



**THE DATASHEET OF  
MF-USMF175X-2**





## Features

- Compliant with AEC-Q200 Rev-C- Stress Test Qualification for Passive Components
- Fast tripping resettable circuit protection
- Surface mount packaging for automated assembly
- Small footprint size (1210)
- RoHS compliant\* and halogen free\*\*
- Agency recognition:

## MF-USMF Series - 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-USMF005  | 30           | 10          | 0.05              | 0.15              | 2.800             | 50.000             | 0.25              | 1.50             | 0.6                       |
| MF-USMF010  | 30           | 10          | 0.10              | 0.30              | 0.800             | 15.000             | 0.50              | 0.60             | 0.6                       |
| MF-USMF020  | 30           | 10          | 0.20              | 0.40              | 0.400             | 5.000              | 8.00              | 0.02             | 0.6                       |
| MF-USMF035  | 6            | 40          | 0.35              | 0.75              | 0.200             | 1.300              | 8.00              | 0.20             | 0.6                       |
| MF-USMF050  | 13.2         | 40          | 0.50              | 1.00              | 0.180             | 0.900              | 8.00              | 0.10             | 0.6                       |
| MF-USMF075  | 6            | 40          | 0.75              | 1.50              | 0.070             | 0.450              | 8.00              | 0.10             | 0.6                       |
| MF-USMF110  | 6            | 40          | 1.10              | 2.20              | 0.050             | 0.210              | 5.00              | 1.00             | 0.6                       |
| MF-USMF150  | 6            | 40          | 1.50              | 3.00              | 0.030             | 0.110              | 5.00              | 5.00             | 0.6                       |
| MF-USMF175  | 6            | 40          | 1.75              | 3.50              | 0.020             | 0.090              | 8.00              | 1.00             | 0.7                       |
| MF-USMF175X | 6            | 40          | 1.75              | 3.50              | 0.020             | 0.090              | 8.00              | 1.00             | 0.7                       |

### Environmental Characteristics

|                                       |  |                                 |
|---------------------------------------|--|---------------------------------|
| Operating Temperature.....            | -40 °C to +85 °C                                 |                                 |
| Passive Aging.....                    | +85 °C, 1000 hours.....                          | ±5 % typical resistance change  |
| Humidity Aging.....                   | +85 °C, 85 % R.H. 1000 hours.....                | ±5 % typical resistance change  |
| Thermal Shock.....                    | +85 °C to -40 °C, 20 times.....                  | ±10 % typical resistance change |
| Solvent Resistance.....               | MIL-STD-202, Method 215.....                     | No change                       |
| Vibration.....                        | MIL-STD-883C, Method 2007.1,.....<br>Condition A | No change                       |
| Moisture Sensitivity Level (MSL)..... | Level 1  |                                 |
| ESD Classification - HBM.....         | Class 6  |                                 |

### Test Procedures And Requirements For Model MF-USMF 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                       |

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

TÜV Certificate Number ..... R 02057213 <http://www.tuvdotcom.com/> Follow link to "other certificates", enter File No. 2057213, or [click here](#)



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

\* 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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## Applications

- Game consoles
- PC motherboards
- USB port protection - USB 2.0, 3.0 & OTG
- HDMI 1.4 Source protection
- IEEE 1394 ports
- Mobile phones
- Digital cameras

## MF-USMF Series - PTC Resettable Fuses

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### Product Dimensions

| Model       | A                      |                        | B                      |                        | C                      |                        | D                      |
|-------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|             | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   |
| MF-USMF005  | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.80}{(0.031)}$ | $\frac{1.1}{(0.043)}$  | $\frac{0.30}{(0.012)}$ |
| MF-USMF010  | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.80}{(0.031)}$ | $\frac{1.1}{(0.043)}$  | $\frac{0.30}{(0.012)}$ |
| MF-USMF020  | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.80}{(0.031)}$ | $\frac{1.1}{(0.043)}$  | $\frac{0.30}{(0.012)}$ |
| MF-USMF035  | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.55}{(0.022)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-USMF050  | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.55}{(0.022)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-USMF075  | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.55}{(0.022)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-USMF110  | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.55}{(0.022)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-USMF150  | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-USMF175X | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-USMF175X | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |

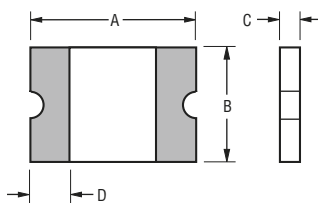
Packaging: 3000 pcs. per reel.

