

# RLD 60P XF Series Devices

2009.10.07

- The Radial Leaded devices (RLD Series), a polymer-based Positive Temperature Coefficient (PTC) device to protect electrical circuits against over-current conditions with resettable feature, is fully compatible with current industrial standards.
- The Radial Leaded devices designed to provide different product series offer 30Vdc and 60Vdc voltage with a maximum 40A short circuit rating.
- Applications: The radial leaded product series is ideal for computers and peripherals, general electronics and can be applied to almost anywhere there is a low voltage power supply and a load to be protected.
- Agency Approval: UL/CSA File # E201431  
TÜV Certificate # R50103284



## 60Vdc Series



### ELECTRICAL CHARACTERISTICS

Part Number	I <sub>hold</sub> (A)	I <sub>trip</sub> (A)	V <sub>max</sub> (Vdc)	I <sub>max</sub> (A)	P <sub>d</sub> <sup>typ.</sup> (W)	Maximum Time To Trip		Resistance		Agency Approval
						Current (A)	Time (Sec.)	R <sub>min</sub> (Ω)	R <sub>1max</sub> (Ω)	
RLD60P010XF	0.10	0.20	60	40	0.38	0.50	4.00	2.500	7.500	UL/CSA/TÜV
RLD60P017XF	0.17	0.34	60	40	0.48	0.85	3.00	3.300	8.000	UL/CSA/TÜV
RLD60P020XF	0.20	0.40	60	40	0.41	1.00	2.20	1.830	4.400	UL/CSA/TÜV
RLD60P025XF	0.25	0.50	60	40	0.45	1.25	2.50	1.250	3.000	UL/CSA/TÜV
RLD60P030XF	0.30	0.60	60	40	0.49	1.50	3.00	0.880	2.100	UL/CSA/TÜV
RLD60P040XF	0.40	0.80	60	40	0.56	2.00	3.80	0.550	1.290	UL/CSA/TÜV
RLD60P050XF	0.50	1.00	60	40	0.77	2.50	4.00	0.500	1.170	UL/CSA/TÜV
RLD60P065XF	0.65	1.30	60	40	0.88	3.25	5.30	0.310	0.720	UL/CSA/TÜV
RLD60P075XF	0.75	1.50	60	40	0.92	3.75	6.30	0.250	0.600	UL/CSA/TÜV
RLD60P090XF	0.90	1.80	60	40	0.99	4.50	7.20	0.200	0.470	UL/CSA/TÜV
RLD60P110XF	1.10	2.20	60	40	1.50	5.50	8.20	0.150	0.380	UL/CSA/TÜV
RLD60P135XF	1.35	2.70	60	40	1.70	6.75	9.60	0.120	0.300	UL/CSA/TÜV
RLD60P160XF	1.60	3.20	60	40	1.90	8.00	11.40	0.090	0.220	UL/CSA/TÜV
RLD60P185XF	1.85	3.70	60	40	2.10	9.25	12.60	0.080	0.190	UL/CSA/TÜV
RLD60P250XF	2.50	5.00	60	40	2.50	12.50	15.60	0.050	0.130	UL/CSA/TÜV
RLD60P300XF	3.00	6.00	60	40	2.80	15.00	19.80	0.040	0.100	UL/CSA/TÜV
RLD60P375XF	3.75	7.50	60	40	3.20	18.75	24.00	0.030	0.080	UL/CSA/TÜV

Note: I<sub>hold</sub> = Hold current: maximum current device will pass without tripping in 23°C still air.

I<sub>trip</sub> = Trip current: minimum current at which the device will trip in 23°C still air.

V<sub>max</sub> = Maximum voltage device can withstand without damage at rated current (I<sub>max</sub>)

I<sub>max</sub> = Maximum fault current device can withstand without damage at rated voltage (V<sub>max</sub>)

P<sub>d</sub> = Power dissipated from device when in the tripped state at 23°C still air.

R<sub>min</sub> = Minimum resistance of device in initial (un-soldered) state.

R<sub>1max</sub> = Maximum resistance of device at 23°C measured one hour after tripping.

