

## Features

- Compact design to save board space - 0603 footprint
- Small size results in very fast time to react to fault events
- Low profile
- RoHS compliant\* and halogen free\*\*
- Agency recognition: ®

## Applications

- USB port protection
- HDMI 1.4 Source protection
- PC motherboards - Plug and Play protection
- Mobile phones - Battery and port protection
- PDAs / digital cameras

# MF-FSMF 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 <sub>Min.</sub>	R <sub>1Max.</sub>			Typ.
MF-FSMF020X	9	40	0.20	0.50	0.550	3.500	1.00	0.60	0.5
MF-FSMF035X	6	40	0.35	0.75	0.200	1.400	8.00	0.10	0.5
MF-FSMF050X	6	40	0.50	1.00	0.100	0.800	8.00	0.10	0.5

## 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. 1000 hours..... ±5 % typical resistance change
Thermal Shock .....	+85 °C to -40 °C, 20 times .....
Solvent Resistance.....	MIL-STD-202, Method 215..... No change
Vibration .....	MIL-STD-883C, Method 2007.1, .....
	Condition A

## Test Procedures And Requirements For Model MF-FSMF 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.....	ANSI/J-STD-002.....	95 % min. coverage

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

## 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-FSMF020X	0.27	0.25	0.23	0.20	0.17	0.14	0.12	0.10	0.07
MF-FSMF035X	0.47	0.41	0.38	0.35	0.29	0.26	0.24	0.20	0.14
MF-FSMF050X	0.67	0.59	0.54	0.50	0.41	0.37	0.34	0.29	0.20



**Asia-Pacific:** Tel: +886-2 2562-4117 • Fax: +886-2 2562-4116  
**Europe:** Tel: +41-41 768 5555 • Fax: +41-41 768 5510  
**The Americas:** Tel: +1-951 781-5500 • Fax: +1-951 781-5700  
[www.bourns.com](http://www.bourns.com)

\*RoHS Directive 2002/95/EC Jan 27 2003 including Annex.

\*\*To be considered halogen free, each homogenous material can have a maximum concentration of 900 ppm of either bromine or chlorine.

Specifications are subject to change without notice.

Customers should verify actual device performance in their specific applications.

## Additional Features

- Patents pending

## Additional Applications

- Automotive electronic control modules
- Game console port protection

# MF-FSMF Series - PTC Resettable Fuses

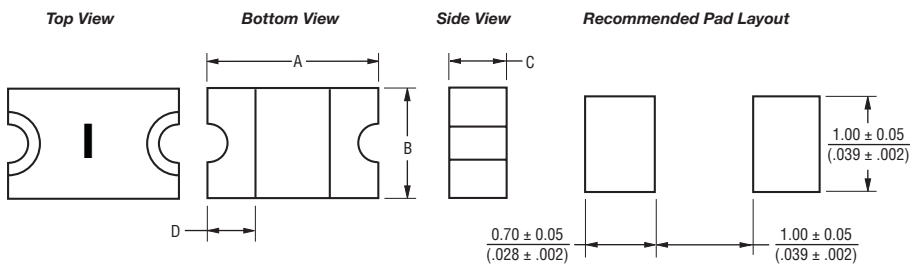
# BOURNS®

### Product Dimensions

Model	A		B		C		D
	Min.	Max.	Min.	Max.	Min.	Max.	Min.
MF-FSMF020X	$\frac{1.45}{(0.057)}$	$\frac{1.85}{(0.073)}$	$\frac{0.65}{(0.026)}$	$\frac{1.05}{(0.041)}$	$\frac{0.30}{(0.012)}$	$\frac{0.65}{(0.026)}$	$\frac{0.20}{(0.008)}$
MF-FSMF035X	$\frac{1.45}{(0.057)}$	$\frac{1.85}{(0.073)}$	$\frac{0.65}{(0.026)}$	$\frac{1.05}{(0.041)}$	$\frac{0.30}{(0.012)}$	$\frac{0.65}{(0.026)}$	$\frac{0.20}{(0.008)}$
MF-FSMF050X	$\frac{1.45}{(0.057)}$	$\frac{1.85}{(0.073)}$	$\frac{0.65}{(0.026)}$	$\frac{1.05}{(0.041)}$	$\frac{0.65}{(0.026)}$	$\frac{1.00}{(0.039)}$	$\frac{0.20}{(0.008)}$

Packaging: MF-FSMF020X & MF-FSMF035X = 6000 pcs. per reel;  
MF-FSMF050X = 4000 pcs. per reel

