
## Features

- Compliant with AEC-Q200 Rev-D - 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: c UL us
- TÜV certificates include IEC 62319-1, IEC 60738-1 and IEC 60730-1:2013 clause 15, clause 17 and Annex J

# MF-USHT Series - PTC Resettable Fuses

## Electrical Characteristics

| | Model | $V_{max}$ | $I_{max}$ | $I_{hold}$ | $I_{trip}$ | Resistance | | Max. Time To Trip | | Tripped Power Dissipation | Agency Recognition | | AEC-Q200 Compliant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | at 23 °C | | | | at 23 °C Ohms | | at 23 °C | | Watts at 23 °C | cUL | TÜV | |
| | | Volts | Amps | Amps | | $R_{min}$ | $R_{1max}$** | Amps | Sec. | Typ. | E174545 | R50384138 | |
| | MF-USHT010KX | 30 | 20 | 0.10 | 0.50 | 1.0 | 7.5 | 2.5 | 1.5 | 1.0 | ✓ | ✓ | ✓ |
| NEW! | MF-USHT010KX/36 | 36 | 20 | 0.10 | 0.50 | 1.0 | 7.5 | 2.5 | 1.5 | 1.0 | ✓ | ✓ | ✓ |
| | MF-USHT016KX | 30 | 20 | 0.16 | 0.80 | 0.7 | 6.0 | 8.0 | 0.1 | 1.0 | ✓ | ✓ | ✓ |
| NEW! | MF-USHT016KX/36 | 36 | 20 | 0.16 | 0.80 | 0.7 | 6.0 | 8.0 | 0.1 | 1.0 | ✓ | ✓ | ✓ |
| | MF-USHT020KX | 30 | 20 | 0.20 | 1.00 | 0.6 | 5.0 | 8.0 | 0.1 | 1.0 | ✓ | ✓ | ✓ |
| NEW! | MF-USHT020KX/36 | 36 | 20 | 0.20 | 1.00 | 0.6 | 5.0 | 8.0 | 0.1 | 1.0 | ✓ | ✓ | ✓ |
| | 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 | ✓ | ✓ | ✓ |
| | MF-USHT075KX | 16 | 20 | 0.75 | 3.75 | 0.1 | 1.0 | 8.0 | 5.0 | 1.0 | ✓ | ✓ | ✓ |
| NEW! | MF-USHT075KX/24 | 24 | 20 | 0.75 | 2.25 | 0.1 | 0.68 | 8.0 | 0.1 | 1.3 | ✓ | ✓ | ✓ |
| NEW! | MF-USHT110KX/16 | 16 | 20 | 1.10 | 3.30 | 0.06 | 0.50 | 8.0 | 0.5 | 1.5 | ✓ | ✓ | ✓ |
| NEW! | MF-USHT125KX/12 | 12 | 40 | 1.25 | 3.75 | 0.03 | 0.30 | 8.0 | 1.0 | 1.5 | ✓ | ✓ | ✓ |
| NEW! | MF-USHT150KX/12 | 12 | 40 | 1.50 | 4.50 | 0.025 | 0.25 | 8.0 | 1.0 | 1.5 | ✓ | ✓ | ✓ |
| NEW! | MF-USHT175KX/12 | 12 | 40 | 1.75 | 5.25 | 0.018 | 0.17 | 10.0 | 5.0 | 1.5 | ✓ | ✓ | ✓ |
| NEW! | MF-USHT200KX/12 | 12 | 40 | 2.00 | 6.00 | 0.015 | 0.15 | 10.0 | 5.0 | 1.5 | ✓ | ✓ | ✓ |

**$R_{1Max.}$ measured 24 hours post reflow.

## Environmental Characteristics

| Item | Condition | Criteria |
|---|---|---|
| Operating Temperature | -40 °C to +125 °C | |
| Recommended Storage | +40 °C max. / 70 % R.H. max. | |
| Passive Aging | +125 °C, 1000 hours | $R < R_{1max}$ |
| Humidity Aging | +85 °C, 85 % R.H. 1000 hours | $R < R_{1max}$ |
| Thermal Shock | -40 °C to +125 °C, 20 times | $R < R_{1max}$ |
| Solvent Resistance | MIL-STD-202, Method 215 | No change (marking still legible) |
| Vibration | MIL-STD-883C, Method 2007.1 Condition A | No change ($R_{min} < R < R_{1max}$) |
| Moisture Sensitivity Level (MSL) | See Note | |
| ESD Classification | Class 6 (per AEC-Q200-2, HBM) | |

