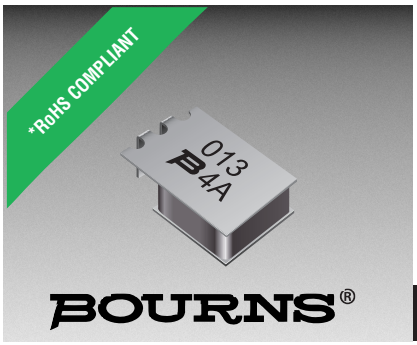

Features

- Surface mount devices
- High voltage surge capabilities
- Binned and sorted resistance ranges
- Assists in meeting ITU K.20/K.21 specifications
- RoHS compliant*
- Agency recognition:

Applications

Used as a secondary overcurrent protection device in:

- Customer Premise Equipment (CPE)
- Central Office (CO)
- Subscriber Line Interface Cards (SLIC)

MF-SM/250 - Telecom PTC Resettable Fuses

Electrical Characteristics

Model	Max. Operating Voltage	Max. Interrupt Ratings		Hold Current	Initial Resistance		One Hour Post-Trip Resistance	Tripped Power Dissipation
	Volts (V)	Volts (V)	Amps (A)	Amps at 23 °C	Ohms at 23 °C	Ohms at 23 °C	Ohms at 23 °C	Watts at 23 °C
		Max.	Max.	I_H	Min.	Max.	Max.	Typ.
MF-SM008/250F-2	80	250	3.0	0.08	5.0	11.0	20.0	1.5
MF-SM013/250-2	60	250	3.0	0.13	6.5	12.0	20.0	3.3
MF-SM013/250-A-2	60	250	3.0	0.13	6.5	9.0	20.0	3.3
MF-SM013/250-B-2	60	250	3.0	0.13	9.0	12.0	20.0	3.3
MF-SM013/250-C-2	60	250	3.0	0.13	7.0	10.0	20.0	3.3

Environmental Characteristics

Operating Temperature ..... -40 °C to +85 °C
Maximum Device Surface Temperature in Tripped State ..... 125 °C
Passive Aging ..... +85 °C, 1000 hours ..... ±15 % typical resistance change
Humidity Aging ..... +85 °C, 85 % R.H. 1000 hours ..... ±15 % typical resistance change
Thermal Shock ..... MIL-STD-202F, Method 107G, ... ±15 % typical resistance change
..... +125 °C to -55 °C,10 times ..... ±15 % typical resistance change
Solvent Resistance ..... MIL-STD-202, Method 215B ..... No change
Lead Solerability ANSI/J-STD-002
Vibration ..... MIL-STD-883C, Method 2007.1, Condition A ..... No change
Moisture Sensitivity Level (MSL) ..... Level 1
ESD Classification - HBM ..... Class 6

Test Procedures And Requirements For Model MF-SM/250 Series

Test	Test Conditions	Accept/Reject Criteria
Visual/Mech.	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	Rmin ≤ R ≤ Rmax
Time to Trip	At specified current, Vmax, 23 °C	T ≤ max. time to trip (seconds)
Hold Current	30 min. at Ihold	No trip
Trip Cycle Life	Vmax, Imax, 100 cycles	No arcing or burning
Trip Endurance	Vmax, 48 hours	No arcing or burning
Solderability	MIL-STD-202F, Method 208F	95 % min. coverage

UL File Number E174545

TÜV File Number
MF-SM008/250-2 ..... R50118917
MF-SM013/250-2 ..... R2057213

Thermal Derating Chart - I_{hold}/ I_{trip} (Amps)

Model	Ambient Operating Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
MF-SM008/250-2	0.124 / 0.34	0.110 / 0.30	0.095 / 0.26	0.080 / 0.22	0.066 / 0.18	0.059 / 0.16	0.051 / 0.14	0.044 / 0.12	0.033 / 0.09
MF-SM013/250-2	0.21 / 0.42	0.18 / 0.37	0.16 / 0.31	0.13 / 0.26	0.10 / 0.23	0.09 / 0.18	0.08 / 0.15	0.07 / 0.12	0.05 / 0.10
MF-SM013/250-A-2	0.21 / 0.42	0.18 / 0.37	0.16 / 0.31	0.13 / 0.26	0.10 / 0.23	0.09 / 0.18	0.08 / 0.15	0.07 / 0.12	0.05 / 0.10
MF-SM013/250-B-2	0.21 / 0.42	0.18 / 0.37	0.16 / 0.31	0.13 / 0.26	0.10 / 0.23	0.09 / 0.18	0.08 / 0.15	0.07 / 0.12	0.05 / 0.10
MF-SM013/250-C-2	0.21 / 0.42	0.18 / 0.37	0.16 / 0.31	0.13 / 0.26	0.10 / 0.23	0.09 / 0.18	0.08 / 0.15	0.07 / 0.12	0.05 / 0.10

*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.
Specifications are subject to change without notice.
Users should verify actual device performance in their specific applications.