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

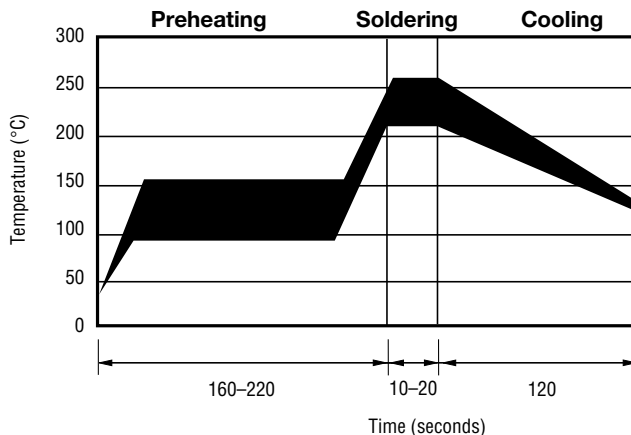


Terminal material:  
Nickel/gold plated.

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

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

### Solder Reflow Recommendations



#### Notes:

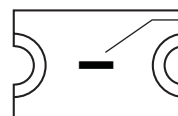
- MF-FSMF models cannot be wave soldered. Please contact Bourns for hand soldering recommendations.
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.
- Compatible with Pb and Pb-free solder reflow profiles.
- Excess solder may cause a short circuit,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

### How To Order

**MF - FSMF 020 X - 2**

Multifuse® Product \_\_\_\_\_  
Designator \_\_\_\_\_  
Series \_\_\_\_\_  
FSMF = 0603 Surface Mount Component  
Hold Current, Ihold \_\_\_\_\_  
020-050 (0.20 - 0.50 Amps)  
Multifuse® freeXpansion™ Design \_\_\_\_\_  
Packaging \_\_\_\_\_  
Packaged per EIA 481-1  
-2 = Tape and Reel

### Typical Part Marking



- PART IDENTIFICATION:  
MF-FSMF020X = I  
MF-FSMF035X = •  
MF-FSMF050X = -

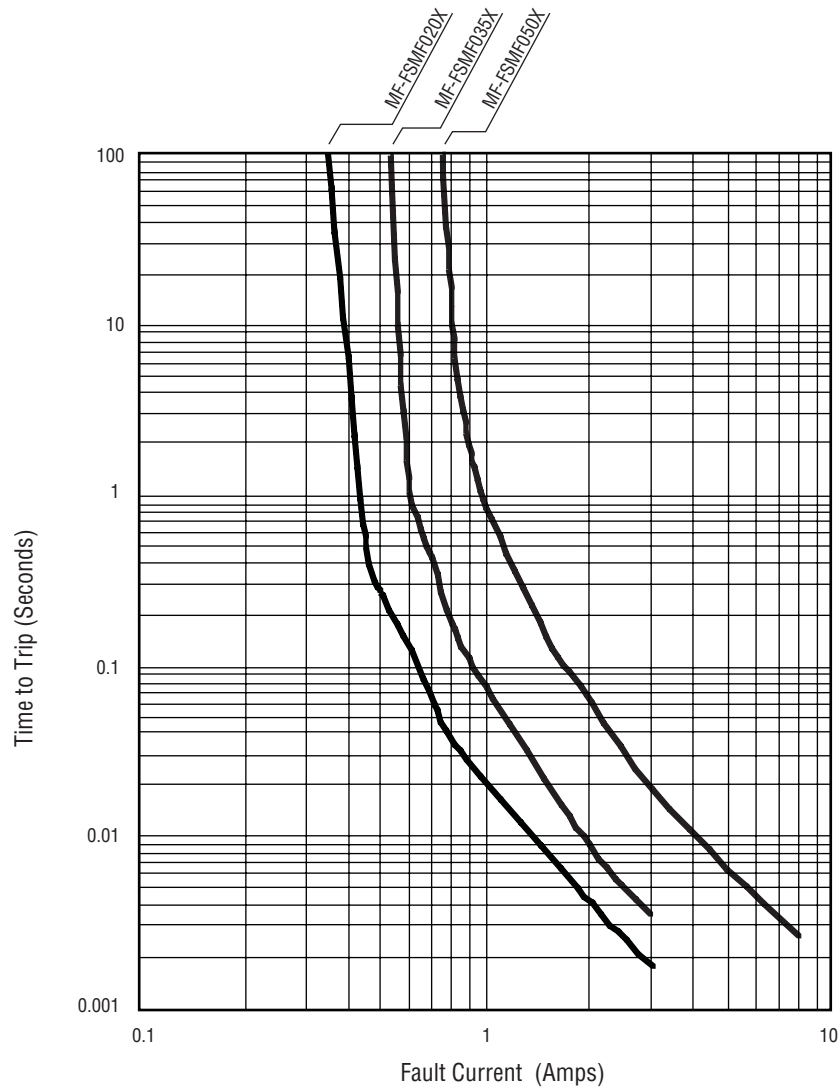
BIWEEKLY DATE CODE WILL APPEAR ON THE PACKAGING LABEL:  
WEEK 1 AND 2 = A  
WEEK 51 AND 52 = Z

