461 Series TeleLink® Fuse
Surge Resistant

Description
The Littelfuse 461 Series TeleLink® Surface Mount, Surge Resistant Fuse, offers over-current protection for a wide range of telecom applications without requiring a series resistor. When used in conjunction with a Littelfuse SIDACtor® Transient Voltage Suppressor (TVS) or a Greentube® Gas Plasma Arrestor, this combination provides a compliant solution for standards and recommendations such as GR-1089–Core, TIA-968-A, UL/EN/IEC 60950, and ITU K.20 and K.21. The coordination requirement contained in GR-1089–Core, and ITU K.20/21 may require a series of impedance devices.

Features & Benefits
- Surface mount surge resistant Slo-Blo® fuse
- Meet UL 60950 3rd Edition power cross requirements standard alone
- Designed to allow compliance with Telcordia GR-1089-CORE and TIA-968-A (formerly FCC Part 68) Surge Specifications
- Provide coordinated protection with Littelfuse SIDACtor® Transient Voltage Suppressor (TVS) or a Greentube® Gas Plasma Arrestor, without series resistors
- Designed to serve the requirements of a wide range of telecommunication and networking equipment
- 2A rating has improved temperature rise performance under 2.2A surge current testing when compared with 1.25A rating
- Product is Halogen Free and RoHS compliant and compatible with lead-free solder and higher temperature profiles when ordered with Standard Silver Plated Brass Caps
- UL Recognized to UL/CSA/NMX 248-1 and UL/CSA/NMX 248-14
- Conforms to IEC/EN 60127-1 and IEC/EN 60127-7

Agency Approvals

<table>
<thead>
<tr>
<th>Agency</th>
<th>Agency File Number</th>
<th>Ampere Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>E10480</td>
<td>0.5A - 2A</td>
<td></td>
</tr>
<tr>
<td>29862</td>
<td>0.5A - 2A</td>
<td></td>
</tr>
<tr>
<td>J50502555</td>
<td>0.5A - 2A</td>
<td></td>
</tr>
</tbody>
</table>

Electrical Characteristics for Series

<table>
<thead>
<tr>
<th>% of Ampere Rating</th>
<th>Opening Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>4 hours, Minimum</td>
</tr>
<tr>
<td>250%</td>
<td>1 sec., Minimum; 120 secs., Maximum</td>
</tr>
</tbody>
</table>

Maximum Temperature Rise

<table>
<thead>
<tr>
<th>Telecom Nano® Fuse</th>
<th>Temperature Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>046111.25</td>
<td>&lt; 62°C (180°F)</td>
</tr>
<tr>
<td>0461002</td>
<td>&lt; 50°C (122°F)</td>
</tr>
</tbody>
</table>

Higher Currents and PCB layout designs can affect this parameter. Readings are measured at rated current after temperature stabilizes.

Applications
- T1/E1/J1 and HDSL2/4
- SLIC interface portion of Fiber to the Curb (FTTC) and Fiber to the Premises (FTTP)
- Non-Fiber SLIC interface for Central Office (CO) locations and Remote Terminals (RT)
- xDSL applications such as ADSL, ADSL2+, VDSL, and VDSL2+
- Ethernet 10/100/1000BaseT
- POTS applications such as modems, answering machines, telephones, fax machines, and security systems
- ISDN “U” interface
- Baystation T1/E1/J1, T3 (DS3) trunk cards
**461 Series TeleLink® Fuse**

**Surge Resistant**

Electrical Specifications by Item

<table>
<thead>
<tr>
<th>Ampere Rating (A)</th>
<th>Amp Code</th>
<th>Max Voltage Rating (V)</th>
<th>Interrupting Rating(^2)</th>
<th>Nominal Cold Resistance (Ohms)</th>
<th>Nominal Melting Pt (A(^2)sec)</th>
<th>Agency Approvals</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.500</td>
<td>.500</td>
<td>600</td>
<td>50A @ 250 VAC</td>
<td>0.560</td>
<td>0.840(^1)</td>
<td>x</td>
</tr>
<tr>
<td>1.25</td>
<td>1.25</td>
<td>600</td>
<td>60 A @600 VAC</td>
<td>.1040</td>
<td>16.5(^1)</td>
<td>x</td>
</tr>
<tr>
<td>2.00</td>
<td>002.</td>
<td>600</td>
<td>100 A @80 VDC</td>
<td>.0450</td>
<td>175(^1)</td>
<td>x</td>
</tr>
</tbody>
</table>

\(^1\) It is calculated at 10 msecs. or less. It at 10 times rated current has a typical value of: 2.4 A\(^2\)sec (2.0A), 2.2 A\(^2\)sec (1.25A), 1.3 A\(^2\)sec (0.5A).

