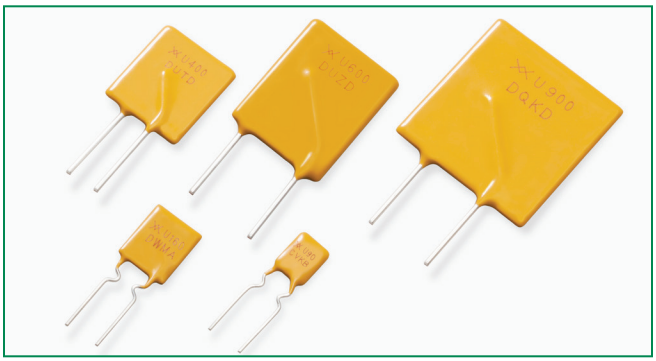
PolySwitch® Resettable PPTCs

Radial Leaded > RUEF Series

RUEF Series



Description

Littelfuse PolySwitch radial-leaded devices represent the most comprehensive and complete set of PPTC products available in the industry today. RUEF series is for balance of voltage rating (30V) and hold current (up to 9A).

Features

- Resettable and single-use overcurrent devices
- Wide range of form factor and termination methods
- Devices compatible with high-volume electronics assembly
- RoHS compliant, Lead-Free and Halogen-Free

Agency Approvals

AGENCY	AGENCY FILE NUMBER
c UL us	E74889
CSA	78165
TÜV	72161784

Applications

- Satellite video receivers
- Industrial controls
- Transformers
- Computer motherboards
- Modems
- USB hubs, ports and peripherals
- IEEE 1394 ports
- CD-ROMs
- Game machines
- Battery packs
- Phones
- Fax machines
- Analog and digital line cards
- Printers

Additional Information

Datasheet | Resources | Samples

Electrical Characteristics

Part Number	I_H	I_T	V_{MAX}		I_{MAX}		$P_{D\ Typ}$	Max Time-to-trip		R_{MIN}	R_{MAX}	R_{1MAX}	Lead Size (mm^2/AWG)
	(A)	(A)	(V_{DC})	($V_{AC\ RMS}$)	(DC_{ADC})	(AC_{ARMS})	(W)	(A)	(s)	(Ω)	(Ω)	(Ω)	
RUEF – 30V													
RUEF090	0.90	1.80	30	30	100	70	0.60	4.50	5.9	0.070	0.120	0.22	0.205/24
RUEF110	1.10	2.20	30	30	100	70	0.70	5.50	6.6	0.070	0.100	0.17	0.205/24
RUEF135	1.35	2.70	30	30	100	70	0.80	6.75	7.3	0.040	0.080	0.13	0.205/24
RUEF160	1.60	3.20	30	30	100	70	0.90	8.00	8.0	0.030	0.070	0.11	0.205/24
RUEF185	1.85	3.70	30	30	100	70	1.00	9.25	8.7	0.030	0.060	0.09	0.205/24
RUEF250	2.50	5.00	30	30	100	70	1.20	12.50	10.3	0.020	0.040	0.07	0.205/24
RUEF300	3.00	6.00	30	30	100	70	2.00	15.00	10.8	0.020	0.050	0.08	0.205/24
RUEF400	4.00	8.00	30	30	100	70	2.50	20.00	12.7	0.010	0.030	0.05	0.205/24
RUEF500	5.00	10.00	30	30	100	70	3.00	25.00	14.5	0.010	0.030	0.05	0.520/20
RUEF600	6.00	12.00	30	30	100	70	3.50	30.00	16.0	0.005	0.020	0.04	0.520/20
RUEF700	7.00	14.00	30	30	100	70	3.80	35.00	17.5	0.005	0.020	0.03	0.520/20
RUEF800	8.00	16.00	30	30	100	70	4.00	40.00	18.8	0.005	0.013	0.02	0.520/20
RUEF900	9.00	18.00	30	30	100	70	4.20	45.00	20.0	0.005	0.010	0.02	0.520/20

Notes:

I_H : Hold current: maximum current device will pass without interruption in 20°C still air.

