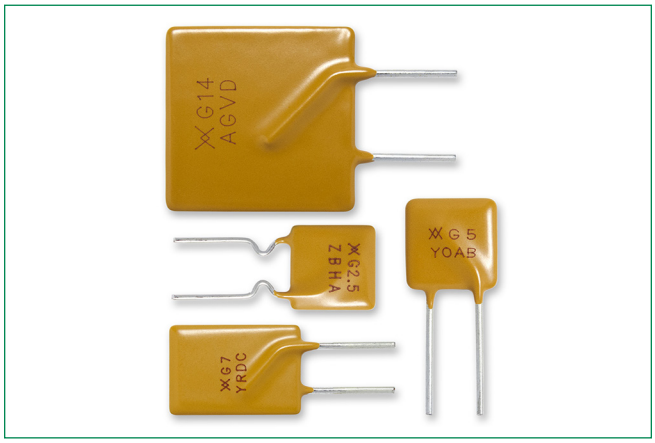
RGEF Series
Radial Leaded



Description

Littelfuse PolySwitch radial-leaded devices represent the most comprehensive and complete set of PPTC products available in the industry today. RGEF series offers low hold currents up to 14A.

Features & Benefits

- 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

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

Resources | Accessories | Samples

Agency Approvals

Agency	Agency File Number
	E74889
	78165
	72161783

Electrical Characteristics

Part Number	Ordering 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)	
RGEF* – 16V														
RGEF250	RF3221-000	2.5	4.7	16	—	100	—	1.0	12.5	5.0	0.0220	0.0350	0.0530	0.205/24
RGEF300	RF3202-000	3.0	5.1	16	—	100	—	2.3	15.0	1.0	0.0380	0.0645	0.0975	0.520/20
RGEF400	RF3203-000	4.0	6.8	16	—	100	—	2.4	20.0	1.7	0.0210	0.0390	0.0600	0.520/20
RGEF500	RF3233-000	5.0	8.5	16	—	100	—	2.6	25.0	2.0	0.0150	0.0240	0.0340	0.520/20
RGEF600	RF3240-000	6.0	10.2	16	—	100	—	2.8	30.0	3.3	0.0100	0.0190	0.0280	0.520/20
RGEF700	RF3246-000	7.0	11.9	16	—	100	—	3.0	35.0	3.5	0.0077	0.0131	0.0200	0.520/20
RGEF800	RF3207-000	8.0	13.6	16	—	100	—	3.0	40.0	5.0	0.0056	0.0110	0.0175	0.520/20
RGEF900	RF3256-000	9.0	15.3	16	—	100	—	3.3	45.0	5.5	0.0047	0.0091	0.0135	0.520/20
RGEF1000	RF3259-000	10.0	17.0	16	—	100	—	3.6	50.0	6.0	0.0040	0.0070	0.0102	0.520/20
RGEF1100	RF3262-000	11.0	18.7	16	—	100	—	3.7	55.0	7.0	0.0037	0.0060	0.0089	0.520/20
RGEF1200	RF3266-000	12.0	20.4	16	—	100	—	4.2	60.0	7.5	0.0033	0.0057	0.0086	0.823/18
RGEF1400	RF3059-000	14.0	23.8	16	—	100	—	4.6	70.0	9.0	0.0026	0.0043	0.0064	0.823/18

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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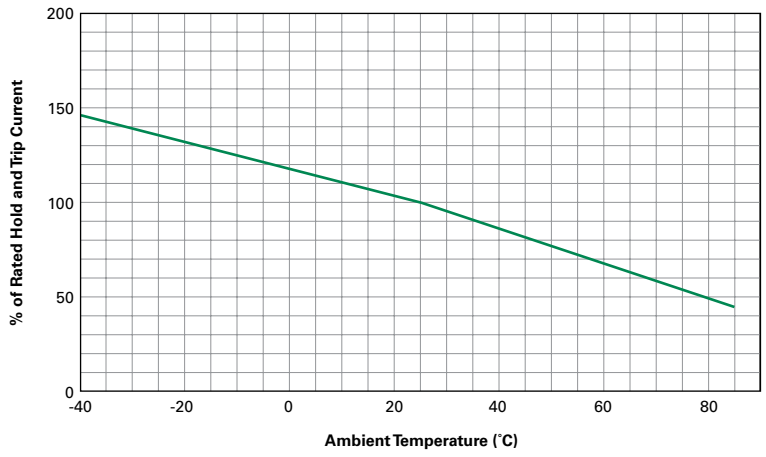
Temperature Rerating

