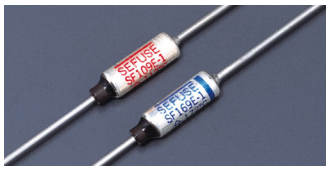
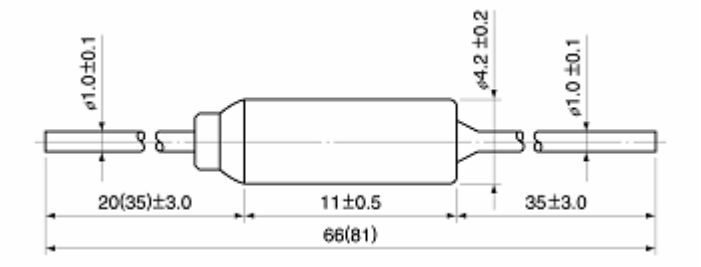


SF/E SERIES

Outline Dimensions

(unit:mm)



Note: Dimensions in ( ) are for long lead devices.

Standard Ratings

WEEE (RoHS) compliance 1)	Type Name 2)	Rated Functioning Temperature Tf (° C)	Operating Temperature (° C)	Th (° C)	Tm (° C)	Rated Current	Rated Voltage	PSE	UL	CSA	VDE	BEAB	CCC	KTL
*	SF70E	73	70 ±2	58	150	15A/10A 4)	250V (AC)	○ 6)	○ 6)	○ 6)	○ 6)	○ 6)	○ 6)	○ 6)
*	SF76E	77	76^{+0}_{-4}	62										
*	SF91E	94	91^{+3}_{-1}	79										
*	SF96E	99	96 ±2	84										
*	SF113E	113	110 ±2	98	160									
*	SF119E	121	119 ±2	106	150									
*	SF129E	133	129 ±2	118	159									
*	SF139E	142	139 ±2	127										
*	SF152E	157	152 ±2	142	172									
*	SF169E	172	169^{+1}_{-3}	157	189									
*	SF184E	184	182 ±2	174	210									
*	SF188E	192	188^{+3}_{-1}	177	3)				○ 5)6)					
*	SF214E	216	214^{+1}_{-3}	200										
*	SF226E	227	226^{+1}_{-3}											
*	SF240E	240	237 ±2											

Notes: 1) *: No use of hazardous substances prescribed by WEEE (RoHS).
2) The type is for standard lead. When long lead type is required, add "-1" at the end of type name.

3) Tm of SF188E, SF214E, SF226E and SF240E are as follows.

Tm	UL	CSA	VDE	BEAB	CCC	KTL
SF188E	375° C	375° C	375° C	300° C		375° C
SF214E				350° C		
SF226E	240° C	330° C	300° C			
SF240E	375° C	375° C	375° C	350° C		375° C

4) The electrical ratings by safety standard are as follows.

Rated Voltage	UL	CSA	VDE	BEAB	CCC	KTL	PSE
AC120V	15A(Inductive)						
	15A(Resistive)						
	20A(Resistive)						
AC240V	15A(Resistive)						
AC250V	10A(Resistive)		10A	10A	10A	10A	10A
	15A(Resistive)	15A(Inductive)	15A	15A	15A	15A	
		15A(Resistive)					
	17A(Resistive)						
AC277V	15A(Resistive)						

5) SF169E, SF184E, SF188E, SF214E, SF226E and SF240E have recognition of CH rating by UL.

6) • means “Approved”. For details, please download the catalog.

Contents

Please be sure to read the "Cautions" on pages 17 through 20 before using.

Series	Rated Current(AC)	Rated Functioning Temperature	Page
SF/E	15/10A	73°C ~ 240°C	5
SF/K	6A	73°C ~ 216°C	7
SF/Y	15A	73°C ~ 240°C	7
SM/A	2A	76°C ~ 187°C	9
SM/B	1A	87°C ~ 151°C	9
SM/G	0.5A	100°C ~ 151°C	9

Select optimum series according to temperature and electrical ratings.

Safety standards

PSE (Japan) UL (USA) CSA (Canada) VDE (Germany) BEAB (UK) CCC (China)

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.

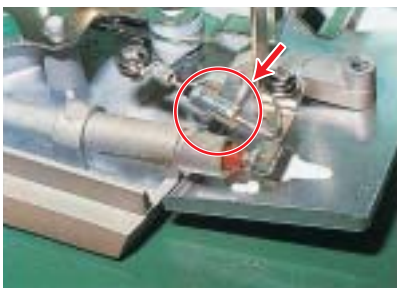
SEFUSE is manufactured in Japan and Thailand, and both factories are certified by the International Standards Organization (ISO) for the ISO9001 quality standard.

Features

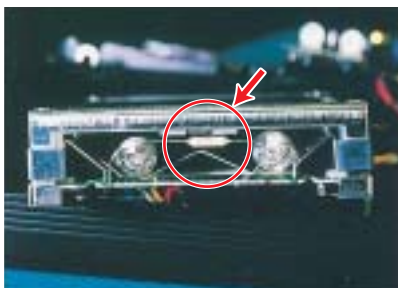
- Excellently sensitive to ambient temperature.
- Stable and precise operation.
- One shot operation.
- Wide choice of types to suite the application. (SF or SM)
- SF types has ceramic pipe to protect sealing resin from the stress when bending the leads. (excluding SF/K type)
- Meets many safety standards.
- Eco-friendly products, meeting the Directive on **WEEE(RoHS)**, are available.
  → For the SF types, the **AgCuO** is used as the material of sliding contact, and its patent has been registered in worldwide countries, such as USA and Europe.

Applications

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



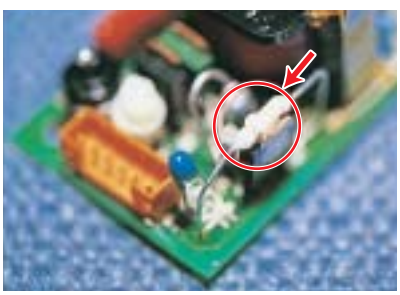
● Iron



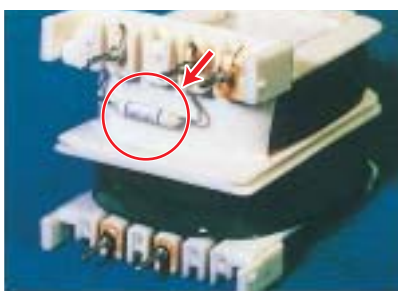
● LCD Television

● 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

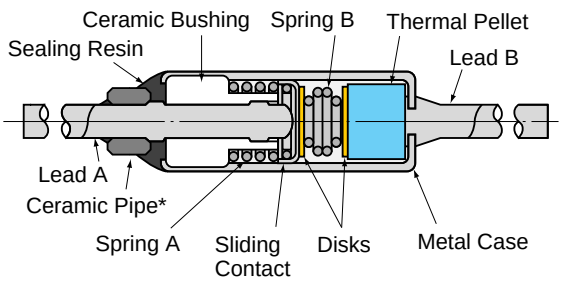
Application Examples

Construction

SF type

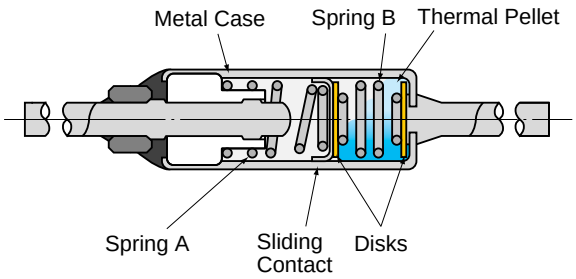
The SF type uses an organic thermosensitive pellet inside a metal case. It features a large cutoff (rated) current of 6 A to 15 A (AC).

