

## Additional Applications

- Game console port protection

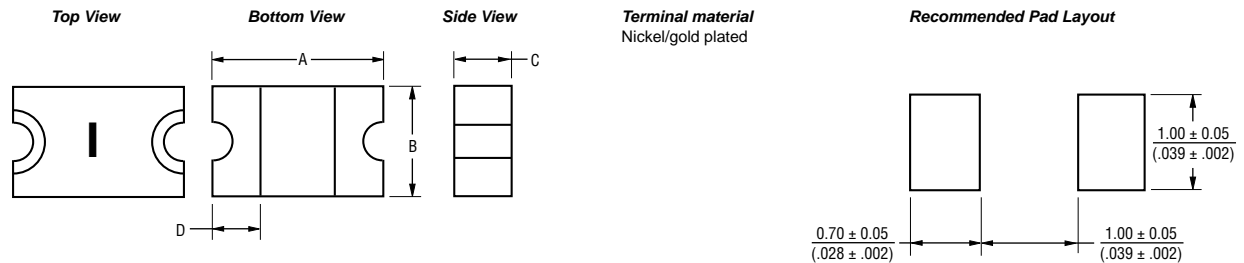
## MF-FSMF Series - PTC Resettable Fuses

**BOURNS®**

Thermal Derating Table -  $I_{hold}$  (Amps)

Model	Ambient Operating Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
MF-FSMF010X	0.13	0.12	0.11	0.10	0.08	0.07	0.06	0.05	0.03
MF-FSMF020X	0.27	0.25	0.23	0.20	0.17	0.14	0.12	0.10	0.07
MF-FSMF025X	0.32	0.29	0.27	0.25	0.21	0.18	0.16	0.14	0.10
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

### Product Dimensions



Model	A		B		C		D
	Min.	Max.	Min.	Max.	Min.	Max.	Min.
MF-FSMF010X	$\frac{1.45}{(0.057)}$	$\frac{1.85}{(0.073)}$	$\frac{0.65}{(0.026)}$	$\frac{1.05}{(0.041)}$	$\frac{0.30}{(0.012)}$	$\frac{0.65}{(0.026)}$	$\frac{0.20}{(0.008)}$
MF-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-FSMF025X	$\frac{1.45}{(0.057)}$	$\frac{1.85}{(0.073)}$	$\frac{0.65}{(0.026)}$	$\frac{1.05}{(0.041)}$	$\frac{0.30}{(0.012)}$	$\frac{0.65}{(0.026)}$	$\frac{0.20}{(0.008)}$
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	$\frac{1.45}{(0.057)}$	$\frac{1.85}{(0.073)}$	$\frac{0.65}{(0.026)}$	$\frac{1.05}{(0.041)}$	$\frac{0.65}{(0.026)}$	$\frac{1.00}{(0.039)}$	$\frac{0.20}{(0.008)}$

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

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

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# MF-FSMF Series - PTC Resettable Fuses



## How To Order

**MF - FSMF 020 X - 2**

Multifuse® Product Designator

Series

FSMF = 0603 Surface Mount Component

Hold Current, I<sub>hold</sub>

010-050 (0.10 - 0.50 Amps)

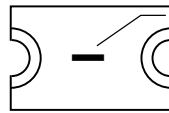
Multifuse® freeXpansion™ Design

Packaging

Packaged per EIA 481-1

-2 = Tape and Reel

## Typical Part Marking



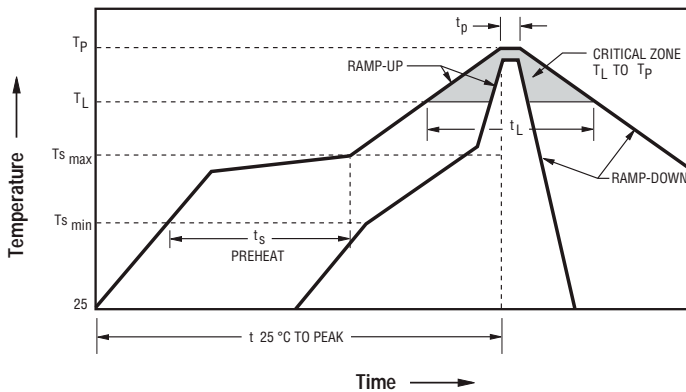
- PART IDENTIFICATION:  
 MF-FSMF010X = II  
 MF-FSMF020X = I  
 MF-FSMF025X = +  
 MF-FSMF035X = •  
 MF-FSMF050X = —

