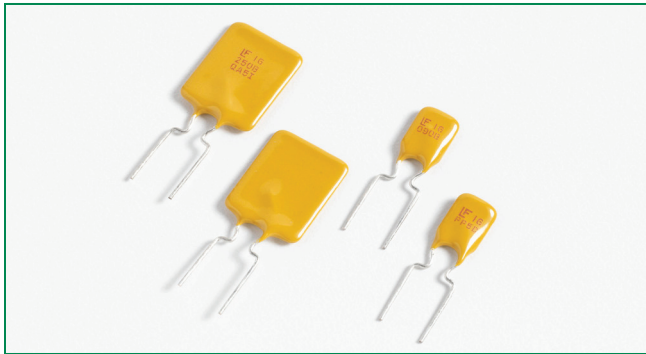


RoHS (Pb) HF 16R Series

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

- 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

Agency Approvals

| AGENCY | AGENCY FILE NUMBER |
|---|--------------------|
|  | E183209 |
|  | R50119318 |

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) |  |  |
| 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 |
| 16R600G | 6.0 | 10.2 | 16 | 100 | 2.8 | 30.0 | 3.3 | 0.0100 | 0.0280 | 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 |
| 16R1100G | 11.0 | 18.7 | 16 | 100 | 3.7 | 55.0 | 7.0 | 0.0037 | 0.0089 | X | X |
| 16R1200G | 12.0 | 20.4 | 16 | 100 | 4.2 | 60.0 | 7.5 | 0.0033 | 0.0086 | X | X |
| 16R1400G | 14.0 | 23.8 | 16 | 100 | 4.6 | 70.0 | 9.0 | 0.0026 | 0.0064 | X | X |

I_{hold} = Hold current: maximum current device will pass without tripping in 23°C still air.

I_{trip} = Trip current: minimum current at which the device will trip in 23°C still air.

V_{max} = Maximum voltage device can withstand without damage at rated current (I_{max})

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 23°C still air.

R_{min} = Minimum resistance of device in initial (un-soldered) state.

R_{1max} = 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.

* Effective January 1, 2010, all 16R PTC products will be manufactured Halogen Free (HF). Existing Non-Halogen Free 16R PTC products may continue to be sold, until supplies are depleted.

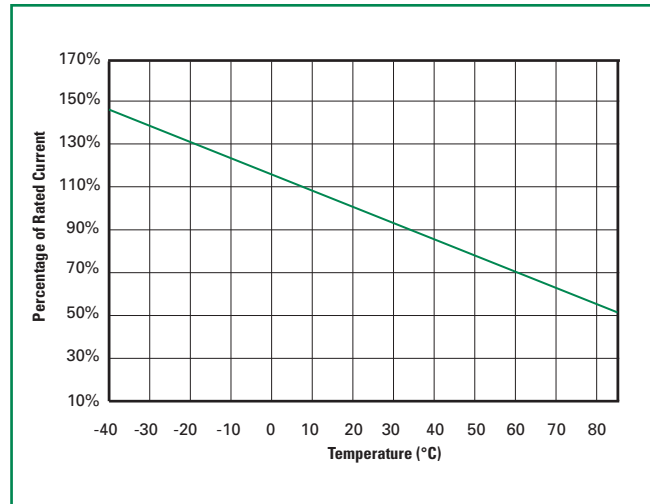
Temperature Derating

| Part Number | Ambient Operation Temperature | | | | | | | | |
|-------------|-------------------------------|-------|------|------|------|------|------|------|------|
| | -40°C | -20°C | 0°C | 23°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 |
| 16R600G | 8.9 | 8.0 | 7.1 | 6.0 | 5.2 | 4.8 | 4.3 | 3.9 | 3.2 |
| 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 |
| 16R1100G | 16.3 | 14.6 | 12.9 | 11.0 | 9.6 | 8.7 | 7.9 | 7.0 | 5.8 |
| 16R1200G | 17.7 | 15.9 | 14.1 | 12.0 | 10.5 | 9.5 | 8.6 | 7.7 | 6.3 |
| 16R1400G | 20.7 | 18.6 | 16.5 | 14.0 | 12.2 | 11.1 | 10.0 | 9.0 | 7.4 |

Average Time Current Curves



Temperature Derating Curve



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

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 |
| Cooling Zone | Cooling by natural convection in air. |



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 208E |
| 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 215F No change |
| Moisture Resistance Level | Level 1, J-STD-020C |

