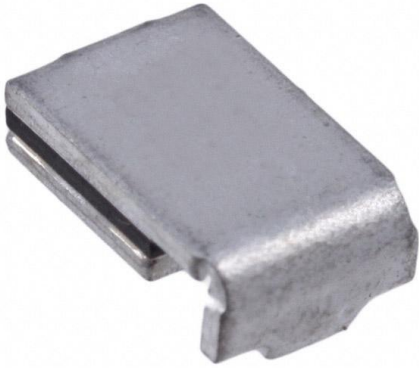


MF-SM050-2 Datasheet

www.digi-electronics.com



MF-SM050-2

<https://www.DiGi-Electronics.com>

| | |
|------------------------------|---|
| DiGi Electronics Part Number | MF-SM050-2-DG |
| Manufacturer | Bourns Inc. |
| Manufacturer Product Number | MF-SM050-2 |
| Description | PTC RESET FUSE 60V 500MA 2SMD |
| Detailed Description | Polymeric PTC Resettable Fuse 60V 500 mA 1h Surface Mount 2-SMD |



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

MF-SM050-2

Series:

Multifuse®, MF-SM

Type:

Polymeric

Current - Hold (Ih) (Max):

500 mA

Current - Max:

40 A

Resistance - Initial (Ri) (Min):

350 mOhms

Operating Temperature:

-40°C ~ 85°C

Mounting Type:

Surface Mount

Size / Dimension:

0.287" L x 0.214" W (7.31mm x 5.44mm)

Thickness (Max):

0.125" (3.18mm)

Approval Agency:

cURus, TUV

Manufacturer:

Bourns Inc.

Product Status:

Active

Voltage - Max:

60V

Current - Trip (It):

1 A

Time to Trip:

4 s

Resistance - Post Trip (R1) (Max):

1.4 Ohms

Ratings:

AEC-Q200

Package / Case:

2-SMD

Height - Seated (Max):

-

Lead Spacing:

-

Base Product Number:

MF-SM

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8533.40.8070

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99



Features

- Compliant with AEC-Q200 Rev-D -Stress Test Qualification for Passive Components in Automotive Applications
- 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 Watts at 23 °C | Agency Recognition | | AEC-Q200 Compliant |
|-------------|-------------|------------|-------------------------------------|------|---------------|---------|-------------------|------------------|---|--------------------|------------------|--------------------|
| | | | Amperes at 23 °C | | Ohms at 23 °C | | Amperes at 23 °C | Seconds at 23 °C | | cUL E174545 | TUV R50362083 | |
| | | | Hold | Trip | R Min. | R1 Max. | | Max. | Typ. | | | |
| 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 | Rmin ≤ R ≤ R1max |
| 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.

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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

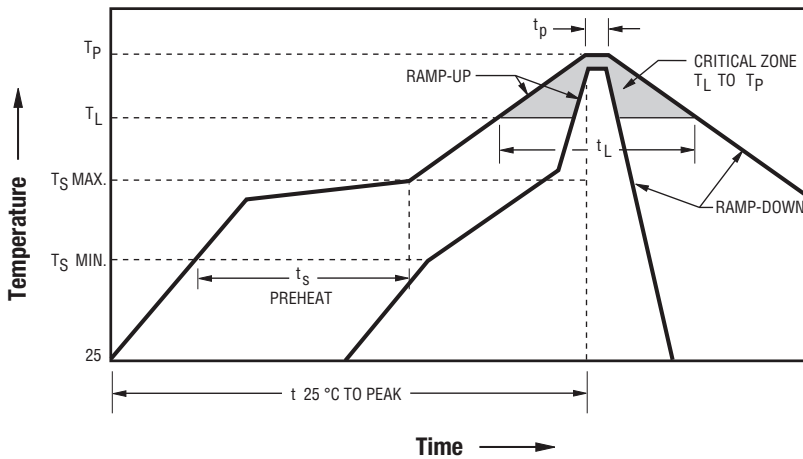
MF-SM Series – PTC Resettable Fuses

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 ± 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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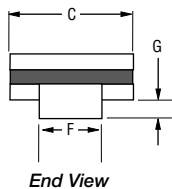
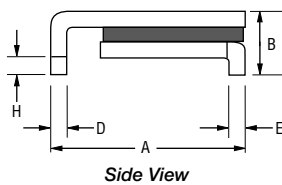
MF-SM Series – PTC Resettable Fuses



