

159 Series Telelink® Fuse and Clip Assembly



Description

The 159 Series product is a metal fuse clip with pre-installed Littelfuse 461 Series TeleLink® fuse. This fuse and clip combination can be automatically installed in PC Boards in one efficient manufacturing operation. It permits quick and easy fuse replacement without exposing the PC Board and other components to risks of rework solder heat as required with direct surface mount fuses.

It meets UL 60950 power cross requirements and is designed to allow compliance with Telcordia GR-1089-CORE and TIA-968-A Surge Specifications. The product provides coordinated protection with Littelfuse SIDACtor® protection thyristors without series resistors.

Agency Approvals

| AGENCY | AGENCY FILE NUMBER | AMPERE RANGE |
|--------|--------------------|-------------------|
| | E14721 | 0.5A, 1.25A, 2.0A |

Electrical Characteristics for Series

| % of Ampere Rating | Opening Time |
|--------------------|---------------------------------------|
| 100% | 4 hours, Minimum |
| 250% | 1 sec., Minimum 120 secs., Maximum |

Additional Information



Datasheet



Resources



Samples


Features

- Offer low profile easily-replaceable fuse alternative compatible with automated PCB surface mount equipment
- Come supplied with surge resistant Littelfuse 461 series TeleLink® Slo-Blo® fuse
- Fuse 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® protection thyristor devices and GDTs, without series resistors
- RoHS compliant and Halogen Free
- Clip fully compatible with RoHS/lead-free solder alloys and higher temperature profiles associated with lead-free assembly
- Available in ratings of 0.5-2.0 Amperes

Applications

- Telecom equipment (POTS) applications such as modems, answering machines, telephones, fax machines, and security systems
- Network equipment, such as:
 - 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
 - ISDN "U" interface
 - Baystation T1/E1/J1, T3 (DS3) trunk cards

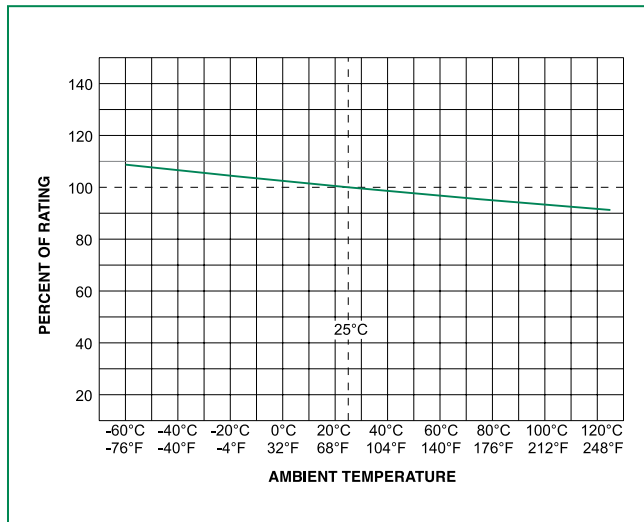
Electrical Specifications by Item

| Ampere Rating (A) | Amp Code | Max Voltage Rating (V) | Interrupting Rating | Nominal Cold Resistance (Ohms) | Nominal Melting I ² t (A ² sec) | Agency Approvals |
|-------------------|----------|------------------------|---------------------|--------------------------------|---|---|
| | | | | | |  |
| 0.50 | .500 | 600 | 60 A @600 VAC | 0.560 | 0.840 ¹ | x |
| 1.25 | 1.25 | 600 | | .1040 | 16.5 ¹ | x |
| 2.00 | 002. | 600 | | .0450 | 17.5 ¹ | x |

¹ I²t is calculated at 10 msec. or less. I²t at 10 times rated current has a typical value of: 24 A²sec (2.0A), 22 A²sec (1.25A), 1.3 A²sec (0.5A).

