep the resistance value of the connecting section low. If the connecting section has a high resistance value, the passing current may generate an abnormally high temperature that will cause the thermal link to operate. If caulking particularly, please test many times because heat-cycle and humidity cause a high resistant value.

After mounting the thermal link, be careful not to apply force that may pull, push or twist the lead wires.

If using a SF-type thermal link, the lead on the resin-sealed side must not be allowed to touch the case. This would cause the current to flow from the lead on the resin-sealed side to the opposite lead resulting in a non-functioning thermal link.

Note that the body of the SF-type is the same in potential as the circuit. Therefore, it must be electrically isolated from other metallic parts.

Storage

The body and lead A of the SF-type, and the leads of SM092A, SM092B, SM225A, SM225B and SM225G are silver-plated. Therefore, these parts may discolor because of sulfuration, making the markings on the body illegible or negatively affecting the solder-ability of the lead. To avoid this, the thermal link should not be kept around materials (such as cardboard or rubber, etc.) which generate sulfurous acid gas.

When storage in cardboard boxes is required, thermal links should be double packed and sealed in polybags such as polyethylene.

Recommendation

SCHOTT recommends the following tests upon receipt and after mounting of the thermal link, as it may have undergone some mechanical load or thermal influence during transportation or when being mounted.

1. Appearance check
2. Resistance check (comparing before with after), or conductive check
3. X-ray inspection
4. Operation check for sampling

Be careful when mounting the thermal link because external force, heat or a harmful atmosphere (containing excessive humidity or sulfurous acid gas) may damage the thermal link.

If applicable, it is recommended that the general consumers, who are unaware of the usage cautions for thermal links, be informed not to mount, remove, or replace the thermal link through a note to this effect in the user's manual and other related material.

All reasonable care has been taken to present the data here and the values contained in this document were obtained under certain testing conditions by us. They are not guaranteed and are for reference only.
For any clarifications or more information about these cautions, please kindly contact SCHOTT.