

### 501 Series – High Current 1206 Fast-Acting Fuse



#### Description

The 501 Series is a 100% Lead-free, RoHS compliant and Halogen-free fuse series designed specifically to provide over-current protection to circuits that operate under high working ambient temperature up to 150°C.

The general design ensures excellent temperature stability and performance reliability.

The high  $I^2t$  values which is typical in the Littelfuse Ceramic Fuse family, ensure high inrush current withstand capability.

#### Features

- Operating Temperature from -55°C to +150°C
- Designed to provide over-current protection in high current voltage regulator module (VRM) applications
- 100% Lead-free, RoHS compliant and Halogen-free
- Suitable for both leaded and lead-free reflow / wave soldering

#### Applications

- Voltage Regulator Module (VRM) Equipment
- Notebook PC
- DC-DC Converter

#### Additional Information



Datasheet



Resources



Samples

#### Agency Approvals

| AGENCY                                                                            | AGENCY FILE NUMBER | AMPERE RANGE |
|-----------------------------------------------------------------------------------|--------------------|--------------|
|  | E10480             | 10A - 20A    |
|  | 29862              | 10A - 20A    |

#### Electrical Characteristics for Series

| % of Ampere Rating | Ampere Rating | Opening Time at 25°C |
|--------------------|---------------|----------------------|
| 100%               | 10A – 20A     | 4 Hours, Minimum     |
| 350%               | 10A – 20A     | 5 Seconds, Maximum   |

#### Electrical Specifications by Item

| Ampere Rating (A) | Amp Code | Max. Voltage Rating (V) | Interrupting Rating (DC) <sup>1</sup> | Nominal Resistance (Ohms) <sup>2</sup> | Nominal Melting $I^2t$ (A <sup>2</sup> Sec.) <sup>3</sup> | Nominal Voltage Drop At Rated Current (V) <sup>4</sup> | Nominal Power Dissipation At Rated Current (W) | Agency Approvals                                                                      |                                                                                       |
|-------------------|----------|-------------------------|---------------------------------------|----------------------------------------|-----------------------------------------------------------|--------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                   |          |                         |                                       |                                        |                                                           |                                                        |                                                |  |  |
| 10                | 010.     | 32                      | 150 A @ 32 VDC                        | 0.00362                                | 10.385                                                    | 0.04407                                                | 0.4407                                         | x                                                                                     | x                                                                                     |
| 12                | 012.     | 32                      |                                       | 0.00311                                | 20.341                                                    | 0.04927                                                | 0.5912                                         | x                                                                                     | x                                                                                     |
| 15                | 015.     | 32                      |                                       | 0.00250                                | 39.700                                                    | 0.04843                                                | 0.7265                                         | x                                                                                     | x                                                                                     |
| 20                | 020.     | 32                      |                                       | 0.00194                                | 86.360                                                    | 0.05888                                                | 1.1776                                         | x                                                                                     | x                                                                                     |

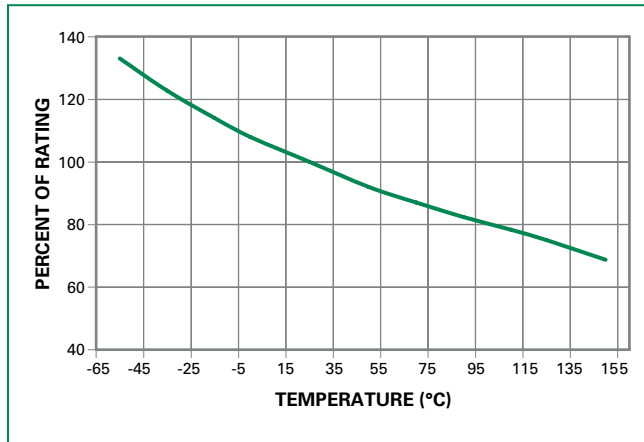
Notes:

- DC Interrupting Rating tested at rated voltage with time constant < 0.5 msec.
- Nominal Resistance measured with < 10% rated current.
- Nominal Melting  $I^2t$  measured at 1 msec. opening time. For other  $I^2t$  data refer to chart.
- Nominal Voltage Drop measured at rated current after temperature has stabilized and with fuse mounted on board with 3-oz Cu trace.

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

Devices designed to be mounted with marking code facing up.

### Temperature Re-rating Curve



Note:

