

Features

- 4.5 mm SMD
- Fast tripping resettable circuit protection
- Surface mount packaging for automated assembly
- Reduced component size and resistance
- Agency recognition:

The MF-MSMD Series is currently available, although not recommended for new designs. The **MF-MSMF Series** is preferred.

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MF-MSMD 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 |
|------------|-----------------|----------------|-------------------|-------------------|-------------------|--------------------|-------------------|------------------|---------------------------|
| | | | Amperes at 23 °C | | Ohms at 23 °C | | Amperes at 23 °C | Seconds at 23 °C | Watts at 23 °C |
| | | | Hold | Trip | R _{Min.} | R _{1Max.} | | | Typ. |
| MF-MSMD010 | 60.0 | 40 | 0.10 | 0.30 | 0.70 | 15.00 | 0.5 | 1.5 | 1.0 |
| MF-MSMD014 | 60.0 | 40 | 0.14 | 0.34 | 0.40 | 6.50 | 1.5 | 0.15 | 1.0 |
| MF-MSMD020 | 30.0 | 80 | 0.20 | 0.40 | 0.40 | 6.00 | 6.0 | 0.06 | 1.0 |
| MF-MSMD030 | 30.0 | 10 | 0.30 | 0.60 | 0.30 | 3.00 | 8.0 | 0.10 | 1.2 |
| MF-MSMD050 | 15.0 | 100 | 0.50 | 1.00 | 0.15 | 1.00 | 8.0 | 0.15 | 1.2 |
| MF-MSMD075 | 13.2 | 100 | 0.75 | 1.50 | 0.11 | 0.45 | 8.0 | 0.20 | 1.2 |
| MF-MSMD110 | 6.0 | 100 | 1.10 | 2.20 | 0.04 | 0.21 | 8.0 | 0.30 | 1.2 |
| MF-MSMD125 | 6.0 | 100 | 1.25 | 2.50 | 0.035 | 0.14 | 8.0 | 0.4 | 1.5 |
| MF-MSMD150 | 6.0 | 100 | 1.50 | 3.00 | 0.03 | 0.120 | 8.0 | 0.5 | 1.5 |
| MF-MSMD160 | 8.0 | 100 | 1.60 | 2.80 | 0.035 | 0.099 | 8.0 | 2.0 | 1.5 |
| MF-MSMD200 | 6.0 | 100 | 2.00 | 4.00 | 0.020 | 0.100 | 8.0 | 3.0 | 1.5 |
| MF-MSMD260 | 6.0 | 100 | 2.60 | 5.20 | 0.015 | 0.080 | 8.0 | 5.0 | 1.5 |

Environmental Characteristics

Operating/Storage Temperature-40 °C to +85 °C
 Maximum Device Surface Temperature
 in Tripped State125 °C
 Passive Aging+85 °C, 1000 hours±5 % typical resistance change
 Humidity Aging+85 °C, 85 % R.H. 1000 hours±5 % typical resistance change
 Thermal Shock+85 °C to -40 °C, 20 times±10 % typical resistance change
 Solvent ResistanceMIL-STD-202, Method 215No change
 VibrationMIL-STD-883C, Method 2007.1,No change
 Condition A

Test Procedures And Requirements For Model MF-MSMD Series

| Test | Test Conditions | Accept/Reject Criteria |
|-----------------------|--|--|
| Visual/Mech..... | Verify dimensions and materials | Per MF physical description |
| Resistance | In still air @ 23 °C | R _{min} ≤ R ≤ R _{1max} |
| Time to Trip | At specified current, V _{max} , 23 °C | T ≤ max. time to trip (seconds) |
| Hold Current..... | 30 min. at I _{hold} | 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 | MIL-STD-202F, Method 208F..... | 95 % min. coverage |

UL File NumberE174545
<http://www.ul.com/> Follow link to Certifications, then UL File No., enter E174545
 CSA File NumberCA110338
<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

Additional Features

- Patents pending

Applications

High Density Circuit Board Applications:

- Hard disk drives
- PC motherboards
- PC peripherals
- Point-of-sale (POS) equipment
- PCMCIA cards