## Additional Information

Click these links for more information:

PRODUCT SELECTOR | TECHNICAL LIBRARY | INVENTORY | SAMPLES | CONTACT

**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.

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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



### Test Procedures and Requirements

| Item | Test Condition | Accept/Reject Criteria |
|---|---|---|
| Visual/Mechanical | Verify dimensions and materials | Per MF physical description |
| Resistance | In still air @ 23 °C | $R_{min} \le R \le R_{max}$ |
| Time to Trip | At specified current, $V_{max}$, 23 °C, still air | T ≤ max. time to trip (seconds) |
| Hold Current | 30 min. at $I_{hold}$, still air | 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 |

### 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 | +125 °C |
| MF-USHT010KX | 0.15 | 0.13 | 0.12 | 0.10 | 0.09 | 0.08 | 0.074 | 0.067 | 0.056 | 0.027 |
| MF-USHT010KX/36 | 0.15 | 0.13 | 0.12 | 0.10 | 0.09 | 0.08 | 0.074 | 0.067 | 0.056 | 0.027 |
| MF-USHT016KX | 0.23 | 0.21 | 0.19 | 0.16 | 0.14 | 0.13 | 0.12 | 0.11 | 0.09 | 0.04 |
| MF-USHT016KX/36 | 0.23 | 0.21 | 0.19 | 0.16 | 0.14 | 0.13 | 0.12 | 0.11 | 0.09 | 0.04 |
| MF-USHT020KX | 0.29 | 0.26 | 0.23 | 0.20 | 0.18 | 0.16 | 0.15 | 0.13 | 0.11 | 0.05 |
| MF-USHT020KX/36 | 0.29 | 0.26 | 0.23 | 0.20 | 0.18 | 0.16 | 0.15 | 0.13 | 0.11 | 0.05 |
| MF-USHT035KX | 0.51 | 0.46 | 0.41 | 0.35 | 0.31 | 0.28 | 0.26 | 0.23 | 0.20 | 0.09 |
| MF-USHT050KX | 0.73 | 0.66 | 0.58 | 0.50 | 0.44 | 0.41 | 0.37 | 0.34 | 0.28 | 0.14 |
| MF-USHT075KX | 1.09 | 0.98 | 0.87 | 0.75 | 0.66 | 0.61 | 0.56 | 0.50 | 0.42 | 0.20 |
| MF-USHT075KX/24 | 1.09 | 0.98 | 0.87 | 0.75 | 0.66 | 0.61 | 0.56 | 0.50 | 0.42 | 0.20 |
| MF-USHT110KX/16 | 1.60 | 1.44 | 1.28 | 1.10 | 0.97 | 0.89 | 0.81 | 0.74 | 0.62 | 0.30 |
| MF-USHT125KX/12 | 1.81 | 1.64 | 1.45 | 1.25 | 1.10 | 1.01 | 0.93 | 0.84 | 0.70 | 0.34 |
| MF-USHT150KX/12 | 2.18 | 1.97 | 1.74 | 1.50 | 1.32 | 1.22 | 1.11 | 1.01 | 0.84 | 0.41 |
| MF-USHT175KX/12 | 2.54 | 2.29 | 2.03 | 1.75 | 1.54 | 1.42 | 1.30 | 1.17 | 0.98 | 0.47 |
| MF-USHT200KX/12 | 2.90 | 2.62 | 2.32 | 2.00 | 1.76 | 1.62 | 1.48 | 1.34 | 1.12 | 0.54 |

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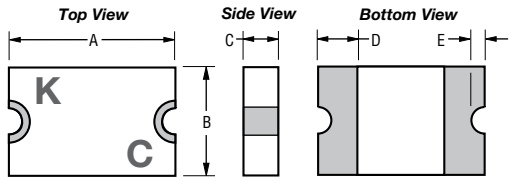
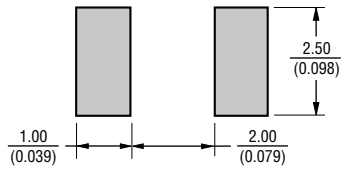
## Product Dimensions




***Terminal Material:***
ENIG-plated terminals

DIMENSIONS: MM / (INCHES)

