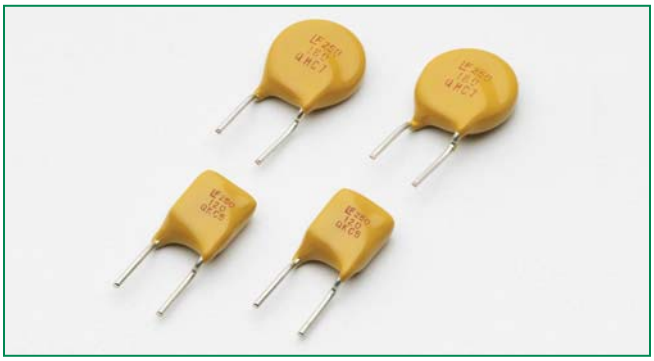
RoHS Pb HF 250R Series



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

- 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

Agency Approvals

AGENCY	AGENCY FILE NUMBER
c UL us	E183209
TÜV	R50120008

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	3	14	22	33	X	X
250R080T	0.08	0.16	250/60	3	1	0.35	3	15	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

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

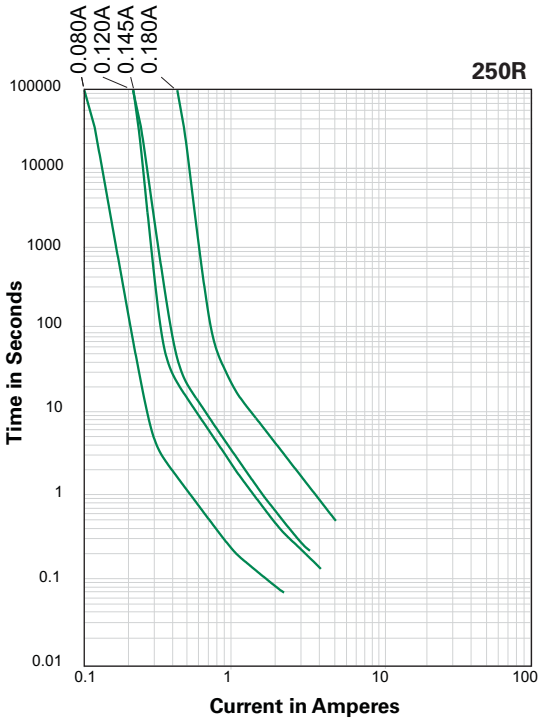
I_{hold} = Hold current: maximum current device will pass without tripping in 23°C still air.
I_{trip} = Trip current: minimum current at which the device will trip in 23°C still air.
V_{int} = Maximum voltage the device can withstand without damage at rated current (I max)
V_{op} = The device regular 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 23°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.
Caution: Operation beyond the specified rating may result in damage and possible arcing and flame.

* Effective January 1, 2010, all 250R PTC products will be manufactured Halogen Free (HF). Existing Non-Halogen Free 250R PTC products may continue to be sold, until supplies are depleted.

Temperature Rerating

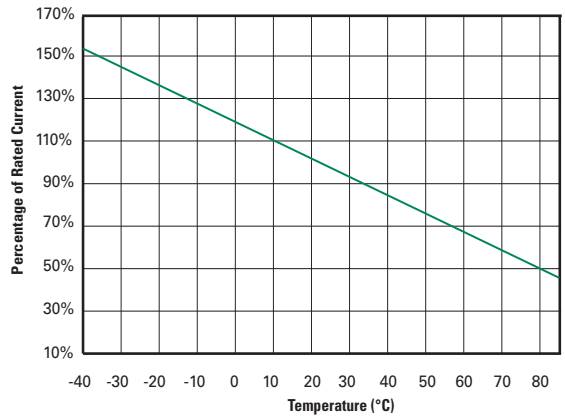
	Ambient Operation Temperature								
	-40°C	-20°C	0°C	23°C	40°C	50°C	60°C	70°C	85°C
Part Number	Hold Current (A)								
250R080	0.12	0.11	0.09	0.08	0.06	0.05	0.05	0.04	0.03
250R080T	0.12	0.11	0.09	0.08	0.06	0.05	0.05	0.04	0.03
250R120	0.18	0.16	0.14	0.12	0.10	0.09	0.08	0.06	0.05
250R120T	0.18	0.16	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 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.

