



## Features

- Compliant with AEC-Q200 Rev-C - Stress Test Qualification for Passive Components in Automotive Applications
- Small footprint size (1206)
- Operating temperature range up to 125 °C
- Low thermal derating factor
- Higher hold currents at elevated temperatures
- RoHS compliant\*

## 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-NSHT 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-NSHT016KX | 30           | 80          | 0.16              | 0.80              | 0.7               | 6.0                   | 8.0               | 0.1              | 0.9                       |
| MF-NSHT035KX | 30           | 80          | 0.35              | 1.75              | 0.4               | 2.6                   | 8.0               | 0.1              | 0.9                       |

\*\*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-NSHT 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                       |

### 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-NSHT016KX | 0.232                         | 0.210  | 0.186 | 0.160  | 0.141  | 0.130  | 0.118  | 0.107  | 0.090  | 0.043   |
| MF-NSHT035KX | 0.508                         | 0.459  | 0.406 | 0.350  | 0.308  | 0.284  | 0.259  | 0.235  | 0.196  | 0.095   |

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\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.

Specifications are subject to change without notice.

The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Users should verify actual device performance in their specific applications.

# MF-NSHT Series - PTC Resettable Fuses

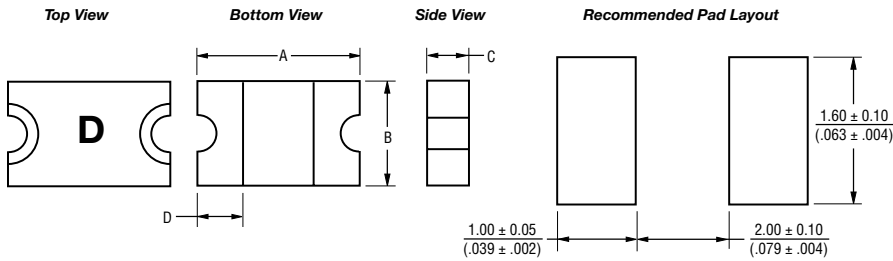
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## Product Dimensions

| Model        | A                      |                        | B                      |                        | C                      |                        | D                      |
|--------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|              | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   | Max.                   | Min.                   |
| MF-NSHT016KX | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.25}{(0.010)}$ |
| MF-NSHT035KX | $\frac{3.00}{(0.118)}$ | $\frac{3.40}{(0.134)}$ | $\frac{1.40}{(0.055)}$ | $\frac{1.80}{(0.071)}$ | $\frac{0.40}{(0.016)}$ | $\frac{0.85}{(0.033)}$ | $\frac{0.25}{(0.010)}$ |

Packaging: 3000 pcs. per reel.

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



### Terminal material:

Nickel/gold plated.

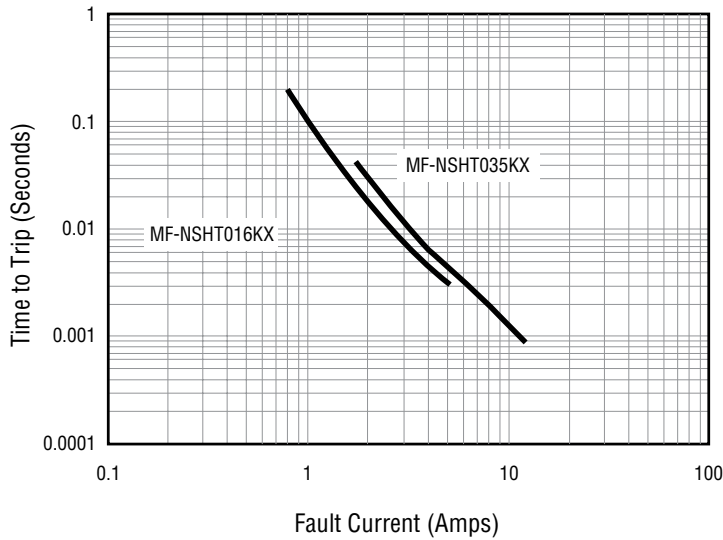
### Termination pad solderability:

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.

