

### 72R Series



#### Description

The 72R Series is designed to provide overcurrent protection to 72Vdc maximum voltage with a maximum 40A short circuit rating.

#### Features

- 72Vdc max voltage w/max 40A short circuit rating
- RoHS compliant, Lead-Free and Halogen Free\*
- Resettable feature
- Ideal for a broad range of general electronics using a low voltage power supply

#### Applications

- Load protection on wide range of low voltage power supplies
- Computers
- Computer peripherals
- General electronics

#### Agency Approvals

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

#### Electrical Characteristics

| Part Number | I <sub>hold</sub> (A) | I <sub>trip</sub> (A) | V <sub>max</sub> (Vdc) | I <sub>max</sub> (A) | P <sub>d</sub> typ. (W) | Maximum Time To Trip |             | Resistance           |                       | Agency Approvals  |   |
|-------------|-----------------------|-----------------------|------------------------|----------------------|-------------------------|----------------------|-------------|----------------------|-----------------------|---|---|
|             |                       |                       |                        |                      |                         | Current (A)          | Time (Sec.) | R <sub>min</sub> (Ω) | R <sub>1max</sub> (Ω) |  |  |
| 72R020X     | 0.20                  | 0.40                  | 72                     | 40                   | 0.41                    | 1.00                 | 2.20        | 1.830                | 4.400                 | X   | X   |
| 72R025X     | 0.25                  | 0.50                  | 72                     | 40                   | 0.45                    | 1.25                 | 2.50        | 1.250                | 3.000                 | X   | X   |
| 72R030X     | 0.30                  | 0.60                  | 72                     | 40                   | 0.49                    | 1.50                 | 3.00        | 0.880                | 2.100                 | X   | X   |
| 72R040X     | 0.40                  | 0.80                  | 72                     | 40                   | 0.56                    | 2.00                 | 3.80        | 0.550                | 1.290                 | X   | X   |
| 72R050X     | 0.50                  | 1.00                  | 72                     | 40                   | 0.77                    | 2.50                 | 4.00        | 0.500                | 1.170                 | X   | X   |
| 72R065X     | 0.65                  | 1.30                  | 72                     | 40                   | 0.88                    | 3.25                 | 5.30        | 0.310                | 0.720                 | X   | X   |
| 72R075X     | 0.75                  | 1.50                  | 72                     | 40                   | 0.92                    | 3.75                 | 6.30        | 0.250                | 0.600                 | X   | X   |
| 72R090X     | 0.90                  | 1.80                  | 72                     | 40                   | 0.99                    | 4.50                 | 7.20        | 0.200                | 0.470                 | X   | X   |
| 72R110X     | 1.10                  | 2.20                  | 72                     | 40                   | 1.50                    | 5.50                 | 8.20        | 0.150                | 0.380                 | X   | X   |
| 72R135X     | 1.35                  | 2.70                  | 72                     | 40                   | 1.70                    | 6.75                 | 9.60        | 0.120                | 0.300                 | X   | X   |
| 72R160X     | 1.60                  | 3.20                  | 72                     | 40                   | 1.90                    | 8.00                 | 11.40       | 0.090                | 0.220                 | X   | X   |
| 72R185X     | 1.85                  | 3.70                  | 72                     | 40                   | 2.10                    | 9.25                 | 12.60       | 0.080                | 0.190                 | X   | X   |
| 72R250X     | 2.50                  | 5.00                  | 72                     | 40                   | 2.50                    | 12.50                | 15.60       | 0.050                | 0.130                 | X   | X   |
| 72R300X     | 3.00                  | 6.00                  | 72                     | 40                   | 2.80                    | 15.00                | 19.80       | 0.040                | 0.100                 | X   | X   |
| 72R375X     | 3.75                  | 7.50                  | 72                     | 40                   | 3.20                    | 18.75                | 24.00       | 0.030                | 0.080                 | X   | X   |

I<sub>hold</sub> = Hold current: maximum current device will pass without tripping in 20°C still air.

I<sub>trip</sub> = Trip current: minimum current at which the device will trip in 20°C still air.

