

## USBR Series



### Agency Approvals

| Agency                                                                            | Agency File Number |
|-----------------------------------------------------------------------------------|--------------------|
|  | E183209            |
|  | R50119318          |

### Description

The USBR Series radial leaded device is designed to provide overcurrent protection for USB applications where space is not a concern.

### Features

- RoHS compliant and lead-free
- Fast time-to-trip
- Meets all USB protection requirements
- 40A short circuit rating
- Operating voltages of 6-16V

### Applications

- Computers & peripherals
- Any USB application

### Additional Information



Datasheet



Resources



Samples

### Electrical Characteristics

| Part Number | $I_{hold}$<br>(A) | $I_{trip}$<br>(A) | $V_{max}$<br>(Vdc) | $I_{max}$<br>(A) | $P_d$<br>max. (W) | Maximum Time To Trip |                | Resistance                |                            | Agency Approvals                                                                      |                                                                                       |
|-------------|-------------------|-------------------|--------------------|------------------|-------------------|----------------------|----------------|---------------------------|----------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|             |                   |                   |                    |                  |                   | Current<br>(A)       | Time<br>(Sec.) | $R_{min}$<br>( $\Omega$ ) | $R_{1max}$<br>( $\Omega$ ) |  |  |
| 06R075B     | 0.75              | 1.30              | 6                  | 40               | 0.3               | 8.00                 | 0.4            | 0.100                     | 0.230                      | X                                                                                     | X                                                                                     |
| 06R120B     | 1.20              | 2.00              | 6                  | 40               | 0.6               | 8.00                 | 0.5            | 0.065                     | 0.140                      | X                                                                                     | X                                                                                     |
| 06R155B     | 1.55              | 2.70              | 6                  | 40               | 0.6               | 7.75                 | 2.2            | 0.040                     | 0.100                      | X                                                                                     | X                                                                                     |
| 16R090B     | 0.90              | 1.80              | 16                 | 40               | 0.6               | 8.00                 | 1.2            | 0.070                     | 0.180                      | X                                                                                     | X                                                                                     |
| 16R110B     | 1.10              | 2.20              | 16                 | 40               | 0.7               | 8.00                 | 2.3            | 0.050                     | 0.140                      | X                                                                                     | X                                                                                     |
| 16R135B     | 1.35              | 2.70              | 16                 | 40               | 0.8               | 8.00                 | 4.5            | 0.040                     | 0.120                      | X                                                                                     | X                                                                                     |
| 16R160B     | 1.60              | 3.20              | 16                 | 40               | 0.9               | 8.00                 | 9.0            | 0.030                     | 0.110                      | X                                                                                     | X                                                                                     |
| 16R185B     | 1.85              | 3.70              | 16                 | 40               | 1.0               | 8.00                 | 10.0           | 0.030                     | 0.090                      | X                                                                                     | X                                                                                     |
| 16R250B     | 2.50              | 5.00              | 16                 | 40               | 1.2               | 8.00                 | 40.0           | 0.020                     | 0.060                      | X                                                                                     | X                                                                                     |

$I_{hold}$  = 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 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 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 or reflow soldering of 260°C for 20 sec.

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

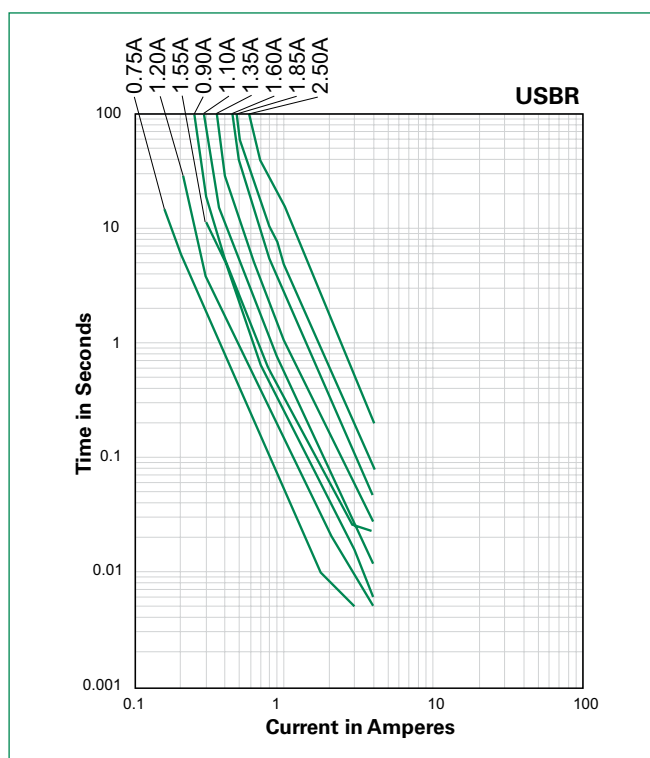
### WARNING

- 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.

