




**THE DATASHEET OF
MF-SM050/60-2**





Features

- Wide selection of hold currents and maximum voltages
- Surface mount package for automated assembly
- Fully compatible with current industry standards
- High power rating

- RoHS compliant* and halogen free**
- Agency recognition: 
- 2920 and 3425 footprints available

MF-SM Series – PTC Resettable Fuses

Electrical Characteristics

Model	V max Volts	I max Amps	I _{hold}	I _{trip}	Resistance		Max. Time To Trip		Tripped Power Dissipation	Agency Recognition	
			Amperes at 23 °C		Ohms at 23 °C		Amperes at 23 °C	Seconds at 23 °C	Watts at 23 °C	cUL	TÜV
			Hold	Trip	R Min.	R1 Max.	Max.	Typ.	E174545	R50362083	
MF-SM030	60	40	0.30	0.60	0.90	4.80	1.5	3.0	1.7	✓	✓
MF-SM050	60	40	0.50	1.00	0.35	1.40	2.5	4.0	1.7	✓	✓
MF-SM075	30	80	0.75	1.50	0.23	1.00	8.0	0.3	1.7	✓	✓
MF-SM075/60	60	10	0.75	1.50	0.23	1.00	8.0	0.3	1.7	✓	✓
MF-SM100	30	80	1.10	2.20	0.12	0.48	8.0	0.5	1.7	✓	✓
MF-SM100/33	33	40	1.10	2.20	0.12	0.41	8.0	0.5	1.7	✓	✓
MF-SM125	15	100	1.25	2.50	0.07	0.25	8.0	2.0	1.7	✓	✓
MF-SM150	15	100	1.50	3.00	0.06	0.25	8.0	5.0	1.9	✓	✓
MF-SM150/33	33	40	1.50	3.00	0.06	0.23	8.0	5.0	1.9	✓	✓
MF-SM185/33	33	40	1.80	3.60	0.04	0.15	8.0	5.0	1.9	✓	✓
MF-SM200	15	100	2.00	4.00	0.045	0.125	8.0	12.0	1.9	✓	✓
MF-SM250	15	100	2.50	5.00	0.024	0.085	8.0	25.0	1.9	✓	✓
MF-SM260	6	100	2.60	5.20	0.025	0.075	8.0	20.0	1.7	✓	✓
MF-SM300	6	100	3.00	6.00	0.015	0.048	8.0	35.0	1.5	✓	✓

Environmental Characteristics

Item	Condition	Criteria
Operating Temperature	-40 °C to +85 °C	
Recommended Storage	+40 °C max. / 70 % RH max.	
Passive Aging	+85 °C, 1000 hours	±5 % typical resistance change
Humidity Aging	+85 °C, 85 % R.H. 7 days	±5 % typical resistance change
Thermal Shock	-40 °C to +85 °C, 20 cycles	-20 % typical resistance change
Resistance to Solvents	MIL-STD-202, Method 215	No change. (Marking still legible)
Vibration	MIL-STD-883C, Method 2007.1 Condition A	R _{min} ≤ R ≤ R _{1max}
Moisture Sensitivity Level (MSL)	See Note	
ESD Classification - HBM	Class 6 (per AEC-Q200-2, HBM)	



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

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

** Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

Specifications are subject to change without notice. Users should verify actual device performance in their specific applications. The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.

Additional Information

Click these links for more information:



[PRODUCT SELECTOR](#) [TECHNICAL LIBRARY](#) [INVENTORY](#) [SAMPLES](#) [CONTACT](#)

How to Order

MF - SM 100/33 - 2 - 99

Multifuse® Product Designator _____
 Series _____
 SM = Surface Mount Component
 Hold Current, I_{hold}/V_{max}* _____
 030 - 300 (0.3 - 3.0 Amps)
 Packaging Options _____
 - 2 = Tape & Reel Packaged per EIA-481
 Part Number Suffix Option _____
 - 99 = RoHS Compliancy

As of date code April 1, 2005 all MF-SM models are RoHS compliant. The suffix "-99" was originally provided to help customers distinguish between RoHS compliant and non-RoHS compliant products, but the -99 suffix option is no longer necessary. The -99 suffix option is no longer available starting January 1, 2020. See [Note](#) for more details.

* V_{max} entry applies to certain models only.