V<sub>max</sub> = Maximum voltage device can withstand without damage at rated current (I<sub>max</sub>)

I<sub>max</sub> = Maximum fault current device can withstand without damage at rated voltage (V<sub>max</sub>)

P<sub>d</sub> = Power dissipated from device when in the tripped state at 20°C still air.

R<sub>min</sub> = Minimum resistance of device in initial (un-soldered) state.

R<sub>1max</sub> = 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.

\* Effective January 1, 2010, all 72R PTC products will be manufactured Halogen Free (HF). Existing Non-Halogen Free 72R PTC products may continue to be sold, until supplies are depleted.

### 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)              |       |      |      |      |      |      |      |      |
| 72R020X     | 0.31                          | 0.27  | 0.24 | 0.20 | 0.16 | 0.14 | 0.13 | 0.11 | 0.08 |
| 72R025X     | 0.39                          | 0.34  | 0.30 | 0.25 | 0.20 | 0.18 | 0.16 | 0.14 | 0.10 |
| 72R030X     | 0.47                          | 0.41  | 0.36 | 0.30 | 0.24 | 0.22 | 0.19 | 0.16 | 0.12 |
| 72R040X     | 0.62                          | 0.54  | 0.48 | 0.40 | 0.32 | 0.29 | 0.25 | 0.22 | 0.16 |
| 72R050X     | 0.78                          | 0.68  | 0.60 | 0.50 | 0.41 | 0.36 | 0.32 | 0.27 | 0.20 |
| 72R065X     | 1.01                          | 0.88  | 0.77 | 0.65 | 0.53 | 0.47 | 0.41 | 0.35 | 0.26 |
| 72R075X     | 1.16                          | 1.02  | 0.89 | 0.75 | 0.61 | 0.54 | 0.47 | 0.41 | 0.30 |
| 72R090X     | 1.40                          | 1.22  | 1.07 | 0.90 | 0.73 | 0.65 | 0.57 | 0.49 | 0.36 |
| 72R110X     | 1.71                          | 1.50  | 1.31 | 1.10 | 0.89 | 0.79 | 0.69 | 0.59 | 0.44 |
| 72R135X     | 2.09                          | 1.84  | 1.61 | 1.35 | 1.09 | 0.97 | 0.85 | 0.73 | 0.54 |
| 72R160X     | 2.48                          | 2.18  | 1.90 | 1.60 | 1.30 | 1.15 | 1.01 | 0.86 | 0.64 |
| 72R185X     | 2.87                          | 2.52  | 2.20 | 1.85 | 1.50 | 1.33 | 1.17 | 1.00 | 0.74 |
| 72R250X     | 3.88                          | 3.40  | 2.98 | 2.50 | 2.03 | 1.80 | 1.58 | 1.35 | 1.00 |
| 72R300X     | 4.65                          | 4.08  | 3.57 | 3.00 | 2.43 | 2.16 | 1.89 | 1.62 | 1.20 |
| 72R375X     | 5.81                          | 5.10  | 4.46 | 3.75 | 3.04 | 2.70 | 2.36 | 2.03 | 1.50 |

### 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

**Soldering Parameters - Wave Soldering**

|                         |   |
|-------------------------|---|
| <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>             | 0.20-0.40A: Tin-plated Copper clad steel<br>0.50-3.75A: 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>Lead Solderability</b>        | Marked with 'LF', voltage, current rating, and date code.                 |

**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>-/+5% typical resistance change    |
| <b>Solvent Resistance</b>                                  | MIL-STD-202, Method 215                                       |
| <b>Moisture Sensitivity Level</b>                          | Level 1, J-STD-020  |