Before Operation



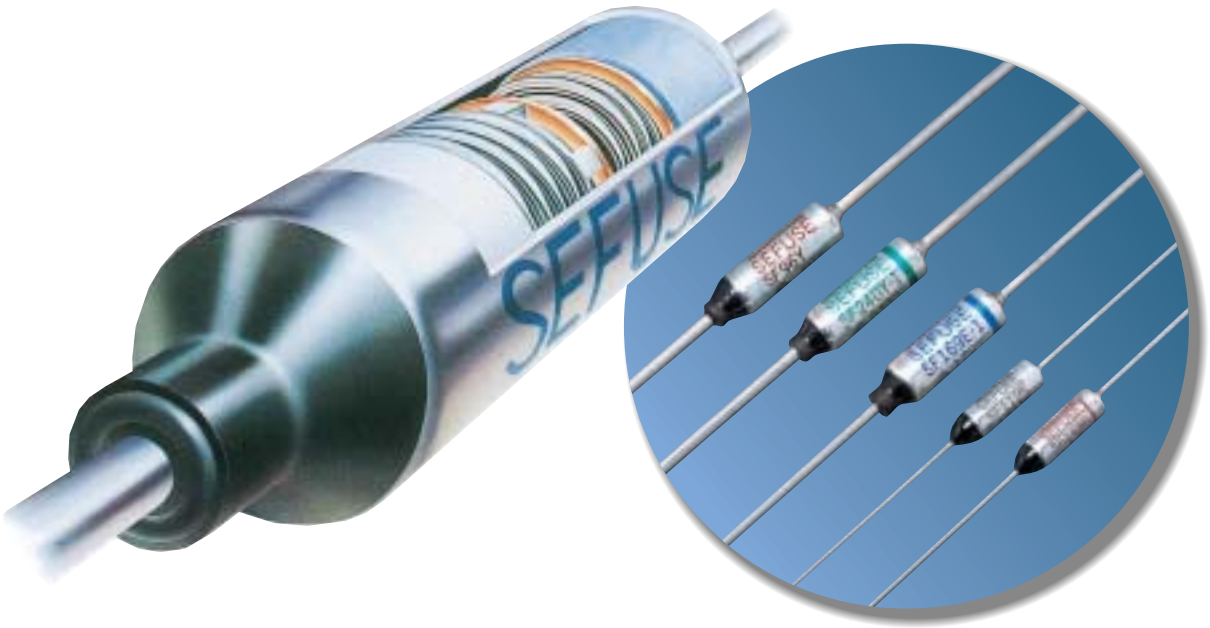
The SF type contains a sliding contact, springs, and a thermal pellet inside a metal case. When spring B is compressed, firm contact between lead A and the sliding contact occurs. At normal temperatures, current flows from lead A to the sliding contact and then through the metal case to lead B.

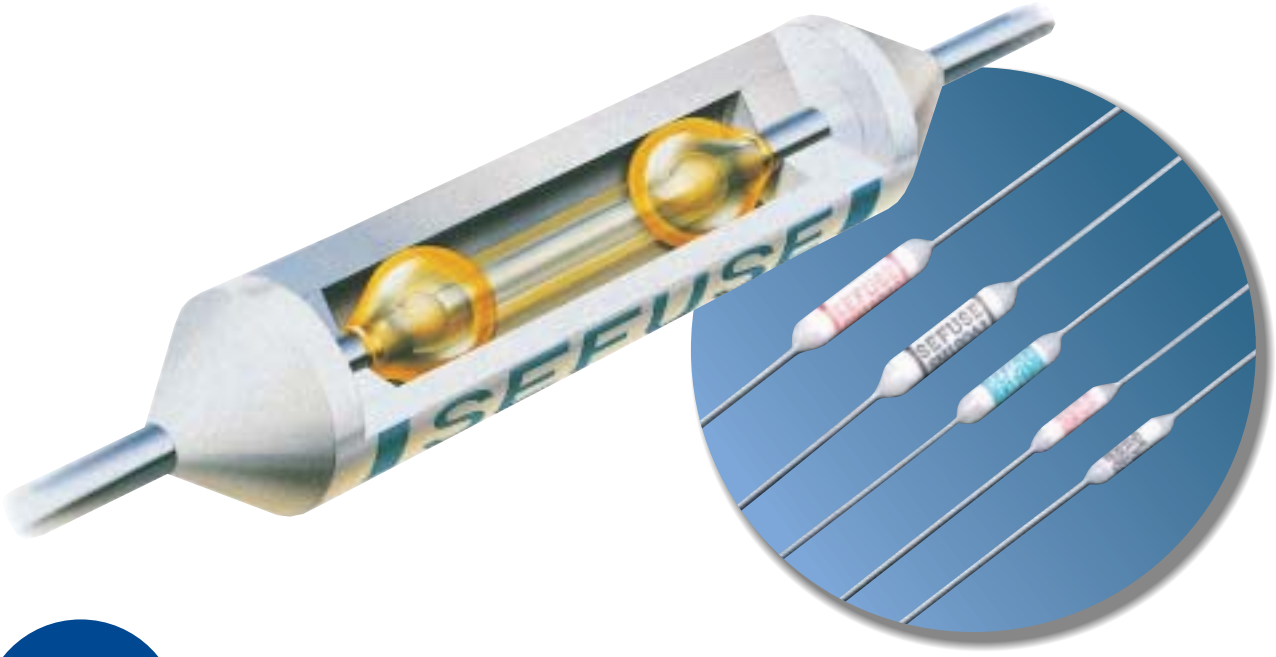
After Operation



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.

*Not using for SF/K series.

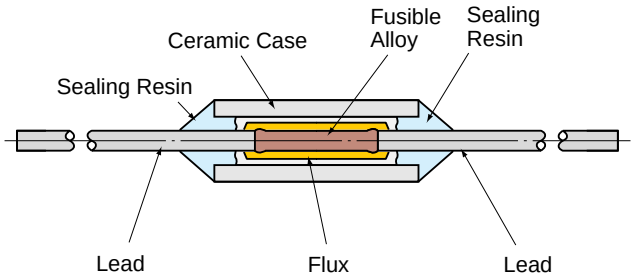




SM type

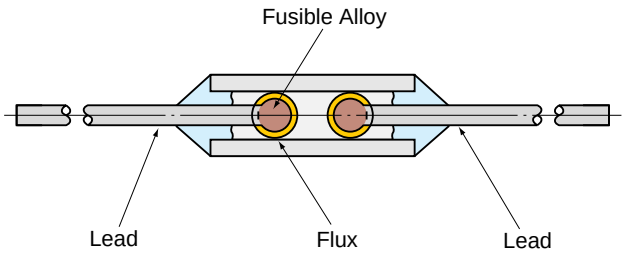
The SM type uses a fusible alloy inside a ceramic case. It has a cutoff (rated) current of 0.5 A to 2.0 A (AC). Because of its insulated case, the SM type can be attached directly where temperature detection is required.

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

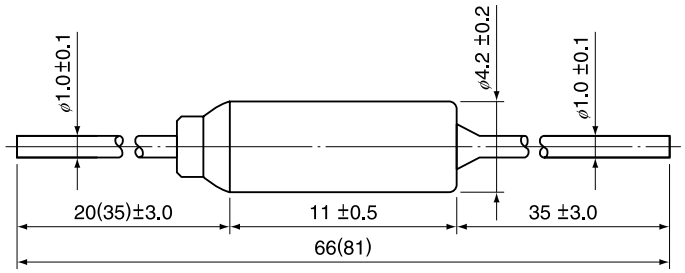


When ambient temperature rises to the SEFUSE operating temperature, the fusible alloy melts and condenses into a drop around the end of each lead because of surface tension and the coating of special flux. The electrical circuit then opens.

