BOURNS®

Features

- High power ratings
- Low profile
- Compatible with Pb and Pb-free solder reflow profiles
- RoHS compliant* and halogen free**
- Surface mount packaging for automated assembly
- Agency recognition:
- Standard 7451 mm (2920 mils) footprint

MF-LSMF 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	
	Volts	Amps	Amps		R_{Min}	R_{1Max}	Amps	Seconds	Typ.	E174545	R50256634	
MF-LSMF075X	30	40	0.75	1.5	0.15	1.00	8.0	0.3	1.5	✓	✓	
MF-LSMF110X	33	40	1.1	2.2	0.07	0.41	8.0	0.5	1.5	✓	✓	
MF-LSMF125X	15	40	1.25	2.5	0.05	0.25	8.0	2.0	1.5	✓	✓	
MF-LSMF125/33X	33	40	1.25	2.5	0.055	0.25	8.0	2.0	1.5	✓	✓	
MF-LSMF150X	15	40	1.5	3.0	0.05	0.23	8.0	2.0	1.5	✓	✓	
MF-LSMF150/33X	33	40	1.5	3.0	0.05	0.23	8.0	2.0	1.5	✓	✓	
MF-LSMF185X	15	40	1.85	3.7	0.045	0.15	8.0	2.5	1.5	✓	✓	
MF-LSMF185/24X	24	40	1.85	3.7	0.045	0.15	8.0	2.5	1.5	✓	✓	
MF-LSMF185/33X	33	40	1.85	3.7	0.045	0.15	8.0	2.5	1.5	✓	✓	✓
MF-LSMF200X	15	40	2.0	4.0	0.035	0.125	8.0	5.0	1.5	✓	✓	
MF-LSMF200/24X	24	40	2.0	4.0	0.035	0.125	8.0	5.0	1.5	✓	✓	
MF-LSMF260X	24	40	2.6	5.2	0.020	0.075	8.0	5.0	1.5	✓	✓	✓
MF-LSMF260/6X	6	40	2.6	5.0	0.020	0.075	8.0	10	1.5	✓	✓	
MF-LSMF260/16X	16	40	2.6	5.2	0.020	0.075	8.0	5.0	1.5	✓	✓	
MF-LSMF300X	6	40	3.0	5.0	0.015	0.048	8.0	15	1.5	✓	✓	
MF-LSMF300/16X	16	40	3.0	5.0	0.015	0.048	8.0	15	1.5	✓	✓	
MF-LSMF300/24X	24	40	3.0	5.2	0.015	0.075	8.0	15	1.5	✓	✓	✓
MF-LSMF330X	6	40	3.3	5.5	0.010	0.055	8.0	15	2.0	✓	✓	
MF-LSMF330/12X	12	40	3.3	5.5	0.010	0.055	8.0	15	2.0	✓	✓	
MF-LSMF330/16X	16	40	3.3	5.5	0.010	0.055	8.0	15	2.0	✓	✓	
MF-LSMF330/24X	24	40	3.3	5.5	0.010	0.055	8.0	15	2.0	✓	✓	
MF-LSMF400/16X	16	40	4.0	8.0	0.005	0.040	20	4.0	1.5	✓	✓	
MF-LSMF500/16X	16	40	5.0	10.0	0.005	0.025	20	5.0	1.5	✓	✓	
MF-LSMF600/12X	12	50	6.0	12.0	0.004	0.020	30	2.0	2.0	✓	✓	

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)	

Additional Information

Click these links for more information:

PRODUCT SELECTOR | TECHNICAL LIBRARY | INVENTORY | SAMPLES | CONTACT

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

- Industrial controls
- IEEE ports
- Portable electronics

Test Procedures and Requirements

Item	Test Conditions	Accept/Reject Criteria
Visual/Mechanical	Verify dimensions and materials	Per MF physical description
Resistance	In still air @ 23 °C	$R_{min} \le R \le R_{max}$
Time to Trip	At specified current, V_{max}, 23 °C, still air	T ≤ 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}, 48 hours	No arcing or burning
Solderability	245 °C ± 5 °C, 5 seconds	95 % min. coverage

