

### Description

- The 250R series is designed to protect against short duration high voltage fault currents (power cross or power induction surge) typically found in telecom applications (250Vrms). The series can be used to help telecom networking equipment meet the protection requirements specified in ITU K.20 and K.21.

### Features

- RoHS compliant and lead-free
- Fast time-to-trip
- Binned and sorted narrow resistance ranges available
- 0.08 – 0.18 Hold current range, 60VDC operating voltage
- 250VAC interrupt rating

### Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E183209
	R50082521

### Applications

- Customer Premises Equipment (CPE)
- Central Office (CO)/Telecom Centers
- LAN/WAN Equipment
- Access equipment

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### Electrical Characteristics

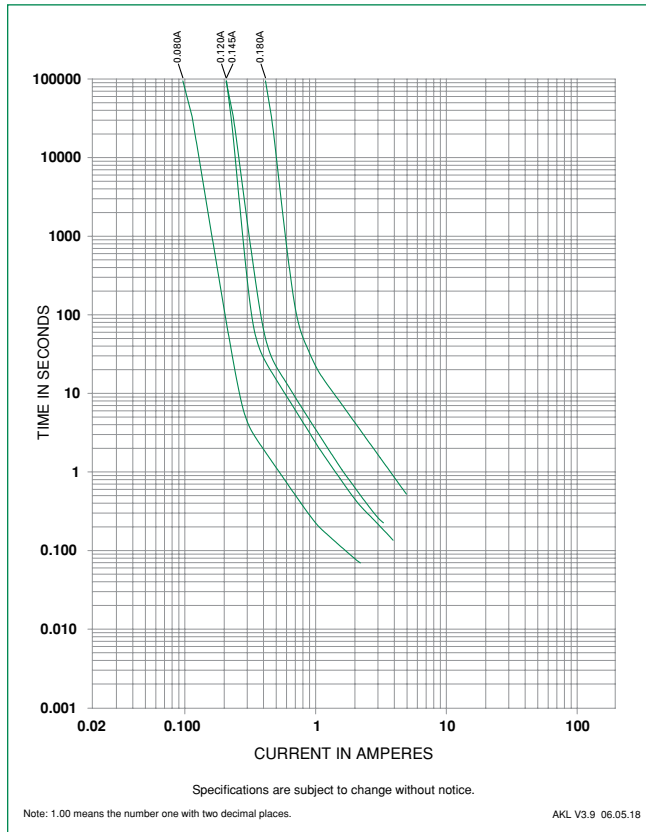
Part Number	I <sub>hold</sub> (A)	I <sub>trip</sub> (A)	V <sub>max</sub> V <sub>int</sub> / V <sub>op</sub>	I <sub>max</sub> (A)	P <sub>d</sub> max. (W)	Maximum Time To Trip		Resistance			Agency Approvals	
						Current (A)	Time (Sec.)	R <sub>min</sub> (Ω)	R <sub>typ</sub> (Ω)	R <sub>1max</sub> (Ω)		
250R080T	0.08	0.16	250/60	3	1	0.35	3	15	22	33	X	X
250R080	0.08	0.16	250/60	3	1	0.35	3	14	22	33	X	X
250R120	0.12	0.24	250/60	3	1	1	1.5	4	8	16	X	X
250R120-RA	0.12	0.24	250/60	3	1	1	1.0	7	9	16	X	X
250R120-RC	0.12	0.24	250/60	3	1	1	0.85	5.4	7.5	14	X	X
250R120-RF	0.12	0.24	250/60	3	1	1	0.7	6	10.5	16	X	X
250R120-R1	0.12	0.24	250/60	3	1	1	0.8	6	9	16	X	X
250R120-R2	0.12	0.24	250/60	3	1	1	0.7	8	10.5	16	X	X
250R120-R3	0.12	0.24	250/60	3	1	1	1	8	10	16	X	X
250R120T	0.12	0.24	250/60	3	1	1	1.2	7	12	16	X	X
250R145	0.145	0.29	250/60	3	1	1	2.5	3	6	14	X	X
250R145-RA	0.145	0.29	250/60	3	1	1	5	3	5.5	12	X	X
250R145-RB	0.145	0.29	250/60	3	1	1	2.5	4.5	6	14	X	X
250R145T	0.145	0.29	250/60	3	1	1	2.0	5.4	7.5	14	X	X
250R180	0.18	0.65	250/60	10	1.8	1	21	0.8	2.2	4	X	X
250R180T	0.18	0.65	250/60	10	1.8	1	20	1.4	3.9	4.5	X	X

