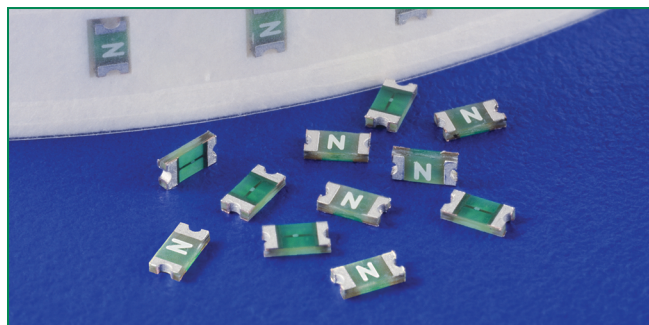


### 494 Series Fuse, NRA Special Series Integrated Circuit Protector



#### Agency Approvals

| AGENCY | AGENCY FILE NUMBER | AMPERE RANGE |
|--------|--------------------|--------------|
|        | E10480             | 250mA - 5A   |
|        | LR29862            | 250mA - 5A   |

#### Electrical Characteristics for Series

| % of Ampere Rating | Opening Time at 25°C |
|--------------------|----------------------|
| 100%               | 4 hours, Minimum     |
| 200%               | 5 sec., Maximum      |
| 300%               | 0.2 sec., Maximum    |

#### Additional Information



Datasheet



Resources



Samples

#### Description

The 494 Series Fast-Acting SMF is an ultra small (0603 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 Halide-Free 494 Series fuses are available to order using the "HF" suffix. See Part Numbering section for additional information.

#### Features

- Compatible with lead-free solders and higher temperature profiles
- High performance materials provide improved performance in elevated ambient temperature applications
- Marked on top surface with code to allow ampere rating identification without testing
- Low profile for height sensitive applications
- Flat top surface for pick-and-place operations
- Element-covering material is resistant to industry standard cleaning operations
- Mounting pad and electrical performance are identical to Littelfuse 431 and 434 Series products
- Alloy-based element construction provides superior inrush withstand characteristics ( $I^2t$ ) over ceramic or glass-based 0603 fuse products

#### Applications

Secondary protection for space constrained applications:

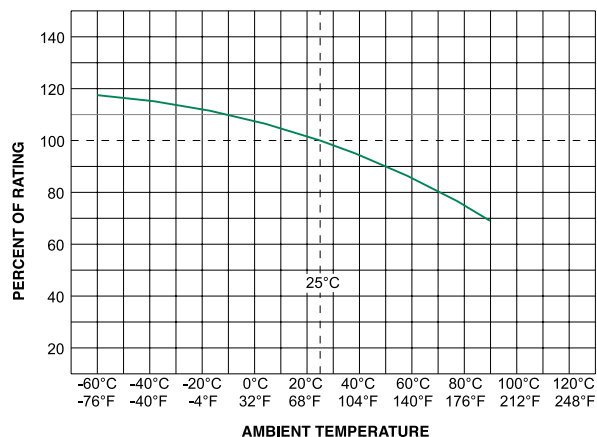
- Cell phones
- Digital cameras
- Hard disk drives
- Battery packs
- DVD players