Additional Features

■ Withstands lightning power induction

MF-SM/250 - Telecom PTC Resettable Fuses

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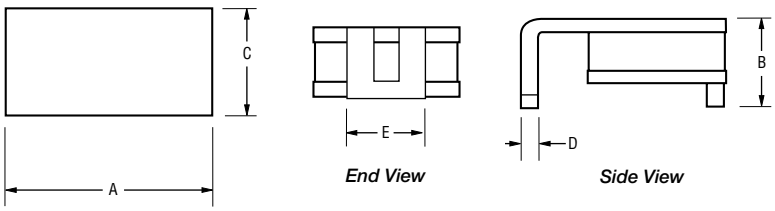
Product Dimensions

Model	A Max.	B Max.	C Max.	D Nom.	E Nom.	G Nom.	H Nom.	I Nom.
MF-SM008/250-2	7.9 (0.311)	3.7 (0.146)	5.3 (0.209)	0.3 (0.012)	3.8 (0.149)	9.7 (0.383)	3.1 (0.122)	2.3 (0.091)
MF-SM013/250-2	9.4 (0.370)	3.7 (0.146)	7.4 (0.291)	0.3 (0.012)	3.8 (0.149)	9.7 (0.383)	4.6 (0.18)	1.8 (0.071)
MF-SM013/250-A-2	9.4 (0.370)	3.7 (0.146)	7.4 (0.291)	0.3 (0.012)	3.8 (0.149)	9.7 (0.383)	4.6 (0.18)	1.8 (0.071)
MF-SM013/250-B-2	9.4 (0.370)	3.7 (0.146)	7.4 (0.291)	0.3 (0.012)	3.8 (0.149)	9.7 (0.383)	4.6 (0.18)	1.8 (0.071)
MF-SM013/250-C-2	9.4 (0.370)	3.7 (0.146)	7.4 (0.291)	0.3 (0.012)	3.8 (0.149)	9.7 (0.383)	4.6 (0.18)	1.8 (0.071)

Packaging:
TAPE & REEL: 1500 pcs. per reel

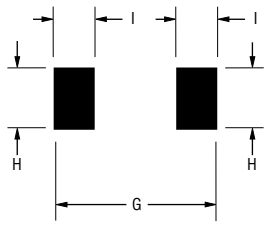
DIMENSIONS: MM / (INCHES)



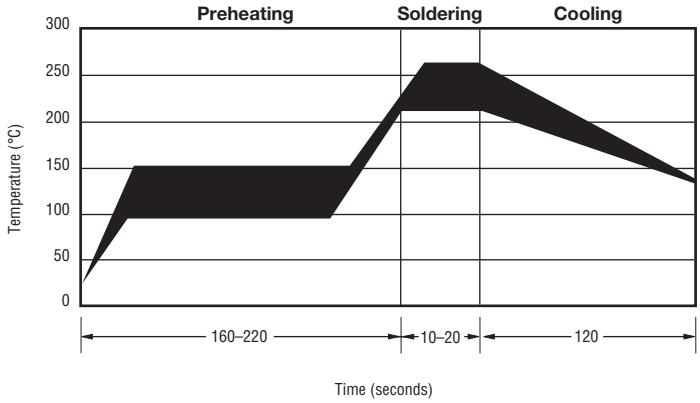
End View *Side View*

Terminal material:
Tin-plated brass

Recommended Pad Layout



Solder Reflow Recommendations



Solder reflow

- Recommended reflow methods: IR, vapor phase oven, hot air oven.
- Devices are not designed to be wave soldered to the bottom side of the board.
- Gluing the devices is not recommended.
- Recommended maximum paste thickness is 0.25 mm (.010 inch).
- Devices can be cleaned using standard industry methods and solvents.

Note:

- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

Rework

- A device should not be reworked.

Storage Recommendations

The recommended long term storage conditions for Multifuse® Polymer PTC devices are 40 °C maximum and 70 % RH maximum. All devices should remain in the original sealed packaging prior to use. Devices may not conform with data sheet specifications if these storage recommendations are exceeded. Devices stored in this manner have an indefinite shelf life.

