



Features

- Standard 1812 footprint
- Fast Time-to-Trip (TTT) to protect against overcurrent events
- Excellent solderability with ENIG terminal
- Symmetrical designs and low profile
- AEC-Q200 compliant (select models)
- RoHS compliant* and halogen free**

- Agency recognition:
- TÜV approval to the following standards: IEC 62319-1, IEC 60738-1 and IEC 60730-1:2013 clause 15, clause 17 and Annex J

Some models are currently available but not recommended for new designs.

MF-MSMF Series – PTC Resettable Fuses

Electrical Characteristics

Model	V _{max}	I _{max}	I _{hold}	I _{trip}	Resistance		Max. Time to Trip		Tripped Power Dissipation	Agency Recognition		AEC-Q200 Compliant
			at 23 °C		at 23 °C Ohms		at 23 °C		at 23 °C Watts	cUL	TÜV	
			Amps		R _{Min}	R _{1Max}	Amps	Seconds	Typ.	E174545	R50256634	
MF-MSMF010	60	40	0.10	0.30	0.70	15	0.5	1.5	0.8	✓	✓	✓
MF-MSMF010/33X	33	40	0.10	0.30	0.70	15	0.5	1.5	0.8	✓	✓	✓
MF-MSMF010/60X	60	40	0.10	0.30	0.70	15	0.5	1.5	0.8	✓	✓	✓
MF-MSMF014	60	40	0.14	0.34	0.40	6.5	1.5	0.15	0.8	✓	✓	✓
MF-MSMF014/60X	60	40	0.14	0.34	0.40	6.0	1.5	0.15	0.8	✓	✓	✓
MF-MSMF020	30	80	0.20	0.40	0.40	6.0	6.0	0.06	0.8	✓	✓	✓
MF-MSMF020/33X	33	40	0.20	0.40	0.35	5.0	8.0	0.02	0.8	✓	✓	✓
MF-MSMF020/60X	60	40	0.20	0.40	0.35	4.4	1.0	2.00	0.8	✓	✓	✓
MF-MSMF020/60	60	40	0.20	0.40	0.40	6.0	1.5	0.15	0.8	✓	✓	✓
MF-MSMF030	30	10	0.30	0.60	0.30	3.0	8.0	0.10	0.8	✓	✓	✓
MF-MSMF030/33X	33	40	0.30	0.60	0.30	3.0	8.0	0.10	0.8	✓	✓	✓
MF-MSMF030/60X	60	10	0.30	0.60	0.30	3.0	8.0	0.10	0.8	✓	✓	✓
MF-MSMF035/33X	33	40	0.35	0.70	0.25	1.7	8.0	0.15	0.8	✓	✓	✓
MF-MSMF035/60X	60	10	0.35	0.70	0.25	1.7	8.0	0.15	0.8	✓	✓	✓
MF-MSMF050	15	100	0.50	1.00	0.15	1.0	8.0	0.15	0.8	✓	✓	✓
MF-MSMF050/16X	16	100	0.50	1.00	0.15	1.3	8.0	0.20	0.8	✓	✓	✓
MF-MSMF050/24X	24	100	0.50	1.00	0.15	1.3	8.0	0.20	0.8	✓	✓	✓
MF-MSMF050/30X	30	100	0.50	1.00	0.15	1.3	8.0	0.20	0.8	✓	✓	✓
MF-MSMF050/40X	40	20	0.50	1.00	0.15	1.3	8.0	0.20	0.8	✓	✓	✓
MF-MSMF050/60X	60	10	0.50	1.00	0.15	1.0	8.0	0.20	0.8	✓	✓	✓
MF-MSMF075	13.2	100	0.75	1.50	0.11	0.45	8.0	0.2	0.8	✓	✓	✓
MF-MSMF075/16X	16	100	0.75	1.50	0.11	0.45	8.0	0.2	0.8	✓	✓	✓
MF-MSMF075/24X	24	100	0.75	1.50	0.11	0.40	8.0	0.2	0.8	✓	✓	✓
MF-MSMF075/24	24	40	0.75	1.50	0.11	0.45	8.0	0.2	0.8	✓	✓	✓
MF-MSMF075/33X	33	20	0.75	1.50	0.11	0.40	8.0	0.2	1.4	✓	✓	✓
MF-MSMF110/8X	8	100	1.10	2.20	0.06	0.21	8.0	0.3	0.8	✓	✓	✓
MF-MSMF110/16X	16	100	1.10	2.20	0.06	0.20	8.0	0.3	0.8	✓	✓	✓
MF-MSMF110/16	16	100	1.10	2.20	0.04	0.21	8.0	0.3	0.8	✓	✓	✓
MF-MSMF110/24X	24	20	1.10	2.20	0.06	0.18	8.0	0.5	0.8	✓	✓	✓
MF-MSMF110/33X	33	20	1.10	2.20	0.06	0.20	8.0	0.5	1.0	✓	✓	✓
MF-MSMF125/8X	8	100	1.25	2.50	0.04	0.14	8.0	0.4	0.8	✓	✓	✓
MF-MSMF125/12X	12	100	1.25	2.50	0.04	0.14	8.0	0.4	0.8	✓	✓	✓

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CALIFORNIA WARNING: Can expose you to lead, a carcinogen and reproductive toxicant. See 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.

