



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-SM013/250 - Telecom PTC Resettable Fuses

Electrical Characteristics

Model	Max. Oper. Voltage Volts	Max. Interrupt Ratings		Hold Current Amps at 23 °C	Initial Resistance		One Hour Post-Trip Resistance Ohms at 23 °C	Tripped Power Dissipation Watts at 23 °C
		Volts (V)	Amps (A)		Ohms at 23 °C	Ohms at 23 °C		
		Max.	Max.		I _H	Min.		
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	-45 °C to +85 °C	
Maximum Device Surface Temperature in Tripped State	125 °C	
Passive Aging	+85 °C, 1000 hours	±2 % typical resistance change
	+60 °C, 1000 hours	±3 % typical resistance change
Humidity Aging	+85 °C, 85 % R.H. 500 hours	±3 % typical resistance change
Thermal Shock	MIL-STD-202F, Method 107G,	±10 % typical resistance change
	+125 °C to -55 °C, 10 times	±15 % typical resistance change
Solvent Resistance	MIL-STD-202, Method 215B	No change
Lead Solderability	ANSI/J-STD-002	
Flammability	IEC 695-2-2	No Flame for 60 secs.
Vibration	MIL-STD-883C, Method 2007.1, Condition A	No change

Test Procedures And Requirements For Model SM013/250 Series

Test	Test Conditions	Accept/Reject Criteria
Visual/Mech.	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	R _{min} ≤ R ≤ R _{max}
Time to Trip	At specified current, V _{max} , 23 °C	T ≤ max. time to trip (seconds)
Hold Current	30 min. at I _{hold}	No trip
Trip Cycle Life	V _{max} , I _{max} , 100 cycles	No arcing or burning
Trip Endurance	V _{max} , 48 hours	No arcing or burning
Solderability	MIL-STD-202F, Method 208F	95 % min. coverage
UL File Number	E 174545S	
CSA File Number	CA 110338	
TÜV File Number	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-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
 Specifications are subject to change without notice.
 Customers should verify actual device performance in their specific applications.

Additional Features

- Withstands lightning power induction

MF-SM013/250 Series - Telecom PTC Resettable Fuses

BOURNS®

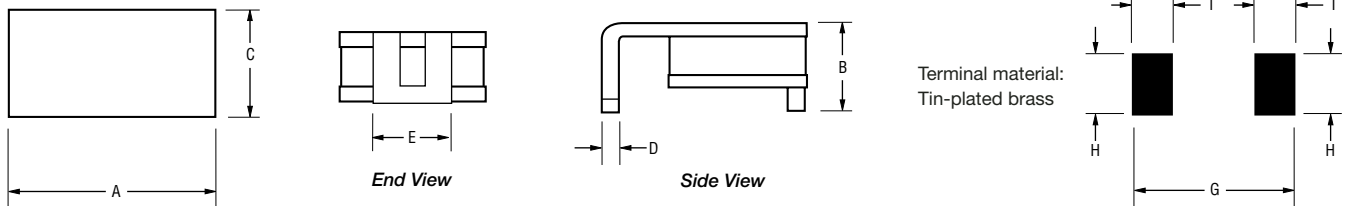
Product Dimensions

Model	A	B	C	D	E	G	H	I
	Max. 9.4 (0.370)	Max. 3.7 (0.146)	Max. 7.4 (0.291)	Nom. 0.3 (0.012)	Nom. 3.8 (0.149)	Nom. 9.7 (0.383)	Nom. 4.6 (0.18)	Nom. 1.8 (0.071)
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)

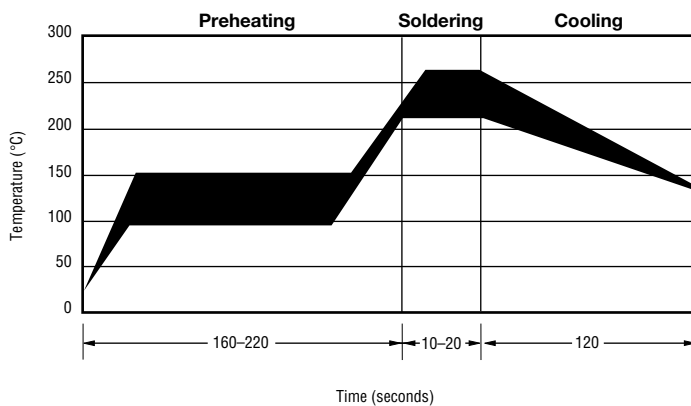
Packaging:
TAPE & REEL: 1500 pcs. per reel

$$\text{DIMENSIONS} = \frac{\text{MM}}{\text{(INCHES)}}$$

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.