I_T : Trip current: minimum current that will switch the device from low resistance to high resistance in 20°C still air.

V_{MAX} : Maximum continuous voltage device can withstand without damage at rated current.

I_{MAX} : Maximum fault current device can withstand without damage at rated voltage.

P_D : Power dissipated from device when in the tripped state in 20°C still air.

R_{MIN} : Minimum resistance of device as supplied at 20°C unless otherwise specified.

R_{MAX} : Maximum resistance of device as supplied at 20°C unless otherwise specified.

R_{1MAX}: Maximum resistance of device when measured one hour post reflow (surface-mount device) or one hour post trip (radial-leaded device) at 20°C unless otherwise specified.

* Electrical characteristics determined at 25°C.

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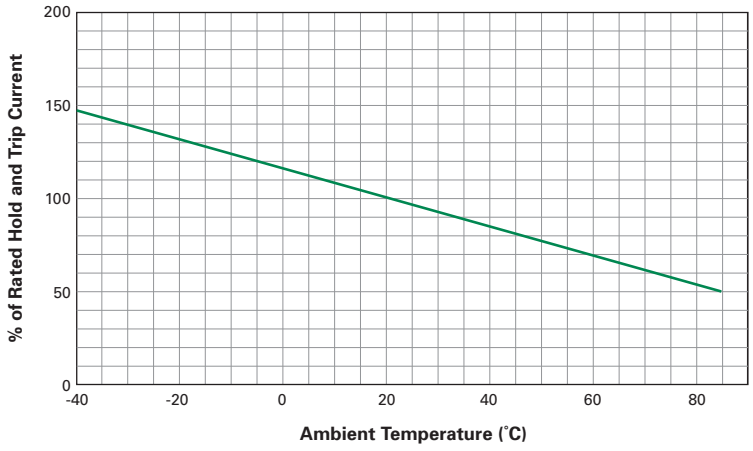
Temperature Rerating

Maximum Ambient Temperature										
	-40°C	-20°C	0°C	20°C	25°C	40°C	50°C	60°C	70°C	85°C
Hold Current (A)										
RUEF – 30V										
RUEF090	1.31	1.17	1.04	0.90	0.87	0.75	0.69	0.61	0.55	0.47
RUEF110	1.60	1.43	1.27	1.10	1.07	0.91	0.85	0.75	0.67	0.57
RUEF135	1.96	1.76	1.55	1.35	1.31	1.12	1.04	0.92	0.82	0.70
RUEF160	2.32	2.08	1.84	1.60	1.55	1.33	1.23	1.09	0.98	0.83
RUEF185	2.68	2.41	2.13	1.85	1.79	1.54	1.42	1.26	1.13	0.96
RUEF250	3.63	3.25	2.88	2.50	2.43	2.08	1.93	1.70	1.53	1.30
RUEF300	4.35	3.90	3.45	3.00	2.91	2.49	2.31	2.04	1.83	1.56
RUEF400	5.80	5.20	4.60	4.00	3.88	3.32	3.08	2.72	2.44	2.08
RUEF500	7.25	6.50	5.75	5.00	4.85	4.15	3.85	3.40	3.05	2.60
RUEF600	8.70	7.80	6.90	6.00	5.82	4.98	4.62	4.08	3.66	3.12
RUEF700	10.15	9.10	8.05	7.00	6.79	5.81	5.39	4.76	4.27	3.64
RUEF800	11.60	10.40	9.20	8.00	7.76	6.64	6.16	5.44	4.88	4.16
RUEF900	13.05	11.70	10.35	9.00	8.73	7.47	6.93	6.12	5.49	4.68