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Applications

Overcurrent and overtemperature protection

for:

- PC motherboards
- PC peripherals
- Point-of-sale (POS) equipment
- PCMCIA cards
- USB port protection - USB 2.0, 3.0 & OTG
- Hard disk drives
- HDMI 1.4 Source protection
- Server and data center interfaces

MF-MSMF Series – PTC Resettable Fuses

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Electrical Characteristics (continued)

Model	V _{max}	I _{max}	I _{hold}	I _{trip}	Resistance		Max. Time to Trip		Tripped Power Dissipation	Agency Recognition		AEC-Q200 Compliant
			at 23 °C		at 23 °C Ohms		at 23 °C		at 23 °C Watts	cUL	TÜV	
	Volts	Amps	Amps		R _{Min}	R _{1Max}	Amps	Seconds	Typ.	E174545	R50256634	
MF-MSMF125/16X	16	100	1.25	2.50	0.04	0.14	8.0	0.4	0.8	✓	✓	✓
MF-MSMF125/24X	24	20	1.25	2.50	0.04	0.14	8.0	0.4	0.8	✓	✓	✓
MF-MSMF150/8X	8	100	1.50	3.00	0.030	0.110	8.0	0.5	0.8	✓	✓	
MF-MSMF150/12X	12	100	1.50	3.00	0.030	0.110	8.0	0.5	0.8	✓	✓	
MF-MSMF150/12	12	100	1.50	3.00	0.030	0.120	8.0	0.5	0.8	✓	✓	✓
MF-MSMF150/16X	16	100	1.50	3.00	0.030	0.120	8.0	0.5	0.8	✓	✓	✓
MF-MSMF150/24X	24	20	1.50	3.00	0.030	0.120	8.0	1.5	1.0	✓	✓	✓
MF-MSMF160/8X	8	100	1.60	2.80	0.030	0.100	8.0	1.0	0.8	✓	✓	
MF-MSMF160/12X	12	100	1.60	2.80	0.030	0.100	8.0	1.0	0.8	✓	✓	
MF-MSMF160/16X	16	100	1.60	2.80	0.030	0.100	8.0	1.0	0.8	✓	✓	✓
MF-MSMF160/24X	24	20	1.60	3.20	0.030	0.100	8.0	1.0	0.8	✓	✓	✓
MF-MSMF200/8X	8	100	2.00	3.50	0.020	0.070	8.0	2.0	0.8	✓	✓	
MF-MSMF200/12X	12	100	2.00	3.50	0.020	0.070	8.0	2.0	1.0	✓	✓	
MF-MSMF200/16X	16	100	2.00	3.50	0.020	0.070	8.0	2.0	1.0	✓	✓	✓
MF-MSMF250/16X	16	100	2.50	5.00	0.015	0.100	8.0	5.0	1.2	✓	✓	✓
MF-MSMF260/6X	6	100	2.60	5.20	0.015	0.060	8.0	5.0	0.8	✓	✓	
MF-MSMF260/8X	8	100	2.60	5.20	0.015	0.050	8.0	5.0	0.8	✓	✓	
MF-MSMF260/12X	12	100	2.60	5.20	0.015	0.050	8.0	5.0	1.2	✓	✓	
MF-MSMF260/16X	16	100	2.60	5.00	0.015	0.050	8.0	5.0	1.2	✓	✓	✓
MF-MSMF300/6X	6	100	3.00	5.00	0.010	0.040	8.0	5.0	1.2	✓	✓	

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MF-MSMF Series – PTC Resettable Fuses

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Environmental Characteristics

Item	Condition	Criteria
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	Class 6 (per AEC-Q200-2, HBM)	

Test Procedures and Requirements

Item	Test Condition	Accept/Reject Criteria
Visual/Mechanical	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	$R_{min} \leq R \leq R_{max}$
Time to Trip	At specified current, V_{max} , 23 °C, still air	$T \leq \text{max. time to trip (seconds)}$
Hold Current	30 min. at I_{hold} , still air	No trip
Trip Cycle Life	V_{max} , I_{max} , 100 cycles	No arcing or burning
Trip Endurance	V_{max} , I_{max} , 48 hours	No arcing or burning
Solderability	245 °C ±5 °C, 5 seconds	95 % min. coverage

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MF-MSMF Series – PTC Resettable Fuses

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Product Dimensions (see page 7 for outline drawings)

Model	A		B		C		D		E		Style
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
MF-MSMF010	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.10 (0.043)	0.30 (0.012)	—	—	—	1
MF-MSMF010/33X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.60 (0.024)	1.10 (0.043)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF010/60X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.60 (0.024)	1.10 (0.043)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF014	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.10 (0.043)	0.30 (0.012)	—	—	—	1
MF-MSMF014/60X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.60 (0.024)	1.10 (0.043)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF020	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.10 (0.043)	0.30 (0.012)	—	—	—	1
MF-MSMF020/33X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.60 (0.024)	1.10 (0.043)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF020/60X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.60 (0.024)	1.10 (0.043)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF020/60	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.10 (0.043)	0.30 (0.012)	—	—	—	1
MF-MSMF030	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.10 (0.043)	0.30 (0.012)	—	—	—	1
MF-MSMF030/33X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.60 (0.024)	1.10 (0.043)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF030/60X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	1.20 (0.047)	1.80 (0.071)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF035/33X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.60 (0.024)	1.10 (0.043)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF035/60X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	1.20 (0.047)	1.80 (0.071)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF050	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	0.30 (0.012)	—	—	—	1
MF-MSMF050/16X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.40 (0.016)	0.85 (0.033)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF050/24X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.40 (0.016)	0.85 (0.033)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF050/30X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.40 (0.016)	0.85 (0.033)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF050/40X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.40 (0.016)	0.85 (0.033)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF050/60X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	1.20 (0.047)	1.80 (0.071)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2

