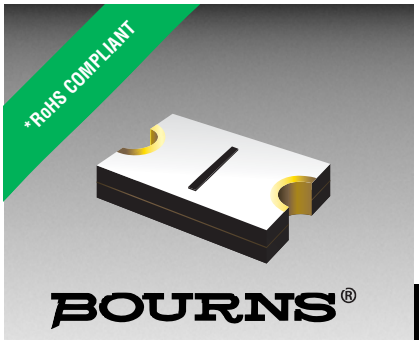


Features

- 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: c UL us, TÜV

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_{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-FSMF010X	15	40	0.10	0.30	0.900	6.000	0.50	1.00	0.5
MF-FSMF020X	9	40	0.20	0.50	0.550	3.500	1.00	0.60	0.5
MF-FSMF025X	6	40	0.25	0.75	0.20	1.400	8.00	0.10	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 ..... ±10 % typical resistance change
Solvent Resistance ..... MIL-STD-202, Method 215 ..... No change
Vibration ..... MIL-STD-883C, Method 2007.1, Condition A ..... No change

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	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 Certifications, then UL File No., enter E174545
TÜV Certificate Number ..... R 50171531
http://www.tuvdotcom.com/ Follow link to "other certificates", enter File No. 50171531

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-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

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 follows the prevailing definition of "halogen free" in the industry. 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.

Additional Applications

- Automotive electronic control modules
- Game console port protection

MF-FSMF Series - PTC Resettable Fuses

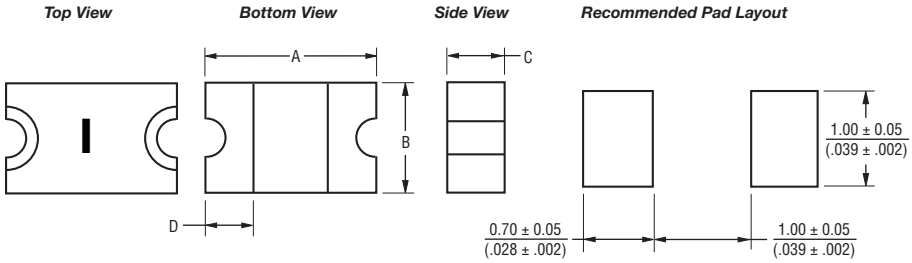
BOURNS®

Product Dimensions

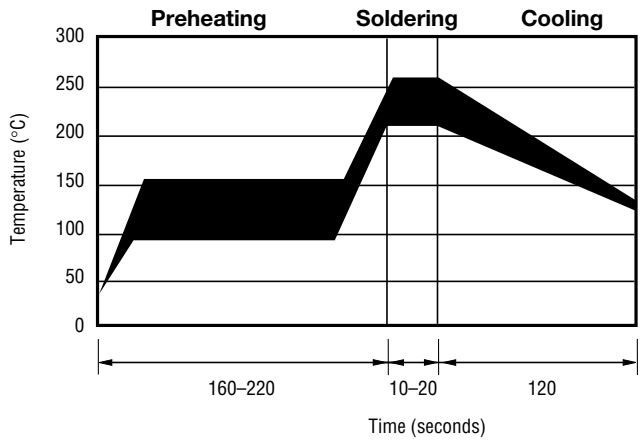
Model	A		B		C		D
	Min.	Max.	Min.	Max.	Min.	Max.	Min.
MF-FSMF010X	1.45 (0.057)	1.85 (0.073)	0.65 (0.026)	1.05 (0.041)	0.30 (0.012)	0.65 (0.026)	0.20 (0.008)
MF-FSMF020X	1.45 (0.057)	1.85 (0.073)	0.65 (0.026)	1.05 (0.041)	0.30 (0.012)	0.65 (0.026)	0.20 (0.008)
MF-FSMF025X	1.45 (0.057)	1.85 (0.073)	0.65 (0.026)	1.05 (0.041)	0.30 (0.012)	0.65 (0.026)	0.20 (0.008)
MF-FSMF035X	1.45 (0.057)	1.85 (0.073)	0.65 (0.026)	1.05 (0.041)	0.30 (0.012)	0.65 (0.026)	0.20 (0.008)
MF-FSMF050X	1.45 (0.057)	1.85 (0.073)	0.65 (0.026)	1.05 (0.041)	0.65 (0.026)	1.00 (0.039)	0.20 (0.008)

