





## 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> )<br>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.

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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

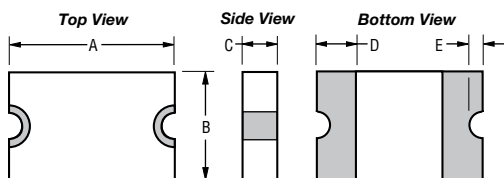
## MF-USML/X Series – Low Ohmic PTC Resettable Fuses

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### Product Dimensions

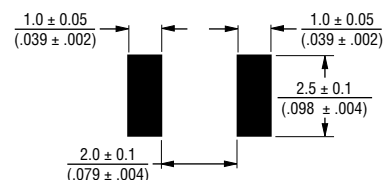
| Model         | A                     |                       | B                     |                       | C                      |                        | D                      | E                      |                        |
|---------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|               | 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:<br>Temperature Min. ( $T_{s_{min}}$ )<br>Temperature Max. ( $T_{s_{max}}$ )<br>Time ( $T_{s_{min}}$ to $T_{s_{max}}$ ) ( $t_s$ ) | 150 °C<br>200 °C<br>60~180 seconds |
| TIME MAINTAINED ABOVE:<br>Temperature ( $T_L$ )<br>Time ( $t_L$ )   | 217 °C<br>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.                     |

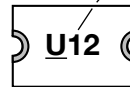
### How to Order

**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

**BOURNS®**

## Packaging Specifications

MF-USML/X Series per EIA 481



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



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

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«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

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