NEC/SCHOTT

SEFUSE™

THERMAL CUTOFF

NEC SCHOTT Components Corporation

SEFUSE™

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Please be sure to read the "Cautions" on pages 15 through 18 before using.

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Select optimum series according to temperature and electrical ratings.

Safety standards

Japan UL CSA VDE BEAB CCEE CCIB

SEFUSE™

Thermal Cutoff

SEFUSE™ is a compact and reliable thermal cutoff designed to protect domestic electrical appliances and industrial electrical equipment from fire. Cutoff occurs and an electrical circuit opens when ambient temperature increases to an abnormal level.

Two SEFUSE types are available. The SF type uses an organic thermosensitive material as the thermal pellet and its operating temperature range is 73 ˚C to 240 ˚C.

The SM type uses a fusible alloy and has an operating range of 76 ˚C to 187 ˚C.

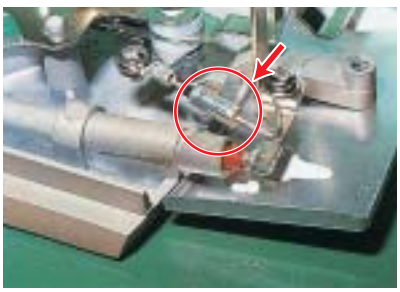
SEFUSE is manufactured in Japan and Thailand, and both factories are ceritified by the International Standards Organization (ISO) for the ISO9001 or ISO9002 quality standard.

Features

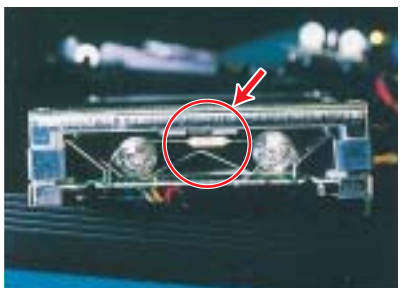
- Excellently sensitive to ambient temperature
- Stable and precise operation
- One shot operation
- Wide choice of types to suite the application (SF or SM)
- SF types has ceramic pipe to protect sealing resin from the stress when bending the leads.
- Meets many safety standards
- Cadmium free and Lead free SF is available

Applications

- Irons, hair dryers, heaters,
- Refrigerators, rice cookers, water pots, coffee makers
- Air conditioners, ventilation fans, electric fans, gas boilers
- Transformers, power suppliers, adaptors, solenoides
- Chargers, battery packs
- Copiers, laser beam printers, power taps



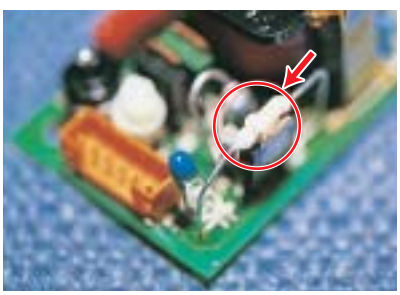
● Iron



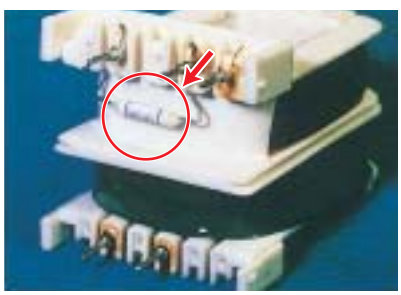
● LCD Television

● Rice cooker

For the purpose of photography, the insulation tube of the thermal cutoff has been removed. In reality, the thermal cutoff is covered by the insulation tube.



● Inverter



● Transformer

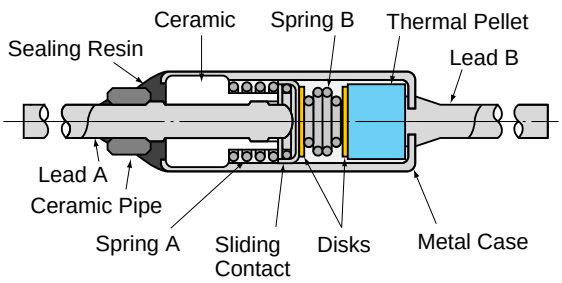
Application Examples

Construction

SF type

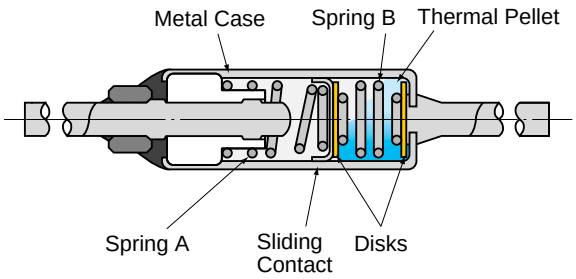
The SF type uses an organic thermosensitive pellet inside a metal case. It features a large cutoff(rated) current of 10 A or 15 A.

