




## Features

- Tip & ring line protection with two devices in one surface mount package
- High voltage surge capabilities
- Assists in meeting ITU-T K.20/K.21/K.45 specifications as well as Telcordia GR-1089 intra-building
- 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-SD/250 Series - Telecom PTC Resettable Fuses

### Electrical Characteristics

Model	Max. Operating Voltage Volts	Max. Interrupt Ratings		Ihold	Itrip	Initial Resistance		1 Hour (R <sub>1</sub> ) Post-Trip Resistance*	Nominal Time to Trip		Tripped Power Dissipation Watts at 23 °C Typ.
		Volts (V)	Amps (A)			Amperes at 23 °C			Ohms at 23 °C		
				Hold	Trip	Min.	Max.	Max.			
MF-SD013/250	60	250	3.0	0.13	0.26	2.0	7.0	10.0	1	2.5	1.5

\* R<sub>1</sub> value is measured 24 hours post reflow.  
Resistance matched in housing: 1.0 ohm measured 24 hours after reflow installation.

### 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 Solderability.....	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-SD/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 <sub>min</sub> ≤ R ≤ R <sub>max</sub>
Time to Trip.....	At specified current, V <sub>max</sub> , 23 °C.....	T ≤ max. time to trip (seconds)
Hold Current.....	30 min. at Ihold.....	No trip

Test	Test Conditions	Primary Protection
Mains Power Contact - ITU-T K.20, K.21.....	230 V rms, 10 ohms, t = 15 min.....	None
Power Induction - ITU-T K.20, K.21.....	600V rms, 600 ohms, t = 0.2 seconds.....	None
Power Induction - ITU-T K.20, K.21.....	600 V rms, 600 ohms, t = 1 second.....	GDT
Lightning Surge - ITU-T K.20, K.21.....	1.5 KV, 10/700 μs.....	None
Lightning Surge.....	4.0 KV, 10/700 μs.....	GDT

UL File Number ..... E 174545S

### Thermal Derating Chart -Ihold (Amps)

Model	Ambient Operating Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
MF-SD013/250	0.21	0.18	0.16	0.13	0.10	0.09	0.08	0.07	0.05

\*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.

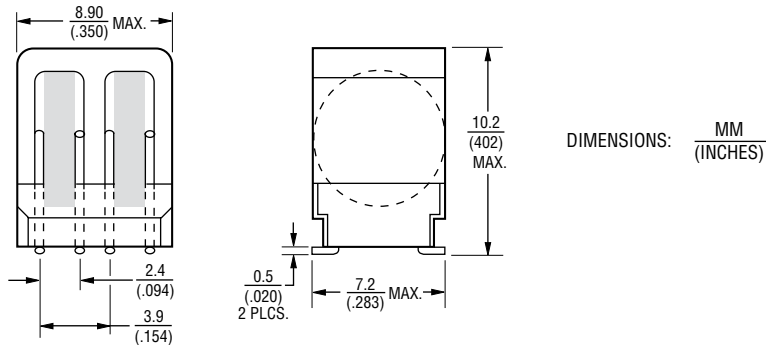
Users should verify actual device performance in their specific applications.

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# MF-SD/250 Series - Telecom PTC Resettable Fuses