\*typical value    C: coated device    T: pre-tripped device

## Temperature Derating

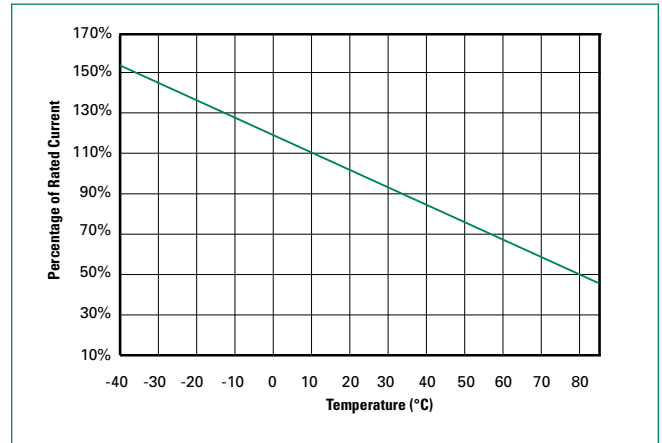
Part Number	Ambient Operation Temperature								
	-40°C	-20°C	0°C	23°C	40°C	50°C	60°C	70°C	85°C
250R080	0.12	0.11	0.09	0.08	0.06	0.05	0.05	0.04	0.03
250R080T	0.12	0.11	0.09	0.08	0.06	0.05	0.05	0.04	0.03
250R120	0.18	0.16	0.14	0.12	0.10	0.09	0.08	0.06	0.05
250R120T	0.18	0.16	0.14	0.12	0.10	0.09	0.08	0.06	0.05
250R145	0.26	0.20	0.17	0.145	0.12	0.11	0.09	0.08	0.06
250R145T	0.26	0.20	0.17	0.145	0.12	0.11	0.09	0.08	0.06
250R180	0.28	0.23	0.21	0.18	0.16	0.13	0.10	0.11	0.083
250R180T	0.28	0.23	0.21	0.18	0.16	0.13	0.10	0.11	0.083

## Average Time Current Curves



The average time current curves and temperature derating curve performance is affected by a number of variables, and these curves provided as guidance only. Customer must verify the performance in their application.

## Temperature Derating Curve



**Agency Specification Selection Guide For Telecom and Networking Applications**

Product	Lightning	Power Cross
250R120 250R145	ITU K.20/21/45 – 1.5kV 10/700µs ITU K.20/21/45 – 4kV 10/700µs*	ITU K.20/21/45 – 230Vac, 10Ω ITU K.20/21/45 – 600Vac, 600Ω
250R180	ITU K.20/21/45 – 1.5kV 10/700µs ITU K.20/21/45 – 4kV 10/700µs* Telcordia GR – 974 – 1.0kV 10/1000µs	ITU K.20/21/45 – 230Vac, 10Ω ITU K.20/21/45 – 600Vac, 600Ω Telcordia GR – 974- 283Vac, 10A

\*Devices should be independently evaluated and tested for use in any specific application