Before Operation

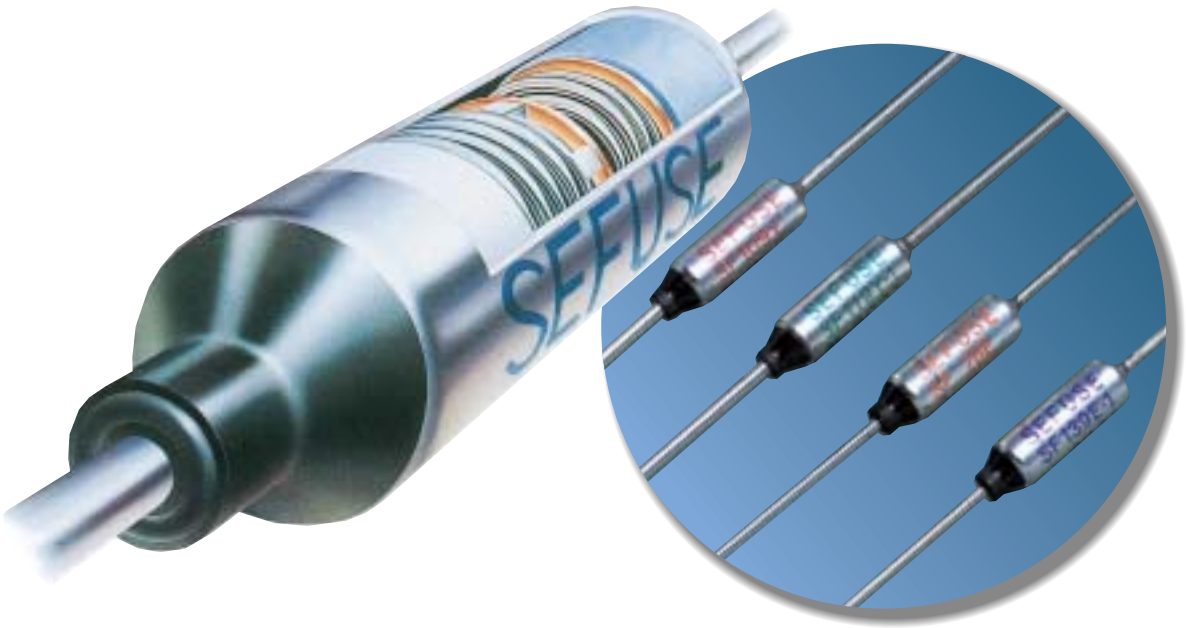


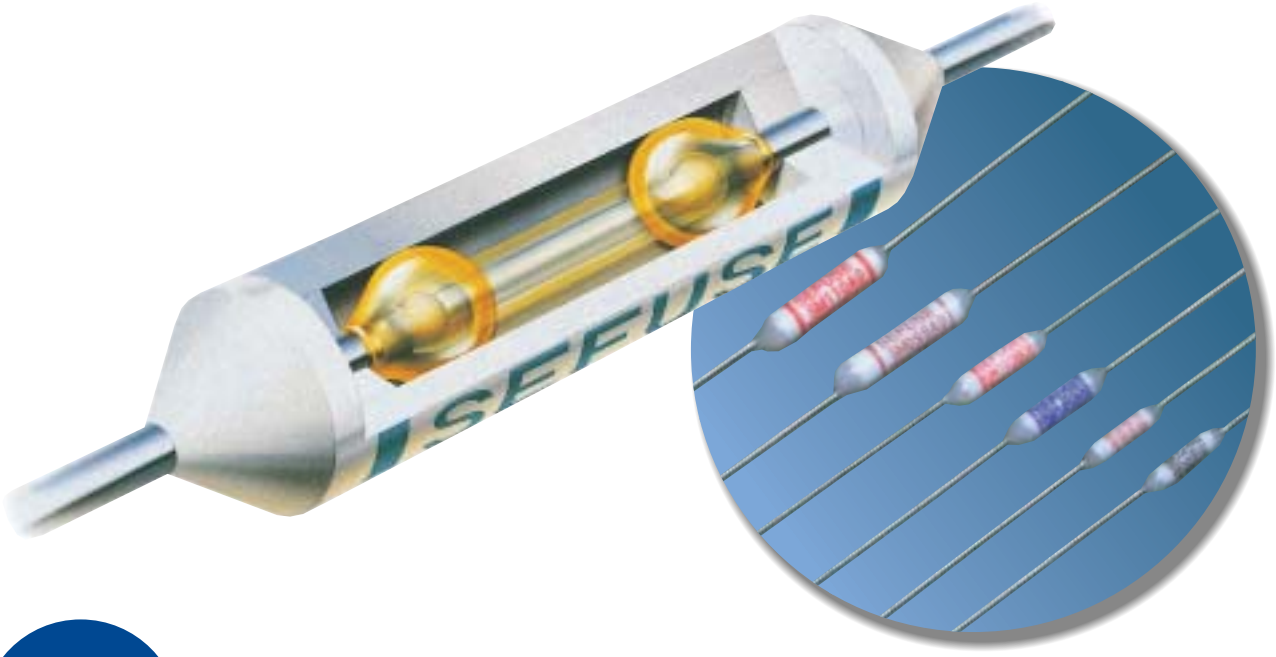
The SF type contains a sliding contact, springs, and a thermal pellet inside a metal case. When spring B is compressed, firm contact between lead A and the sliding contact occurs. At normal temperatures, current flows from lead A to the sliding contact and then through the metal case to lead B.

After Operation



When the ambient temperature rises to the SEFUSE operating temperature, the heat transferred through the metal case melts the thermal pellet. When the thermal pellet melts, springs A and B expand, moving the sliding contact away from lead A. The electrical circuit is opened by breaking contact between the sliding contact and lead A.

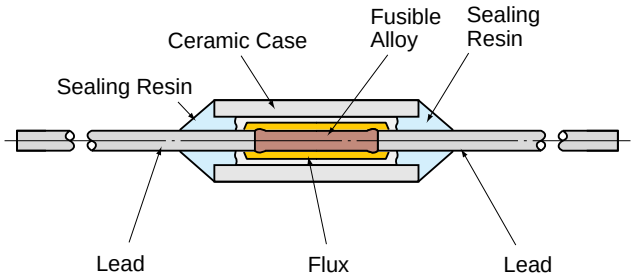




SM type

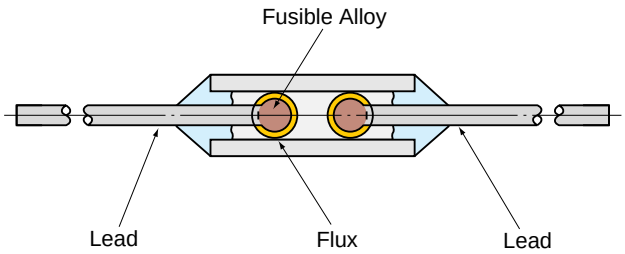
The SM type uses a fusible alloy inside a ceramic case. It has a cutoff(rated) current of 0.5 A, 1 A or 2 A. Because of its insulated case, the SM type can be attached directly where temperature detection is required.

Before Operation



In the SM type, leads are connected by a fusible alloy. The current flows directly from one lead to the other. The fusible alloy is coated with a special flux.

After Operation

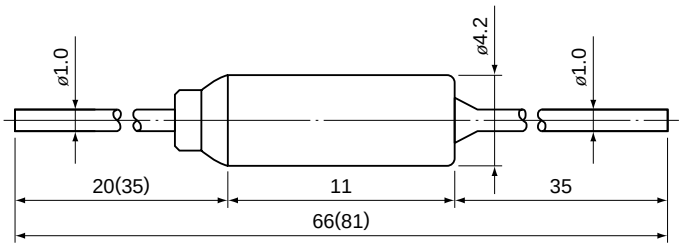


When ambient temperature rises to the SEFUSE operating temperature, the fusible alloy melts and condenses into a drop around the end of each lead because of surface tension and the coating of special flux. The electrical circuit then opens.

Standard Ratings

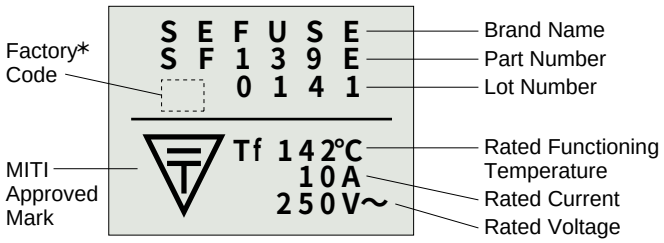
SF/E Series

Dimension (Unit:mm)



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

Marking



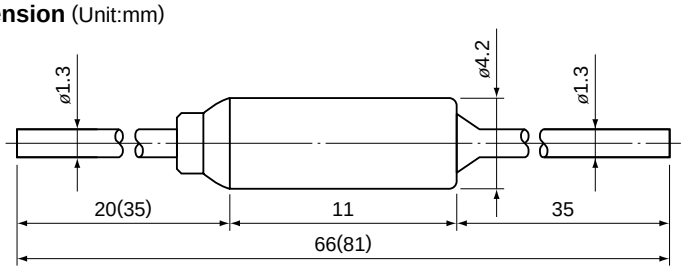
* Factory Code represents the factory location as shown below.
Japan : none, Thailand : B

How to read a lot number

ex.) 0 1 4 1
- 1 → Sub-lot number
- 4 → Month
  - X……October
  - Y……November
  - Z……December
- 0 1 → Last two digit of year

