Features

- Compliant with AEC-Q200 Rev-D Stress Test Qualification for Passive Components in Automotive Applications
- 100 % electrically compatible with all previous generations of 1812 SMT devices
- Compatible with Pb and Pb-free solder reflow profiles
- RoHS compliant* and halogen free**
- Surface mount packaging for automated assembly
- Agency recognition: c UL us, TÜV
- Standard 4532 mm (1812 mils) footprint

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	
	Volts	Amps	Amps		R_{Min}	R_{1Max}	Amps	Seconds	Typ.	E174545	R50256634	
MF-MSMF010	60	40	0.1	0.3	0.7	15	0.5	1.5	0.8	✓	✓	✓
MF-MSMF014	60	40	0.14	0.3	0.4	6.5	1.5	0.2	0.8	✓	✓	✓
MF-MSMF020	30	80	0.2	0.4	0.4	6.0	6.0	0.1	0.8	✓	✓	✓
MF-MSMF020/60	60	40	0.2	0.4	0.4	6.0	1.5	0.2	0.8	✓	✓	✓
MF-MSMF030	30	10	0.3	0.6	0.3	3.0	8.0	0.1	0.8	✓	✓	✓
MF-MSMF050	15	100	0.5	1.0	0.15	1.0	8.0	0.2	0.8	✓	✓	✓
MF-MSMF050/30X	30	40	0.5	1.0	0.15	1.3	8.0	0.2	0.8	✓	✓	✓
MF-MSMF050/40X	40	20	0.5	1.0	0.15	1.3	8.0	0.2	0.8	✓		
MF-MSMF075	13.2	100	0.75	1.5	0.11	0.45	8.0	0.2	0.8	✓	✓	✓
MF-MSMF075/24	24	40	0.75	1.5	0.11	0.45	8.0	0.2	0.8	✓	✓	✓
MF-MSMF075/33X	33	20	0.8	1.5	0.11	0.40	8.0	0.2	1.4	✓		✓
MF-MSMF110	6	100	1.1	2.2	0.04	0.21	8.0	0.3	0.8	✓	✓	
MF-MSMF110/16	16	100	1.1	2.2	0.04	0.21	8.0	0.3	0.8	✓	✓	✓
MF-MSMF110/24X	24	20	1.1	2.2	0.06	0.18	8.0	0.5	0.8	✓	✓	✓
MF-MSMF125	6	100	1.3	2.5	0.05	0.14	8.0	0.4	0.8	✓	✓	
MF-MSMF150	6	100	1.5	3.0	0.03	0.12	8.0	0.5	0.8	✓	✓	
MF-MSMF150/12	12	100	1.5	3.0	0.03	0.12	8.0	0.5	0.8	✓	✓	✓
MF-MSMF150/24X	24	20	1.5	3.0	0.03	0.12	8.0	1.5	1.0	✓	✓	✓
MF-MSMF160	8	100	1.6	2.8	0.035	0.099	8.0	2.0	0.8	✓	✓	
MF-MSMF200	8	40	2.0	4.0	0.020	0.080	8.0	2.0	0.8	✓	✓	
MF-MSMF250/16X	16	100	2.5	5.0	0.015	0.100	8.0	5.0	1.2	✓	✓	✓
MF-MSMF260	6	100	2.6	5.2	0.015	0.080	8.0	5.0	0.8	✓	✓	
MF-MSMF260/16X	16	100	2.6	5.0	0.015	0.050	8.0	5.0	1.2	✓	✓	✓
MF-MSMF300X	6	100	3.0	5.0	0.010	0.040	8.0	5.0	1.2	✓		

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)	

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

- Overcurrent and overtemperature protection of automotive electronics
- Hard disk drives
- PC motherboards
- PC peripherals
- Point-of-sale (POS) equipment
- PCMCIA cards
- USB port protection - USB 2.0, 3.0 & OTG
- HDMI 1.4 Source protection

MF-MSMF Series - PTC Resettable Fuses

BOURNS®

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	$R_{min} \le R \le R_{max}$
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}, I_{max}, 48 hours	No arcing or burning
Solderability	245 °C ±5 °C, 5 seconds	95 % min. coverage