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

## Packaging Quantity

Model	Packaging Quantity
MF-FSMF010X	5,000 pcs. per reel
MF-FSMF020X	6,000 pcs. per reel
MF-FSMF025X	6,000 pcs. per reel
MF-FSMF035X	6,000 pcs. per reel
MF-FSMF050X	4,000 pcs. per reel

## Solder Reflow Recommendations



### Notes:

- MF-FSMF 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](#) document for more details.

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate ( $T_{s\text{ max}}$ to $T_p$ )	3 °C / second max.
PREHEAT:	
Temperature Min. ( $T_{s\text{ min}}$ )	150 °C
Temperature Max. ( $T_{s\text{ max}}$ )	200 °C
Time ( $T_{s\text{ min}}$ to $T_{s\text{ max}}$ ) ( $t_s$ )	60-180 seconds
TIME MAINTAINED ABOVE:	
Temperature ( $T_L$ )	217 °C
Time ( $t_L$ )	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.

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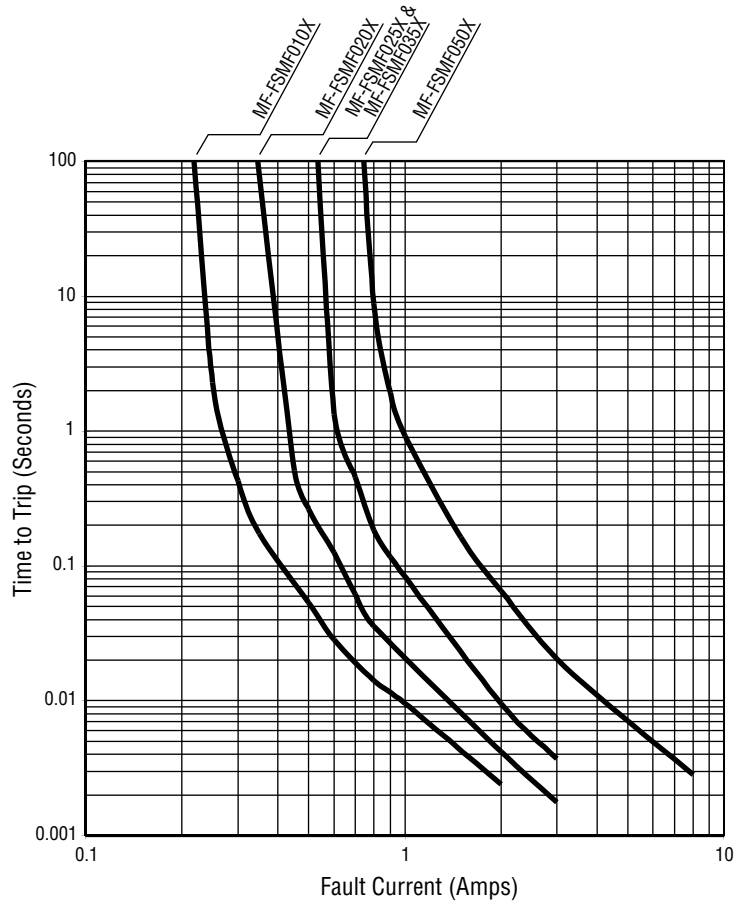
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## MF-FSMF Series - PTC Resettable Fuses

**BOURNS®**

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.