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)										
RGEF – 16V										
RGEF250	3.7	3.3	3.0	2.6	2.50	2.2	2.0	1.8	1.6	1.2
RGEF300	4.4	4.0	3.6	3.1	3.00	2.6	2.4	2.1	1.9	1.4
RGEF400	5.9	5.3	4.8	4.1	4.00	3.5	3.2	2.8	2.5	1.9
RGEF500	7.3	6.6	6.0	5.2	5.00	4.4	4.0	3.6	3.1	2.4
RGEF600	8.8	8.0	7.2	6.2	6.00	5.2	4.8	4.2	3.8	2.8
RGEF700	10.3	9.3	8.4	7.3	7.00	6.2	5.6	5.0	4.4	3.3
RGEF800	11.7	10.7	9.6	8.3	8.00	6.9	6.4	5.6	5.1	3.7
RGEF900	13.2	11.9	10.7	9.4	9.00	7.9	7.2	6.4	5.6	4.2
RGEF1000	14.7	13.3	12.0	10.3	10.00	8.7	8.0	7.0	6.3	4.7
RGEF1100	16.1	14.6	13.1	11.5	11.00	9.7	8.8	7.8	6.9	5.2
RGEF1200	17.6	16.0	14.4	12.4	12.00	10.4	9.6	8.4	7.6	5.6
RGEF1400	20.5	18.7	16.8	14.5	14.00	12.1	11.2	9.8	8.9	6.5

Temperature Rerating Curve



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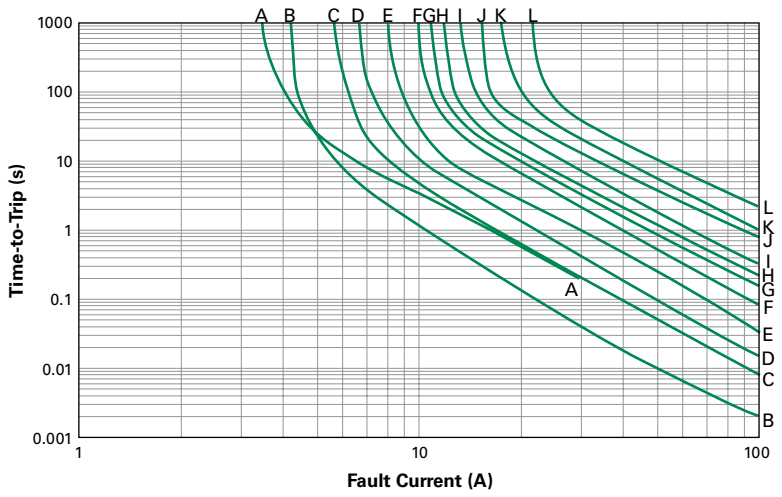
Typical Time-to-Trip Curves at 20°C

RGEF (data at 25°C)

A	=	RGEF250	G	=	RGEF800
B	=	RGEF300	H	=	RGEF900
C	=	RGEF400	I	=	RGEF1000
D	=	RGEF500	J	=	RGEF1100
E	=	RGEF600	K	=	RGEF1200
F	=	RGEF700	L	=	RGEF1400



Physical Specifications

Lead Material	RGEF250 : Tin-plated Copper-clad Steel, 0.205mm² (24AWG), ø0.51mm/0.020in RGEF300 to RGEF1100 : Tin-plated Copper, 0.52mm² (20AWG), ø0.81mm/0.032in RGEF1200 to RGEF1400 : Tin-plated Copper, 0.82mm² (18AWG), ø1.0mm/0.04in
Soldering Characteristics	Solderability per ANSI/J-STD-002 Category 3
Solder Heat Withstand	RGEF250 and RGEF400 : per IEC 60068-2-20, Test Tb, Method 1; Can withstand 5s at 260°C ±5°C RGEF500 to RGEF1400 : per IEC 60068-2-20, Test Tb, Method 1; 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	-40°C, 1000 hrs 85°C, 1000 hrs	±5% ±5%
Humidity Aging	85°C, 85% R.H., 1000 hrs	±5%
Thermal Shock	85°C, -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

