

# Surface Mount Fuses

## Miniature Surface Mount

### Telecom NANO<sup>2</sup>® Fuse 461 Series and Teccor TeleLink® Fuse



- Surface mount surge resistant Slo-Blo<sup>®</sup> fuse.
- Meets UL 60950 3rd Edition power cross requirements stand alone.
- Designed to allow compliance with Telcordia GR-1089-CORE and TIA-968-A (formerly FCC Part 68) Surge Specifications.
- Provides coordinated protection with Littelfuse SIDACTor<sup>®</sup> Protection Thyristors without series resistors.
- Ideal for use in telecommunication equipment including line cards, modems, fax machines, phones, answering machines, caller ID devices and other products connected to phone network.
- 2A rating has improved temperature rise performance under 2.2A surge current testing when compared with 1.25A rating.
- Product is **RoHS Compliant** and compatible with lead-free solders and higher temperature profiles when ordered with Standard Silver Plated Brass Caps.
- Standard product is **RoHS Compliant** and compatible with lead-free solders and higher temperature profiles.

**AGENCY APPROVALS:** Recognized under the Components Program of Underwriters Laboratories and Certified by CSA.

Littelfuse: UL E10480  
CSA LR29862

Teccor: UL E191008  
CSA LR702828

#### PHYSICAL SPECIFICATIONS:

**Materials:** Body: Ceramic  
RoHS Compliant Terminations: Silver Plated Brass Caps  
Terminations: Tin-Lead Alloy also available, add suffix, T.

#### Soldering Parameters:

Reflow Solder — 230°C, 30 seconds maximum.  
Wave Solder — 260°C, 3 seconds maximum.

**PACKAGING SPECIFICATIONS:** 24mm Tape and Reel per EIA-RS481-2, (IEC 286 part 3); 2500 fuses per reel, add suffix, ER.

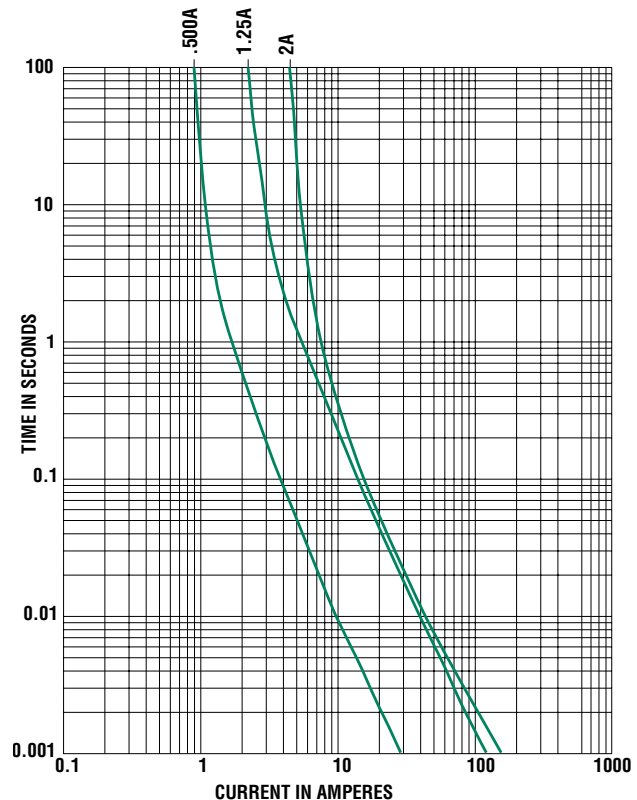
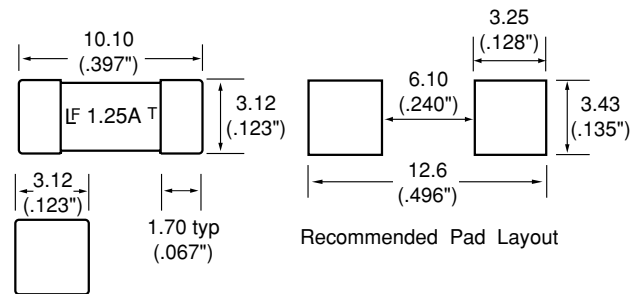
#### ORDERING INFORMATION:

| Telecom Nano <sup>2</sup> Catalog Number | Teccor TeleLink Catalog Number | Ampere Rating | Voltage Rating | Nominal Resistance Cold Ohms | Nominal Melting I <sup>2</sup> t A <sup>2</sup> Sec. |
|--|--------------------------------|---------------|----------------|------------------------------|--|
| 0461.500                                 | F0500T                         | 0.5           | 250            | .560                         | .840 <sup>1</sup>                                    |
| 0461 1.25                                | F1250T                         | 1.25          | 250            | .110                         | 16.5 <sup>1</sup>                                    |
| 0461 002.                                | F1251T                         | 2.00          | 250            | .050                         | 17.5 <sup>1</sup>                                    |

<sup>1</sup> I<sup>2</sup>t is calculated at 10 msec or less. I<sup>2</sup>t at 10 times rated current has a typical value of: 24 A<sup>2</sup>sec (2.0A), 22 A<sup>2</sup>sec (1.25A), 1.3 A<sup>2</sup>sec (0.5A).



