





## 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 <sub>hold</sub>	I <sub>trip</sub>	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 <sub>Min.</sub>	R <sub>1Max.</sub>			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

### Environmental Characteristics

Operating Temperature.....	-40 °C to +85 °C
Maximum Device Surface Temperature in Tripped State .....	125 °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,..... No change (R <sub>min</sub> <R<R <sub>1max</sub> ) Condition A

### 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.....	R <sub>min</sub> ≤ R ≤ R <sub>1max</sub>
Time to Trip.....	At specified current, V <sub>max</sub> , 23 °C.....	T ≤ max. time to trip (seconds)
Hold Current .....	30 min. at I <sub>hold</sub> .....	No trip
Trip Cycle Life.....	V <sub>max</sub> , I <sub>max</sub> , 100 cycles.....	No arcing or burning
Trip Endurance .....	V <sub>max</sub> , 48 hours.....	No arcing or burning
Solderability.....	ANSI/J-STD-002.....	95 % min. coverage
cUL File Number.....	E174545 <a href="http://www.ul.com/">http://www.ul.com/</a> Follow link to Certifications, then cUL File No., enter E174545	
TÜV Certificate Number .....	R 02057213 <a href="http://www.tuvdotcom.com/">http://www.tuvdotcom.com/</a> 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 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.

Specifications are subject to change without notice.

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# MF-USML Series - Low Ohmic PTC Resettable Fuses

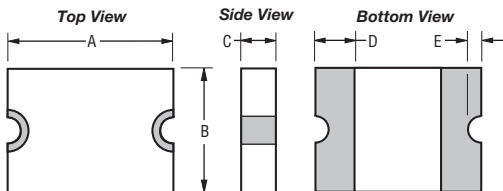
# BOURNS®

## Product Dimensions

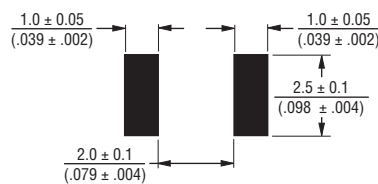
Model	A		B		C		D	E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.
MF-USML175	$\frac{3.00}{(0.118)}$	$\frac{3.43}{(0.135)}$	$\frac{2.35}{(0.093)}$	$\frac{2.80}{(0.110)}$	$\frac{0.30}{(0.012)}$	$\frac{0.60}{(0.024)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML190	$\frac{3.00}{(0.118)}$	$\frac{3.43}{(0.135)}$	$\frac{2.35}{(0.093)}$	$\frac{2.80}{(0.110)}$	$\frac{0.30}{(0.012)}$	$\frac{0.60}{(0.024)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML200	$\frac{3.00}{(0.118)}$	$\frac{3.43}{(0.135)}$	$\frac{2.35}{(0.093)}$	$\frac{2.80}{(0.110)}$	$\frac{0.30}{(0.012)}$	$\frac{0.60}{(0.024)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML230	$\frac{3.00}{(0.118)}$	$\frac{3.43}{(0.135)}$	$\frac{2.35}{(0.093)}$	$\frac{2.80}{(0.110)}$	$\frac{0.30}{(0.012)}$	$\frac{0.60}{(0.024)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML250	$\frac{3.00}{(0.118)}$	$\frac{3.43}{(0.135)}$	$\frac{2.35}{(0.093)}$	$\frac{2.80}{(0.110)}$	$\frac{0.30}{(0.012)}$	$\frac{0.60}{(0.024)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML270	$\frac{3.00}{(0.118)}$	$\frac{3.43}{(0.135)}$	$\frac{2.35}{(0.093)}$	$\frac{2.80}{(0.110)}$	$\frac{0.30}{(0.012)}$	$\frac{0.60}{(0.024)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML300	$\frac{3.00}{(0.118)}$	$\frac{3.43}{(0.135)}$	$\frac{2.35}{(0.093)}$	$\frac{2.80}{(0.110)}$	$\frac{0.30}{(0.012)}$	$\frac{0.60}{(0.024)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML350	$\frac{3.00}{(0.118)}$	$\frac{3.43}{(0.135)}$	$\frac{2.35}{(0.093)}$	$\frac{2.80}{(0.110)}$	$\frac{0.30}{(0.012)}$	$\frac{0.60}{(0.024)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML380	$\frac{3.00}{(0.118)}$	$\frac{3.43}{(0.135)}$	$\frac{2.35}{(0.093)}$	$\frac{2.80}{(0.110)}$	$\frac{0.30}{(0.012)}$	$\frac{0.60}{(0.024)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$

Packaging: 3000 pcs. per reel.

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



Recommended Pad Layout



### Terminal material:

ENIG-plated terminals  
(Tin-plated terminals available upon request).

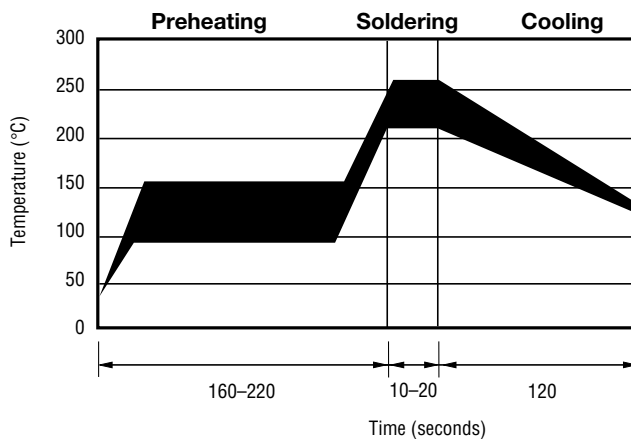
### Termination pad solderability:

Meets ANSI/J-STD-002 Category 2.