Packaging: MF-FSMF010X = 5000 pcs. per reel;
MF-FSMF020X, MF-FSMF025X & MF-FSMF035X = 6000 pcs. per reel;
MF-FSMF050X = 4000 pcs. per reel

DIMENSIONS: MM / (INCHES)



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.

Terminal material:
Nickel/gold plated.

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

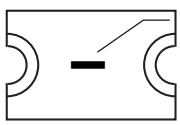
Recommended Storage:
40 °C max./70 % RH max.

How To Order

MF - FSMF 020 X - 2

- Multifuse® Product Designator
- Series
  - FSMF = 0603 Surface Mount Component
- Hold Current, Ihold
  - 010-050 (0.10 - 0.50 Amps)
- Multifuse® freeXpansion™ Design
- Packaging
  - Packaged per EIA 481-1
  - -2 = Tape and Reel

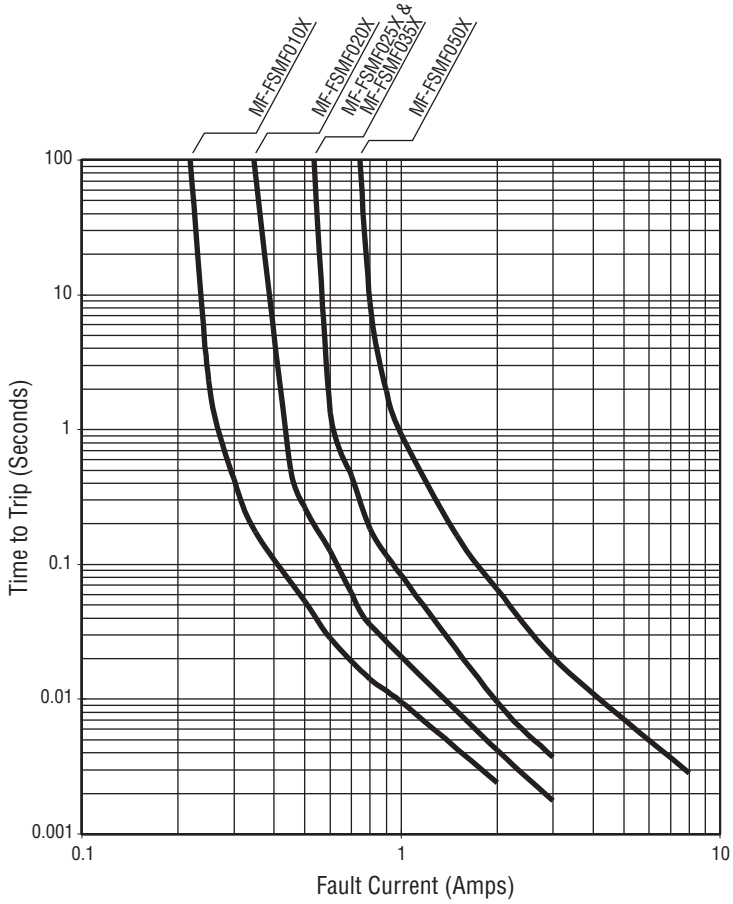
Typical Part Marking



– 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

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.

