



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/Storage 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, +125 °C to -55 °C, 10 times	±10 % typical resistance change
	MIL-STD-202, Method 215B	±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 NumberE 174545S
 CSA File NumberCA 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
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Additional Features

- Withstands lightning power induction

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BOURNS®

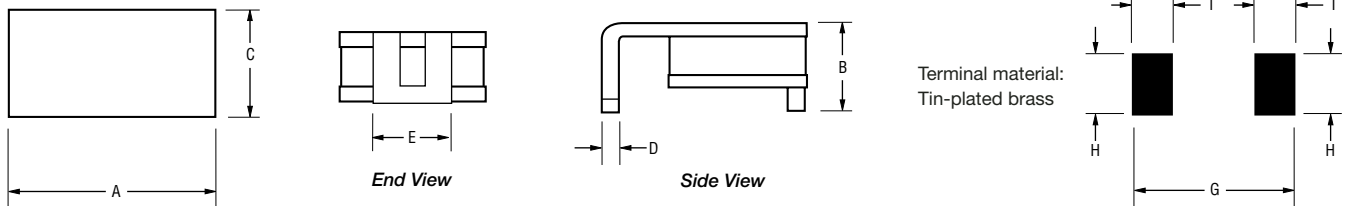
Product Dimensions

Model	A	B	C	D	E	G	H	I
	Max.	Max.	Max.	Nom.	Nom.	Nom.	Nom.	Nom.
MF-SM013/250-2	$\frac{9.4}{(0.370)}$	$\frac{3.7}{(0.146)}$	$\frac{7.4}{(0.291)}$	$\frac{0.3}{(0.012)}$	$\frac{3.8}{(0.149)}$	$\frac{9.7}{(0.383)}$	$\frac{4.6}{(0.18)}$	$\frac{1.8}{(0.071)}$
MF-SM013/250-A-2	$\frac{9.4}{(0.370)}$	$\frac{3.7}{(0.146)}$	$\frac{7.4}{(0.291)}$	$\frac{0.3}{(0.012)}$	$\frac{3.8}{(0.149)}$	$\frac{9.7}{(0.383)}$	$\frac{4.6}{(0.18)}$	$\frac{1.8}{(0.071)}$
MF-SM013/250-B-2	$\frac{9.4}{(0.370)}$	$\frac{3.7}{(0.146)}$	$\frac{7.4}{(0.291)}$	$\frac{0.3}{(0.012)}$	$\frac{3.8}{(0.149)}$	$\frac{9.7}{(0.383)}$	$\frac{4.6}{(0.18)}$	$\frac{1.8}{(0.071)}$
MF-SM013/250-C-2	$\frac{9.4}{(0.370)}$	$\frac{3.7}{(0.146)}$	$\frac{7.4}{(0.291)}$	$\frac{0.3}{(0.012)}$	$\frac{3.8}{(0.149)}$	$\frac{9.7}{(0.383)}$	$\frac{4.6}{(0.18)}$	$\frac{1.8}{(0.071)}$

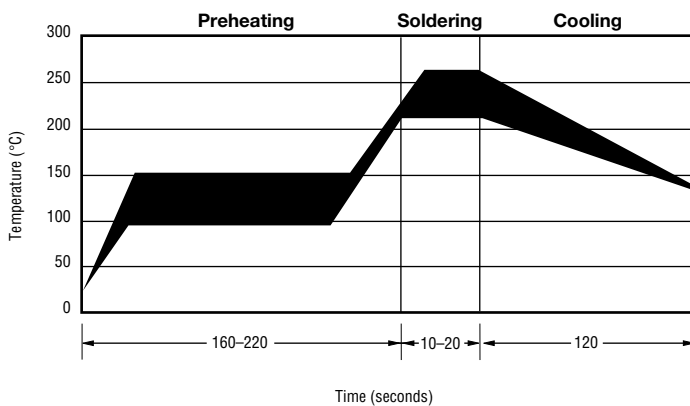
Packaging:
TAPE & REEL: 1500 pcs. per reel