Product Dimensions

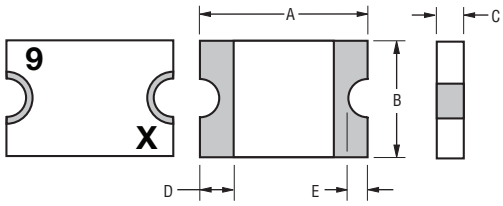
Model	A		B		C		D		E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
MF-LSMF075X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.35 (0.014)	0.85 (0.033)				
MF-LSMF110X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.35 (0.014)	0.85 (0.033)				
MF-LSMF125X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.35 (0.014)	0.85 (0.033)				
MF-LSMF125/33X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF150X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.35 (0.014)	0.85 (0.033)				
MF-LSMF150/33X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF185X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.35 (0.014)	0.85 (0.033)				
MF-LSMF185/24X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF185/33X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)	0.30 (0.012)	2.50 (0.098)	0.25 (.010)	2.00 (.079)
MF-LSMF200X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF200/24X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF260X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF260/6X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.35 (0.014)	0.85 (0.033)				
MF-LSMF260/16X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF300X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.35 (0.014)	0.85 (0.033)				
MF-LSMF300/16X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF300/24X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				

Product Dimensions (continued)

Model	A		B		C		D		E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
MF-LSMF330X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.35 (0.014)	0.85 (0.033)				
MF-LSMF330/12X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF330/16X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF330/24X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)	0.30 (0.012)	2.50 (0.098)	0.25 (.010)	2.00 (.079)
MF-LSMF400/16X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF500/16X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				
MF-LSMF600/12X	6.73 (0.265)	7.98 (0.314)	4.80 (0.189)	5.44 (0.214)	0.75 (0.030)	1.60 (0.063)				

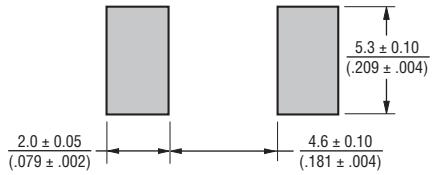
DIMENSIONS: MM (INCHES)

Top View *Bottom View* *Side View*



Terminal material:
Electroless Ni under immersion Au

Recommended Pad Layout



How to Order

MF - LSMF 185/33X - 2

Multifuse® Product Designator

Series
LSMF = 7451 mm (2920 mils) Surface Mount Component

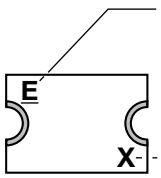
Hold Current, Ihold
0.75-600 (0.75 Amps - 6.0 Amps)

Voltage Option
/33 = 33 Volt Rated
X = Multifuse® freeXpansion™ Design

Packaging
-2 = Tape and Reel packaged per EIA-481

Typical Part Marking

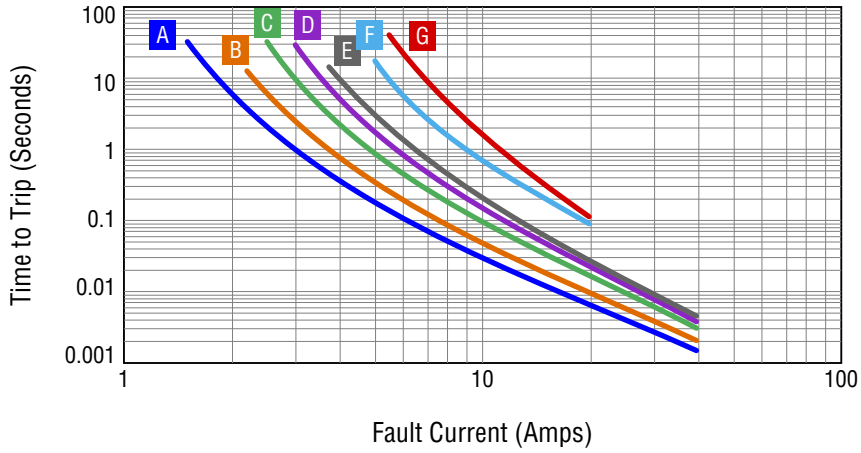
Represents total content. Layout may vary.



