Features

- Compliant with AEC-Q200 Rev-D 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

MF-NSMF Series - PTC Resettable Fuses

Electrical Characteristic

Model	V max. Volts	I max. Amps	I_{hold}	I_{trip}	Resistance		Max. Time To Trip		Tripped Power Dissipation	Certifications	
			Amperes at 23 °C		Ohms at 23 °C		Amperes at 23 °C	Seconds at 23 °C	Watts at 23 °C	cUL	TÜV
			Hold	Trip	$R_{Min.}$	$R_{1Max.}$			Typ.	E174545	R 50256634
MF-NSMF012	30.0	10	0.12	0.29	1.35	8.50	1.0	0.20	0.6	✓	✓
MF-NSMF016	30.0	10	0.16	0.37	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	0.6	✓	✓
MF-NSMF075	6.0	100	0.75	1.50	0.10	0.40	8.0	0.20	0.6	✓	✓
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
Recommended Storage..... +40 °C max, 70 % R.H. max.
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 ..... -40 °C to +85 °C, 20 times..... ±10 % typical resistance change
Solvent Resistance..... MIL-STD-202, Method 215 ..... No change (marking still legible)
Vibration ..... MIL-STD-883C, Method 2007.1, Condition A..... No change ($R_{min} < R < R_{1max}$)
Moisture Sensitivity Level (MSL) ..... See Note
ESD Classification - HBM..... 6

Test Procedures And Requirements

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	245 °C ±5 °C, 5 seconds	95 % min. coverage

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.

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

MF-NSMF Series - PTC Resettable Fuses

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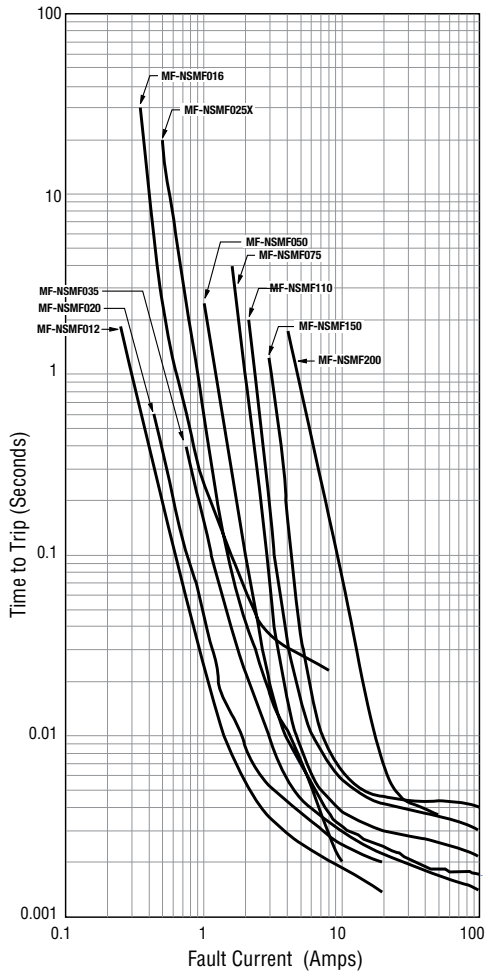
Thermal Derating Chart - I_{hold} (Amps)

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	0.39	0.35	0.31	0.25	0.23	0.21	0.18	0.16	0.13
MF-NSMF035	0.51	0.46	0.40	0.35	0.30	0.27	0.24	0.22	0.18
MF-NSMF035X	0.51	0.46	0.40	0.35	0.30	0.27	0.24	0.22	0.18
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

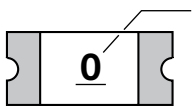
Hold Current, Ihold
012-200 (0.12 Amps - 2.00 Amps)

Options
__ = Standard
X = Multifuse® freeXpansion Design™

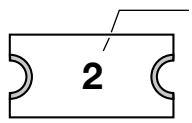
Packaging
-2 = Tape and Reel
Packaged per EIA 481

Typical Part Marking

Represents total content. Layout may vary.



STYLE 1 PART IDENTIFICATION:
MF-NSMF012 = 0
MF-NSMF016 = 1
MF-NSMF020 = 2
MF-NSMF035 = 3
MF-NSMF050 = 4
MF-NSMF075 = 5
MF-NSMF110 = 6
MF-NSMF150 = 8
MF-NSMF200 = A



STYLE 2 PART IDENTIFICATION:
MF-NSMF020X = 2
MF-NSMF025X = C
MF-NSMF035X = 3

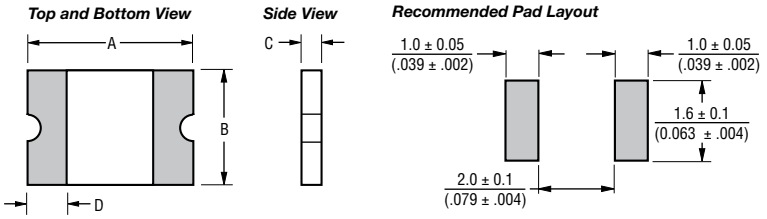
BIWEEKLY DATE CODE WILL APPEAR ON THE PACKAGING LABEL:
WEEK 1 AND 2 = A
WEEK 51 AND 52 = Z