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

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MF-MSMF Series – PTC Resettable Fuses

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Product Dimensions – continued (see page 7 for outline drawings)

Model	A		B		C		D		E		Style
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
MF-MSMF075	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	0.30 (0.012)	—	—	—	1
MF-MSMF075/16X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF075/24X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF075/24	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	0.30 (0.012)	—	—	—	1
MF-MSMF075/33X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF110/8X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF110/16X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF110/16	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	0.30 (0.012)	—	—	—	1
MF-MSMF110/24X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF110/33X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	1.20 (0.047)	1.80 (0.071)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF125/8X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF125/12X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF125/16X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF125/24X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF150/8X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF150/12X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF150/12	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	0.30 (0.012)	—	—	—	1
MF-MSMF150/16X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF150/24X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF160/8X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2

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MF-MSMF Series – PTC Resettable Fuses

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Product Dimensions – continued (see page 7 for outline drawings)

Model	A		B		C		D		E		Style
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
MF-MSMF160/12X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF160/16X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF160/24X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF200/8X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF200/12X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF200/16X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF250/16X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF260/6X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.35 (0.014)	0.80 (0.031)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF260/8X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF260/12X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF260/16X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2
MF-MSMF300/6X	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.60 (0.024)	1.10 (0.043)	0.30 (0.012)	1.20 (0.047)	0.20 (0.008)	0.65 (0.026)	2

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

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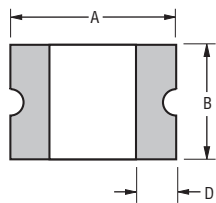
MF-MSMF Series – PTC Resettable Fuses

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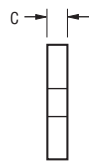
Product Dimensions (see previous pages for dimensions)

Style 1

Top and Bottom View



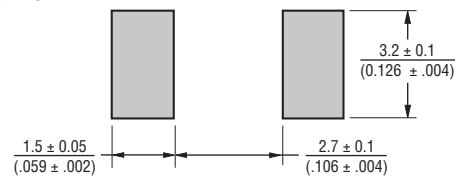
Side View



Terminal material:
Electroless Ni under immersion Au

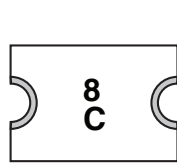
DIMENSIONS: $\frac{\text{MM}}{(\text{INCHES})}$

Recommended Pad Layout

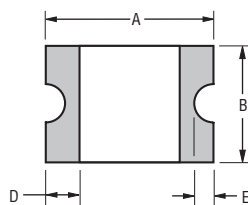


Style 2

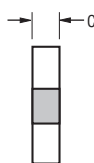
Top View



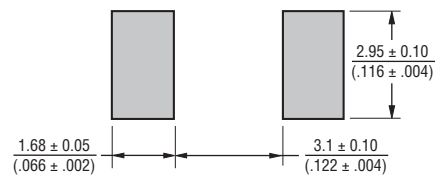
Bottom View



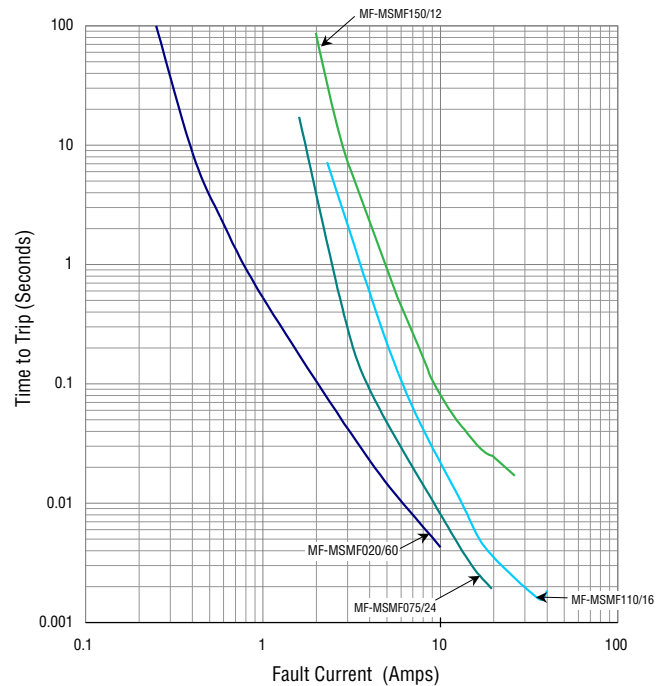
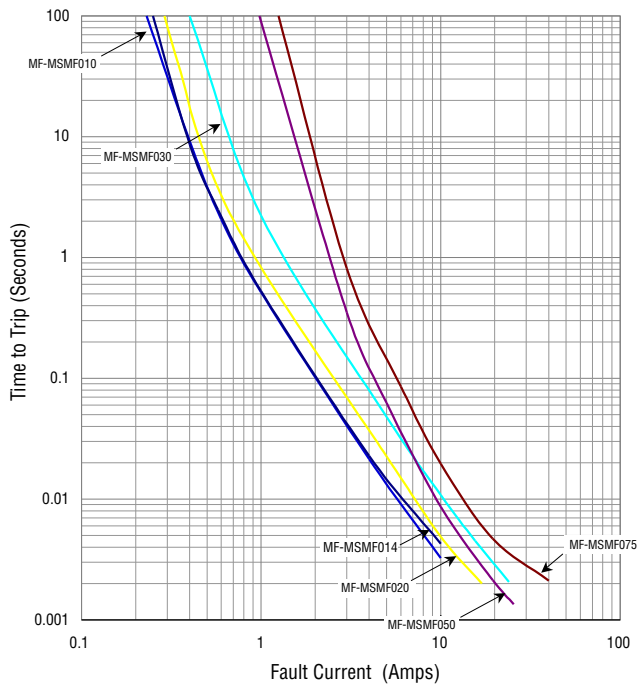
Side View



