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	Max. Interrupt Ratings		Ihold	Itrip	Initial Resistance		*Post-Trip Resistance R_1	Nominal Time to Trip		Tripped Power Dissipation	Agency Recognition
	Volts	Volts (V)	Amps (A)	Amperes at 23 °C		Ohms at 23 °C		Ohms at 23 °C	Amps at 23 °C	Seconds at 23 °C	Watts at 23 °C	cUL
				Hold	Trip	Min.	Max.	Max.			Typ.	E174545
MF-SD013/250	60	250	3.0	0.13	0.26	2.0	7.0	10.0	1	2.5	1.5	✓

* R_1 value is measured 24 hours post reflow.
Resistance matched in housing: 1.0 ohm measured 24 hours after reflow installation.

Environmental Characteristics

Item	Condition	Criteria
Operating Temperature	-40 °C to +85 °C	
Storage Condition	+40 °C max. / 70 % RH max.	
Passive Aging	+85 °C, 1000 hours	±15 % typical resistance change
Humidity Aging	+85 °C, 85 % R.H. 100 hours	±15 % typical resistance change
Thermal Shock	-55 °C to +125 °C, 10 times	±15 % typical resistance change
Resistance to Solvents	MIL-STD-202, Method 215B	No change (marking still legible)
Resistance to Soldering Heat	245 °C ±5 °C, 5 seconds	$(R_{min} < R < R_{1max})$
Vibration	MIL-STD-883C, Method 2007.1 Condition A	±5 % typical resistance change
Moisture Sensitivity Level (MSL)	See Note	
ESD Classification	Class 6 (per AEC-Q200-2, HBM)	

Test Procedures and Requirements

Item	Test Condition	Accept/Reject Criteria
Visual/Mechanical	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	$R_{min} \le R \le R_{max}$
Time to Trip	At specified current, V_{max}, 23 °C, still air	T ≤ max. time to trip (seconds)
Hold Current	30 min. at I_{hold}, still air	No trip
Trip Cycle Life	V_{max}, I_{max}, 100 cycles	No arcing or burning
Trip Endurance	V_{max}, I_{max}, 48 hours	No arcing or burning
Solderability	245 °C ±5 °C, 5 seconds	95 % min. coverage

Item	Test Condition	Primary Protection
Mains Power Contact - ITU-T K.20, K.21	230 Vrms, 10 ohms, t = 15 minutes	None
Power Induction - ITU-T K.20, K.21	600 Vrms, 600 ohms, t = 0.2 seconds	None
Power Induction - ITU-T K.20, K.21	600 Vrms, 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

Thermal Derating Table - I_{hold} (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

WARNING Cancer and Reproductive Harm
www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.
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Users should verify actual device performance in their specific applications.
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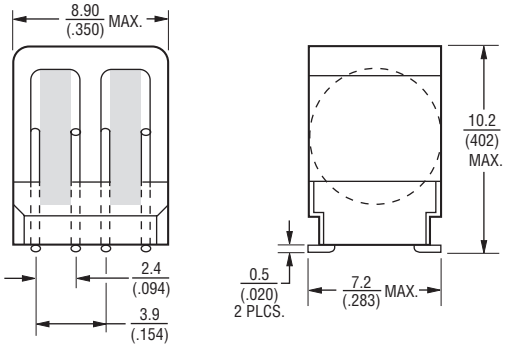
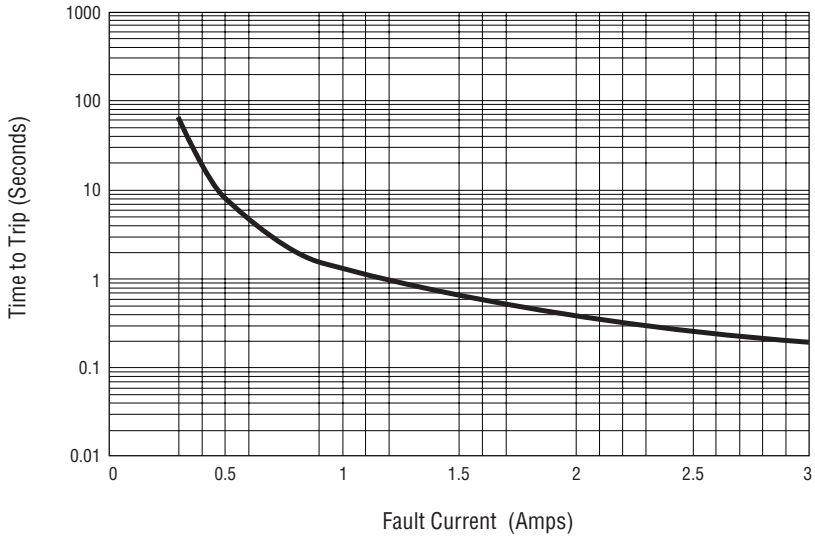
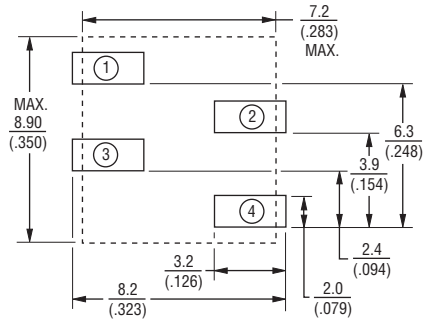
Product Dimensions