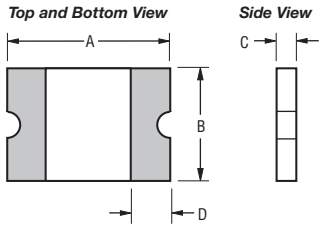
Product Dimensions (see next page for outline drawings)

Model	Style	A		B		C		D
		Min.	Max.	Min.	Max.	Min.	Max.	Min.
MF-MSMF010	1	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)
MF-MSMF014								
MF-MSMF020								
MF-MSMF020/60								
MF-MSMF030								
MF-MSMF050								
MF-MSMF050/30X	2	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.40 (0.016)	0.85 (0.033)	
MF-MSMF050/40X								
MF-MSMF075	1	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	
MF-MSMF075/24								
MF-MSMF075/33X	2	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	
MF-MSMF110	1	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	
MF-MSMF110/16								
MF-MSMF110/24X	2	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	
MF-MSMF125	1	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	
MF-MSMF150								
MF-MSMF150/12								
MF-MSMF150/24X	2	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	
MF-MSMF160	1	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.55 (0.022)	0.85 (0.033)	
MF-MSMF200		4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.45 (0.018)	0.85 (0.033)	
MF-MSMF250/16X	2	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	
MF-MSMF260	1	4.37 (0.172)	4.73 (0.186)	3.07 (0.121)	3.41 (0.134)	0.45 (0.018)	0.85 (0.033)	
MF-MSMF260/16X	2	4.37 (0.172)	4.83 (0.190)	3.07 (0.121)	3.41 (0.134)	0.70 (0.028)	1.60 (0.063)	
MF-MSMF300X								

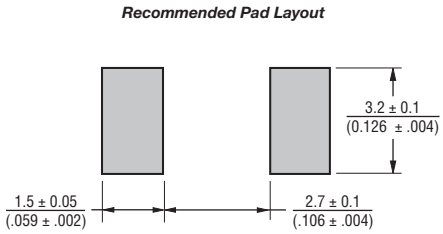
DIMENSIONS: MM (INCHES)

Product Dimensions (see previous page for dimensions)