Recommended Pad Layout



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.

Specifications are subject to change without notice.

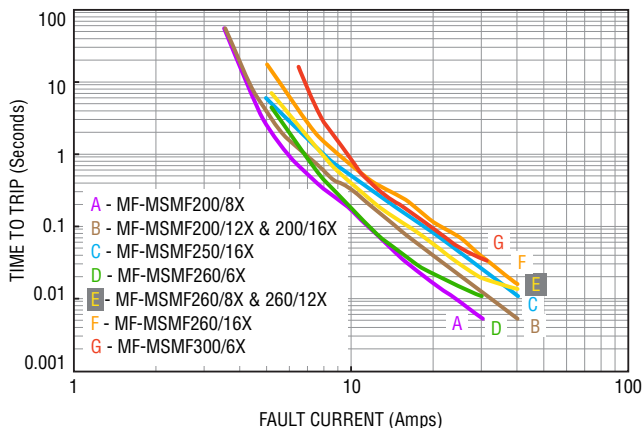
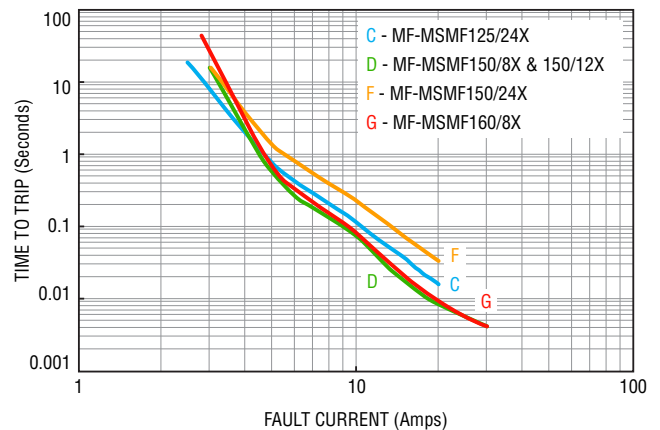
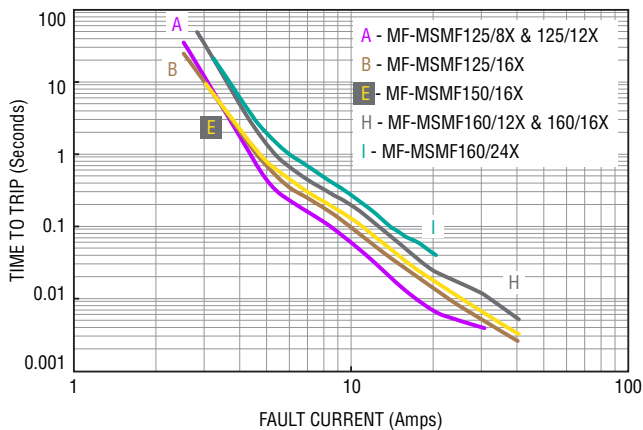
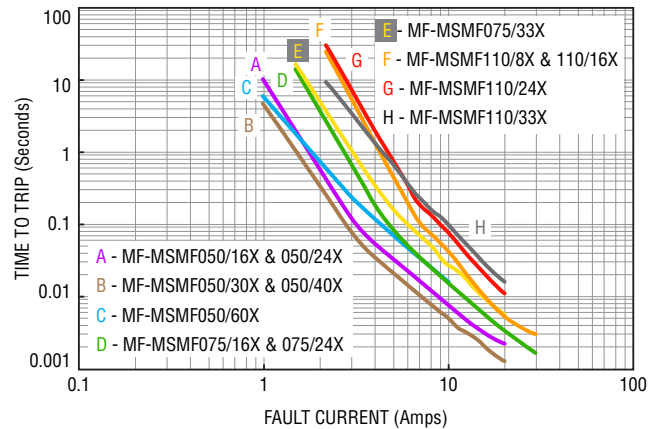
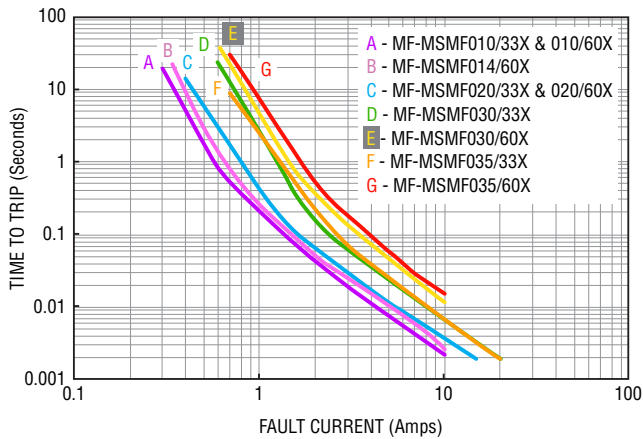
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Typical Time to Trip at 23 °C – continued



