



## Features

- Compliant with AEC-Q200 Rev-C - Stress Test Qualification for Passive Components in Automotive Applications
- Small footprint size (1210)
- Operating temperature range up to 125 °C
- Low thermal derating factor
- Higher hold currents at elevated temperatures

■ RoHS compliant\*

■ Agency recognition: 

## MF-USHT Series - PTC Resettable Fuses

### Electrical Characteristics

| Model        | V max.<br>Volts | I max.<br>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-USHT035KX | 30              | 20             | 0.35              | 1.75              | 0.4               | 2.2                   | 8.0               | 0.1              | 1.0                       |
| MF-USHT050KX | 30              | 20             | 0.50              | 2.50              | 0.3               | 1.6                   | 8.0               | 0.1              | 1.0                       |

\*\*R<sub>1Max.</sub> measured 24 hours post reflow.

### Environmental Characteristics

|                                       |                                   |                                        |
|---------------------------------------|-----------------------------------|----------------------------------------|
| Operating Temperature.....            | -40 °C to +125 °C                 |                                        |
| Passive Aging.....                    | +125 °C, 1000 hours.....          | R <sub>final</sub> < R <sub>1max</sub> |
| Humidity Aging.....                   | +85 °C, 85 % R.H. 1000 hours..... | R <sub>final</sub> < R <sub>1max</sub> |
| Thermal Shock.....                    | +125 °C to -40 °C, 20 times.....  | R <sub>final</sub> < R <sub>1max</sub> |
| 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-USHT 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                       |
| cUL File Number..... | E174545<br>http://www.ul.com/ Follow link to Online Certificates Directory, then enter UL File No.<br>E174545, or <a href="#">click here</a> |                                          |
| TÜV Certificate..... | Certificate Number Available on Request, or <a href="#">click here</a>                                                                       |                                          |

### 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 | +125 °C |
| MF-USHT035KX | 0.508                         | 0.459  | 0.406 | 0.350  | 0.308  | 0.284  | 0.259  | 0.235  | 0.196  | 0.095   |
| MF-USHT050KX | 0.725                         | 0.655  | 0.580 | 0.500  | 0.440  | 0.405  | 0.370  | 0.335  | 0.280  | 0.135   |



**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.

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## Applications

- Protection of automotive circuitry including engine control modules
- Overcurrent surge protection of electronic equipment required to operate at high operating temperature ranges
- Resettable fault protection for general electronic equipment

## MF-USHT Series - PTC Resettable Fuses

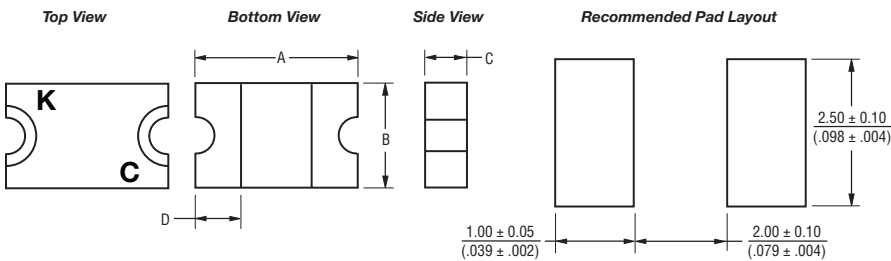
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### Product Dimensions

| Model       | A                      |                        | B                      |                        | C                      |                        | D                      |
|-------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|             | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   |
| MF-USHT035X | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |
| MF-USHT050X | $\frac{3.00}{(0.118)}$ | $\frac{3.43}{(0.135)}$ | $\frac{2.35}{(0.093)}$ | $\frac{2.80}{(0.110)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.30}{(0.012)}$ |

Packaging: 3000 pcs. per reel.

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



#### Terminal material:

Nickel/gold plated.

#### Termination pad solderability:

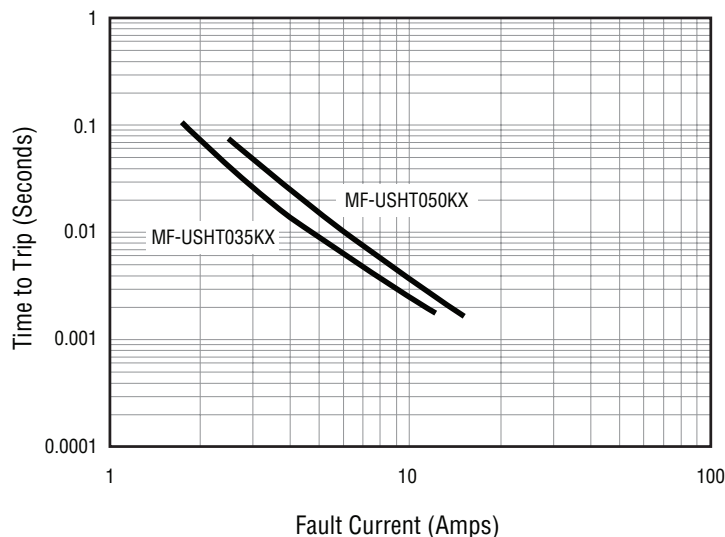
Standard Au finish:

Meets ANSI/J-STD-002 Category 2.

#### Recommended Storage:

40 °C max./70 % RH max.