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

**Recognitions: UL, CSA, TUV recognized**

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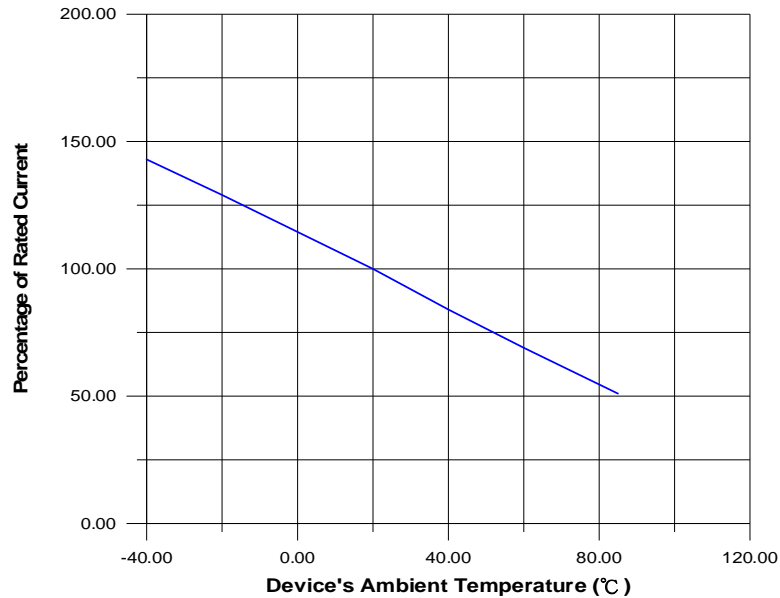
新竹市科學工業園區工業東四路 24-1 號 24-1, Industry E.4<sup>th</sup> Rd. Science Park, Hsinchu, Taiwan. TEL:+886-3-5643931 FAX:+886-3-5644624

E-mail: [sales@pttc.com.tw](mailto:sales@pttc.com.tw) [Http://www.pttc.com.tw](http://www.pttc.com.tw)



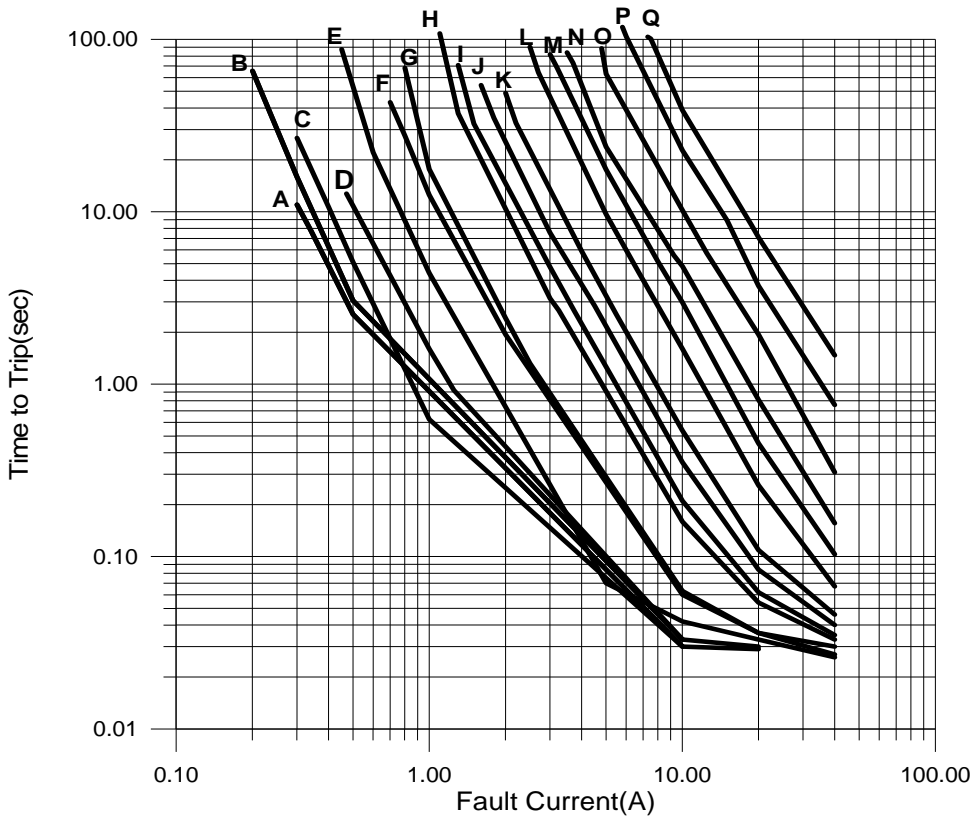
### **How to Select a Polymer PTC fuse:**