MF-SM/250 - Telecom PTC Resettable Fuses

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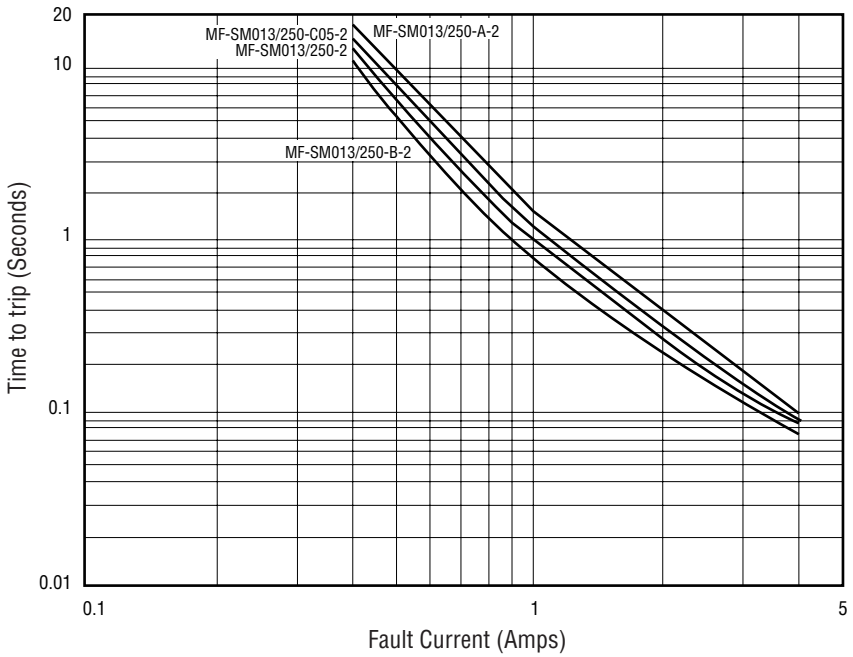
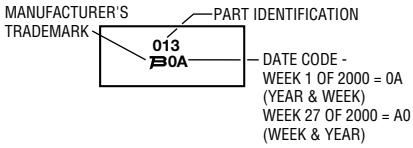
Typical Time to Trip at 23 °C



Typical Part Marking

Represents total content. Layout may vary.



How to Order

MF - SM 013/250 - __ __ - 2

Multifuse® Product Designator

Series
- R = Radial Leaded Component
- SM = Surface Mount Component

Hold Current, I_{hold}
- 008 (0.08 Amps)
- 013 (0.13 Amps)

Max. Interrupt Voltage, V

Resistance Range
- A = 6.5-9 ohms
- B = 9-12 ohms
- C = 7-10 ohms
- F = 5-11 ohms

Resistance Sorted in Bins
- 05 = 0.5 ohms

Packaging
- - 2 = Tape and Reel*

*Packaged per EIA486-B

NOTE: All parts are also available “binned”. All parts within a package will be within 0.5 ohms of each other within the initial resistance range.

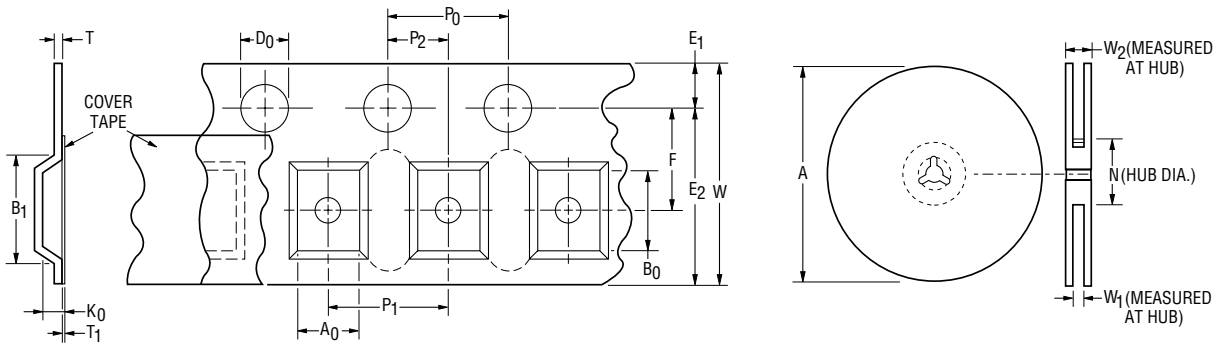
MF-SM, MF-SM/33, MF-SM/60 & MF-SM/250 Series Tape and Reel Specifications

NOTE: Effective December 1, 2010 (product date code V0), the cover tape was changed to the new 3M™ Universal Cover Tape (UCT).