### 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.

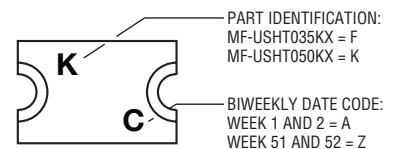
### How to Order

#### MF - USHT 035 K X - 2

Multifuse® Product Designator \_\_\_\_\_  
 Series \_\_\_\_\_  
 USHT = 1210 High Temperature Surface Mount Component  
 Hold Current,  $I_{hold}$  \_\_\_\_\_  
 035 - 050 (0.35 - 0.50 Amps)  
 Material Specific Code \_\_\_\_\_  
 Multifuse® freeXpansion™ Design \_\_\_\_\_  
 Packaging \_\_\_\_\_  
 Packaged per EIA 481-1  
 -2 = Tape and Reel

### Typical Part Marking

Represents total content. Layout may vary.



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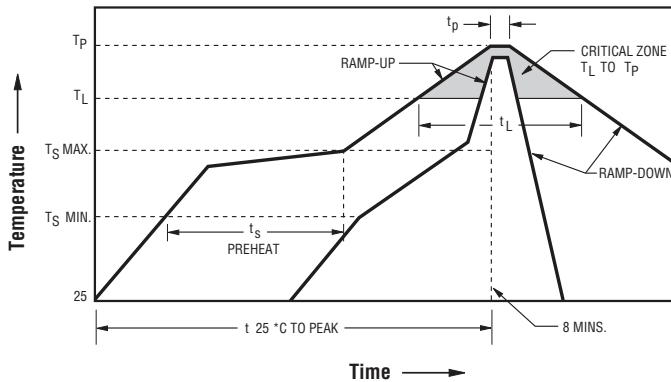
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# MF-USHT Series - PTC Resettable Fuses

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## Solder Reflow Recommendations



### Notes:

- MF-USHT 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 ( $T_{S_{max}}$ 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 $t_{s_{max}}$ ) | 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 / Classification 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 within 25 °C to Peak Temperature                                                                                           | 8 minutes max.                     |

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**Asia-Pacific:** Tel: +886-2 2562-4117 • Email: [asiacus@bourns.com](mailto:asiacus@bourns.com)

**EMEA:** Tel: +36 88 520 390 • Email: [eurocus@bourns.com](mailto:eurocus@bourns.com)

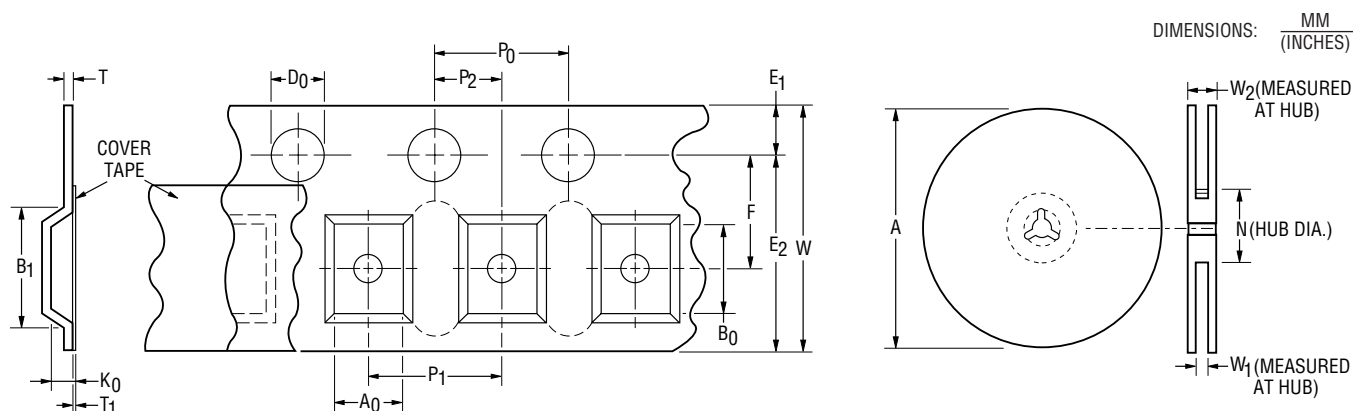
**The Americas:** Tel: +1-951 781-5500 • Email: [americus@bourns.com](mailto:americus@bourns.com)

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# MF-USHT Series Tape and Reel Specifications

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| Tape Dimensions     | MF-USHT Series<br>per EIA 481-1          |
|---------------------|------------------------------------------|
| W                   | $8.0 \pm 0.30$<br>(0.315 $\pm$ 0.012)    |
| P <sub>0</sub>      | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)    |
| P <sub>1</sub>      | $4.0 \pm 0.10$<br>(0.157 $\pm$ 0.004)    |
| P <sub>2</sub>      | $2.0 \pm 0.05$<br>(0.079 $\pm$ 0.002)    |
| A <sub>0</sub>      | $3.00 \pm 0.10$<br>(0.118 $\pm$ 0.004)   |
| B <sub>0</sub>      | $3.65 \pm 0.10$<br>(0.144 $\pm$ 0.004)   |
| B <sub>1</sub> max. | $4.35$<br>(0.171)                        |
| D <sub>0</sub>      | $1.5 + 0.10/-0.0$<br>(0.059 + 0.004/-0)  |
| F                   | $3.5 \pm 0.05$<br>(0.138 $\pm$ 0.002)    |
| E <sub>1</sub>      | $1.75 \pm 0.10$<br>(0.069 $\pm$ 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>      | $0.85 \pm 0.10$<br>(0.033 $\pm$ 0.004)   |
| Leader min.         | $390$<br>(15.35)                         |
| Trailer min.        | $160$<br>(6.30)                          |
| Reel Dimensions     |                                          |
| A max.              | $185$<br>(7.28)                          |
| N min.              | $50$<br>(1.97)                           |
| W <sub>1</sub>      | $8.4 + 1.5/-0.0$<br>(0.331 + 0.059/-0.0) |
| W <sub>2</sub> max. | $14.4$<br>(0.567)                        |



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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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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А