Temperature Rerating Curve



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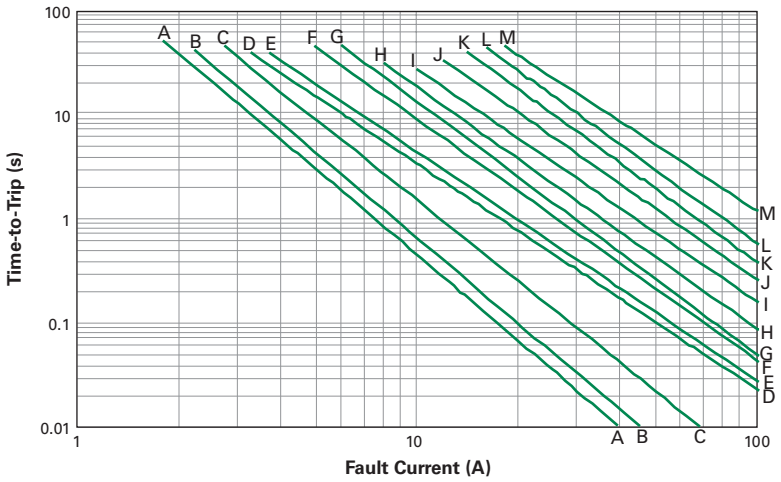
Typical Time-to-Trip Curves at 20°C

RUEF

A	=	RUEF090	H	=	RUEF400
B	=	RUEF110	I	=	RUEF500
C	=	RUEF135	J	=	RUEF600
D	=	RUEF160	K	=	RUEF700
E	=	RUEF185	L	=	RUEF800
F	=	RUEF250	M	=	RUEF900
G	=	RUEF300			



Physical Specifications

Lead Material	RUEF090 to RUEF250: Tin-plated Copper-clad Steel, 0.205mm² (24AWG) RUEF300 to RUEF900: Tin-plated Copper, 0.52mm² (20AWG), ø0.81mm (0.032in)
Soldering Characteristics	Solderability per ANSI/J-STD-002 Category 3
Solder Heat Withstand	per IEC-STD 68-2-20, Test Tb, Method 1a, Condition b, Can Withstand 10s at 260°C ±5°C
Insulating Material	Cured, Flame-retardant Epoxy Polymer; Meets UL 94V-0
Operation Temperature	-40°C~85°C

Note: Devices are not designed to be placed through a reflow process.

Environmental Specifications

Test	Conditions	Resistance Change
Passive Aging	70°C, 1000 hrs 85°C, 1000 hrs	±5% ±5%
Humidity Aging	85°C, 85% R.H., 1000 hrs	±5%
Thermal Shock	85°C to -40°C (10 times)	±5%
Solvent Resistance	MIL-STD-202, Method 215F	No change

Moisture Resistance Level	Level 1, J-STD-020
Storage Conditions	40°C max, 70% RH max; devices should remain in original sealed bags prior to use. Devices may not meet specified values if these storage conditions are exceeded.

