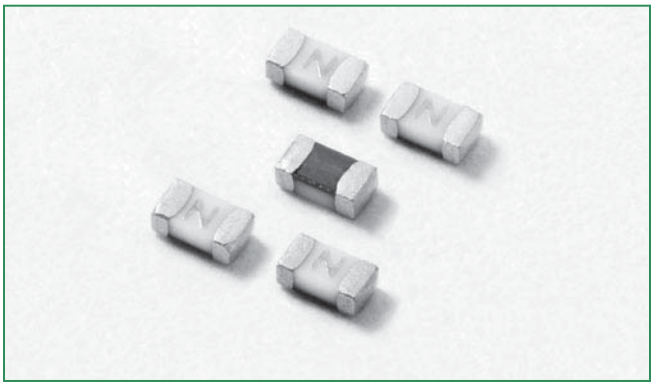
# RoHS Pb HF 441 Series – 0603 High I²t Fuse



## Description

This 100% Lead-free, RoHS compliant and Halogen-free fuse series has been designed specifically to provide over current protection to circuits that see high working ambient temperatures (up to 150°C) and high inrush currents.

The general design ensures excellent temperature stability and performance reliability.

This high I²t fuse series is designed to have ultra high inrush current withstand capability to avoid nuisance fuse open.



## Agency Approvals

| AGENCY | AGENCY FILE NUMBER | AMPERE RANGE |
|---|---|---|
| | E10480 | 2A - 6A |
| | LR29862 | 2A - 6A |

## Features

- Operating Temperature from -55°C to 150°C
- 100% Lead-free and RoHS compliant
- Suitable for both leaded and lead-free reflow / wave soldering
- Ultra high I²t values

## Electrical Characteristics

| % of Ampere Rating | Ampere Rating | Opening Time at 25°C |
|---|---|---|
| 100% | 2A - 6A | 4 Hours Minimum |
| 350% | 2A - 6A | 5 Seconds Maximum |

## Applications

- Handheld Electronics
- LCD Displays
- Battery Packs
- Hard Disk Drives
- SD Memory Cards
- Automotive Electronics

## Electrical Specifications by Item

| Ampere Rating (A) | Amp Code | Max. Voltage Rating (V) | Interrupting Rating | Nominal Resistance (Ohms)[2] | Nominal Melting I²t (A²Sec.)[3] | Nominal Voltage Drop At Rated Current (V)[4] | Nominal Power Dissipation At Rated Current (W) | Agency Approvals | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| 2 | 002. | 32 | 50 A @ 32 VDC | 0.0302 | 0.3103 | 0.0551 | 0.110 | X | X |
| 2.5 | 02.5 | 32 | | 0.0200 | 0.5520 | 0.0534 | 0.134 | X | X |
| 3 | 003. | 32 | | 0.0158 | 0.8165 | 0.0531 | 0.159 | X | X |
| 3.5 | 03.5 | 32 | | 0.0117 | 0.9438 | 0.0468 | 0.164 | X | X |
| 4 | 004. | 32 | | 0.0097 | 1.2659 | 0.0475 | 0.190 | X | X |
| 5 | 005. | 32 | | 0.0073 | 1.6287 | 0.0472 | 0.236 | X | X |
| 6 | 006. | 32 | | 0.0056 | 2.6049 | 0.0464 | 0.278 | X | X |

Notes:

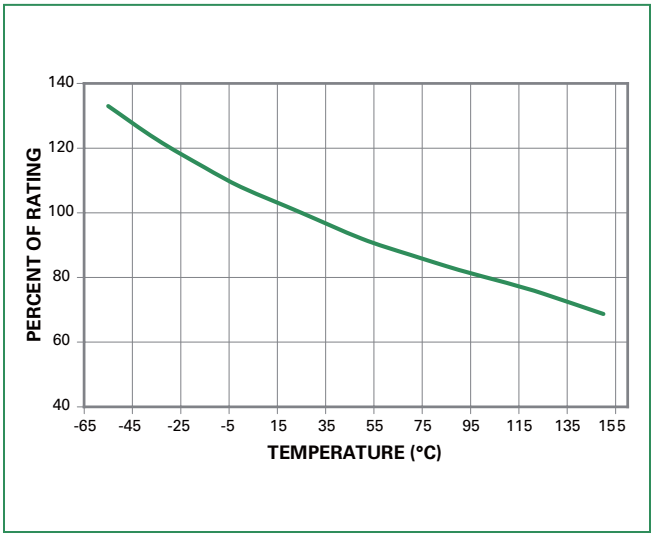
1. DC Interrupting Rating tested at rated voltage with time constant < 0.8 msecs.
2. Nominal Resistance measured with < 10% rated current.
3. Nominal Melting I²t measured at 1 msec. opening time.
4. Nominal Voltage Drop measured at rated current after temperature has stabilized.

