

### Description

- The 60R series radial leaded device is designed to provide overcurrent protection for ( $\leq 60V$ ) applications where space is not a concern and resettable protection is preferred.

### Features

- RoHS compliant and lead-free
- Fast time-to-trip
- Cured, flame retardant epoxy polymer insulating material meets UL 94V-0 requirements

### Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E183209
	R50082521

### Applications

- USB hubs, ports and peripherals
- IEEE1394 ports
- Computers & peripherals
- Motor protection
- General electronics
- Automotive applications
- Industrial controls
- Transformers

### Electrical Characteristics

Part Number	$I_{hold}$ (A)	$I_{trip}$ (A)	$V_{max}$ (Vdc)	$I_{max}$ (A)	$P_d$ max. (W)	Maximum Time To Trip		Resistance		Agency Approvals	
						Current (A)	Time (Sec.)	$R_{min}$ ( $\Omega$ )	$R_{1max}$ ( $\Omega$ )		
60R010	0.10	0.20	60	40	0.38	0.50	4.00	2.500	7.500	X	X
60R020	0.20	0.40	60	40	0.41	1.00	2.20	1.830	4.400	X	X
60R025	0.25	0.50	60	40	0.45	1.25	2.50	1.250	3.000	X	X
60R030	0.30	0.60	60	40	0.49	1.50	3.00	0.880	2.100	X	X
60R040	0.40	0.80	60	40	0.56	2.00	3.80	0.550	1.290	X	X
60R050	0.50	1.00	60	40	0.77	2.50	4.00	0.500	1.170	X	X
60R065	0.65	1.30	60	40	0.88	3.25	5.30	0.310	0.720	X	X
60R075	0.75	1.50	60	40	0.92	3.75	6.30	0.250	0.600	X	X
60R090	0.90	1.80	60	40	0.99	4.50	7.20	0.200	0.470	X	X
60R110	1.10	2.20	60	40	1.50	5.50	8.20	0.150	0.380	X	X
60R135	1.35	2.70	60	40	1.70	6.75	9.60	0.120	0.300	X	X
60R160	1.60	3.20	60	40	1.90	8.00	11.40	0.090	0.220	X	X
60R185	1.85	3.70	60	40	2.10	9.25	12.60	0.080	0.190	X	X
60R250	2.50	5.00	60	40	2.50	12.50	15.60	0.050	0.130	X	X
60R300	3.00	6.00	60	40	2.80	15.00	19.80	0.040	0.100	X	X
60R375	3.75	7.50	60	40	3.20	18.75	24.00	0.030	0.080	X	X

$I_{hold}$  = 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.  
 $V_{max}$  = Maximum voltage device can withstand without damage at rated current ( $I_{max}$ )  
 $I_{max}$  = 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.

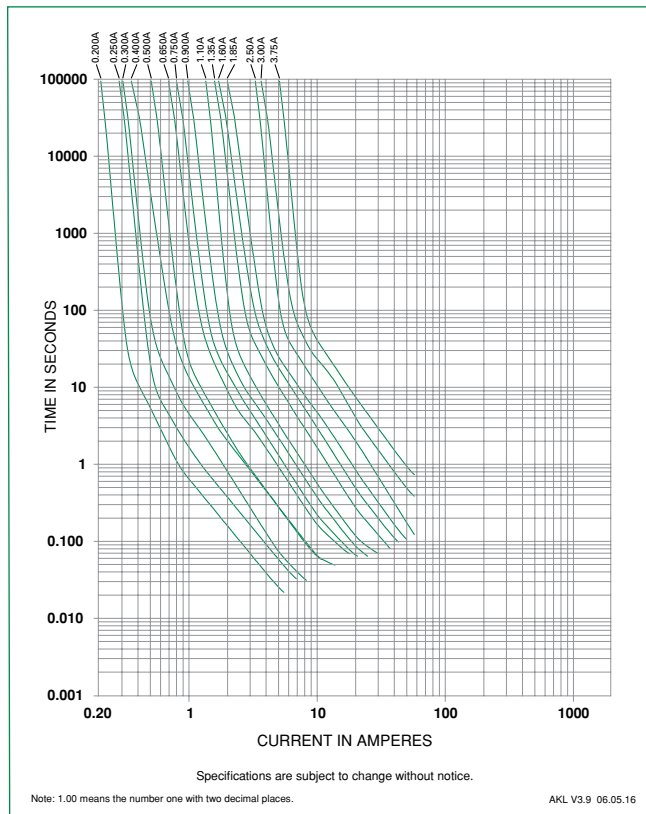
$R_{min}$  = Minimum resistance of device in initial (un-soldered) state.  
 $R_{typ}$  = Typical resistance of device in initial (un-soldered) state.  
 $R_{1max}$  = Maximum resistance of device at 20°C measured one hour after tripping or reflow soldering of 260°C for 20 sec.