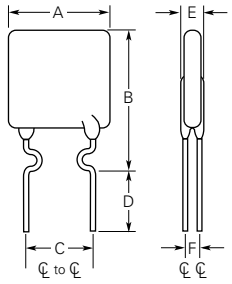

Figure 1

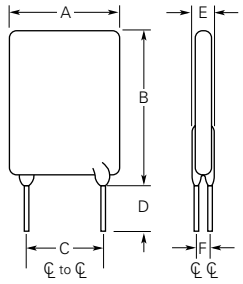

Figure 2

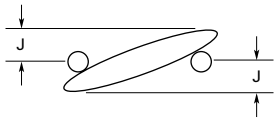

Figure 3

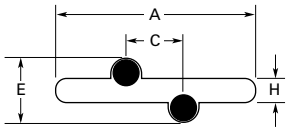

Figure 4

Dimensions and Weights

Part Number	Dimensions in Millimeters (Inches)													Figure	Device Mass (g) (Only for Reference)
	A		B		C		D		E		F	H	J		
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Typ	Typ	Typ		
RGEF – 16V															
RGEF250	—	8.9 (0.35)	—	12.8 (0.50)	4.3 (0.17)	5.8 (0.23)	3.18 (0.13)	6.18 (0.24)	—	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	1.2 (0.05)	1,3,4	0.277
RGEF300	6.1 (0.24)	7.1 (0.28)	6.1 (0.24)	11.0 (0.43)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	2.0 (0.08)	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	1.2 (0.05)	2,3,4	0.323
RGEF400	7.9 (0.31)	8.9 (0.35)	7.9 (0.31)	12.8 (0.50)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	2.0 (0.08)	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	1.4 (0.06)	2,3,4	0.417
RGEF500	9.4 (0.37)	10.4 (0.41)	9.4 (0.37)	14.3 (0.56)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	2.0 (0.08)	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	1.6 (0.06)	2,3,4	0.540
RGEF600	9.7 (0.38)	10.7 (0.42)	12.2 (0.48)	17.1 (0.67)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	2.0 (0.08)	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	1.6 (0.06)	2,3,4	0.604
RGEF700	10.2 (0.40)	11.2 (0.44)	14.7 (0.58)	19.7 (0.78)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	2.0 (0.08)	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	1.7 (0.07)	2,3,4	0.701
RGEF800	11.7 (0.46)	12.7 (0.50)	16.0 (0.63)	20.9 (0.82)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	2.0 (0.08)	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	1.8 (0.07)	2,3,4	0.829
RGEF900	13.0 (0.51)	14.0 (0.55)	16.8 (0.66)	21.7 (0.85)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	2.0 (0.08)	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	2.0 (0.08)	2,3,4	0.887
RGEF1000	—	16.5 (0.65)	21.1 (0.83)	25.2 (0.99)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	2.0 (0.08)	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	2.0 (0.08)	2,3,4	1.219
RGEF1100	16.5 (0.65)	17.5 (0.69)	21.1 (0.83)	26.0 (1.02)	4.3 (0.17)	5.8 (0.23)	7.6 (0.30)	—	2.0 (0.08)	3.0 (0.12)	1.2 (0.05)	1.24 (0.049)	2.4 (0.09)	2,3,4	1.408
RGEF1200	16.4 (0.65)	17.5 (0.69)	22.6 (0.89)	28.0 (1.10)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	—	2.3 (0.09)	3.5 (0.14)	1.4 (0.06)	1.45 (0.057)	1.5 (0.06)	2,3,4	1.650
RGEF1400	—	23.5 (0.925)	22.6 (0.89)	27.9 (1.10)	9.4 (0.37)	10.9 (0.43)	7.6 (0.30)	—	2.3 (0.09)	3.5 (0.14)	1.4 (0.06)	1.45 (0.057)	1.9 (0.08)	2,3,4	2.146