MF-MSMD Series - PTC Resettable Fuses

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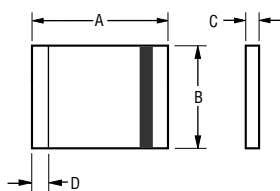
Product Dimensions

| Model | A | | B | | C | | D |
|------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | Min. | Max. | Min. | Max. | Min. | Max. | Min. |
| MF-MSMD010 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.56}{(0.022)}$ | $\frac{0.81}{(0.032)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD014 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.56}{(0.022)}$ | $\frac{0.81}{(0.032)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD020 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.56}{(0.022)}$ | $\frac{0.81}{(0.032)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD030 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.56}{(0.022)}$ | $\frac{0.81}{(0.032)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD050 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.38}{(0.015)}$ | $\frac{0.62}{(0.024)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD075 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.38}{(0.015)}$ | $\frac{0.62}{(0.024)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD110 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.38}{(0.015)}$ | $\frac{0.62}{(0.024)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD125 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.30}{(0.012)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD150 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.30}{(0.012)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD160 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.30}{(0.012)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD200 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.30}{(0.012)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |
| MF-MSMD260 | $\frac{4.37}{(0.172)}$ | $\frac{4.73}{(0.186)}$ | $\frac{3.07}{(0.121)}$ | $\frac{3.41}{(0.134)}$ | $\frac{0.25}{(0.010)}$ | $\frac{0.48}{(0.019)}$ | $\frac{0.30}{(0.012)}$ |

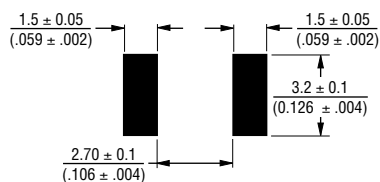
Packaging: 2000 pcs. per reel.

UNIT = $\frac{\text{MM}}{\text{INCHES}}$

Top and Bottom View Side View

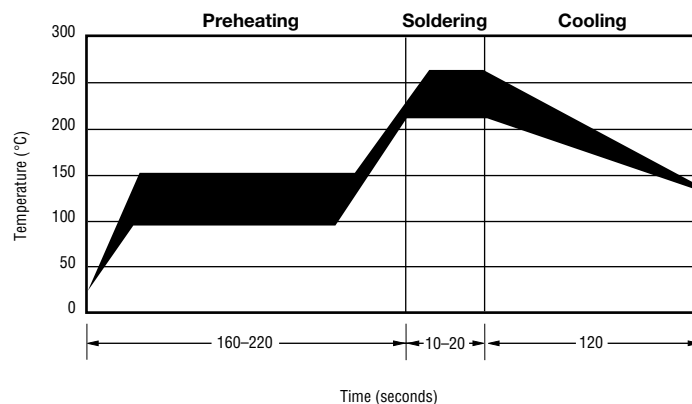


Recommended Pad Layout



Terminal material: solder-plated copper
Termination pad solderability: Meets EIA Specification RS-186-9E, ANSI/J-STD-002 Category 3.

Solder Reflow Recommendations



Note:

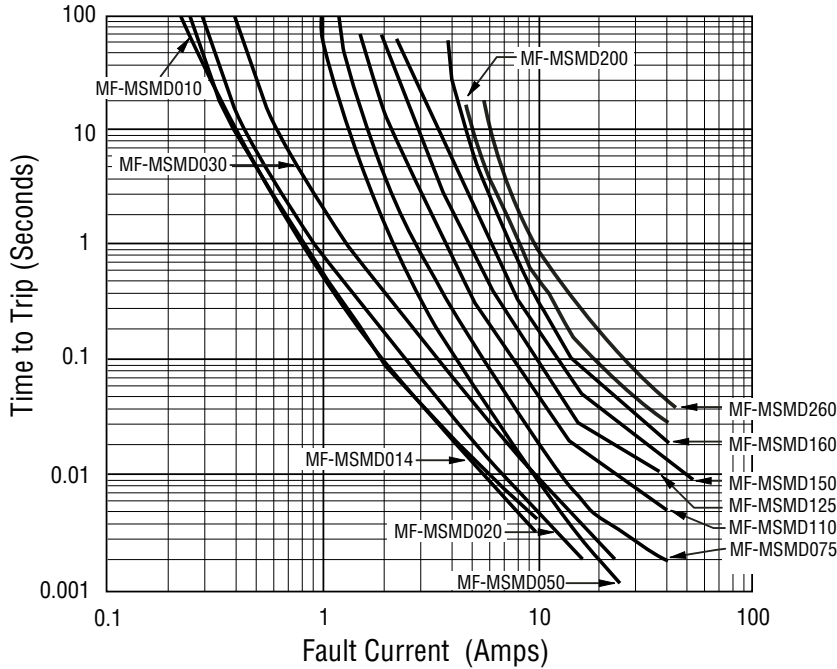
- MF-MSMD models can be wave soldered and reworked.
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

Specifications are subject to change without notice.
Customers should verify actual device performance in their specific applications.

MF-MSMD Series - PTC Resettable Fuses

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Typical Time to Trip at 23 °C



How to Order

MF - MSMD 075 - 2

Multifuse® Product Designator _____

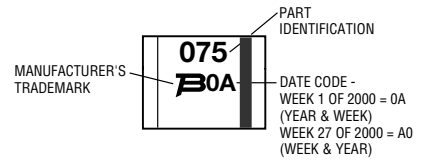
Series _____
 MSMD = 4.5 mm Surface Mount Component

Hold Current, I_{hold} _____
 010-260 (0.10 Amps - 2.60 Amps)

Packaging _____
 Packaged per EIA 481-1
 -2 = Tape and Reel

Typical Part Marking

Represents total content. Layout may vary.



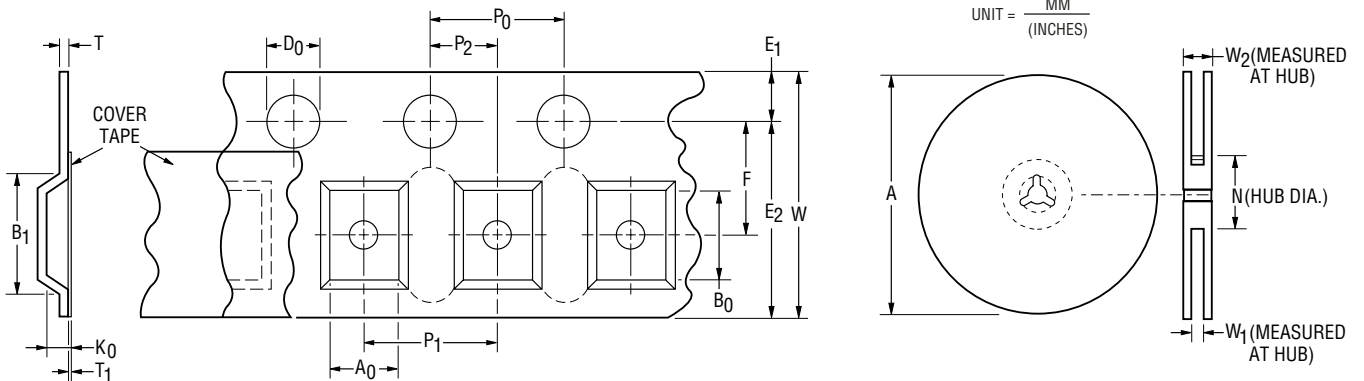
Thermal Derating Chart - I_{hold} / I_{trip} (Amps)

