

Features

- Surface mount packaging for automated assembly
- Small footprint size (1210) and low profile for space-constrained mobile applications
- Ultra-low resistance
- RoHS compliant* and halogen free**
- Agency recognition:

Applications

- Thermal protection for Li-ion and polymer battery packs
- Game consoles
- PC motherboards
- USB port protection - USB 2.0, 3.0 & OTG
- Mobile phones
- Digital cameras

MF-USML Series - Low Ohmic 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-USML175	6	50	1.75	3.50	0.0060	0.0400	8.00	2.50	0.8
MF-USML190	6	50	1.90	4.90	0.0060	0.0300	9.50	3.00	0.8
MF-USML200	6	50	2.00	4.00	0.0050	0.0240	8.00	3.00	0.8
MF-USML230	6	50	2.30	4.60	0.0045	0.0240	8.00	3.50	0.8
MF-USML250	6	50	2.50	5.00	0.0045	0.0220	8.00	3.50	0.8
MF-USML270	6	50	2.70	5.40	0.0040	0.0200	8.00	4.00	0.8
MF-USML300	6	50	3.00	6.00	0.0040	0.0180	8.00	4.00	0.8
MF-USML350	6	50	3.50	7.00	0.0030	0.0180	17.50	2.00	0.8
MF-USML380	6	50	3.80	8.00	0.0020	0.0160	19.00	2.00	0.8
MF-USML400***	6	50	4.00	8.00	0.0015	0.0155	20.00	2.00	0.8
MF-USML450***	6	50	4.50	9.00	0.0010	0.0150	22.50	2.00	0.8
MF-USML500***	6	50	5.00	10.00	0.0010	0.0145	25.00	2.00	0.8
MF-USML600***	6	50	6.00	12.00	0.0010	0.0140	30.00	2.00	0.8
MF-USML650***	6	50	6.50	13.00	0.0010	0.0140	32.50	2.00	0.8
MF-USML700***	6	50	7.00	14.00	0.0010	0.0135	35.00	2.00	0.8

*** TÜV approval pending.

Environmental Characteristics

Operating Temperature	-40 °C to +85 °C	
Passive Aging	+85 °C, 1000 hours	±10 % typical resistance change
Humidity Aging	+85 °C, 85 % R.H. 100 hours	±15 % typical resistance change
Thermal Shock	+85 °C to -40 °C, 20 times	±30 % 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-USML 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

cUL File Number	E174545 http://www.ul.com/ Follow link to Certifications, then cUL File No., enter E174545
TÜV Certificate Number	R 02057213 http://www.tuvdotcom.com/ Follow link to “other certificates”, enter File No. 2057213

* RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

**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.

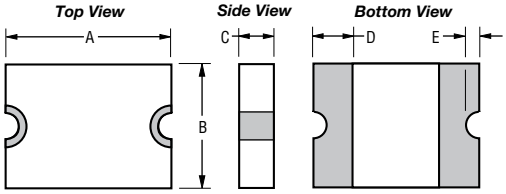
Specifications are subject to change without notice.
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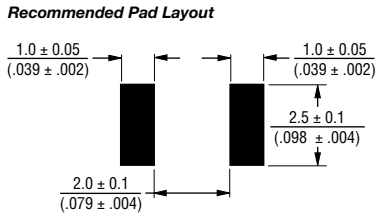
Product Dimensions

Model	A		B		C		D	E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.
MF-USML175	3.00 (0.118)	3.43 (0.135)	2.35 (0.093)	2.80 (0.110)	0.30 (0.012)	0.60 (0.024)	0.25 (0.010)	0.05 (0.002)	0.45 (0.018)
MF-USML190									
MF-USML200									
MF-USML230									
MF-USML250									
MF-USML270									
MF-USML300									
MF-USML350									
MF-USML380									
MF-USML400									
MF-USML450	3.00 (0.118)	3.43 (0.135)	2.35 (0.093)	2.80 (0.110)	0.60 (0.024)	1.20 (0.047)	0.25 (0.010)	0.05 (0.002)	0.45 (0.018)
MF-USML500									
MF-USML600									
MF-USML650									
MF-USML700									

Packaging:
MF-USML175~MF-USML400 = 5000 pcs. per reel
MF-USML450~MF-USML700 = 3500 pcs. per reel

DIMENSIONS: MM (INCHES)





Terminal material:
ENIG-plated terminals
(Tin-plated terminals available upon request).

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

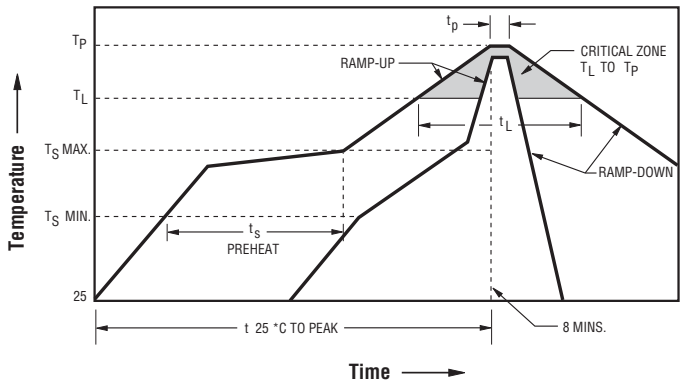
Recommended Storage:
40 °C max./70 % RH max.

