

# RUEF Series

## Radial Leaded



### Additional Information



Resources



Accessories



Samples

### 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 & 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

### Agency Approvals

Agency	Agency File Number
	E74889
	78165
	72161784
	16001159723

### Electrical Characteristics

Part Number	Ordering Part Number	$I_H$ (A)	$I_T$ (A)	$V_{MAX}$ ( $V_{DC}$ )	$V_{MAX}$ ( $V_{AC RMS}$ )	$I_{MAX}$ ( $DC_{ADC}$ )	$I_{MAX}$ ( $AC_{ARMS}$ )	$P_{D TYP}$ (W)	Max Time-to-trip (A)	(s)	$R_{MIN}$ ( $\Omega$ )	$R_{MAX}$ ( $\Omega$ )	$R_{TMAX}$ ( $\Omega$ )	Lead Size (mm <sup>2</sup> /AWG)	
<b>RUEF – 30V</b>															
RUEF090	RF2639-000	0.90	1.80	30	30	100	70	0.60	4.50	5.9	0.070	0.120	0.22	0.205/24	
RUEF110	RF2624-000	1.10	2.20	30	30	100	70	0.70	5.50	6.6	0.070	0.100	0.17	0.205/24	
RUEF135	RF2644-000	1.35	2.70	30	30	100	70	0.80	6.75	7.3	0.040	0.080	0.13	0.205/24	
RUEF160	RF2645-000	1.60	3.20	30	30	100	70	0.90	8.00	8.0	0.030	0.070	0.11	0.205/24	
RUEF185	RF2559-000	1.85	3.70	30	30	100	70	1.00	9.25	8.7	0.030	0.060	0.09	0.205/24	
RUEF250	RF2626-000	2.50	5.00	30	30	100	70	1.20	12.50	10.3	0.020	0.040	0.07	0.205/24	
RUEF300	RF2611-000	3.00	6.00	30	30	100	70	2.00	15.00	10.8	0.020	0.050	0.08	0.205/24	
RUEF400	RF2561-000	4.00	8.00	30	30	100	70	2.50	20.00	12.7	0.010	0.030	0.05	0.205/24	
RUEF500	RF2643-000	5.00	10.00	30	30	100	70	3.00	25.00	14.5	0.010	0.030	0.05	0.520/20	
RUEF600	RF2652-000	6.00	12.00	30	30	100	70	3.50	30.00	16.0	0.005	0.020	0.04	0.520/20	
RUEF700	RF2653-000	7.00	14.00	30	30	100	70	3.80	35.00	17.5	0.005	0.020	0.03	0.520/20	
RUEF800	RF2738-000	8.00	16.00	30	30	100	70	4.00	40.00	18.8	0.005	0.013	0.02	0.520/20	
RUEF900	RF2723-000	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.

$R_{TMAX}$  : 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.