\(^2\) Typical withstand: 40mHz up to 500 MHz.

- Resistance changes 0.5% for every °C.
- Resistance is measured at 10% rated current.

Interrupting Rating may differ based on Agency Approval. See Agency Approval certificate for more details.

**Average Time Current Curves**

- **Temperature Re-rating Curve**

  - Note: 1. Re-rating depicted in this curve is in addition to the standard re-rating of 25% for continuous operation.

**GR 1089 Inter-building requirements**

**GR 1089 1st level lighting surge inter-building**

(Equipment under test can not be damaged and must continue to operate properly)

<table>
<thead>
<tr>
<th>Surge</th>
<th>Minimum Peak Voltage (V)</th>
<th>Minimum Peak Current (A)</th>
<th>Max. Rise/Min. Decay (µs)</th>
<th>Repetitions Each Polarity</th>
<th>Fuse Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>600</td>
<td>100</td>
<td>10/1000</td>
<td>25</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>2</td>
<td>1000</td>
<td>100</td>
<td>10/360</td>
<td>25</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>3</td>
<td>1000</td>
<td>100</td>
<td>10/1000</td>
<td>25</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>4</td>
<td>2500</td>
<td>500</td>
<td>2/10</td>
<td>10</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>5</td>
<td>1000</td>
<td>25</td>
<td>10/360</td>
<td>5</td>
<td>0.5, 1.25, 2.0</td>
</tr>
</tbody>
</table>

If sufficient series resistance is used, then the 0.5 fuse may be used in test conditions 1-4.

**GR 1089 2nd level lightning surge telecom port**

(Equipment under test shall not become a fire or electrical safety hazard)

<table>
<thead>
<tr>
<th>Surge</th>
<th>Minimum Peak Voltage (V)</th>
<th>Minimum Peak Current (A)</th>
<th>Max. Rise/Min. Decay (µs)</th>
<th>Repe-titions Each Polarity</th>
<th>Fuse Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5000</td>
<td>500</td>
<td>2/10</td>
<td>1</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>Alter-native</td>
<td>5000</td>
<td>500/8=625</td>
<td>8/10</td>
<td>1</td>
<td>0.5, 1.25, 2.0</td>
</tr>
</tbody>
</table>

The 0.5 fuse will open during these test conditions. The 1.25 & 2.0 will not open thus providing operational compliance.
**461 Series TeleLink® Fuse**  
Surge Resistant

---

**GR 1089 AC power fault 1st level inter-building**  
(fuse not allowed to open)

<table>
<thead>
<tr>
<th>Test</th>
<th>Vrms (V)</th>
<th>Short Circuit Current (A)</th>
<th>Hits</th>
<th>Duration</th>
<th>Primary Protector</th>
<th>Fuse Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50</td>
<td>0.33</td>
<td>1</td>
<td>15 min.</td>
<td>removed</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>0.17</td>
<td>1</td>
<td>15 min.</td>
<td>removed</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>3</td>
<td>200, 400, 600</td>
<td>1</td>
<td>60</td>
<td>1 sec.</td>
<td>removed</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>4</td>
<td>1000</td>
<td>1</td>
<td>60</td>
<td>1 sec.</td>
<td>operative</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>5</td>
<td>Diagram</td>
<td>Diagram</td>
<td>60</td>
<td>5 secs.</td>
<td>removed</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>6</td>
<td>600</td>
<td>0.5</td>
<td>1</td>
<td>30 secs.</td>
<td>removed</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>7</td>
<td>440</td>
<td>2.2</td>
<td>5</td>
<td>2 secs.</td>
<td>removed</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>8</td>
<td>600</td>
<td>3</td>
<td>1</td>
<td>11 secs.</td>
<td>removed</td>
<td>1.25, 2.0</td>
</tr>
<tr>
<td>9</td>
<td>1000</td>
<td>5</td>
<td>1</td>
<td>0.4 sec.</td>
<td>in place</td>
<td>1.25, 2.0</td>
</tr>
</tbody>
</table>

