

16R Series

Radial Leaded



Description

Littelfuse 16R Series Radial Leaded PTCs are designed to provide resettable overcurrent protection serving a wide range of electronics applications. With maximum 16 volts and maximum 100-ampere short circuit rating, they offer an ideal solution for USB protection.

Features & Benefits

- 100A short circuit rating
- 16V Operating voltages
- Fast time-to-trip
- Meets all USB protection requirements
- RoHS compliant, Lead- Free and Halogen-Free*

Applications

- Computers & peripherals
- Any USB application
- General Electronics

Additional Information



Resources



Accessories



Samples

Agency Approvals

| Agency | Agency File Number |
|---------|--------------------|
| c UL US | E74889 |
| A | R72161783 |

Electrical Characteristics

| Part Number | I_{hold} (A) | I_{trip} (A) | V_{max} (Vdc) | I_{max} (A) | P_d typ. (W) | Maximum Time To Trip | | Resistance | | Agency Approvals | |
|-------------|----------------|----------------|-----------------|---------------|----------------|----------------------|-------------|------------------------|-------------------------|------------------|---|
| | | | | | | Current (A) | Time (Sec.) | R_{min} (Ω) | R_{1max} (Ω) | c UL US | A |
| 16R250G | 2.5 | 4.7 | 16 | 100 | 1.0 | 12.5 | 5.0 | 0.0220 | 0.0530 | X | X |
| 16R300G | 3.0 | 5.1 | 16 | 100 | 2.3 | 15.0 | 1.0 | 0.0380 | 0.0975 | X | X |
| 16R400G | 4.0 | 6.8 | 16 | 100 | 2.4 | 20.0 | 1.7 | 0.0210 | 0.0600 | X | X |
| 16R500G | 5.0 | 8.5 | 16 | 100 | 2.6 | 25.0 | 2.0 | 0.0150 | 0.0340 | X | X |
| 16R700G | 7.0 | 11.9 | 16 | 100 | 3.0 | 35.0 | 3.5 | 0.0077 | 0.0200 | X | X |
| 16R800G | 8.0 | 13.6 | 16 | 100 | 3.0 | 40.0 | 5.0 | 0.0056 | 0.0175 | X | X |
| 16R900G | 9.0 | 15.3 | 16 | 100 | 3.3 | 45.0 | 5.5 | 0.0047 | 0.0135 | X | X |
| 16R1000G | 10.0 | 17.0 | 16 | 100 | 3.6 | 50.0 | 6.0 | 0.0040 | 0.0102 | X | X |
| 16R1400G | 14.0 | 23.8 | 16 | 100 | 4.6 | 70.0 | 9.0 | 0.0026 | 0.0064 | X | X |

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

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 the device can withstand without damage at rated current (I_{max})
 V_{op} = The device regular operation voltage
 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.

* Effective February 11, 2010 onward, all 600R PTC products will be manufactured Halogen Free (HF). Existing Non-Halogen Free 600R PTC products may continue to be sold, until supplies are depleted. This change will have no effect on 600R product specifications or performance.

Warning

- Users shall independently assess the suitability of these devices for each of their applications
- Operation of these devices beyond the stated maximum ratings could result in damage to the devices and lead to electrical arcing and/or fire
- These devices are intended to protect against the effects of temporary over-current or over-temperature conditions and are not intended to perform as protective devices where such conditions are expected to be repetitive or prolonged in duration
- Exposure to silicon-based oils, solvents, electrolytes, acids, and similar materials can adversely affect the performance of these PPTC devices
- These devices undergo thermal expansion under fault conditions, and thus shall be provided with adequate space and be protected against mechanical stresses
- Circuits with inductance may generate a voltage ($L di/dt$) above the rated voltage of the PPTC device.

