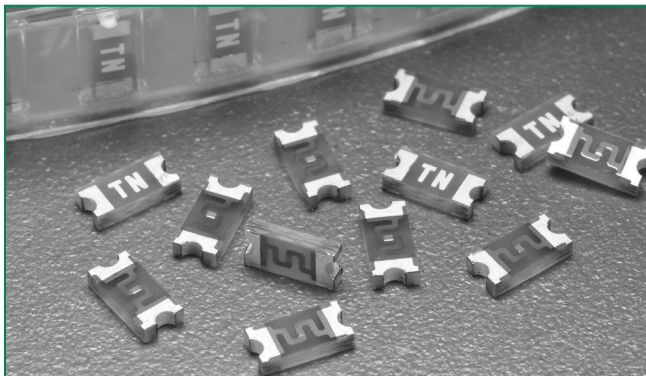


## RoHS HF 468 Series Fuse



### Description

The 468 Series Time-Lag (Slo-Blo®) SMF is a small (1206 size) thin-film device designed for secondary protection of circuits used in space constrained applications such as hand-held portable electronic devices.

This series is 100% lead-free and meets the requirements of the RoHS directive. New Halogen-Free 468 Series fuses are available—to order use the “HF” suffix. See Part Numbering section for additional information.

### Features

- Complies with electronic industry environmental standards for lead reduction.
- Product is compatible with lead-free solders and higher temperature profiles.
- Time delay feature withstands high inrush currents and prevents nuisance openings.
- Package is visually distinct from fast-acting version for easy identification.
- Top side marking allows visual verification of amperage rating.

### Applications

Secondary protection for space constrained applications:

- Cell phones
- Battery packs
- Digital cameras
- DVD players
- Hard disk drives.

### Agency Approvals

| AGENCY                                                                            | AGENCY FILE NUMBER | AMPERE RANGE |
|-----------------------------------------------------------------------------------|--------------------|--------------|
|  | E10480             | 500MA - 3A   |
|  | LR29862            | 500MA - 3A   |

### Electrical Characteristics for Series

| % of Ampere Rating | Opening Time at 25°C              |
|--------------------|-----------------------------------|
| 100%               | 4 hours, Minimum                  |
| 200%               | 1 sec., Min.; 120 sec., Max.      |
| 300%               | 0.05 sec., Min.; 1.5 sec., Max    |
| 800%               | 0.0015 sec., Min.; .05 sec., Max. |