Standard Ratings

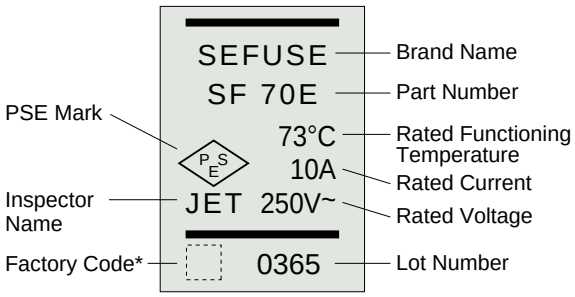
SF/E Series

Dimension (Unit:mm)

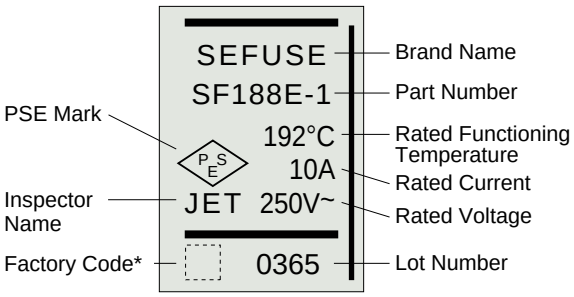


Note: The dimensions for long lead devices are in parentheses.

Marking 1 (SF70E~SF129E)



Marking 2 (SF139E~SF240E)



* Factory Code represents the factory location as shown below

Japan : none
Thailand : C

How to read a lot number

ex.) 03 6 5
- 5 — Sub-lot number
- 6 — Month
  - X ····· October
  - Y ····· November
  - Z ····· December
- 03 — Last two digit of year

Ratings

1) Meet for WEEE (RoHS)	2) Part Number	Rated Functioning Temperature Tf (°C)	Operating Temperature (°C)	Th Tc (°C)	Tm (°C)	Rated Current	Rated Voltage	UL Made in Japan	UL Made in Thailand	CSA Made in Japan	CSA Made in Thailand	VDE Made in Japan	VDE Made in Thailand	BEAB Made in Japan	BEAB Made in Thailand	CCC Made in Japan	CCC Made in Thailand	PSE 7) Made in Japan (JET1975-32001-XXXX)	PSE 7) Made in Thailand (JET1974-32001-XXXX)
○	SF 70E	73	70 ± 2	58	150	4) 15A／10A (Resistive)	4) AC250V	E71747		6) 172780 (LR52330)		677802 -1171 -0002		C1060		*1	*2	1008	1003
○	SF 76E	77	76 ± 0/4	62															
○	SF 91E	94	91 ± 3/1	79														1010	1002
○	SF 96E	99	96 ± 2	84															
○	SF113E	113	110 ± 2	98	160													1011	1001
○	SF119E	121	119 ± 2	106	150													1012	1004
○	SF129E	133	129 ± 2	118	159														
○	SF139E	142	139 ± 2	127														1013	1005
○	SF152E	157	152 ± 2	142	172														
○	SF169E	172	169 ± 1/3	157	189			5)										1014	1006
○	SF184E	184	182 ± 2	174	210													1015	1007
○	SF188E	192	188 ± 3/1	177	3)														
○	SF214E	216	214 ± 1/3	200														*3	1008
○	SF226E	227	226 ± 1/3															*4	1009
○	SF240E	240	237 ± 2																

*1: 2002010205023072 (10A)
2004010205121099 (15A)
*2: 2002010205023074 (10A)
2004010205120822 (15A)
*3: 33-549
*4: 33-354

Note: 1) ○: No use the hazardous substances prescribed by WEEE(RoHS).

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

3) Tm of SF188E, SF214E, SF226E, SF240E are as follows.

Tm	UL	CSA	VDE	BEAB	CCC
SF188E	375°C	300°C	375°C	300°C	
SF214E		350°C		350°C	
SF226E	240°C	330°C	300°C		
SF240E	375°C	350°C	375°C	350°C	

4) The electrical ratings by safety standards are as follows.

Rated Voltage	UL	CSA	VDE	BEAB	CCC	PSE
AC120V	15A (Inductive) (Resistive) 20A (Resistive)					
AC240V	15A (Resistive)					
AC250V	10A (Resistive)	15A (Inductive) (Resistive)	10A	10A	10A	10A
	15A (Resistive)		15A	15A	15A	
	17A (Resistive)					
AC277V	15A (Resistive)					

5) SF169E, SF184E, SF188E, SF214E, SF226E and SF240E has a recognition of CH rating by UL.

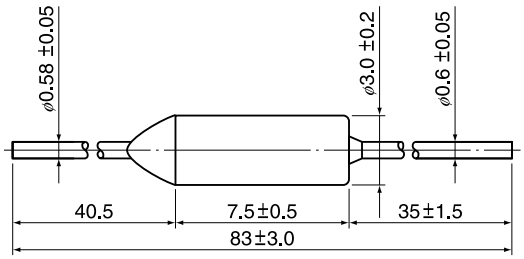
6) The number in parentheses are previous number. Both number can be inquired.

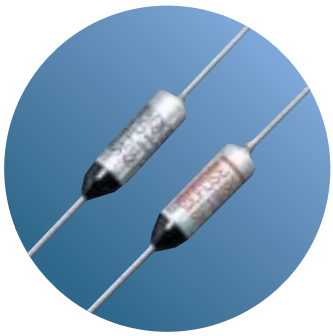
7) The products indicated in *3 and *4 mention a certified number by the former law, the Electrical Appliance Material Control Law, as a transitional measure to the current law, the Electrical Appliance and Material Safety Law of Japan.

Standard Ratings

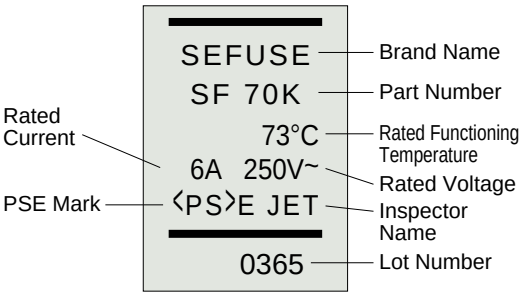
SF/K Series

Dimension (Unit:mm)

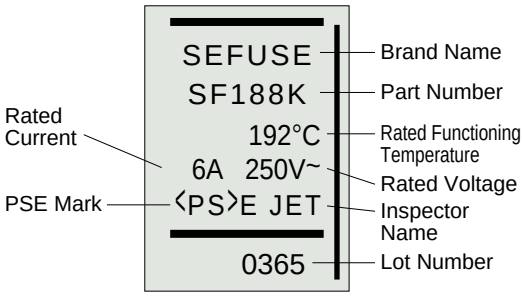




Marking 1 (SF70K~SF119K)



Marking 2 (SF188K,SF214K)



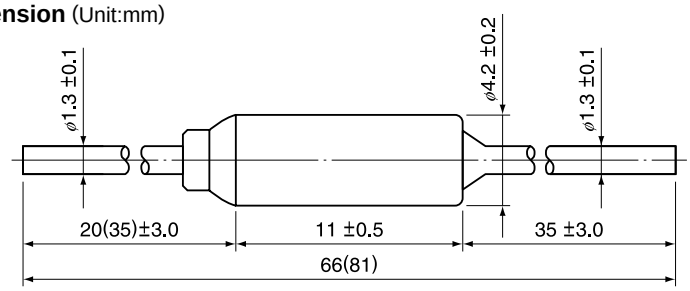
How to read a lot number

ex.) **03** **6** **5**

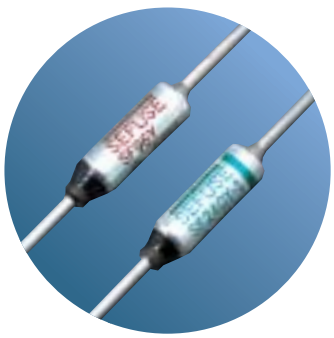
- 03 — Last two digit of year
- 6 — Month
  - X ····· October
  - Y ····· November
  - Z ····· December
- 5 — Sub-lot number