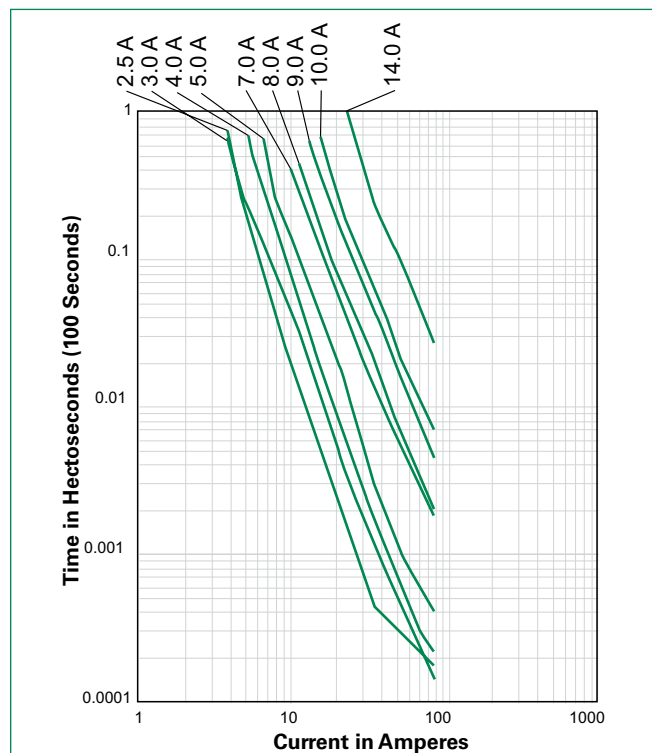
16R Series

Radial Leaded

Temperature Rerating

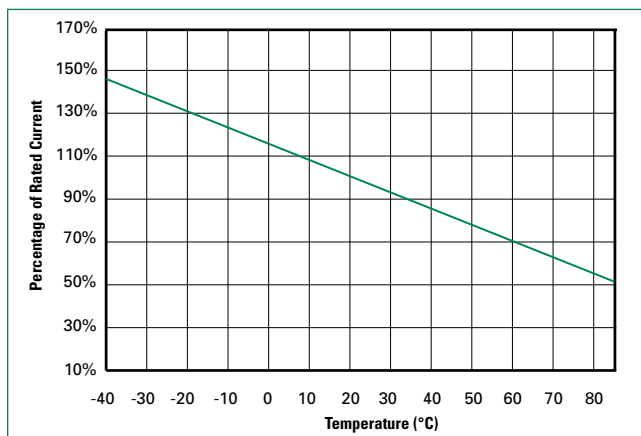
| Part Number | Ambient Operation Temperature | | | | | | | | |
|-------------|-------------------------------|-------|------|------|------|------|------|------|------|
| | -40°C | -20°C | 0°C | 20°C | 40°C | 50°C | 60°C | 70°C | 85°C |
| 16R250G | 3.7 | 3.3 | 2.9 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.3 |
| 16R300G | 4.4 | 4.0 | 3.5 | 3.0 | 2.6 | 2.4 | 2.1 | 1.9 | 1.6 |
| 16R400G | 5.9 | 5.3 | 4.7 | 4.0 | 3.5 | 3.2 | 2.9 | 2.6 | 2.1 |
| 16R500G | 7.4 | 6.6 | 5.9 | 5.0 | 4.4 | 4.0 | 3.6 | 3.2 | 2.6 |
| 16R700G | 10.4 | 9.3 | 8.2 | 7.0 | 6.1 | 5.6 | 5.0 | 4.5 | 3.7 |
| 16R800G | 11.8 | 10.6 | 9.4 | 8.0 | 7.0 | 6.3 | 5.7 | 5.1 | 4.2 |
| 16R900G | 13.3 | 12.0 | 10.6 | 9.0 | 7.8 | 7.1 | 6.5 | 5.8 | 4.7 |
| 16R1000G | 14.8 | 13.3 | 11.8 | 10.0 | 8.7 | 7.9 | 7.1 | 6.4 | 5.3 |
| 16R1400G | 20.7 | 18.6 | 16.5 | 14.0 | 12.2 | 11.1 | 10.0 | 9.0 | 7.4 |

Average Time Current Curves



The average time current curves and Temperature Rerating curve performance is affected by a number of variables, and these curves provided as guidance only. Customer must verify the performance in their application.