---

**GR 1089 AC power fault 2nd level**  
(fuse can open but must open in a safe and controlled manner)

<table>
<thead>
<tr>
<th>Test</th>
<th>Circuit</th>
<th>Vrms (V)</th>
<th>Short Circuit Current (A)</th>
<th>Duration</th>
<th>Fuse Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>120,277</td>
<td>25</td>
<td>15 min.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>600</td>
<td>60</td>
<td>5 secs.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>600</td>
<td>7</td>
<td>5 secs.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>100-600</td>
<td>2.2</td>
<td>15 min.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>5</td>
<td>Diagram</td>
<td>Diagram</td>
<td>15 min.</td>
<td></td>
<td>0.5, 1.25, 2.0</td>
</tr>
</tbody>
</table>

---

**TIA –968-A (formerly FCC Part 68) Surge Waveforms**  
(fuse cannot open during type B events)

<table>
<thead>
<tr>
<th>Surge</th>
<th>Voltage (V)</th>
<th>Waveform (µs)</th>
<th>Current (A)</th>
<th>Repetitions</th>
<th>Recommended Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metallic A</td>
<td>800</td>
<td>10×560</td>
<td>100</td>
<td>1 ea. polarity</td>
<td>1.25</td>
</tr>
<tr>
<td>Longitudinal A</td>
<td>1500</td>
<td>10×160</td>
<td>200</td>
<td>1 ea. polarity</td>
<td>1.25</td>
</tr>
<tr>
<td>Metallic B</td>
<td>1000</td>
<td>9×720</td>
<td>25</td>
<td>1 ea. polarity</td>
<td>1.25</td>
</tr>
<tr>
<td>Longitudinal B</td>
<td>1500</td>
<td>9×720</td>
<td>375</td>
<td>1 ea. polarity</td>
<td>1.25</td>
</tr>
</tbody>
</table>

---

**UL 60950 requirements**

**UL60950 (EN 60950) (formerly UL 1950) Power Cross**  
(L = longitudinal, M = metallic)

<table>
<thead>
<tr>
<th>Test Number</th>
<th>Voltage (V)</th>
<th>Current (A)</th>
<th>Time</th>
<th>Fuse Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>600</td>
<td>40</td>
<td>1.5 secs.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>L2</td>
<td>600</td>
<td>7</td>
<td>5 secs.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>L3</td>
<td>600</td>
<td>2.2</td>
<td>30 min.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>L4</td>
<td>200</td>
<td>2.2</td>
<td>30 min.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>L5</td>
<td>120</td>
<td>25</td>
<td>30 min.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>M1</td>
<td>600</td>
<td>40</td>
<td>1.5 secs.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>M2</td>
<td>600</td>
<td>7</td>
<td>5 secs.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>M3</td>
<td>600</td>
<td>2.2</td>
<td>30 min.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>M4</td>
<td>600</td>
<td>2.2</td>
<td>30 min.</td>
<td>0.5, 1.25, 2.0</td>
</tr>
</tbody>
</table>

---

**UL60950 (EN 60950) (formerly UL 1950) Impulse Test and Steady-State Electric Strength Test**

<table>
<thead>
<tr>
<th>Test</th>
<th>Voltage (V)</th>
<th>Current (A)</th>
<th>Waveform</th>
<th>Repetitions</th>
<th>Fuse Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impulse</td>
<td></td>
<td></td>
<td></td>
<td>+/- 10 w/80 secs. rest</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>L1</td>
<td>2500</td>
<td>62.5</td>
<td>10×700ms</td>
<td>+/- 10 w/80 secs. rest</td>
<td>0.5, 1.25, 2.0</td>
</tr>
<tr>
<td>Non handheld</td>
<td>1500</td>
<td>375</td>
<td>10×700ms</td>
<td>+/- 10 w/80 secs. rest</td>
<td>0.5, 1.25, 2.0</td>
</tr>
</tbody>
</table>

---

**Steady-State**

<table>
<thead>
<tr>
<th>Test</th>
<th>Voltage (V)</th>
<th>Current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>For handheld units</td>
<td>1500</td>
<td>60Hz</td>
</tr>
<tr>
<td>Non handheld</td>
<td>1000</td>
<td>60Hz</td>
</tr>
</tbody>
</table>