**Caution:** Operation beyond the specified rating may result in damage and possible arcing and flame.

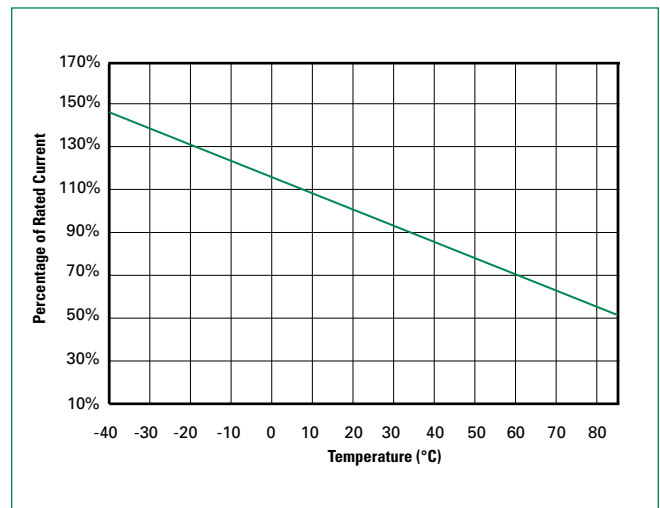
## Temperature Derating

Part Number	Ambient Operation Temperature								
	-40°C	-20°C	0°C	23°C	40°C	50°C	60°C	70°C	85°C
60R010	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.04
60R020	0.31	0.27	0.24	0.20	0.16	0.14	0.13	0.11	0.08
60R025	0.39	0.34	0.30	0.25	0.20	0.18	0.16	0.14	0.10
60R030	0.47	0.41	0.36	0.30	0.24	0.22	0.19	0.16	0.12
60R040	0.62	0.54	0.48	0.40	0.32	0.29	0.25	0.22	0.16
60R050	0.78	0.68	0.60	0.50	0.41	0.36	0.32	0.27	0.20
60R065	1.01	0.88	0.77	0.65	0.53	0.47	0.41	0.35	0.26
60R075	1.16	1.02	0.89	0.75	0.61	0.54	0.47	0.41	0.30
60R090	1.40	1.22	1.07	0.90	0.73	0.65	0.57	0.49	0.36
60R110	1.71	1.50	1.31	1.10	0.89	0.79	0.69	0.59	0.44
60R135	2.09	1.84	1.61	1.35	1.09	0.97	0.85	0.73	0.54
60R160	2.48	2.18	1.90	1.60	1.30	1.15	1.01	0.86	0.64
60R185	2.87	2.52	2.20	1.85	1.50	1.33	1.17	1.00	0.74
60R250	3.88	3.40	2.98	2.50	2.03	1.80	1.58	1.35	1.00
60R300	4.65	4.08	3.57	3.00	2.43	2.16	1.89	1.62	1.20
60R375	5.81	5.10	4.46	3.75	3.04	2.70	2.36	2.03	1.50

## Average Time Current Curves



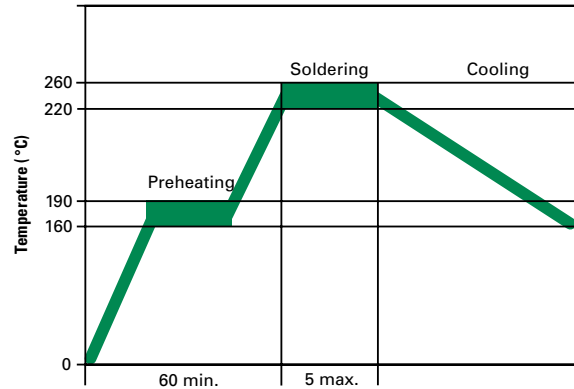
## Temperature Derating Curve



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.