## Temperature Derating

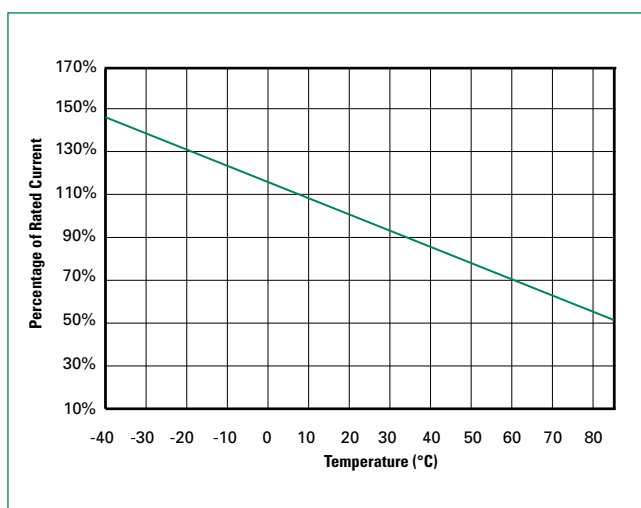
| Part Number      | Ambient Operation Temperature |       |      |      |      |      |      |      |      |
|------------------|-------------------------------|-------|------|------|------|------|------|------|------|
|                  | -40°C                         | -20°C | 0°C  | 20°C | 40°C | 50°C | 60°C | 70°C | 85°C |
| Hold Current (A) |                               |       |      |      |      |      |      |      |      |
| 06R075B          | 1.05                          | 0.95  | 0.85 | 0.75 | 0.65 | 0.60 | 0.55 | 0.50 | 0.43 |
| 06R120B          | 1.69                          | 1.52  | 1.36 | 1.20 | 1.04 | 0.96 | 0.88 | 0.80 | 0.68 |
| 06R155B          | 2.17                          | 1.96  | 1.75 | 1.55 | 1.34 | 1.24 | 1.13 | 1.03 | 0.88 |
| 16R090B          | 1.31                          | 1.17  | 1.04 | 0.90 | 0.75 | 0.69 | 0.61 | 0.55 | 0.47 |
| 16R110B          | 1.60                          | 1.43  | 1.27 | 1.10 | 1.00 | 0.92 | 0.75 | 0.67 | 0.57 |
| 16R135B          | 1.96                          | 1.76  | 1.55 | 1.35 | 1.12 | 1.04 | 0.92 | 0.82 | 0.70 |
| 16R160B          | 2.32                          | 2.08  | 1.84 | 1.60 | 1.33 | 1.23 | 1.09 | 0.98 | 0.83 |
| 16R185B          | 2.68                          | 2.41  | 2.13 | 1.85 | 1.54 | 1.42 | 1.26 | 1.13 | 0.96 |
| 16R250B          | 3.63                          | 3.25  | 2.88 | 2.50 | 2.08 | 1.93 | 1.70 | 1.53 | 1.30 |

## Average Time Current Curves



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.

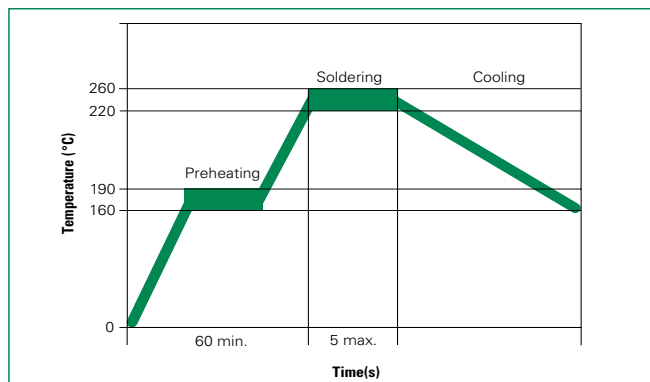
## Temperature Derating Curve



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

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## Soldering Parameters



|                         |                                                                                                                                                                                                                               |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Pre-Heating Zone</b> | Refer to the condition recommended by the flux manufacturer.<br>Max. ramping rate should not exceed 4°C/Sec.                                                                                                                  |
| <b>Soldering Zone</b>   | Max. solder temperature should not exceed 260°C<br>Time within 5°C of actual Max. solder temperature within 3 – 5 seconds<br>Total time from 25°C room to Max. solder temperature within 5 minutes including Pre-Heating time |
| <b>Cooling Zone</b>     | Cooling by natural convection in air.<br>Max. ramping down rate should not exceed 6°C/Sec.                                                                                                                                    |