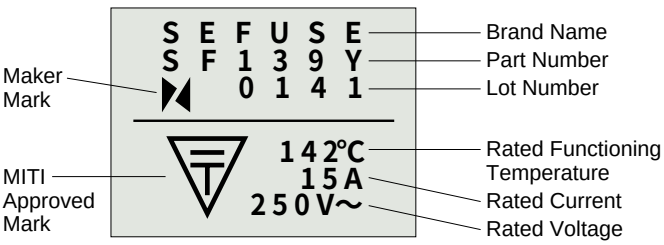
SF/Y Series

Dimension (Unit:mm)



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

Marking



How to read a lot number

ex.) 0 1 4 1
- 1 → Sub-lot number
- 4 → Month
  - X……October
  - Y……November
  - Z……December
- 0 1 → Last two digit of year

Ratings

Part Number 1)	Rated Functioning Temperature TF•Tf (°C)	Operating Temperature (°C)	TH Th (°C)	TM Tm (°C)	Rated Current	Rated Voltage	U L	CSA	VDE	BEAB	CCIB	CCEE	Made in Japan	Made in Thailand
SF 70E	73	70 ± 2	45	150	4) 15A/10A (Resistive)	4) AC250V	E71747	6) 172780 (LR52330)	File No. 6778.2 -1171 -0002 Licence No. Made in Japan 081640 Made in Thailand 097299	C1060	Made in Japan 2001 LV2618 Made in Thailand 2001 LV2561	Made in Japan CH 0045037 -2000 Made in Thailand CH 0045041 -2000	33-312	33-835
SF 76E	77	76 ± 0/4	51	150										
SF 91E	94	91 ± 3/1	66	150									33-331	33-834
SF 96E	99	96 ± 2	71	150										
SF109E	113	109 ± 3/1	84	150									33-332	33-833
SF119E	121	119 ± 2	94	150									33-333	33-832
SF129E	133	129 ± 2	104	159										
SF139E	142	139 ± 2	114	159									33-334	33-831
SF152E	157	152 ± 2	127	172										
SF169E	172	169 ± 1/3	144	189			5)						33-335	33-830
SF188E	192	188 ± 3/1	164	300									33-336	33-886
SF214E	216	214 ± 1/3	200 2)	350									33-549	33-827
SF226E	227	226 ± 1/3	200 2)	300 3)									33-354	33-828
SF240E	240	237 ± 2	200 2)	350										

Note: 1) Part numbers are for standard lead devices. For long leads, add the number "-1" at the end of part number.
2) Th approved by BEAB is 189 ˚C for SF214E and 190 ˚C for SF226E and SF240E.
3) TM approved by UL is 240 ˚C. Tm approved by CSA is 330 ˚C.
4) The electrical ratings by safety standards are as follows.

Rated Voltage	Japan	UL	CSA	VDE	BEAB	CCIB	CCEE
AC120V		15A (Inductive) 20A (Resistive)					
AC240V		15A (Resistive)					
AC250V	10A	10A (Resistive)	15A (Inductive) (Resistive)	10A	10A	10A	10A
		15A (Resistive)					
		17A (Resistive)					
AC277V		15A (Resistive)					

5) SF169E, SF188E, SF214E, SF226E and SF240E has a recognition of CH rating by UL.
6) The number in parentheses are provious number. Both number can be inquired.

Ratings

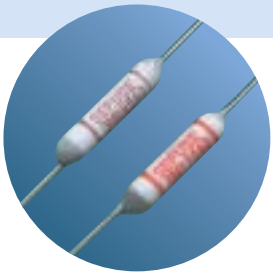
Part Number 1)	Rated Functioning Temperature	Operating Temperature	Rated Current	Rated Voltage	Made in Japan	U L
SF 70Y	73˚C	70 ± 2˚C	15A	AC250V	33-312	
SF 76Y	77˚C	76 ± 0/4 ˚C				
SF 91Y	94˚C	91 ± 3/1 ˚C			33-331	
SF 96Y	99˚C	96 ± 2˚C				
SF109Y	113˚C	109 ± 3/1 ˚C			33-332	E71747
SF119Y	121˚C	119 ± 2˚C			33-333	
SF129Y	133˚C	129 ± 2˚C				
SF139Y	142˚C	139 ± 2˚C			33-334	
SF152Y	157˚C	152 ± 2˚C				E71747
SF169Y	172˚C	169 ± 1/3 ˚C			33-335	
SF188Y	192˚C	188 ± 3/1 ˚C			33-336	
SF214Y	216˚C	214 ± 1/3 ˚C			33-549	
SF226Y	227˚C	226 ± 1/3 ˚C			33-354	
SF240Y	240˚C	237 ± 2˚C				

Note: 1) Part numbers are for standard lead devices. For long leads, add the number "-1" at the end of part number.

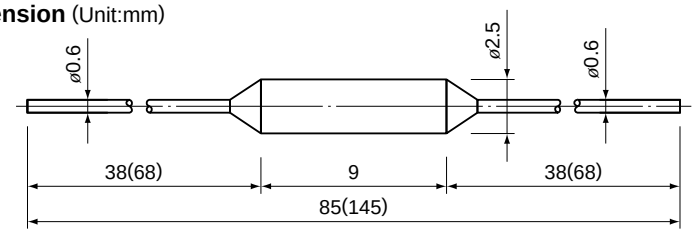
- All the parts and materials don't contain lead (Pb).
- Cadmium free contact types are available. Please contact us.

Standard Ratings

SM/A Series

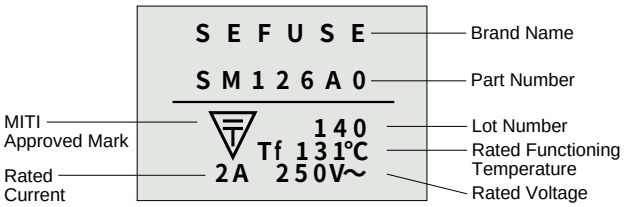


■ **Dimension** (Unit:mm)



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

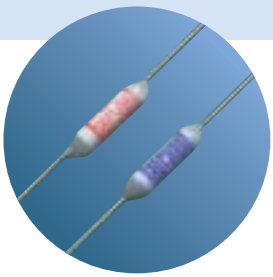
■ **Marking**



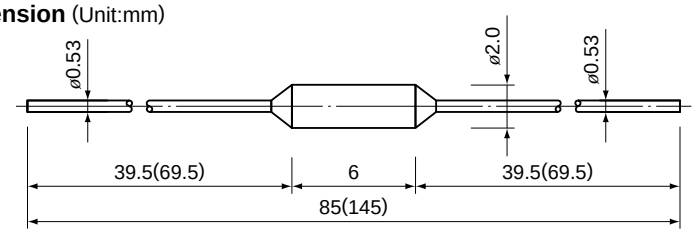
How to read a lot number

ex.) 1 4 0
- 0: Sub-lot number
- 4: Month (X……October, Y……November, Z……December)
- 1: Last digit of year

