Cautions

SEFUSE®

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

For optimal thermal cutoff performance, it is recommended that customers correctly stores the thermal protection devices, designs appropriate circuits for the appliances and performs 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 NEC SCHOTT declines any and all responsibility.

Design

●Do not use this device for any purpose other than as a thermal cutoff.

The thermal cutoff 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 thermal cutoff 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 cutoff, the installation location and the mounting method should be made by customers based upon the requirements of the end-application.

It is recommended that designers test the final design with the selected thermal cutoff under both normal conditions as well as predicted worst-case scenario.

▼ Thermal cutoff should be mounted where it can detect abnormal heat as quickly as possible.

The thermal cutoff 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 cutoff only detects part of the temperature increase.

▼ Thermal cutoff(*) should be mounted such that the temperature gradient is equal throughout the thermal cutoff.

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 cutoff 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 whereby the temperature it is exposed to is always lower than that of lead B, the thermal cutoff could also be prematurely triggered.

(*) except SFH-E series

●Designers of the end-application should take into account the maximum surface temperature of the thermal cutoff, as shown in Table 1, and avoid exceeding this level.

If the body temperature of the thermal cutoff is exceeded on a regular basis, the thermal cutoff may start operating at temperatures lower than the normal operating temperature. Malfunctions may also occur. In case of using SM-type and D6-type in DC rating, please kindly contact NEC SCHOTT Components Corporation.

Table 1

SM Type		SF Type					
		SF/E, SF/K, SF/Y, SF/L Series				SFH/E Series	
Part Number	Fuse Body Temperature	Part Number	Fuse Body Temperature	Part Number	Fuse Body Temperature	Part Number	Fuse Body Temperature
SM072A	52°C	SF70E, K, Y, L	50°C	SF167L	140°C	SFH106E	86°C
SM092A, B	72°C	SF76E, K, Y, L	56°C	SF169E, Y, L	140°C	SFH109E	89°C
SM110A, B, G	90°C	SF90L	70°C	SF184E, Y, L	140°C	SFH113E	93°C
SM125A, B	106°C	SF91E, K, Y	71°C	SF188E, K, Y, L	140°C	SFH117E	97°C
SM137A, B, G	117°C	SF96E, K, Y, L	76°C	SF214E, K, Y, L	140°C	SFH124E	104°C
SM146A, B, G	126°C	SF113E, Y, L	90°C	SF226E, Y	140°C	SFH129E	109°C
SM150A, B	126°C	SF119E, K, Y, L	99°C	SF229L	140°C	SFH134E	114°C
		SF129E, Y, L	109°C	SF240E, Y, L	140°C	SFH152E	132°C
		SF139E, Y, L	119°C			SFH162E	140°C
		SF152E, Y, L	132°C			SFH172E	140°C

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

●Thermal cutoffs have a limited life.

The thermal elements used are durable substances designed for long-time usage. However, the longevity of the thermal cutoff depends on the conditions in which it is exposed to. This is particularly true if the thermal protection device is frequently exposed to temperature 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 end-application and simulating the expected operating conditions to assess the lifetime of the device.

●The body temperature of the thermal cutoff increases as current passes through it.

The body temperature of the thermal cutoff could rise to levels higher than the ambient temperature as the 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 thermal cutoff after conducting a reliability test.

●Use the thermal cutoff with a voltage and current level lower than the rated level.

If the thermal cutoff 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 cutoff to malfunction. In the SM-type and D6-type, the body of the thermal cutoff may rupture.

●Do not use the thermal cutoff in an atmospher 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 cutoff(*) is made with a copper alloy (brass). Hence, installing the thermal cutoff in such conditions or similar, could deteriorate the sealing resin or lead to cracks in the case of the thermal cutoff due to corrosion. The thermal cutoff could thus operate at lower than operating temperatures or not activate even if its operating temperature is exceeded.

* except SF-Y series, SM-type and D6-type

●The thermal cutoff corresponds to industrial waste.

The thermal cutoff 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 cutoff is a non-repairable device.

