





## Features

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

## MF-USML/X Series - Low Ohmic PTC Resettable Fuses

### Electrical Characteristics

Model	V max.	I max.	I <sub>hold</sub>	I <sub>trip</sub>	Resistance		Max. Time To Trip		Tripped Power Dissipation	Certifications	
			at 23 °C		at 23 °C Ohms		at 23 °C		Watts at 23 °C	cUL	TÜV
	Volts	Amps	Amps	R <sub>min</sub>	R <sub>1max</sub>	Amps	Seconds	Typ.	E174545	R50391579	
MF-USML175/12	12	50	1.75	3.5	0.006	0.050	8.0	0.8	1.0	✓	✓
MF-USML200/12	12	50	2.0	4.0	0.005	0.040	8.0	5.0	1.0	✓	✓
MF-USML260/12	12	50	2.6	5.2	0.004	0.030	8.0	5.0	1.0	✓	✓
MF-USML300/12	12	50	3.0	6.0	0.003	0.024	15.0	5.0	1.0	✓	✓
MF-USML350/12	12	50	3.5	7.0	0.002	0.022	17.0	5.0	1.0	✓	✓
MF-USML380/12	12	50	3.8	7.6	0.002	0.020	19.0	5.0	1.0	✓	✓
MF-USML400/12	12	50	4.0	8.0	0.002	0.018	20.0	5.0	1.0	✓	✓
MF-USML450/12	12	50	4.5	9.0	0.002	0.014	22.5	2.0	1.0	✓	✓
MF-USML500/12	12	50	5.0	10.0	0.001	0.012	25.0	2.0	1.2	✓	✓
MF-USML550/12	12	50	5.5	11.0	0.001	0.010	27.5	2.0	1.2	✓	✓

### Environmental Characteristics

Operating Temperature.....	-40 °C to +85 °C
Storage Condition	
Before Opening .....	+40 °C max. / 70 % RH max.
After Opening.....	+40 °C max. / 10 % RH max.
Floor Condition After Opening .....	Consumption within 4 weeks at floor condition +30 °C max. / 60 % RH max.
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 (marking still legible)
Vibration .....	MIL-STD-883C, Method 2007.1,..... No change (R <sub>min</sub> <R<R <sub>1max</sub> ) Condition A
Moisture Sensitivity Level (MSL) .....	<a href="#">See Note</a>
ESD Classification - HBM.....	6

### Test Procedures and Requirements

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.....	245 °C ±5 °C, 5 seconds.....	95 % min. coverage



**WARNING Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://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.

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

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## Applications

- Li-ion battery pack protection
- Power delivery port protection
- Higher voltage withstand
- PC motherboards – Plug & Play protection
- Mobile phones – battery & charging protection
- USB port protection
- Game console port protection

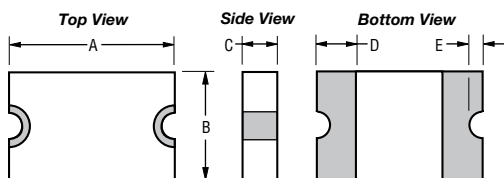
## MF-USML/X Series – Low Ohmic PTC Resettable Fuses

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### Product Dimensions

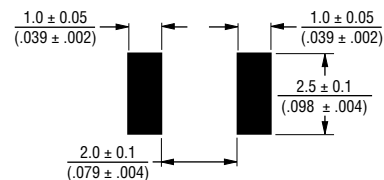
Model	A		B		C		D	E	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Min.	Max.
MF-USML175/12	$\frac{3.00}{(0.12)}$	$\frac{3.43}{(0.14)}$	$\frac{2.35}{(0.09)}$	$\frac{2.80}{(0.11)}$	$\frac{0.40}{(0.016)}$	$\frac{0.80}{(0.031)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML200/12									
MF-USML260/12									
MF-USML300/12	$\frac{3.00}{(0.12)}$	$\frac{3.43}{(0.14)}$	$\frac{2.35}{(0.09)}$	$\frac{2.80}{(0.11)}$	$\frac{0.60}{(0.024)}$	$\frac{1.20}{(0.047)}$	$\frac{0.25}{(0.010)}$	$\frac{0.05}{(0.002)}$	$\frac{0.45}{(0.018)}$
MF-USML350/12									
MF-USML380/12									
MF-USML400/12									
MF-USML450/12									
MF-USML500/12									
MF-USML550/12									

