
## Features

- Compliant with AEC-Q200 Rev-C Stress Test Qualification for Passive Components in Automotive Applications
- Compact design to save board space - 1206 footprint
- Small size results in very fast time to react to fault events
- Symmetrical design
- Low profile
- RoHS compliant* and halogen free**
- Agency recognition: c UL us, VDE

# MF-NSMF 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-NSMF012 | 30.0 | 10 | 0.12 | 0.29 | 1.35 | 8.50 | 1.0 | 0.20 | 0.4 |
| MF-NSMF016 | 30.0 | 10 | 0.16 | 0.75 | 0.70 | 6.00 | 1.0 | 0.30 | 0.6 |
| MF-NSMF020 | 24.0 | 10 | 0.20 | 0.46 | 0.60 | 2.60 | 1.0 | 0.60 | 0.6 |
| MF-NSMF020X | 30.0 | 60 | 0.20 | 0.40 | 0.60 | 3.30 | 1.0 | 0.60 | 0.6 |
| MF-NSMF025X | 16.0 | 20 | 0.25 | 0.50 | 0.45 | 2.30 | 8.0 | 0.08 | 0.6 |
| MF-NSMF035 | 6.0 | 100 | 0.35 | 0.75 | 0.30 | 1.20 | 8.0 | 0.10 | 0.6 |
| MF-NSMF035X | 16.0 | 20 | 0.35 | 0.75 | 0.30 | 1.40 | 3.5 | 0.14 | 0.6 |
| MF-NSMF050 | 13.2 | 100 | 0.50 | 1.00 | 0.15 | 0.70 | 8.0 | 0.10 | 0.4 |
| MF-NSMF075 | 6.0 | 100 | 0.75 | 1.50 | 0.10 | 0.40 | 8.0 | 0.10 | 0.4 |
| MF-NSMF110 | 6.0 | 100 | 1.10 | 2.20 | 0.06 | 0.20 | 8.0 | 0.10 | 0.6 |
| MF-NSMF150 | 6.0 | 100 | 1.50 | 3.00 | 0.03 | 0.13 | 8.0 | 0.30 | 0.6 |
| MF-NSMF200 | 6.0 | 100 | 2.00 | 4.00 | 0.02 | 0.085 | 8.0 | 1.00 | 0.7 |

## Environmental Characteristics

| | | |
|---|---|---|
| Operating Temperature | -40 °C to +85 °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 Resistance | MIL-STD-202, Method 215 | No change |
| Vibration | MIL-STD-883C, Method 2007.1, Condition A | No change |
| Moisture Sensitivity Level | 1 | |
| ESD Classification (HBM) | 6 | |

## Test Procedures And Requirements For Model MF-NSMF Series

| Test | Test Conditions | Accept/Reject Criteria |
|---|---|---|
| Visual/Mech. | Verify dimensions and materials | Per MF physical description |
| Resistance | In still air @ 23 °C | Rmin ≤ R ≤ R1max |
| Time to Trip | At specified current, Vmax, 23 °C | T ≤ max. time to trip (seconds) |
| Hold Current | 30 min. at Ihold | No trip |
| Trip Cycle Life | Vmax, Imax, 100 cycles | No arcing or burning |
| Trip Endurance | Vmax, 48 hours | No arcing or burning |
| Solderability | ANSI/J-STD-002 | 95 % min. coverage |

UL File Number ..... E174545
http://www.ul.com/ Follow link to Online Certificates Directory, then enter UL File No. E174545, or click here

TÜV Certificate Number ..... R 02057213
http://www.tuvdotcom.com/ Follow link to “other certificates”, enter File No. 2057213 or click here

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

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

## Applications

- USB port protection - USB 2.0, 3.0 & OTG
- HDMI 1.4 Source protection
- PC motherboards - Plug and Play protection
- Mobile phones - Battery and port protection
- PDAs / digital cameras
- Game console port protection
- Automotive electronic control modules

