

# Surface Mount Fuses

## Miniature Surface Mount

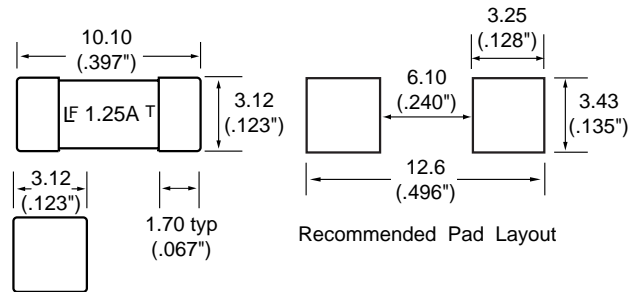
### RoHS Telecom NANO<sup>2</sup>® Fuse 461 Series and Teccor TeleLink® Fuse



- 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.



Reference Dimensions:



**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.

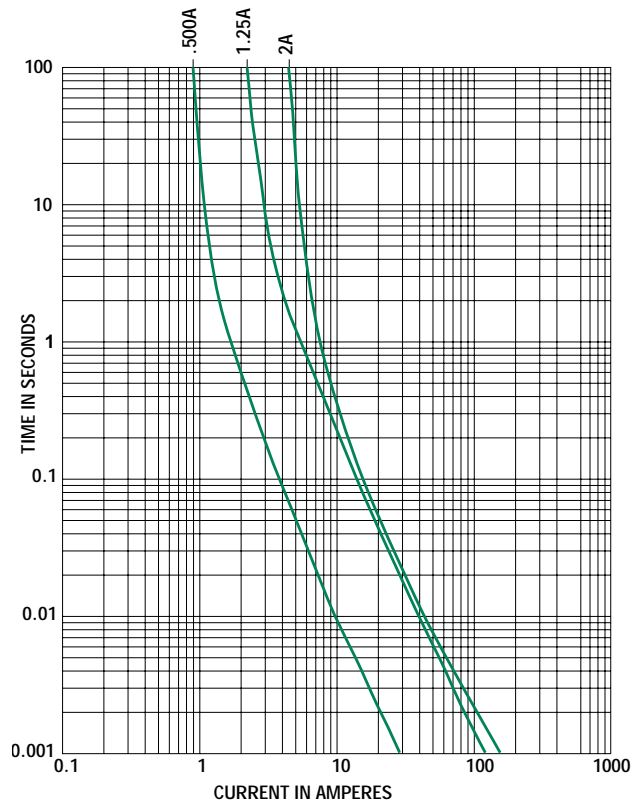
**PACKAGING SPECIFICATIONS:** 24mm Tape and Reel per EIA-RS481-2, (IEC 286 part 3); 2500 fuses per reel, add suffix, ER.

#### 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>

Notes:

- <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).
- Typical inductance < 40nH up to 500 MHz.
- Resistance changes 0.5% for every °C.
- Resistance is measured at 10% rated current.



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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).

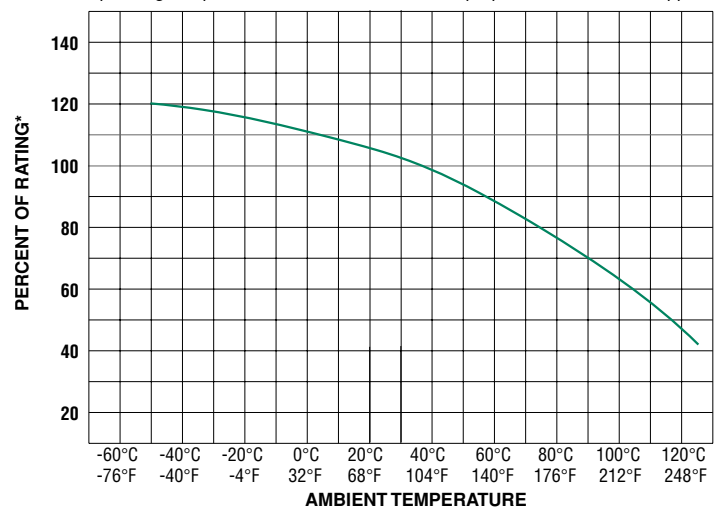
#### Maximum Temperature Rise:

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