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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
RGEF – 16V						
RGEF250	500	—	—	10,000	G2.5	UL, CSA, TÜV
RGEF250-2	—	3,000	—	15,000	G2.5	UL, CSA, TÜV
RGEF250-AP	—	—	2,000	10,000	G2.5	UL, CSA, TÜV
RGEF300	500	—	—	10,000	G3	UL, CSA, TÜV
RGEF300-2	—	2,500	—	12,500	G3	UL, CSA, TÜV
RGEF300-AP	—	—	2,000	10,000	G3	UL, CSA, TÜV
RGEF400	500	—	—	10,000	G4	UL, CSA, TÜV
RGEF400-2	—	2,500	—	12,500	G4	UL, CSA, TÜV
RGEF400-AP	—	—	2,000	10,000	G4	UL, CSA, TÜV
RGEF500	500	—	—	10,000	G5	UL, CSA, TÜV
RGEF500-2	—	2,000	—	10,000	G5	UL, CSA, TÜV
RGEF500-AP	—	—	2,000	10,000	G5	UL, CSA, TÜV
RGEF600	500	—	—	10,000	G6	UL, CSA, TÜV
RGEF600-2	—	2,000	—	10,000	G6	UL, CSA, TÜV
RGEF600-AP	—	—	2,000	10,000	G6	UL, CSA, TÜV
RGEF700	500	—	—	10,000	G7	UL, CSA, TÜV
RGEF700-2	—	1,500	—	7,500	G7	UL, CSA, TÜV
RGEF700-AP	—	—	1,500	7,500	G7	UL, CSA, TÜV
RGEF800	500	—	—	10,000	G8	UL, CSA, TÜV
RGEF800-2	—	1,500	—	7,500	G8	UL, CSA, TÜV
RGEF800-AP	—	—	1,500	7,500	G8	UL, CSA, TÜV
RGEF900	500	—	—	10,000	G9	UL, CSA, TÜV
RGEF900-2	—	1,000	—	5,000	G9	UL, CSA, TÜV
RGEF900-AP	—	—	1,000	5,000	G9	UL, CSA, TÜV
RGEF1000	250	—	—	5,000	G10	UL, CSA, TÜV
RGEF1000-2	—	1,000	—	5,000	G10	UL, CSA, TÜV
RGEF1000-AP	—	—	1,000	5,000	G10	UL, CSA, TÜV
RGEF1100	250	—	—	5,000	G11	UL, CSA, TÜV
RGEF1100-2	—	1,000	—	5,000	G11	UL, CSA, TÜV
RGEF1100-AP	—	—	1,000	5,000	G11	UL, CSA, TÜV
RGEF1200	250	—	—	5,000	G12	UL, CSA, TÜV
RGEF1200-2	—	1,000	—	5,000	G12	UL, CSA, TÜV
RGEF1200-AP	—	—	1,000	5,000	G12	UL, CSA, TÜV
RGEF1400	250	—	—	5,000	G14	UL, CSA, TÜV
RGEF1400-2	—	1,000	—	5,000	G14	UL, CSA, TÜV
RGEF1400-AP	—	—	1,000	5,000	G14	UL, CSA, TÜV

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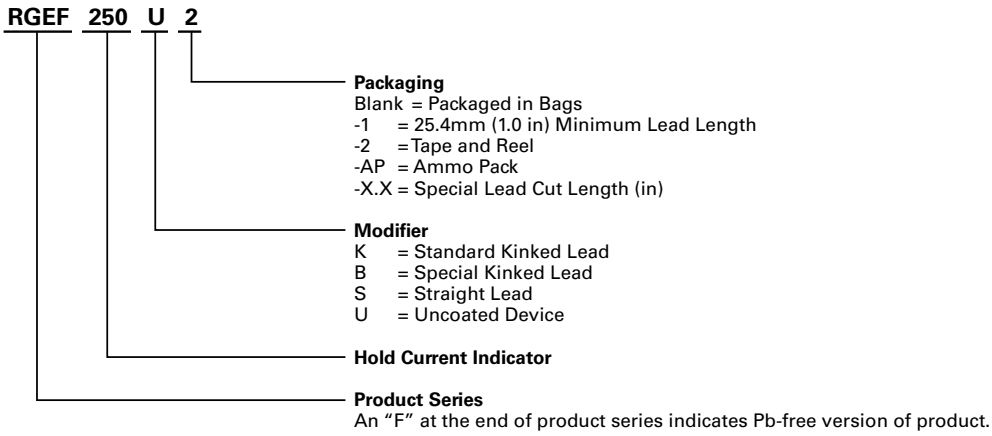
Part Ordering Number System



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

RGEF 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	D_0	4	± 0.2
Abscissa to Plane (Straight Lead) (RGEF250 to RGEF1400)	H	18.5	± 2.5
Abscissa to Plane (Kinked Lead)	H_0	16.0	± 0.5
Abscissa to Top (RGEF250 to RGEF500)	H_1	32.2	Maximum
Abscissa to Top* (RGEF600 to RGEF1400)	H_1	45.0	Maximum
Overall Width with Lead Protrusion (RGEF250 to RGEF600)	C_1	43.2	Maximum
Overall Width with Lead Protrusion (RGEF700 to RGEF1400)	C_1	55	Maximum
Overall Width without Lead Protrusion (RGEF250 to RGEF600)	C_2	42.5	Maximum
Overall Width without Lead Protrusion (RGEF700 to RGEF1400)	C_2	54	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 (RGEF250 to RGEF700)	—	25.4	± 0.61
Device Pitch (RGEF800 to RGEF1400)	—	25.4	± 0.6
Pitch Tolerance	—	20 Consecutive	± 1
Tape Thickness	T	0.9	Maximum
Overall Tape and Lead Thickness* (RGEF250 to RGEF1100)	T_1	2.0	Maximum
Overall Tape and Lead Thickness* (RGEF1200 to RGEF1400)	T_1	2.3	Maximum
Splice Sprocket Hole Alignment	—	0	± 0.3
Body Lateral Deviation	h	0	± 1.0
Body Tape Plane Deviation	p	0	± 1.3
Ordinate to Adjacent Component Lead (RGEF250 to RGEF1100)	P_1	3.81	± 0.7
Ordinate to Adjacent Component Lead (RGEF1200 to RGEF1400)	P_1	7.62	± 0.7
Lead Spacing* (RGEF250 to RGEF1100)	F	5.05	± 0.75
Lead Spacing* (RGEF1200 to RGEF1400)	F	10.15	± 0.75
Reel Width (RGEF250 to RGEF600)	W_2	56.0	Maximum
Reel Width* (RGEF700 to RGEF1400)	W_2	63.5	Maximum
Reel Diameter	A	370.0	Maximum
Space between Flanges* (RGEF250 to RGEF600)	W_1	48.0	Maximum
Space between Flanges* (RGEF700 to RGEF400)	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