SF/Y Series

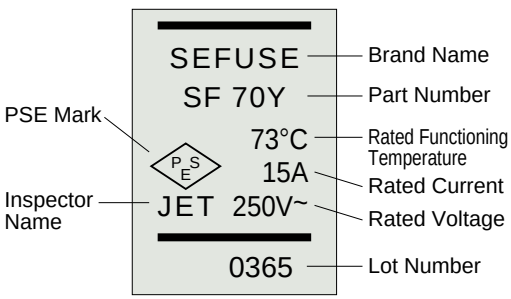
Dimension (Unit:mm)



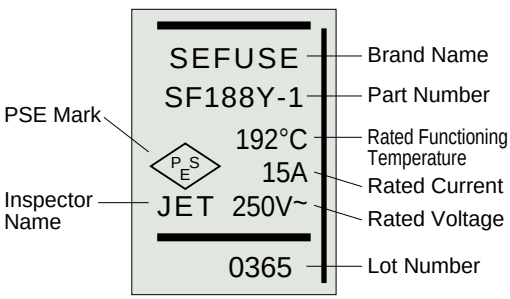
Note: The dimensions for long lead devices are in parentheses.



Marking 1 (SF70Y~SF129Y)



Marking 2 (SF139Y~SF240Y)



How to read a lot number

ex.) **03** **6** **5**

- 03 — Last two digit of year
- 6 — Month
  - X ····· October
  - Y ····· November
  - Z ····· December
- 5 — Sub-lot number

Ratings

1) Meet for WEEE (RoHS)	Part Number	Rated Functioning Temperature Tf (°C)	Operating Temperature (°C)	Th (°C)	Tm (°C)	Rated Current	Rated Voltage	UL • cUL	VDE	BEAB	4) PSE (JET1975-32001-XXXX)
○	SF 70K	73	70 ± 2	45	150	2) 6A (Resistive)	AC250V	E71747	677802 -1171 -0006	C1057	1008
○	SF 76K	77	76 ± $^{0}_{4}$	51							
○	SF 91K	94	91 ± $^{3}_{1}$	66							1010
○	SF 96K	99	96 ± 2	71							
○	SF119K	121	119 ± 2	94							1012
○	SF188K	192	188 ± $^{3}_{1}$	164	300			3)			1015
○	SF214K	216	214 ± $^{1}_{3}$	198							*1

*1: 33-549

Note: 1) ○ : **No use the hazardous substances prescribed by WEEE(RoHS).**
2) **The following recognition is approved by UL and VDE.**
10A(Resistive)/AC250V
3) SF188K and SF214K has a recognition of CH rating by UL.
4) The products indicated in *1 mention a certified number by the former law, the Electrical Appliance Material Control Law, as a transitional measure to the current law, the Electrical Appliance and Material Safety Law of Japan.

● **This series are made only in Japan.**

Ratings

1) Meet for WEEE (RoHS)	2) Part Number	Rated Functioning Temperature	Operating Temperature	Rated Current	Rated Voltage	UL	CCC	3) PSE (JET1975-32001-XXXX)
○	SF 70Y	73°C	70 ± 2°C	15A	AC250V		*1	1008
○	SF 76Y	77°C	76 ± $^{0}_{4}$°C					
○	SF 91Y	94°C	91 ± $^{3}_{1}$°C					1010
○	SF 96Y	99°C	96 ± 2°C					
○	SF113Y	113°C	110 ± 2°C					1011
○	SF119Y	121°C	119 ± 2°C			E71747		1012
○	SF129Y	133°C	129 ± 2°C					
○	SF139Y	142°C	139 ± 2°C					1013
○	SF152Y	157°C	152 ± 2°C			E71747		
○	SF169Y	172°C	169 ± $^{1}_{3}$°C					1014
○	SF184Y	184°C	182 ± 2°C					1015
○	SF188Y	192°C	188 ± $^{3}_{1}$°C					
○	SF214Y	216°C	214 ± $^{1}_{3}$°C					*2
○	SF226Y	227°C	226 ± $^{1}_{3}$°C					*3
○	SF240Y	240°C	237 ± 2°C					

*1: 2004010205122568
*2: 33-549
*3: 33-354

Note: 1) ○ : **No use the hazardous substances prescribed by WEEE(RoHS).**
2) Part numbers are for standard lead devices. For long leads, add the number "-1" at the end of part number.
3) The products indicated in*2 and *3 mention a certified number by the former law, the Electrical Appliance Material Control Law, as a transitional measure to the current law, the Electrical Appliance and Material Safety Law of Japan.

● **This series are made only in Japan.**

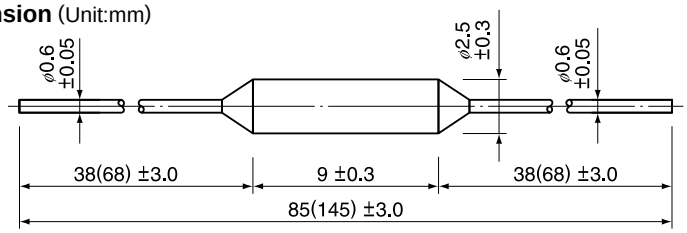
SM type

SEFUSE™

Standard Ratings

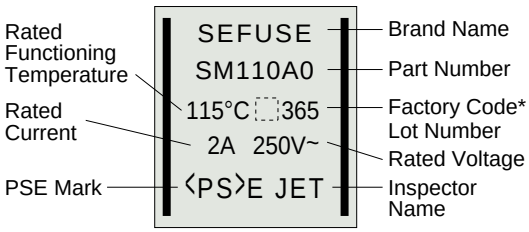
SM/A Series

■ **Dimension** (Unit:mm)



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

■ **Marking**



* Factory Code represents the factory location as shown below

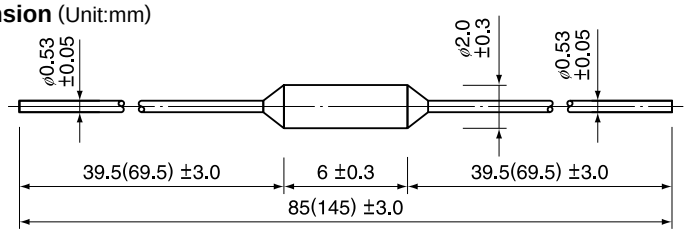
Japan : none
Thailand : C

How to read a lot number

ex.) 3 6 5
- 5: Sub-lot number
- 6: Month (X·····October, Y·····November, Z·····December)
- 3: Last one digit of year

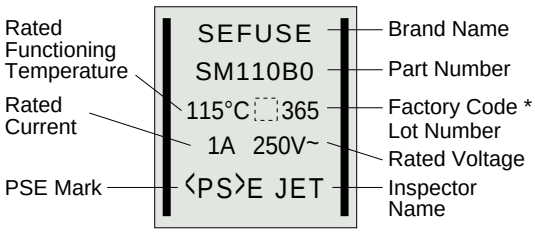
SM/B Series

■ **Dimension** (Unit:mm)