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

Temperature Re-rating Curve



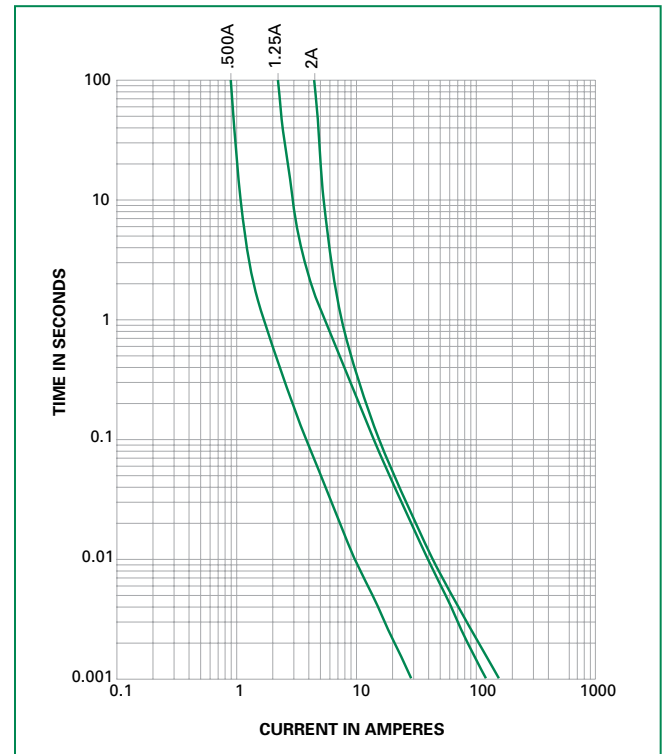
Note:

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

Maximum Temperature Rise

| Telecom Nano ² ® Fuse | Temperature |
|----------------------------------|---------------|
| 04611.25 | ≤82°C (180°F) |
| 0461002 | ≤50°C (122°F) |

Average Time Current Curves



TIA-968-A (formerly FCC part 68) Surge Waveforms

(fuse can not open during type B events)

| Surge | Voltage (V) | Waveform (μs) | Current (A) | Repetitions | Recommended Fuse |
|----------------|-------------|---------------|-------------|----------------|------------------|
| Metallic A | 800 | 10×560 | 100 | 1 ea. polarity | 1.25 |
| Longitudinal A | 1500 | 10×160 | 200 | 1 ea. polarity | 1.25 |
| Metallic B | 1000 | 9×720 | 25 | 1 ea. polarity | 1.25 |
| Longitudinal B | 1500 | 9×720 | 37.5 | 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.

GR 1089 Inter-building requirements

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

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

GR 1089 2nd 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 | 500/8=625 | 8/10 | 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 2nd level (fuse can open but must open in a safe and controlled manner)

| Test Circuite | Vrms | Short (A) | Duration | Fuse |
|---------------|---------|-----------|----------|----------------|
| 1 | 120,277 | 25 | 15 min. | 0.5, 1.25, 2.0 |
| 2 | 600 | 60 | 5 secs. | 0.5, 1.25, 2.0 |
| 3 | 600 | 7 | 5 secs. | 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).

UL60950 Requirements

UL 60950 (EN 60950, formerly UL 1950) Power Cross Test (L=Longitudinal, M=Metallic)

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

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

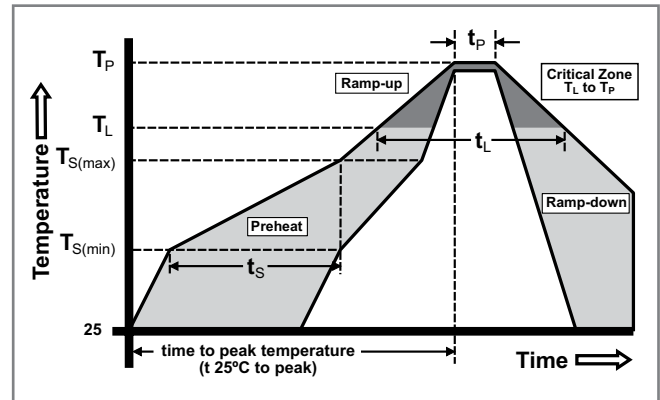
- 26 AWG line cord removes L1/M1 test requirement
 - L5 conducted only if product does not pass section 6.1.2
 - L2,M2,L3,M3,L4,M4 conducted if not in a fire enclosure
- Fuse must open before the wiring simulator fuse (MDL 2.0).