SM/B Series

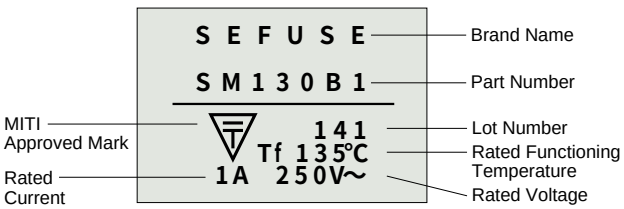


■ **Dimension** (Unit:mm)



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

■ **Marking**

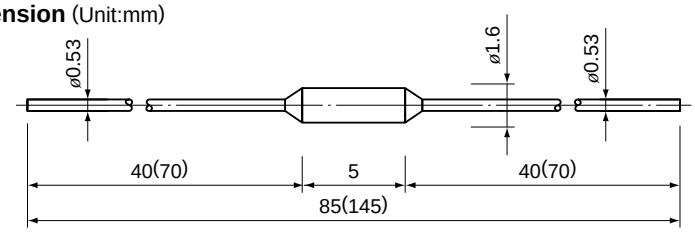


How to read a lot number

ex.) 1 4 0
- 0: Sub-lot number
- 4: Month (X……October, Y……November, Z……December)
- 1: Last digit of year

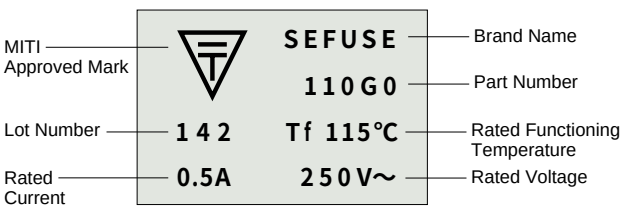
SM/G Series

■ **Dimension** (Unit:mm)



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

■ **Marking**



How to read a lot number

ex.) 1 4 0
- 0: Sub-lot number
- 4: Month (X……October, Y……November, Z……December)
- 1: Last digit of year

Ratings

1) Part Number	Rated Functioning Temperature T_F•Tf (˚C)	Operating Temperature (˚C)	T_H Th (˚C)	T_M Tm (˚C)	Rated Current	Rated Voltage	U L	CSA	VDE	BEAB	CCIB	CCEE	
SM072A0	76	72 ± 3/2	46	100	2 A (Resistive)	AC250V	2) E71747	172780 (LR52330) 3)	File No. 6778.2 -1171 -0001	C1054	2001 LV2618	CH 0045038 -2000	33-528
SM095A0	100	95 ± 5/0	65	115									33-466
SM110A0	115	110 ± 2	80	125									33-472
SM126A0	131	126 ± 2	96	140									33-467
SM130A0	135	130 ± 2	100	145									
SM134A0	139	134 ± 2	—	—									
SM145A0	150	145 ± 2	115	160					Licence No. 117275				33-468
SM164A0	169	164 ± 3/2	133	180									33-470
SM182A0	187	182 ± 2	152	195									33-556

Note: 1) Part numbers are for standard devices. For long leads, change the last number from 0 to 1.
2) SM072A has C-UL recognition.
3) The number in parentheses are provious number. Both number can be inquired.

Ratings

1) Part Number	Rated Functioning Temperature T_F•Tf (˚C)	Operating Temperature (˚C)	T_H Th (˚C)	T_M Tm (˚C)	Rated Current	Rated Voltage	U L	CSA	VDE	BEAB	CCIB	CCEE	
SM095B0	100	95 ± 5/0	65	115	1 A (Resistive)	AC250V	E71747	172780 (LR52330) 3)	File No. 6778.2 -1171 -0004 Licence No. 117162	C1030	2001 LV2618	CH 0045039 -2000	33-466
SM110B0	115	110 ± 2	80	125									33-472
SM126B0	131	126 ± 2	96	140									33-467
SM130B0	135	130 ± 2	100	145									
SM134B0	139	134 ± 3/2	—	—									
SM145B0	150	145 ± 2	115	160 2)									33-468

Note: 1) Part numbers are for standard devices. For long leads, change the last number from 0 to 1.
2) Tm approved by CSA is 155 ˚C
3) The number in parentheses are provious number. Both number can be inquired.

Ratings

1) Part Number	Rated Functioning Temperature T_F•Tf (˚C)	Operating Temperature (˚C)	T_H Th (˚C)	T_M Tm (˚C)	Rated Current	Rated Voltage	U L	CSA	VDE	BEAB	CCIB	CCEE	
SM095G0	100	95 ± 5/0	65	115	0.5 A (Resistive)	AC250V	2) E71747	172780 (LR52330) 3)	File No. 6778.2 -1171 -0003 Licence No. 117163	C0743	2001 LV2618	CH 0045040 -2000	33-466
SM110G0	115	110 ± 2	80	125									33-472
SM126G0	131	126 ± 2	96	140									33-467
SM130G0	135	130 ± 2	100	145									
SM134G0	139	134 ± 3/2	104	200									
SM145G0	150	145 ± 2	115	155									33-468

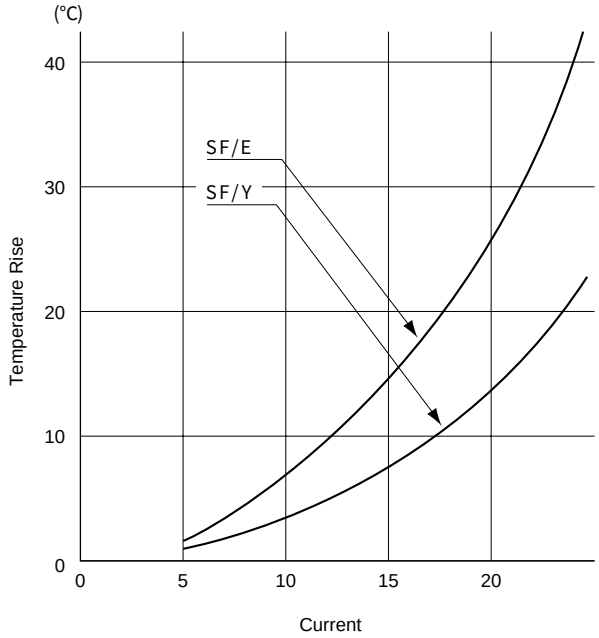
Note: 1) Part numbers are for standard devices. For long leads, change the last number from 0 to 1.
2) SM/G series has following recognition of DC rating by UL.
SM095G : 3 A / DC 50 V
SM110G,SM126G,SM130G,SM134G,SM145G : 5 A / DC 50 V
3) The number in parentheses are provious number. Both number can be inquired.

● Lead (Pb)-free lead types are available. Please contact us.
● Fusible alloy doesn't contain cadmium except SM145✶.