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



Terminal material:  
ENIG-plated terminals

#### Recommended Pad Layout



### Packaging Quantity

MF-USML175/12 ~ MF-USML260/12 = 5000 pcs. per reel  
MF-USML300/12 ~ MF-USML550/12 = 3500 pcs. per reel

### 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-USML175/12	2.57	2.33	2.07	1.75	1.49	1.34	1.24	1.00	0.88
MF-USML200/12	2.94	2.65	2.35	2.00	1.70	1.53	1.42	1.14	1.00
MF-USML260/12	3.82	3.46	3.07	2.60	2.21	1.95	1.85	1.48	1.30
MF-USML300/12	4.41	3.99	3.54	3.00	2.55	2.30	2.13	1.71	1.50
MF-USML350/12	5.10	4.65	4.13	3.50	2.98	2.65	2.50	2.00	1.75
MF-USML380/12	5.59	5.05	4.48	3.80	3.23	2.95	2.70	2.17	1.90
MF-USML400/12	5.80	5.25	4.70	4.00	3.40	3.10	2.80	2.28	2.00
MF-USML450/12	6.30	5.65	4.95	4.50	3.83	3.40	2.95	2.50	2.05
MF-USML500/12	7.00	6.25	5.50	5.00	4.25	3.75	3.25	2.75	2.25
MF-USML550/12	7.70	6.90	6.05	5.50	4.68	4.15	3.60	3.05	2.40

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# MF-USML/X Series – Low Ohmic PTC Resettable Fuses



## Solder Reflow Recommendations



### Notes:

- MF-USML/X 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. Please refer to the Multifuse® Polymer PTC Soldering Recommendation guidelines.

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate ( $T_{s_{max}}$ to $T_p$ )	3 °C / second max.
PREHEAT: Temperature Min. ( $T_{s_{min}}$ ) Temperature Max. ( $T_{s_{max}}$ ) Time ( $T_{s_{min}}$ to $T_{s_{max}}$ ) ( $t_s$ )	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.

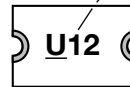
### How to Order

**MF - USML 400 / 12 - 2**

Multifuse® \_\_\_\_\_  
Product Designator \_\_\_\_\_  
Series \_\_\_\_\_  
USML = 1210 Low Ohmic  
Surface Mount Component  
Hold Current,  $I_{hold}$  \_\_\_\_\_  
175 - 550 (1.75 Amps - 5.50 Amps)  
Maximum Voltage,  $V_{max}$  \_\_\_\_\_  
12 = 12 Volts  
Packaging \_\_\_\_\_  
-2 = Tape and Reel  
Packaged per EIA 481

### Typical Part Marking

Represents total content. Layout may vary.



PART IDENTIFICATION:  
MF-USML175/12 = H12  
MF-USML200/12 = J12  
MF-USML260/12 = N12  
MF-USML300/12 = P12  
MF-USML350/12 = S12  
MF-USML380/12 = V12  
MF-USML400/12 = U12  
MF-USML450/12 = X12  
MF-USML500/12 = Y12  
MF-USML550/12 = S12

MANUFACTURING DATE CODE IS  
LOCATED ON PACKING LABEL.

MF-USML/X SERIES, REV. A, 03/19

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# MF-USML/X Series – Low Ohmic PTC Resettable Fuses

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## Packaging Specifications

MF-USML/X Series per EIA 481



K0	
$0.65 \pm 0.10$ (.026 ± .004)	MF-USML175/12 ~ MF-USML260/12
$1.10 \pm 0.10$ (.043 ± .004)	MF-USML300/12 ~ MF-USML550/12



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

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