Temperature Rerating 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 South America/Asia/Europe ITU K.20	*Primary protection modules MDF modules Network interface	250R180 250R180T 250R145 250R145T 250R120 250R120T
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 250R180T 250R145 250R145T 250R120 250R120T
	LAN Intrabuilding power cross Protection LAN equipment, IP phone	250R080

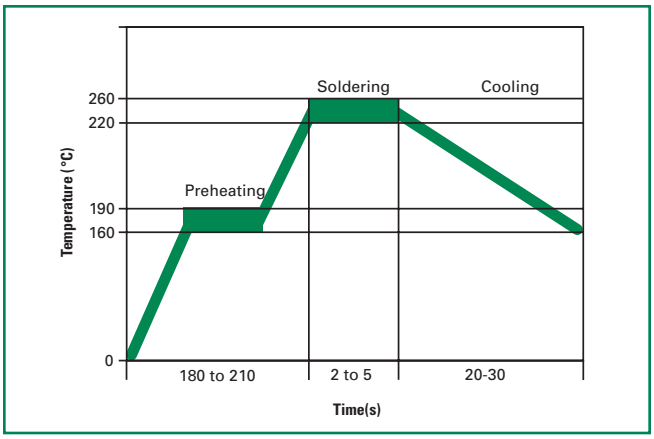
*Resistance binned parts are recommended

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_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

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



Physical Specifications

Lead Material	Tin-plated Copper
Soldering Characteristics	Solderability per MIL–STD–202, Method 208E
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/Storage 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–202F, Method 107G +125°C to -55°C 10 times
Solvent Resistance	MIL–STD–202, Method 215F
Moisture Sesitivity Level	Level 1, J–STD–020C

Dimensions

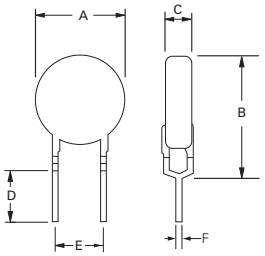


Figure 1

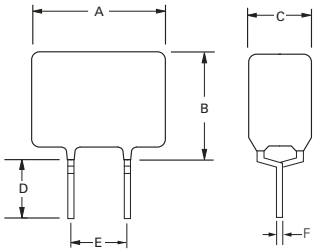
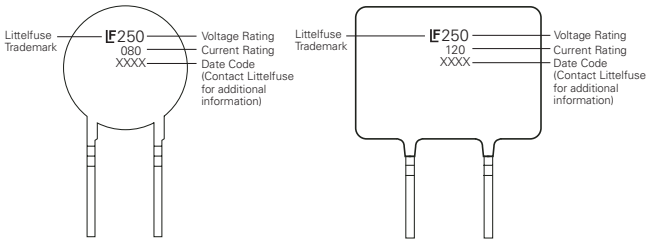


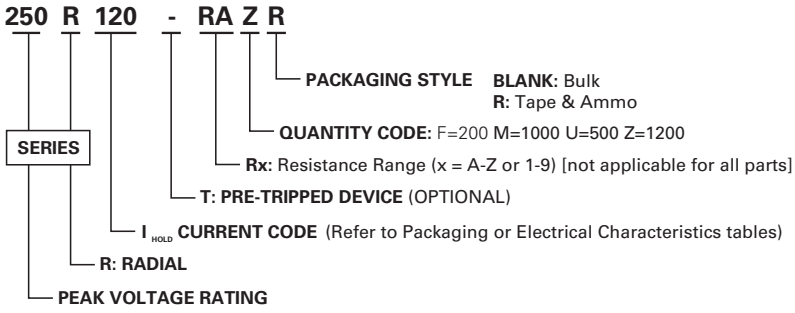
Figure 2

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
250R080T	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	0.26	6.5	0.43	11	0.15	3.8	0.19	4.7	0.20	5.1	0.026	0.65	Sn/Cu
250R120-RA	2	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
250R120-RC	2	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
250R120-RF	2	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
250R120-R1	2	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
250R120-R2	2	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
250R120-R3	2	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
250R120T	2	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
250R145	2	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
250R145-RA	2	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
250R145-RB	2	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
250R145T	2	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
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
250R180T	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