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

Top and Bottom View

Side View

Recommended Pad Layout



#### Terminal material:

Electroless Ni under immersion Au

#### Termination pad solderability:

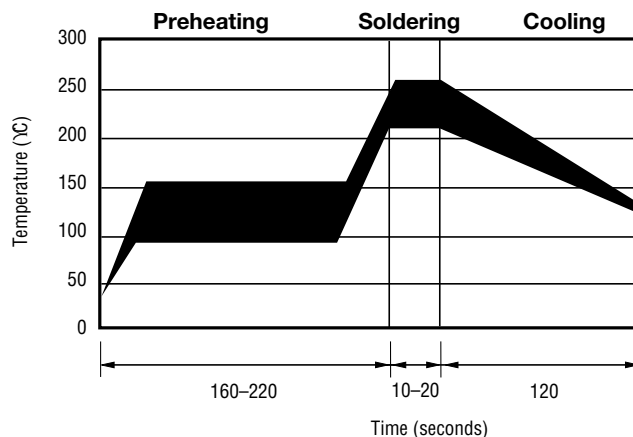
Standard Au finish:

Meets ANSI/J-STD-002 Category 2.

#### Recommended Storage:

40 °C max./70 % RH max.

### Solder Reflow Recommendations



#### Notes:

- MF-USMF models cannot be wave soldered.
- 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.

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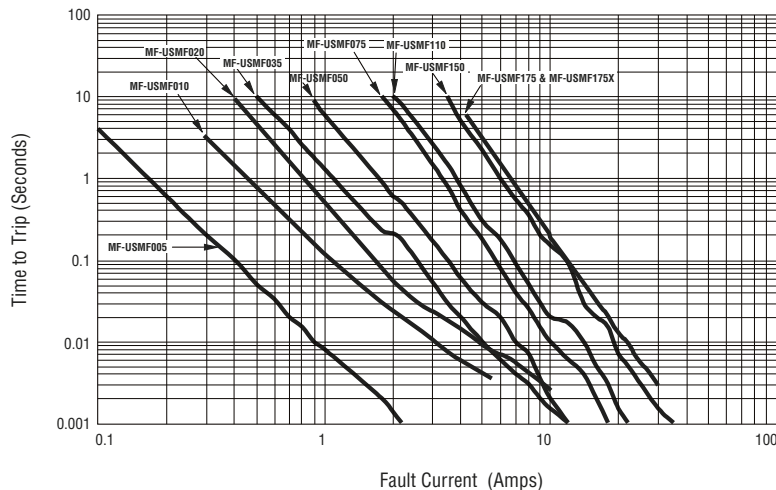
# MF-USMF Series - PTC Resettable Fuses

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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-USMF005  | 0.08                          | 0.07   | 0.06 | 0.05  | 0.04  | 0.04  | 0.03  | 0.03  | 0.02  |
| MF-USMF010  | 0.15                          | 0.13   | 0.12 | 0.10  | 0.09  | 0.08  | 0.07  | 0.06  | 0.05  |
| MF-USMF020  | 0.32                          | 0.28   | 0.24 | 0.20  | 0.18  | 0.16  | 0.14  | 0.12  | 0.10  |
| MF-USMF035  | 0.51                          | 0.46   | 0.40 | 0.34  | 0.30  | 0.27  | 0.24  | 0.22  | 0.18  |
| MF-USMF050  | 0.76                          | 0.66   | 0.58 | 0.48  | 0.42  | 0.38  | 0.35  | 0.29  | 0.23  |
| MF-USMF075  | 1.10                          | 0.97   | 0.86 | 0.72  | 0.64  | 0.58  | 0.55  | 0.47  | 0.39  |
| MF-USMF110  | 1.60                          | 1.42   | 1.26 | 1.10  | 0.94  | 0.86  | 0.80  | 0.70  | 0.58  |
| MF-USMF150  | 2.30                          | 2.02   | 1.76 | 1.43  | 1.24  | 1.11  | 1.00  | 0.85  | 0.65  |
| MF-USMF175  | 2.80                          | 2.45   | 2.10 | 1.75  | 1.55  | 1.45  | 1.35  | 1.25  | 1.10  |
| MF-USMF175X | 2.80                          | 2.45   | 2.10 | 1.75  | 1.55  | 1.45  | 1.35  | 1.25  | 1.10  |

## Typical Time to Trip at 23 °C



The Time to Trip curves represent typical performance of a device in a simulated application environment. Actual performance in specific customer applications may differ from these values due to the influence of other variables.