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)	0.40 (0.016)	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

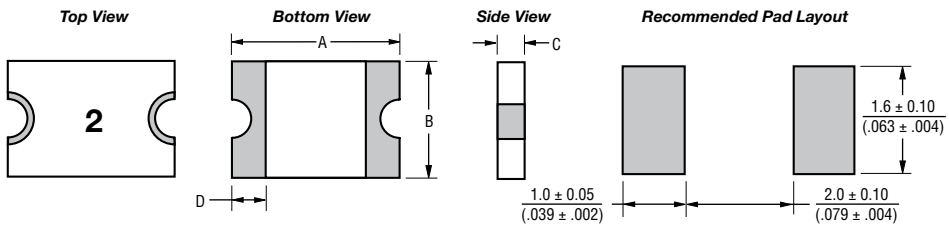
DIMENSIONS: MM (INCHES)

Style 1



Terminal material:
Electroless Ni under immersion Au

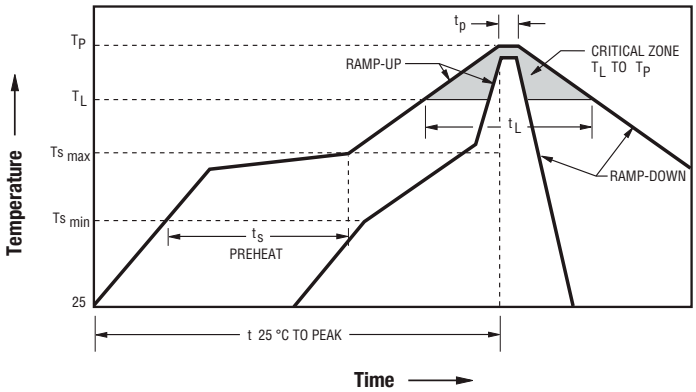
Style 2



Packaging Quantity

3000 pcs. per reel

Solder Reflow Recommendations



Notes:

- MF-NSMF 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 for more details.

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to T_p)	3 °C / second max.
PREHEAT: Temperature Min. (Ts_{min}) Temperature Max. (Ts_{max}) Time (Ts_{min} to Ts_{max}) (ts)	 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.

MF-NSMF Series Tape and Reel Specifications

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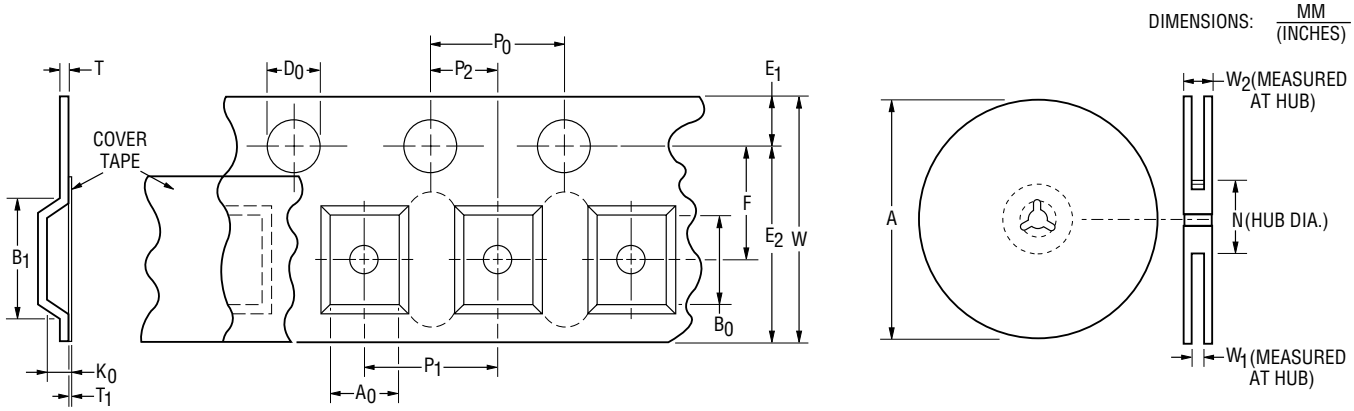
Tape Dimensions	MF-NSMF012 & MF-NSMF200 per EIA 481	MF-NSMF016 ~ MF-NSMF050 per EIA 481	MF-NSMF075 ~ MF-NSMF150 per EIA 481	MF-NSMF020X, MF-NSMF025X & MF-NSMF035X per EIA 481
W	8.0 ± 0.30 (0.315 ± 0.012)	8.0 ± 0.30 (0.315 ± 0.012)	8.0 ± 0.30 (0.315 ± 0.012)	8.0 ± 0.30 (0.315 ± 0.012)
P_0	4.0 ± 0.10 (0.157 ± 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)



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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