***Recommended Pad Layout***




| Model | A | | B | | C | | D | | E | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| MF-USHT010KX | 3.00 (0.118) | 3.43 (0.135) | 2.35 (0.093) | 2.80 (0.110) | 0.40 (0.016) | 0.85 (0.033) | 0.30 (0.012) | 1.00 (0.039) | 0.05 (0.002) | 0.45 (0.018) |
| MF-USHT010KX/36 | | | | | | | | | | |
| MF-USHT016KX | | | | | | | | | | |
| MF-USHT016KX/36 | | | | | | | | | | |
| MF-USHT020KX | | | | | | | | | | |
| MF-USHT020KX/36 | | | | | | | | | | |
| MF-USHT035KX | | | | | | | | | | |
| MF-USHT050KX | | | | | | | | | | |
| MF-USHT075KX | | | | | 0.60 (0.024) | 1.20 (0.047) | | | | |
| MF-USHT075KX/24 | | | | | | | | | | |
| MF-USHT110KX/16 | | | | | 0.65 (0.026) | 1.05 (0.041) | | | | |
| MF-USHT125KX/12 | | | | | | | | | | |
| MF-USHT150KX/12 | | | | | | | | | | |
| MF-USHT175KX/12 | | | | | 1.00 (0.039) | 1.40 (0.055) | | | | |
| MF-USHT200KX/12 | | | | | | | | | | |

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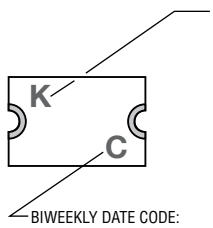
## Packaging Quantity

| Model | Packaging Quantity |
|---|---|
| MF-USHT010KX<br>MF-USHT010KX/36<br>MF-USHT016KX<br>MF-USHT016KX/36<br>MF-USHT020KX<br>MF-USHT020KX/36<br>MF-USHT035KX<br>MF-USHT050KX<br>MF-USHT075KX<br>MF-USHT075KX/24<br>MF-USHT110KX/16<br>MF-USHT125KX/12<br>MF-USHT150KX/12 | 3,000 pcs. per reel |
| MF-USHT175KX/12<br>MF-USHT200KX/12 | 2,000 pcs. per reel |

## Typical Part Marking

Represents total content. Layout may vary.




PART IDENTIFICATION:
MF-USHT010KX &
MF-USHT010KX/36 = B
MF-USHT016KX &
MF-USHT016KX/36 = D
MF-USHT020KX &
MF-USHT020KX/36 = E
MF-USHT035KX = F
MF-USHT050KX = K
MF-USHT075KX &
MF-USHT075KX/24 = L
MF-USHT110KX/16 = N
MF-USHT125KX/12 = P
MF-USHT150KX/12 = S
MF-USHT175KX/12 = T
MF-USHT200KX/12 = U

BIWEEKLY DATE CODE:
WEEK 1 AND 2 = A
WEEK 51 AND 52 = Z

## How to Order

**MF - USHT 075 K X / 24 - 2**

Multifuse® Product Designator

Series
USHT = 1210 High Temperature Surface Mount Component

Hold Current ($I_{hold}$) Indicator
010 ~ 200 (0.10 - 2.00 Amps)

Material Specific Code

Multifuse® freeXpansion™ Design Code

Voltage Options
12 = 12 Voltage Rated
16 = 16 Voltage Rated
24 = 24 Voltage Rated
36 = 36 Voltage Rated

Packaging
-2 = Tape and Reel Packaged per EIA-481

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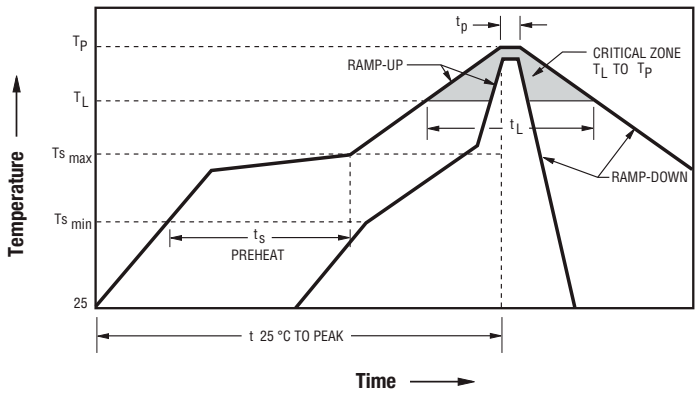
## Solder Reflow Recommendations