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

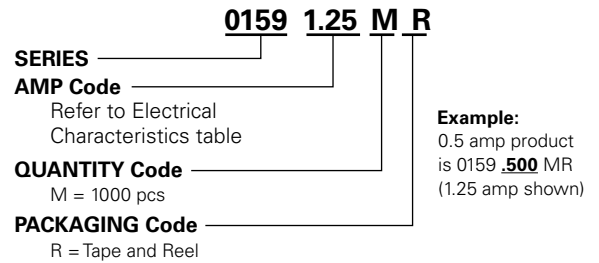
| Test | Voltage (V) | Current (A) | Waveform | Repetitions | Fuse Choices |
|---------------------|-------------|-------------|----------|----------------------|----------------|
| Impulse | | | | | |
| For handheld units | 2500 | 62.5 | 10x700ms | + 10 w/60 secs. rest | 0.5, 1.25, 2.0 |
| Non handheld | 1500 | 37.5 | 10x700ms | + 10 w/60 secs. rest | 0.5, 1.25, 2.0 |
| Steady-State | | | | | |
| For handheld units | 1500 | | 60Hz | | 0.5, 1.25, 2.0 |
| Non handheld | 1000 | | 60Hz | | 0.5, 1.25, 2.0 |

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 (LiquidusTemp (T_L) to peak) | | 3°C/second max. |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/second max. |
| Reflow | - Temperature (T_L) (Liquidus) | 217°C |
| | - Temperature (t_L) | 60 – 90 seconds |
| Peak Temperature (T_p) | | 260 ^{+0/-5} °C |
| Time within 5°C of actual peak Temperature (t_p) | | 20 – 40 seconds |
| Ramp-down Rate | | 6°C/second max. |
| Time 25°C to peak Temperature (T_p) | | 8 minutes max. |
| Do not exceed | | 260°C |



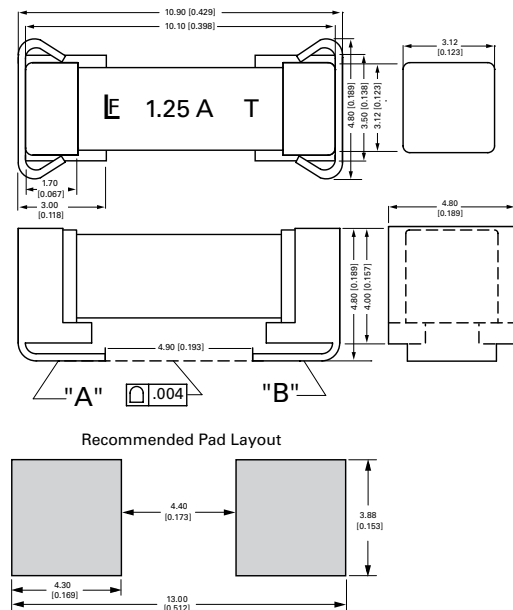
Part Numbering System



Product Characteristics

| | |
|--|---|
| Materials | Fuse Body: Ceramic Fuse Caps/Terminals: Silver-plated Brass Clip Base: Gold-plated Clip Terminals: Nickel-plated |
| Product Marking | Brand Logo, Current Rating, 'T' |
| Insulation Resistance (after opening) | MIL-STD-202, Method 302, Test condition A (10,000 ohms, minimum) |
| Operating Temperature | -55°C to 125°C with proper re-rating |
| Humidity Test | 85°C/ 85% RH, 1000 hours |
| Solderability | MIL-STD-202, Method 208/IPC EIA J-STD-002, Test Condition A |
| Resistance to Solvents | MIL-STD-202, Method 215 (3 solvent types) |
| Thermal Shock | MIL-STD-202, Method 107, Test Condition B3 (95 cycles -65°C to +125°C) |
| Mechanical Shock | MIL-STD-202, Method 213, Test Condition I (100G's peak for 6 msecs.) |
| Vibration | MIL-STD-202, Method 201, (10-55 Hz) |
| Moisture Resistance | MIL-STD-202, Method 106, High Humidity (90-98% RH), Heat (65°C) |
| Salt Spray/ Atmosphere | MIL-STD-202, Method 101, Test Condition B (48 hours) |
| Terminal Attachment | MIL-STD-202, Method 211, Test Condition A, 5 lbs applied to end caps |

Dimensions



Packaging

| Packaging Option | Packaging Specification | Quantity | Quantity & Packaging Code |
|--------------------|--------------------------------|----------|---------------------------|
| 24mm Tape and Reel | EIA RS-481-2 (IEC 286, part 3) | 1000 | MR |