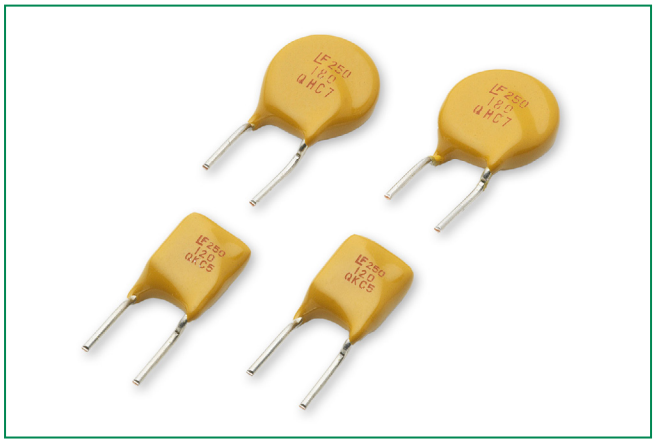
250R Series
Radial Leaded



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 & Benefits

- 0.08 – 0.18 hold current range, 60VDC operating voltage
- 250VAC interrupt rating
- Fast time–to-trip
- Binned and sorted narrow resistance ranges available
- RoHS-compliant, Lead-Free and Halogen-Free*

Applications

- Customer Premises Equipment (CPE)
- Central Office (CO)/ telecom centers
- LAN/WAN equipment
- Access equipment

Additional Information

Resources | Accessories | Samples

Agency Approvals

Agency	Agency File Number
c UL us	E74889
TÜV	R72161780

Electrical Characteristics

Part Number	I_{hold} (A)	I_{trip} (A)	V_{max} V_{int}/V_{op}	I_{max} (A)	P_d typ. (W)	Maximum Time To Trip		Resistance			Agency Approvals	
						Current (A)	Time (Sec.)	R_{min}(Ω)	R_{typ}(Ω)	R_{1max}(Ω)	c UL us	TÜV
250R080	0.08	0.16	250/60	3	1	0.35	4.0	14	22	33	X	X
250R120	0.12	0.24	250/60	3	1	1	2.5	4	8	16	X	X
250R120-RA	0.12	0.24	250/60	3	1	1	2.5	7	9	16	X	X
250R120-RC	0.12	0.24	250/60	3	1	1	3.0	5.4	7.5	14	X	X
250R120-R2	0.12	0.24	250/60	3	1	1	2.5	8	10.5	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	2.5	3	5.5	12	X	X
250R180	0.18	0.65	250/60	10	1.8	1	20	0.8	2.2	4	X	X

Note: Items with T at end of part number = pre-tripped device. See Part Ordering Number System section of this data sheet for additional information.

I_{hold} = Hold current: maximum current device will pass without tripping in 20°C still air.
I_{trip} = Trip current: minimum current at which the device will trip in 20°C still air.
V_{int} = Maximum voltage the device can withstand without damage at rated current (I max)
V_{op} = The device regular operation voltage
I_{max} = Maximum fault current device can withstand without damage at rated voltage (V_{max})
P_d = Power dissipated from device when in the tripped state at 20°C still air.

R_{min} = Minimum resistance of device in initial (un-soldered) state.
R_{typ} = Typical resistance of device in initial (un-soldered) state.
R_{1max} = Maximum resistance of device at 20°C measured one hour after tripping.

* Effective February 11, 2010 onward, all 600R PTC products will be manufactured Halogen Free (HF). Existing Non-Halogen Free 600R PTC products may continue to be sold, until supplies are depleted. This change will have no effect on 600R product specifications or performance.

Warning

- Users shall independently assess the suitability of these devices for each of their applications
- Operation of these devices beyond the stated maximum ratings could result in damage to the devices and lead to electrical arcing and/or fire
- These devices are intended to protect against the effects of temporary over-current or over-temperature conditions and are not intended to perform as protective devices where such conditions are expected to be repetitive or prolonged in duration
- Exposure to silicon-based oils, solvents, electrolytes, acids, and similar materials can adversely affect the performance of these PPTC devices
- These devices undergo thermal expansion under fault conditions, and thus shall be provided with adequate space and be protected against mechanical stresses
- Circuits with inductance may generate a voltage (L di/dt) above the rated voltage of the PPTC device.

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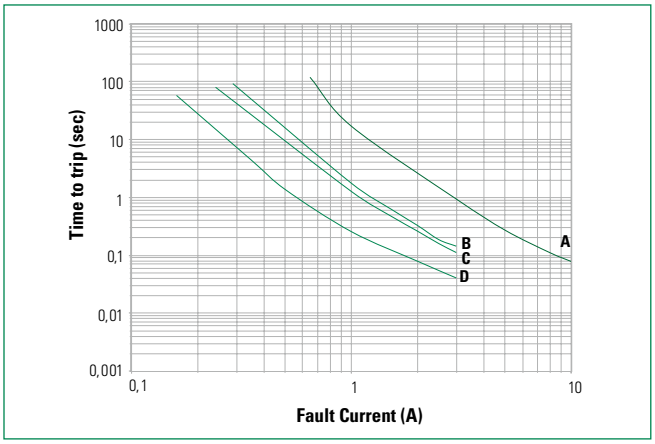
Temperature Rerating