- (1) Determine the following operating parameters for the circuits:
  - (A) Normal Operating Current (I hold)
  - (B) Maximum Circuit Voltage (V max)
  - (C) Maximum Interrupt Current (I max)
  - (D) Normal Operating Temperature (min<sup>°C</sup>/max<sup>°C</sup>)
- (2) Select the device form factor and dimension suitable for the application:
  - Surface Mount Device (SMD Series)
  - Radial Leaded Device (RLD Series)
  - Axial Leaded Strap Device (STD Series)
  - Other Custom-designed Device (Disc/Chip)
- (3) Compare the maximum ratings for V max and I max of the PTC device with the circuit in application and make sure that the circuit's requirement does not exceed the device ratings.
- (4) Check that the PTC device's trip time (time-to-trip) will protect the circuit.
- (5) Verify that the circuit operating temperatures are within the PTC device's normal operating temperature range.
- (6) Verify the performance and suitability of the chosen PTC device in the application.

**THERMAL DERATING CURVE FOR RLD 60Vdc SERIES**

**THERMAL DERATING CHART FOR RLD60V SERIES –  $I_{hold}$  (Amps)**

Model	Ambient Operation Temperature								
	-40°C	-20°C	0°C	23°C	40°C	50°C	60°C	70°C	85°C
RLD60P010XF	0.16	0.14	0.12	0.10	0.08	0.07	0.06	0.05	0.04
RLD60P017XF	0.26	0.23	0.20	0.17	0.14	0.12	0.11	0.09	0.07
RLD60P020XF	0.31	0.27	0.24	0.20	0.16	0.14	0.13	0.11	0.08
RLD60P025XF	0.39	0.34	0.30	0.25	0.20	0.18	0.16	0.14	0.10
RLD60P030XF	0.47	0.41	0.36	0.30	0.24	0.22	0.19	0.16	0.12
RLD60P040XF	0.62	0.54	0.48	0.40	0.32	0.29	0.25	0.22	0.16
RLD60P050XF	0.78	0.68	0.60	0.50	0.41	0.36	0.32	0.27	0.20
RLD60P065XF	1.01	0.88	0.77	0.65	0.53	0.47	0.41	0.35	0.26
RLD60P075XF	1.16	1.02	0.89	0.75	0.61	0.54	0.47	0.41	0.30
RLD60P090XF	1.40	1.22	1.07	0.90	0.73	0.65	0.57	0.49	0.36
RLD60P110XF	1.71	1.50	1.31	1.10	0.89	0.79	0.69	0.59	0.44
RLD60P135XF	2.09	1.84	1.61	1.35	1.09	0.97	0.85	0.73	0.54
RLD60P160XF	2.48	2.18	1.90	1.60	1.30	1.15	1.01	0.86	0.64
RLD60P185XF	2.87	2.52	2.20	1.85	1.50	1.33	1.17	1.00	0.74
RLD60P250XF	3.88	3.40	2.98	2.50	2.03	1.80	1.58	1.35	1.00
RLD60P300XF	4.65	4.08	3.57	3.00	2.43	2.16	1.89	1.62	1.20
RLD60P375XF	5.81	5.10	4.46	3.75	3.04	2.70	2.36	2.03	1.50

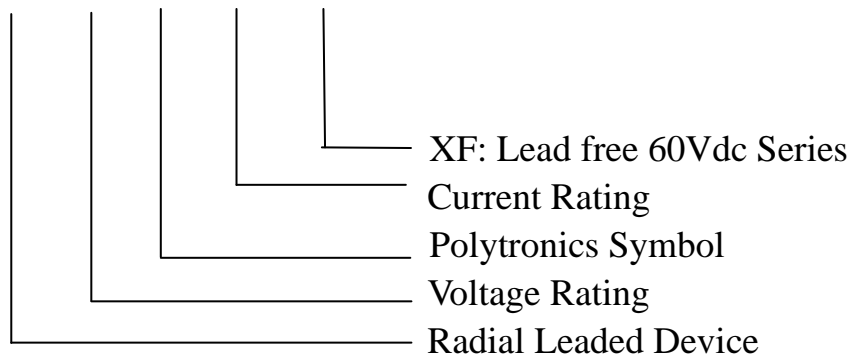
## AVERAGE TIME-CURRENT CURVE FOR RLD 60Vdc SERIES