| Model | Ambient Operating Temperature | | | | | | | | |
|------------|-------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | -40 °C | -20 °C | 0 °C | 23 °C | 40 °C | 50 °C | 60 °C | 70 °C | 85 °C |
| MF-MSMD010 | 0.16 / 0.32 | 0.14 / 0.28 | 0.12 / 0.24 | 0.11 / 0.22 | 0.08 / 0.16 | 0.07 / 0.14 | 0.06 / 0.12 | 0.05 / 0.10 | 0.03 / 0.06 |
| MF-MSMD014 | 0.23 / 0.52 | 0.19 / 0.45 | 0.17 / 0.40 | 0.14 / 0.34 | 0.12 / 0.29 | 0.10 / 0.25 | 0.09 / 0.23 | 0.08 / 0.21 | 0.06 / 0.16 |
| MF-MSMD020 | 0.29 / 0.58 | 0.26 / 0.52 | 0.23 / 0.46 | 0.20 / 0.40 | 0.17 / 0.34 | 0.15 / 0.30 | 0.14 / 0.28 | 0.12 / 0.24 | 0.10 / 0.20 |
| MF-MSMD030 | 0.44 / 0.88 | 0.39 / 0.78 | 0.35 / 0.70 | 0.30 / 0.60 | 0.26 / 0.52 | 0.23 / 0.46 | 0.21 / 0.42 | 0.18 / 0.36 | 0.15 / 0.30 |
| MF-MSMD050 | 0.77 / 1.54 | 0.68 / 1.36 | 0.59 / 1.18 | 0.50 / 1.00 | 0.44 / 0.88 | 0.40 / 0.80 | 0.37 / 0.74 | 0.33 / 0.66 | 0.29 / 0.58 |
| MF-MSMD075 | 1.15 / 2.30 | 1.01 / 2.02 | 0.88 / 1.76 | 0.75 / 1.50 | 0.65 / 1.30 | 0.60 / 1.20 | 0.55 / 1.10 | 0.49 / 0.98 | 0.43 / 0.86 |
| MF-MSMD110 | 1.59 / 3.18 | 1.43 / 2.86 | 1.26 / 2.52 | 1.10 / 2.20 | 0.95 / 1.90 | 0.87 / 1.74 | 0.80 / 1.60 | 0.71 / 1.42 | 0.60 / 1.20 |
| MF-MSMD125 | 1.80 / 3.61 | 1.63 / 3.25 | 1.43 / 2.86 | 1.25 / 2.50 | 1.08 / 2.16 | 0.99 / 1.98 | 0.91 / 1.82 | 0.81 / 1.62 | 0.68 / 1.36 |
| MF-MSMD150 | 2.17 / 4.34 | 1.95 / 3.90 | 1.72 / 3.44 | 1.50 / 3.00 | 1.30 / 2.59 | 1.18 / 2.37 | 1.09 / 2.18 | 0.97 / 1.94 | 0.82 / 1.64 |
| MF-MSMD160 | 2.30 / 5.00 | 2.20 / 4.40 | 1.90 / 3.80 | 1.60 / 2.80 | 1.45 / 2.90 | 1.30 / 2.60 | 1.15 / 2.30 | 1.03 / 2.06 | 0.91 / 1.82 |
| MF-MSMD200 | 3.08 / 6.14 | 2.71 / 5.39 | 2.35 / 4.62 | 2.00 / 4.01 | 1.80 / 1.61 | 1.60 / 3.19 | 1.50 / 2.98 | 1.07 / 2.12 | 0.80 / 1.58 |
| MF-MSMD260 | 4.00 / 7.98 | 3.52 / 7.01 | 3.06 / 6.09 | 2.60 / 5.15 | 2.34 / 4.64 | 2.08 / 4.13 | 1.95 / 3.87 | 1.39 / 2.74 | 1.04 / 2.05 |