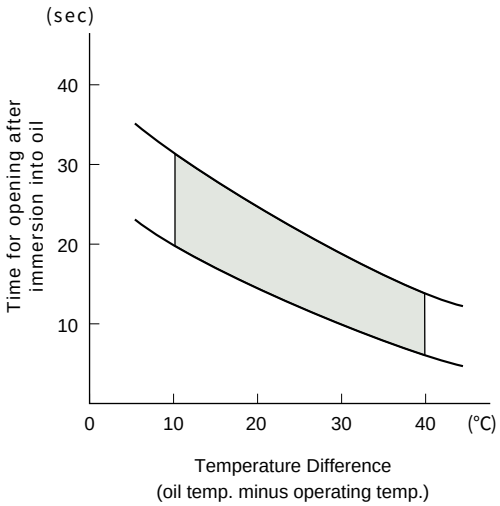
Performance Data

SF/E Series • SF/Y Series

Temperature Rise

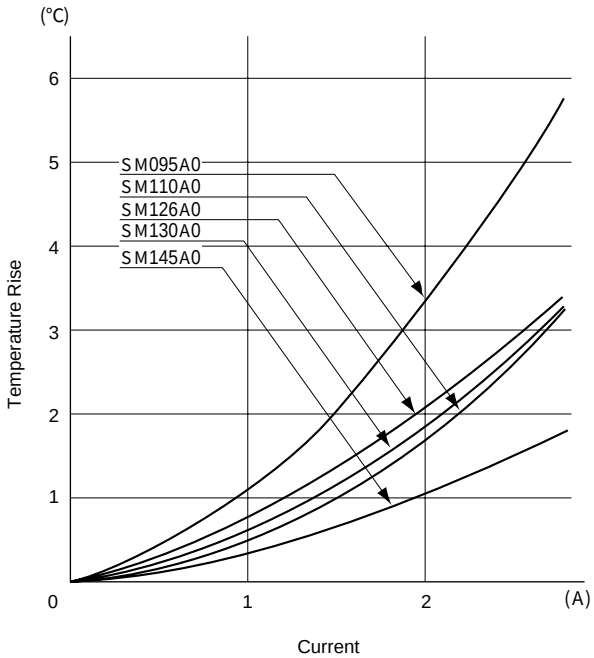


Response Time

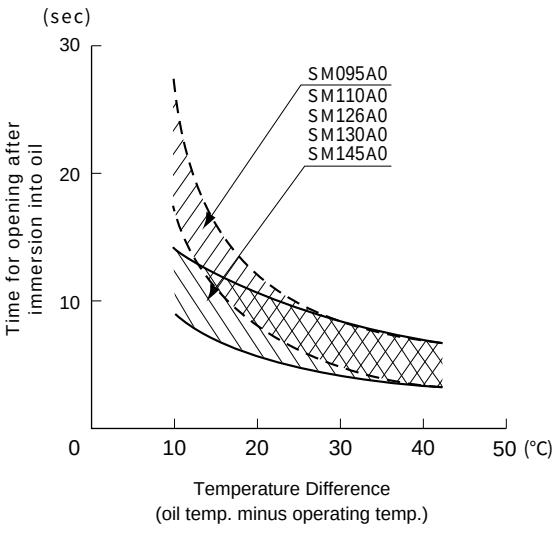


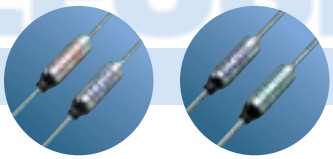
SM/A Series

Temperature Rise



Response Time





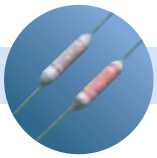
Initial Characteristics

Part Number	Operating Temperature (°C)	Insulation Resistance after Operation (MΩ)	Withstand Voltage after Operation (kV)	Internal Resistance (mΩ/25 mm)
SF169E & SF169Y	169 / 168 / 167	10^6 / 10^5 / 10^4	2.0 / 1.5 / 1.0	1.5 / 1.0 / 0.5 (E, Y)
SF139E & SF139Y	140 / 139 / 138	10^6 / 10^5 / 10^4	2.0 / 1.5 / 1.0	1.5 / 1.0 / 0.5 (E, Y)
SF109E & SF109Y	112 / 111 / 110	10^6 / 10^5 / 10^4	2.0 / 1.5 / 1.0	1.5 / 1.0 / 0.5 (E, Y)
SF96E & SF96Y	97 / 96 / 95	10^6 / 10^5 / 10^4	2.0 / 1.5 / 1.0	1.5 / 1.0 / 0.5 (E, Y)
SF70E & SF70Y	71 / 70 / 69	10^6 / 10^5 / 10^4	2.0 / 1.5 / 1.0	1.5 / 1.0 / 0.5 (E, Y)

Aging Test

Part Number	Change of Operating Temperature (°C)	0	10	100	1,000	10,000
SF169E & SF169Y	@140°C	+2 / 0 / −2				
SF139E & SF139Y	@119°C	+2 / 0 / −2				
SF109E & SF109Y	@89°C	+2 / 0 / −2				
SF96E & SF96Y	@76°C	+2 / 0 / −2				
SF70E & SF70Y	@50°C	+2 / 0 / −2				
				Time (Hours)		

Note: The values following @ are the storage temperature.



Initial Characteristics

Part Number	Operating Temperature (°C)	Insulation Resistance after Operation (MΩ)	Withstand Voltage after Operation (kV)	Internal Resistance (mΩ/25 mm)
SM145A0	146 / 145 / 144	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	3.4 / 3.0 / 2.6
SM130A0	131 / 130 / 129	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	4.4 / 4.0 / 3.6
SM126A0	127 / 126 / 125	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	4.4 / 4.0 / 3.6
SM110A0	111 / 110 / 109	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	4.4 / 4.0 / 3.6
SM095A0	99 / 98 / 97	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	11 / 9 / 7

Aging Test

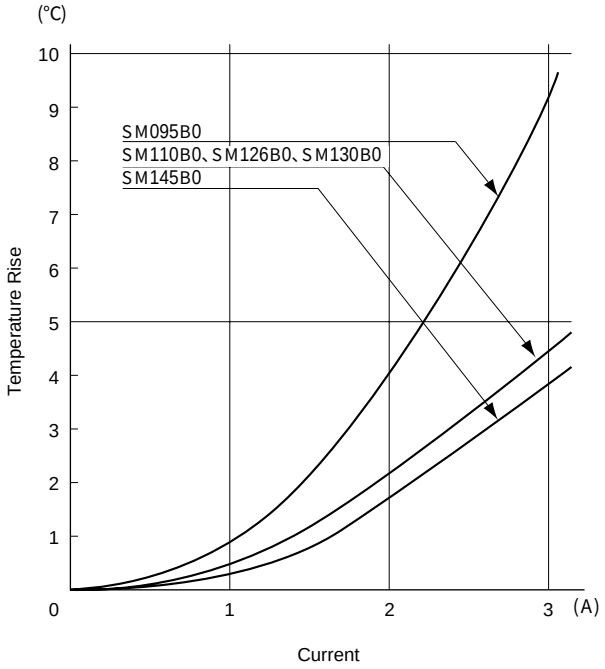
Part Number	Change of Operating Temperature (°C)	0	10	100	1,000	10,000
SM145A0	@125°C	+5 / 0 / −5				
SM130A0	@110°C	+5 / 0 / −5				
SM126A0	@106°C	+5 / 0 / −5				
SM110A0	@90°C	+5 / 0 / −5				
SM095A0	@75°C	+5 / 0 / −5				
				Time (Hours)		

Note: The values following @ are the storage temperature.