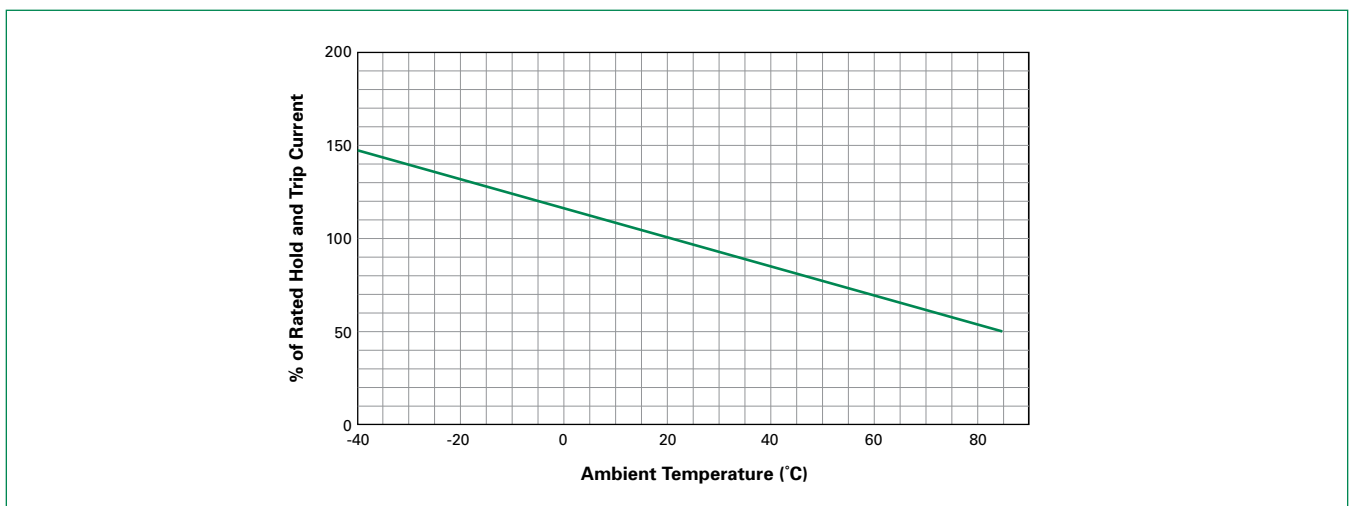
# RUEF Series

## Radial Leaded

### 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

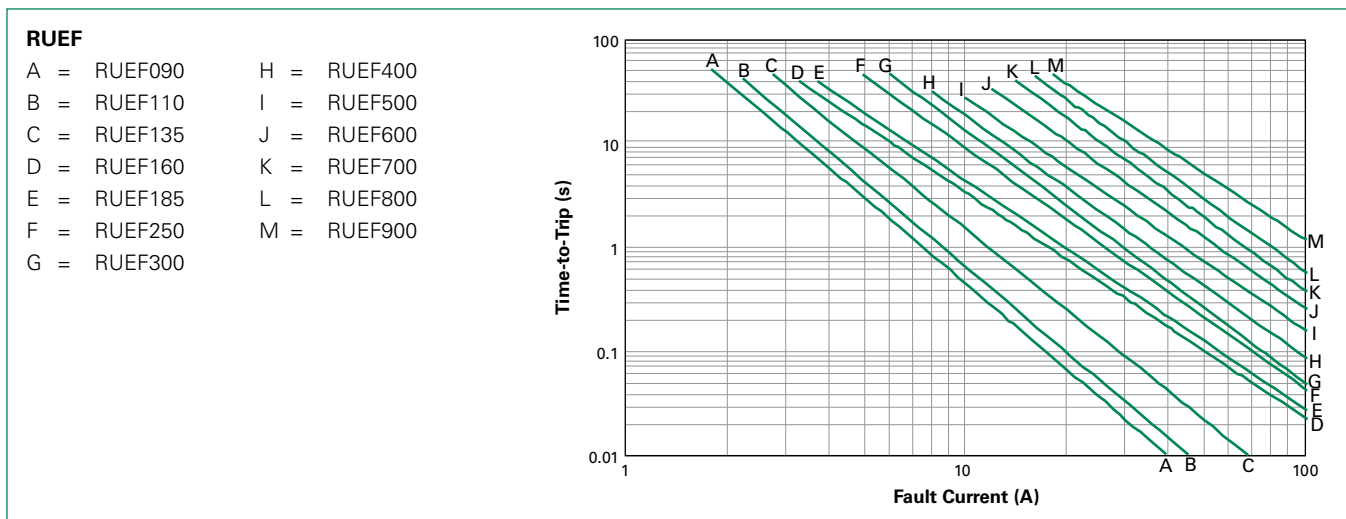
### Temperature Rerating Curve



# RUEF Series

## Radial Leaded

### Typical Time-to-Trip Curves at 20°C



### Physical Specifications

<b>Lead Material</b>	RUEF090 to RUEF250: Tin-plated Copper-clad Steel, 0.205mm <sup>2</sup> (24AWG) RUEF300 to RUEF900: Tin-plated Copper, 0.52mm <sup>2</sup> (20AWG), ø0.81mm (0.032in)
<b>Soldering Characteristics</b>	Solderability per ANSI/J-STD-002 Category 3
<b>Solder Heat Withstand</b>	per IEC 60068-2-20, Test Tb, Method 1; Can withstand 10s at 260°C ±5°
<b>Insulating Material</b>	Cured, Flame-retardant Epoxy Polymer; Meets UL 94V-0
<b>Operation Temperature</b>	-40°C~85°C

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

### Environmental Specifications

Test	Conditions	Resistance Change
<b>Passive Aging</b>	70°C, 1000 hrs	±5%
	85°C, 1000 hrs	±5%
<b>Humidity Aging</b>	85°C, 85% R.H., 1000 hrs	±5%
<b>Thermal Shock</b>	85°C to -40°C (10 times)	±5%
<b>Solvent Resistance</b>	MIL-STD-202, Method 215F	No change
<b>Moisture Resistance Level</b>	Level 1, J-STD-020	
<b>Storage Conditions</b>	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.	