Applications

Almost anywhere there is a low voltage power supply and a load to be protected, including:

- Computers & peripherals
- General electronics
- Automotive applications
- Industrial controls
- Portable electronic devices
- Displays and sensors
- DC motors and DC fans
- LEDs

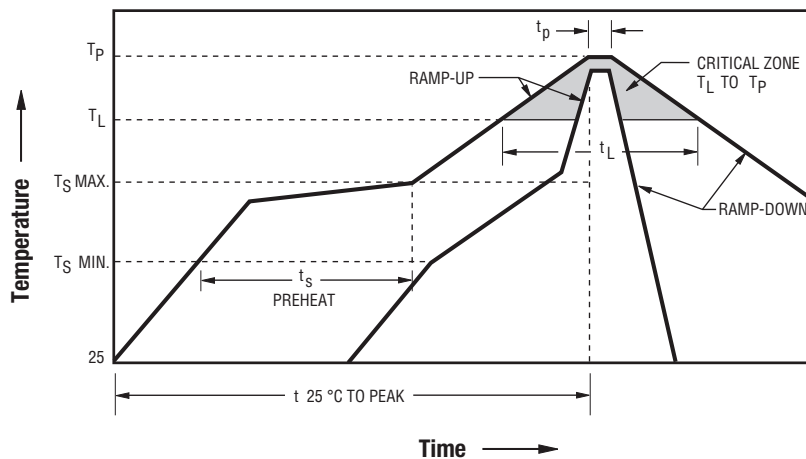
MF-SM Series – PTC Resettable Fuses

BOURNS®

Test Procedures and Requirements

Item	Test Conditions	Accept/Reject Criteria
Visual/Mechanical	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	$R_{min} \leq R \leq R_{max}$
Time to Trip	At specified current, V_{max} , 23 °C, still air	$T \leq \text{max. time to trip (seconds)}$
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} , 48 hours	No arcing or burning
Solderability	245 °C \pm 5 °C, 5 seconds	95 % min. coverage

Solder Reflow Recommendations



Notes:

- MF-SM 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 ($T_{s_{max}}$ to T_p)	3 °C / second max.
PREHEAT: Temperature Min. ($T_{s_{min}}$) Temperature Max. ($T_{s_{max}}$) Time ($T_{s_{min}}$ to $T_{s_{max}}$) (t_s)	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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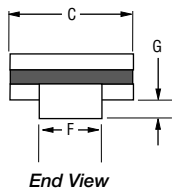
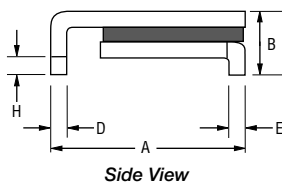
MF-SM Series – PTC Resettable Fuses



Product Dimensions

Model	A		B	C	D		E		F		G		H
	Min.	Max.	Max.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
MF-SM030	6.73 (0.265)	7.98 (0.314)	3.18 (0.125)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM050	6.73 (0.265)	7.98 (0.314)	3.18 (0.125)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM075	6.73 (0.265)	7.98 (0.314)	3.18 (0.125)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM075/60	6.73 (0.265)	7.98 (0.314)	3.18 (0.125)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM100	6.73 (0.265)	7.98 (0.314)	3.0 (0.118)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM100/33	6.73 (0.265)	7.98 (0.314)	3.0 (0.118)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM125	6.73 (0.265)	7.98 (0.314)	3.0 (0.118)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM150	8.00 (0.315)	9.50 (0.374)	3.0 (0.118)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM150/33	8.00 (0.315)	9.50 (0.374)	3.0 (0.118)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM185/33	8.00 (0.315)	9.50 (0.374)	3.0 (0.118)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM200	8.00 (0.315)	9.50 (0.374)	3.0 (0.118)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM250	8.00 (0.315)	9.50 (0.374)	3.0 (0.118)	6.71 (0.264)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	3.68 (0.145)	3.94 (0.155)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM260	6.73 (0.265)	7.98 (0.314)	3.0 (0.118)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)
MF-SM300	6.73 (0.265)	7.98 (0.314)	3.0 (0.118)	5.44 (0.214)	0.56 (0.022)	0.71 (0.028)	0.56 (0.022)	0.71 (0.028)	2.16 (0.085)	2.41 (0.095)	0.66 (0.026)	1.37 (0.054)	0.43 (0.017)

