

RoHS

## 461E Series Enhanced TeleLink® Fuse



### Description

The Littelfuse 461E Series Enhanced TeleLink® Surface Mount, Surge – Tolerant Fuse, is the next generation of the popular 461 Telelink® Fuse. With optimized opening times at certain overload conditions, this enhanced TeleLink® Fuse works in harmony with Littelfuse's new SIDACtor® Transient Voltage Suppressor products in the QFN package. 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.20/21. The coordination requirement contained in GR-1089-Core and ITU K.20/21, may require a series impedance device.

### Agency Approvals

AGENCY	AGENCY FILE NUMBER	AMPERE RANGE
	E10480	1.25 A

### Electrical Characteristics for Series

% of Ampere Rating	Opening Time
100%	4 Hours, Minimum
2.2A (176%)	300 Seconds, Maximum
200%	1 Second, Minimum; 60 Seconds, Maximum

### Maximum Temperature Rise

Telecom Nano <sup>2</sup> Fuse	Temperature Reading
04611.25E	< 82°C (180°F)

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

### Features

- Surface Mount Surge Resistant Slo-Blo® Fuse.
- Meets UL/EN/IEC 60950, 3rd Edition, Power Fault Requirements stand alone.
- Designed for compliance with Telcordia GR-1089-CORE and TIA-968-A (formerly FCC Part 68) Surge Specifications.
- Provides GR-1089 compliant overcurrent protection with Littelfuse SIDACtor®, TVS or GDT, without the need of any additional resistance.
- Product is RoHS compliant and compatible with lead-free solders and higher temperature profiles.
- Designed to serve the requirements of a wide range of telecommunication and networking equipment.

### 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

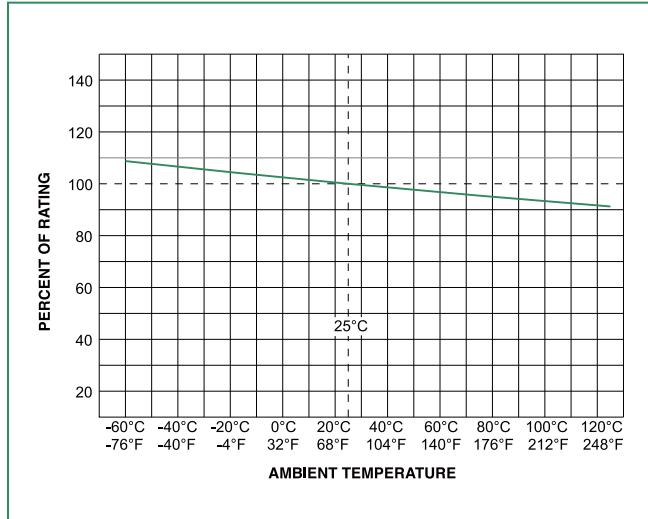
**Electrical Specifications by Item**

Ampere Rating (A)	Amp Code	Max Voltage Rating (V)	Interrupting Rating	Nominal Cold Resistance (Ohms)	Nominal Melting I <sup>2</sup> t (A <sup>2</sup> sec)	Agency Approvals
1.25	1.25	600	60 amperes @600 VAC	0.112	14.2	x

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 17 A<sup>2</sup>sec (1.25A)

Resistance is measured at 10% rated current.

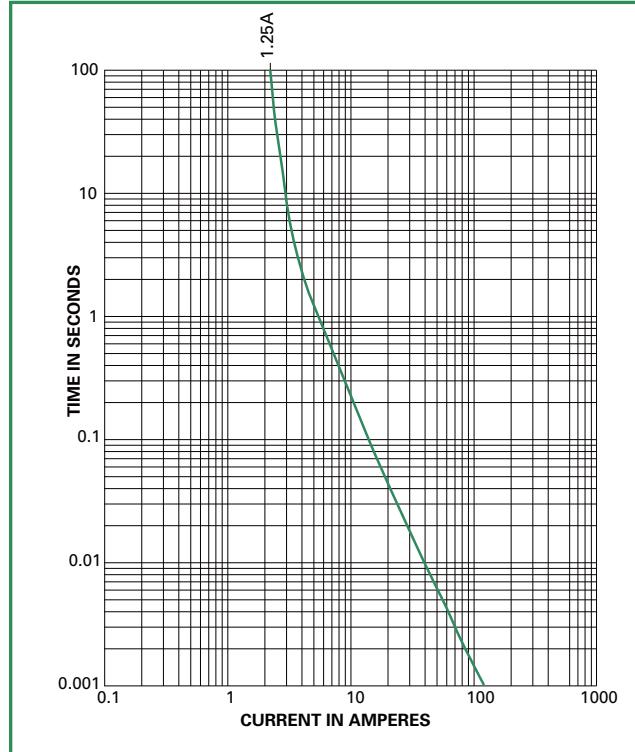
**Temperature Rerating Curve**



Note:

- Derating depicted in this curve is in addition to the standard derating of 25% for continuous operation.

**Average Time Current Curves**



**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)

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

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

Surge	Minimum Peak Voltage (V)	Minimum Peak Current (A)	Max. Rise/Min. Decay (μs)	Repetitions Each Polarity
1	5000	500	2/10	1
Alternative	5000	500/8=625	8/10	1

The 1.25 will not open thus providing operational compliance.