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

■ **Marking**



* Factory Code represents the factory location as shown below

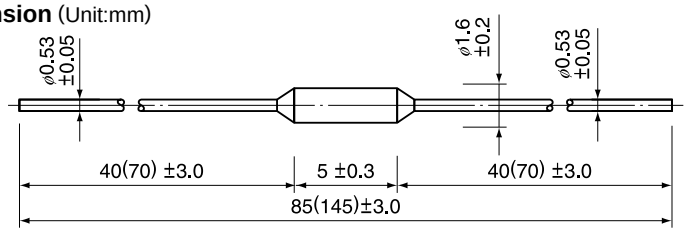
Japan : none
Thailand : C

How to read a lot number

ex.) 3 6 5
- 5: Sub-lot number
- 6: Month (X·····October, Y·····November, Z·····December)
- 3: Last one digit of year

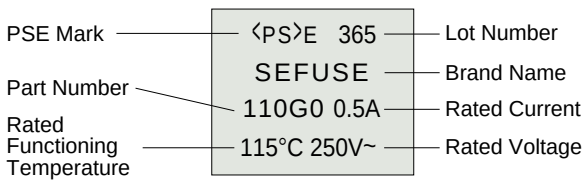
SM/G Series

■ **Dimension** (Unit:mm)



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

■ **Marking**



How to read a lot number

ex.) 3 6 5
- 5: Sub-lot number
- 6: Month (X·····October, Y·····November, Z·····December)
- 3: Last one digit of year

Ratings

Meet for WEEE (RoHS) 1)	Part Number 2)	Rated Functioning Temperature Tf (°C)	Operating Temperature (°C)	Th Tc (°C)	Tm (°C)	Electrical Ratings AC	Electrical Ratings DC 3)	UL Made in Japan	UL Made in Thailand	CSA Made in Japan	CSA Made in Thailand	VDE Made in Japan	VDE Made in Thailand	BEAB Made in Japan	BEAB Made in Thailand	CCC Made in Japan	CCC Made in Thailand	PSE 6) Made in Japan (JET1975-32001-XXXX)	PSE 6) Made in Thailand (JET1974-32001-XXXX)
○	SM072A0	76	72 ± 3/2	46	100	2 A (Resistive) AC250V	3A/DC50V(UL) 4A/DC50V(VDE)	E71747		4)		677802-1171-0001		C1054		*1	*2	1007	1017
○	SM082A0	87	82 ± 3/2	52	200		4 A DC50V											1004	1016
○	SM092A0	97	92 ± 3/2	62															
	SM095A0	100	95 ± 5/0	65	115					5) 172780 (LR52330)								1001	1010
○	SM110A0	115	110 ± 2	80	125													1006	1011
○	SM125A0	131	126 ± 3/2	96	200		7 A DC50V							Under Application				1002	1012
	SM126A0		126 ± 2		140									C1054					
	SM130A0	135	130 ± 2	100	145														
	SM134A0	139	134 ± 2	104	200					4)									
○	SM137A0	142	137 ± 3/2	107															
○	SM146A0	151	146 ± 3/2	116						172780 (LR52330)				C1054		*1	*2	1003	1013
○	SM150A0	150																	
	SM164A0	169	164 ± 3/2	133	180													1005	1014
	SM182A0	187	182 ± 2	152	195													*3	1015

*1: 2002010205002641
*2: 2002010205023067
*3: 33-556

Note: 1) ○: **No use the hazardous substances prescribed by WEEE(RoHS).**
2) Part numbers are for standard devices. For long leads, change the last number from 0 to 1.
3) **DC rating are approved by UL and VDE.**
4) SM072A0 and SM134A0 have c-UL recognition.
5) The number in parentheses are previous number. Both number can be inquired.
6) The products indicated in *3 mention a certified number by the former law, the Electrical Appliance Material Control Law, as a transitional measure to the current law, the Electrical Appliance and Material Safety Law of Japan.

Ratings

Meet for WEEE (RoHS) 1)	Part Number 2)	Rated Functioning Temperature Tf (°C)	Operating Temperature (°C)	Th Tc (°C)	Tm (°C)	Electrical Ratings AC	Electrical Ratings DC 3)	UL Made in Japan	UL Made in Thailand	CSA Made in Japan	CSA Made in Thailand	VDE Made in Japan	VDE Made in Thailand	BEAB Made in Japan	BEAB Made in Thailand	CCC Made in Japan	CCC Made in Thailand	PSE Made in Japan (JET1975-32001-XXXX)	PSE Made in Thailand (JET1974-32001-XXXX)
○	SM082B0	87	82 ± 3/2	52	200	1 A (Resistive) AC250V	3A/DC50V	E71747		4) 172780 (LR52330)		677802-1171-0004		C1030		*1	*2	1004	1016
○	SM092B0	97	92 ± 3/2	62			3.5 A DC50V												
	SM095B0	100	95 ± 5/0	65	115													1001	1010
○	SM110B0	115	110 ± 2	80	125													1006	1011
○	SM125B0	131	126 ± 3/2	96	200		6 A DC50V							Under Application				1002	1012
	SM126B0		126 ± 2		140									C1030					
	SM130B0	135	130 ± 2	100	145														
	SM134B0	139	134 ± 3/2	104	200					5)									
○	SM137B0	142	137 ± 3/2	107															
○	SM146B0	151	146 ± 3/2	116						172780 (LR52330)				C1030		*1	*2	1003	1013
○	SM150B0	150																	

*1: 2002010205002645
*2: 2002010205023066

Note: 1) ○: **No use the hazardous substances prescribed by WEEE(RoHS).**
2) Part numbers are for standard devices. For long leads, change the last number from 0 to 1.
3) **DC rating are approved by UL and VDE.**
4) The number in parentheses are previous number. Both number can be inquired.
5) SM134B0 has c-UL recognition.

Ratings

● This series are made only in Japan.

Meet for WEEE (RoHS) 1)	Part Number 2)	Rated Functioning Temperature Tf (°C)	Operating Temperature (°C)	Th Tc (°C)	Tm (°C)	Electrical Ratings AC	Electrical Ratings DC 3)	UL	CSA	VDE	BEAB	CCC	PSE (JET1975-32001-XXXX)
	SM095G0	100	95 ± 5/0	65	115	0.5 A (Resistive) AC250V	3A/DC50V	E71747	4) 172780 (LR52330)	677802-1171-0003	C1090	*1	1001
○	SM110G0	115	110 ± 2	80	125		5 A DC50V						1006
	SM126G0	131	126 ± 2	96	140								1002
	SM130G0	135	130 ± 2	100	145								
	SM134G0	139	134 ± 3/2	104	200								
○	SM137G0	142	137 ± 3/2	107									
○	SM146G0	151	146 ± 3/2	116					172780 (LR52330)		C1090		1003

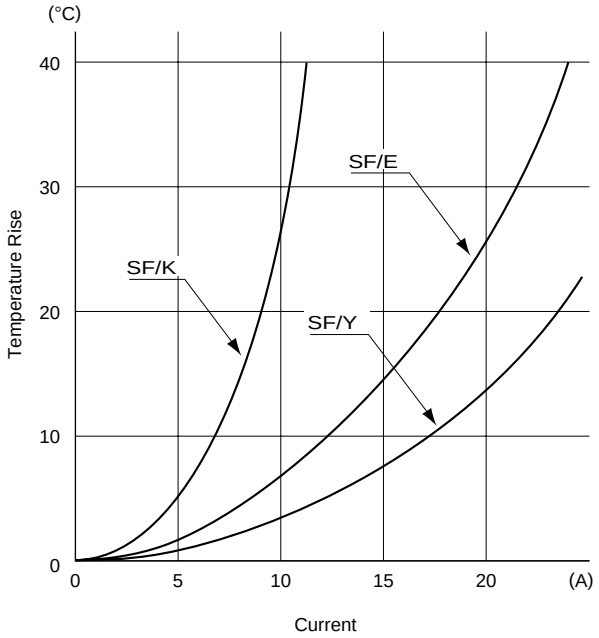
*1: 2002010205023071

Note: 1) ○: **No use the hazardous substances prescribed by WEEE(RoHS).**
2) Part numbers are for standard devices. For long leads, change the last number from 0 to 1.
3) **DC rating are approved by UL and VDE.**
4) The number in parentheses are previous number. Both number can be inquired.