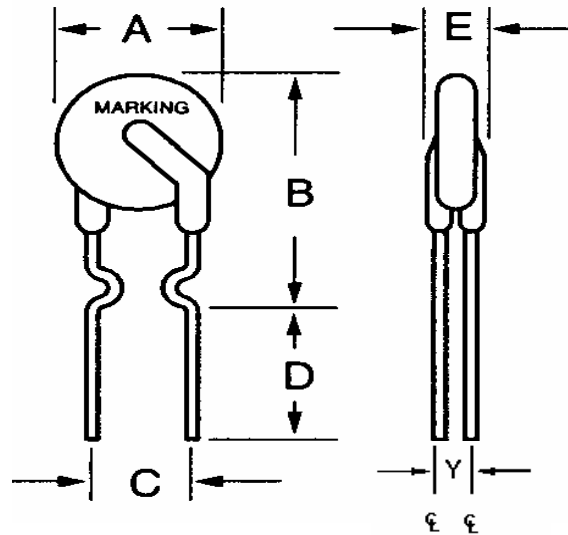


- A=RLD60P010XF
- B=RLD60P017XF
- C=RLD60P020XF
- D=RLD60P025XF
- E=RLD60P030XF
- F=RLD60P040XF
- G=RLD60P050XF
- H=RLD60P065XF
- I=RLD60P075XF
- J=RLD60P090XF
- K=RLD60P110XF
- L=RLD60P135XF
- M=RLD60P160XF
- N=RLD60P185XF
- O=RLD60P250XF
- P=RLD60P300XF
- Q=RLD60P375XF

## PART NUMBERING SYSTEM

RLD   P     F



**60Vdc Series Figure**

**PHYSICAL DIMENSIONS (mm)**

Part Number	A (max.)	B (max.)	C (typ.)	D (min.)	E (max.)	Y (typ.)	Physical Characteristics	
							Lead	Material
RLD60P010XF	7.4	11.6	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/CuFe
RLD60P017XF	7.4	12.7	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/CuFe
RLD60P020XF	7.4	12.7	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/CuFe
RLD60P025XF	7.4	12.7	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/CuFe
RLD60P030XF	7.4	13.4	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/CuFe
RLD60P040XF	7.4	13.7	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/CuFe
RLD60P050XF	7.9	13.7	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/Cu
RLD60P065XF	9.4	15.2	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/Cu
RLD60P075XF	10.2	16.0	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/Cu
RLD60P090XF	11.2	16.7	5.1±0.7	7.6	3.1	1.2	0.51 dia.	Sn/Cu
RLD60P110XF	12.8	18.0	5.1±0.7	7.6	3.1	1.4	0.81 dia.	Sn/Cu
RLD60P135XF	14.5	19.6	5.1±0.7	7.6	3.1	1.4	0.81 dia.	Sn/Cu
RLD60P160XF	16.3	21.3	5.1±0.7	7.6	3.1	1.4	0.81 dia.	Sn/Cu
RLD60P185XF	17.5	22.9	5.1±0.7	7.6	3.1	1.4	0.81 dia.	Sn/Cu
RLD60P250XF	20.8	26.4	10.2±1.0	7.6	3.1	1.4	0.81 dia.	Sn/Cu
RLD60P300XF	23.9	30.0	10.2±1.0	7.6	3.1	1.4	0.81 dia.	Sn/Cu
RLD60P375XF	27.2	33.5	10.2±1.0	7.6	3.1	1.4	0.81 dia.	Sn/Cu

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## ENVIRONMENTAL SPECIFICATIONS

Operating/Storage Temperature	-40°C to +85°C	
Maximum Device Surface Temperature in Tripped State	125°C	
Passive Aging	+85°C, 1000 hours	±5% typical resistance change
Humidity Aging	+85°C, 85% R.H. 1000 hours	±5% typical resistance change
Thermal Shock	+85°C to -40°C 10 times	±5% typical resistance change
Solvent Resistance	MIL-STD-202, Method 215F	No change