MF-MSMD, MF-USMD & MF-ESMD Series Tape and Reel Specs



| Tape Dimensions | MF-MSMD Series per EIA-481-1 | MF-USMD Series per EIA 481-1 | MF-ESMD Series per EIA 481-2 |
|------------------------|--|--|--|
| W | $\frac{12.0 \pm 0.30}{(0.472 \pm 0.012)}$ | $\frac{8.0 \pm 0.30}{(0.315 \pm 0.012)}$ | $\frac{24.0 \pm 0.3}{(0.945 \pm 0.012)}$ |
| P ₀ | $\frac{4.0 \pm 0.10}{(0.157 \pm 0.004)}$ | $\frac{4.0 \pm 0.10}{(0.157 \pm 0.004)}$ | $\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$ |
| P ₁ | $\frac{8.0 \pm 0.10}{(0.315 \pm 0.004)}$ | $\frac{4.0 \pm 0.10}{(0.157 \pm 0.004)}$ | $\frac{8.0 \pm 0.1}{(0.315 \pm 0.004)}$ |
| P ₂ | $\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$ | $\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$ | $\frac{2.0 \pm 0.1}{(0.079 \pm 0.004)}$ |
| A ₀ | $\frac{3.66 \pm 0.15}{(0.144 \pm 0.006)}$ | MF-USMD005,010,020: $\frac{2.76 \pm 0.10}{(0.109 \pm 0.004)}$ | MF-USMD035,050,075,110: $\frac{2.93 \pm 0.15}{(0.115 \pm 0.006)}$ |
| B ₀ | $\frac{4.98 \pm 0.10}{(0.196 \pm 0.004)}$ | MF-USMD005,010,020: $\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$ | MF-USMD035,050,075,110: $\frac{3.56 \pm 0.1}{(0.140 \pm 0.004)}$ |
| B ₁ max. | $\frac{5.9}{(0.232)}$ | $\frac{4.35}{(0.171)}$ | $\frac{20.1}{(0.791)}$ |
| D ₀ | $\frac{1.5 + 0.10/-0.00}{(0.059 + 0.004/-0)}$ | $\frac{1.50 + 0.1/-0.0}{(0.059 + 0.004/-0)}$ | $\frac{1.5 + 0.1/-0.0}{(0.059 + 0.004/-0)}$ |
| F | $\frac{5.5 \pm 0.05}{(0.217 \pm 0.002)}$ | $\frac{3.5 \pm 0.05}{(0.138 \pm 0.002)}$ | $\frac{11.5 \pm 0.10}{(0.453 \pm 0.004)}$ |
| E ₁ | $\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$ | $\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$ | $\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$ |
| E ₂ min. | $\frac{10.25}{(0.404)}$ | $\frac{6.25}{(0.246)}$ | $\frac{22.25}{(0.876)}$ |
| T max. | $\frac{0.6}{(0.024)}$ | $\frac{0.6}{(0.024)}$ | $\frac{0.6}{(0.024)}$ |
| T ₁ max. | $\frac{0.1}{(0.004)}$ | $\frac{0.1}{(0.004)}$ | $\frac{0.1}{(0.004)}$ |
| K ₀ | $\frac{0.95 \pm 0.10}{(0.037 \pm 0.004)}$ | MF-USMD005,010,020: $\frac{1.07 \pm 0.10}{(0.042 \pm 0.004)}$ | MF-USMD035,050,075,110: $\frac{0.75 \pm 0.10}{(0.030 \pm 0.004)}$ |
| Leader min. | $\frac{390}{(15.35)}$ | $\frac{390}{(15.35)}$ | $\frac{390}{(15.35)}$ |
| Trailer min. | $\frac{160}{(6.30)}$ | $\frac{160}{(6.30)}$ | $\frac{160}{(6.30)}$ |
| Reel Dimensions | | | |
| A max. | $\frac{185}{(7.28)}$ | $\frac{185}{(7.28)}$ | $\frac{360}{(14.17)}$ |
| N min. | $\frac{50}{(1.97)}$ | $\frac{50}{(1.97)}$ | $\frac{60}{(2.36)}$ |
| W ₁ | $\frac{12.4 + 2.0/-0.0}{(0.488 + 0.079/-0.0)}$ | $\frac{8.4 + 1.5/-0.0}{(0.331 + 0.059/-0)}$ | $\frac{24.4 + 2.0/-0.0}{(0.961 + 0.079/-0)}$ |
| W ₂ max. | $\frac{18.4}{(0.724)}$ | $\frac{14.4}{(0.567)}$ | $\frac{30.4}{(1.20)}$ |



Specifications are subject to change without notice.
Customers should verify actual device performance in their specific applications.

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