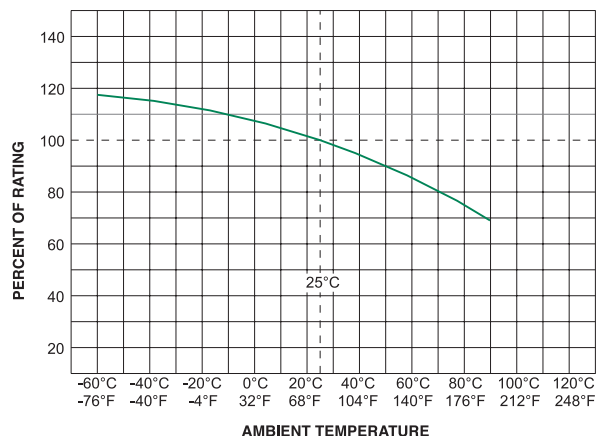
### Electrical Specifications by Item

| Ampere Rating (A) | Amp Code | Max Voltage Rating (V) | Interrupting Rating                      | Nominal Cold Resistance (Ohms) | Nominal Melting I <sup>2</sup> t (A <sup>2</sup> sec) | Nom Voltage Drop (mV) | Nom Power Dissipation (W) | Agency Approvals                                                                      |                                                                                       |
|-------------------|----------|------------------------|------------------------------------------|--------------------------------|-------------------------------------------------------|-----------------------|---------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                   |          |                        |                                          |                                |                                                       |                       |                           |  |  |
| 0.50              | .500     | 63                     | 50 amperes @63 VAC/VDC                   | 0.27000                        | 0.0310                                                | 156.77                | 0.0784                    | x                                                                                     | x                                                                                     |
| 1.00              | 001.     | 63                     |                                          | 0.08250                        | 0.1270                                                | 94.70                 | 0.0947                    | x                                                                                     | x                                                                                     |
| 1.50              | 01.5     | 63                     |                                          | 0.04750                        | 0.2880                                                | 82.32                 | 0.1235                    | x                                                                                     | x                                                                                     |
| 2.00              | 002.     | 63                     | 35 amperes @63 VAC<br>50 amperes @63 VDC | 0.03240                        | 0.5060                                                | 77.27                 | 0.1545                    | x                                                                                     | x                                                                                     |
| 2.50              | 02.5     | 63                     |                                          | 0.02240                        | 1.0110                                                | 73.92                 | 0.1848                    | x                                                                                     | x                                                                                     |
| 3.00              | 003.     | 32                     | 50 amperes @32 VAC/VDC                   | 0.01950                        | 1.2700                                                | 72.95                 | 0.2189                    | x                                                                                     | x                                                                                     |

1. Measured at 10% of rated current, 25°C.

2. Measured at rated voltage.

## Temperature Derating Curve



Note:

1. Derating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

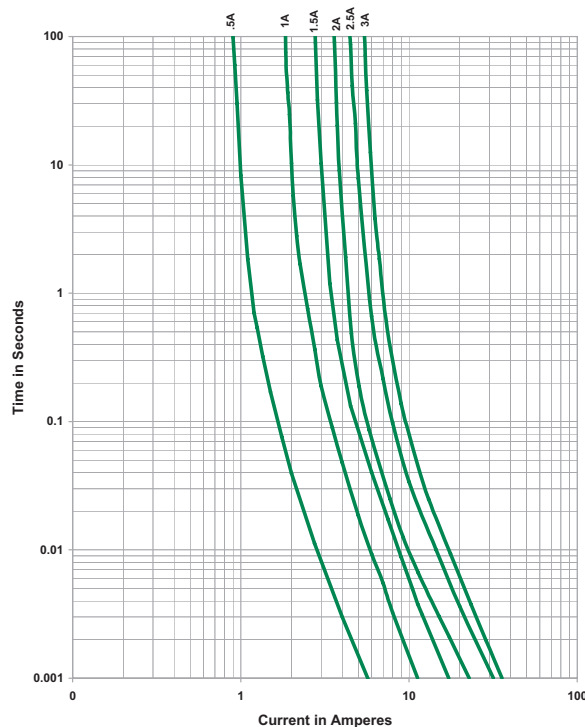
Example:

For continuous operation at 70 degrees celsius, the fuse should be derated as follows:

$$I = (0.75)(0.80)I_{\text{RAT}} = (0.60)I_{\text{RAT}}$$

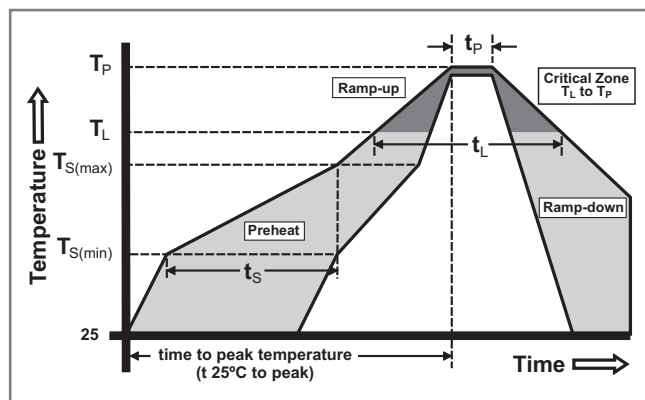
2. The temperature derating curve represents the nominal conditions. For questions about temperature derating curve, please consult Littelfuse technical support for assistance.