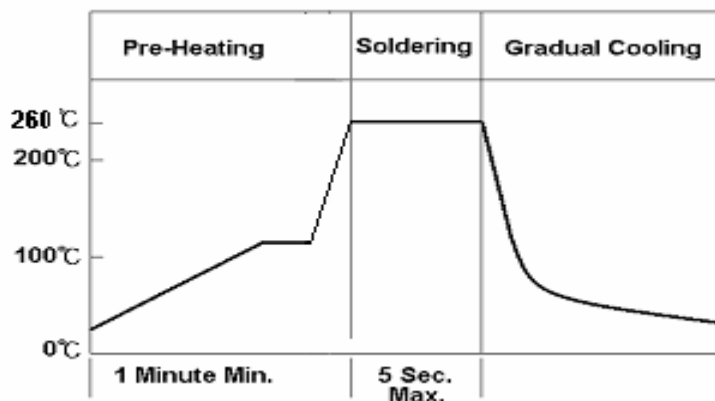
## PHYSICAL SPECIFICATIONS

Lead Material	P020XF-P040XF: Tin-plated copper clad steel P050XF-P375XF: 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 the letter "P", voltage, amperage rating, and lot number.

## WAVE SOLDERING INFORMATION

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

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# RLD 60P XF Series Devices

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## TAPE AND REEL SPECIFICATIONS

Product availability: RLD60P010XF-RLD60P300XF

Devices taped using EIA468-B/IEC286-2 standards. See table below and Figures 1 and 2 for details.

Dimension Description	EIA Mark	IEC Mark	Dimensions	
			Dim.(mm)	Tol.(mm)
Carrier tape width	W	W	18	-0.5/+1.0
Hold down tape width	W <sub>4</sub>	W <sub>0</sub>	11	min.
Top distance between tape edges	W <sub>6</sub>	W <sub>2</sub>	3	max.
Sprocket hole position	W <sub>5</sub>	W <sub>1</sub>	9	-0.5+0.75
Sprocket hole diameter*	D <sub>0</sub>	D <sub>0</sub>	4	-0.32/+0.2
Abscissa to plane(straight lead)	H	H	18.5	+3.0
Abscissa to plane(kinked lead)	H <sub>0</sub>	H <sub>0</sub>	16	+0.5
Abscissa to top P010XF-P090XF	H <sub>1</sub>	H <sub>1</sub>	32.2	max.
Abscissa to top P110XF-P300XF	H <sub>1</sub>		47.5	max.
Overall width without lead protrusion:P010XF-P090XF	C <sub>1</sub>		42.5	max.
Overall width without lead protrusion:P110XF-P300XF			57	
Overall width with lead protrusion:P010XF-P090XF	C <sub>2</sub>		43.2	max.
Overall width with lead protrusion:P110XF-P300XF			58	
Lead protrusion	L <sub>1</sub>	l <sub>1</sub>	1.0	max.
Protrusion of cut out	L	L	11	max.
Protrusion beyond hold-down tape	l <sub>2</sub>	l <sub>2</sub>	Not specified	
Sprocket hole pitch:P010XF-P090XF	P <sub>0</sub>	P <sub>0</sub>	12.7	+0.3
Sprocket hole pitch:P110XF-P300XF	P <sub>0</sub>	P <sub>0</sub>	25.4	+0.5
Pitch tolerance			20 consecutive.	+1
Device pitch:P010XF-P090XF			12.7	
Device pitch:P110XF-P300XF			25.4	
Tape thickness	t	t	0.9	max.
Tape thickness with splice	t <sub>1</sub>		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*:P010XF-P090XF	P <sub>1</sub>	P <sub>1</sub>	3.81	+0.7
Ordinate to adjacent component lead*:P110XF-P300XF			7.62	+0.7
Lead spacing:P010XF-P185XF	F	F	5.08	+0.8
Lead spacing:P250XF-P300XF	F	F	10.18	+0.8
Reel width P010XF-P065XF	w <sub>2</sub>	w	56	max.
Reel width P075XF-P300XF	w <sub>2</sub>	w	63.5	max.
Reel diameter	a	d	370	max.
Space between flanges less device*	w <sub>1</sub>		4.75	-3.25/+9.25
Arbor hole diameter	c	f	26	+12.0
Core diameter*	n	h	91	max.
Box			56/372/372	max.
Consecutive missing places			None	
Empty places per reel			0.1% max.	

