






## Features

- Compliant with AEC-Q200 Rev-C- Stress Test Qualification for Passive Components in Automotive Applications
- Surface mount devices
- Fully compatible with current industry standards
- Packaged per EIA 481-2 standard
- RoHS compliant\* and halogen free\*\*
- Agency recognition:   
- Patents pending

## MF-SM Series - PTC Resettable Fuses

### Electrical Characteristics

| Model       | V max. Volts | I max Amps | I <sub>hold</sub> | I <sub>trip</sub> | Resistance    |         | Max. Time To Trip |                  | Tripped Power Dissipation |
|-------------|--------------|------------|-------------------|-------------------|---------------|---------|-------------------|------------------|---------------------------|
|             |              |            | Amperes at 23 °C  |                   | Ohms at 23 °C |         | Amperes at 23 °C  | Seconds at 23 °C | Watts at 23 °C            |
|             |              |            | 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                       |

\*\*UL approved, CSA & TUV approval pending.

### Environmental Characteristics

|   |   |
|---|---|
| Operating Temperature.....                                | -40 °C to +85 °C  |
| Maximum Device Surface Temperature in Tripped State ..... | 125 °C  |
| 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 .....                                       | MIL-STD-202F, Method 107G, .....±10 % typical resistance change                       |
|   | -40 °C to +85 °C, 20 cycles .....-20 % typical resistance change                      |
| Vibration .....   | MIL-STD-883C, Method 2007.1, Condition A.....R <sub>min</sub> ≤ R ≤ R <sub>1max</sub> |

### Test Procedures And Requirements For Model MF-SM 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>1max</sub> |
| Time to Trip.....    | At specified current, V <sub>max</sub> , 23 °C.....   | T ≤ max. time to trip (seconds)          |
| Hold Current.....    | 30 min. at I <sub>hold</sub> .....                    | No trip                                  |
| Trip Cycle Life..... | V <sub>max</sub> , I <sub>max</sub> , 100 cycles..... | No arcing or burning                     |
| Trip Endurance ..... | V <sub>max</sub> , 48 hours.....                      | No arcing or burning                     |
| Solderability.....   | MIL-STD-202F, Method 208F.....                        | 95 % min. coverage                       |

UL File Number ..... E174545      <http://www.ul.com/> Follow link to Certifications, then UL File No., enter E174545  
 CSA File Number..... CA110338      <http://directories.csa-international.org/> Under "Certification Record" and "File Number" enter 110338-0-000  
 TÜV Certificate Number .. R 02057213      <http://www.tuvdotcom.com/> Follow link to "other certificates", enter File No. 2057213

### Thermal Derating Chart - I<sub>hold</sub> (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<sub>trip</sub> is approximately two times I<sub>hold</sub>.

\* RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

\*\*Bourns follows the prevailing definition of "halogen free" in the industry. 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.

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## Applications

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

- Computers & peripherals
- General electronics
- Automotive applications

## MF-SM Series - PTC Resettable Fuses

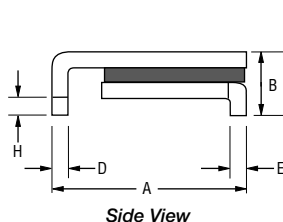
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### Product Dimensions