Reference Dimensions:



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#### ELECTRICAL CHARACTERISTICS:

| % of Ampere Rating | Opening Time                                     |
|--------------------|--|
| 100%               | 4 hours, <b>Min.</b>                             |
| 250%               | 1 Second, <b>Min.</b> ; 120 Seconds, <b>Max.</b> |

#### INTERRUPTING RATINGS:

50 amperes at 250 VAC.

#### GR 1089 Inter-building requirements

**GR 1089 1<sup>st</sup> level lighting surge inter-building**  
(Equipment under test can not be damaged & must continue to operate properly)

| Surge | Minimum Peak Voltage (V) | Minimum Peak Current (A) | Max Rise/Min. Decay (μs) | Repetitions Each Polarity | Fuse Choices   |
|-------|--------------------------|--------------------------|--------------------------|---------------------------|----------------|
| 1     | 600                      | 100                      | 10/1000                  | 25                        | 1.25, 2.0      |
| 2     | 1000                     | 100                      | 10/360                   | 25                        | 1.25, 2.0      |
| 3     | 1000                     | 100                      | 10/1000                  | 25                        | 1.25, 2.0      |
| 4     | 2500                     | 500                      | 2/10                     | 10                        | 1.25, 2.0      |
| 5     | 1000                     | 25                       | 10/360                   | 5                         | 0.5, 1.25, 2.0 |

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

**GR 1089 2<sup>nd</sup> level lightning surge telecom port (Equipment under test shall not become a fire, fragmentation, or electrical safety hazard)**

| Surge       | Minimum Peak Voltage (V) | Minimum Peak Current (A) | Max Rise/Min. Decay (μs) | Repetitions Each Polarity | Fuse Choices   |
|-------------|--------------------------|--------------------------|--------------------------|---------------------------|----------------|
| 1           | 5000                     | 500                      | 2/10                     | 1                         | 0.5, 1.25, 2.0 |
| alternative | 5000                     | 5000/8=625               | 8/20                     | 1                         | 0.5, 1.25, 2.0 |

The 0.5 fuse will open during these test conditions. The 1.25 & 2.0 will not open thus providing operational compliance.

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

| Test | Vrms          | Short Circuit Current (A) | Duration    | Primary Protector | Fuse Choices |
|------|---------------|---------------------------|-------------|-------------------|--------------|
| 1    | 50            | .33                       | 15 min.     | removed           | 1.25, 2.0    |
| 2    | 100           | .17                       | 15 min      | removed           | 1.25, 2.0    |
| 3    | 200, 400, 600 | 1                         | 60 x 1 sec. | removed           | 1.25, 2.0    |
| 4    | 1000          | 1                         | 60 x 1 sec. | operative         | 1.25, 2.0    |
| 5    | Diagram       | Diagram                   | 60 x 5 sec. | removed           | 1.25, 2.0    |
| 6    | 600           | 0.5                       | 30s         | removed           | 1.25, 2.0    |
| 7    | 440           | 2.2                       | 5 x 2 sec.  | removed           | 1.25, 2.0    |
| 8    | 600           | 3                         | 1.1 sec.    | removed           | 1.25, 2.0    |
| 9    | 1000          | 5                         | 0.4 sec.    | in place          | 1.25, 2.0    |

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

| Test Circuit | Vrms     | Short (A) | Duration | Fuse           |
|--------------|----------|-----------|----------|----------------|
| 1            | 120, 277 | 25        | 15 min.  | 0.5, 1.25, 2.0 |
| 2            | 600      | 60        | 5 sec.   | 0.5, 1.25, 2.0 |
| 3            | 600      | 7         | 5 sec.   | 0.5, 1.25, 2.0 |
| 4            | 100-600  | 2.2       | 15 min.. | 0.5, 1.25, 2.0 |
| 5            | Diagram  | Diagram   | 15 min.  | 0.5, 1.25, 2.0 |

Fuse must open before wiring simulator fuse (MDL 2.0).