- Differs from EIA specification

### TAPE AND REEL SPECIFICATIONS

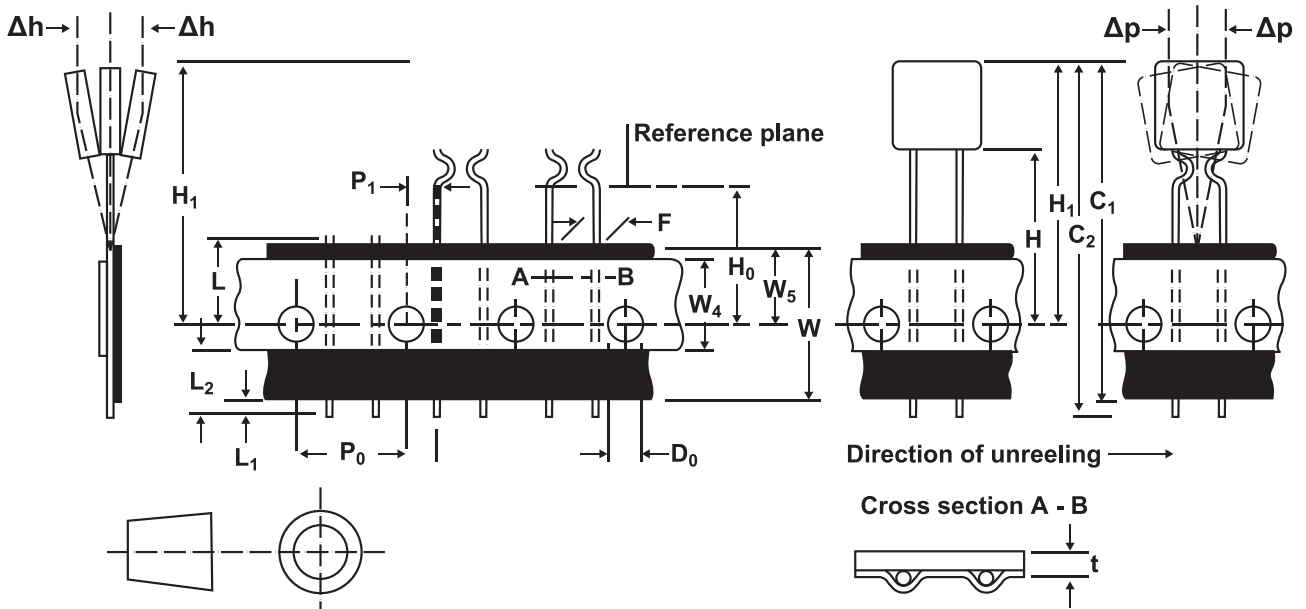


Figure 1

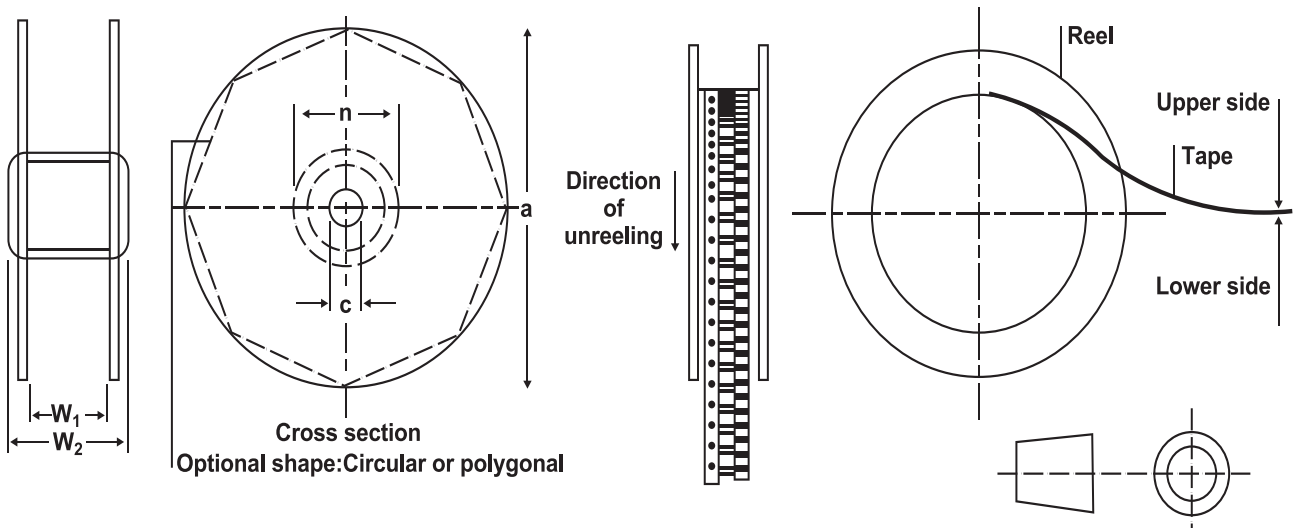


Figure 2

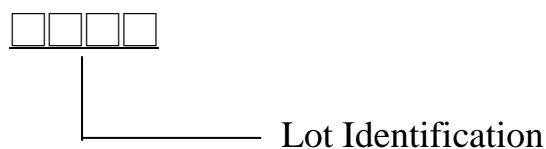
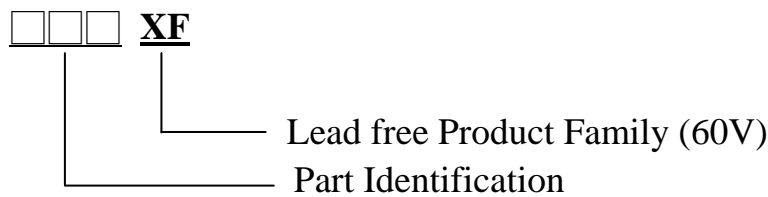
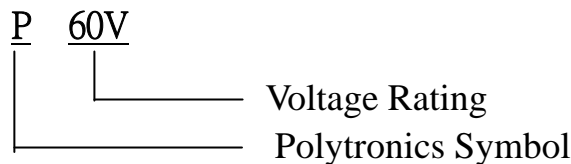
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2009.10.07

## PACKAGING INFORMATION

Product Description	Part I.D.	Bag Quantity	Reel Quantity	Ammopack Quantity
RLD60P010XF	010	500	2000	2000
RLD60P017XF	017	500	2000	2000
RLD60P020XF	020	500	2000	2000
RLD60P025XF	025	500	2000	2000
RLD60P030XF	030	500	2000	2000
RLD60P040XF	040	500	2000	2000
RLD60P050XF	050	500	2000	2000
RLD60P065XF	065	500	2000	2000
RLD60P075XF	075	500	2000	2000
RLD60P090XF	090	500	2000	2000
RLD60P110XF	110	500	1000	1000
RLD60P135XF	135	200	1000	1000
RLD60P160XF	160	200	1000	1000
RLD60P185XF	185	200	1000	1000
RLD60P250XF	250	200	1000	1000
RLD60P300XF	300	200	1000	1000
RLD60P375XF	375	100	800	800

## PART MARKING SYSTEM



**CROSS REFERENCE**

Polytronics/ EVERFUSE™	Cross Reference	