Temperature Rerating Curve



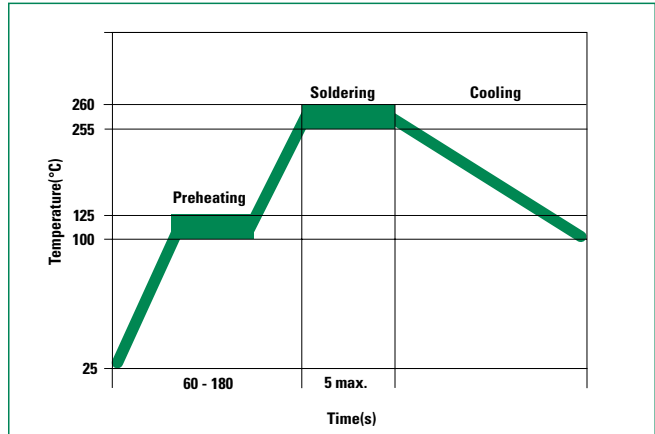
Note:
Typical Temperature rerating curve, refer to table for derating data

16R Series

Radial Leaded

Soldering Parameters - Wave Soldering

| | |
|-------------------------|--|
| 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. Time within 5°C of actual Max. solder temperature within 3 - 5 seconds. Total time from 25°C room to Max. solder temperature within 5 minutes including Pre-Heating time. |
| Cooling Zone | Cooling by natural convection in air. Max. ramping down rate should not exceed 6°C/Sec. |



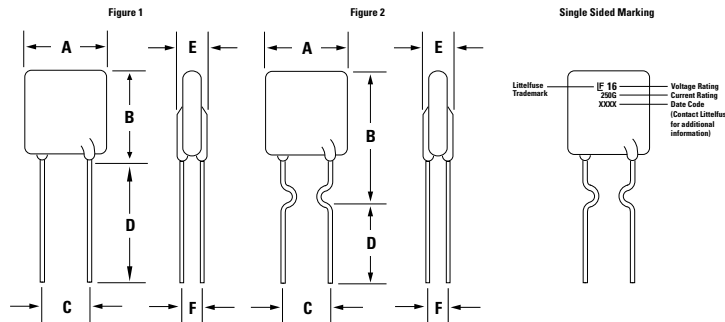
Physical Specifications

| | |
|----------------------------------|--|
| Lead Material | 2.5A: Tin-plated Copper clad Steel 3.0 - 14.0A: Tin-plated Copper |
| Soldering Characteristics | Solderability per MIL-STD-202, Method 208 |
| Insulating Material | Cured, flame retardant epoxy polymer meets UL94V-0 requirements. |
| Device Labeling | Marked with 'LF', voltage, current rating, and date code. |

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 215 No change |
| Moisture Resistance Level | Level 1, J-STD-020 |