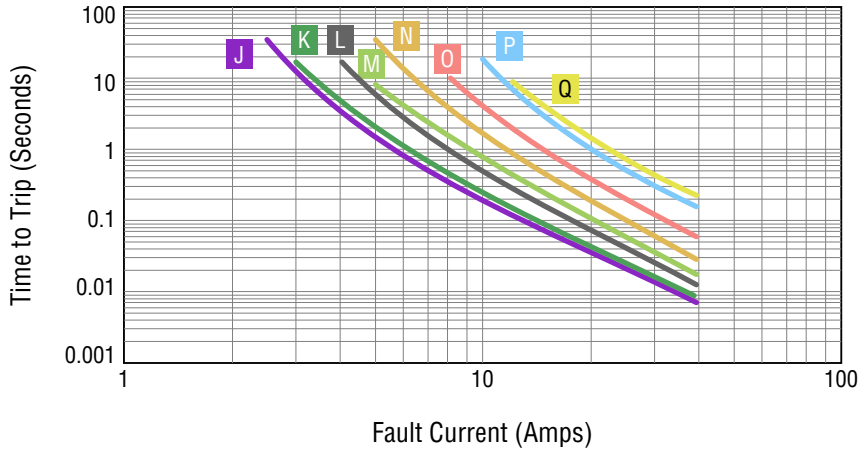
PART IDENTIFICATION EXAMPLES:

MF-LSMF075X = 5	MF-LSMF185X = N	MF-LSMF300/16X = H
MF-LSMF110X = 6	MF-LSMF185/24X = 9	MF-LSMF300/24X = J
MF-LSMF125X = 7	MF-LSMF185/33X = 9	MF-LSMF330X = X
MF-LSMF125/33X = L	MF-LSMF200X = A	MF-LSMF330/12X = Q
MF-LSMF150X = M	MF-LSMF200/24X = A	MF-LSMF330/16X = Q
MF-LSMF150/33X = 8	MF-LSMF260X = E	MF-LSMF330/24X = Q
	MF-LSMF260/6X = P	MF-LSMF400/16X = K
BI-WEEKLY DATE CODE:	MF-LSMF260/16X = E	MF-LSMF500/16X = S
WEEKS 47-48 = X	MF-LSMF300X = F	MF-LSMF600/12X = T

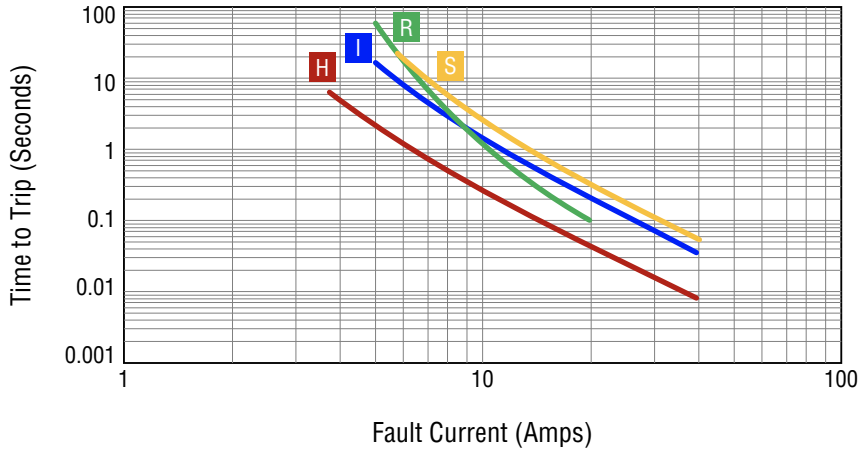
Typical Time to Trip at 23 °C



A MF-LSMF075X
B MF-LSMF110X
C MF-LSMF125X
D MF-LSMF150X
E MF-LSMF185X
F MF-LSMF260/6X
G MF-LSMF330X



J MF-LSMF125/33X
K MF-LSMF150/33X
L MF-LSMF200X, MF-LSMF200/24X
M MF-LSMF260X, MF-LSMF260/16X
N MF-LSMF300/16X
O MF-LSMF400/16X
P MF-LSMF500/16X
Q MF-LSMF600/12X



H MF-LSMF185/24X, MF-LSMF185/33X
I MF-LSMF300/24X
R MF-LSMF300X
S MF-LSMF330/12X, MF-LSMF330/16X, MF-LSMF330/24X

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.

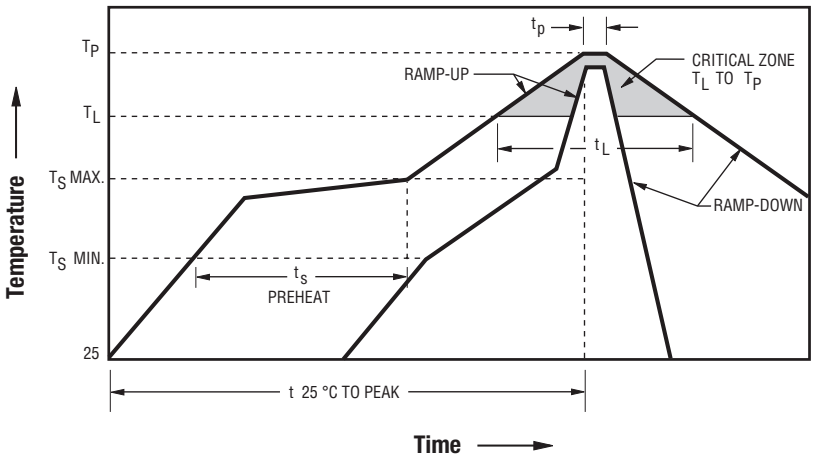
Thermal Derating Chart - I_{hold} (Amps)