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Dimension Figures

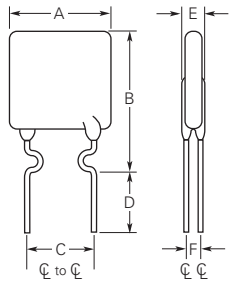

Figure 1

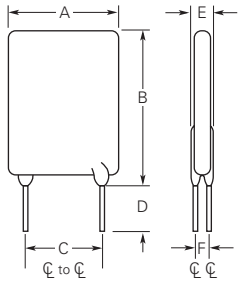

Figure 2

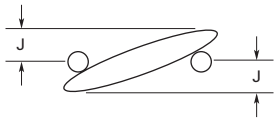

Figure 3

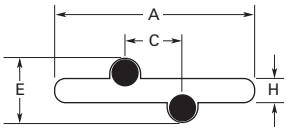

Figure 4

Dimensions and Weights

Part Number	Dimensions in Millimeters (Inches)												Figure	Device Mass (g) (Only for Reference)
	A		B		C		D		E		H	J		
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Typ	Typ		
RUEF – 30V														
RUEF090	—	7.4 (0.29)	—	12.2 (0.48)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.0 (0.12)	0.89 (0.035)	0.8 (0.03)	1,3,4	0.183
RUEF110	—	7.4 (0.29)	—	14.2 (0.56)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.0 (0.12)	0.89 (0.035)	0.8 (0.03)	1,3,4	0.204
RUEF135	—	8.9 (0.35)	—	13.5 (0.53)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.0 (0.12)	0.89 (0.035)	1.0 (0.04)	1,3,4	0.255
RUEF160	—	8.9 (0.35)	—	15.2 (0.60)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.0 (0.12)	0.89 (0.035)	1.0 (0.04)	1,3,4	0.289
RUEF185	—	10.2 (0.40)	—	15.7 (0.62)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.0 (0.12)	0.89 (0.035)	1.0 (0.04)	1,3,4	0.379
RUEF250	—	11.4 (0.45)	—	18.3 (0.72)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.0 (0.12)	0.89 (0.035)	1.2 (0.05)	1,3,4	0.493
RUEF300	—	11.4 (0.45)	—	16.5 (0.65)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.0 (0.12)	1.19 (0.047)	1.5 (0.06)	2,3,4	0.516
RUEF400	—	14.0 (0.55)	—	19.3 (0.76)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	—	3.0 (0.12)	1.19 (0.047)	1.7 (0.07)	2,3,4	0.670
RUEF500	—	14.0 (0.55)	—	24.1 (0.95)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	—	—	3.0 (0.12)	1.19 (0.047)	1.0 (0.04)	2,3,4	0.926
RUEF600	—	16.5 (0.65)	—	24.1 (0.95)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	—	—	3.0 (0.12)	1.19 (0.047)	1.0 (0.04)	2,3,4	1.352
RUEF700	—	19.1 (0.75)	—	25.9 (1.02)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	—	—	3.0 (0.12)	1.19 (0.047)	1.2 (0.05)	2,3,4	1.543
RUEF800	—	21.6 (0.85)	—	28.4 (1.12)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	—	—	3.0 (0.12)	1.19 (0.047)	1.5 (0.06)	2,3,4	1.852
RUEF900	—	24.1 (0.95)	—	29.0 (1.14)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	—	—	3.0 (0.12)	1.19 (0.047)	1.5 (0.06)	2,3,4	2.104

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Packaging and Marking Information