#### Electrical Specifications by Item

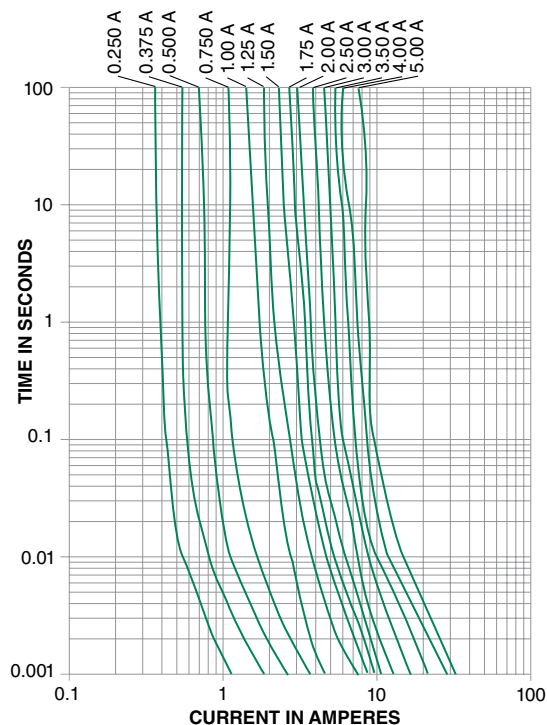
| Ampere Rating (A) | Amp Code | Max Voltage Rating (V) | Interrupting Rating | Nominal Cold Resistance (Ohms) | Nominal Melting $I^2t$ (A <sup>2</sup> sec) | Nom Voltage Drop (mV) | Nom Power Dissipation (W) | Agency Approvals |   |
|-------------------|----------|------------------------|---------------------|--------------------------------|---------------------------------------------|-----------------------|---------------------------|------------------|---|
|                   |          |                        |                     |                                |                                             |                       |                           |                  |   |
| 0.250             | .250     | 32                     | 50A @32V AC/DC      | 0.5450                         | 0.0030                                      | 158.56                | 0.0396                    | x                | x |
| 0.375             | .375     | 32                     |                     | 0.2900                         | 0.0053                                      | 128.03                | 0.0480                    | x                | x |
| 0.500             | .500     | 32                     |                     | 0.1870                         | 0.0087                                      | 115.71                | 0.0579                    | x                | x |
| 0.750             | .750     | 32                     |                     | 0.1170                         | 0.0171                                      | 107.33                | 0.0805                    | x                | x |
| 1.00              | 001.     | 32                     |                     | 0.0710                         | 0.0212                                      | 89.10                 | 0.0891                    | x                | x |
| 1.25              | 1.25     | 32                     | 35A @32V AC/DC      | 0.0530                         | 0.0518                                      | 84.32                 | 0.1054                    | x                | x |
| 1.40              | 01.4     | 32                     |                     | 0.049                          | 0.05529                                     | 74.84                 | 0.1048                    | x                | x |
| 1.50              | 01.5     | 32                     |                     | 0.0410                         | 0.0766                                      | 81.14                 | 0.1217                    | x                | x |
| 1.75              | 1.75     | 32                     |                     | 0.0320                         | 0.0903                                      | 78.75                 | 0.1378                    | x                | x |
| 2.00              | 002.     | 32                     |                     | 0.0300                         | 0.1103                                      | 78.22                 | 0.1564                    | x                | x |
| 2.50              | 02.5     | 32                     |                     | 0.0220                         | 0.1440                                      | 76.10                 | 0.1903                    | x                | x |
| 3.00              | 003.     | 32                     |                     | 0.0180                         | 0.2403                                      | 75.04                 | 0.2251                    | x                | x |
| 3.15              | 3.15     | 32                     |                     | 0.017                          | 0.27405                                     | 63.78                 | 0.2009                    | x                | x |
| 3.50              | 03.5     | 32                     |                     | 0.0150                         | 0.4306                                      | 74.25                 | 0.2599                    | x                | x |
| 4.00              | 004.     | 32                     |                     | 0.0130                         | 0.5760                                      | 73.72                 | 0.2949                    | x                | x |
| 5.00              | 005.     | 32                     |                     | 0.0090                         | 0.9000                                      | 72.71                 | 0.3635                    | x                | x |