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

Test	Vrms	Short Circuit Current (A)	Hits	Duration	Primary Protector
1	50	0.33	1	15 min.	removed
2	100	0.17	1	15 min.	removed
3	200,400,600	1	60	1 sec.	removed
4	1000	1	60	1 sec.	operative
5	Diagram	Diagram	60	5 sec.	removed
6	600	0.5	1	30 sec.	removed
7	440	2.2	5	2 sec.	removed
8	600	3	1	1.1 sec.	removed
9	1000	5	1	0.4 sec.	in place

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

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

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

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

Surge	Voltage (V)	Waveform (μs)	Current (A)	Reps
Metallic A	800	10 x 560	100	1 ea. polarity
Longitudinal A	1500	10 x 160	200	1 ea. polarity
Metallic B	1000	9 x 720	25	1 ea. polarity
Longitudinal B	1500	9 x 720	37.5	1 ea. polarity

For the type A events the fuse will not open, providing for operational compliance with TIA-968-A type A surge events.

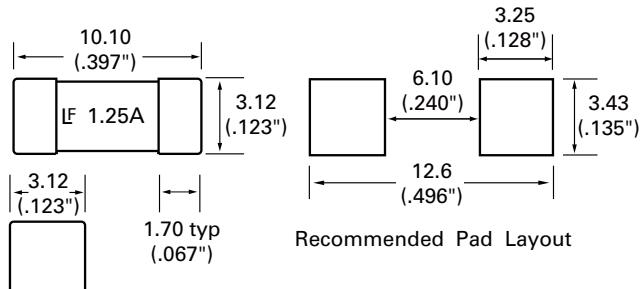
**UL 60950 requirements**
**UL60950 (EN 60950) (formerly UL 1950) Power Cross  
(L = longitudinal, M = metallic)**

Test Number	Voltage (V)	Current (A)	Time
L1	600	40	1.5 sec.
L2	600	7	5 sec.
L3	600	2.2	30 min.
L4	200	2.2	30 min.
L5	120	25	30 min.
M1	600	40	1.5 sec.
M2	600	7	5 sec.
M3	600	2.2	30 min.
M4	600	2.2	30 min.

Selection of test number depends on current limiting F 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

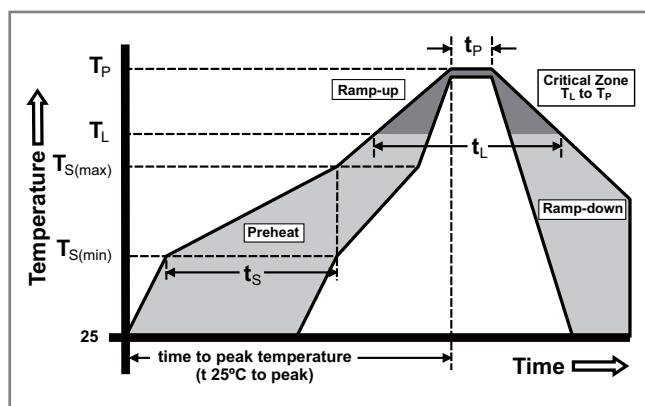
Fuse must open before the wiring simulator fuse (MDL 2.0).

**Dimensions**

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

Test	Voltage (V)	Current (A)	Waveform	Repetitions
<b>Impulse</b>				
For handheld units	2500	62.5	10 x 700ms	-/+ 10 w/60 Sec. rest
Non handheld	1500	37.5	10 x 700ms	-/+ 10 w/60 Sec. rest
<b>Steady-State</b>				
For handheld units	1500		60Hz	
Non handheld	1000		60Hz	

### 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 – 120 Seconds
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak		5°C/Sec. Max.
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		5°C/Sec. Max.
Reflow	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Temperature ( $t_L$ )	60 – 90 Seconds
Peak Temperature ( $T_p$ )		250 <sup>+0/-5</sup> °C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 Seconds
Ramp-down Rate		6°C/Sec. Max.
Time 25°C to peak Temperature ( $T_p$ )		8 Minutes Max.
Do not exceed		260°C

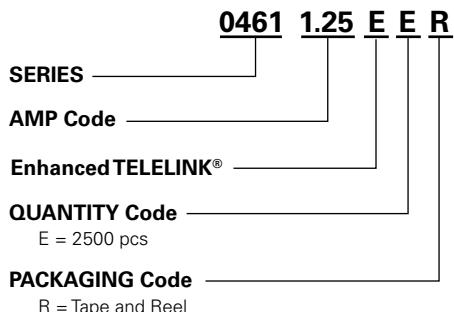


### Product Characteristics

<b>Materials</b>	Body: Ceramic Terminations: Silver-plated Caps
<b>Product Marking</b>	Brand Logo, Ampere Rating
<b>Operating Temperature</b>	-55°C to +125°C
<b>Moisture Sensitivity Level</b>	Level 1, J-STD-020C

<b>Thermal Shock</b>	MIL-STD-202, Method 107, Test Condition B, 5 cycles, -55°C to +125°C, 15 minutes @ each extreme
<b>Mechanical Shock</b>	MIL-STD-202, Method 213, Test Condition I – Sawtooth Waveform 6ms duration, 100G's peak
<b>Vibration</b>	MIL-STD-202, Method 201, 10 - 55hz, 1 minute
<b>Moisture Resistance</b>	MIL-STD-202, Method 106, 10 cycles
<b>No Load Humidity</b>	Mil Std 202, Method 103; 1000 hours, 85°C/85% RH

### Part Numbering System



### Packaging

Packaging Option	Packaging Specification	Quantity	Quantity & Packaging Code
24mm Tape and Reel	EIA RS-481-2 (IEC 286, part 3)	2500	ER