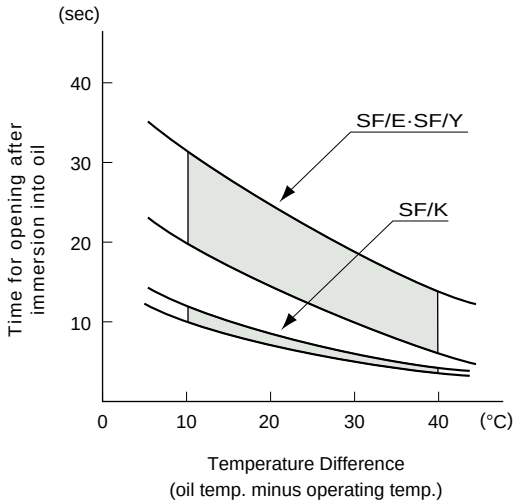
Performance Data

SF/E Series・SF/K Series・SF/Y Series

■ Temperature Rise

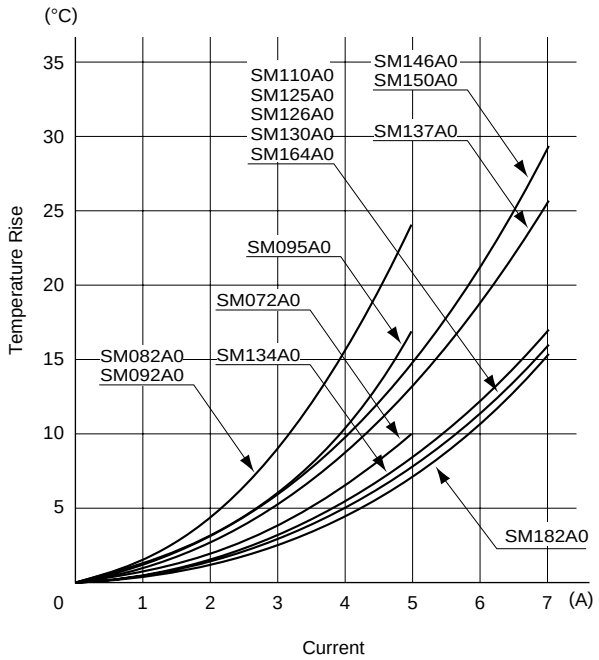


■ Response Time

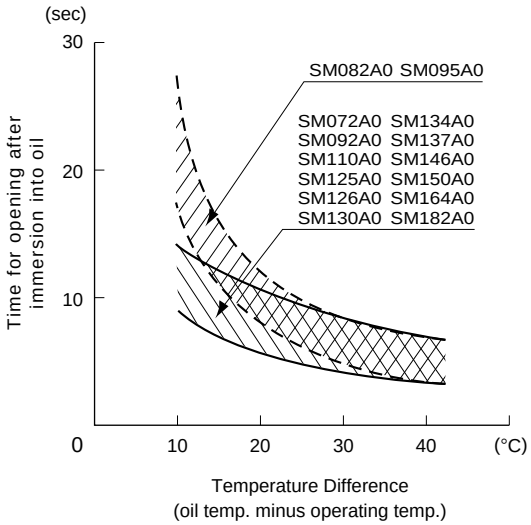


SM/A Series

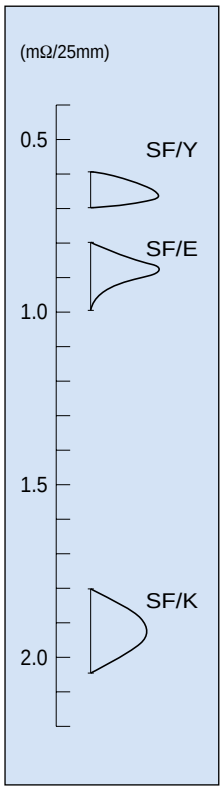
■ Temperature Rise



■ Response Time



Internal Resistance



initial operating temperature

Part Number	Operating Temperature (°C)	Part Number	Operating Temperature (°C)	Part Number	Operating Temperature (°C)
SF70E/K/Y	69 70 71	SF119E/K/Y	118 119 120	SF184E/Y	180 182 184
SF76E/K/Y	73 74 75	SF129E/Y	129 130 131	SF188E/K/Y	189 190 191
SF91E/K/Y	91 92 93	SF139E/Y	138 139 140	SF214E/K/Y	212 213 214
SF96E/K/Y	95 96 97	SF152E/Y	152 153 154	SF226E/Y	224 225 226
SF113E/Y	108 109 110	SF169E/Y	167 168 169	SF240E/Y	235 236 237

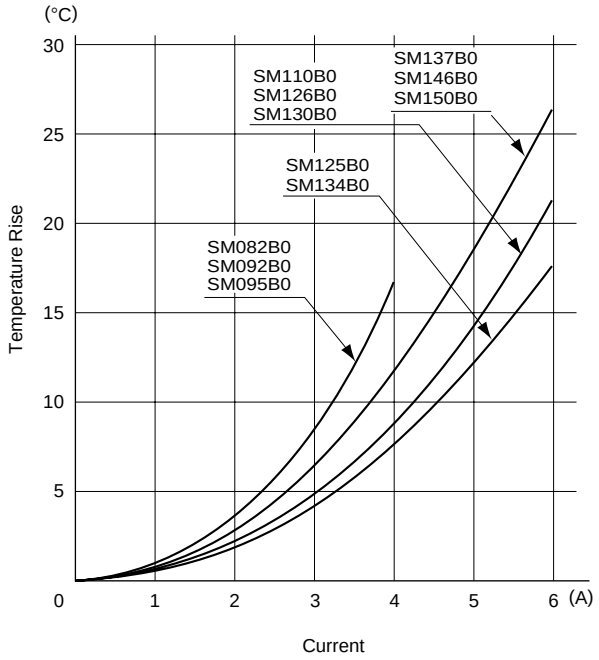
Internal Resistance and initial operating temperature

Part Number	Internal Resistance (mΩ/25mm)	Operating Temperature (°C)	Part Number	Internal Resistance (mΩ/25mm)	Operating Temperature (°C)
SM072A0	3.7 3.9 4.1	72 73 74	SM130A0	2.7 2.9 3.1	128 129 130
SM082A0	5.8 6.3 6.8	81.5 82.5 83.5	SM134A0	3.0 3.2 3.4	132 133 134
SM092A0	5.8 6.3 6.8	90.6 91.6 92.6	SM137A0	3.8 4.3 4.8	137 138 139
SM095A0	5.2 5.4 5.6	96 97 98	SM146A0 SM150A0	4.4 4.7 5.0	145 146 147
SM110A0	2.8 3.0 3.2	110 111 112	SM164A0	2.7 2.9 3.1	163 164 165
SM125A0	2.7 2.9 3.1	124.4 125.4 126.4	SM182A0	2.2 2.4 2.6	181 182 183
SM126A0	2.7 2.9 3.1	125 126 127			