## Physical Specifications

|                                  |                                                                    |
|----------------------------------|--------------------------------------------------------------------|
| <b>Lead Material</b>             | .90-2.50A: Tin-plated Copper clad steel<br>.75A: Tin-plated Copper |
| <b>Soldering Characteristics</b> | Solderability per MIL-STD-202, Method 208                          |
| <b>Insulating Material</b>       | Cured, flame retardant epoxy polymer meets UL 94V-0 requirements.  |
| <b>Device Labeling</b>           | Marked with 'LF', voltage, current rating, and date code.          |

## Dimensions (mm)

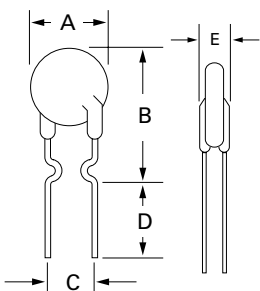


Figure 1

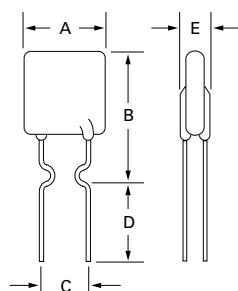


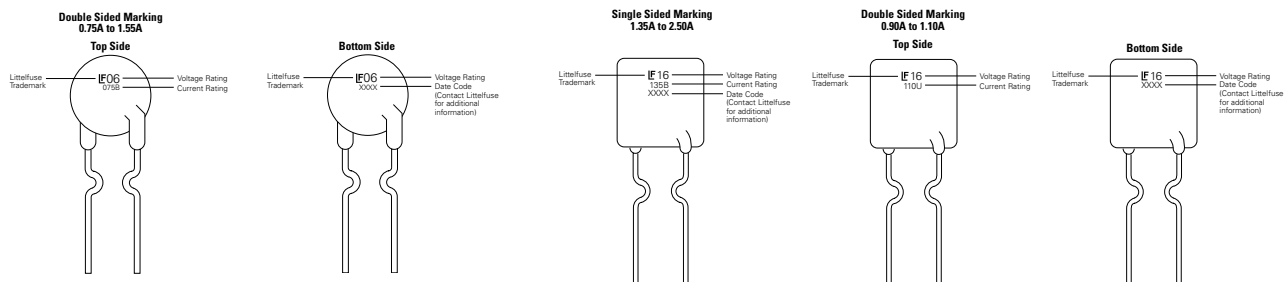
Figure 2

## Environmental Specifications

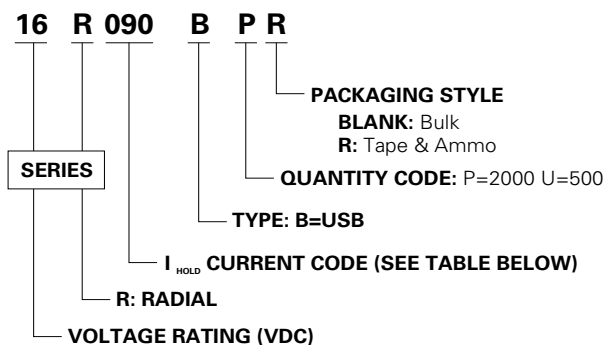
|                                                            |                                                                |
|------------------------------------------------------------|----------------------------------------------------------------|
| <b>Operating/Storage Temperature</b>                       | -40°C to +85°C                                                 |
| <b>Maximum Device Surface Temperature in Tripped State</b> | 125°C                                                          |
| <b>Passive Aging</b>                                       | +85°C, 1000 hours<br>-/+5% typical resistance change           |
| <b>Humidity Aging</b>                                      | +85°C, 85% R.H., 1000 hours<br>-/+5% typical resistance change |
| <b>Thermal Shock</b>                                       | +85°C to -40°C 10 times<br>30% typical resistance change       |
| <b>Solvent Resistance</b>                                  | MIL-STD-202, Method 215                                        |
| <b>Moisture Sensitivity Level</b>                          | Level 1, J-STD-020                                             |

| 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   |          |
| 06R075B     | 1      | 0.27   | 6.9  | 0.45   | 11.4 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3    | 0.020                    | 0.51 | Sn/Cu    |
| 06R120B     | 1      | 0.27   | 6.9  | 0.46   | 11.7 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3    | 0.020                    | 0.51 | Sn/CuFe  |
| 06R155B     | 1      | 0.27   | 6.9  | 0.46   | 11.7 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3    | 0.020                    | 0.51 | Sn/CuFe  |
| 16R090B     | 2      | 0.29   | 7.4  | 0.48   | 12.2 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3    | 0.020                    | 0.51 | Sn/CuFe  |
| 16R110B     | 2      | 0.29   | 7.4  | 0.56   | 14.2 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3    | 0.020                    | 0.51 | Sn/CuFe  |
| 16R135B     | 2      | 0.35   | 8.9  | 0.53   | 13.5 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3    | 0.020                    | 0.51 | Sn/CuFe  |
| 16R160B     | 2      | 0.35   | 8.9  | 0.60   | 15.2 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3    | 0.020                    | 0.51 | Sn/CuFe  |
| 16R185B     | 2      | 0.40   | 10.2 | 0.62   | 15.7 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3    | 0.020                    | 0.51 | Sn/CuFe  |
| 16R250B     | 2      | 0.45   | 11.4 | 0.72   | 18.3 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3    | 0.020                    | 0.51 | Sn/CuFe  |