**Notes:**

- MF-USHT models are intended for reflow soldering (including, but not limited to heating plate, hot air, IR, nitrogen, and vapor phase).
- Wave soldering is permissible only if the device is on the top of the PCB, opposite the heat source.
- Hand soldering is not recommended for these devices.
- All temperatures refer to the topside of the device, measured on the device 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 Resettable Fuse Soldering Recommendations document for more details.

| Profile Feature | Pb-Free Assembly |
|---|---|
| Average Ramp-Up Rate ($Ts_{max}$ to $T_p$) | 3 °C / second max. |
| PREHEAT:<br>Temperature Min. ($Ts_{min}$)<br>Temperature Max. ($Ts_{max}$)<br>Time ($Ts_{min}$ to $Ts_{max}$) (ts) | <br>150 °C<br>200 °C<br>60~180 seconds |
| TIME MAINTAINED ABOVE:<br>Temperature ($T_L$)<br>Time ($t_L$) | <br>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. |

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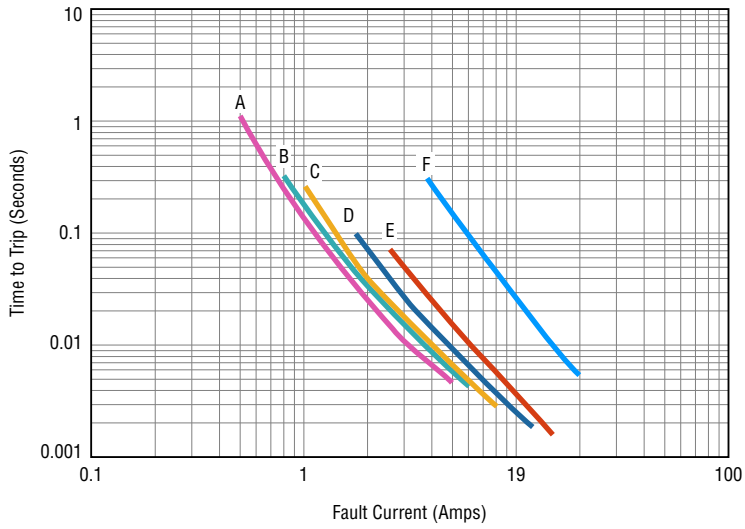
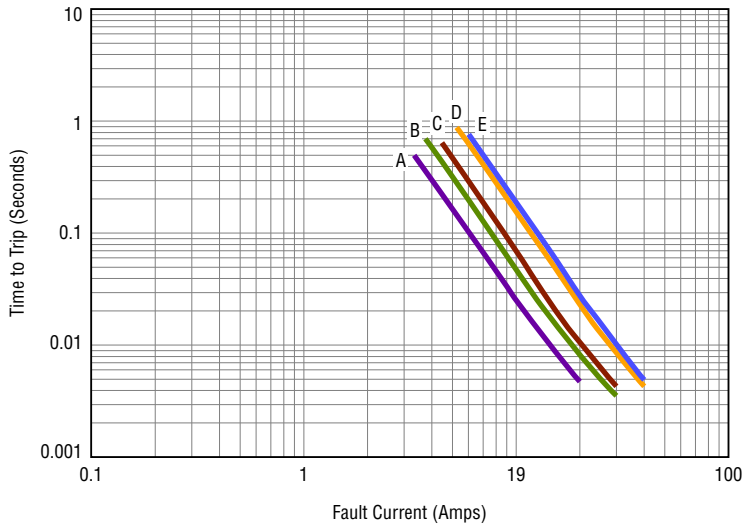
## Typical Time to Trip at 23 ˚C




A - MF-USHT010KX, MF-USHT010KX/36
B - MF-USHT016KX, MF-USHT016KX/36
C - MF-USHT020KX, MF-USHT020KX/36
D - MF-USHT035KX
E - MF-USHT050KX
F - MF-USHT075KX, MF-USHT075KX/24




A - MF-USHT110KX/16
B - MF-USHT125KX/12
C - MF-USHT150KX/12
D - MF-USHT175KX/12
E - MF-USHT200KX/12

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.

