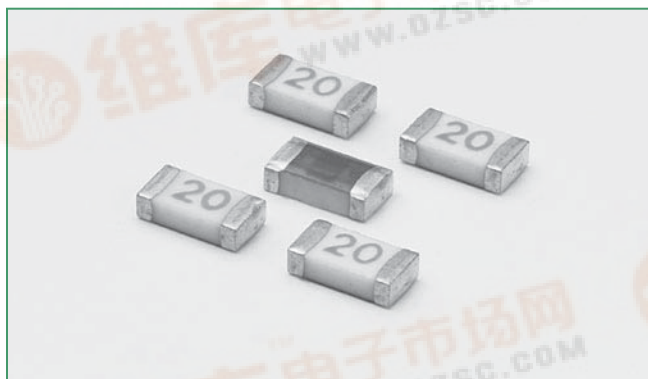


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### RoHS HF **501 Series – High Current 1206 Fast-Acting Fuse**





#### 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<sup>2</sup>t values which is typical in the Littelfuse Ceramic Fuse family, ensure high inrush current withstand capability.

#### Agency Approvals

| AGENCY  | AGENCY FILE NUMBER | AMPERE RANGE |
|---|--------------------|--------------|
|  | E10480             | 10A - 20A    |
|  | LR29862            | 10A - 20A    |

#### Features

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



#### 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   |

#### Applications

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

#### 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 <sup>2</sup> T (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.     | 24                      | 150 A @ 24 VDC                        | 0.00427                                | 10.385  | 0.05679  | 0.5679   | x   | x   |
| 12                | 012.     | 24                      |                                       | 0.00321                                | 20.341  | 0.04891  | 0.5870   | x   | x   |
| 15                | 015.     | 24                      |                                       | 0.00250                                | 36.100  | 0.04605  | 0.6908   | x   | x   |
| 20                | 020.     | 24                      |                                       | 0.00200                                | 54.760  | 0.05936  | 1.1871   | x   | x   |

Notes:

- DC Interrupting Rating tested at rated voltage with time constant < 0.8 msec.
- Nominal Resistance measured with < 10% rated current.
- Nominal Melting I<sup>2</sup>t measured at 1 msec. opening time. For other I<sup>2</sup>t 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 Rerating Curve" for additional rerating information.

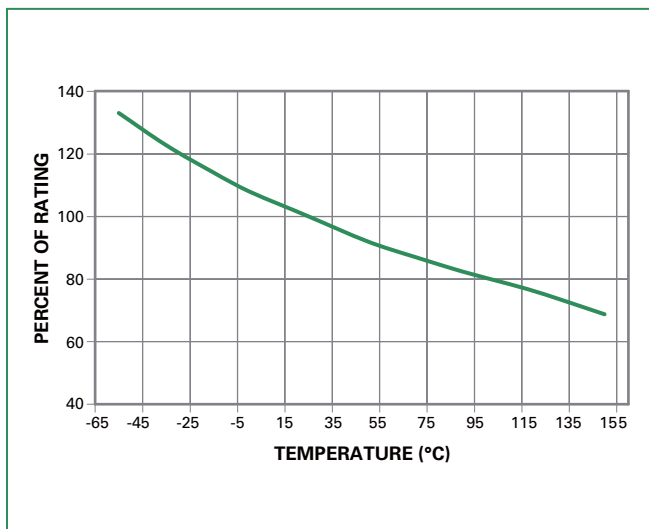
Devices designed to be mounted with marking code facing up.

501 Series



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### Temperature Derating Curve



Note:

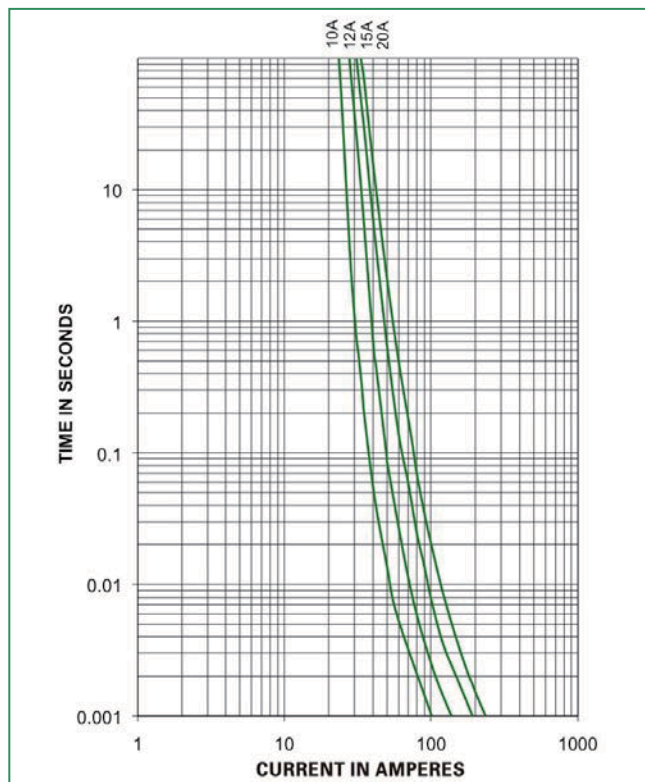
1. Derating depicted in this curve is in addition to the standard derating of 20% for continuous operation.