**Protection Application Guide**

Region/Specification	Application	Device Selection
South America/Asia/Europe ITU K.45	*Access network equipment Remote terminal Repeaters WAN equipment Cross –connect	250R180 250R180T 250R145 250R145T 250R120 250R120T
South America/Asia/Europe ITU K.21	Customer and IT equipment Analog modems ADSL, xDSL Phone sets, PBX systems Internet appliances POS terminals	250R180 250R180T 250R145 250R145T 250R120 250R120T
South America/Asia/Europe ITU K.20	Central Office POTS/ISDN linecards T1/E1/J1 linecards ADSL/VDSL splitters CSU/DSU	250R180 250R180T 250R145 250R145T 250R120 250R120T
North America Telcordia GR-974	*Primary protection modules MDF modules Network interface	250R180 250R180T 250R145 250R145T 250R120 250R120T
South America/Asia/Europe ITU K.20		
North America Telcordia GR-1089	*Intrabuilding communication systems LAN, VOIP cards Local loop handsets	250R180 250R180T 250R145 250R145T 250R120 250R120T
South America/Asia/Europe ITU K.20 and K.21		
	LAN Intrabuilding power cross Protection LAN equipment, IP phone	250R080

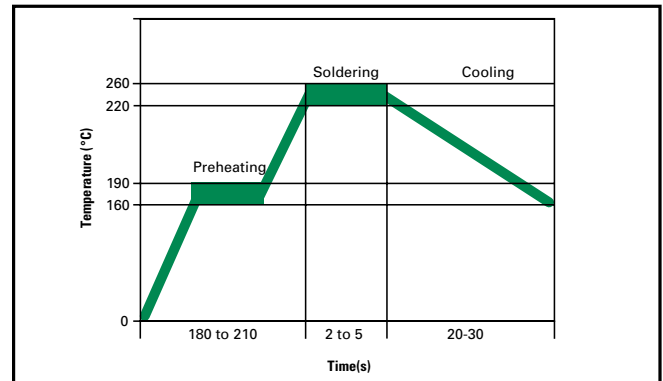
\*Resistance binned parts are recommended

## Soldering Parameters - Wave Soldering

Condition	Wave Soldering
Peak Temp/ Duration Time	260°C ≤ 5 Sec
≥ 220°C	2 Sec ~ 20 Sec
Preheat 140°C ~ 180°C	180 Sec ~ 210 Sec
Storage Condition	0°C~35°C ≤ 70%RH

- Recommended soldering methods: heat element oven or N<sub>2</sub> environment for lead-free.
- Devices are designed to be wave soldered to the bottom side of the board.
- Devices can be cleaned using standard industry methods and solvents.
- This profile can be used for lead-free device

**Note:** If soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

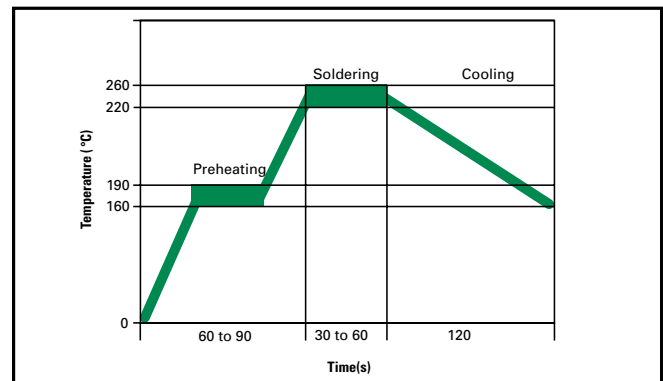


## Soldering Parameters - Solder Reflow

Condition	Reflow
Peak Temp/ Duration Time	260°C ≥ 5 Sec
≥ 220°C	30 Sec ~ 60 Sec
Preheat 160°C ~ 190°C	60 Sec ~ 90 Sec
Storage Condition	0°C~35°C, ≤ 70%RH

- Recommended reflow methods: IR, vapor phase oven, hot air oven, N<sub>2</sub> environment for lead-free.
- Devices are not designed to be wave soldered to the bottom side of the board.
- Devices can be cleaned using standard industry methods and solvents.

**Note:** If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.



## Physical Specifications

<b>Lead Material</b>	Tin-plated copper
<b>Soldering Characteristics</b>	Solderability per MIL-STD-202, Method 208E
<b>Insulating Material</b>	Cured, flame retardant epoxy polymer meets UL94V-0 requirements.
<b>Device Labeling</b>	Marked with LF, voltage, current rating, and date code.