"freeXpansion Design" is a trademark of Bourns, Inc.  
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# MF-FSMF Series - PTC Resettable Fuses

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Typical Time to Trip at 23 °C



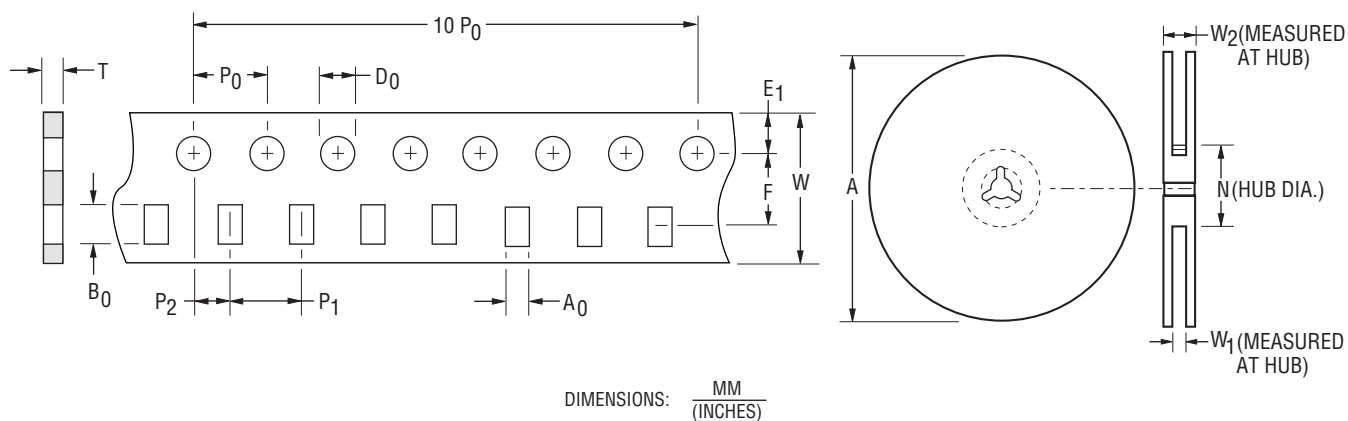
The Time to Trip curves represent typical performance of a device in a simulated application environment. Actual performance in specific customer applications may differ from these values due to the influence of other variables.

# MF-FSMF Series Tape and Reel Specifications

**BOURNS®**

## Product Dimensions

Tape Dimensions	MF-FSMF Series per EIA 481-1
W	$8.0 \pm 0.1$ (0.315 ± 0.004)
P <sub>0</sub>	$4.0 \pm 0.1$ (0.157 ± 0.004)
P <sub>1</sub>	$4.0 \pm 0.05$ (0.157 ± 0.002)
P <sub>2</sub>	$2.0 \pm 0.05$ (0.079 ± 0.002)
A <sub>0</sub>	$1.17 \pm 0.05$ (0.046 ± 0.002)
B <sub>0</sub>	$2.02 \pm 0.05$ (0.079 ± 0.002)
D <sub>0</sub>	$1.55 \pm 0.05$ (0.061 ± 0.002)
F	$3.5 \pm 0.05$ (0.138 ± 0.002)
E <sub>1</sub>	$1.75 \pm 0.1$ (0.069 ± 0.004)
T max.	$0.95 \pm 0.05$ (0.037 ± 0.002)
10 P <sub>0</sub>	$40.0 \pm 0.1$ (1.575 ± 0.004)
<b>Reel Dimensions</b>	
A max.	$185$ (7.283)
N min.	$50$ (1.97)
W <sub>1</sub>	$8.4 + 1.5/-0.0$ (0.331 + 0.059/-0)
W <sub>2</sub> max.	$14.4$ (0.567)



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