# MF-NSMF Series - PTC Resettable Fuses

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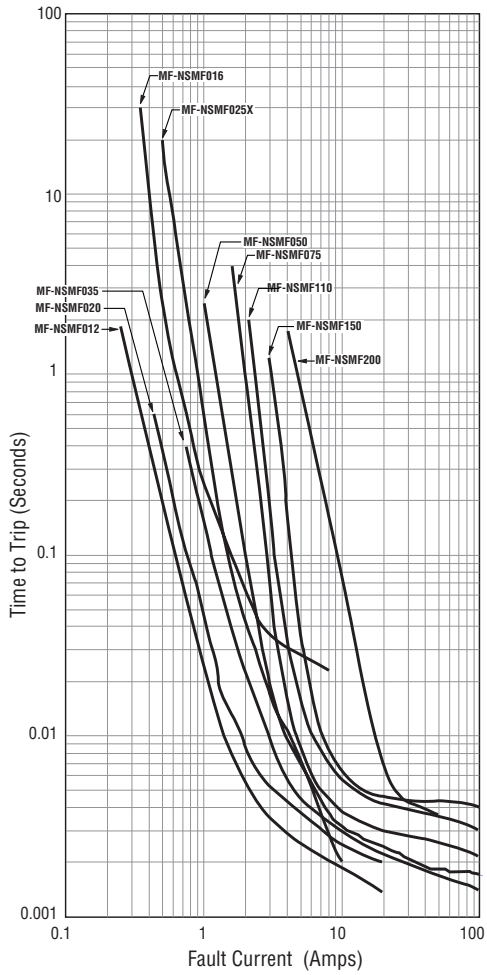
### Thermal Derating Chart - $I_{hold}$ (Amps)

| Model | Ambient Operating Temperature | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | -40 °C | -20 °C | 0 °C | 23 °C | 40 °C | 50 °C | 60 °C | 70 °C | 85 °C |
| MF-NSMF012 | 0.19 | 0.17 | 0.15 | 0.12 | 0.11 | 0.10 | 0.09 | 0.08 | 0.07 |
| MF-NSMF016 | 0.21 | 0.20 | 0.18 | 0.16 | 0.14 | 0.13 | 0.12 | 0.11 | 0.09 |
| MF-NSMF020 | 0.30 | 0.27 | 0.24 | 0.20 | 0.18 | 0.16 | 0.14 | 0.12 | 0.11 |
| MF-NSMF020X | 0.30 | 0.27 | 0.24 | 0.20 | 0.18 | 0.16 | 0.14 | 0.12 | 0.10 |
| MF-NSMF025X | 0.37 | 0.33 | 0.29 | 0.25 | 0.22 | 0.20 | 0.17 | 0.15 | 0.12 |
| MF-NSMF035 | 0.51 | 0.46 | 0.40 | 0.35 | 0.30 | 0.27 | 0.24 | 0.22 | 0.18 |
| MF-NSMF035X | 0.58 | 0.51 | 0.44 | 0.35 | 0.31 | 0.28 | 0.24 | 0.21 | 0.16 |
| MF-NSMF050 | 0.76 | 0.68 | 0.59 | 0.50 | 0.44 | 0.40 | 0.35 | 0.32 | 0.26 |
| MF-NSMF075 | 1.11 | 1.00 | 0.85 | 0.75 | 0.67 | 0.61 | 0.52 | 0.50 | 0.42 |
| MF-NSMF110 | 1.64 | 1.46 | 1.30 | 1.10 | 0.92 | 0.83 | 0.80 | 0.65 | 0.52 |
| MF-NSMF150 | 2.20 | 1.99 | 1.77 | 1.50 | 1.34 | 1.23 | 1.10 | 1.01 | 0.84 |
| MF-NSMF200 | 2.88 | 2.61 | 2.28 | 2.00 | 1.80 | 1.66 | 1.51 | 1.39 | 1.19 |