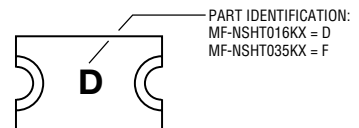
## How to Order

### MF - NSHT 016 K X - 2

Multifuse® Product Designator \_\_\_\_\_  
 Series \_\_\_\_\_  
 NSHT = 1206 High Temperature Surface Mount Component  
 Hold Current,  $I_{hold}$  \_\_\_\_\_  
 016 - 035 (0.16 - 0.35 Amps)  
 Material Specific Code \_\_\_\_\_  
 Multifuse® freeExpansion™ Design \_\_\_\_\_  
 Packaging \_\_\_\_\_  
 Packaged per EIA 481-1  
 -2 = Tape and Reel

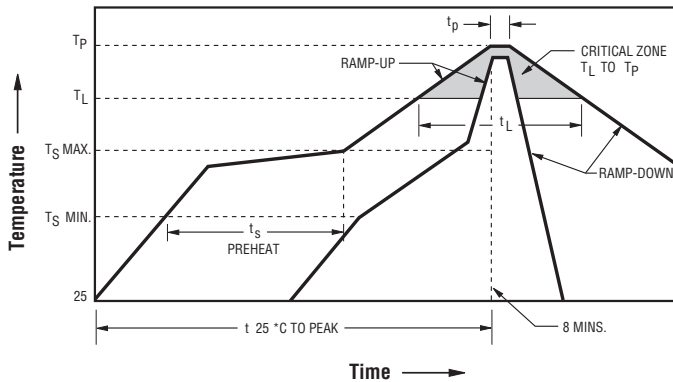
## Typical Part Marking

Represents total content. Layout may vary.



BIWEEKLY DATE CODE WILL APPEAR ON THE PACKAGING LABEL:  
 WEEK 1 AND 2 = A  
 WEEK 51 AND 52 = Z

## Solder Reflow Recommendations



### Notes:

- MF-NSHT 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.

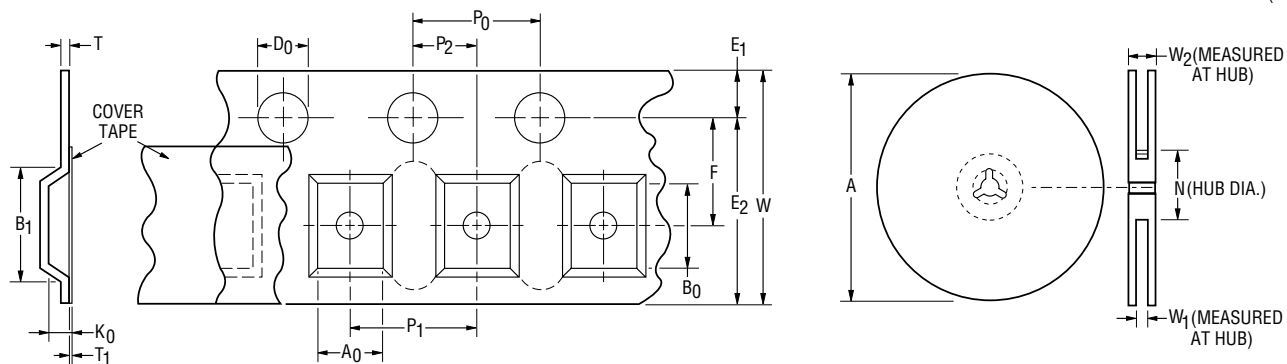
| Profile Feature   | Pb-Free Assembly                   |
|---|------------------------------------|
| Average Ramp-Up Rate ( $T_{S_{max}}$ to $T_p$ )   | 3 °C / second max.                 |
| PREHEAT:<br>Temperature Min. ( $T_{S_{min}}$ )<br>Temperature Max. ( $T_{S_{max}}$ )<br>Time ( $t_{s_{min}}$ 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.                     |

# MF-NSHT Series Tape and Reel Specifications

# BOURNS®

| Tape Dimensions        | MF-NSHT Series<br>per EIA 481-1          |
|------------------------|--|
| W                      | $8.0 \pm 0.30$<br>(0.315 ± 0.012)        |
| P <sub>0</sub>         | $4.0 \pm 0.10$<br>(0.157 ± 0.004)        |
| P <sub>1</sub>         | $4.0 \pm 0.10$<br>(0.157 ± 0.004)        |
| P <sub>2</sub>         | $2.0 \pm 0.05$<br>(0.079 ± 0.002)        |
| A <sub>0</sub>         | $1.95 \pm 0.10$<br>(0.077 ± 0.004)       |
| B <sub>0</sub>         | $3.55 \pm 0.10$<br>(0.140 ± 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 ± 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>         | $0.80 \pm 0.15$<br>(0.031 ± 0.006)       |
| Leader min.            | $390$<br>(15.35)                         |
| Trailer min.           | $160$<br>(6.30)                          |
| <b>Reel Dimensions</b> |  |
| 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)                        |

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



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