**Additional Information**



**Datasheet**



**Resources**



**Samples**

### Dimensions



### Part Marking System



| Part Number | A      |       | B      |      | C      |      | D      |      | E      |      | F      |      | Physical Characteristics |      |          |
|-------------|--------|-------|--------|------|--------|------|--------|------|--------|------|--------|------|--------------------------|------|----------|
|             | Inches | mm    | Inches | mm   | Inches | mm   | Inches | mm   | Inches | mm   | Inches | mm   | Lead (dia)               |      | Material |
|             | Max.   | Max.  | Max.   | Max. | Typ.   | Typ. | Min.   | Min. | Max.   | Max. | Typ.   | Typ. | Inches                   | mm   |          |
| 72R020X     | 0.29   | 7.4   | 0.46   | 11.7 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.047  | 1.2  | 0.02                     | 0.51 | Sn/CuFe  |
| 72R025X     | 0.29   | 7.4   | 0.50   | 12.7 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.047  | 1.2  | 0.02                     | 0.51 | Sn/CuFe  |
| 72R030X     | 0.29   | 7.4   | 0.50   | 12.7 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.047  | 1.2  | 0.02                     | 0.51 | Sn/CuFe  |
| 72R040X     | 0.30   | 7.6   | 0.53   | 13.5 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.047  | 1.2  | 0.02                     | 0.51 | Sn/CuFe  |
| 72R050X     | 0.31   | 7.9   | 0.54   | 13.7 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.047  | 1.2  | 0.02                     | 0.51 | Sn/Cu    |
| 72R065X     | 0.37   | 9.4   | 0.57   | 14.5 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.047  | 1.2  | 0.02                     | 0.51 | Sn/Cu    |
| 72R075X     | 0.40   | 10.2  | 0.60   | 15.2 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.047  | 1.2  | 0.02                     | 0.51 | Sn/Cu    |
| 72R090X     | 0.44   | 11.2  | 0.62   | 15.8 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.047  | 1.2  | 0.02                     | 0.51 | Sn/Cu    |
| 72R110X     | 0.51   | 13.0  | 0.72   | 18.2 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.055  | 1.4  | 0.03                     | 0.81 | Sn/Cu    |
| 72R135X     | 0.53   | 13.58 | 0.78   | 19.8 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.055  | 1.4  | 0.03                     | 0.81 | Sn/Cu    |
| 72R160X     | 0.60   | 15.36 | 0.85   | 21.6 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.055  | 1.4  | 0.03                     | 0.81 | Sn/Cu    |
| 72R185X     | 0.66   | 16.76 | 0.91   | 23.0 | 0.20   | 5.1  | 0.30   | 7.6  | 0.12   | 3.1  | 0.055  | 1.4  | 0.03                     | 0.81 | Sn/Cu    |
| 72R250X     | 0.78   | 19.93 | 1.03   | 26.2 | 0.40   | 10.2 | 0.30   | 7.6  | 0.12   | 3.1  | 0.055  | 1.4  | 0.03                     | 0.81 | Sn/Cu    |
| 72R300X     | 0.91   | 23.11 | 1.15   | 29.3 | 0.40   | 10.2 | 0.30   | 7.6  | 0.12   | 3.1  | 0.055  | 1.4  | 0.03                     | 0.81 | Sn/Cu    |
| 72R375X     | 1.04   | 26.3  | 1.22   | 31.1 | 0.40   | 10.2 | 0.30   | 7.6  | 0.12   | 3.1  | 0.055  | 1.4  | 0.03                     | 0.81 | Sn/Cu    |