**Soldering Parameters - Wave Soldering**

<b>Pre-Heating Zone</b>	Refer to the condition recommended by the flux manufacturer. Max. ramping rate should not exceed 4°C/Sec.
<b>Soldering Zone</b>	Max. solder temperature should not exceed 260°C
<b>Cooling Zone</b>	Cooling by natural convection in air.

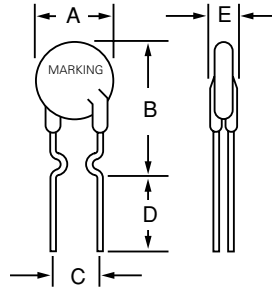

**Physical Specifications**

<b>Lead Material</b>	.20-.40A: Tin-plated copper clad steel .50-3.75A: 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**

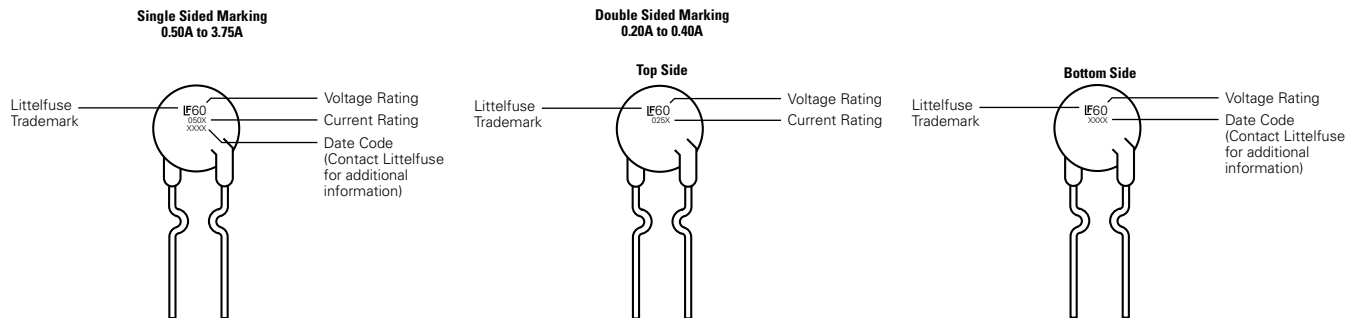
<b>Operating/Storage Temperature</b>	-40°C to +85°C
<b>Maximum Device Surface Temperature in Tripped State</b>	125°C
<b>Passive Aging</b>	+85°C, 1000 hours ±5% typical resistance change
<b>Humidity Aging</b>	+85°C, 85% R.H. 1000 hours ±5% typical resistance change
<b>Thermal Shock</b>	+85°C to -40°C 10 times ±5% typical resistance change
<b>Solvent Resistance</b>	MIL-STD-202, Method 215F