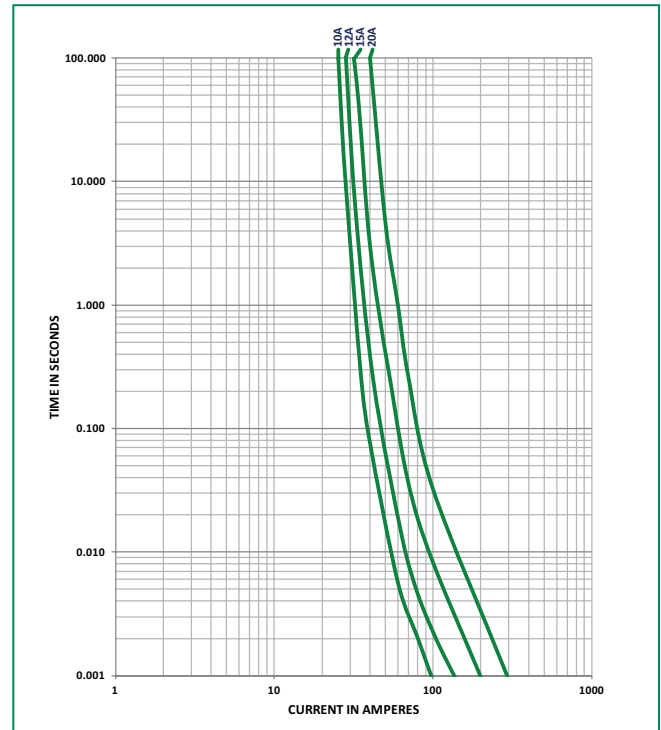
1. Re-rating depicted in this curve is in addition to the standard re-rating of 20% for continuous operation.

Example:

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

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

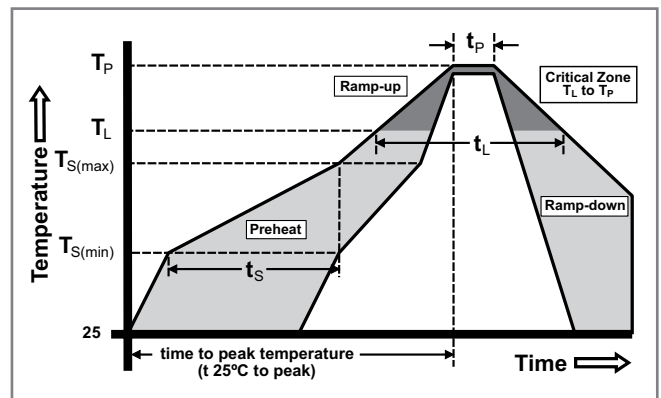
### Average Time Current Curves



### 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. |
|----------------|------------------------|

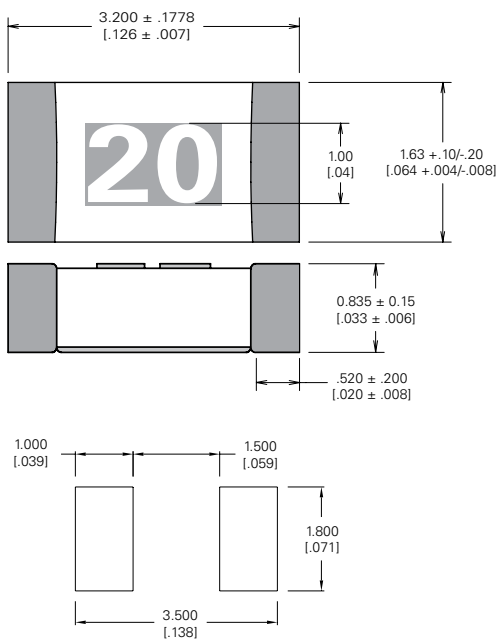


### Product Characteristics

|                                   |                                                                                                                                      |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Materials</b>                  | <b>Body:</b> Advanced Ceramic<br><b>Terminations:</b> Ag / Ni / Sn (100% Lead-free)<br><b>Element Cover Coating:</b> Lead-free Glass |
| <b>Moisture Sensitivity Level</b> | IPC/JEDEC J-STD-020, Level 1                                                                                                         |
| <b>Solderability</b>              | IPC/ECA/JEDEC J-STD-002, Condition B                                                                                                 |
| <b>Humidity Test</b>              | MIL-STD-202, Method 103, Conditions D                                                                                                |
| <b>Resistance to Solvents</b>     | MIL-STD-202, Method 210, Condition B                                                                                                 |

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

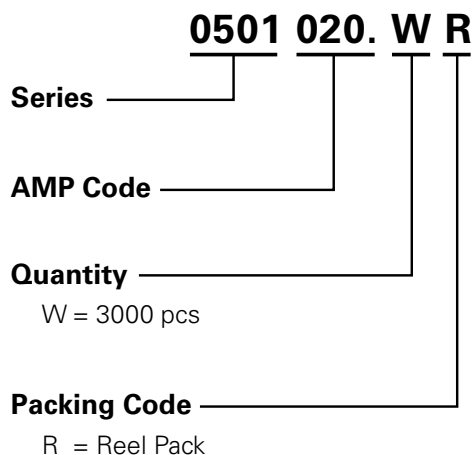
### Dimensions



### Part Marking System

| Amp Code | Marking Code |
|----------|--------------|
| 010.     | <b>10</b>    |
| 012.     | <b>12</b>    |
| 015.     | <b>15</b>    |
| 020.     | <b>20</b>    |

### Part Numbering System



### Packaging

| Packaging Option  | Packaging Specification    | Quantity | Quantity & Packaging Code |
|-------------------|----------------------------|----------|---------------------------|
| 8mm Tape and Reel | EIA-481, IEC 60286, Part 3 | 3000     | WR                        |