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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MF-SM Series – PTC Resettable Fuses

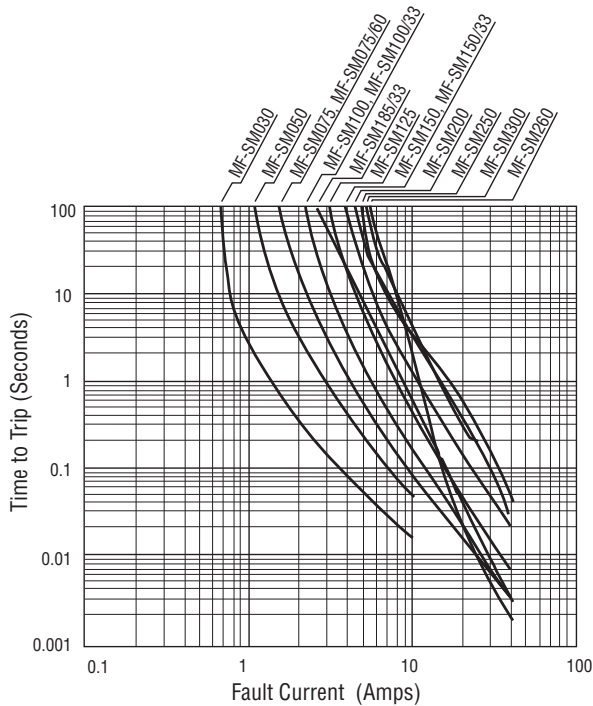


Thermal Derating Chart - I_{hold} (Amps)

| 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}.

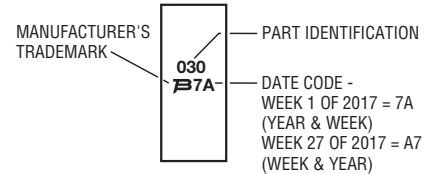
Typical Time to Trip at 23 °C



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-SM150 MF-SM150/33 | 1500 | Reel |
| MF-SM185/33 MF-SM200 | | |
| MF-SM250 MF-SM260 MF-SM300 | | |

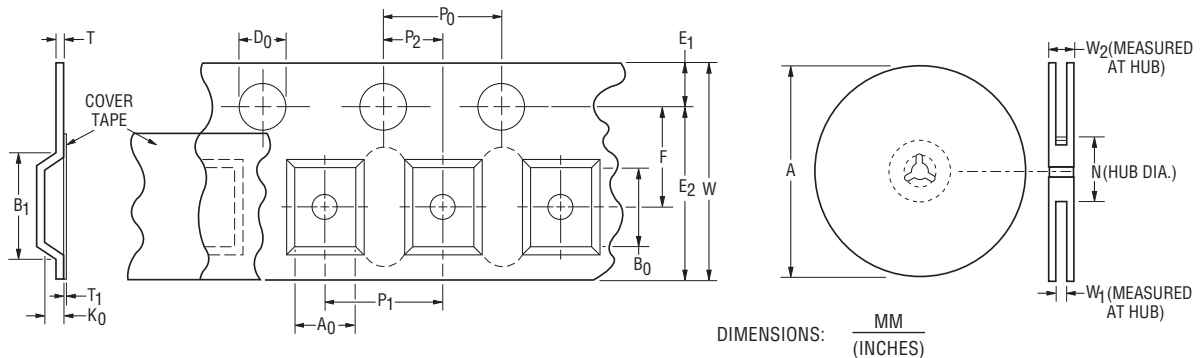
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MF-SM Series – PTC Resettable Fuses



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. Z, 03/25

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Bourns® Multifuse® PPTC Resettable Fuses**BOURNS®****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

MFAN 12/18

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