Dimensions & Part Marking System

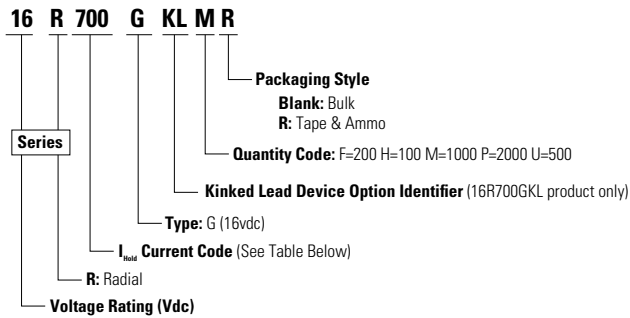


| Part Number | Figure | A | | B | | C | | D | | E | | F | | Physical Characteristics | | |
|-------------|--------|--------|-------|--------|-------|--------|------|--------|------|--------|------|--------|-----|--------------------------|----------|---------|
| | | Inches | mm | Inches | mm | Inches | mm | Inches | mm | Inches | mm | Inches | mm | Lead (dia) | Material | |
| 16R250G | 2 | 0.35 | 8.90 | 0.50 | 12.80 | 0.20 | 5.1 | 0.13 | 3.18 | 0.12 | 3.00 | 0.035 | 0.9 | 0.020 | 0.51 | Sn/CuFe |
| 16R300G | 1 | 0.28 | 7.10 | 0.43 | 11.00 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 0.047 | 1.2 | 0.032 | 0.81 | Sn/Cu |
| 16R400G | 1 | 0.35 | 8.90 | 0.50 | 12.80 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 0.047 | 1.2 | 0.032 | 0.81 | Sn/Cu |
| 16R500G | 1 | 0.41 | 10.40 | 0.56 | 14.30 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 0.047 | 1.2 | 0.032 | 0.81 | Sn/Cu |
| 16R700G | 1 | 0.44 | 11.20 | 0.78 | 19.70 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 0.047 | 1.2 | 0.032 | 0.81 | Sn/Cu |
| 16R800G | 1 | 0.50 | 12.70 | 0.82 | 20.90 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 0.047 | 1.2 | 0.032 | 0.81 | Sn/Cu |
| 16R900G | 1 | 0.55 | 14.00 | 0.85 | 21.70 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 0.047 | 1.2 | 0.032 | 0.81 | Sn/Cu |
| 16R1000G | 1 | 0.65 | 16.50 | 0.99 | 25.20 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 0.047 | 1.2 | 0.032 | 0.81 | Sn/Cu |
| 16R1400G | 1 | 0.93 | 23.50 | 1.10 | 27.90 | 0.40 | 10.2 | 0.30 | 7.6 | 0.14 | 3.50 | 0.055 | 1.4 | 0.039 | 1.00 | Sn/Cu |

16R Series

Radial Leaded

Part Ordering Number System



Packaging Options

| Part Number | Ordering Number | I_{hold} (A) | I_{hold} Code | Packaging Option | Quantity | Quantity & Packaging Codes |
|-------------|-----------------|----------------|-----------------|------------------|----------|----------------------------|
| 16R250G | 16R250GU | 2.50 | 250 | Bulk | 500 | U |
| | 16R250GPR | | | Bulk | 500 | U |
| 16R300G | 16R300GU | 3.00 | 300 | Tape and Ammo | 2000 | PR |
| | 16R300GPR | | | Bulk | 500 | U |
| 16R400G | 16R400GU | 4.00 | 400 | Tape and Ammo | 2000 | PR |
| | 16R400GPR | | | Bulk | 500 | U |
| 16R500G | 16R500GU | 5.00 | 500 | Tape and Ammo | 2000 | PR |
| | 16R500GPR | | | Bulk | 500 | U |
| 16R700G | 16R700GMR | 7.00 | 700 | Tape and Ammo | 1000 | MR |
| 16R800G | 16R800GF | 8.00 | 800 | Bulk | 200 | F |
| | 16R800GPR | | | Bulk | 200 | F |
| 16R900G | 16R900GF | 9.00 | 900 | Tape and Ammo | 1000 | MR |
| | 16R900GMR | | | Bulk | 200 | F |
| 16R1000G | 16R1000GMR | 10.00 | 1000 | Tape and Ammo | 1000 | MR |
| 16R1400G | 16R1400GH | 14.00 | 1400 | Bulk | 100 | H |

Warning

- Users shall independently assess the suitability of these devices for each of their applications
- Operation of these devices beyond the stated maximum ratings could result in damage to the devices and lead to electrical arcing and/or fire
- These devices are intended to protect against the effects of temporary over-current or over-temperature conditions and are not intended to perform as protective devices where such conditions are expected to be repetitive or prolonged in duration
- Exposure to silicon-based oils, solvents, electrolytes, acids, and similar materials can adversely affect the performance of these PPTC devices
- These devices undergo thermal expansion under fault conditions, and thus shall be provided with adequate space and be protected against mechanical stresses
- Circuits with inductance may generate a voltage ($L di/dt$) above the rated voltage of the PPTC device.