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

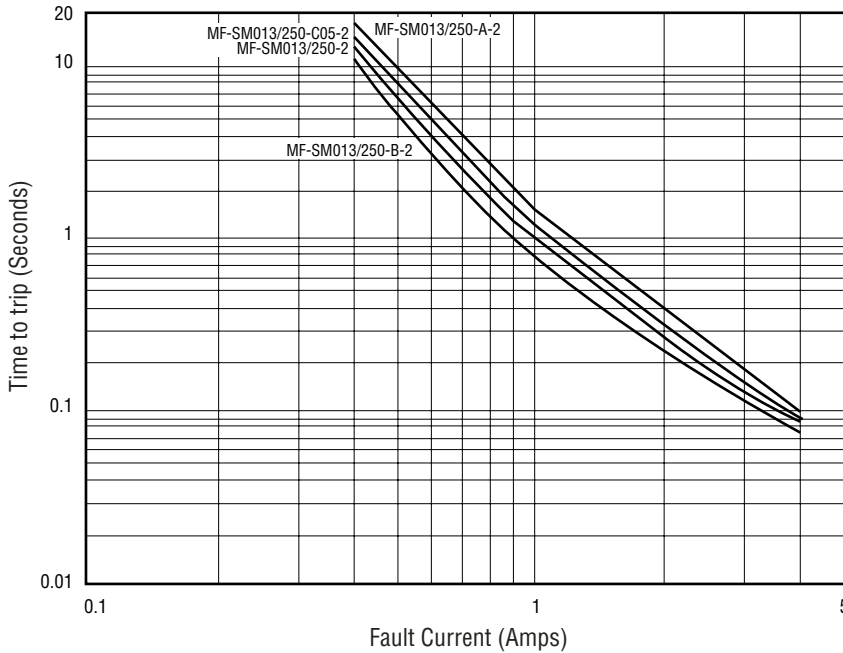
- A device should not be reworked.

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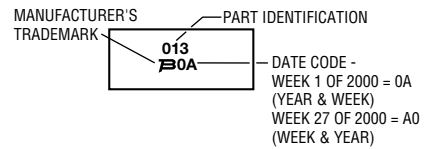


Typical Time to Trip at 23 BC

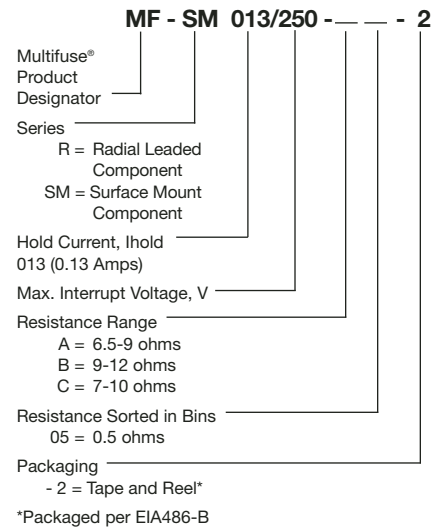


Typical Part Marking

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.

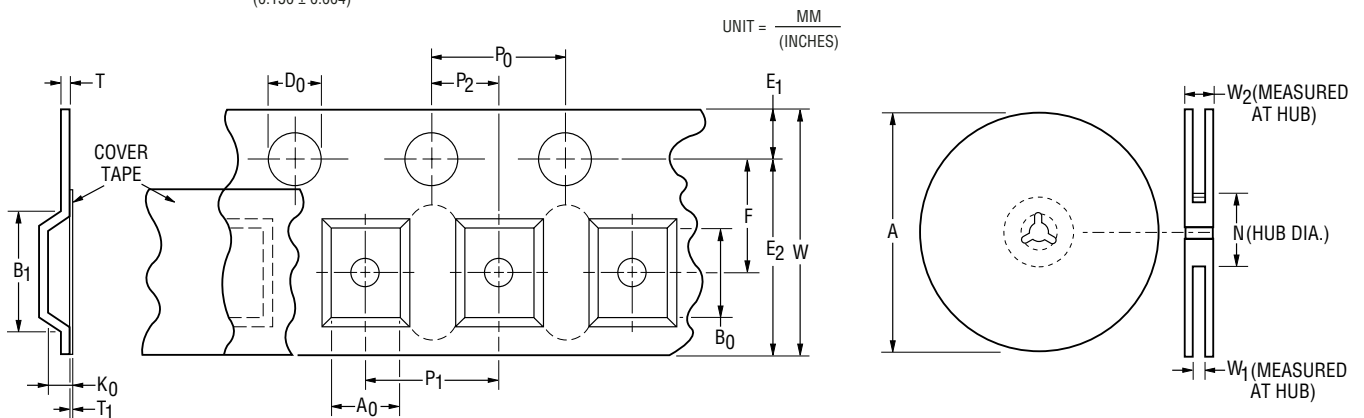
**MF-SM030, 050, 075, 100, 125, 260, 300;
MF-SM075/60; MF-SM-100/33
per EIA-481-2**

**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 = $\frac{3.8 \pm 0.1}{(0.150 \pm 0.004)}$



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