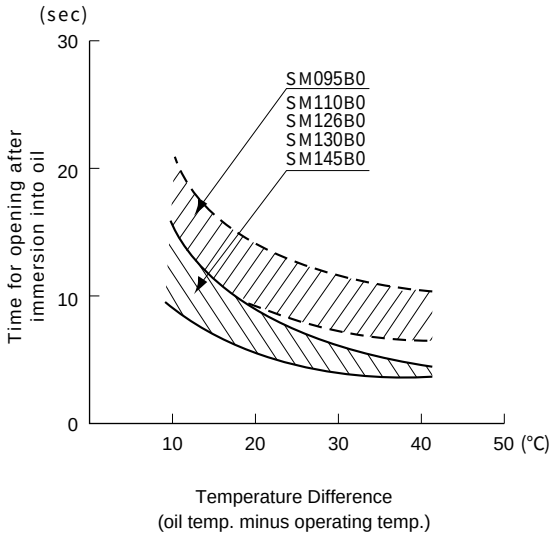
Performance Data

SM/B Series

Temperature Rise

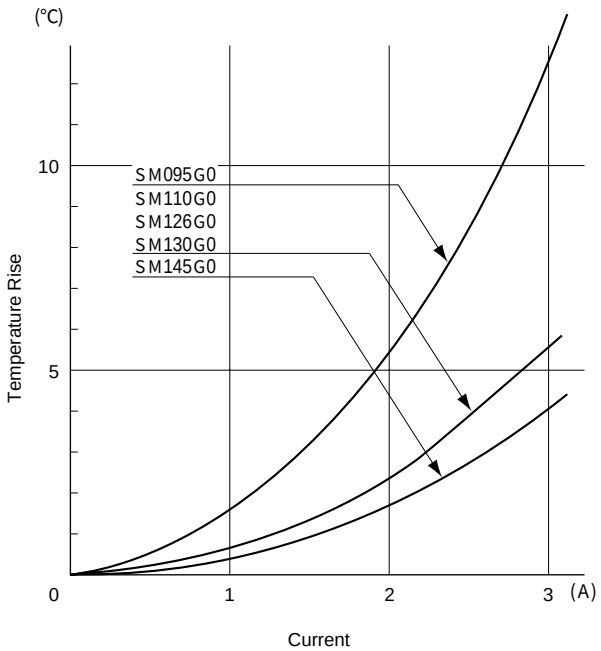


Response Time

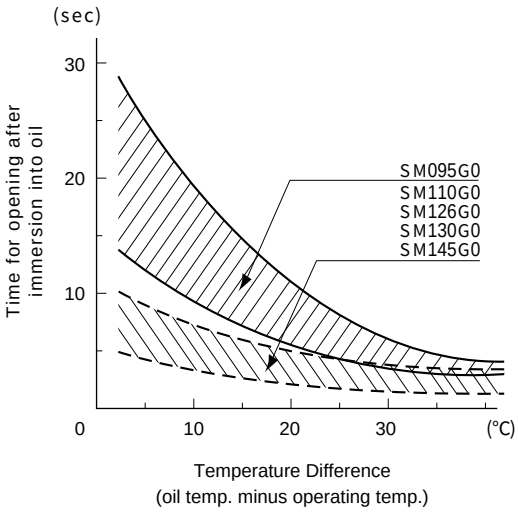


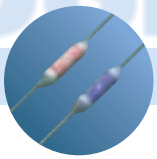
SM/G Series

Temperature Rise



Response Time

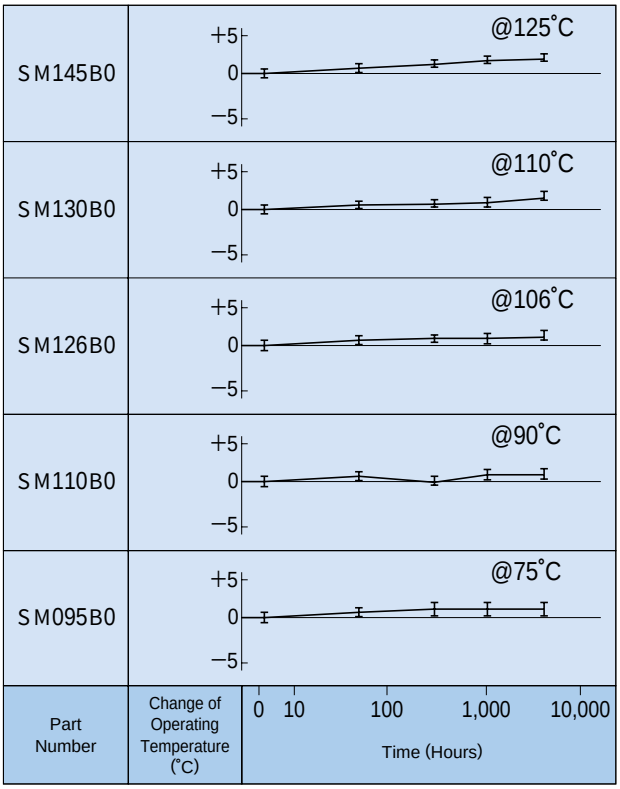




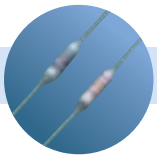
Initial Characteristics

Part Number	Operating Temperature (˚C)	Insulation Resistance after Operation (MΩ)	Withstand Voltage after Operation (kV)	Internal Resistance (mΩ/25 mm)
SM145B0	146 / 145 / 144	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	4.0 / 3.5 / 3.0
SM130B0	130 / 129 / 128	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	4.7 / 4.6 / 4.5
SM126B0	127 / 126 / 125	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	4.8 / 4.6 / 4.4
SM110B0	112 / 111 / 110	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	4.7 / 4.6 / 4.5
SM095B0	98 / 97 / 96	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	10.0 / 9.0 / 8.0

Aging Test



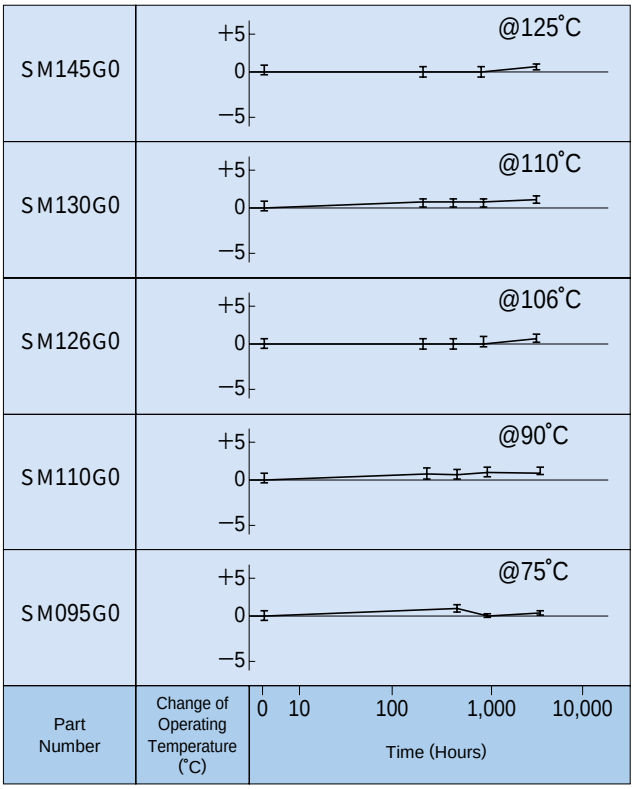
Note: The values following @ are the storage temperature.



