temperature rise performance under 2.2A surge current

testing when compared with

and RoHS compliant and

compatible with lead-free

profiles when ordered with

UL Recognized to UL/CSA/

and IEC/EN 60127-7

NMX 248-1 and UL/CSA/NMX

Standard Silver Plated Brass

solder and higher temperature

1.25A rating

Caps

248-14



Additional Information



Agency Approvals

Agency	Agency File/Certificate Number	Ampere Range
91	E10480	0.5A - 2A
<u>جو</u>	29862	0.5A - 2A
\triangle	R50502555	0.5A, 1.25A, 2A
UK	N/A	0.5A - 2A
Œ	N/A	0.5A - 2A

Electrical Characteristics for Series

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

Maximum Temperature Rise

Telecom Nano ^{2®} 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.

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 GreentubeTM 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
 2A rating has improved Slo-Blo® fuse
- Meet UL 60950 3rd Edition power cross requirements standard alone
- Designed to allow compliance Product is Halogen Free 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 Conforms to IEC/EN 60127-1
- 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

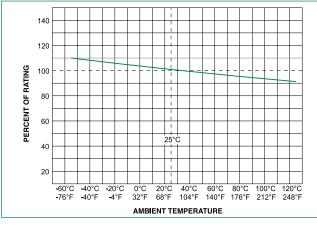
Ampere	Amp	Max Voltage	Interrupting	Nominal Cold Nominal Resistance Melting			Age	ency Appro	vals	
Rating (A)	Code	Rating (V)	Rating	(Ohms)	Melting I ² t (A ² sec)	91	SP:	\triangle	UK CA	Œ
0.500	.500	600	50A @ 250 VAC	0.560	0.840 ¹	х	х	х	х	х
1.25	1.25	600	60 A @600 VAC	.1040	16.5 ¹	х	х	х	х	х
2.00	002.	600	100 A @80 VDC	.0450	17.5 ¹	х	х	х	х	х

1/2t is calculated at 10 msecs. 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.

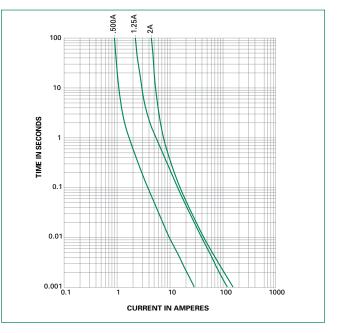
Temperature Re-rating Curve



Note:

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

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	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 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)	Repe-titions Each Polarity	Fuse Choices
1	5000	500	2/10	1	0.5, 1.25, 2.0
Alter-native	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 1st level inter-building (fuse not allowed to open)

Test	Vrms	Short Circuit Current (A)	Hits	Duration	Primary Protector	Fuse Choices
1	50	0.33	1	15 min.	removed	1.25, 2.0
2	100	0.17	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 AC power fault 2nd level (fuse can open but must open in a safe and controlled manner)

	ai		(manner)	
Test Circuit	Vrms	ShortCircuit Current(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

Dimensions mm(inches)

3.12

(.123")

1.70 typ

(.067")

3.25

(.128")

3.43

(.135")

6.10

(.240")

12.6

(.496")

Recommended Pad Layout

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

10.10

(.397")

LF 1.25A T

3.12

(.123")

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.

UL 60950 requirements UL60950 (EN 60950) (formerly UL 1950) Power Cross (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).

UL6095	50 (EN 60950) (forme	erly UL 1950) Impuls	e Test and Steady-	State Electric Strength	Test	
Test	Voltage (V)	Current (A)	Waveform	Repetitions	Fuse Choices	
Impulse						
For handheld units	2500	62.5	10×700ms	+/- 10 w/60 secs. rest	0.5, 1.25, 2.0	
Non handheld	1500	37.5	10×700ms	+/- 10 w/60 secs. rest	0.5, 1.25, 2.0	
		Stead	y-State			
For handheld units	1500	-	60Hz	-	0.5, 1.25, 2.0	
Non handheld	1000	-	60Hz	-	0.5, 1.25, 2.0	



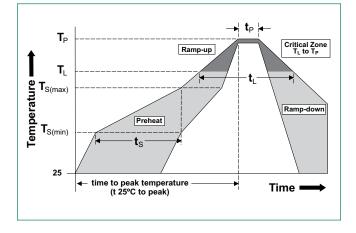
TeleLink® Fuse Datasheet

Soldering Parameters

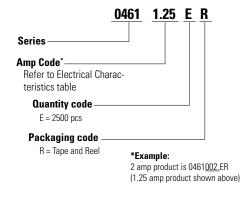
Reflow Cond	Pb – free assembly		
	- Temperature Min (T _{s(min)})	150°C	
Pre Heat	- Temperature Max (T _{s(max)})	200°C	
	-Time (Min to Max) (t _s)	60 – 180 seconds	
Average Ran	5°C/second max.		
$T_{S(max)}$ to T_L -	5°C/second max.		
Reflow	- Temperature (T _L) (Liquidus)	217°C	
nenow	- Temperature (t _L)	60 – 150 seconds	
Peak Temper	rature (T _P)	260 ^{+0/-5} °C	
Time within	5°C of actual peak Temperature (t_p)	20-40 seconds	
Ramp-down	6°C/second max.		
Time 25°C to	8 minutes max.		
Do not exce	Do not exceed		

Product Characteristics

Materials	Body: Ceramic Terminations: Silver-plated Caps		
Product Marking	Brand Logo, Ampere Rating, T		
Operating Temperature	-55°C to 125°C		
Moisture Sensitivity Level	Level 1, J-STD-020		
Solderability	IEC-60127-4 (215°C immersion, 3 seconds)		
Resistance to Dissolution of Metallization	IPC / EIA J-STD-002-Test D 260°C for 120 seconds		
Thermal Shock	MIL-STD-202, Method 107, Test Condition B, -55°C to +125°C, 30 minutes @ each extreme		
Mechanical Shock	MILSTD-202, Method 213, Test Condition A - Half Sine, 50 G's, 11 msecs. duration		
High Frequency Vibration	MIL-STD-202, Method 204, Test Condition D		
Moisture Resistance	MILSTD-202, Method 106, 50 cycles		
Terminal Strength	Board deflection per EIA / IS-722, 1mm deflection for 1 minute		
Terminal Attachment	MIL-STD-202, Method 211, Test Condition A, 5 lbs applied to end caps		



Part Numbering System



Packaging

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

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