Devices designed to carry out rated current for 4 hours minimum. It is recommended that devices be operated continuously at no more than 80% rated current. See "Temperature Rerating Curve" for additional rerating information.

Devices designed to be mounted with marking code facing up.

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## Temperature Rerating Curve



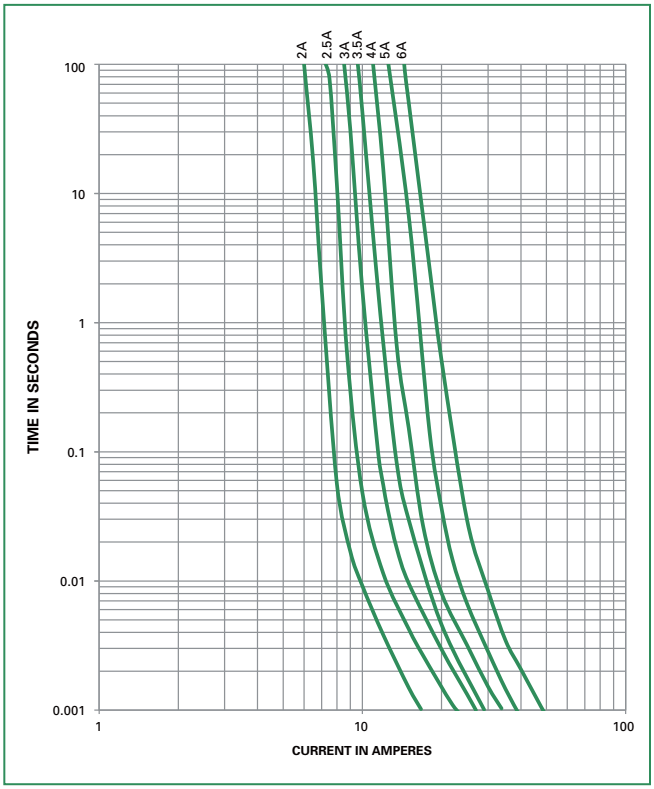

Note:

1. Rerating depicted in this curve is in addition to the standard rerating of 20% for continuous operation.

   For continuous operation at 75 degrees celsius, the fuse should be rerated as follows:

   $I = (0.80)(0.85)I_{RAT} = (0.68)I_{RAT}$

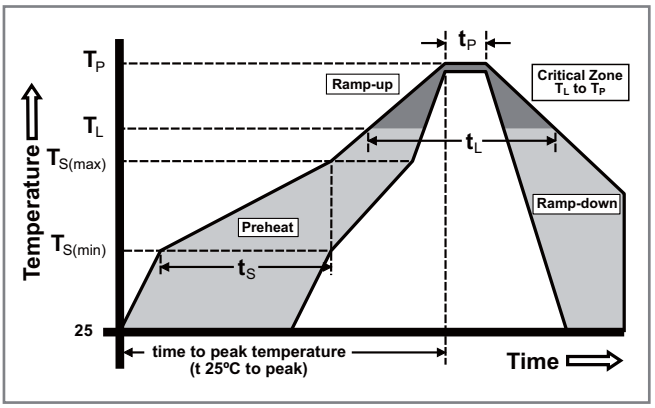
## Average Time Current Curves




## Soldering Parameters

| | | |
|---|---|---|
| Reflow Condition | | Pb – free assembly |
| Pre Heat | -Temperature Min ($T_{s(min)}$) | 150°C |
| | -Temperature Max ($T_{s(max)}$) | 200°C |
| | -Time (Min to Max) ($t_s$) | 60 – 180 seconds |
| Average Ramp-up Rate (Liquidus Temp ($T_L$) to peak) | | 3°C/second max. |
| $T_{S(max)}$ to $T_L$ - Ramp-up Rate | | 5°C/second max. |
| Reflow | -Temperature ($T_L$) (Liquidus) | 217°C |
| | -Temperature ($t_L$) | 60 – 150 seconds |
| Peak Temperature ($T_P$) | | $260^{+0/-5}$ °C |
| Time within 5°C of actual peak Temperature ($t_p$) | | 10 – 30 seconds |
| Ramp-down Rate | | 6°C/second max. |
| Time 25°C to peak Temperature ($T_P$) | | 8 minutes max. |
| Do not exceed | | 260°C |

| | |
|---|---|
| Wave Soldering | 260°C, 10 seconds max. |





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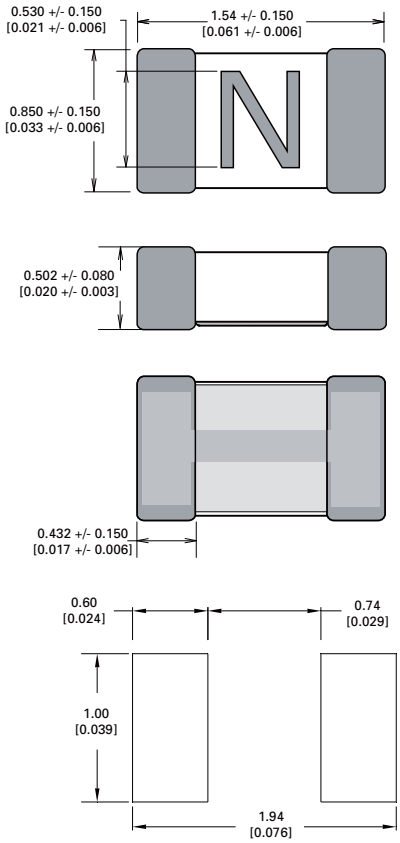
## Product Characteristics

| | |
|---|---|
| **Materials** | **Body:** Advanced Ceramic<br>**Terminations:** Ag / Ni / Sn (100% Lead-free)<br>**Element Cover Coating:** Lead-free Glass |
| **Moisture Sensitivity Level** | IPC/JEDEC J-STD-020C, Level 1 |
| **Solderability** | IPC/ECA/JEDEC J-STD-002C, Condition C |
| **Humidity** | MIL-STD-202, Method 103B, Conditions D |
| **ESD Immunity** | IEC 61000-4-2, 8kV Direct |
| **Resistance to Solder Heat** | MIL-STD-202, Method 210F, Condition B |

| | |
|---|---|
| **Moisture Resistance** | MIL-STD-202, Method 106G |
| **Thermal Shock** | MIL-STD-202, Method 107G, Condition B |
| **Mechanical Shock** | MIL-STD-202, Method 213B, Condition A |
| **Vibration** | MIL-STD-202, Method 201A |
| **Vibration, High Frequency** | MIL-STD-202, Method 204D, Condition D |
| **Dissolution of Metallization** | IPC/ECA/JEDEC J-STD-002C, Condition D |
| **Terminal Strength** | IEC 60127-4 |



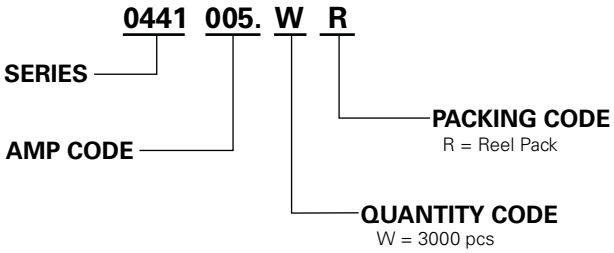
## Dimensions




## Part Marking System

| Amp Code | Marking Code |
|---|---|
| 002. | **N** |
| 02.5 | **O** |
| 003. | **P** |
| 03.5 | **R** |
| 004. | **S** |
| 005. | **T** |
| 006. | **U** |

## Part Numbering System




## Packaging

| Packaging Option | Packaging Specification | Quantity | Quantity & Packaging Code |
|---|---|---|---|
| 8mm Tape and Reel | EIA-481-1 (IEC 286, part 3) | 3000 | WR |

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