## Environmental Specifications

<b>Operating/Storage Temperature</b>	-40°C to +85°C
<b>Maximum Device Surface Temperature in Tripped State</b>	125°C
<b>Passive Aging</b>	65°C/85°C, 1000 hours
<b>Humidity Aging</b>	+85°C, 85%R.H. 1000 hours
<b>Thermal Shock</b>	MIL-STD-202F Method 107G +125°C to -55°C 10 times
<b>Solvent Resistance</b>	MIL-STD-202, Method 215F

### Dimensions

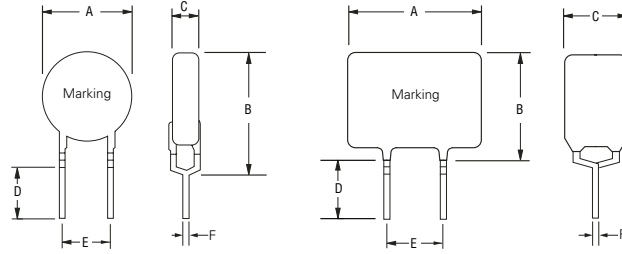
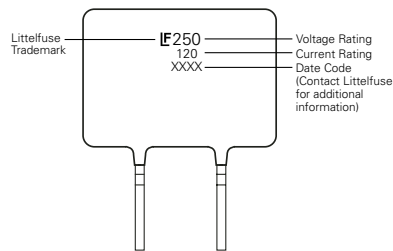
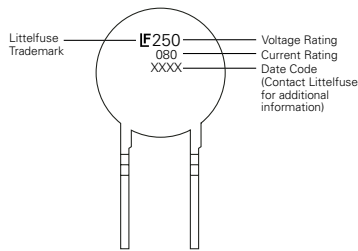


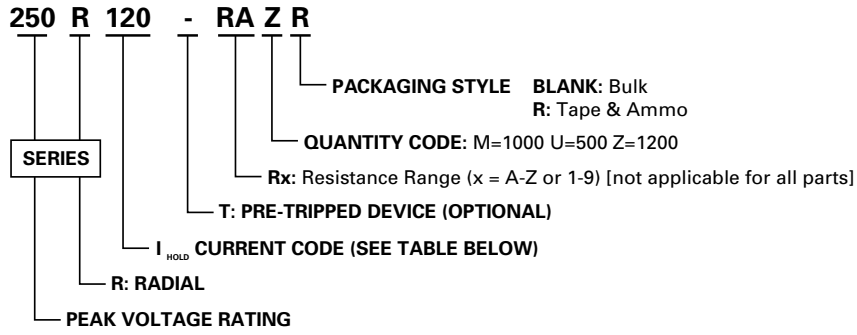
Figure 1

Figure 2

Part Number	A		B		C		D		E		Physical Characteristics			
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Lead (dia)		Material	Figure
	Max.	Max.	Max.	Max.	Max.	Max.	Min.	Min.	Typ.	Typ.	Inches	mm		
250R080	0.23	5.8	0.39	9.9	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	1
250R080T	0.23	5.8	0.39	9.9	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	1
250R120	0.26	6.5	0.43	11	0.15	3.8	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R120-RA	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R120-RC	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R120-RF	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R120-R1	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R120-R2	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R120-R3	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R120T	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R145	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R145-RA	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R145-RB	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R145T	0.26	6.5	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	2
250R180	0.37	9.5	0.47	12	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	1
250F180T	0.37	9.5	0.47	12	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu	1

### Part Marking System



**Part Numbering System**

**Packaging**

$I_{\text{hold}}$ (A)	$I_{\text{hold}}$ Code	Packaging Option	Quantity	Quantity & Packaging Codes
0.080	080	Bulk	500	U
		Tape and Ammo	1500	DR
0.120	120	Bulk	500	U
		Tape and Ammo	1200	ZR
0.145	145	Bulk	500	U
		Tape and Ammo	1200	ZR
0.180	180	Bulk	200	F
		Tape and Ammo	1000	MR