Initial Characteristics

Part Number	Operating Temperature (˚C)	Insulation Resistance after Operation (MΩ)	Withstand Voltage after Operation (kV)	Internal Resistance (mΩ/25 mm)
SM145G0	146 / 145 / 144	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	5.0 / 4.0 / 3.0
SM130G0	131 / 130 / 129	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	6.0 / 5.0 / 4.0
SM126G0	127 / 126 / 125	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	6.0 / 5.0 / 4.0
SM110G0	112 / 111 / 110	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	6.0 / 5.0 / 4.0
SM095G0	99 / 98 / 97	10^6 / 10^5 / 10^4	3.0 / 2.0 / 1.0	13.0 / 11.0 / 9.0

Aging Test



Note: The values following @ are the storage temperature.

Definition of Terms

Rated Functioning Temperature

Rated functioning temperature is the operating temperature of thermal cutoffs, measured using the method specified in the safety standard. In present E.A.M.C. (Electrical Appliance and Material Control) Law of Japan, the operation should be within the specified operating temperature range of ± 7 ˚C. In various standards such as UL, CSA, VDE and BEAB which comply with the IEC standard, it is called the rated functioning temperature, and should operate within the prescribed temperature range of + 0 / − 10 ˚C.

It is represented by the symbol T_F in the UL standard, and by the symbol Tf in the CSA, VDE and BEAB standards.

In SEFUSE, a temperature that complies with both standards is set as the rated functioning temperature, and is indicated on the body of the thermal cutoff.

Operating Temperature

Operating temperature is the actual operating temperature range when the thermal cutoff is made to operate inside a constant temperature oven whose temperature is raised at the rate of 0.5 to 1 ˚C/min. while a detection current of 10 mA or lower is applied.

The operating temperature is a standard set by ourself and is not specified by a safety standard.

T_H, Th, Tc (Holding Temperature)

Holding temperature is the maximum temperature at which, when applying a rated current to the thermal cutoff, the state of conductivity is not changed during specified time not hess than 168 hours (1 week).

It is represented by the symbol. T_H in the UL standard, Th in the CSA standard, and Tc in the BEAB standards.

T_M, Tm (Maximum Temperature Limit)

Maximum temperature limit is the temperature up to which thermal cutoffs will not change its state of cutoff without impairing.

It is represented by the symbol T_M in the UL standard and by Tm in the CSA, VDE and BEAB standards.

Lead Cutting and Taping

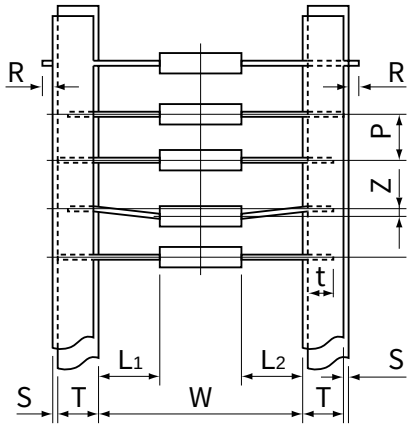
SEFUSE™

The following lead cutting and taping are available as your request.

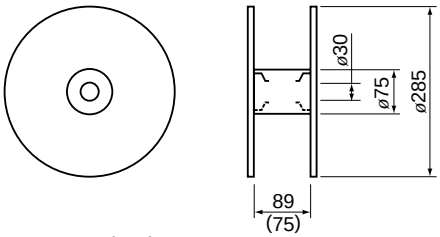
Applicable Preducts

	Standard lead type					Long lead type				
	SF/E	SF/Y	SM/A0	SM/B0	SM/G0	SF/E-1	SF/Y-1	SM/A1	SM/B1	SM/G1
Taping	—	—	○	○	○	○	—	—	—	—
Lead Cutting	○	—	○	○	○	○	—	—	—	—
Lead Forming	○	—	—	—	—	○	—	—	—	—

Taping



reel



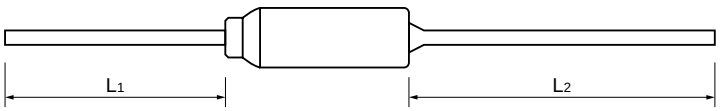
SF: 2000pcs/reel
SM: 2500pcs/reel

(Unit:mm)

W	P	|L1−L2|	T	Z	R	t	S
52±2	5±0.5	2.0	6±1	2.0	0.5	3.2	0.8
63±2							
67±2							

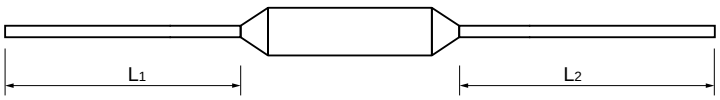
Lead Cutting

● SF Type



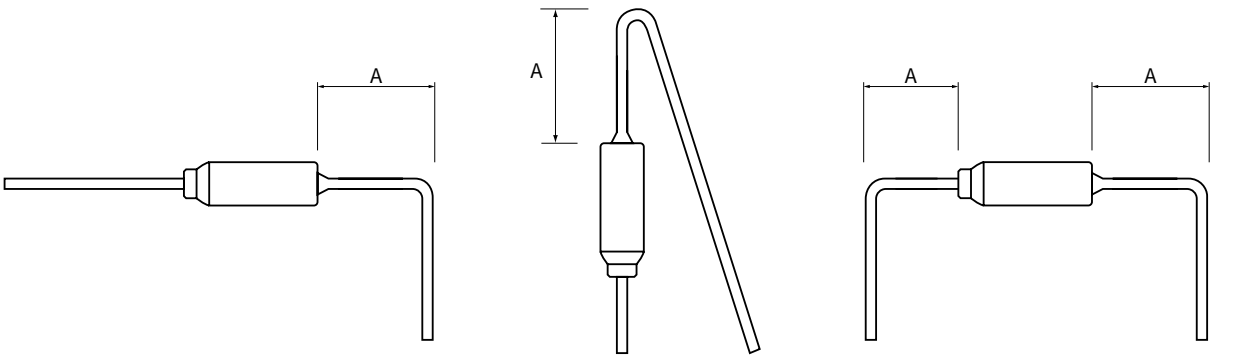
L1 : 7～30
L2 : 7～33 (mm)

● SM Type



L1, L2 : 7～33 (mm)

Lead Forming



A: Shoud be over 5 mm

● For more information on dimensions not described in diagrams above, please contact us.

Cautions

SEFUSE™

This section describes cautions designed to protect the performance of the thermal cutoff. Be sure to read and fully understand these cautions.

To obtain full performance from the thermal cutoff, it is necessary for the customer to appropriately store the thermal cutoff, design appropriate circuits for the application, and perform evaluations, mounting and testing as necessary. Problems arising from the inappropriate execution of the above are the responsibility of the customer, and we declines any and all responsibility.

Design Cautions

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

The thermal cutoff is designed to detect abnormal rises in temperature and break circuits if needed. It is not a current fuse that cuts excess current. If used as a current fuse, the SEFUSE 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 electric appliance, office automation equipment, audio and video equipment, computer communications equipment, test and measurement equipment, personal electronic equipment and transportation equipment (excluding engine control).