	Ambient Operation Temperature								
	-40°C	-20°C	0°C	20°C	40°C	50°C	60°C	70°C	85°C
Part Number	**Hold Current (A)**								
250R080	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
250R145	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

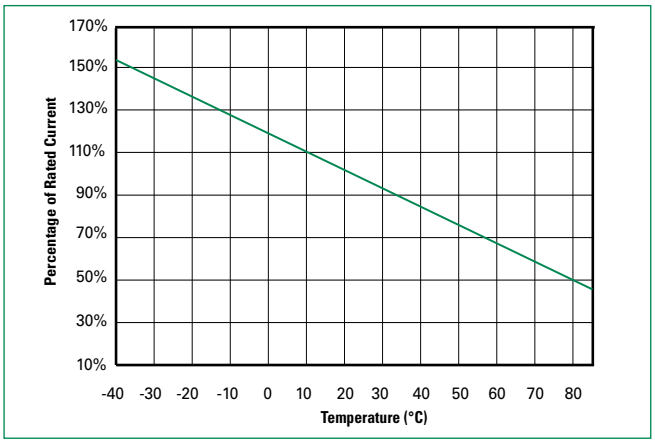
Average Time Current Curves



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

Curve Designation	I_{hold} (A)
A	0.18
B	0.145
C	0.12
D	0.80

Temperature Rerating Curve



Note: Typical Temperature rerating curve, refer to table for derating data

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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

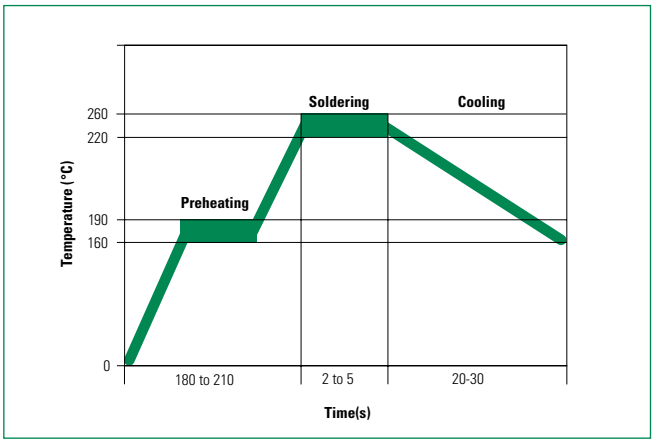
Region/Specification	Application	Device Selection
South America/Asia/Europe ITU K.45	*Access network equipment, Remote terminal Repeaters, WAN equipment, Cross –connect	250R180 250R145 250R120
South America/Asia/Europe ITU K.21	Customer and IT equipment, Analog modems ADSL, xDSL, Phone sets, PBX systems,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

Note:
- Recommended soldering methods: heat element oven or N_2 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
- If soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.



250R Series
Radial Leaded

Physical Specifications

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

Environmental Specifications

Operating Temperature	-40°C to +85°C
Maximum Device Surface Temperature in Tripped State	125°C
Passive Aging	65°C/85°C, 1000 hours
Humidity Aging	+85°C, 85% R.H,.1000 hours
Thermal Shock	MIL–STD–202, Method 107 +125°C to -55°C 10 times
Solvent Resistance	MIL–STD–202, Method 215
Moisture Sesitivity Level	Level 1, J–STD–020

Dimensions

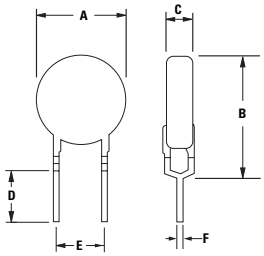


Figure 1

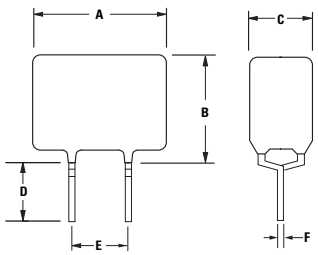
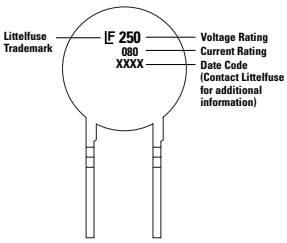
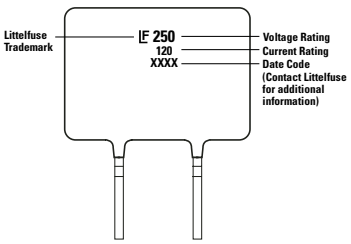


Figure 2

Part Marking System





Part Number	Figure	A		B		C		D		E		Physical Characteristics		
		Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Lead (dia)		Material
		Max.	Max.	Max.	Max.	Max.	Max.	Min.	Min.	Typ.	Typ.	Inches	mm	
250R080	1	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
250R120	2	0.27	6.8	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu
250R120-RA	2	0.27	6.8	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu
250R120-RC	2	0.27	6.8	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu
250R120-R2	2	0.27	6.8	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu
250R145	2	0.27	6.8	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu
250R145-RA	2	0.27	6.8	0.43	11	0.18	4.6	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu
250R180	1	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