Model	Ambient Operating Temperature								
	-40 ˚C	-20 ˚C	0 ˚C	23 ˚C	40 ˚C	50 ˚C	60 ˚C	70 ˚C	85 ˚C
MF-LSMF075X	1.10	1.01	0.89	0.75	0.63	0.56	0.50	0.44	0.34
MF-LSMF110X	1.61	1.47	1.30	1.10	0.92	0.83	0.73	0.64	0.50
MF-LSMF125X	1.83	1.68	1.48	1.25	1.05	0.94	0.83	0.73	0.56
MF-LSMF125/33X	1.83	1.68	1.48	1.25	1.05	0.94	0.83	0.73	0.56
MF-LSMF150X	2.19	2.01	1.77	1.50	1.26	1.13	0.99	0.87	0.68
MF-LSMF150/33X	2.19	2.01	1.77	1.50	1.26	1.13	0.99	0.87	0.68
MF-LSMF185X	2.70	2.48	2.18	1.85	1.55	1.39	1.22	1.07	0.83
MF-LSMF185/24X	2.80	2.47	2.17	1.85	1.54	1.39	1.22	1.07	0.85
MF-LSMF185/33X	2.80	2.47	2.17	1.85	1.54	1.39	1.22	1.07	0.85
MF-LSMF200X	2.92	2.68	2.36	2.00	1.68	1.50	1.32	1.16	0.90
MF-LSMF200/24X	2.92	2.68	2.36	2.00	1.68	1.50	1.32	1.16	0.90
MF-LSMF260X	3.75	3.35	3.00	2.60	2.35	2.15	2.05	1.80	1.30
MF-LSMF260/6X	3.80	3.48	3.07	2.60	2.18	1.95	1.72	1.51	1.17
MF-LSMF260/16X	3.75	3.35	3.00	2.60	2.35	2.15	2.05	1.80	1.30
MF-LSMF300X	4.53	4.02	3.51	3.00	2.52	2.26	1.99	1.75	1.34
MF-LSMF300/16X	4.38	4.02	3.54	3.00	2.52	2.25	1.98	1.74	1.35
MF-LSMF300/24X	4.00	3.55	3.20	3.30	2.50	2.25	2.15	1.85	1.50
MF-LSMF330X	4.82	4.42	3.89	3.30	2.77	2.48	2.18	1.91	1.49
MF-LSMF330/12X	4.82	4.42	3.89	3.30	2.77	2.48	2.18	1.91	1.49
MF-LSMF330/16X	4.82	4.42	3.89	3.30	2.77	2.48	2.18	1.91	1.49
MF-LSMF330/24X	4.82	4.42	3.89	3.30	2.77	2.48	2.18	1.91	1.49
MF-LSMF400/16X	5.84	5.36	4.72	4.00	3.36	3.00	2.64	2.32	1.80
MF-LSMF500/16X	7.30	6.70	5.90	5.00	4.20	3.75	3.30	2.90	2.25
MF-LSMF600/12X	8.76	8.04	7.08	6.00	5.04	4.50	3.96	3.48	2.70

Packaging Quantity

Model			Unit Quantity (pcs.)	Unit
MF-LSMF125/33X MF-LSMF150/33X MF-LSMF185/24X MF-LSMF185/33X MF-LSMF200X MF-LSMF200/24X	MF-LSMF260X MF-LSMF260/16X MF-LSMF300/16X MF-LSMF300/24X MF-LSMF330/12X MF-LSMF330/16X	MF-LSMF330/24X MF-LSMF400/16X MF-LSMF500/16X MF-LSMF600/12X	4000	Reel
MF-LSMF075X MF-LSMF110X MF-LSMF125X	MF-LSMF150X MF-LSMF185X MF-LSMF260/6X	MF-LSMF300X MF-LSMF330X	6000	Reel

Solder Reflow Recommendations



Notes:

- MF-LSMF 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 (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.