---

**Selection of test number depends on current limiting fire enclosure spacing of end product**
- 26 AWG line cord removes L1/M1 test requirement
- L2 conducted only if product does not pass section 6.1.2
- UL M1 UL M4 UL A4M conducted if not in a fire enclosure
- Fuse must open before wiring simulator fuse (MDL 2.0).
**Fuse Datasheet**

**461 Series TeleLink® Fuse**
Surge Resistant

### Soldering Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflow Condition</td>
<td>Pb – free assembly</td>
</tr>
<tr>
<td>Pre Heat</td>
<td>- Temperature Min ( T_{S(min)} ) 150°C</td>
</tr>
<tr>
<td></td>
<td>- Temperature Max ( T_{S(max)} ) 200°C</td>
</tr>
<tr>
<td></td>
<td>- Time (Min to Max) ( t_s ) 60 – 180 seconds</td>
</tr>
<tr>
<td>Average Ramp-up Rate (Liquidus Temp ( T_L ) to peak)</td>
<td>5°C/second max.</td>
</tr>
<tr>
<td>( T_{S(max)} ) to ( T_L ) - Ramp-up Rate</td>
<td>5°C/second max.</td>
</tr>
<tr>
<td>Reflow</td>
<td>- Temperature ( T_L ) (Liquidus) 217°C</td>
</tr>
<tr>
<td></td>
<td>- Temperature ( t_L ) 60 – 150 seconds</td>
</tr>
<tr>
<td>Peak Temperature ( T_p )</td>
<td>260°C to 265°C</td>
</tr>
<tr>
<td>Time within 5°C of actual peak Temperature ( t_L )</td>
<td>20 – 40 seconds</td>
</tr>
<tr>
<td>Ramp-down Rate</td>
<td>6°C/second max.</td>
</tr>
<tr>
<td>Time 25°C to peak Temperature ( T_p )</td>
<td>8 minutes max.</td>
</tr>
<tr>
<td>Do not exceed</td>
<td>260°C</td>
</tr>
</tbody>
</table>

### Product Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Body: Ceramic</td>
</tr>
<tr>
<td></td>
<td>Terminations: Silver-plated Caps</td>
</tr>
<tr>
<td>Product Marking</td>
<td>Brand Logo, Ampere Rating, T</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-55°C to 125°C</td>
</tr>
<tr>
<td>Moisture Sensitivity Level</td>
<td>Level 1, J-STD-020</td>
</tr>
<tr>
<td>Solderability</td>
<td>IEC 60127-4 (215°C immersion, 3 seconds)</td>
</tr>
<tr>
<td>Resistance to Dissolution of Metallization</td>
<td>IPC / EIA J-STD-002-Test D 260°C for 120 seconds</td>
</tr>
<tr>
<td>Thermal Shock</td>
<td>MIL-STD-202, Method 107, Test Condition B, -55°C to +125°C, 30 minutes @ each extreme</td>
</tr>
<tr>
<td>High Frequency Vibration</td>
<td>MIL-STD-202, Method 204, Test Condition D</td>
</tr>
<tr>
<td>Moisture Resistance</td>
<td>MIL-STD-202, Method 106, 50 cycles</td>
</tr>
<tr>
<td>Terminal Strength</td>
<td>Board deflection per EIA / IS-722, 1mm deflection for 1 minute</td>
</tr>
<tr>
<td>Terminal Attachment</td>
<td>MIL-STD-202, Method 211, Test Condition A, 5 lbs applied to end caps</td>
</tr>
</tbody>
</table>

### Part Numbering System

- **Series**
- **Amp Code**
  - **0461**
  - **1.25**
  - **E**
  - **R**

*Example:*
- 2 amp product is 0461002.ER
- (1.25 amp product shown above)

### Packaging

<table>
<thead>
<tr>
<th>Packaging Option</th>
<th>Specification</th>
<th>Quantity</th>
<th>Quantity &amp; Packaging Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>24mm Tape and Reel</td>
<td>EIA RS-481-2 (IEC 60286-3)</td>
<td>2500</td>
<td>ER</td>
</tr>
</tbody>
</table>

**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at: [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).

© 2021 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: GD. 06/31/21