## Part Marking System



## Part Ordering Number System



## Ordering Information

| Part Number | Ordering Number | $I_{hold}$ (A) | $I_{hold}$ Code | Packaging Option | Quantity | Quantity & Packaging Codes |
|-------------|-----------------|----------------|-----------------|------------------|----------|----------------------------|
| 06R075B     | 06R075BU        | 0.75           | 075             | Bulk             | 500      | U                          |
|             | 06R075BPR       |                |                 | Tape and Ammo    | 2000     | PR                         |
| 06R120B     | 06R120BU        | 1.20           | 120             | Bulk             | 500      | U                          |
|             | 06R120BPR       |                |                 | Tape and Ammo    | 2000     | PR                         |
| 06R155B     | 06R155BU        | 1.55           | 155             | Bulk             | 500      | U                          |
|             | 06R155BPR       |                |                 | Tape and Ammo    | 2000     | PR                         |
| 16R090B     | 16R090BU        | 0.90           | 090             | Bulk             | 500      | U                          |
|             | 16R090BPR       |                |                 | Tape and Ammo    | 2000     | PR                         |
| 16R110B     | 16R110BU        | 1.10           | 110             | Bulk             | 500      | U                          |
|             | 16R110BPR       |                |                 | Tape and Ammo    | 2000     | PR                         |
| 16R135B     | 16R135BU        | 1.35           | 135             | Bulk             | 500      | U                          |
|             | 16R135BPR       |                |                 | Tape and Ammo    | 2000     | PR                         |
| 16R160B     | 16R160BU        | 1.60           | 160             | Bulk             | 500      | U                          |
|             | 16R160BPR       |                |                 | Tape and Ammo    | 2000     | PR                         |
| 16R185B     | 16R185BU        | 1.85           | 185             | Bulk             | 500      | U                          |
|             | 16R185BPR       |                |                 | Tape and Ammo    | 2000     | PR                         |
| 16R250B     | 16R250BU        | 2.50           | 250             | Bulk             | 500      | U                          |
|             | 16R250BPR       |                |                 | Tape and Ammo    | 2000     | PR                         |

## 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                 | W <sub>4</sub> | W <sub>0</sub> | 11             | min.         |
| Top distance between tape edges      | W <sub>6</sub> | W <sub>2</sub> | 3              | max.         |
| Sprocket hole position               | W <sub>5</sub> | W <sub>1</sub> | 9              | -0.5 / +0.75 |
| Sprocket hole diameter*              | D <sub>0</sub> | D <sub>0</sub> | 4              | -/+ 0.32     |
| Abscissa to plane(straight lead)     | H              | H              | 18.5           | -/+ 3.0      |
| Abscissa to plane(kinked lead)       | H <sub>0</sub> | H <sub>0</sub> | 16             | -/+ 0.5      |
| Abscissa to top                      | H <sub>1</sub> | H <sub>1</sub> | 32.2           | max.         |
| Overall width w/o lead protrusion    | C <sub>1</sub> | -              | 42.5           | max.         |
| Overall width w/ lead protrusion     | C <sub>2</sub> | -              | 43.2           | max.         |
| Lead protrusion                      | L <sub>1</sub> | l <sub>1</sub> | 1.0            | max.         |
| Protrusion of cut out                | L              | L              | 11             | max.         |
| Protrusion beyond hold-down tape     | l <sub>2</sub> | l <sub>2</sub> | Not specified  | -            |
| Sprocket hole pitch                  | P <sub>0</sub> | P <sub>0</sub> | 12.7           | -/+ 0.35     |
| Pitch tolerance                      | -              | -              | 20 consecutive | -/+ 1        |
| Device pitch                         | -              | -              | 12.7           | -            |
| Tape thickness                       | t              | t              | 0.9            | max.         |
| Tape thickness with splice           | t <sub>1</sub> | -              | 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* | P <sub>1</sub> | P <sub>1</sub> | 3.81           | -/+ 1.0      |
| Lead spacing*                        | F              | F              | 5.08           | -/+ 0.8      |

\*Differs from EIA specification.

## Tape and Ammo Diagram