Part Ordering Number System



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
250R080T	250R080TU	0.080	080	Bulk	500	U
	250R080TZR			Tape and Ammo	1200	ZR
250R120	250R120U	0.120	120	Bulk	500	U
	250R120ZR			Tape and Ammo	1200	ZR
250R120-RA	250R120-RAU	0.120	120	Bulk	500	U
	250R120-RAZR			Tape and Ammo	1200	ZR
250R120-RC	250R120-RCU	0.120	120	Bulk	500	U
	250R120-RCZR			Tape and Ammo	1200	ZR
250R120-RF	250R120-RFU	0.120	120	Bulk	500	U
	250R120-RFZR			Tape and Ammo	1200	ZR
250R120-R1	250R120-R1U	0.120	120	Bulk	500	U
	250R120-R1ZR			Tape and Ammo	1200	ZR
250R120-R2	250R120-R2U	0.120	120	Bulk	500	U
	250R120-R2ZR			Tape and Ammo	1200	ZR
250R120-R3	250R120-R3U	0.120	120	Bulk	500	U
	250R120-R3ZR			Tape and Ammo	1200	ZR
250R120T	250R120TU	0.120	120	Bulk	500	U
	250R120TZR			Tape and Ammo	1200	ZR
250R145	250R145U	0.145	145	Bulk	500	U
	250R145ZR			Tape and Ammo	1200	ZR
250R145-RA	250R145-RAU	0.145	145	Bulk	500	U
	250R145-RAZR			Tape and Ammo	1200	ZR
250R145-RB	250R145-RBU	0.145	145	Bulk	500	U
	250R145-RBZR			Tape and Ammo	1200	ZR
250R145T	250R145TU	0.145	145	Bulk	500	U
	250R145TZR			Tape and Ammo	1200	ZR
250R180	250R180F	0.180	180	Bulk	200	F
	250R180MR			Tape and Ammo	1000	MR
250R180T	250R180TF	0.180	180	Bulk	200	F
	250R180TMR			Tape and Ammo	1000	MR

Tape and Ammo Specifications

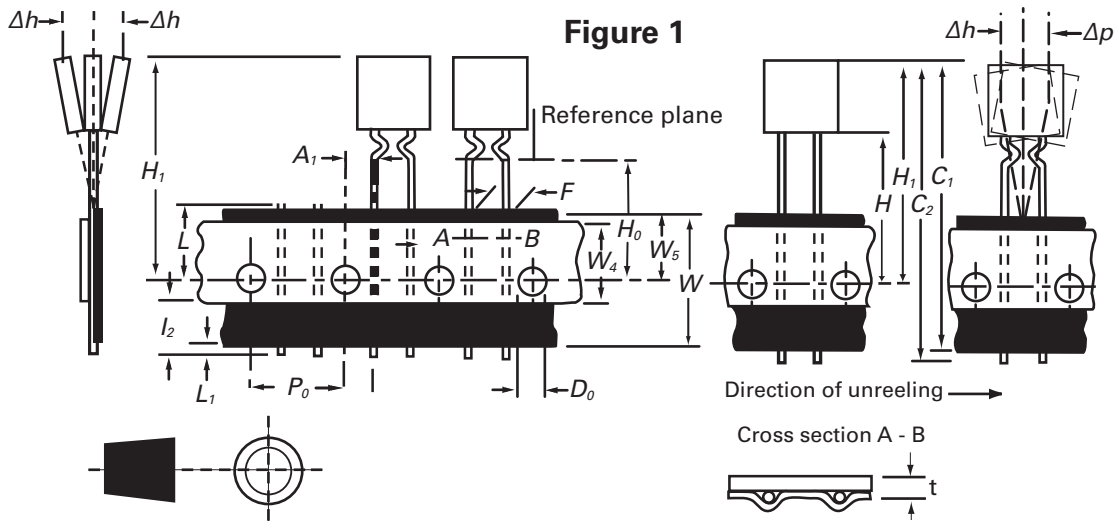
Devices taped using EIA468-B/IE286-2 standards. See table below and Figure 1 for details.

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



Revised: August 31, 2011