Dimensions



Figure 1

Figure 2

Part Marking System



| Part Number | Figure | A | | B | | C | | D | | E | | Physical Characteristics | | |
|-------------|--------|--------|-------|--------|-------|--------|------|--------|------|--------|------|--------------------------|------|----------|
| | | Inches | mm | Inches | mm | Inches | mm | Inches | mm | Inches | mm | Lead (dia) | | Material |
| | | Max. | Max. | Max. | Max. | Typ. | Typ. | Min. | Min. | Max. | Max. | Inches | mm | |
| 16R250G | 2 | 0.35 | 8.90 | 0.50 | 12.80 | 0.20 | 5.1 | 0.13 | 3.18 | 0.12 | 3.00 | 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 | 0.032 | 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 | 0.032 | 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 | 0.032 | 0.81 | Sn/Cu |
| 16R600G | 1 | 0.42 | 10.70 | 0.67 | 17.10 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 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 | 0.032 | 0.81 | Sn/Cu |
| 16R700GKL | 2 | 0.44 | 11.20 | 0.93 | 23.70 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 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 | 0.032 | 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 | 0.032 | 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 | 0.032 | 0.81 | Sn/Cu |
| 16R1100G | 1 | 0.69 | 17.50 | 1.02 | 26.00 | 0.20 | 5.1 | 0.30 | 7.6 | 0.12 | 3.00 | 0.032 | 0.81 | Sn/Cu |
| 16R1200G | 1 | 0.69 | 17.50 | 1.10 | 28.00 | 0.40 | 10.2 | 0.30 | 7.6 | 0.14 | 3.50 | 0.039 | 1.00 | Sn/Cu |
| 16R1400G | 1 | 0.93 | 23.50 | 1.10 | 27.90 | 0.40 | 10.2 | 0.30 | 7.6 | 0.14 | 3.50 | 0.039 | 1.00 | Sn/Cu |

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 | | | Tape and Ammo | 2000 | PR |
| 16R300G | 16R300GU | 3.00 | 300 | Bulk | 500 | U |
| | 16R300GPR | | | Tape and Ammo | 2000 | PR |
| 16R400G | 16R400GU | 4.00 | 400 | Bulk | 500 | U |
| | 16R400GPR | | | Tape and Ammo | 2000 | PR |
| 16R500G | 16R500GU | 5.00 | 500 | Bulk | 500 | U |
| | 16R500GPR | | | Tape and Ammo | 2000 | PR |
| 16R600G | 16R600GU | 6.00 | 600 | Bulk | 500 | U |
| | 16R600GDR | | | Tape and Ammo | 1500 | DR |
| 16R700G | 16R700GF | 7.00 | 700 | Bulk | 200 | F |
| | 16R700GKLF | | | Tape and Ammo | 1000 | MR |
| | 16R700GMR | | | | | |
| | 16R700GKL MR | | | | | |
| 16R800G | 16R800GF | 8.00 | 800 | Bulk | 200 | F |
| | 16R800GMR | | | Tape and Ammo | 1000 | MR |
| 16R900G | 16R900GF | 9.00 | 900 | Bulk | 200 | F |
| | 16R900GMR | | | Tape and Ammo | 1000 | MR |
| 16R1000G | 16R1000GF | 10.00 | 1000 | Bulk | 200 | F |
| | 16R1000GMR | | | Tape and Ammo | 1000 | MR |
| 16R1100G | 16R1100GF | 11.00 | 1100 | Bulk | 200 | F |
| | 16R1100GMR | | | Tape and Ammo | 1000 | MR |
| 16R1200G | 16R1200GH | 12.00 | 1200 | Bulk | 100 | H |
| | 16R1200GMR | | | Tape and Ammo | 1000 | MR |
| 16R1400G | 16R1400GH | 14.00 | 1400 | Bulk | 100 | H |

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-16R1100G | F | F | 5.08 | -/+ 0.8 |
| Lead spacing:16R1200G-16R1400G | F | F | 10.18 | -/+ 0.8 |

*Differs from EIA specification

Tape and Ammo Diagram

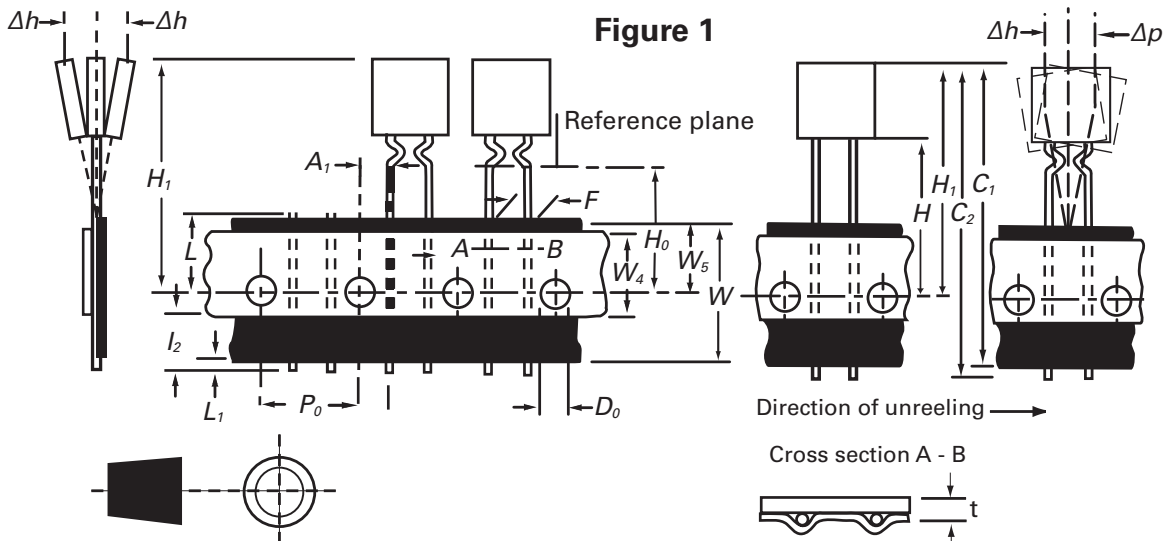


Figure 1