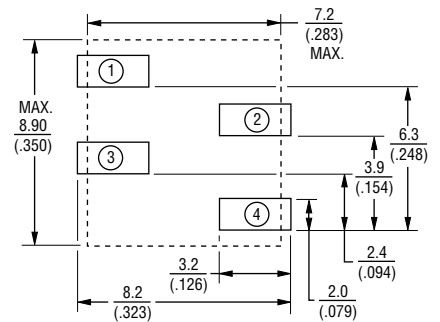
**BOURNS®**

## Product Dimensions

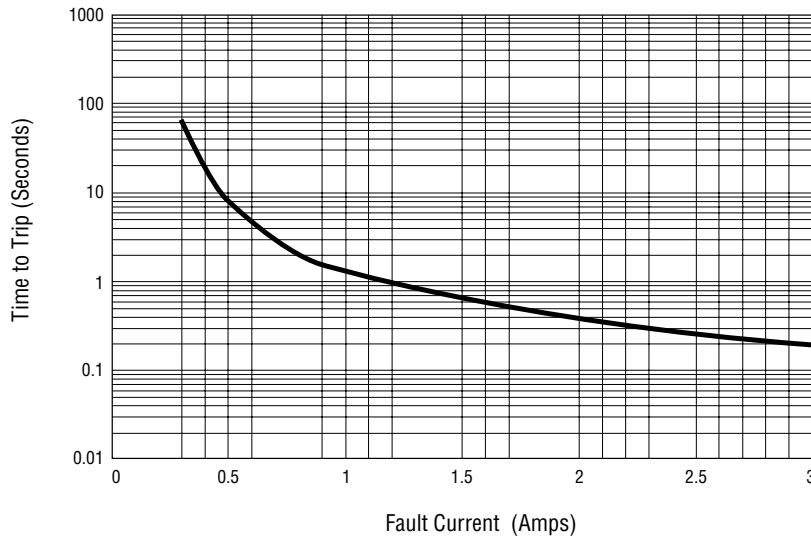


Packaging: TAPE & REEL = 400 pcs. per reel

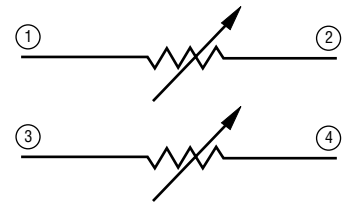
## Recommended Pad Layout



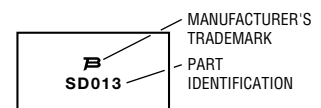
## Typical Time to Trip at 23 °C



## Schematic



## Typical Part Marking



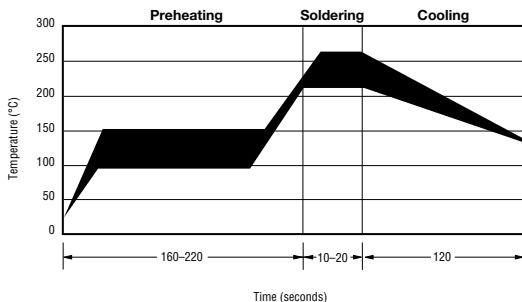
## How to Order

**MF - SD 013/250 - 2**

Multifuse® Product Designator \_\_\_\_\_  
 Series \_\_\_\_\_  
 SD = Surface Mount Dual Package  
 Hold Current, I<sub>hold</sub> \_\_\_\_\_  
 013 (0.13 Amps)  
 Max. Interrupt Voltage, V \_\_\_\_\_  
 250 = 250 Volts  
 Packaging \_\_\_\_\_  
 - 2 = Tape and Reel\*

\*Packaged per EIA481-2

## 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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# MF-SD/250 Series - Telecom PTC Resettable Fuses

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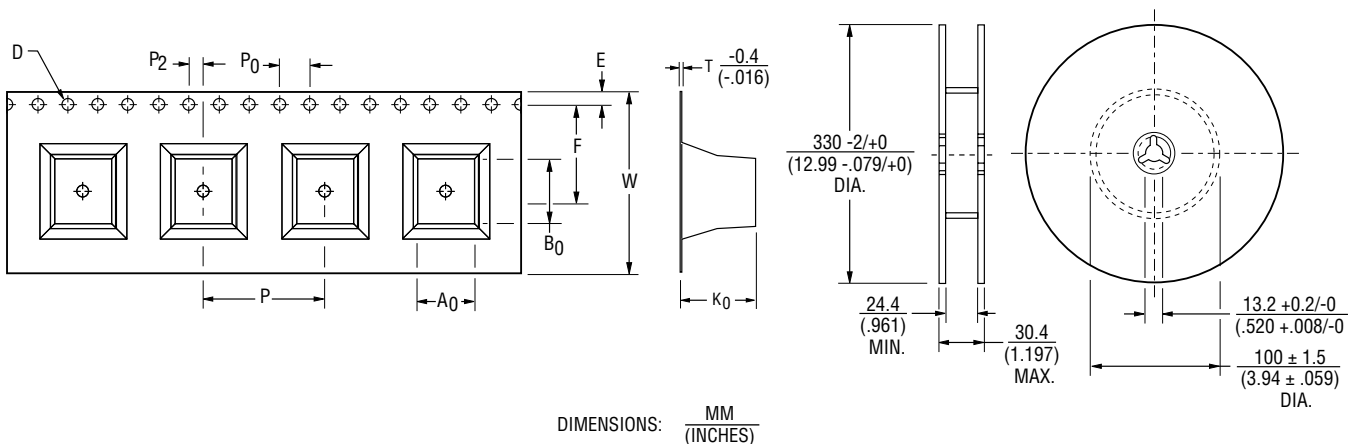
## Storage Recommendations

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.

## Packaging Dimensions

### Tape Dimensions

	MF-SD/250 Series per EIA 481-2
W	$24.0 \pm 0.5$ (0.945 ± 0.020)
P <sub>0</sub>	$4.0$ (0.157)
P	$16.0$ (0.630)
P <sub>2</sub>	$2.0$ (0.079)
A <sub>0</sub>	$7.5 \pm 0.2$ (0.295 ± 0.008)
B <sub>0</sub>	$9.0 \pm 0.2$ (0.354 ± 0.008)
D	$1.5$ (0.059)
F	$11.5$ (0.453)
E	$1.75$ (0.069)
t	$0.5 \pm 0.15$ (0.020 ± 0.006)
K <sub>0</sub>	$10.0 \pm 0.2$ (0.394 ± 0.008)
Leader min.	$390$ (15.35)
Trailer min.	$160$ (6.30)



MF-SD/250, REV. F 06/17

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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](https://www.bourns.com/docs/RoHS-MSL/msl_mf.pdf)

MFAN 12/18

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