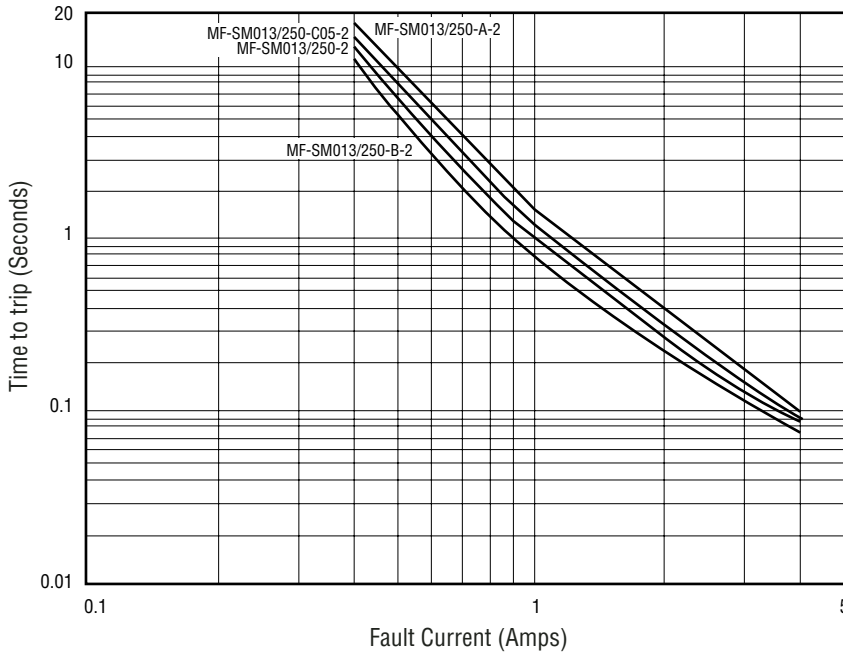
Storage Recommendations

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-SM013/250 Series - Telecom PTC Resettable Fuses

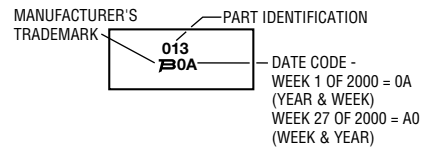


Typical Time to Trip at 23 °C

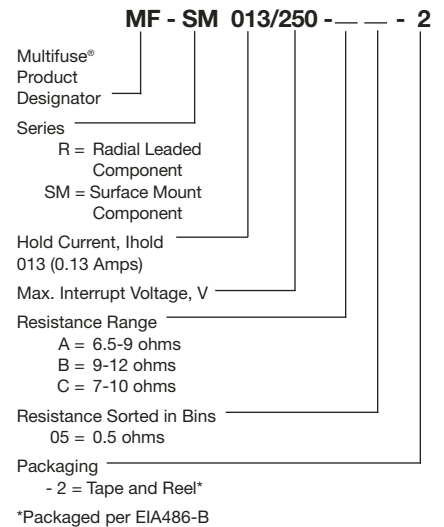


Typical Part Marking

Represents total content. Layout may vary.



How to Order



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-SM030, 050, 075, 100, 125, 260, 300;
MF-SM075/60; MF-SM-100/33
per EIA-481-2**

**MF-SM150, 200, 250;
MF-SM-150/33; MF-SM013/250
per EIA 481-2**

Tape Dimensions

W	$\frac{16.0 \pm 0.3}{(0.630 \pm 0.012)}$	$\frac{16.0 \pm 0.3}{(0.630 \pm 0.012)}$
P ₀	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$
P ₁	$\frac{8.0 \pm 0.1}{(0.315 \pm 0.004)}$	$\frac{12.0 \pm 0.1}{(0.472 \pm 0.004)}$
P ₂	$\frac{2.0 \pm 0.1}{(0.079 \pm 0.004)}$	$\frac{2.0 \pm 0.1}{(0.079 \pm 0.004)}$
A ₀	$\frac{5.7 \pm 0.1}{(0.224 \pm 0.004)}$	$\frac{6.9 \pm 0.1}{(0.272 \pm 0.004)}$
B ₀	$\frac{8.1 \pm 0.1}{(0.319 \pm 0.004)}$	$\frac{9.6 \pm 0.1}{(0.378 \pm 0.004)}$
B ₁ max.	$\frac{12.1}{(0.476)}$	$\frac{12.1}{(0.476)}$
D ₀	$\frac{1.5 + 0.1/-0.0}{(0.059 + 0.004/-0)}$	$\frac{1.5 + 0.1/-0.0}{(0.059 + 0.004/-0)}$
F	$\frac{7.5 \pm 0.1}{(0.295 \pm 0.004)}$	$\frac{7.5 \pm 0.1}{(0.295 \pm 0.004)}$
E ₁	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$
E ₂ min.	$\frac{14.25}{(0.561)}$	$\frac{14.25}{(0.561)}$
T max.	$\frac{0.6}{(0.024)}$	$\frac{0.6}{(0.024)}$
T ₁ max.	$\frac{0.1}{(0.004)}$	$\frac{0.1}{(0.004)}$
K ₀	$\frac{3.4 \pm 0.1}{(0.134 \pm 0.004)}$	$\frac{3.4 \pm 0.1^*}{(0.134 \pm 0.004)^*}$
Leader min.	$\frac{390}{(15.35)}$	$\frac{390}{(15.35)}$
Trailer min.	$\frac{160}{(6.30)}$	$\frac{160}{(6.30)}$
Reel Dimensions		
A max.	$\frac{360}{(14.17)}$	$\frac{360}{(14.17)}$
N min.	$\frac{50}{(1.97)}$	$\frac{50}{(1.97)}$
W ₁	$\frac{16.4 + 2.0/-0.0}{(0.646 + 0.079/-0)}$	$\frac{16.4 + 2.0/-0.0}{(0.646 + 0.079/-0)}$
W ₂ max.	$\frac{22.4}{(0.882)}$	$\frac{22.4}{(0.882)}$

* Model MF-SM013/250 = $\frac{3.8 \pm 0.1}{(0.150 \pm 0.004)}$