### Recommended Storage:

40 °C max./70 % RH max.

## Solder Reflow Recommendations



### Notes:

- MF-USML models cannot be wave soldered or hand soldered. Please contact Bourns for 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.
- Designed for single solder reflow operations.

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## Thermal Derating Chart - I<sub>hold</sub> (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

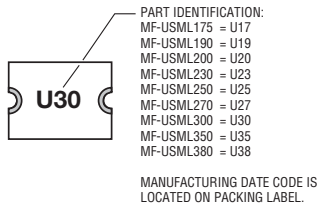
### How to Order

**MF - USML 175 - 2**

Multifuse® Product Designator \_\_\_\_\_  
 Series \_\_\_\_\_  
 USML = 1210 Low-Ohmic Surface Mount Component  
 Hold Current, I<sub>hold</sub> \_\_\_\_\_  
 175 - 380 (1.75 - 3.80 Amps)  
 Packaging \_\_\_\_\_  
 Packaged per EIA 481-1  
 -2 = Tape and Reel

### Typical Part Marking

Represents total content. Layout may vary.



**BOURNS®**

**Asia-Pacific:** Tel: +886-2 2562-4117 • Fax: +886-2 2562-4116

**Europe:** Tel: +41-41 768 5555 • Fax: +41-41 768 5510

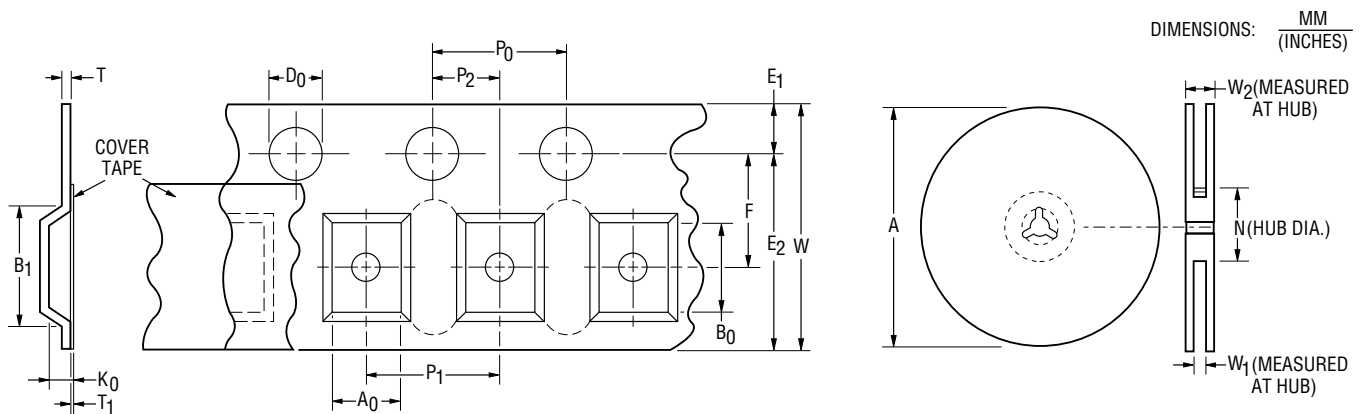
**The Americas:** Tel: +1-951 781-5500 • Fax: +1-951 781-5700

[www.bourns.com](http://www.bourns.com)

# MF-USML Series - Low Ohmic PTC Resettable Fuses

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Tape Dimensions	MF-USML Series per EIA 481-2
W	$8.0 \pm 0.3$ (0.315 ± 0.012)
P <sub>0</sub>	$4.0 \pm 0.1$ (0.157 ± 0.004)
P <sub>1</sub>	$4.0 \pm 0.1$ (0.157 ± 0.004)
P <sub>2</sub>	$2.0 \pm 0.05$ (0.079 ± 0.002)
A <sub>0</sub>	$2.76 \pm 0.10$ (0.109 ± 0.004)
B <sub>0</sub>	$3.50 \pm 0.10$ (0.138 ± 0.004)
B <sub>1</sub> max.	$4.35$ (0.171)
D <sub>0</sub>	$1.5 + 0.1/-0.0$ (0.059 + 0.004/-0)
F	$3.5 \pm 0.05$ (0.138 ± 0.002)
E <sub>1</sub>	$1.75 \pm 0.10$ (0.069 ± 0.004)
E <sub>2</sub> min.	$6.25$ (0.246)
T max.	$0.6$ (0.024)
T <sub>1</sub> max.	$0.1$ (0.004)
K <sub>0</sub>	$1.07 \pm 0.10$ (0.042 ± 0.004)
Leader min.	$390$ (15.35)
Trailer min.	$160$ (6.30)
<b>Reel Dimensions</b>	
A max.	$185$ (7.283)
N min.	$50$ (1.97)
W <sub>1</sub>	$8.4 + 1.5/-0.0$ (0.331 + 0.059/-0)
W <sub>2</sub> max.	$14.4$ (0.567)



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