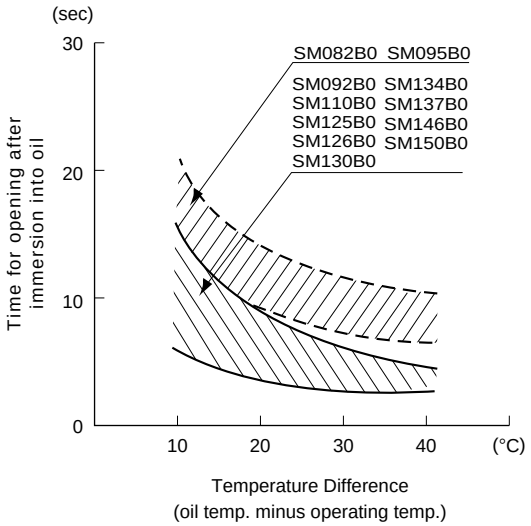
Performance Data

SM/B Series

Temperature Rise

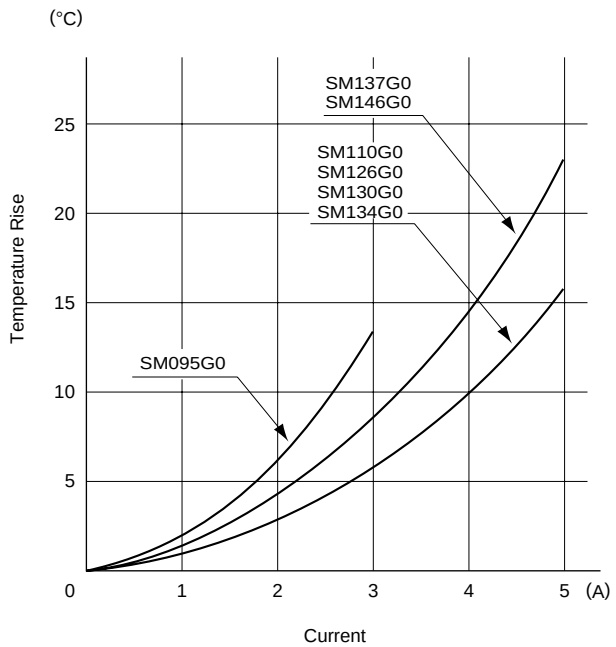


Response Time

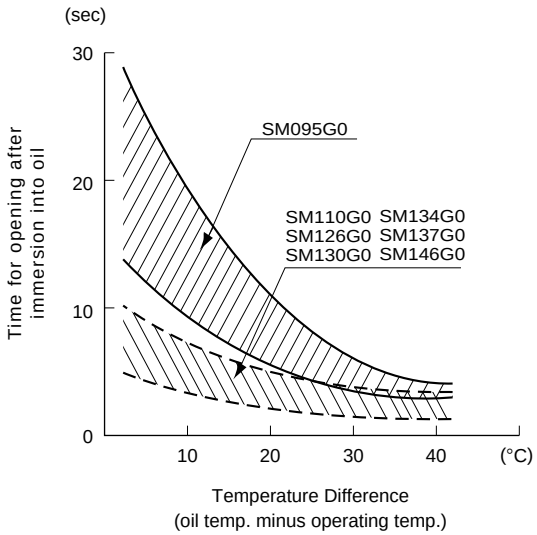


SM/G Series

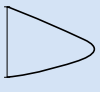
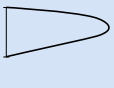
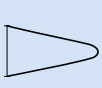
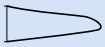
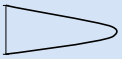
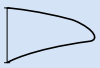
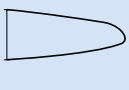
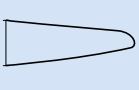
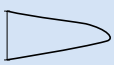
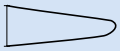
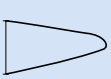
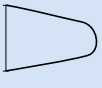
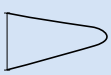
Temperature Rise



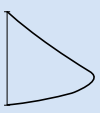
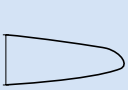
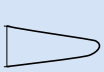
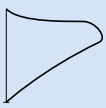
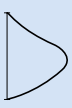
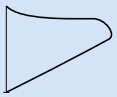
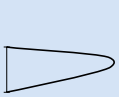
Response Time



Internal Resistance and initial operating temperature

Part Number	Internal Resistance (mΩ/25mm)	Operating Temperature (°C)	Part Number	Internal Resistance (mΩ/25mm)	Operating Temperature (°C)
SM082B0	7.2 / 8.2 / 9.2 	81 / 82 / 83 	SM126B0	4.4 / 4.6 / 4.8 	125 / 126 / 127 
SM092B0	8 / 9 / 10 	90.6 / 91.6 / 92.6 	SM130B0	4.4 / 4.6 / 4.8 	128 / 129 / 130 
SM095B0	8 / 9 / 10 	96 / 97 / 98 	SM134B0	4.1 / 4.4 / 4.7 	132.5 / 133.5 / 134.5 
SM110B0	4.4 / 4.6 / 4.8 	110 / 111 / 112 	SM137B0	5.6 / 6.1 / 6.6 	137 / 138 / 139 
SM125B0	3.8 / 4.2 / 4.6 	125 / 126 / 127 	SM146B0 SM150B0	5.7 / 6.2 / 6.7 	145.5 / 146.5 / 147.5 

Internal Resistance and initial operating temperature

Part Number	Internal Resistance (mΩ/25mm)	Operating Temperature (°C)	Part Number	Internal Resistance (mΩ/25mm)	Operating Temperature (°C)
SM095G0	10 / 11 / 12 	96 / 97 / 98	SM134G0	4.5 / 5.5 / 6.5 	134 / 135 / 136 
SM110G0	5 / 6 / 7 	110 / 111 / 112 	SM137G0	6.8 / 7.6 / 8.4 	136 / 137 / 138 
SM126G0	4 / 5 / 6 	125 / 126 / 127	SM146G0	6.4 / 7.2 / 8.0 	145.5 / 146.5 / 147.5 
SM130G0	4.0 / 5.0 / 6.0 	128 / 129 / 130 			

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 PSE (Electrical Appliance and Material safety Law) of Japan, the operation should be within the specified operating temperature range of ±7 °C. In various standards such as UL, CSA, VDE, BEAB and CCC 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 Tf in the UL, CSA, VDE, BEAB and CCC 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.

● 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 less than 168 hours (1 week).

It is represented by the symbol Th in the UL and CSA standard, Tc in the VDE, BEAB and CCC standard as an option.

● 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 Tm in the UL, CSA, VDE, BEAB and CCC standards.

Lead Cutting and Taping

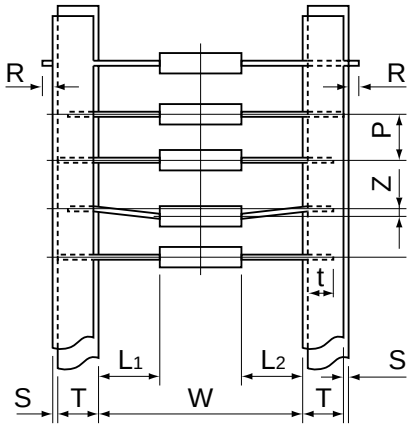
SEFUSE™

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

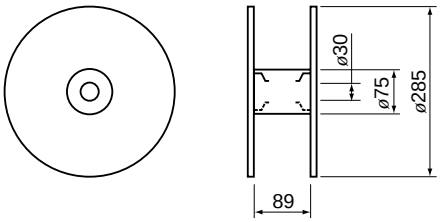
■ Applicable Products

	Standard lead type						Long lead type				
	SF/E	SF/K	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



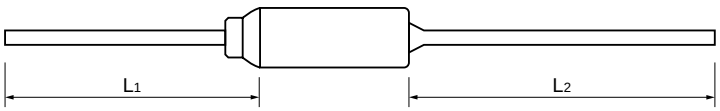
SF/E : 2000pcs/reel
SF/K,SM : 2500pcs/reel