	Raychem/ PolySwitch®	Bourns/ Multifuse®
RLD60P010XF / RLD60P010XF-S	RXEF010 / RXEF010S	MF-R010
RLD60P017XF / RLD60P017XF-S	RXEF017 / RXEF017S	MF-R017
RLD60P020XF / RLD60P020XF-S	RXEF020 / RXEF020S	MF-R020
RLD60P025XF / RLD60P025XF-S	RXEF025 / RXEF025S	MF-R025
RLD60P030XF / RLD60P030XF-S	RXEF030 / RXEF030S	MF-R030
RLD60P040XF / RLD60P040XF-S	RXEF040 / RXEF040S	MF-R040
RLD60P050XF / RLD60P050XF-S	RXEF050 / RXEF050S	MF-R050
RLD60P065XF / RLD60P065XF-S	RXEF065 / RXEF065S	MF-R065
RLD60P075XF / RLD60P075XF-S	RXEF075 / RXEF075S	MF-R075
RLD60P090XF / RLD60P090XF-S	RXEF090 / RXEF090S	MF-R090
RLD60P110XF / RLD60P110XF-S	RXEF110K / RXEF110	MF-RX110
RLD60P135XF / RLD60P135XF-S	RXEF135K / RXEF135	MF-RX135
RLD60P160XF / RLD60P160XF-S	RXEF160K / RXEF160	MF-RX160
RLD60P185XF / RLD60P185XF-S	RXEF185K / RXEF185	MF-RX185
RLD60P250XF / RLD60P250XF-S	RXEF250K / RXEF250	MF-RX250
RLD60P300XF / RLD60P300XF-S	RXEF300K / RXEF300	MF-RX300
RLD60P375XF / RLD60P375XF-S	RXEF375K / RXEF375	MF-RX375

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