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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MF-MSMF Series – PTC Resettable Fuses

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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-MSMF010	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.03
MF-MSMF010/33X	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.03
MF-MSMF010/60X	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.03
MF-MSMF014	0.23	0.20	0.17	0.14	0.12	0.10	0.09	0.08	0.06
MF-MSMF014/60X	0.23	0.20	0.17	0.14	0.12	0.10	0.09	0.08	0.05
MF-MSMF020	0.30	0.27	0.23	0.20	0.17	0.15	0.13	0.12	0.09
MF-MSMF020/33X	0.29	0.26	0.23	0.20	0.17	0.15	0.14	0.12	0.07
MF-MSMF020/60X	0.29	0.26	0.23	0.20	0.17	0.15	0.14	0.12	0.07
MF-MSMF020/60	0.29	0.26	0.23	0.20	0.17	0.15	0.13	0.11	0.08
MF-MSMF030	0.46	0.40	0.36	0.30	0.26	0.22	0.20	0.18	0.14
MF-MSMF030/33X	0.46	0.40	0.36	0.30	0.26	0.22	0.20	0.18	0.13
MF-MSMF030/60X	0.46	0.40	0.36	0.30	0.26	0.22	0.20	0.18	0.13
MF-MSMF035/33X	0.50	0.45	0.40	0.35	0.30	0.26	0.24	0.20	0.15
MF-MSMF035/60X	0.50	0.45	0.40	0.35	0.30	0.26	0.24	0.20	0.15
MF-MSMF050	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.29
MF-MSMF050/16X	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.25
MF-MSMF050/24X	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.25
MF-MSMF050/30X	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.25
MF-MSMF050/40X	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.25
MF-MSMF050/60X	0.77	0.68	0.59	0.50	0.44	0.40	0.33	0.27	0.20
MF-MSMF075	1.15	1.01	0.88	0.75	0.65	0.60	0.55	0.49	0.43
MF-MSMF075/16X	1.06	0.95	0.84	0.75	0.60	0.55	0.50	0.45	0.37
MF-MSMF075/24X	1.06	0.95	0.84	0.75	0.60	0.55	0.50	0.45	0.37
MF-MSMF075/24	1.15	1.01	0.88	0.75	0.65	0.60	0.55	0.49	0.43
MF-MSMF075/33X	1.16	1.03	0.90	0.75	0.63	0.56	0.49	0.42	0.32
MF-MSMF110/8X	1.58	1.43	1.26	1.10	0.95	0.85	0.77	0.71	0.58
MF-MSMF110/16X	1.58	1.43	1.26	1.10	0.95	0.85	0.77	0.71	0.58
MF-MSMF110/16	1.59	1.43	1.26	1.10	0.95	0.87	0.80	0.71	0.60

Continued on next page

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MF-MSMF Series – PTC Resettable Fuses

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Thermal Derating Table - I_{hold} (Amps) – continued

Model	Ambient Operating Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
MF-MSMF110/24X	2.00	1.70	1.40	1.10	0.95	0.88	0.80	0.73	0.61
MF-MSMF110/33X	1.55	1.40	1.25	1.10	0.93	0.83	0.73	0.63	0.50
MF-MSMF125/8X	2.00	1.75	1.52	1.25	1.00	0.95	0.90	0.75	0.61
MF-MSMF125/12X	2.00	1.75	1.52	1.25	1.00	0.95	0.90	0.75	0.61
MF-MSMF125/16X	2.00	1.75	1.52	1.25	1.00	0.95	0.90	0.75	0.61
MF-MSMF125/24X	1.98	1.73	1.50	1.25	0.98	0.93	0.86	0.67	0.53
MF-MSMF150/8X	2.06	1.93	1.79	1.50	1.28	1.10	1.02	0.80	0.68
MF-MSMF150/12X	2.06	1.93	1.76	1.50	1.28	1.10	1.02	0.80	0.68
MF-MSMF150/12	2.17	1.95	1.72	1.50	1.30	1.18	1.09	0.97	0.82
MF-MSMF150/16X	2.04	1.88	1.68	1.50	1.25	1.08	1.00	0.78	0.64
MF-MSMF150/24X	2.10	1.90	1.70	1.50	1.25	1.13	1.00	0.88	0.69
MF-MSMF160/8X	2.20	2.06	1.91	1.60	1.36	1.17	1.09	0.85	0.72
MF-MSMF160/12X	2.18	2.03	1.87	1.60	1.33	1.15	1.07	0.83	0.68
MF-MSMF160/16X	2.18	2.03	1.87	1.60	1.33	1.15	1.07	0.83	0.68
MF-MSMF160/24X	2.15	2.00	1.84	1.60	1.31	1.13	1.05	0.81	0.66
MF-MSMF200/8X	2.60	2.44	2.22	2.00	1.78	1.67	1.50	1.45	1.29
MF-MSMF200/12X	2.58	2.41	2.18	2.00	1.75	1.65	1.48	1.43	1.25
MF-MSMF200/16X	2.58	2.41	2.18	2.00	1.75	1.68	1.48	1.43	1.25
MF-MSMF250/16X	3.90	3.42	2.96	2.50	2.24	1.98	1.85	1.29	0.94
MF-MSMF260/6X	3.40	3.16	3.00	2.60	2.30	2.15	2.00	1.85	1.50
MF-MSMF260/8X	3.36	3.12	2.95	2.60	2.26	2.12	1.97	1.82	1.50
MF-MSMF260/12X	3.36	3.12	2.95	2.60	2.26	2.12	1.97	1.82	1.50
MF-MSMF260/16X	3.50	3.42	2.96	2.60	2.30	2.15	2.00	1.85	1.63
MF-MSMF300/6X	4.13	3.75	3.30	3.00	2.62	2.43	2.25	2.00	1.78