## 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 secs           |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak |                                     | 5°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 ( $T_p$ )                            |                                     | 250 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )  |                                     | 20 – 40 seconds         |
| Ramp-down Rate                                        |                                     | 5°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )               |                                     | 8 minutes Max.          |
| Do not exceed                                         |                                     | 260°C                   |



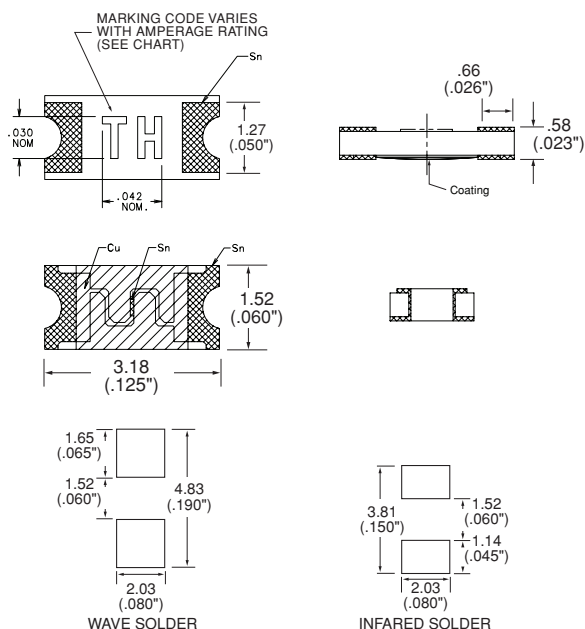
|                |                        |
|----------------|------------------------|
| Wave Soldering | 260°C, 10 seconds max. |
|----------------|------------------------|

## Product Characteristics

|                              |                                                                                                                                       |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Materials</b>             | <b>Body:</b> Epoxy Substrate<br><b>Terminations:</b> 100% Tin over Nickel over Copper<br><b>Element Cover Coat:</b> Conformal Coating |
| <b>Operating Temperature</b> | –55°C to 90°C. Consult temperature derating curve chart. For operation above 90°C please contact Littelfuse                           |
| <b>Thermal Shock</b>         | Withstands 5 cycles of – 50°C to 125°C                                                                                                |
| <b>Humidity</b>              | MIL-STD-202F, Method 103B, Condition D                                                                                                |

|                                              |                                                                                                                       |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Vibration</b>                             | Withstands 10-55 Hz per MIL-STD-202F, Method 201A and 10-2000 Hz at 20 G's per MIL-STD-202F, Method 204D, Condition D |
| <b>Insulation Resistance (After Opening)</b> | Greater than 10,000 ohms.                                                                                             |
| <b>Resistance to Soldering Heat</b>          | MIL-STD-202G, Method 210F, Condition D                                                                                |

## Dimensions



## Part Marking System

| Amp Code | Marking Code |
|----------|--------------|
| .500     | TF           |
| 001.     | TH           |
| 01.5     | TK           |
| 002.     | TN           |
| 02.5     | TO           |
| 003.     | TP           |

## Part Numbering System

**0468002.NRHF**

**SERIES**

**AMP Code**

The dot is positioned before the Packaging Suffix with whole ratings and within the numbering sequence for fractional ratings. Refer to Amp Code column in the Electrical Specifications table.

**PACKAGING Code**

NR = Tape and Reel, 5000 pcs

**'HF' SUFFIX**

**HALOGEN FREE ITEM**

**Example:**  
1.5 amp product is 046801.5NRHF (2 amp product shown above).

## Packaging

| Packaging Option       | Packaging Specification            | Quantity | Quantity & Packaging Code |
|------------------------|------------------------------------|----------|---------------------------|
| Tape & Reel – 8mm tape | EIA-481 Rev. D (IEC 60286, part 3) | 5000     | NR                        |