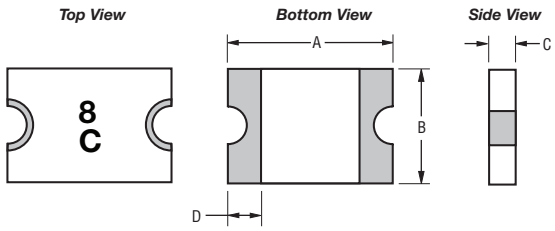
Style 1

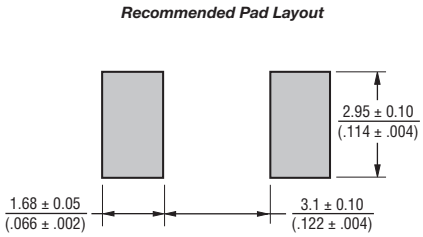


Terminal material:
Electroless Ni under immersion Au

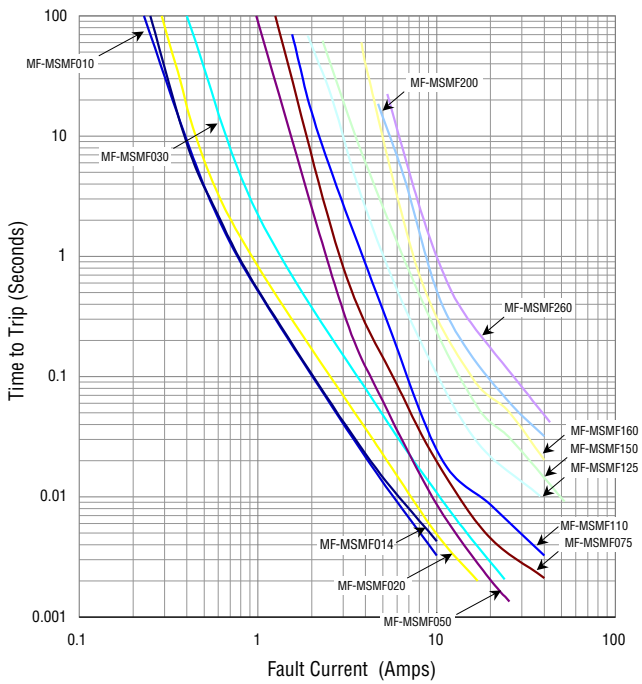


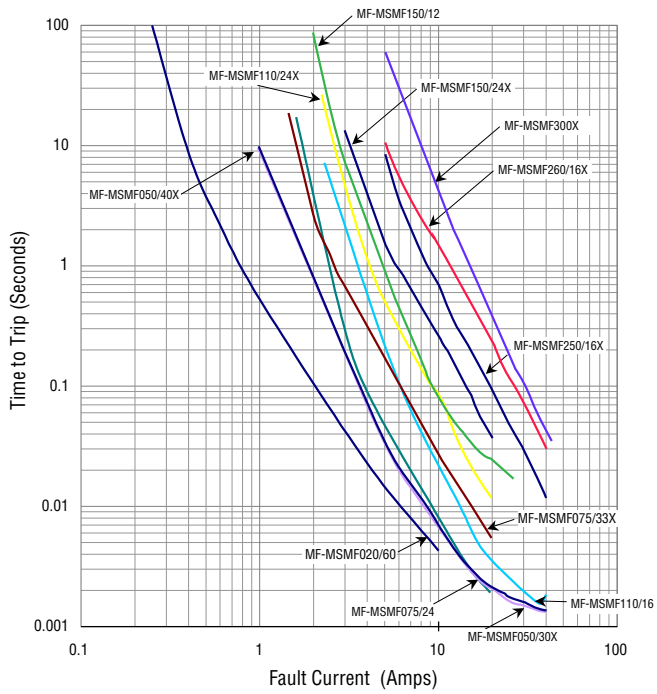
Style 2





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.

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-MSMF014	0.23	0.20	0.17	0.14	0.12	0.10	0.09	0.08	0.06
MF-MSMF020	0.30	0.27	0.23	0.20	0.17	0.15	0.13	0.12	0.09
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-MSMF050	0.77	0.68	0.59	0.50	0.44	0.40	0.37	0.33	0.29
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-MSMF075	1.15	1.01	0.88	0.75	0.65	0.60	0.55	0.49	0.43
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	1.59	1.43	1.26	1.10	0.95	0.87	0.80	0.71	0.60
MF-MSMF110/16	1.59	1.43	1.26	1.10	0.95	0.87	0.80	0.71	0.60
MF-MSMF110/24X	2.00	1.70	1.40	1.10	0.95	0.88	0.80	0.73	0.61
MF-MSMF125	2.00	1.69	1.47	1.25	1.03	0.92	0.90	0.69	0.53
MF-MSMF150	2.17	1.95	1.72	1.50	1.30	1.18	1.09	0.97	0.82
MF-MSMF150/12	2.17	1.95	1.72	1.50	1.30	1.18	1.09	0.97	0.82
MF-MSMF150/24X	2.10	1.90	1.70	1.50	1.25	1.13	1.00	0.88	0.69
MF-MSMF160	2.30	2.20	1.90	1.60	1.45	1.30	1.15	1.03	0.91
MF-MSMF200	3.08	2.71	2.35	2.00	1.80	1.60	1.50	1.40	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	3.40	3.16	2.90	2.60	2.32	2.18	2.00	1.90	1.69
MF-MSMF260/16X	3.50	3.20	3.00	2.60	2.30	2.15	2.00	1.85	1.63
MF-MSMF300X	4.13	3.75	3.33	3.00	2.70	2.54	2.35	2.22	1.98