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MF-MSMF Series – PTC Resettable Fuses

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Packaging Quantity

Model		Packaging Quantity
MF-MSMF030/60X	MF-MSMF035/60X	1,000 pcs. per reel
MF-MSMF050/60X	MF-MSMF110/33X	
MF-MSMF010	MF-MSMF014	1,500 pcs. per reel
MF-MSMF020	MF-MSMF020/60	
MF-MSMF030		
MF-MSMF075/33X		
MF-MSMF110/24X	MF-MSMF125/16X	
MF-MSMF125/24X	MF-MSMF150/16X	
MF-MSMF150/24X	MF-MSMF160/12X	
MF-MSMF160/16X	MF-MSMF160/24X	
MF-MSMF200/12X	MF-MSMF200/16X	
MF-MSMF250/16X	MF-MSMF260/8X	
MF-MSMF260/12X	MF-MSMF260/16X	
MF-MSMF300/6X		
MF-MSMF050	MF-MSMF075	2,000 pcs. per reel
MF-MSMF075/24		
MF-MSMF110/16		
MF-MSMF150/12		
MF-MSMF010/33X	MF-MSMF010/60X	
MF-MSMF014/60X	MF-MSMF020/33X	
MF-MSMF020/60X	MF-MSMF030/33X	
MF-MSMF035/33X	MF-MSMF050/16X	
MF-MSMF050/24X	MF-MSMF050/30X	
MF-MSMF050/40X	MF-MSMF075/16X	
MF-MSMF075/24X	MF-MSMF110/8X	
MF-MSMF110/16X	MF-MSMF125/8X	
MF-MSMF125/12X	MF-MSMF150/8X	
MF-MSMF150/12X	MF-MSMF160/8X	
MF-MSMF200/8X	MF-MSMF260/6X	

How to Order

MF - MSMF 160 / 16 X - 2

Multifuse® Product Designator _____

Series _____
 MSMF = 4532 mm (1812 mils)
 Surface Mount Component

Hold Current, I_{hold} _____
 010 ~ 300 (0.1 ~ 3.0 Amps)

Voltage Options _____
 6 = 6 Voltage Rated 8 = 8 Voltage Rated
 12 = 12 Voltage Rated 16 = 16 Voltage Rated
 24 = 24 Voltage Rated 30 = 30 Voltage Rated
 33 = 33 Voltage Rated 40 = 40 Voltage Rated
 48 = 48 Voltage Rated 60 = 60 Voltage Rated

Multifuse® Design Specific Code _____
 Blank = Standard Voltage
 X = Multifuse® freeXpansion™ Design

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

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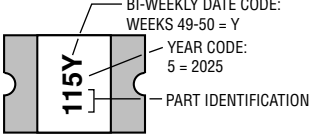
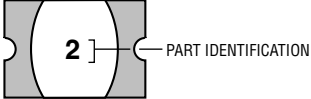
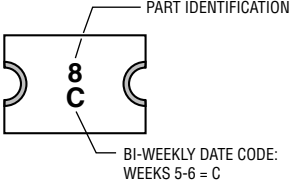
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MF-MSMF Series – PTC Resettable Fuses

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Typical Part Marking

Represents total content. Layout may vary.

		
PART IDENTIFICATION EXAMPLES: MF-MSMF010 = 10 MF-MSMF014 = 14 MF-MSMF020 = 02 MF-MSMF030 = 30 MF-MSMF050 = 50 MF-MSMF075 & 075/24 = 75 MF-MSMF110/16 = 11 MF-MSMF150/12 = 15	PART IDENTIFICATION EXAMPLE: MF-MSMF020/60 = 2	PART IDENTIFICATION EXAMPLES: MF-MSMF010/33X & 010/60X = 0 MF-MSMF014/60X = 1 MF-MSMF020/33X & 020/60X = 2 MF-MSMF030/33X = E MF-MSMF030/60X = I MF-MSMF035/33X = 3 MF-MSMF035/60X = J MF-MSMF050/16X, 050/24X, 050/30X & 050/40X = 4 MF-MSMF050/60X = K MF-MSMF075/16X & 075/24X = 5 MF-MSMF075/33X = H MF-MSMF110/8X & 110/16X = N MF-MSMF110/24X = 6 MF-MSMF110/33X = R MF-MSMF125/8X & 125/12X = S MF-MSMF125/16X = M MF-MSMF125/24X = 7 MF-MSMF150/8X & 150/12X = T MF-MSMF150/16X = Q MF-MSMF150/24X = 8 MF-MSMF160/8X = U MF-MSMF160/12X & 160/16X = W MF-MSMF160/24X = 9 MF-MSMF200/8X = L MF-MSMF200/12X & 200/16X = A MF-MSMF250/16X = C MF-MSMF260/6X = X MF-260/8X & 260/12X = Y MF-MSMF260/16X = D MF-MSMF300/6X = Z