Example:

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

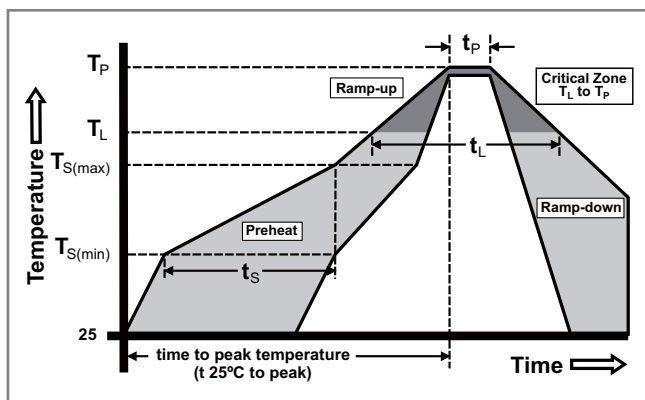
$$I = (0.80)(0.85)I_{RAT} = (0.68)I_{RAT}$$

### 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 <sup>+0/-5</sup> °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. |
|----------------|------------------------|

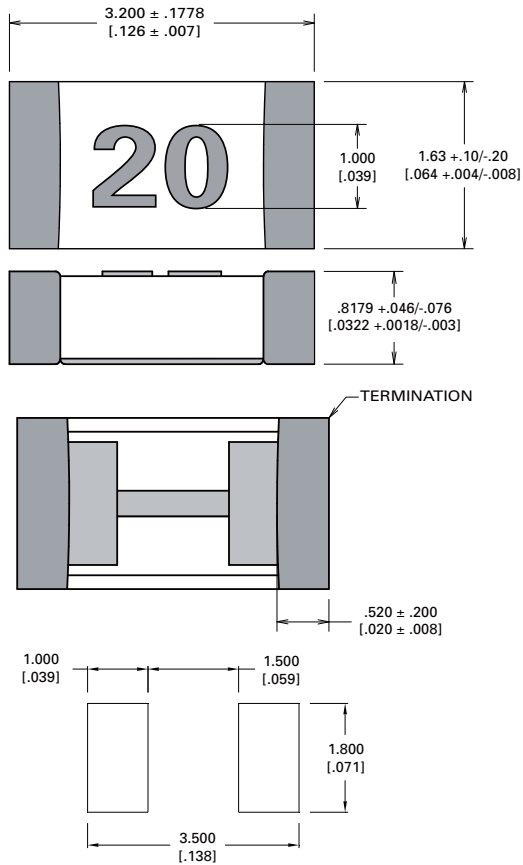
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### Product Characteristics

|                                   |  |
|-----------------------------------|--|
| <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-020C, Level 1  |
| <b>Solderability</b>              | IPC/ECA/JEDEC J-STD-002C, Condition B  |
| <b>Humidity Test</b>              | MIL-STD-202, Method 103B, Conditions D   |
| <b>ESD Immunity</b>               | IEC 61000-4-2, 8kV Direct  |
| <b>Resistance to Solvents</b>     | MIL-STD-202, Method 210F, Condition B  |

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

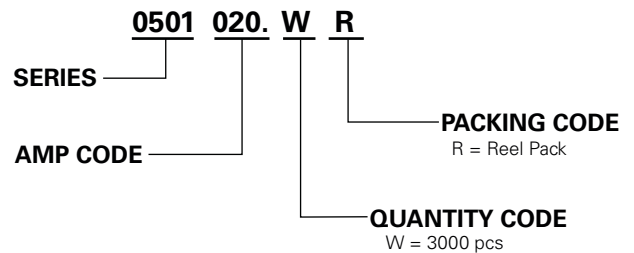
### Dimensions



### Part Marking System

| Amp Code | Marking Code |
|----------|--------------|
| 010.     | 10           |
| 012.     | 12           |
| 015.     | 15           |
| 020.     | 20           |

### 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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