●The customer should select the proper thermal cutoff device, mounting location, and mounting method as appropriate for each application.

Verify whether the chosen selections are appropriate by repeatedly testing the final design for thermal cutoff under normal conditions as well as under predicted maximum abnormal conditions.

●Make designs so that the temperature of the body of the thermal cutoff does not exceed the temperatures shown in Table 1.

If, the temperature is exceeded on a regular basis, the thermal cutoff may start operating only at temperature lower than the normal operating temperature. Malfunctions may also occur. Even if the thermal cutoff's operating temperature is exceeded, it may malfunction.

Table 1

SM Type		SF Type	
Type	Body Temperature	Type	Body Temperature
SM072A	52˚C	SF 70E, Y	50˚C
SM095A, B, G	75˚C	SF 76E, Y	56˚C
SM110A, B, G	90˚C	SF 91E, Y	71˚C
SM126A, B, G	106˚C	SF 96E, Y	76˚C
SM130A, B, G	110˚C	SF109E, Y	89˚C
SM134A, B, G	114˚C	SF119E, Y	99˚C
SM145A, B, G	125˚C	SF129E, Y	109˚C
SM164A	140˚C	SF139E, Y	119˚C
SM182A	140˚C	SF152E, Y	132˚C
		SF169E, Y	140˚C
		SF188E, Y	140˚C
		SF214E, Y	140˚C
		SF226E, Y	140˚C
		SF240E, Y	140˚C

Temperatures listed in the table 1 aren't ambient temperature but body temperature of a thermal cutoff. A life of a thermal cutoff is subject to a temperature experienced. Every temperature rating has different characteristics and the life tends to shorten if the thermal cutoff rating is too close to the temperature experienced. Therefore, design engineer must take the life of thermal cutoff and an application into consideration.

- The body temperature of the thermal cutoff becomes higher as current passes through and might rise higher than the ambient operating temperature (see test data). The temperature may rise even higher depending on the mounting method and other conditions. Therefore, after mounting the thermal cutoff under the same conditions you would use for the actual application, work the final product and measure the body temperature of the thermal cutoff.

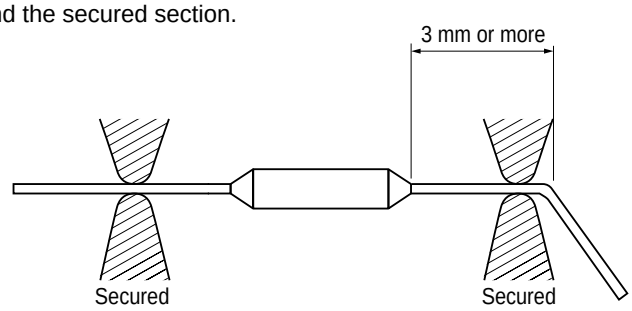
- Use the thermal cutoff with a voltage and current level lower than the rated level.

  If the thermal cutoff is used with a voltage or current level higher than the rated level, contacts may melt in the SF type, causing the fuse to malfunction. In the SM type, the body of the thermal cutoff may be destroyed.

- Do not use the thermal cutoff in water, organic solvents or other liquids, or environments containing sulfurous acid gas, nitrous acid gas, or high humidity. Doing so will cause deterioration of the sealing resin, the thermal cutoff may operate at lower than operating temperature, or any other malfunctions may occur. Also, the thermal cutoff may not operate even if its operating temperature is exceeded.

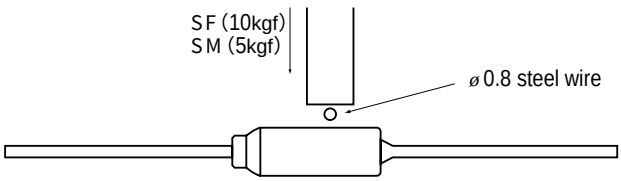
Lead wire process

- When bending the lead wire, in order to protect the resin seal from excessive pressure, secure the lead wire close to the case and bend the part beyond the secured section.



The lead wire should be bent at a distance 3 mm or more from the body of the fuse, and should not be twisted.

- The tensile strength applied to the lead wire should be 5 kg or less for the SF type, and 1 kg or less for the SM type.
- The strength applied to the body of the thermal cutoff should be 10 kg or less for the SF type, and 5 kg or less for the SM type.



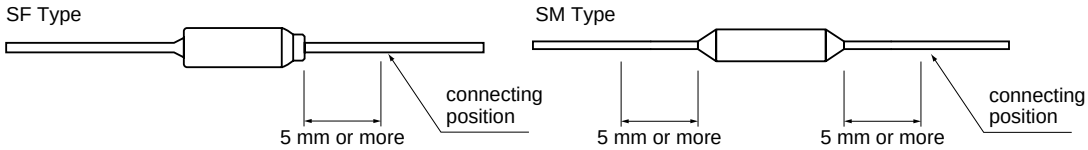
In the case of an SF type, deformation of the case may change the location of the moving electrode during operation and may cause the thermal cutoff to operate only at temperatures lower than the normal operating temperature range. The thermal cutoff also may not operate even if the thermal cutoff's operating temperture is exceeded.

Cautions

SEFUSE™

Mounting

SEFUSE™ can be mounted by soldering, caulking, or welding.
It is recommended that the connecting position at the lead of resign-sealed side should be 5 mm or more from the body of the thermal cutoff.



- If soldering, note that the thermal cutoff may not function because of excessive solder temperature.
  To prevent such malfunctions, for example, holding the lead near the case by a tool is effective for allowing the heat to escape, and the soldering should be done in short interval.
  Another effective method is to use a lower solder temperature and to solder at a location that is distant 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 (break the circuit).

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

- If using an SF type thermal cutoff, be sure not to make the lead on the resin-sealed side 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 break 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 metalic part.

Storage

- The body and lead A of SF type, and the leads of SM164A and SM182A are silver-plated. Therefore, these parts may discolor because of sulfuration. In the case, the marking of the body will become difficult to discriminate or the solder-ability of lead will decline. To avoid this, the SEFUSE should not keep around materials (such as cardboard or rubber, etc.) which generate sulfurous acid gas.

- When the SEFUSE have to be storaged in a cardboard box, the SEFUSE's packs should be put into other bags (such as polyethylene) and make sure the packs seal.

Recommendation

- 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 to warn general consumers who are not aware of the usage cautions for the thermal cutoff not to mount, remove or replace the thermal cutoff through a note to this effect in the user's manual and other related material.

If you desire any clarifications or explanations regarding these cautions, please contact us.

The values contained in this document were obtained under certain testing conditions by us.
They are not guaranteed and are for reference only.

- The information herein is based on the documents as of April 2001, and is subject to change without notice. Therefore it is recommended to refer to latest individual information such as drawing for mass production designing.
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Computers, office equipment, communication equipment, measuring equipment, audio & visual equipment, home electric appliances, machine tools, personal electric equipment and industrial robots. etc.

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Transportation equipment (automobiles, trains, ships and others), aircrafts, aerospace equipment, medical equipment for life support. etc.

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