| 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<br>(0.265) | 7.98<br>(0.314) | 3.18<br>(0.125) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM050    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.18<br>(0.125) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM075    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.18<br>(0.125) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM075/60 | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.18<br>(0.125) | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM100    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.0<br>(0.118)  | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM100/33 | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.0<br>(0.118)  | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM125    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.0<br>(0.118)  | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM150    | 8.00<br>(0.315) | 9.50<br>(0.374) | 3.0<br>(0.118)  | 6.71<br>(0.264) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 3.68<br>(0.145) | 3.94<br>(0.155) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM150/33 | 8.00<br>(0.315) | 9.50<br>(0.374) | 3.0<br>(0.118)  | 6.71<br>(0.264) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 3.68<br>(0.145) | 3.94<br>(0.155) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM185/33 | 8.00<br>(0.315) | 9.50<br>(0.374) | 3.0<br>(0.118)  | 6.71<br>(0.264) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 3.68<br>(0.145) | 3.94<br>(0.155) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM200    | 8.00<br>(0.315) | 9.50<br>(0.374) | 3.0<br>(0.118)  | 6.71<br>(0.264) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 3.68<br>(0.145) | 3.94<br>(0.155) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM250    | 8.00<br>(0.315) | 9.50<br>(0.374) | 3.0<br>(0.118)  | 6.71<br>(0.264) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 3.68<br>(0.145) | 3.94<br>(0.155) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM260    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.0<br>(0.118)  | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |
| MF-SM300    | 6.73<br>(0.265) | 7.98<br>(0.314) | 3.0<br>(0.118)  | 5.44<br>(0.214) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.56<br>(0.022) | 0.71<br>(0.028) | 2.16<br>(0.085) | 2.41<br>(0.095) | 0.66<br>(0.026) | 1.37<br>(0.054) | 0.43<br>(0.017) |

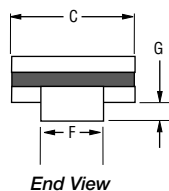
Packaging:

TAPE & REEL: MF-SM030, 050, 075, 075/60, 100, 100/33, 125, 260, 300 = 2000 pcs. per reel;  
MF-SM150, 150/33, 185/33, 200, 250 = 1500 pcs. per reel.

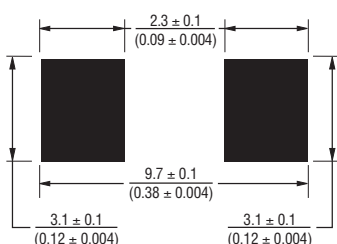


DIMENSIONS: MM (INCHES)

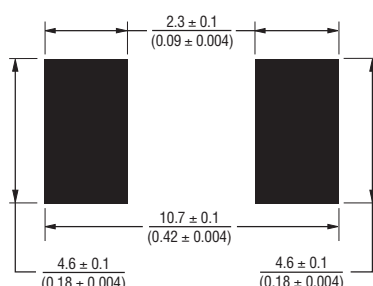
Terminal material:  
Tin-plated brass



Recommended Pad Layout  
MF-SM030, 050, 075, 075/60, 100, 100/33, 125, 260, 300



Recommended Pad Layout  
MF-SM150, 150/33, 185/33, 200, 250



### 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 and Reel\*\*

Part Number Suffix Option \_\_\_\_\_

- 99 = As of date code April 1, 2005 all MF-SM models are RoHS compliant. The suffix "-99" can be used if a new part number is required to reference the RoHS compliance.

Examples:

MF-SM030-2.....Tape and reel packaging  
MF-SM030-2-99.....Tape and reel packaging with part number suffix option  
MF-SM150-2.....Tape and reel packaging  
MF-SM150/33-2-99...Tape and reel packaging with part number suffix option

\*  $V_{max}$  entry applies only to models MF-SM075/60, MF-SM100/33, MF-SM150/33 & MF-SM185/33.

\*\* Packaged per EIA-481-2

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# MF-SM Series - PTC Resettable Fuses

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## Typical Time to Trip at 23 °C

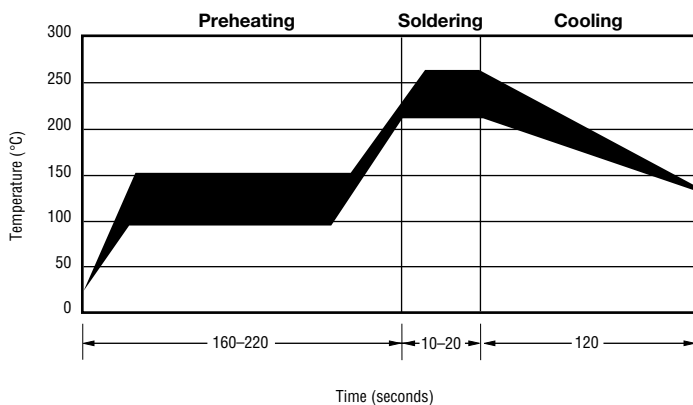


## Typical Part Marking

Represents total content. Layout may vary.