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



Terminal material:
Tin-plated brass

Recommended Pad Layout	
MF-SM030 MF-SM050 MF-SM075 MF-SM075/60 MF-SM100 MF-SM100/33 MF-SM125 MF-SM260 MF-SM300	
MF-SM150 MF-SM150/33 MF-SM185/33 MF-SM200 MF-SM250	

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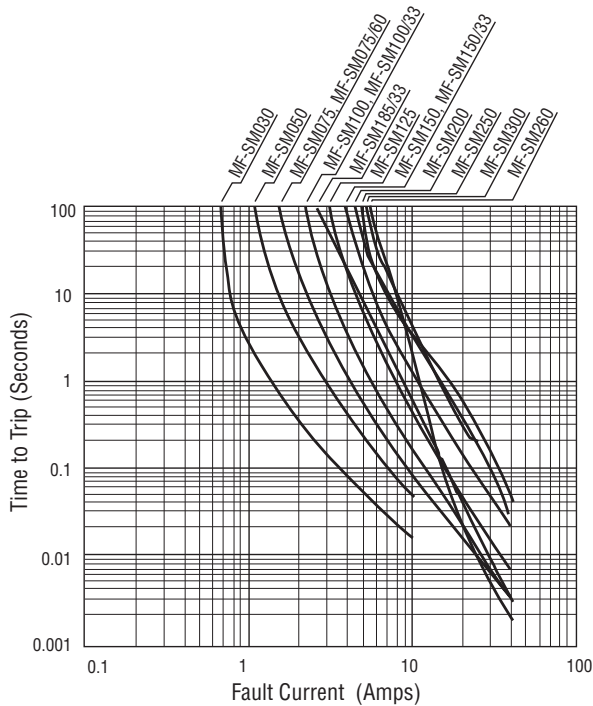


Thermal Derating Chart - I_{hold} (Amps)

Model	Ambient Operating Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
MF-SM030	0.45	0.40	0.35	0.30	0.25	0.23	0.20	0.17	0.14
MF-SM050	0.76	0.67	0.59	0.50	0.42	0.38	0.33	0.29	0.23
MF-SM075	1.11	0.99	0.84	0.75	0.63	0.57	0.49	0.45	0.36
MF-SM075/60	1.11	0.99	0.84	0.75	0.63	0.57	0.49	0.45	0.36
MF-SM100	1.66	1.47	1.29	1.10	0.91	0.83	0.73	0.64	0.50
MF-SM100/33	1.66	1.47	1.29	1.10	0.91	0.83	0.73	0.64	0.50
MF-SM125	1.89	1.68	1.46	1.25	1.04	0.94	0.83	0.73	0.56
MF-SM150	2.27	2.01	1.76	1.50	1.25	1.13	0.99	0.87	0.68
MF-SM150/33	2.27	2.01	1.76	1.50	1.25	1.13	0.99	0.87	0.68
MF-SM185/33	2.56	2.32	2.08	1.85	1.60	1.44	1.28	1.12	0.88
MF-SM200	3.02	2.68	2.34	2.00	1.66	1.50	1.32	1.16	0.90
MF-SM250	3.78	3.35	2.93	2.50	2.08	1.88	1.65	1.45	1.13
MF-SM260	3.64	3.25	2.91	2.60	2.26	2.08	1.95	1.74	1.48
MF-SM300	4.13	3.75	3.30	2.87	2.62	2.43	2.25	2.00	1.78

I_{trip} is approximately two times I_{hold}.

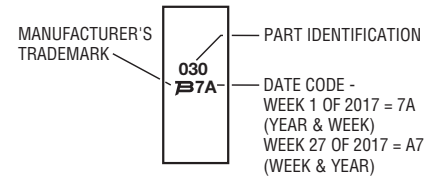
Typical Time to Trip at 23 °C



The Time to Trip curves represent typical performance of a device in a simulated application environment. Actual performance in specific customer applications may differ from these values due to the influence of other variables.

Typical Part Marking

Represents total content. Layout may vary.