16R Series

Radial Leaded

Tape and Ammo Specifications

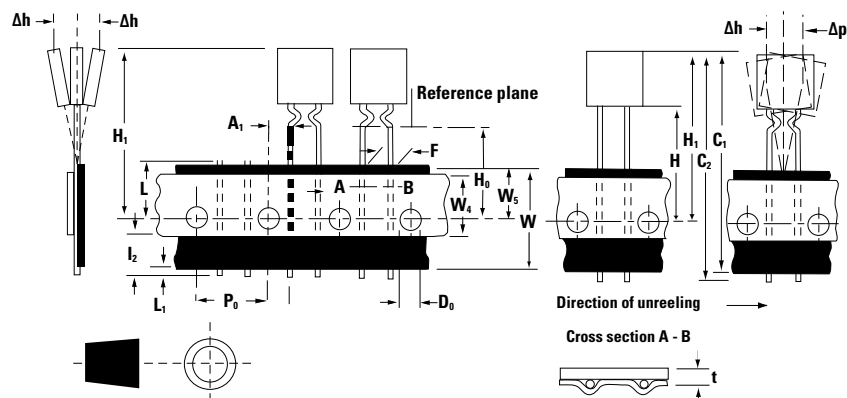
Devices taped using EIA468-B/IE286-2 standards. See table below and Figure 1 for details.

| Dimension | EIA Mark | IEC Mark | Dimensions | |
|--------------------------------------|----------------------|----------------------|-----------------|-------------|
| | | | Dim. (mm) | Tol. (mm) |
| Carrier tape width | W | W | 18 | -0.5 /+1.0 |
| Hold down tape width: | W₄ | W₀ | 11 | min. |
| Top distance between tape edges | W₆ | W₂ | 3 | max. |
| Sprocket hole position | W₅ | W₁ | 9 | -0.5 /+0.75 |
| Sprocket hole diameter* | D₀ | D₀ | 4 | -0.32 /+0.2 |
| Abscissa to plane(straight lead) | H | H | 18.5 | -/+ 3.0 |
| Abscissa to plane(kinked lead) | H₀ | H₀ | 16 | -/+ 0.5 |
| Abscissa to top | - | - | 45.0 | max. |
| Overall width w/o lead protrusion | - | - | 56 | max. |
| Overall width w/ lead protrusion | - | - | 57 | max. |
| Lead protrusion | L₁ | I₁ | 1.0 | max. |
| Protrusion of cut out | L | L | 11 | max. |
| Protrusion beyond hold-down tape | I₂ | I₂ | Not specified | |
| Sprocket hole pitch | P₀ | P₀ | 25.4 | -/+ 0.5 |
| Device pitch: | - | - | 25.4 | |
| Pitch tolerance | - | - | 20 consecutive. | -/+ 1 |
| Tape thickness | t | t | 0.9 | max. |
| Tape thickness with splice | t₁ | - | 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* | P₁ | P₁ | 3.81 | -/+ 0.7 |
| Ordinate to adjacent component lead* | - | - | 7.62 | -/+ 0.7 |
| Lead spacing:16R250G-16R1000G | F | F | 5.08 | -/+ 0.8 |
| Lead spacing:16R1400G | F | F | 10.18 | -/+ 0.8 |

*Differs from EIA specification

Tape and Ammo Diagram

Figure 1



Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at www.littelfuse.com/disclaimer-electronics.