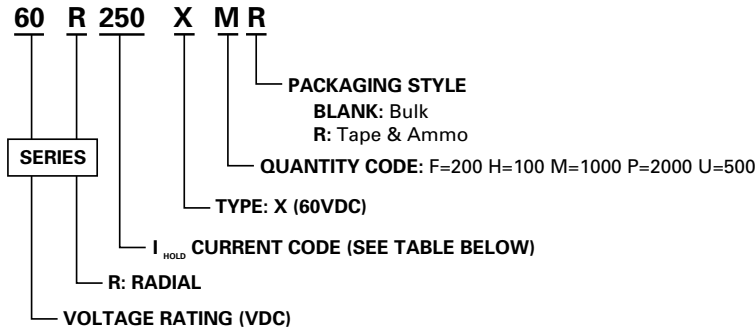
### Dimensions



Part Number	A		B		C		D		E		Physical Characteristics		
	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Lead (dia)		Material
	Max.	Max.	Max.	Max.	Typ.	Typ.	Min.	Min.	Max.	Max.	Inches	mm	
60R010	0.29	7.4	0.50	12.7	0.20	5.1	0.30	7.6	0.12	3.1	0.02	0.51	Sn/CuFe
60R020	0.29	7.4	0.46	11.7	0.20	5.1	0.30	7.6	0.12	3.1	0.02	0.51	Sn/CuFe
60R025	0.29	7.4	0.50	12.7	0.20	5.1	0.30	7.6	0.12	3.1	0.02	0.51	Sn/CuFe
60R030	0.29	7.4	0.50	12.7	0.20	5.1	0.30	7.6	0.12	3.1	0.02	0.51	Sn/CuFe
60R040	0.30	7.6	0.53	13.5	0.20	5.1	0.30	7.6	0.12	3.1	0.02	0.51	Sn/CuFe
60R050	0.31	7.9	0.54	13.7	0.20	5.1	0.30	7.6	0.12	3.1	0.02	0.51	Sn/Cu
60R065	0.37	9.4	0.57	14.5	0.20	5.1	0.30	7.6	0.12	3.1	0.02	0.51	Sn/Cu
60R075	0.40	10.2	0.59	15	0.20	5.1	0.30	7.6	0.12	3.1	0.02	0.51	Sn/Cu
60R090	0.44	11.2	0.62	15.8	0.20	5.1	0.30	7.6	0.12	3.1	0.02	0.51	Sn/Cu
60R110	0.51	13	0.72	18.2	0.20	5.1	0.30	7.6	0.12	3.1	0.03	0.81	Sn/Cu
60R135	0.53	13.58	0.78	19.8	0.20	5.1	0.30	7.6	0.12	3.1	0.03	0.81	Sn/Cu
60R160	0.60	15.36	0.85	21.6	0.20	5.1	0.30	7.6	0.12	3.1	0.03	0.81	Sn/Cu
60R185	0.66	16.76	0.91	23	0.20	5.1	0.30	7.6	0.12	3.1	0.03	0.81	Sn/Cu
60R250	0.78	19.93	1.03	26.2	0.40	10.2	0.30	7.6	0.12	3.1	0.03	0.81	Sn/Cu
60R300	0.91	23.11	1.15	29.3	0.40	10.2	0.30	7.6	0.12	3.1	0.03	0.81	Sn/Cu
60R375	1.04	26.3	1.22	31.1	0.40	10.2	0.30	7.6	0.12	3.1	0.03	0.81	Sn/Cu

### Part Marking System



**Part Numbering System**

**Packaging**

$I_{hold}$ (A)	$I_{hold}$ Code	Packaging Option	Quantity	Quantity & Packaging Codes
0.10	010	Bulk	500	U
		Tape and Ammo	2000	PR
0.20	020	Bulk	500	U
		Tape and Ammo	2000	PR
0.30	030	Bulk	500	U
		Tape and Ammo	2000	PR
0.40	040	Bulk	500	U
		Tape and Ammo	2000	PR
0.50	050	Bulk	500	U
		Tape and Ammo	2000	PR
0.65	065	Bulk	500	U
		Tape and Ammo	2000	PR
0.75	075	Bulk	500	U
		Tape and Ammo	2000	PR
0.90	090	Bulk	500	U
		Tape and Ammo	2000	PR
1.10	110	Bulk	500	U
		Tape and Ammo	1000	MR
1.35	135	Bulk	200	F
		Tape and Ammo	1000	MR
1.60	160	Bulk	200	F
		Tape and Ammo	1000	MR
1.85	185	Bulk	200	F
		Tape and Ammo	1000	MR
2.50	250	Bulk	200	F
		Tape and Ammo	1000	MR
3.00	300	Bulk	200	F
3.75	375	Bulk	100	H