### 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.

### How to Order

**MF - NSMF 020 X - 2**

Multifuse® Product Designator

Series
NSMF = 1206 Surface Mount Component

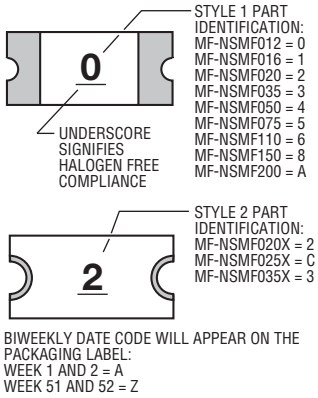
Hold Current, Ihold
012-200 (0.12 Amps - 2.00 Amps)

Options
__ = Standard
X = Multifuse® freeXpansion Design™

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

### Typical Part Marking

Represents total content. Layout may vary.




BIWEEKLY DATE CODE WILL APPEAR ON THE PACKAGING LABEL:
WEEK 1 AND 2 = A
WEEK 51 AND 52 = Z

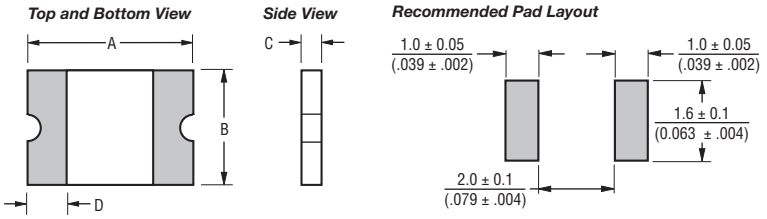
## Product Dimensions

| Model | A | | B | | C | | D | Style |
|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Min. | Max. | Min. | Max. | Min. | |
| MF-NSMF012 | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.70 (0.028) | 1.10 (0.043) | 0.25 (0.010) | 1 |
| MF-NSMF016 | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.48 (0.019) | 0.85 (0.033) | 0.25 (0.010) | 1 |
| MF-NSMF020 | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.48 (0.019) | 0.85 (0.033) | 0.25 (0.010) | 1 |
| MF-NSMF020X | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.40 (0.016) | 0.85 (0.033) | 0.25 (0.010) | 2 |
| MF-NSMF025X | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.48 (0.019) | 0.85 (0.033) | 0.25 (0.010) | 2 |
| MF-NSMF035 | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.48 (0.019) | 0.85 (0.033) | 0.25 (0.010) | 1 |
| MF-NSMF035X | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.40 (0.016) | 0.85 (0.033) | 0.25 (0.010) | 2 |
| MF-NSMF050 | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.48 (0.019) | 0.85 (0.033) | 0.25 (0.010) | 1 |
| MF-NSMF075 | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.40 (0.016) | 0.70 (0.028) | 0.25 (0.010) | 1 |
| MF-NSMF110 | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.40 (0.016) | 0.70 (0.028) | 0.25 (0.010) | 1 |
| MF-NSMF150 | 3.00 (0.118) | 3.40 (0.134) | 1.40 (0.055) | 1.80 (0.071) | 0.40 (0.016) | 0.70 (0.028) | 0.25 (0.010) | 1 |
| MF-NSMF200 | 3.00 (0.118) | 3.50 (0.138) | 1.40 (0.055) | 1.80 (0.071) | 0.70 (0.028) | 1.60 (0.063) | 0.25 (0.010) | 1 |

Packaging: 3000 pcs. per reel.

DIMENSIONS: MM (INCHES)