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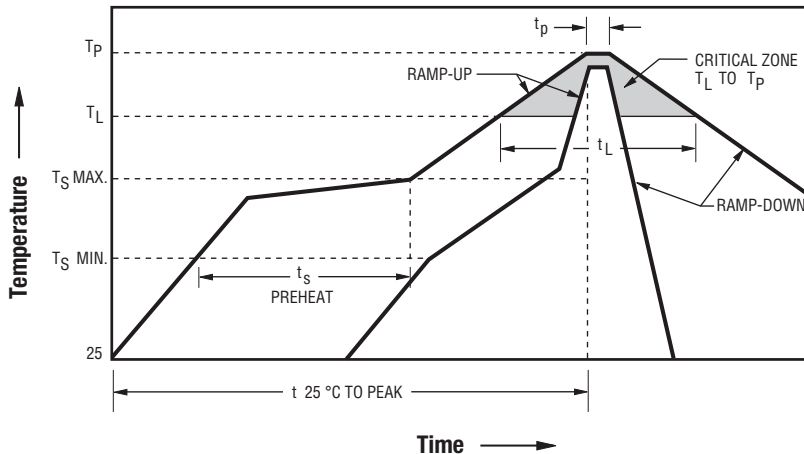
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Solder Reflow Recommendations

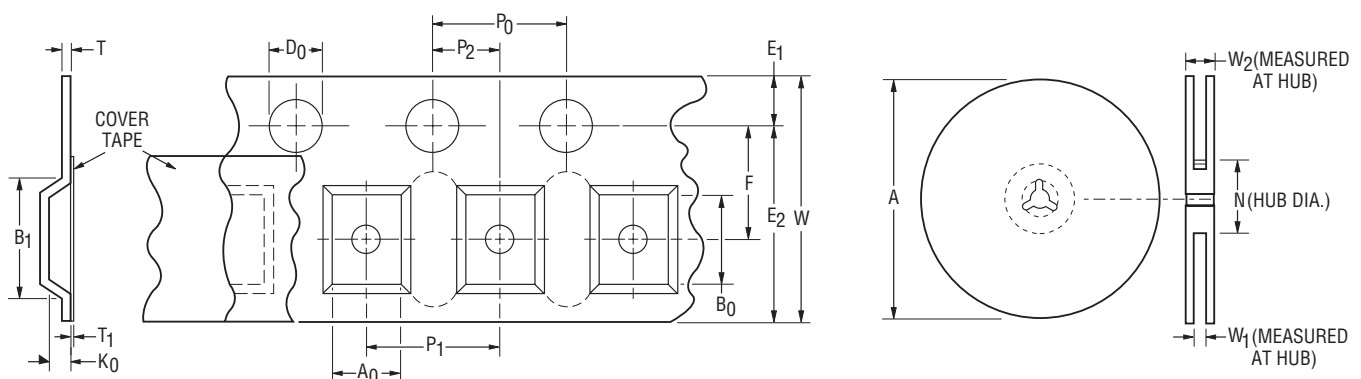


Notes:

- MF-MSMF 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 ($T_{S_{max}}$ to T_p)	3 °C / second max.
PREHEAT:	
Temperature Min. ($T_{S_{min}}$)	150 °C
Temperature Max. ($T_{S_{max}}$)	200 °C
Time ($T_{S_{min}}$ to $T_{S_{max}}$) (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.

Packaging Dimensions – continued (see next page for dimensions)



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MF-MSMF Series Tape and Reel Specifications

