



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

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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	0.0300	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

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,.....	No change
	Condition A	
Moisture Sensitivity Level (MSL).....	Level 1	
ESD Classification - HBM.....	Class 6	

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 _{min} ≤ R ≤ R _{1max}
Time to Trip.....	At specified current, V _{max} , 23 °C.....	T ≤ max. time to trip (seconds)
Hold Current.....	30 min. at I _{hold}	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.....	ANSI/J-STD-002.....	95 % min. coverage

cUL File Number..... E174545
<http://www.ul.com/> Follow link to Online Certificates Directory, then enter cUL File No. E174545, or [click here](#)

TÜV Certificate Number..... R 50302873
<http://www.tuvdotcom.com/> Follow link to "other certificates", enter File No. 50302873, or [click here](#)

* 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.

The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.

Users should verify actual device performance in their specific applications.

MF-USML Series - Low Ohmic PTC Resettable Fuses

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Product Dimensions

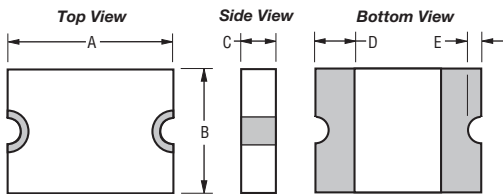
Model	A		B		C		D	E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.
MF-USML175	3.00 (0.118)	3.43 (0.135)	2.35 (0.093)	2.80 (0.110)	0.30 (0.012)	0.60 (0.024)	0.25 (0.010)	0.05 (0.002)	0.45 (0.018)
MF-USML190									
MF-USML200									
MF-USML230									
MF-USML250									
MF-USML270									
MF-USML300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

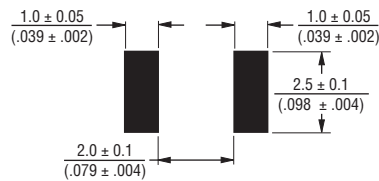
MF-USML175~MF-USML400 = 5000 pcs. per reel

MF-USML450~MF-USML700 = 3500 pcs. per reel

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



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.

Thermal Derating Chart - I_{hold} (Amps)

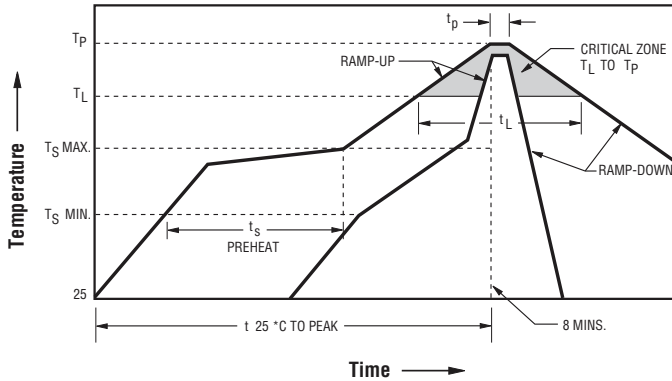
Model	Ambient Operating Temperature								
	-40 °C	-20 °C	0 °C	23 °C	40 °C	50 °C	60 °C	70 °C	85 °C
MF-USML175	2.57	2.33	2.07	1.75	1.49	1.34	1.24	1.00	0.91
MF-USML190	2.89	2.58	2.25	1.90	1.54	1.36	1.21	0.94	0.77
MF-USML200	3.26	2.87	2.50	2.00	1.70	1.48	1.29	1.09	0.78
MF-USML230	3.55	3.17	2.78	2.30	1.94	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 Tp)	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 (TL) Time (tl)	217 °C 60~150 seconds
Peak / Classification Temperature (Tp)	260 °C
Time within 5 °C of Actual Peak Temperature (tp)	20~40 seconds
Ramp-Down Rate	6 °C / second max.
Time within 25 °C to Peak Temperature	8 minutes max.

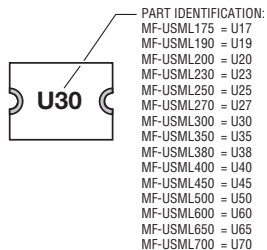
How to Order

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.



MANUFACTURING DATE CODE IS LOCATED ON PACKING LABEL.

BOURNS®

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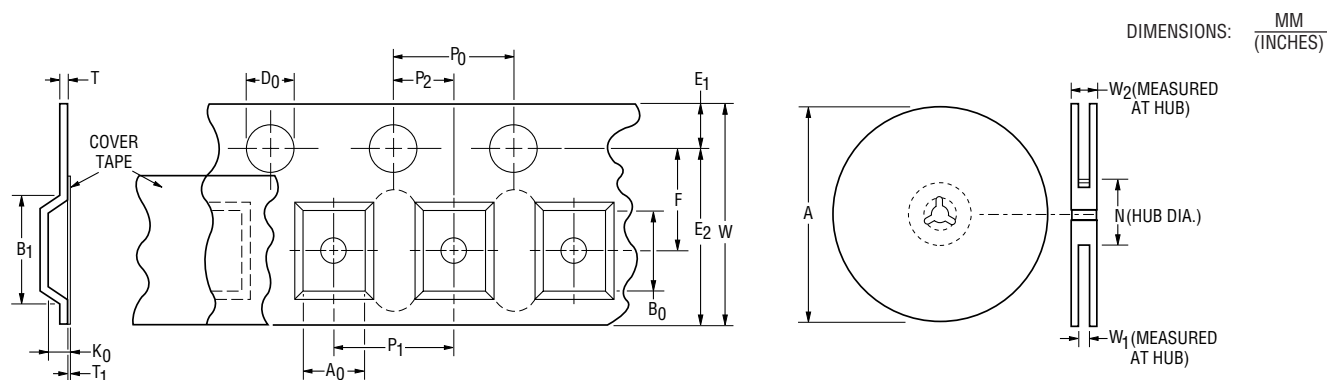
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The Americas:
Tel: +1-951 781-5500
Email: americus@bourns.com
www.bourns.com

MF-USML Series - Low Ohmic PTC Resettable Fuses

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Tape Dimensions	MF-USML Series per EIA 481-2
W	$\frac{12.0 \pm 0.3}{(0.472 \pm 0.012)}$
P ₀	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$
P ₁	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$
P ₂	$\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$
A ₀	$\frac{2.9 \pm 0.10}{(0.114 \pm 0.004)}$
B ₀	$\frac{3.50 \pm 0.10}{(0.138 \pm 0.004)}$
B ₁ max.	$\frac{4.5}{(0.177)}$
D ₀	$\frac{1.5 + 0.1/-0.0}{(0.059 + 0.004/-0)}$
F	$\frac{5.5 \pm 0.05}{(0.216 + 0.002)}$
E ₁	$\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$
E ₂ typ.	$\frac{10.25}{(0.404)}$
T max.	$\frac{0.6}{(0.024)}$
T ₁ max.	$\frac{0.1}{(0.004)}$
K ₀ (MF-USML175~MF-USML400)	$\frac{0.65 \pm 0.10}{(0.026 \pm 0.004)}$
K ₀ (MF-USML450~MF-USML700)	$\frac{1.10 \pm 0.10}{(0.043 \pm 0.004)}$
Leader min.	$\frac{390}{(15.35)}$
Trailer min.	$\frac{160}{(6.30)}$
Reel Dimensions	
A max.	$\frac{185}{(7.283)}$
N min.	$\frac{50}{(1.97)}$
W ₁	$\frac{12.4 + 1/-0}{(0.488 + 0.039/-0)}$
W ₂ max.	$\frac{15.4}{(0.606)}$



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