Tape Dimensions	MF-SM030, 050, 075, 100, 125, 260, 300; MF-SM075/60; MF-SM-100/33; MF-SM008/250 per EIA-481-2	MF-SM150, 200, 250; MF-SM-150/33, MF-SM-185/33; MF-SM013/250 per EIA 481-2
W max.	16.3 (0.642)	16.3 (0.642)
P_0	4.0 ± 0.1 (0.157 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)
P_1	8.0 ± 0.1 (0.315 ± 0.004)	12.0 ± 0.1 (0.472 ± 0.004)
P_2	2.0 ± 0.1 (0.079 ± 0.004)	2.0 ± 0.1 (0.079 ± 0.004)
A_0	5.7 ± 0.1 (0.224 ± 0.004)	6.9 ± 0.1 (0.272 ± 0.004)
B_0	8.1 ± 0.1 (0.319 ± 0.004)	9.6 ± 0.1 (0.378 ± 0.004)
B_1 max.	12.1 (0.476)	12.1 (0.476)
D_0	1.5 + 0.1/-0.0 (0.059 + 0.004/-0)	1.5 + 0.1/-0.0 (0.059 + 0.004/-0)
F	7.5 ± 0.1 (0.295 + 0.004)	7.5 ± 0.1 (0.295 + 0.004)
E_1	1.75 ± 0.1 (0.069 ± 0.004)	1.75 ± 0.1 (0.069 ± 0.004)
E_2 min.	14.25 (0.561)	14.25 (0.561)
T max.	0.6 (0.024)	0.6 (0.024)
T_1 max.	0.1 (0.004)	0.1 (0.004)
K_0	3.4 ± 0.1 (0.134 ± 0.004)	3.4 ± 0.1* (0.134 ± 0.004)*
Leader min.	390 (15.35)	390 (15.35)
Trailer min.	160 (6.30)	160 (6.30)
Reel Dimensions		
A max.	360 (14.17)	360 (14.17)
N min.	50 (1.97)	50 (1.97)
W_1	16.4 + 2.0/ -0.0 (0.646 + 0.079/-0)	16.4 + 2.0/ -0.0 (0.646 + 0.079/-0)
W_2 max.	22.4 (0.882)	22.4 (0.882)

* Model MF-SM013/250 = 3.8 ± 0.1 (0.150 ± 0.004)

DIMENSIONS: MM (INCHES)



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Users should verify actual device performance in their specific applications.
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Application Notice

- Users are responsible for independent and adequate evaluation of Bourns® Multifuse® Polymer PTC devices in the user's application, including the PPTC device characteristics stated in the applicable data sheet.
- Polymer PTC devices must not be allowed to operate beyond their stated maximum ratings. Operation in excess of such maximum ratings could result in damage to the PTC device and possibly lead to electrical arcing and/or fire. Circuits with inductance may generate a voltage above the rated voltage of the polymer PTC device and should be thoroughly evaluated within the user's application during the PTC selection and qualification process.
- Polymer PTC devices are intended to protect against adverse effects of temporary overcurrent or overtemperature conditions up to rated limits and are not intended to serve as protective devices where overcurrent or overvoltage conditions are expected to be repetitive or prolonged.
- In normal operation, polymer PTC devices experience thermal expansion under fault conditions. Thus, a polymer PTC device must be protected against mechanical stress, and must be given adequate clearance within the user's application to accommodate such thermal expansion. Rigid potting materials or fixed housings or coverings that do not provide adequate clearance should be thoroughly examined and tested by the user, as they may result in the malfunction of polymer PTC devices if the thermal expansion is inhibited.
- Exposure to lubricants, silicon-based oils, solvents, gels, electrolytes, acids, and other related or similar materials may adversely affect the performance of polymer PTC devices.
- Aggressive solvents may adversely affect the performance of polymer PTC devices. Conformal coating, encapsulating, potting, molding, and sealing materials may contain aggressive solvents including but not limited to xylene and toluene, which are known to cause adverse effects on the performance of polymer PTCs. Such aggressive solvents must be thoroughly cured or baked to ensure their complete removal from polymer PTCs to minimize the possible adverse effect on the device.
- Recommended storage conditions should be followed at all times. Such conditions can be found on the applicable data sheet and on the Multifuse® Polymer PTC Moisture/Reflow Sensitivity Classification (MSL) note: https://www.bourns.com/docs/RoHS-MSL/msl_mf.pdf

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