Part Number	Bag Quantity	Tape and Reel Quantity	Ammo Pack Quantity	Standard Package Quantity	Part Marking	Agency Recognition
RUEF – 30V						
RUEF090	500	—	—	10,000	U90	UL, CSA, TÜV, CQC
RUEF090-2	—	3,000	—	15,000	U90	UL, CSA, TÜV, CQC
RUEF090-AP	—	—	2,000	10,000	U90	UL, CSA, TÜV, CQC
RUEF110	500	—	—	10,000	U110	UL, CSA, TÜV, CQC
RUEF110-2	—	3,000	—	15,000	U110	UL, CSA, TÜV, CQC
RUEF110-AP	—	—	2,000	10,000	U110	UL, CSA, TÜV, CQC
RUEF135	500	—	—	10,000	U135	UL, CSA, TÜV, CQC
RUEF135-2	—	3,000	—	15,000	U135	UL, CSA, TÜV, CQC
RUEF135-AP	—	—	2,000	10,000	U135	UL, CSA, TÜV, CQC
RUEF160	500	—	—	10,000	U160	UL, CSA, TÜV, CQC
RUEF160-2	—	3,000	—	15,000	U160	UL, CSA, TÜV, CQC
RUEF160-AP	—	—	2,000	10,000	U160	UL, CSA, TÜV, CQC
RUEF185	500	—	—	10,000	U185	UL, CSA, TÜV, CQC
RUEF185-2	—	3,000	—	15,000	U185	UL, CSA, TÜV, CQC
RUEF185-AP	—	—	2,000	10,000	U185	UL, CSA, TÜV, CQC
RUEF250	500	—	—	10,000	U250	UL, CSA, TÜV, CQC
RUEF250-2	—	3,000	—	15,000	U250	UL, CSA, TÜV, CQC
RUEF250-AP	—	—	2,000	10,000	U250	UL, CSA, TÜV, CQC
RUEF300	500	—	—	10,000	U300	UL, CSA, TÜV, CQC
RUEF300-2	—	2,500	—	12,500	U300	UL, CSA, TÜV, CQC
RUEF300-AP	—	—	1,000	5,000	U300	UL, CSA, TÜV, CQC
RUEF400	500	—	—	10,000	U400	UL, CSA, TÜV, CQC
RUEF400-2	—	1,500	—	7,500	U400	UL, CSA, TÜV, CQC
RUEF400-AP	—	—	1,000	5,000	U400	UL, CSA, TÜV, CQC
RUEF500	250	—	—	5,000	U500	UL, CSA, TÜV, CQC
RUEF500-2	—	1,500	—	7,500	U500	UL, CSA, TÜV, CQC
RUEF500-AP	—	—	1,000	5,000	U500	UL, CSA, TÜV, CQC
RUEF600	250	—	—	5,000	U600	UL, CSA, TÜV, CQC
RUEF600-2	—	1,000	—	5,000	U600	UL, CSA, TÜV, CQC
RUEF600-AP	—	—	1,000	5,000	U600	UL, CSA, TÜV, CQC
RUEF700	250	—	—	5,000	U700	UL, CSA, TÜV, CQC
RUEF700-2	—	1,000	—	5,000	U700	UL, CSA, TÜV, CQC
RUEF700-AP	—	—	1,000	5,000	U700	UL, CSA, TÜV, CQC
RUEF800	250	—	—	5,000	U800	UL, CSA, TÜV, CQC
RUEF800-2	—	1,000	—	5,000	U800	UL, CSA, TÜV, CQC
RUEF800-AP	—	—	1,000	5,000	U800	UL, CSA, TÜV, CQC
RUEF900	250	—	—	5,000	U900	UL, CSA, TÜV, CQC
RUEF900-2	—	1,000	—	4,000	U900	UL, CSA, TÜV, CQC
RUEF900-AP	—	—	1,000	4,000	U900	UL, CSA, TÜV, CQC

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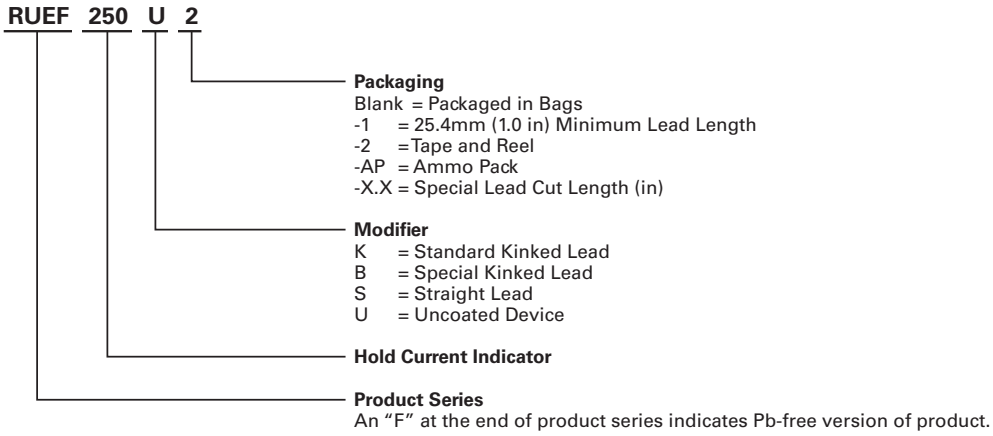
Part Ordering Number System



Note: Kinked parts are recommended to control the height of the part on the PCB in non-auto PCB applications.