## How to Order

**MF - USMF 010 X - 2**

Multifuse® Product Designator \_\_\_\_\_

Series \_\_\_\_\_  
 USMF = 1210 Surface Mount Component

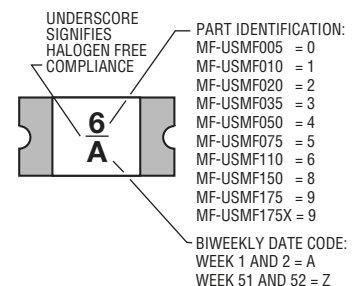
Hold Current, I<sub>hold</sub> \_\_\_\_\_  
 005-175 (0.05-1.75 Amps)

Multifuse® freeXpansion™ Design \_\_\_\_\_

Packaging \_\_\_\_\_  
 Packaged per EIA 481-1  
 -2 = Tape and Reel

## Typical Part Marking

Represents total content. Layout may vary.



MF-USMF SERIES, REV. R, 11/18

"freeXpansion Design" is a trademark of Bourns, Inc.

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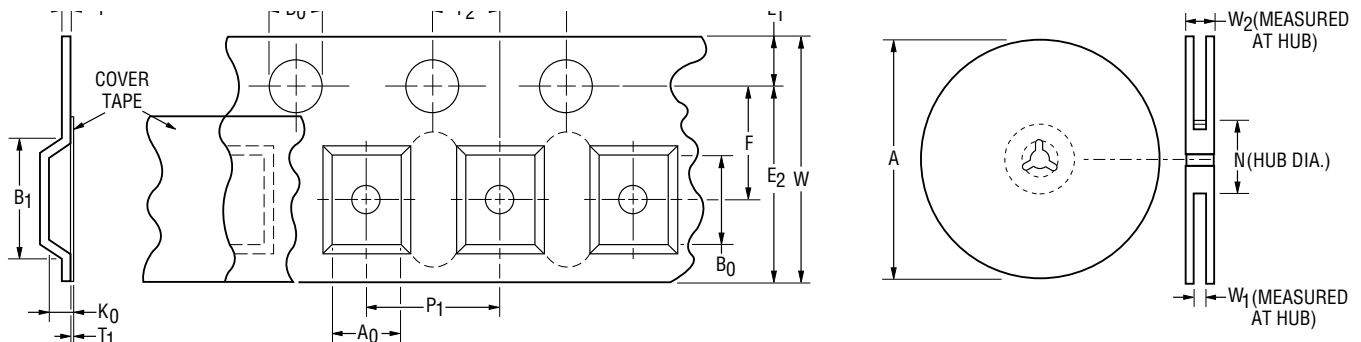
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# MF-USMF Series Tape and Reel Specifications

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

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



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- Users are responsible for independent and adequate evaluation of Bourns® Multifuse® Polymer PTC devices in the user's application, including the PPTC device characteristics stated in the applicable data sheet.
- Polymer PTC devices must not be allowed to operate beyond their stated maximum ratings. Operation in excess of such maximum ratings could result in damage to the PTC device and possibly lead to electrical arcing and/or fire. Circuits with inductance may generate a voltage above the rated voltage of the polymer PTC device and should be thoroughly evaluated within the user's application during the PTC selection and qualification process.
- Polymer PTC devices are intended to protect against adverse effects of temporary overcurrent or overtemperature conditions up to rated limits and are not intended to serve as protective devices where overcurrent or overvoltage conditions are expected to be repetitive or prolonged.
- In normal operation, polymer PTC devices experience thermal expansion under fault conditions. Thus, a polymer PTC device must be protected against mechanical stress, and must be given adequate clearance within the user's application to accommodate such thermal expansion. Rigid potting materials or fixed housings or coverings that do not provide adequate clearance should be thoroughly examined and tested by the user, as they may result in the malfunction of polymer PTC devices if the thermal expansion is inhibited.
- Exposure to lubricants, silicon-based oils, solvents, gels, electrolytes, acids, and other related or similar materials may adversely affect the performance of polymer PTC devices.
- Aggressive solvents may adversely affect the performance of polymer PTC devices. Conformal coating, encapsulating, potting, molding, and sealing materials may contain aggressive solvents including but not limited to xylene and toluene, which are known to cause adverse effects on the performance of polymer PTCs. Such aggressive solvents must be thoroughly cured or baked to ensure their complete removal from polymer PTCs to minimize the possible adverse effect on the device.
- Recommended storage conditions should be followed at all times. Such conditions can be found on the applicable data sheet and on the Multifuse® Polymer PTC Moisture/Reflow Sensitivity Classification (MSL) note:  
[https://www.bourns.com/docs/RoHS-MSL/msl\\_mf.pdf](https://www.bourns.com/docs/RoHS-MSL/msl_mf.pdf)

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