BOURNS®

Tape Dimensions per EIA-481	MF-MSMF010 MF-MSMF014 MF-MSMF020 MF-MSMF020/60 MF-MSMF030	MF-MSMF110/8X MF-MSMF110/16X MF-MSMF125/8X MF-MSMF125/12X MF-MSMF150/8X MF-MSMF150/12X MF-MSMF160/8X MF-MSMF200/8X MF-MSMF260/6X	MF-MSMF010/33X MF-MSMF010/60X MF-MSMF014/60X MF-MSMF020/33X MF-MSMF020/60X MF-MSMF030/33X MF-MSMF035/33X MF-MSMF050 MF-MSMF050/16X MF-MSMF050/24X MF-MSMF050/30X MF-MSMF050/40X	MF-MSMF075 MF-MSMF075/16X MF-MSMF075/24 MF-MSMF075/24X MF-MSMF110/16 MF-MSMF125 MF-MSMF150/12 MF-MSMF160	MF-MSMF075/33X MF-MSMF110/24X MF-MSMF125/16X MF-MSMF125/24X MF-MSMF150/16X MF-MSMF150/24X MF-MSMF160/12X MF-MSMF160/16X MF-MSMF160/24X MF-MSMF200/12X MF-MSMF200/16X MF-MSMF250/16X MF-MSMF260/8X MF-MSMF260/12X MF-MSMF260/16X MF-MSMF300/6X	MF-MSMF030/60X MF-MSMF035/60X MF-MSMF050/60X MF-MSMF110/33X
W	$\frac{12.00 \pm 0.30}{(0.472 \pm 0.012)}$					
P ₀	$\frac{4.00 \pm 0.10}{(0.157 \pm 0.004)}$					
10 P ₀	$\frac{40.0 \pm 0.20}{(1.575 \pm 0.008)}$					
P ₁	$\frac{8.00 \pm 0.10}{(0.315 \pm 0.004)}$					
P ₂	$\frac{2.00 \pm 0.05}{(0.079 \pm 0.002)}$					
A ₀	$\frac{3.58 \pm 0.10}{(0.141 \pm 0.004)}$	$\frac{3.66 \pm 0.15}{(0.144 \pm 0.006)}$	$\frac{3.66 \pm 0.15}{(0.144 \pm 0.006)}$	$\frac{3.70 \pm 0.10}{(0.146 \pm 0.004)}$	$\frac{3.50 \pm 0.10}{(0.138 \pm 0.004)}$	
B ₀	$\frac{4.93 \pm 0.10}{(0.194 \pm 0.004)}$	$\frac{4.98 \pm 0.10}{(0.196 \pm 0.004)}$	$\frac{4.98 \pm 0.10}{(0.196 \pm 0.004)}$	$\frac{5.10 \pm 0.10}{(0.201 \pm 0.004)}$	$\frac{4.90 \pm 0.10}{(0.193 \pm 0.004)}$	
B ₁ max.	$\frac{5.90}{(0.232)}$					
D ₀	$\frac{1.50 + 0.10/-0}{(0.059 + 0.004/-0)}$					
F	$\frac{5.50 \pm 0.05}{(0.217 \pm 0.002)}$					
E ₁	$\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$					
E ₂ typ.	$\frac{10.25}{(0.404)}$					
T max.	$\frac{0.60}{(0.024)}$					
T ₁ max.	$\frac{0.10}{(0.004)}$					
K ₀	$\frac{1.30 \pm 0.10}{(0.051 \pm 0.004)}$	$\frac{0.80 \pm 0.10}{(0.031 \pm 0.004)}$	$\frac{0.95 \pm 0.10}{(0.037 \pm 0.004)}$	$\frac{1.50 \pm 0.10}{(0.059 \pm 0.004)}$	$\frac{1.80 \pm 0.10}{(0.071 \pm 0.004)}$	
Leader min.	$\frac{390}{(15.4)}$					
Trailer min.	$\frac{160}{(6.3)}$					

Reel Dimensions

A max.	$\frac{185}{(7.3)}$
N min.	$\frac{50}{(2.0)}$
W ₁	$\frac{12.4 + 2.0/-0}{(0.49 + 0.08/-0)}$
W ₂ max.	$\frac{18.4}{(0.72)}$

MF-MSMF SERIES, REV. BE, 09/26

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

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

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

MFAN 12/18

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The characteristics and parameters of a Bourns® product set forth in its data sheet are based on laboratory conditions, and statements regarding the suitability of products for certain "typical" applications are based on Bourns' knowledge of typical requirements in generic applications. Bourns assumes that "typical" applications include failsafe/backup features to address critical risks to users and are designed to allow rework of Bourns® product to avoid scrap of a device solely due to malfunctioning Bourns® product. The characteristics and parameters of a Bourns® product in a user application may vary from the data sheet characteristics and parameters due to (i) the combination of the Bourns® product with other components in the user's application, or (ii) the environment of the user application itself. The characteristics and parameters of a Bourns® product also can and do vary in different applications and actual performance may vary over time. Thus, users should always verify the actual performance of the Bourns® product in their specific devices and applications and make their own independent judgments regarding the suitability of Bourns® product and the amount of additional test margin to design into their device or application to compensate for differences between laboratory and real-world conditions.

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Bourns® products are not recommended, authorized or intended for use in applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage, such as without limitation nuclear, life-critical medical and certain automotive and aviation applications. Except as set forth in the bullet points below or unless expressly and specifically approved in writing on a case-by-case basis by an authorized Bourns' representative, use of any Bourns® products in such unauthorized high-risk applications is at the user's sole risk.

- Bourns considers implantable/invasive devices and devices/procedures designed as life-supporting or life-sustaining by the U.S. Food and Drug Administration or equivalent organizations outside of the United States as "life-critical" medical applications. Bourns expressly identifies those Bourns® standard products that are suitable for use in typical medical applications that are not life-critical in its publication entitled "Bourns Medical Grade Component Guide."
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- Bourns expressly identifies Bourns® standard products that are suitable for use in the typical aviation applications/systems requiring System Design Assurance Level (RTCA DO-254 DAL) of C, D or E in its publication entitled "Bourns Civilian Aerospace/Aviation Grade Component Guide." Bourns does not test its products for compliance with United States Federal Aviation Administration standards or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aviation applications. Use of Bourns® standard components in aviation applications associated with RTCA DO-254 DAL A or B without proper approval noted above shall be at the user's sole risk.
- Bourns will review and authorize on a case-by-case basis the use of Bourns® standard products which are at least AEC-Q compliant in space-related civil applications (rockets, satellites) with a negotiated cross-waiver and indemnity agreement.

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