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Tape and Reel Specifications

RUEF devices are available in tape and reel packaging per EIA468–B/IEC60286–2 standards.
See Figures 1 and 2 for details.

Description	EIA Mark	Dimension (mm)	Tolerance
Carrier Tape Width	W	18	-0.5/+1.0
Hold-down Tape Width	W_4	11	Minimum
Top Distance between Tape Edges	W_6	3	Maximum
Sprocket Hole Position	W_5	9	-0.5/+0.75
Sprocket Hole Diameter	W_0	4	± 0.2
Abscissa to Plane (Straight Lead)* (RUEF300 to RUEF900)	H	18.5	± 2.5
Abscissa to Plane (Kinked Lead) (RUEF090 to RUEF250)	H_0	16.0	± 0.5
Abscissa to Top (RUEF090 to RUEF300)	H_1	32.2	Maximum
Abscissa to Top* (RUEF400 to RUEF900)	H_1	45.0	Maximum
Overall Width with Lead Protrusion (RUEF090 to RUEF300)	C_1	43.2	Maximum
Overall Width with Lead Protrusion (RUEF400 To RUEF900)	C_1	56	Maximum
Overall Width without Lead Protrusion (RUEF090 to RUEF300)	C_2	42.5	Maximum
Overall Width without Lead Protrusion (RUEF400 to RUEF900)	C_2	56	Maximum
Lead Protrusion	L_1	1.0	Maximum
Protrusion of Cut-out	L	11	Maximum
Protrusion beyond Hold-down Tape	I_2	Not Specified	—
Sprocket Hole Pitch	P_0	12.7	± 0.3
Device Pitch (RUEF090 to RUEF300)	—	12.7	± 0.3
Device Pitch (RUEF400 to RUEF900)	—	25.4	± 0.6
Pitch Tolerance	—	20 Consecutive	± 1
Tape Thickness	T	0.9	Maximum
Overall Tape and Lead Thickness (RUEF090 to RUEF50)	T_1	1.5	Maximum
Overall Tape and Lead Thickness* (RUEF300 to RUEF900)	T_1	2.3	Maximum
Splice Sprocket Hole Alignment	—	0	± 0.3
Body Lateral Deviation	Δh	0	± 1.0
Body Tape Plane Deviation	Δp	0	± 1.3
Ordinate to Adjacent Component Lead (RUEF090 to RUEF300)	P_1	3.81	± 0.7
Ordinate to Adjacent Component Lead (RUEF400 to RUEF900)	P_1	7.62	± 0.7
Lead Spacing* (RUEF090 to RUEF400)	F	5.05	± 0.75
Lead Spacing* (RUEF500 to RUEF900)	F	10.15	± 0.75
Reel Width (RUEF090 to RUEF400)	W_2	56.0	Maximum
Reel Width (RUEF500* to RUEF900)	W_2	63.5	Maximum
Reel Diameter	A	370.0	Maximum
Space between Flanges* (RUEF090 to RUEF400)	W_1	48.0	Maximum
Space between Flanges* (RUEF500 to RUEF900)	W_1	55.0	Maximum
Arbor Hold Diameter	C	26.0	± 12.0
Core Diameter*	N	91.0	Maximum
Box	—	64/372/362	Maximum
Consecutive Missing Places	—	None	—
Empty Places per Reel	—	0.1%	Maximum

*Differs from EIA specification.