Packaging Quantity

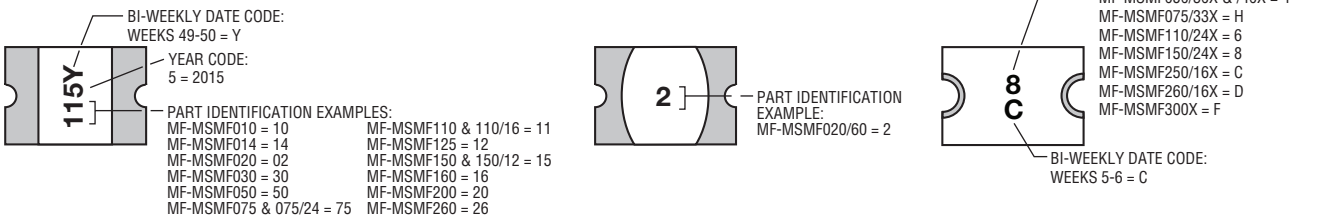
MF-MSMF010 ~ MF-MSMF030 = 1500 pcs. per reel

MF-MSMF050 ~ MF-MSMF260 = 2000 pcs. per reel

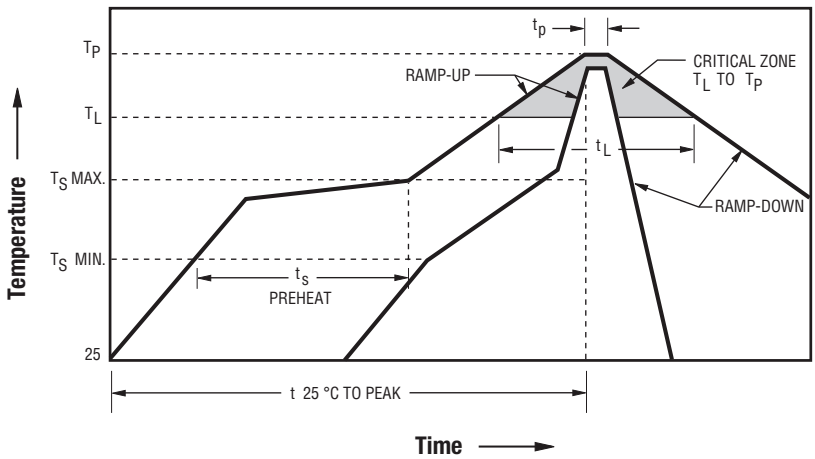
MF-MSMF075/33X, MF-MSMF110/24X, MF-MSMF150/24X, MF-MSMF250/16X, MF-MSMF260/16X & MF-MSMF300X = 1500 pcs. per reel

Typical Part Marking

Represents total content. Layout may vary.



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 (Ts_{max} to T_p)	3 °C / second max.
PREHEAT:	
Temperature Min. (Ts_{min})	150 °C
Temperature Max. (Ts_{max})	200 °C
Time (Ts_{min} to Ts_{max}) (ts)	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.

How to Order

MF - MSMF 075/24 - 2

Multifuse® Product Designator

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

Hold Current, Ihold
010-300 (0.10 Amps - 3.0 Amps)

Higher Voltage Option
Blank = Standard Voltage
/12, /16, /24, /30, /33, /40, /60 = Specific Voltage Rated
X = Multifuse® freeXpansion Design™