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-USML175	2.57	2.33	2.07	1.75	1.49	1.34	1.24	1.00	0.91
MF-USML190	2.89	2.58	2.25	1.90	1.54	1.36	1.21	0.94	0.77
MF-USML200	3.26	2.87	2.50	2.00	1.70	1.48	1.29	1.09	0.78
MF-USML230	3.55	3.17	2.78	2.30	1.94	1.72	1.55	1.27	1.06
MF-USML250	3.70	3.35	2.95	2.50	2.10	1.90	1.75	1.40	1.30
MF-USML270	3.98	3.60	3.18	2.70	2.28	2.03	1.90	1.52	1.40
MF-USML300	4.41	3.99	3.54	3.00	2.55	2.30	2.13	1.71	1.56
MF-USML350	5.00	4.60	4.05	3.50	2.80	2.40	2.00	1.60	1.00
MF-USML380	6.00	5.28	4.52	3.80	3.15	2.65	2.39	2.09	1.60
MF-USML400	5.71	5.26	4.63	4.00	3.20	2.70	2.29	2.00	1.37
MF-USML450	6.62	5.99	5.31	4.50	3.83	3.50	3.20	2.57	2.34
MF-USML500	7.35	6.60	5.90	5.00	4.25	3.88	3.55	2.85	2.60
MF-USML600	8.82	7.98	7.08	6.00	5.10	4.66	4.26	3.43	3.12
MF-USML650	9.56	8.65	7.67	6.50	5.53	5.05	4.62	3.71	3.38
MF-USML700	10.29	9.31	8.26	7.00	5.96	5.44	4.97	3.99	3.64

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Solder Reflow Recommendations



Notes:

- MF-USML models cannot be wave soldered or hand soldered. Please contact Bourns for soldering recommendations.
- All temperatures refer to topside of the package, measured on the package 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, especially during hand soldering. Please refer to the Multifuse® Polymer PTC Soldering Recommendation guidelines.
- Designed for single solder reflow operations.

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})	 150 °C 200 °C 60~180 seconds
TIME MAINTAINED ABOVE: Temperature (T_L) Time (t_L)	 217 °C 60~150 seconds
Peak / Classification 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 within 25 °C to Peak Temperature	8 minutes max.

How to Order

MF - USML 175 - 2

Multifuse® Product Designator

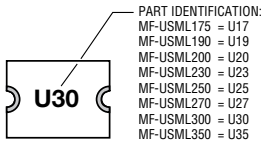
Series
USML = 1210 Low-Ohmic Surface Mount Component

Hold Current, Ihold
175 - 700 (1.75 - 7.00 Amps)

Packaging
Packaged per EIA 481-1
-2 = Tape and Reel

Typical Part Marking

Represents total content. Layout may vary.



PART IDENTIFICATION:
MF-USML175 = U17
MF-USML190 = U19
MF-USML200 = U20
MF-USML230 = U23
MF-USML250 = U25
MF-USML270 = U27
MF-USML300 = U30
MF-USML350 = U35
MF-USML380 = U38
MF-USML400 = U40
MF-USML450 = U45
MF-USML500 = U50
MF-USML600 = U60
MF-USML650 = U65
MF-USML700 = U70

MANUFACTURING DATE CODE IS LOCATED ON PACKING LABEL.

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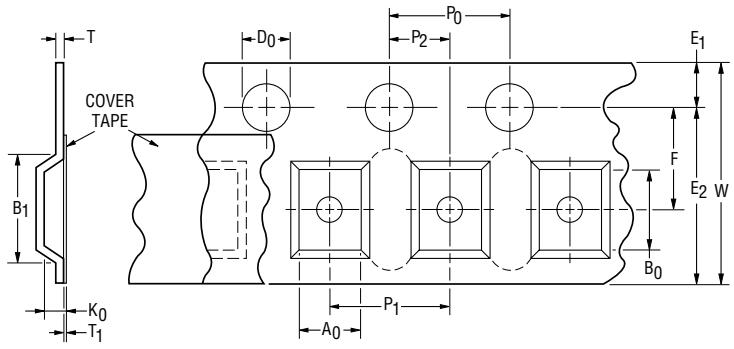
The Americas:
Tel: +1-951 781-5500
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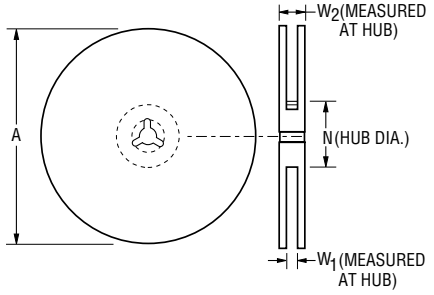
www.bourns.com

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Tape Dimensions	MF-USML Series per EIA 481-2
W	12.0 ± 0.3 (0.472 ± 0.012)
P_0	4.0 ± 0.1 (0.157 ± 0.004)
P_1	4.0 ± 0.1 (0.157 ± 0.004)
P_2	2.0 ± 0.05 (0.079 ± 0.002)
A_0	2.9 ± 0.10 (0.114 ± 0.004)
B_0	3.50 ± 0.10 (0.138 ± 0.004)
B_1 max.	4.5 (0.177)
D_0	1.5 + 0.1/-0.0 (0.059 + 0.004/-0)
F	5.5 ± 0.05 (0.216 + 0.002)
E_1	1.75 ± 0.10 (0.069 ± 0.004)
E_2 typ.	10.25 (0.404)
T max.	0.6 (0.024)
T_1 max.	0.1 (0.004)
K_0 (MF-USML175~MF-USML400)	0.65 ± 0.10 (0.026 ± 0.004)
K_0 (MF-USML450~MF-USML700)	1.10 ± 0.10 (0.043 ± 0.004)
Leader min.	390 (15.35)
Trailer min.	160 (6.30)
Reel Dimensions	
A max.	185 (7.283)
N min.	50 (1.97)
W_1	12.4 + 1/-0 (0.488 + 0.039/-0)
W_2 max.	15.4 (0.606)

DIMENSIONS: MM (INCHES)





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