Packaging Quantity

Model	Unit Quantity (pcs.)	Unit
MF-SM030 MF-SM050 MF-SM075	2000	Reel
MF-SM075/60 MF-SM100 MF-SM100/33		
MF-SM125 MF-SM260 MF-SM300		
MF-SM150 MF-SM150/33	1500	Reel
MF-SM185/33 MF-SM200		
MF-SM250		

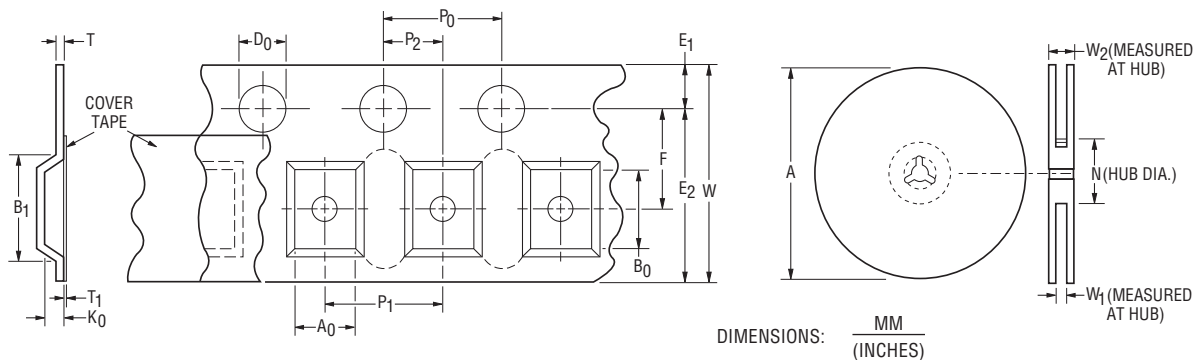
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Packaging Specifications

Tape Dimensions per EIA-481	MF-SM030	MF-SM075/60	MF-SM125	MF-SM150	MF-SM200
	MF-SM050	MF-SM100	MF-SM260	MF-SM150/33	MF-SM250
	MF-SM075	MF-SM100/33	MF-SM300	MF-SM185/33	
W	$\frac{16.3}{(0.642)}$				
P ₀	$\frac{4.00 \pm 0.10}{(0.157 \pm 0.004)}$				
10 P ₀	$\frac{40.00 \pm 0.20}{(1.575 \pm 0.008)}$				
P ₁	$\frac{8.00 \pm 0.10}{(0.315 \pm 0.004)}$			$\frac{12.00 \pm 0.10}{(0.472 \pm 0.004)}$	
P ₂	$\frac{2.00 \pm 0.10}{(0.079 \pm 0.004)}$				
A ₀	$\frac{5.7 \pm 0.10}{(0.224 \pm 0.004)}$			$\frac{6.9 \pm 0.10}{(0.272 \pm 0.004)}$	
B ₀	$\frac{8.1 \pm 0.10}{(0.319 \pm 0.004)}$			$\frac{9.6 \pm 0.15}{(0.378 \pm 0.004)}$	
B ₁ max.	$\frac{12.1}{(0.476)}$				
D ₀	$\frac{1.50 + 0.10/-0}{(0.059 + 0.004/-0)}$				
F	$\frac{7.50 \pm 0.10}{(0.296 \pm 0.004)}$				
E ₁	$\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$				
E ₂ typ.	$\frac{14.25}{(0.561)}$				
T max.	$\frac{0.60}{(0.024)}$				
T ₁ max.	$\frac{0.10}{(0.004)}$				
K ₀	$\frac{3.4 \pm 0.10}{(0.134 \pm 0.004)}$				
Leader min.	$\frac{390}{(15.35)}$				
Trailer min.	$\frac{160}{(6.30)}$				
Reel Dimensions					
A max.	$\frac{360}{(14.17)}$				
N min.	$\frac{50}{(1.97)}$				
W ₁	$\frac{16.4 + 2.0/-0}{(0.646 + 0.079/-0)}$				
W ₂ max.	$\frac{22.4}{(0.882)}$				



MF-SM SERIES, REV. Y, 02/24

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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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The use and level of testing applicable to Bourns® custom products shall be negotiated on a case-by-case basis by Bourns and the user for which such Bourns® custom products are specially designed. Absent a written agreement between Bourns and the user regarding the use and level of such testing, the above provisions applicable to Bourns® standard products shall also apply to such Bourns® custom products.

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