**Style 1**

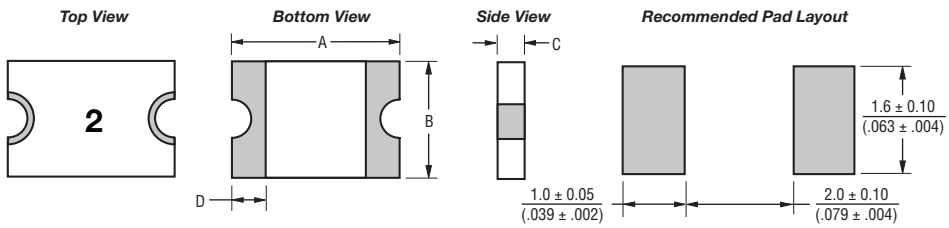



**Terminal material:**
Electroless Ni under immersion Au

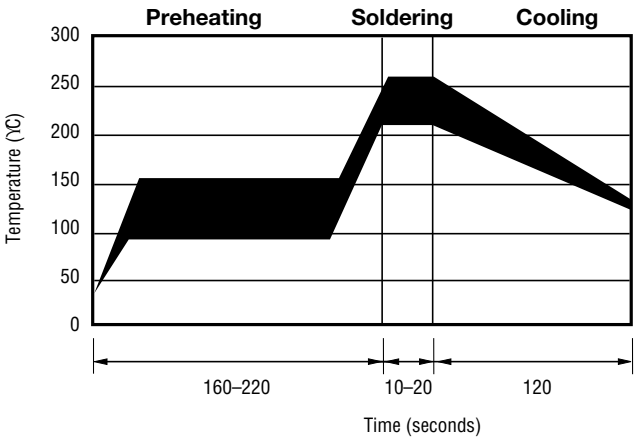
**Termination pad solderability:**
Standard Au finish:
Meets ANSI/J-STD-002 Category 2.

**Recommended Storage:**
40 °C max./70 % RH max.

**Style 2**



## Solder Reflow Recommendations




**Notes:**

- MF-NSMF models cannot be wave soldered. Please contact Bourns for hand soldering recommendations.
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.
- Compatible with Pb and Pb-free solder reflow profiles.
- Excess solder may cause a short circuit, especially during hand soldering. Please refer to the Multifuse® Polymer PTC Soldering Recommendation guidelines.