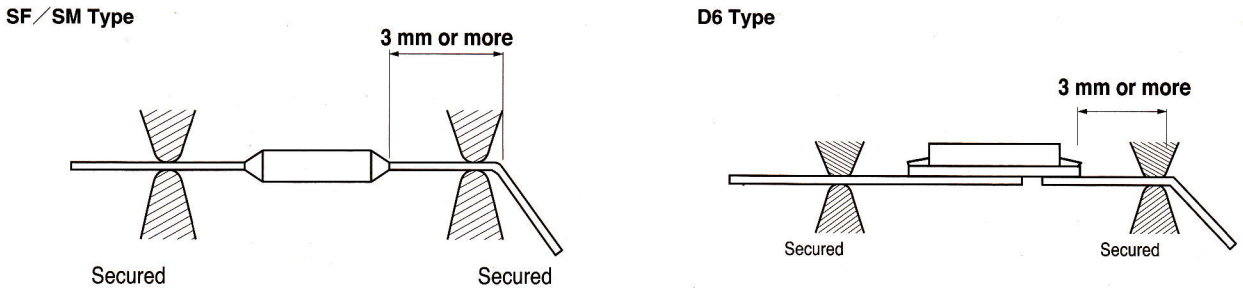
In case of replacement, an equivalent thermal cutoff from the same manufacturer should be used. For general consumers who are not aware of the cautions associated with the thermal cutoff, they should be informed not to mount, remove or replace the thermal cutoff through a note to this effect in the user's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

Cautions

SEFUSE®

Lead wire process

- When bending the lead wire, it is important not to apply excessive pressure to the root of the lead wire. Therefore, 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.



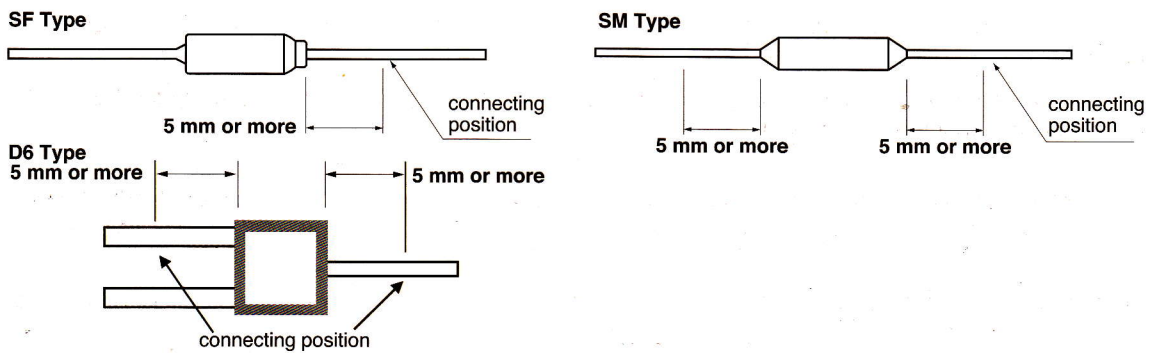
- The tensile strength applied to the lead wire should be **SF-type: 49N or less** and **SM- and D6-types: 9.8N or less**.
- The strength applied to the body of the thermal cutoff should be **SF-type: 98N or less**, **SM-type: 49 N or less, and D6-type: 4.9N or less**.

  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 cutoff operating only at temperatures lower than the normal operating temperature range. The thermal cutoff may also not operate even if the thermal cutoff's operating temperature is exceeded.

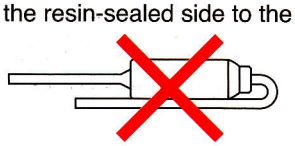
Mounting

Thermal cutoff can be mounted by soldering, caulking or welding.

- The connecting position at the lead of resin-sealed side should be 5 mm or more from the body of the thermal cutoff.



- If soldering, note that the thermal cutoff 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 cutoff to operate.
- After mounting the thermal cutoff, be careful not to apply force that may pull, push or twist the lead wires.
- If using a SF-type thermal cutoff, 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 so that the thermal cutoff cannot open the circuit.



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

Storage

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

- When storage of thermal cutoff in cardboard boxes is required, the pack of thermal cutoffs should be double packed and sealed in bags such as polyethylene.

Recommendation

- NEC SCHOTT recommend the following tests upon receipt and after mounting of the thermal cutoff, 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 cutoff because external force, heat or a harmful atmosphere (containing excessive humidity or sulfurous acid gas) may damage the characteristics of the thermal cutoff. If applicable, it is recommended that the general consumers, who are unaware of the usage cautions for thermal cutoff, be informed not to mount, remove, or replace the thermal cutoff through a note to this effect in the user's manual and other related material.

For any clarifications or more information about these cautions, please kindly contact NEC SCHOTT Components Corporation.

The values contained in this document were obtained under the testing conditions conducted by NEC SCHOTT. These are not guaranteed and are for reference only.