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www.bourns.com

MF-FSMF Series Tape and Reel Specifications

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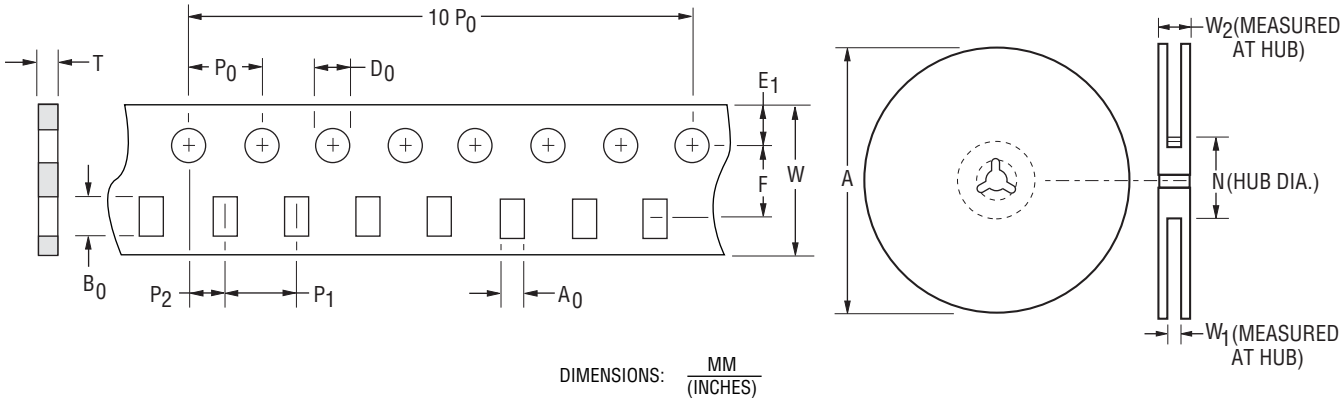
Product Dimensions

Tape Dimensions	MF-FSMF010X per EIA 481-1	MF-FSMF020X, MF-FSMF025X, MF-FSMF035X per EIA 481-1	MF-FSMF050X per EIA 481-1
W	8.0 ± 0.1 (0.315 ± 0.004)	8.0 ± 0.1 (0.315 ± 0.004)	8.0 ± 0.1 (0.315 ± 0.004)
P_0	4.0 ± 0.1 (0.157 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)
P_1	4.0 ± 0.05 (0.157 ± 0.002)	4.0 ± 0.05 (0.157 ± 0.002)	4.0 ± 0.05 (0.157 ± 0.002)
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)
A_0	1.17 ± 0.05 (0.046 ± 0.002)	1.17 ± 0.05 (0.046 ± 0.002)	1.17 ± 0.05 (0.046 ± 0.002)
B_0	2.02 ± 0.05 (0.079 ± 0.002)	2.02 ± 0.05 (0.079 ± 0.002)	2.02 ± 0.05 (0.079 ± 0.002)
D_0	1.55 ± 0.05 (0.061 ± 0.002)	1.55 ± 0.05 (0.061 ± 0.002)	1.55 ± 0.05 (0.061 ± 0.002)
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)
E_1	1.75 ± 0.1 (0.069 ± 0.004)	1.75 ± 0.1 (0.069 ± 0.004)	1.75 ± 0.1 (0.069 ± 0.004)
T	0.75 ± 0.05 (0.030 ± 0.002)	0.60 ± 0.05 (0.024 ± 0.002)	0.95 ± 0.05 (0.037 ± 0.002)
10 P_0	40.0 ± 0.1 (1.575 ± 0.004)	40.0 ± 0.1 (1.575 ± 0.004)	40.0 ± 0.1 (1.575 ± 0.004)
Reel Dimensions			
A max.	185 (7.283)	185 (7.283)	185 (7.283)
N min.	50 (1.97)	50 (1.97)	50 (1.97)
W_1	8.4 + 1.5/ -0.0 (0.331 + 0.059/-0)	8.4 + 1.5/ -0.0 (0.331 + 0.059/-0)	8.4 + 1.5/ -0.0 (0.331 + 0.059/-0)
W_2 max.	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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