(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							

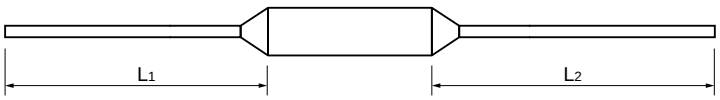
■ Lead Cutting

● SF Type



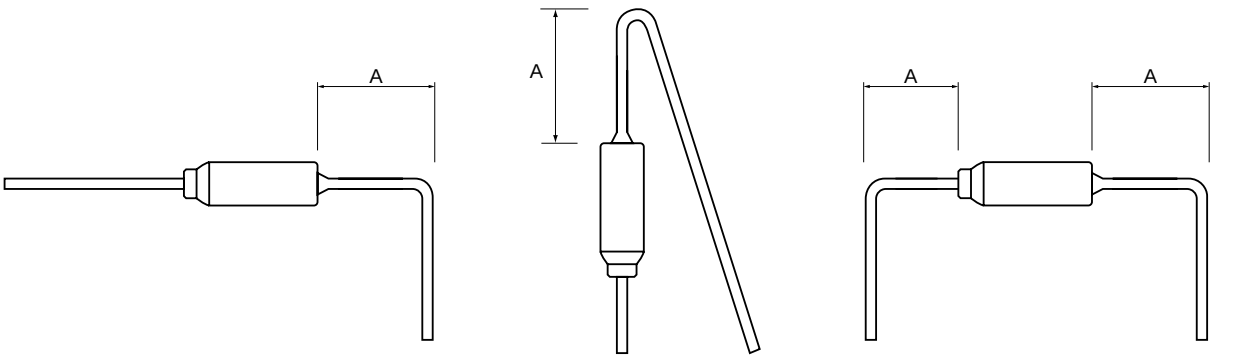
L1 : 9~32
L2 : 7~33 (mm)

● SM Type



L1, L2 : 9~35 (mm)

■ Lead Forming



A: Should 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

●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.

▼ Mount the SEFUSE so that it can detect abnormal heat as quick as possible.

The thermal cutoff operates when the inside thermal element melts. Therefore, if the inside thermal element does not reach the operating temperature, the thermal cutoff does not operate, even if the ambient temperature rises to the operating temperature. When the ambient temperature rises suddenly or detect heat partially, it may take time till the SEFUSE operates.

▼ Mount the SEFUSE so that the temperature of every part become to equal.

If the SF-type lead B, which is caulked to the metal case, is mounted so that it only conducts heat to the body, the temperature around the thermal pellet can be always higher than the other places in the metal case, which can cause the SEFUSE to early open. Be sure to connect the lead A, the resin-sealed side, to the heat source.

Mounting the SEFUSE so that the temperature of the lead A is always lower than that of the lead B can also cause the SEFUSE to early open.

●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,K,Y	50°C
SM082A, B	62°C	SF 76E,K,Y	56°C
SM092A, B	72°C	SF 91E,K,Y	71°C
SM095A, B, G	75°C	SF 96E,K,Y	76°C
SM110A, B, G	90°C	SF113E, Y	90°C
SM125A, B	106°C	SF119E,K,Y	99°C
SM126A, B, G	106°C	SF129E,Y	109°C
SM130A, B, G	110°C	SF139E,Y	119°C
SM134A, B, G	114°C	SF152E,Y	132°C
SM137A, B, G	117°C	SF169E,Y	140°C
SM146A, B, G	126°C	SF184E,Y	140°C
SM150A, B	126°C	SF188E,K,Y	140°C
SM164A	140°C	SF214E,K,Y	140°C
SM182A	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.

●The SEFUSE has a limited life.

Although the thermal elements are made of durable substances for the long time using, their lifetime varies, depending on using conditions. Especially, the more often the SEFUSE are used at the temperature nearly to the operating temperature, the lifetime may be short. Therefore, We recommend performing a reliability test, with the SEFUSE mounted to the actual application, or under the almost same conditions as the actual ones, and confirming that there is no problem with the lifetime.

●The body temperature of the thermal cutoff becomes higher as current passes through.

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.

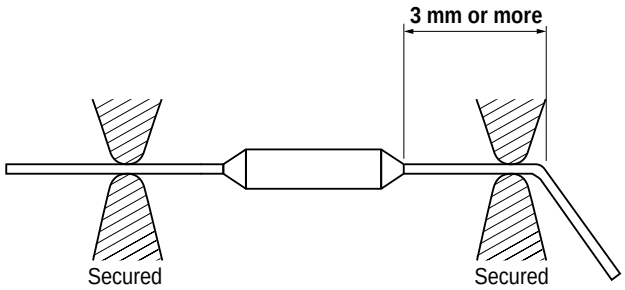
Doing so will cause deterioration of the sealing resin, the thermal cutoff may operate at lower than operating temperature, or any other malfunctions may occur. Also, the thermal cutoff may not operate even if its operating temperature is exceeded.

Cautions

SEFUSE™

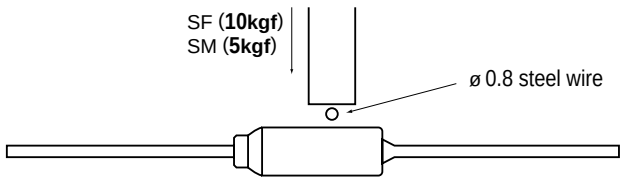
Lead wire process

- 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.

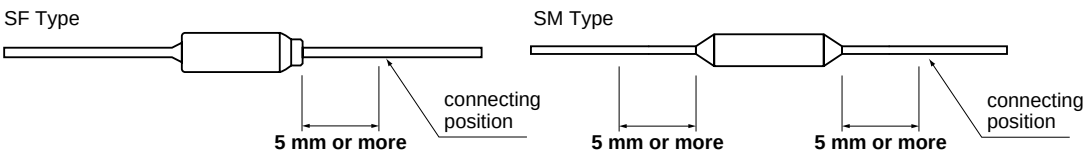
  In the case of an SF type, deformation of the case may change the location of the sliding contact during operation and may cause the thermal cutoff to operate only at temperatures lower than the normal operating temperature range. The thermal cutoff also may not operate even if the thermal cutoff's operating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



Mounting

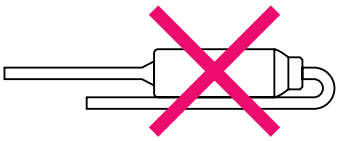
SEFUSE™ can be mounted by soldering, caulking, or welding.

- 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 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 a 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 metallic part.

Storage

- The body and lead A of SF type, and the leads of SM092A, SM164A, SM182A and SM092B 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

- We recommend the following tests on the receiving of the SEFUSE and after mounting it, as it may have a mechanical load or thermal influence under 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 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 January 2006, and is subject to change without notice. Therefore it is recommended to refer to latest individual information such as drawing for mass production designing.
- It is prohibited to reprint or copy the contents herein without written agreement of NEC SCHOTT Components Corporation.
- If problems relevant to the industrial property right of third parties occur by using the products, we would not assume any responsibility for matters other than ones directly related to the manufacturing process, which please note.
- Although we have been making continuous efforts to improve the quality and reliability of our products, the possibility of defects cannot be eliminated entirely. Therefore when using our electronic component products, please make sure to consider safety measures in its design, such as redundancy, fire containment and malfunction prevention against physical injuries, fire disasters and social damages in consideration of the said defect occurrences.

Our products are classified into 2 quality grades: "Standard" and "Special". The recommended applications of the products according to its quality level are indicated below. If you intend to use our products for applications other than "Standard" level, please make sure to consult with our sales representative in advance.

"Standard"
Computers, office equipment, communication equipment, measuring equipment, audio & visual equipment, home electric appliances, machine tools, personal electric equipment and industrial robots. etc.

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