1. Measured at 10% of rated current, 25°C. 2. Measured at rated voltage.

## Temperature Derating Curve

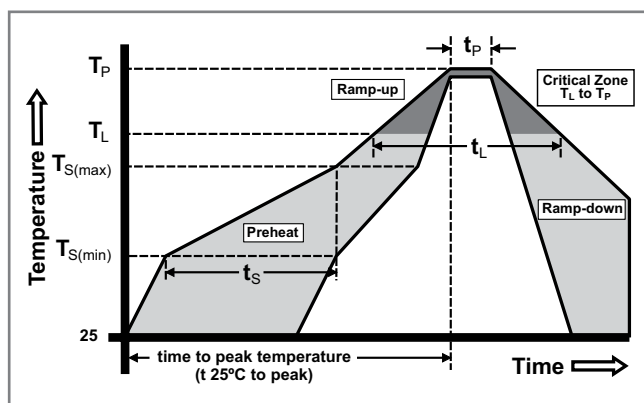


## Average Time Current Curves



## 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) |                                    | 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                   |



# Surface Mount Fuses

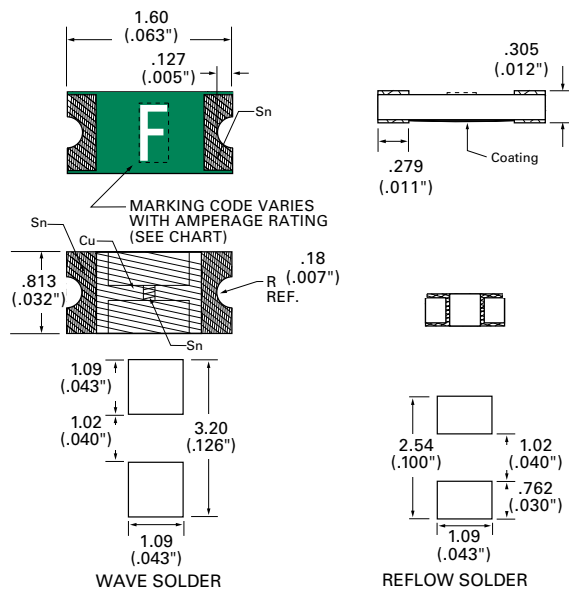
Thin Film > 0603 Size > Fast-Acting > 494 Series

## Product Characteristics

|                              |                                                                                                                                                           |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Materials</b>             | <b>Body:</b> Advanced High Temperature 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 contact Littelfuse.                                                    |
| <b>Humidity</b>              | MIL-STD-202F, Method 103B, Condition D                                                                                                                    |

|                                              |                                                            |
|----------------------------------------------|------------------------------------------------------------|
| <b>Thermal Shock</b>                         | Withstands 5 cycles of - 55°C to 125°C                     |
| <b>Vibration</b>                             | Per MIL-STD-202F                                           |
| <b>Insulation Resistance (After Opening)</b> | Greater than 10,000 ohms                                   |
| <b>Resistance to Soldering Heat</b>          | Withstands 60 seconds above 200°C and up to 260°C, maximum |

## Dimensions



## Part Marking System

| Amp Code | Marking Code |
|----------|--------------|
| .250     | <b>D</b>     |
| .375     | <b>E</b>     |
| .500     | <b>F</b>     |
| .750     | <b>G</b>     |
| 001.     | <b>H</b>     |
| 1.25     | <b>J</b>     |
| 01.4     | <b>III</b>   |
| 01.5     | <b>K</b>     |
| 1.75     | <b>L</b>     |
| 002.     | <b>N</b>     |
| 02.5     | <b>O</b>     |
| 003.     | <b>P</b>     |
| 3.15     | <b>III</b>   |
| 03.5     | <b>R</b>     |
| 004.     | <b>S</b>     |
| 005.     | <b>T</b>     |

## Packaging

| Packaging Option  | Packaging Specification        | Quantity | Quantity & Packaging Code |
|-------------------|--------------------------------|----------|---------------------------|
| 8mm Tape and Reel | EIA RS-481-2 (IEC 286, part 3) | 5000     | NR                        |

## Part Numbering System

**0494002.NRHF**

**SERIES**

**AMP Code**

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

**PACKAGING Code**

NR = Tape and Reel, 5000 pcs

**'HF' SUFFIX HALIDE FREE ITEM**