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# MF-USHT Series Tape and Reel Specifications

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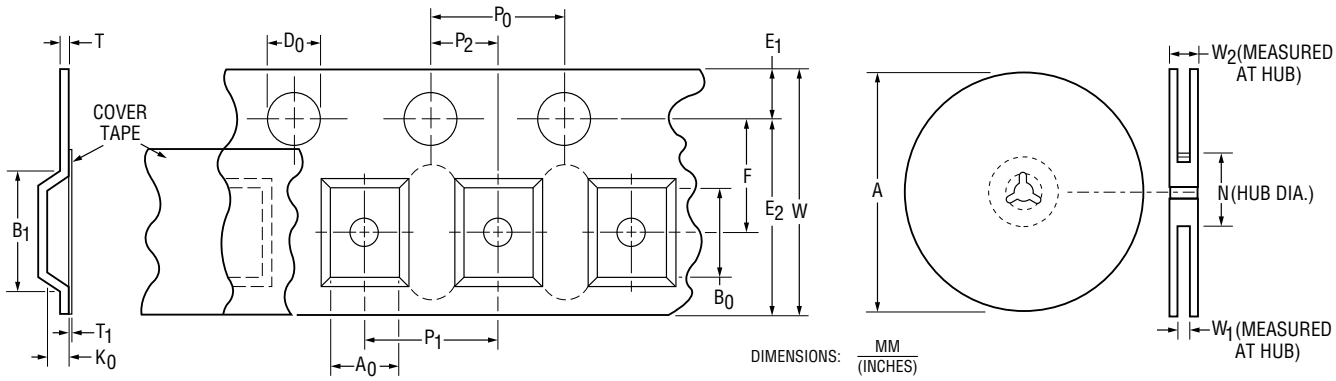
| Tape Dimensions per EIA-481 | MF-USHT010KX<br>MF-USHT010KX/36<br>MF-USHT016KX<br>MF-USHT016KX/36 | MF-USHT020KX<br>MF-USHT020KX/36<br>MF-USHT035KX<br>MF-USHT050KX | MF-USHT075KX<br>MF-USHT075KX/24 | MF-USHT110KX/16<br>MF-USHT125KX/12<br>MF-USHT150KX/12 | MF-USHT175KX/12<br>MF-USHT200KX/12 |
|---|---|---|---|---|---|
| W | | | 8.00 ± 0.30<br>(.315 ± .012) | | |
| $P_0$ | | | 4.00 ± 0.10<br>(.157 ± .004) | | |
| 10 $P_0$ | | | 40.0 ± 0.20<br>(1.575 ± .008) | | |
| $P_1$ | | | 4.00 ± 0.10<br>(.157 ± .004) | | |
| $P_2$ | | | 2.0 ± 0.05<br>(.079 ± .002) | | |
| $A_0$ | 2.86 ± 0.10<br>(.113 ± .004) | 3.00 ± 0.10<br>(.118 ± .004) | 3.00 ± 0.10<br>(.118 ± .004) | 3.00 ± 0.10<br>(.118 ± .004) | 3.00 ± 0.10<br>(.118 ± .004) |
| $B_0$ | 3.50 ± 0.10<br>(.138 ± .004) | 3.65 ± 0.10<br>(.144 ± .004) | 3.50 ± 0.10<br>(.138 ± .004) | 3.50 ± 0.10<br>(.138 ± .004) | 3.50 ± 0.10<br>(.138 ± .004) |
| $B_1$ max. | | | 4.35<br>(.171) | | |
| $D_0$ | | | 1.50 +0.10/-0<br>(.059 +.004/-0) | | |
| F | | | 3.50 ± 0.05<br>(.138 ± .002) | | |
| $E_1$ | | | 1.75 ± 0.10<br>(.069 ± .004) | | |
| $E_2$ min. | | | 6.25<br>(.246) | | |
| T max. | | | 0.60<br>(.024) | | |
| $T_1$ max. | | | 0.10<br>(.004) | | |
| $K_0$ | 1.07 ± 0.10<br>(.042 ± .004) | 0.85 ± 0.10<br>(.033 ± .004) | 1.22 ± 0.10<br>(.048 ± .004) | 1.10 ± 0.10<br>(.043 ± .004) | 1.68 ± 0.10<br>(.066 ± .004) |
| Leader min. | | | 390<br>(15.4) | | |
| Trailer min. | | | 160<br>(6.3) | | |
| **Reel Dimensions** | | | | | |
| A max. | | | 185<br>(7.3) | | |
| N min. | | | 50<br>(2.0) | | |
| $W_1$ | | | 8.4 +1.5/-0<br>(.33 +.06/-0) | | |
| $W_2$ max. | | | 14.4<br>(.57) | | |




MF-USHT SERIES, REV. K 12/24

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## Application Notice

- 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


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