Warning:
- Users shall independently assess the suitability of these devices for each of their applications
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Part Ordering Number System

250 R 120 - RA Z R

- **Packaging Style** — **Blank:** Bulk; **R:** Tape & Ammo
- **Quantity Code: F**=200 **M**=1000 **U**=500 **Z**=1200
- **Rx:** Resistance Range (x = A-Z or 1-9) [not applicable for all parts]
- **T: Pre-tripped Device** (Optional)
- **I_{HOLD} Current Code** (Refer to Packaging or Electrical Characteristics tables)
- **R: Radial**
- **Peak Voltage Rating**

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Packaging

Part Number	Ordering Number	I_{hold} (A)	I_{hold} Code	Packaging Option	Quantity	Quantity & Packaging Codes
250R080	250R080U	0.080	080	Bulk	500	U
	250R080ZR			Tape and Ammo	1200	ZR
250R120	250R120U	0.120	120	Bulk	500	U
	250R120ZR			Tape and Ammo	1200	ZR
250R120-RA	250R120-RAZR	0.120	120	Tape and Ammo	1200	ZR
250R120-RC	250R120-RCZR	0.120	120	Tape and Ammo	1200	ZR
250R120-R2	250R120-R2ZR	0.120	120	Tape and Ammo	1200	ZR
250R145	250R145ZR	0.145	145	Tape and Ammo	1200	ZR
250R180	250R180F	0.180	180	Bulk	200	F
	250R180MR			Tape and Ammo	1000	MR

Tape and Ammo Specifications

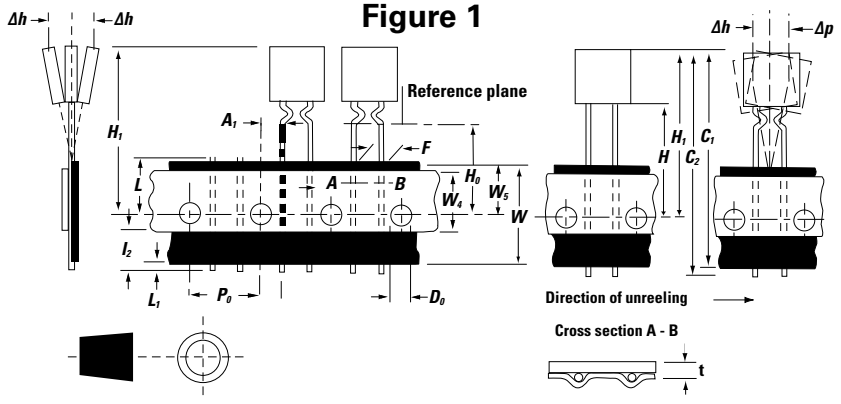
Devices taped using EIA468-B/IE286-2 standards. See table below and Figure 1 for details.

Dimension	EIA Mark	IEC Mark	Dimensions	
			Dim. (mm)	Tol. (mm)
Carrier tape width	**W**	**W**	18	–0.5 / +1.0
Hold down tape width	**W_4**	**W_0**	11	min.
Top distance between tape edges	**W_6**	**W_2**	3	max.
Sprocket hole position	**W_5**	**W_1**	9	–0.5 / +0.75
Sprocket hole diameter*	**D_0**	**D_0**	4	–0.32 / +0.2
Abscissa to plane (straight lead)	**H**	**H**	18.5	–/+ 3.0
Abscissa to plane (kinked lead)	**H_0**	**H_0**	16	–/+ 0.5
Abscissa to top	**H_1**	**H_1**	32.2	max.
Overall width without lead protrusion	**C_1**	-	42.5	max.
Overall width with lead protrusion	**C_2**	-	43.2	max.
Lead protrusion	**L_1**	**I_1**	1.0	max.
Protrusion of cut out	**L**	**L**	11	max.
Protrusion beyond hold–down tape	**I_2**	**I_2**	Not specified	-
Sprocket hole pitch: 250R080–250R145	**P_0**	**P_0**	12.7	–/+ 0.3
Sprocket hole pitch: 250R180	**P_0**	**P_0**	25.4	–/+ 0.5
Pitch tolerance	-	-	20 consecutive.	–/+ 1
Device pitch: 250R080–250R145	-	-	12.7	-
Device pitch: 250R180	-	-	25.4	-
Tape thickness	**t**	**t**	0.9	max.
Tape thickness with splice	**t_1**	-	2.0	max.
Splice sprocket hole alignment	-	-	0	–/+ 0.3
Body lateral deviation	**Δh**	**Δh**	0	–/+ 1.0
Body tape plane deviation	**Δp**	**Δp**	0	–/+ 1.3
Ordinate to adjacent component lead*	**P_1**	**P_1**	3.81	–/+ 0.7
Lead spacing	**F**	**F**	5.1	–/+ 0.7

*Differs from EIA Specification

Tape and Ammo Diagram

Figure 1



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