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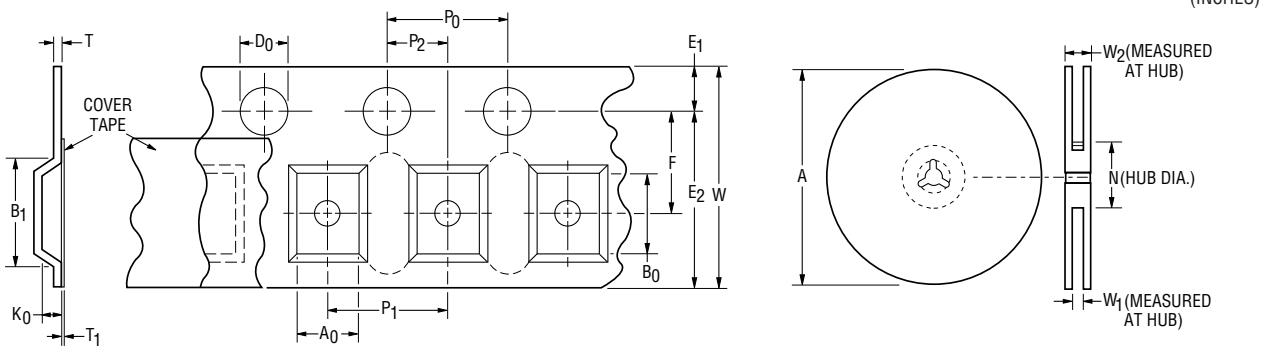
MF-LSMF Series Tape and Reel Specifications

BOURNS®

Tape Dimensions per EIA 481	MF-LSMF075X, MF-LSMF110/X, MF-LSMF125X, MF-LSMF150X, MF-LSMF185X, MF-LSMF260/6X, MF-LSMF300X & MF-LSMF330X	MF-LSMF125/33X, MF-LSMF150/33X, MF-LSMF185/24X, MF-LSMF185/33X, MF-LSMF200X, MF-LSMF200/24X, MF-LSMF260X, MF-LSMF260/16X, MF-LSMF300/16X, MF-LSMF300/24X, MF-LSMF330/12X, MF-LSMF330/16X, MF-LSMF330/24X, MF-LSMF400/16X, MF-LSMF500/16X & MF-LSMF600/12X
W	16.0 ± 0.30 (0.630 ± 0.012)	16.0 ± 0.30 (0.630 ± 0.012)
P_0	4.0 ± 0.10 (0.157 ± 0.004)	4.0 ± 0.10 (0.157 ± 0.004)
10 P_0	40 ± 0.20 (1.575 ± 0.008)	40 ± 0.20 (1.575 ± 0.008)
P_1	8.0 ± 0.10 (0.315 ± 0.004)	8.0 ± 0.10 (0.315 ± 0.004)
P_2	2.0 ± 0.10 (0.079 ± 0.004)	2.0 ± 0.10 (0.079 ± 0.004)
A_0	5.74 ± 0.10 (0.226 ± 0.004)	5.70 ± 0.10 (0.224 ± 0.004)
B_0	8.02 ± 0.10 (0.316 ± 0.004)	8.10 ± 0.10 (0.319 ± 0.004)
B_1 max.	12.1 (0.476)	12.1 (0.476)
D_0	1.5 +0.10/-0 (0.059 +0.004/-0)	1.5 +0.10/-0 (0.059 +0.004/-0)
F	7.5 ± 0.10 (0.295 ± 0.004)	7.5 ± 0.10 (0.295 ± 0.004)
E_1	1.75 ± 0.10 (0.069 ± 0.004)	1.75 ± 0.10 (0.069 ± 0.004)
E_2 min.	14.25 (0.561)	14.25 (0.561)
T max.	0.6 (0.024)	0.6 (0.024)
T_1 max	0.1 (0.004)	0.1 (0.004)
K_0	0.91 ± 0.10 (0.036 ± 0.004)	1.70 ± 0.10 (0.067 ± 0.004)
Leader min.	390 (15.35)	390 (15.35)
Trailer min.	160 (6.30)	160 (6.30)
Reel Dimensions		
A max.	331 (13.03)	331 (13.03)
N min.	50 (1.97)	50 (1.97)
W_1	16.4 +2.0/-0 (0.646 + 0.079/-0)	16.4 +2.0/-0 (0.646 + 0.079/-0)
W_2 max.	22.4 (0.882)	22.4 (0.882)

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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