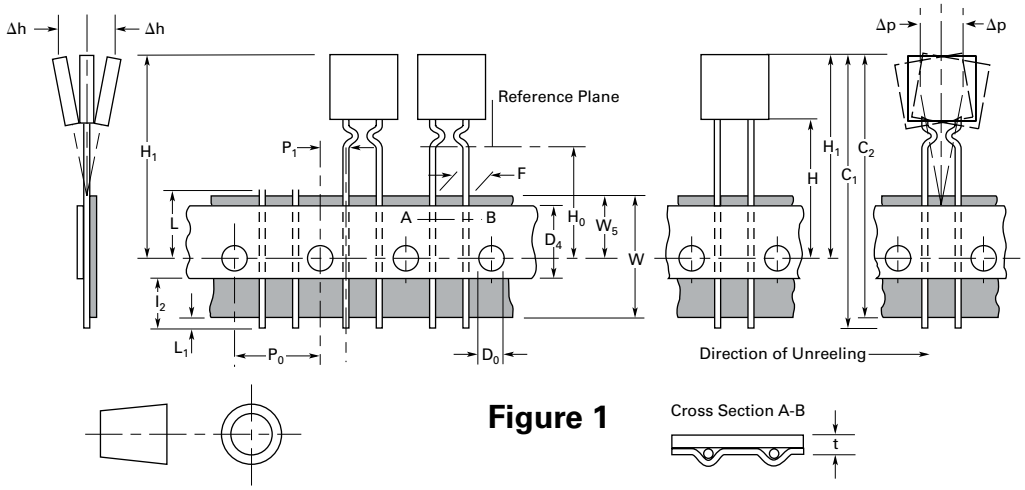

Figure 1

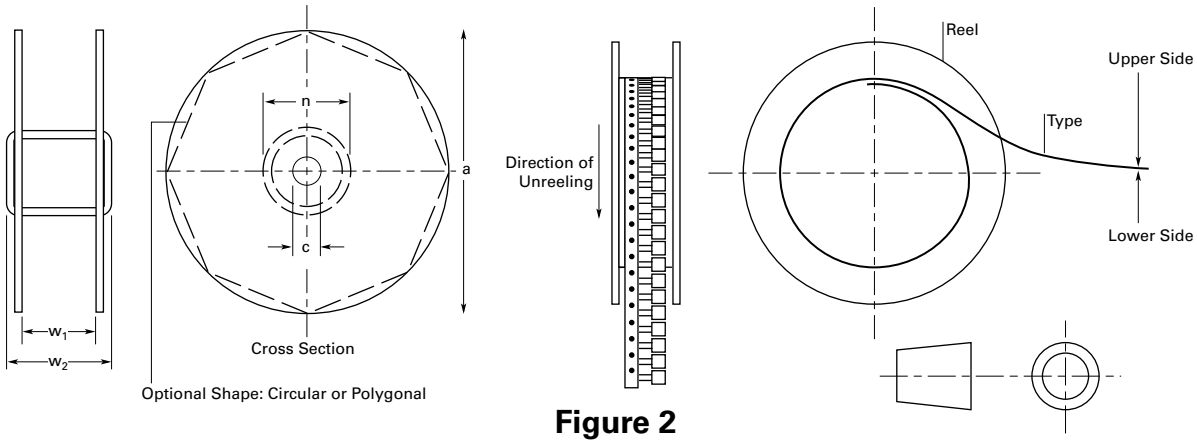

Figure 2

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.

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