# MF-NSMF Series Tape and Reel Specifications

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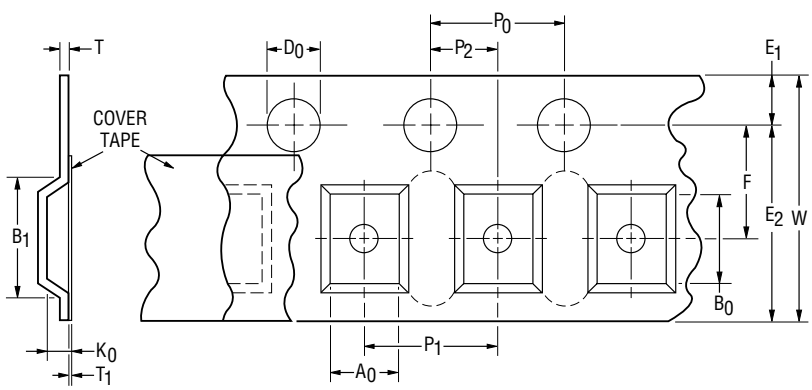
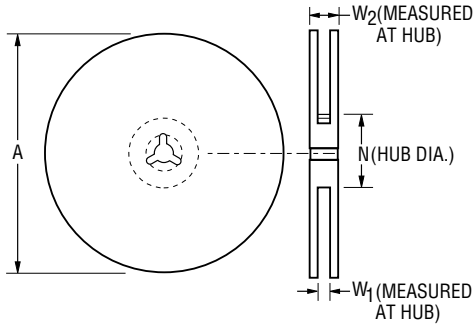
| Tape Dimensions | MF-NSMF012 & MF-NSMF200 per EIA 481-1 | MF-NSMF016 ~ MF-NSMF050 per EIA 481-1 | MF-NSMF075 ~ MF-NSMF150 per EIA 481-1 | MF-NSMF020X, MF-NSMF025X & MF-NSMF035X per EIA 481-1 |
|---|---|---|---|---|
| W | 8.0 ± 0.30 (0.315 ± 0.012) | 8.0 ± 0.30 (0.315 ± 0.012) | 8.0 ± 0.30 (0.315 ± 0.012) | 8.0 ± 0.30 (0.315 ± 0.012) |
| $P_0$ | 4.0 ± 0.10 (0.157 ± 0.004) | 4.0 ± 0.10 (0.157 ± 0.004) | 4.0 ± 0.10 (0.157 ± 0.004) | 4.0 ± 0.10 (0.157 ± 0.004) |
| $P_1$ | 4.0 ± 0.10 (0.157 ± 0.004) | 4.0 ± 0.10 (0.157 ± 0.004) | 4.0 ± 0.10 (0.157 ± 0.004) | 4.0 ± 0.10 (0.157 ± 0.004) |
| $P_2$ | 2.0 ± 0.05 (0.079 ± 0.002) | 2.0 ± 0.05 (0.079 ± 0.002) | 2.0 ± 0.05 (0.079 ± 0.002) | 2.0 ± 0.05 (0.079 ± 0.002) |
| $A_0$ | 1.90 ± 0.10 (0.075 ± 0.004) | 1.90 ± 0.10 (0.075 ± 0.004) | 1.90 ± 0.10 (0.075 ± 0.004) | 1.90 ± 0.10 (0.075 ± 0.004) |
| $B_0$ | 3.50 ± 0.10 (0.138 ± 0.004) | 3.45 ± 0.10 (0.136 ± 0.004) | 3.45 ± 0.10 (0.136 ± 0.004) | 3.55 ± 0.10 (0.140 ± 0.004) |
| $B_1$ max. | 4.35 (0.171) | 4.35 (0.171) | 4.35 (0.171) | 4.35 (0.171) |
| $D_0$ | 1.5 + 0.10/-0.0 (0.059 + 0.004/-0) | 1.5 + 0.10/-0.0 (0.059 + 0.004/-0) | 1.5 + 0.10/-0.0 (0.059 + 0.004/-0) | 1.5 + 0.10/-0.0 (0.059 + 0.004/-0) |
| F | 3.5 ± 0.05 (0.138 ± 0.002) | 3.5 ± 0.05 (0.138 ± 0.002) | 3.5 ± 0.05 (0.138 ± 0.002) | 3.5 ± 0.05 (0.138 ± 0.002) |
| $E_1$ | 1.75 ± 0.10 (0.069 ± 0.004) | 1.75 ± 0.10 (0.069 ± 0.004) | 1.75 ± 0.10 (0.069 ± 0.004) | 1.75 ± 0.10 (0.069 ± 0.004) |
| $E_2$ min. | 6.25 (0.246) | 6.25 (0.246) | 6.25 (0.246) | 6.25 (0.246) |
| T max. | 0.6 (0.024) | 0.6 (0.024) | 0.6 (0.024) | 0.6 (0.024) |
| $T_1$ max. | 0.1 (0.004) | 0.1 (0.004) | 0.1 (0.004) | 0.1 (0.004) |
| $K_0$ | 1.35 ± 0.10 (0.053 ± 0.004) | 1.04 ± 0.10 (0.041 ± 0.004) | 0.85 ± 0.10 (0.033 ± 0.004) | 0.80 ± 0.10 (0.032 ± 0.004) |
| Leader min. | 390 (15.35) | 390 (15.35) | 390 (15.35) | 390 (15.35) |
| Trailer min. | 160 (6.30) | 160 (6.30) | 160 (6.30) | 160 (6.30) |
| **Reel Dimensions** | | | | |
| A max. | 185 (7.28) | 185 (7.28) | 185 (7.28) | 185 (7.28) |
| N min. | 50 (1.97) | 50 (1.97) | 50 (1.97) | 50 (1.97) |
| $W_1$ | 8.4 + 1.5/-0.0 (0.331 + 0.059/-0.0) | 8.4 + 1.5/-0.0 (0.331 + 0.059/-0.0) | 8.4 + 1.5/-0.0 (0.331 + 0.059/-0.0) | 8.4 + 1.5/-0.0 (0.331 + 0.059/-0.0) |
| $W_2$ max. | 14.4 (0.567) | 14.4 (0.567) | 14.4 (0.567) | 14.4 (0.567) |

DIMENSIONS: MM (INCHES)

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Users should verify actual device performance in their specific applications.
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