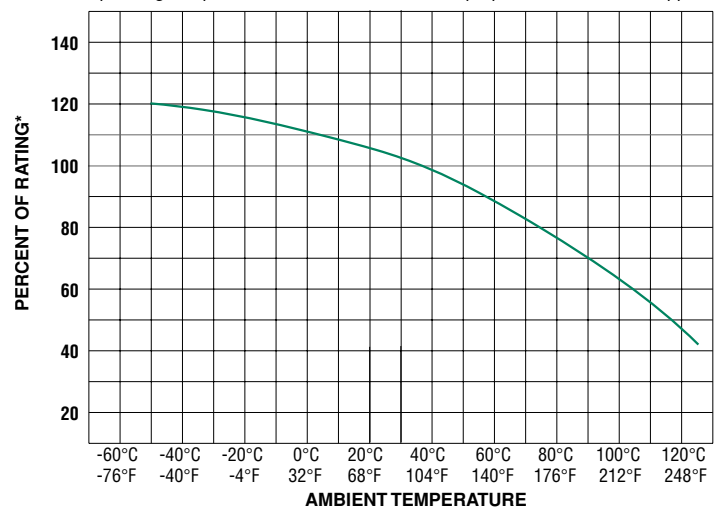
#### Maximum Temperature Rise:

| Telecom Nano <sup>2</sup> Fuse | Temperature Reading |
|--------------------------------|---------------------|
| 04611.25                       | ≤ 82°C (180°F)      |
| 0461002.                       | ≤ 50°C (122°F)      |

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

#### Temperature Derating Curve

Operating Temperature is -55°C to +125°C with proper correction factor applied



• Ambient temperature effects are in addition to the normal derating.

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

| Surge                 | Voltage (V) | Waveform (μs) | Current (A) | Waveform (μs) | Reps           | Recommended Fuse |
|-----------------------|-------------|---------------|-------------|---------------|----------------|------------------|
| <b>Metallic A</b>     | 800         | 10 x 560      | 100         | 10 x 560      | 1 ea. polarity | 1.25             |
| <b>Longitudinal A</b> | 1500        | 10 x 160      | 200         | 10 x 160      | 1 ea. polarity | 1.25             |
| <b>Metallic B</b>     | 1000        | 9 x 720       | 25          | 5 x 320       | 1 ea. polarity | 1.25             |
| <b>Longitudinal B</b> | 1500        | 9 x 720       | 37.5        | 5 x 320       | 1 ea. polarity | 1.25             |

For the type A events the 0.5 fuse will open, providing non-operational compliance. The 1.25 & 2.0 will not open, providing for operational compliance with TIA-968-A type A surge events.

## UL 60950 requirements

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

| Test Number | Voltage (V) | Current (A) | Time     | Fuse Choices   |
|-------------|-------------|-------------|----------|----------------|
| <b>L1</b>   | 600         | 40          | 1.5 sec. | 0.5, 1.25, 2.0 |
| <b>L2</b>   | 600         | 7           | 5 sec.   | 0.5, 1.25, 2.0 |
| <b>L3</b>   | 600         | 2.2         | 30 min.  | 0.5, 1.25, 2.0 |
| <b>L4</b>   | 200         | 2.2         | 30 min.  | 0.5, 1.25, 2.0 |
| <b>L5</b>   | 120         | 25          | 30 min.  | 0.5, 1.25, 2.0 |
| <b>M1</b>   | 600         | 40          | 1.5 sec. | 0.5, 1.25, 2.0 |
| <b>M2</b>   | 600         | 7           | 5 sec.   | 0.5, 1.25, 2.0 |
| <b>M3</b>   | 600         | 2.2         | 30 min.  | 0.5, 1.25, 2.0 |
| <b>M4</b>   | 600         | 2.2         | 30 min.  | 0.5, 1.25, 2.0 |

Selection of test number depends on current limiting & fire enclosure/spacing of end product

- 26 AWG line cord removes L1/M1 test requirement
- L5 conducted only if product does not pass section 6.1.2
- L2,M2,L3,M3,L4,M4 conducted if not in a fire enclosure

Fuse must open before the wiring simulator fuse (MDL 2.0).

**UL60950 (EN 60950) (formerly UL 1950)**  
**Impulse Test & Steady-state electric strength test**

| Test                | Voltage (V) | Current (A) | Waveform   | Repetitions         | Fuse Choices   |
|---------------------|-------------|-------------|------------|---------------------|----------------|
| <b>Impulse</b>      |             |             |            |                     |                |
| For handheld units  | 2500        | 62.5        | 10 x 700μs | ± 10 w/60 sec. rest | 0.5, 1.25, 2.0 |
| Non handheld        | 1500        | 37.5        | 10 x 700μs | ± 10 w/60 sec. rest | 0.5, 1.25, 2.0 |
| <b>Steady-State</b> |             |             |            |                     |                |
| For handheld units  | 1500        |             | 60Hz       |                     | 0.5, 1.25, 2.0 |
| Non handheld        | 1000        |             | 60Hz       |                     | 0.5, 1.25, 2.0 |

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