





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 _{hold} | I _{trip} | 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 _{min} | R _{1max} | 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 _{min} <R<R _{1max}) Condition A |
| Moisture Sensitivity Level (MSL) | See Note |
| 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 _{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..... | 245 °C ±5 °C, 5 seconds..... | 95 % min. coverage |



WARNING Cancer and Reproductive Harm - 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

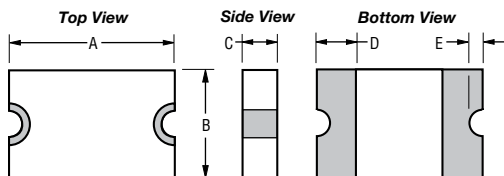
MF-USML/X Series – Low Ohmic PTC Resettable Fuses

BOURNS®

Product Dimensions

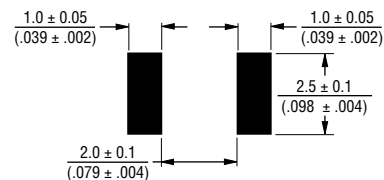
| Model | A | | B | | C | | D | E | |
|---------------|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| | Min. | Max. | Min. | 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. |

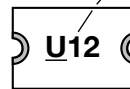
How to Order

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 ± 0.10 (.026 ± .004) | MF-USML175/12 ~ MF-USML260/12 |
| 1.10 ± 0.10 (.043 ± .004) | MF-USML300/12 ~ MF-USML550/12 |



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

BOURNS®

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JONHON

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