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Tape and Reel Diagrams

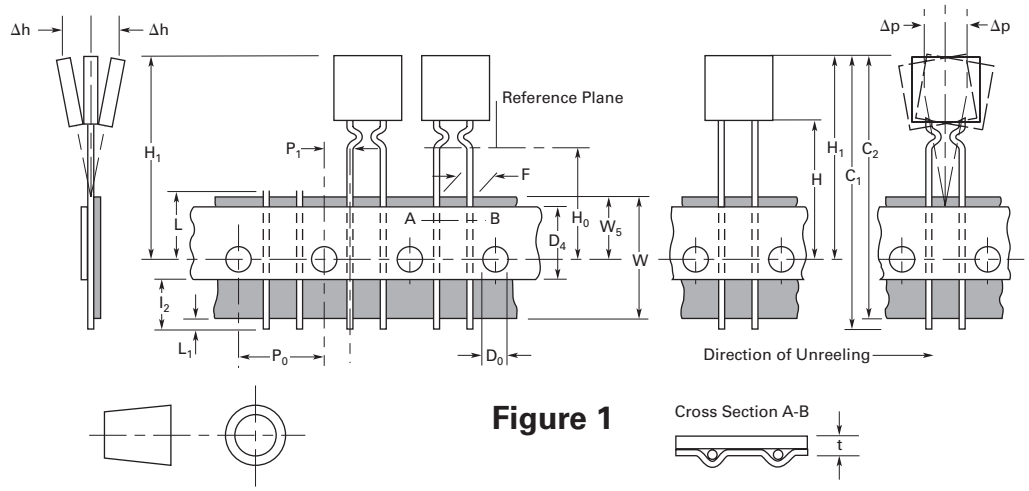

Figure 1

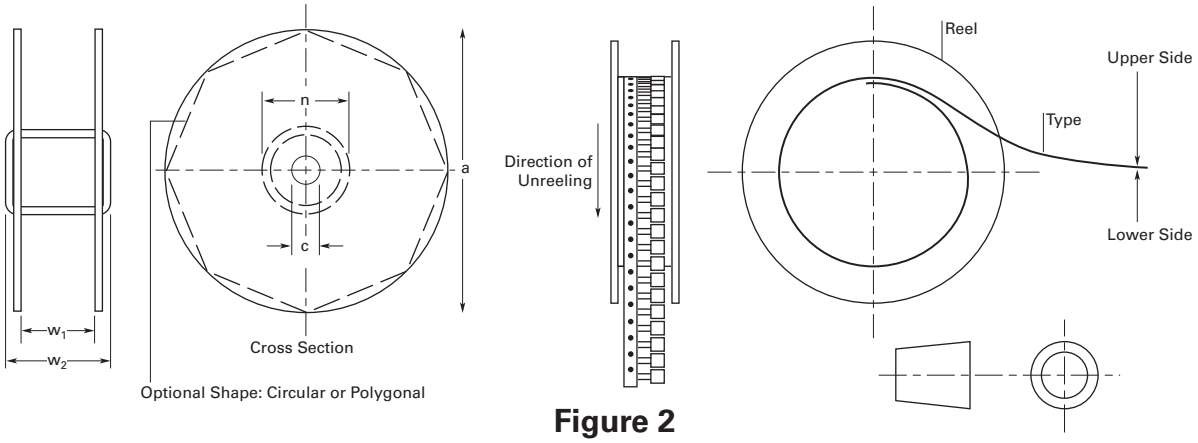

Figure 2

WARNING

- Users should independently evaluate the suitability of and test each product selected for their own application.
- Operation beyond the maximum ratings or improper use may result in device damage and possible electrical arcing and flame.
- These devices are intended for protection against damage caused by occasional overcurrent or overtemperature fault conditions and should not be used when repeated fault conditions or prolonged trip events are anticipated.
- Contamination of the PPTC material with certain silicone-based oils or some aggressive solvents can adversely impact the performance of the devices.
- Device performance can be impacted negatively if devices are handled in a manner inconsistent with recommended electronic, thermal, and mechanical procedures for electronic components.
- PPTC devices are not recommended for installation in applications where the device is constrained such that its PTC properties are inhibited, for example in rigid potting materials or in rigid housings, which lack adequate clearance to accommodate device expansion.
- Operation in circuits with a large inductance can generate a circuit voltage (Ldi/dt) above the rated voltage of the device.