# RUEF Series

## Radial Leaded

### Dimension Figures

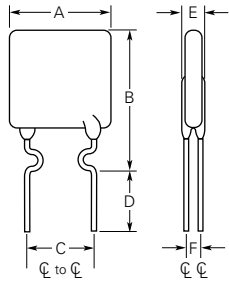


Figure 1

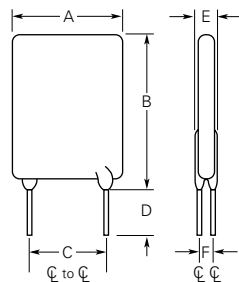


Figure 2

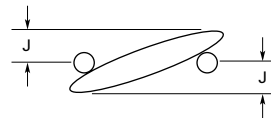


Figure 3

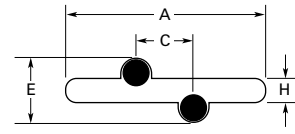


Figure 4

### 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		
<b>RUEF – 30V</b>														
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

# RUEF Series

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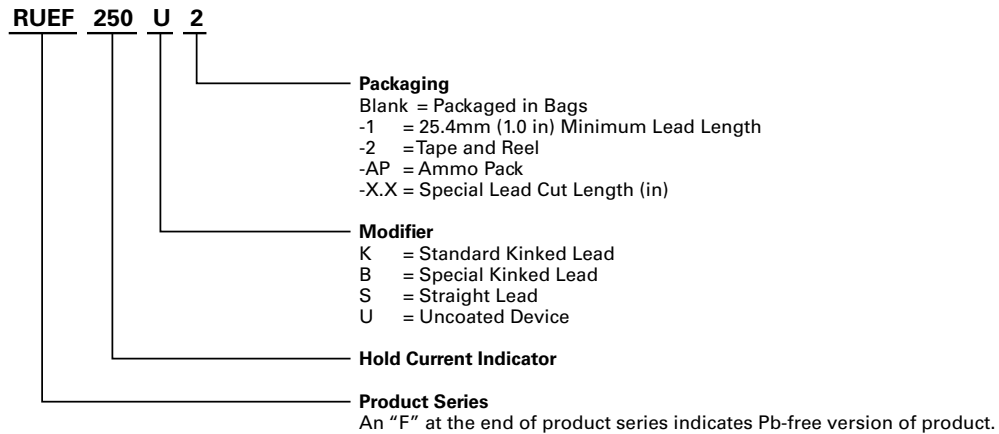
### Packaging and Marking Information

Part Number	Bag Quantity	Tape and Reel Quantity	Ammo Pack Quantity	Standard Package Quantity	Part Marking	Agency Recognition
<b>RUEF – 30V</b>						
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