## 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.

## 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.

MF-SM SERIES, REV.R, 01/14

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MF-SM, MF-SM/33, MF-SM/60 & MF-SM/250 Series Tape and Reel Specifications



NOTE: Effective December 1, 2010 (product date code V0), the cover tape was changed to the new 3M™ Universal Cover Tape (UCT).

| Tape Dimensions        | MF-SM030, 050, 075, 100, 125, 260, 300;<br>MF-SM075/60; MF-SM-100/33<br>per EIA-481-2 | MF-SM150, 200, 250;<br>MF-SM-150/33, MF-SM-185/33;<br>MF-SM013/250 per EIA 481-2 |
|------------------------|---|--|
|                        | W   | $16.0 \pm 0.3$<br>(0.630 ± 0.012)  |
| P <sub>0</sub>         | $4.0 \pm 0.1$<br>(0.157 ± 0.004)  | $4.0 \pm 0.1$<br>(0.157 ± 0.004)   |
| P <sub>1</sub>         | $8.0 \pm 0.1$<br>(0.315 ± 0.004)  | $12.0 \pm 0.1$<br>(0.472 ± 0.004)  |
| P <sub>2</sub>         | $2.0 \pm 0.1$<br>(0.079 ± 0.004)  | $2.0 \pm 0.1$<br>(0.079 ± 0.004)   |
| A <sub>0</sub>         | $5.7 \pm 0.1$<br>(0.224 ± 0.004)  | $6.9 \pm 0.1$<br>(0.272 ± 0.004)   |
| B <sub>0</sub>         | $8.1 \pm 0.1$<br>(0.319 ± 0.004)  | $9.6 \pm 0.1$<br>(0.378 ± 0.004)   |
| B <sub>1</sub> max.    | $12.1$<br>(0.476)   | $12.1$<br>(0.476)  |
| D <sub>0</sub>         | $1.5 + 0.1/-0.0$<br>(0.059 + 0.004/-0)  | $1.5 + 0.1/-0.0$<br>(0.059 + 0.004/-0)   |
| F                      | $7.5 \pm 0.1$<br>(0.295 ± 0.004)  | $7.5 \pm 0.1$<br>(0.295 ± 0.004)   |
| E <sub>1</sub>         | $1.75 \pm 0.1$<br>(0.069 ± 0.004)   | $1.75 \pm 0.1$<br>(0.069 ± 0.004)  |
| E <sub>2</sub> min.    | $14.25$<br>(0.561)  | $14.25$<br>(0.561)   |
| T max.                 | $0.6$<br>(0.024)  | $0.6$<br>(0.024)   |
| T <sub>1</sub> max.    | $0.1$<br>(0.004)  | $0.1$<br>(0.004)   |
| K <sub>0</sub>         | $3.4 \pm 0.1$<br>(0.134 ± 0.004)  | $3.4 \pm 0.1^*$<br>(0.134 ± 0.004)*  |
| Leader min.            | $390$<br>(15.35)  | $390$<br>(15.35)   |
| Trailer min.           | $160$<br>(6.30)   | $160$<br>(6.30)  |
| <b>Reel Dimensions</b> |   |  |
| A max.                 | $360$<br>(14.17)  | $360$<br>(14.17)   |
| N min.                 | $50$<br>(1.97)  | $50$<br>(1.97)   |
| W <sub>1</sub>         | $16.4 + 2.0/-0.0$<br>(0.646 + 0.079/-0)   | $16.4 + 2.0/-0.0$<br>(0.646 + 0.079/-0)  |
| W <sub>2</sub> max.    | $22.4$<br>(0.882)   | $22.4$<br>(0.882)  |

\* Model MF-SM013/250 =  $\frac{3.8 \pm 0.1}{(0.150 \pm 0.004)}$

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



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