Typical Time to Trip at 23 °C



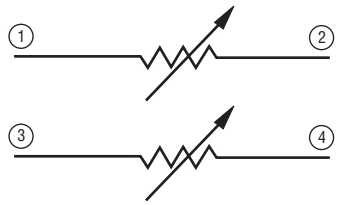
Recommended Pad Layout



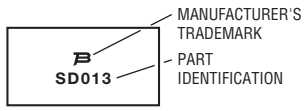
Packaging Quantity

400 pcs. per reel

Schematic



Typical Part Marking



How to Order

MF - SD 013/250 - 2

Multifuse® Product Designator

Series
SD = Surface Mount Dual Package

Hold Current, Ihold
013 (0.13 Amps)

Max. Interrupt Voltage, V
250 = 250 Volts

Packaging
- 2 = Tape and Reel Packaged per EIA-481

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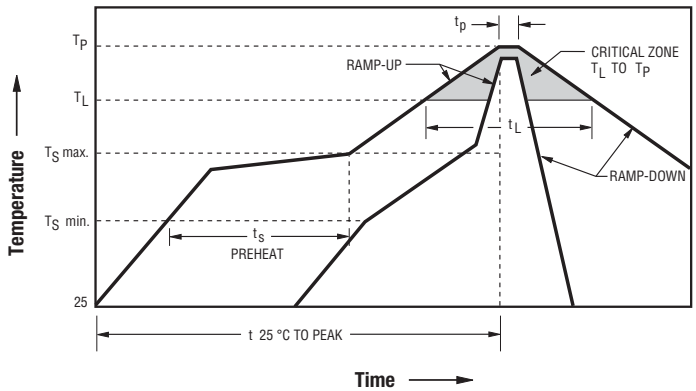
Solder Reflow Recommendations



Notes:

- MF-SD/250 models are intended for reflow soldering (including, but not limited to heating plate, hot air, IR, nitrogen, and vapor phase).
- Wave soldering is permissible only if the device is on the top of the PCB, opposite the heat source.
- Hand soldering is not recommended for these devices.
- All temperatures refer to the topside of the device, measured on the device body surface.
- If reflow temperatures exceed the recommended profile, devices may not meet the published specifications.
- Compatible with Pb and Pb-free solder reflow profiles.
- Excess solder may cause a short circuit.
- Please refer to the Multifuse® Polymer PTC Resettable Fuse Soldering Recommendations document for more details.

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to T_p)	3 °C / second max.
PREHEAT: Temperature Min. (Ts_{min}) Temperature Max. (Ts_{max}) Time (Ts_{min} to Ts_{max}) (ts)	 150 °C 200 °C 60~180 seconds
TIME MAINTAINED ABOVE: Temperature (T_L) Time (t_L)	 217 °C 60~150 seconds
Peak Temperature (T_p)	260 °C
Time within 5 °C of Actual Peak Temperature (t_p)	20~40 seconds
Ramp-Down Rate	6 °C / second max.
Time 25 °C to Peak Temperature	8 minutes max.

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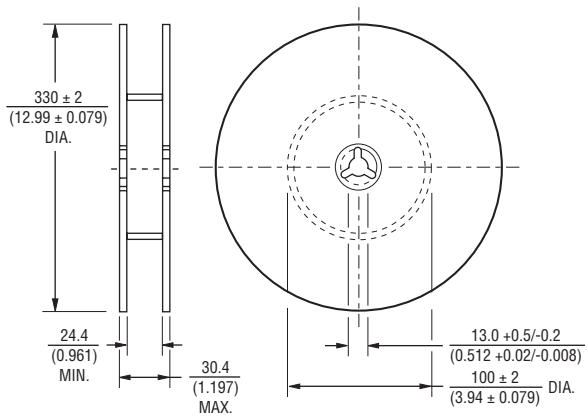
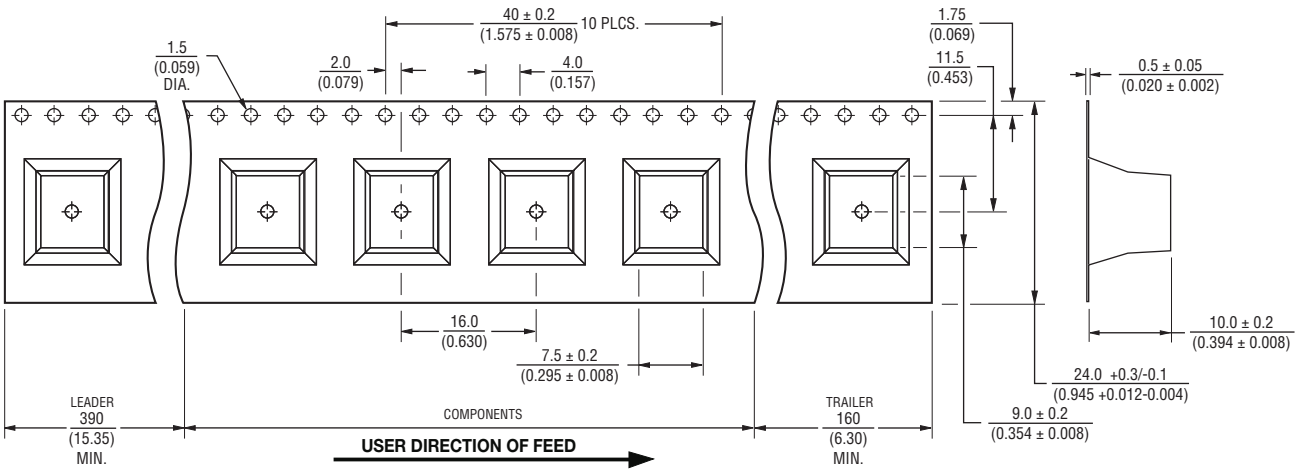
Packaging Dimensions

Packaged per EIA-481





DIMENSIONS: MM / (INCHES)

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.
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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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