# RUEF Series

## Radial Leaded

### Part Ordering Number System



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

# RUEF Series

## Radial Leaded

### 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.

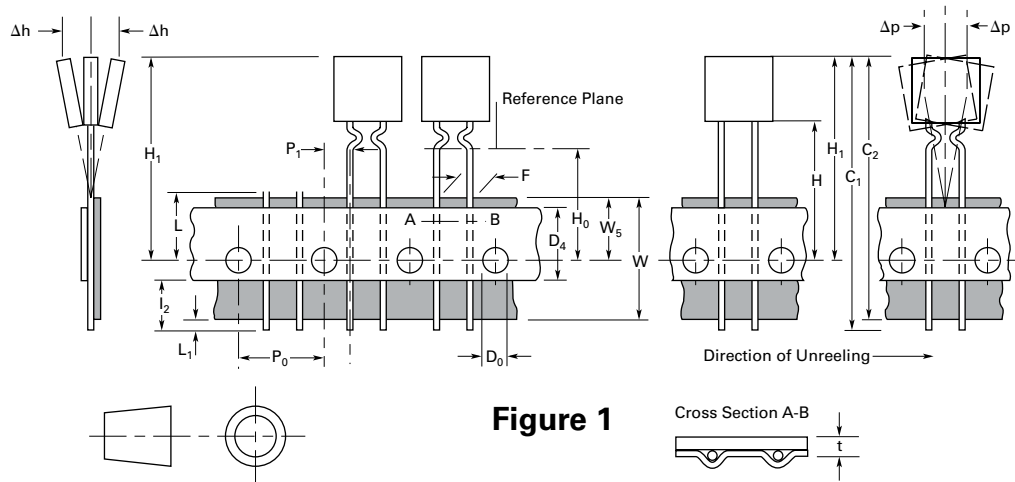
Description	EIA Mark	Dimension (mm)	Tolerance
Carrier Tape Width	W	18	-0.5/+1.0
Hold-down Tape Width	W <sub>4</sub>	11	Minimum
Top Distance between Tape Edges	W <sub>6</sub>	3	Maximum
Sprocket Hole Position	W <sub>5</sub>	9	-0.5/+0.75
Sprocket Hole Diameter	W <sub>0</sub>	4	± 0.2
Abscissa to Plane (Straight Lead)* (RUEF300 to RUEF900)	H	18.5	± 2.5
Abscissa to Plane (Kinked Lead) (RUEF090 to RUEF250)	H <sub>0</sub>	16.0	± 0.5
Abscissa to Top (RUEF090 to RUEF300)	H <sub>1</sub>	32.2	Maximum
Abscissa to Top* (RUEF400 to RUEF900)	H <sub>1</sub>	45.0	Maximum
Overall Width with Lead Protrusion (RUEF090 to RUEF300)	C <sub>1</sub>	43.2	Maximum
Overall Width with Lead Protrusion (RUEF400 To RUEF900)	C <sub>1</sub>	56	Maximum
Overall Width without Lead Protrusion (RUEF090 to RUEF300)	C <sub>2</sub>	42.5	Maximum
Overall Width without Lead Protrusion (RUEF400 to RUEF900)	C <sub>2</sub>	56	Maximum
Lead Protrusion	L <sub>1</sub>	1.0	Maximum
Protrusion of Cut-out	L	11	Maximum
Protrusion beyond Hold-down Tape	I <sub>2</sub>	Not Specified	—
Sprocket Hole Pitch	P <sub>0</sub>	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 <sub>1</sub>	1.5	Maximum
Overall Tape and Lead Thickness* (RUEF300 to RUEF900)	T <sub>1</sub>	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 <sub>1</sub>	3.81	± 0.7
Ordinate to Adjacent Component Lead (RUEF400 to RUEF900)	P <sub>1</sub>	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 <sub>2</sub>	56.0	Maximum
Reel Width (RUEF500* to RUEF900)	W <sub>2</sub>	63.5	Maximum
Reel Diameter	A	370.0	Maximum
Space between Flanges* (RUEF090 to RUEF400)	W <sub>1</sub>	48.0	Maximum
Space between Flanges* (RUEF500 to RUEF900)	W <sub>1</sub>	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.

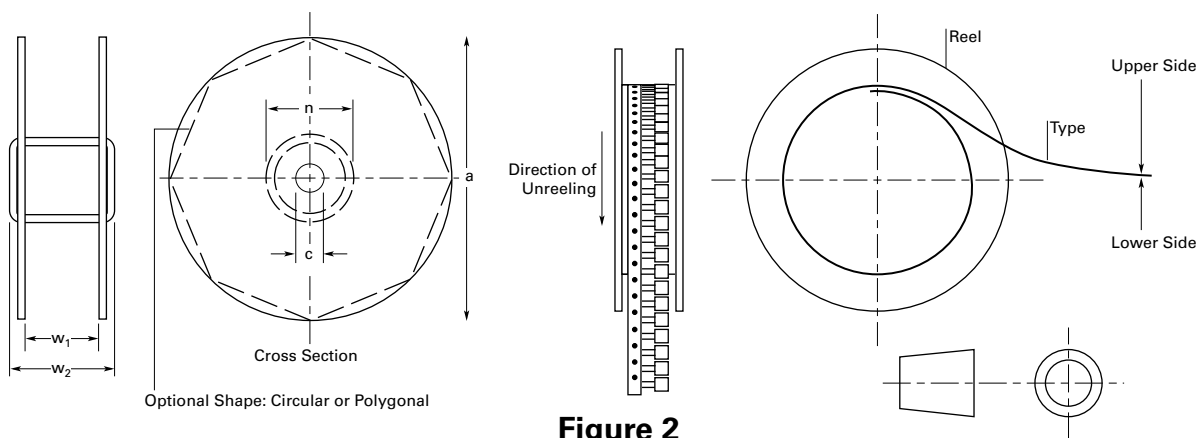
# RUEF Series

## Radial Leaded

### 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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