**BOURNS®**

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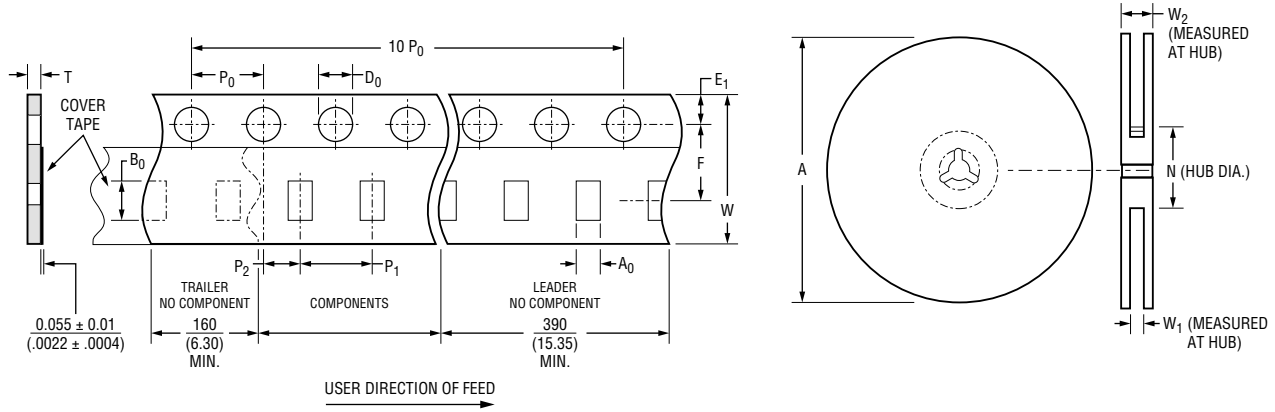
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# MF-FSMF Series Tape and Reel Specifications

**BOURNS®**



Tape Dimensions per EIA-481	MF-FSMF010X	MF-FSMF020X MF-FSMF025X MF-FSMF035X	MF-FSMF050X
W		$\frac{8.0 \pm 0.1}{(.315 \pm .004)}$	
P <sub>0</sub>		$\frac{4.0 \pm 0.10}{(.157 \pm .004)}$	
P <sub>1</sub>		$\frac{4.00 \pm 0.05}{(.157 \pm .002)}$	
P <sub>2</sub>		$\frac{2.00 \pm 0.05}{(.079 \pm .002)}$	
A <sub>0</sub>		$\frac{1.17 \pm 0.05}{(.046 \pm .002)}$	
B <sub>0</sub>		$\frac{2.02 \pm 0.05}{(.079 \pm .002)}$	
D <sub>0</sub>		$\frac{1.55 \pm 0.05}{(.061 \pm .002)}$	
F		$\frac{3.5 \pm 0.05}{(.138 \pm .002)}$	
E <sub>1</sub>		$\frac{1.75 \pm 0.1}{(.069 \pm .004)}$	
T	$\frac{0.75 \pm 0.05}{(.030 \pm .002)}$	$\frac{0.60 \pm 0.05}{(.024 \pm .002)}$	$\frac{0.95 \pm 0.05}{(.037 \pm .002)}$
10 P <sub>0</sub>	$\frac{40.0 \pm 0.1}{(1.575 \pm .004)}$	$\frac{40.0 \pm 0.1}{(1.575 \pm .004)}$	$\frac{40.0 \pm 0.1}{(1.575 \pm .004)}$
<b>Reel Dimensions</b>			
A max.		$\frac{185}{(7.283)}$	
N min.		$\frac{50}{(1.97)}$	
W <sub>1</sub>		$\frac{8.4 + 1.5/-0}{(.331 + .059/-0)}$	
W <sub>2</sub> max.		$\frac{14.4}{(.567)}$	

MF-FSMF SERIES, REV. J, 06/21

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

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**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](https://www.bourns.com/docs/RoHS-MSL/msl_mf.pdf)

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