Packaging
-2 = Tape and Reel*

* Packaged per EIA-481

MF-MSMF Series Tape and Reel Specifications

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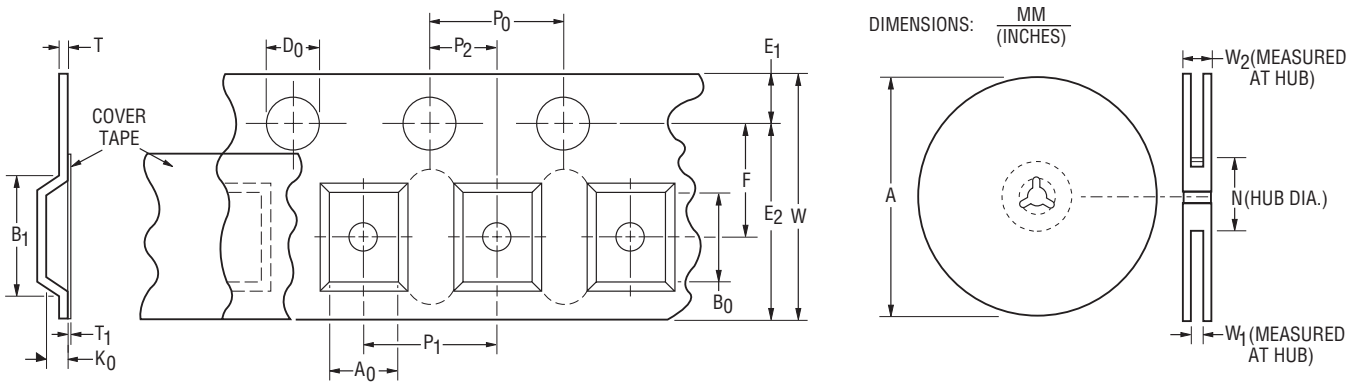
Tape Dimensions per EIA-481	MF-MSMF010 MF-MSMF014 MF-MSMF020 MF-MSMF020/60 MF-MSMF030	MF-MSMF050 MF-MSMF050/30X MF-MSMF050/40X MF-MSMF075 MF-MSMF075/24 MF-MSMF110 MF-MSMF110/16 MF-MSMF125 MF-MSMF150 MF-MSMF150/12 MF-MSMF160 MF-MSMF200 MF-MSMF260	MF-MSMF075/33X MF-MSMF110/24X MF-MSMF150/24X MF-MSMF250/16X MF-MSMF260/16X MF-MSMF300X
W	12.00 ± 0.30 (0.472 ± 0.012)		
P_0	4.00 ± 0.10 (0.157 ± 0.004)		
10 P_0	40.00 ± 0.20 (1.575 ± 0.008)		
P_1	8.00 ± 0.10 (0.315 ± 0.004)		
P_2	2.00 ± 0.05 (0.079 ± 0.002)		
A_0	3.58 ± 0.10 (0.141 ± 0.004)	3.66 ± 0.15 (0.144 ± 0.006)	3.70 ± 0.10 (0.146 ± 0.004)
B_0	4.93 ± 0.10 (0.194 ± 0.004)	4.98 ± 0.15 (0.196 ± 0.006)	5.10 ± 0.10 (0.201 ± 0.004)
B_1 max.	5.90 (0.232)		
D_0	1.50 +0.10/-0 (0.059 +0.004/-0)		
F	5.50 ± 0.05 (0.217 ± 0.002)		
E_1	1.75 ± 0.10 (0.069 ± 0.004)		
E_2 typ.	10.25 (0.404)		
T max.	0.60 (0.024)		
T_1 max.	0.10 (0.004)		
K_0	1.30 ± 0.10 (0.051 ± 0.004)	0.95 ± 0.10 (0.037 ± 0.004)	1.50 ± 0.10 (0.059 ± 0.004)
Leader min.	390 (15.4)		
Trailer min.	160 (6.3)		
Reel Dimensions			
A max.	185 (7.3)		
N min.	50 (2.0)		
W_1	12.4 +2.0/-0 (0.49 +0.08/-0)		
W_2 max.	18.4 (0.72)		



Specifications are subject to change without notice.
Users should verify actual device performance in their specific applications.
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.

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

Legal Disclaimer Notice

BOURNS®

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Unless otherwise expressly indicated in writing, Bourns® products and data sheets relating thereto are subject to change without notice. Users should check for and obtain the latest relevant information and verify that such information is current and complete before placing orders for Bourns® products.

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 types of applications are based on Bourns' knowledge of typical requirements in generic applications. 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. 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 amount of additional test margin to design into their device or application to compensate for differences between laboratory and real world conditions.

Unless Bourns has explicitly designated an individual Bourns® product as meeting the requirements of a particular industry standard (e.g., ISO/TS 16949) or a particular qualification (e.g., UL listed or recognized), Bourns is not responsible for any failure of an individual Bourns® product to meet the requirements of such industry standard or particular qualification. Users of Bourns® products are responsible for ensuring compliance with safety-related requirements and standards applicable to their devices or applications.

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