### Part Ordering Number System



### Packaging

| Part Number | Ordering Part Number | $I_{hold}$ (A) | $I_{hold}$ Code | Packaging Option | Quantity | Quantity & Packaging Codes |
|-------------|----------------------|----------------|-----------------|------------------|----------|----------------------------|
| 72R020X     | 72R020XU             | 0.20           | 020             | Bulk             | 500      | U                          |
|             | 72R020XPR            |                |                 | Tape and Ammo    | 2000     | PR                         |
| 72R025X     | 72R025XU             | 0.25           | 025             | Bulk             | 500      | U                          |
|             | 72R025XPR            |                |                 | Tape and Ammo    | 2000     | PR                         |
| 72R030X     | 72R030XU             | 0.30           | 030             | Bulk             | 500      | U                          |
|             | 72R030XPR            |                |                 | Tape and Ammo    | 2000     | PR                         |
| 72R040X     | 72R040XU             | 0.40           | 040             | Bulk             | 500      | U                          |
|             | 72R040XPR            |                |                 | Tape and Ammo    | 2000     | PR                         |
| 72R050X     | 72R050XU             | 0.50           | 050             | Bulk             | 500      | U                          |
|             | 72R050XPR            |                |                 | Tape and Ammo    | 2000     | PR                         |
| 72R065X     | 72R065XU             | 0.65           | 065             | Bulk             | 500      | U                          |
|             | 72R065XPR            |                |                 | Tape and Ammo    | 2000     | PR                         |
| 72R075X     | 72R075XU             | 0.75           | 075             | Bulk             | 500      | U                          |
|             | 72R075XPR            |                |                 | Tape and Ammo    | 2000     | PR                         |
| 72R090X     | 72R090XU             | 0.90           | 090             | Bulk             | 500      | U                          |
|             | 72R090XPR            |                |                 | Tape and Ammo    | 2000     | PR                         |
| 72R110X     | 72R110XU             | 1.10           | 110             | Bulk             | 500      | U                          |
|             | 72R110XMR            |                |                 | Tape and Ammo    | 1000     | MR                         |
| 72R135X     | 72R135XF             | 1.35           | 135             | Bulk             | 200      | F                          |
|             | 72R135XMR            |                |                 | Tape and Ammo    | 1000     | MR                         |
| 72R160X     | 72R160XF             | 1.60           | 160             | Bulk             | 200      | F                          |
|             | 72R160XMR            |                |                 | Tape and Ammo    | 1000     | MR                         |
| 72R185X     | 72R185XF             | 1.85           | 185             | Bulk             | 200      | F                          |
|             | 72R185XMR            |                |                 | Tape and Ammo    | 1000     | MR                         |
| 72R250X     | 72R250XF             | 2.50           | 250             | Bulk             | 200      | F                          |
|             | 72R250XMR            |                |                 | Tape and Ammo    | 1000     | MR                         |
| 72R300X     | 72R300XF             | 3.00           | 300             | Bulk             | 200      | F                          |
|             | 72R300XMR            |                |                 | Tape and Ammo    | 1000     | MR                         |
| 72R375X     | 72R375XH             | 3.75           | 375             | 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  | <b>W</b>             | <b>W</b>             | 18              | -0.5 / +1.0  |
| Hold down tape width                                      | <b>W<sub>4</sub></b> | <b>W<sub>0</sub></b> | 11              | min.         |
| Top distance between tape edges                           | <b>W<sub>6</sub></b> | <b>W<sub>2</sub></b> | 3               | max.         |
| Sprocket hole position                                    | <b>W<sub>5</sub></b> | <b>W<sub>1</sub></b> | 9               | -0.5 / +0.75 |
| Sprocket hole diameter*                                   | <b>D<sub>0</sub></b> | <b>D<sub>0</sub></b> | 4               | -0.32 / +0.2 |
| Abscissa to plane (straight lead)                         | <b>H</b>             | <b>H</b>             | 18.5            | -/+ 3.0      |
| Abscissa to plane (kinked lead)                           | <b>H<sub>0</sub></b> | <b>H<sub>0</sub></b> | 16              | -/+ 0.5      |
| Abscissa to top 72R020X-72R090X                           | <b>H<sub>1</sub></b> | <b>H<sub>1</sub></b> | 32.2            | max.         |
| Abscissa to top 72R110X-72R300X                           | <b>H<sub>1</sub></b> |                      | 47.5            | max.         |
| Overall width without lead protrusion:<br>72R020X-72R090X | <b>C<sub>1</sub></b> |                      | 42.5            | max.         |
| Overall width without lead protrusion:<br>72R110X-72R300X |                      |                      | 57              |              |
| Overall width with lead protrusion:<br>72R020X-72R090X    | <b>C<sub>2</sub></b> |                      | 43.2            | max.         |
| Overall width with lead protrusion:<br>72R110X-72R300X    |                      | <b>58</b>            |                 |              |
| Lead protrusion   | <b>L<sub>1</sub></b> | <b>I<sub>1</sub></b> | 1.0             | max.         |
| Protrusion of cut out                                     | <b>L</b>             | <b>L</b>             | 11              | max.         |
| Protrusion beyond hold-down tape                          | <b>I<sub>2</sub></b> | <b>I<sub>2</sub></b> | Not specified   |              |
| Sprocket hole pitch: 72R020X-72R090X                      | <b>P<sub>0</sub></b> | <b>P<sub>0</sub></b> | 12.7            | -/+ 0.3      |
| Sprocket hole pitch: 72R110X-72R300X                      | <b>P<sub>0</sub></b> | <b>P<sub>0</sub></b> | 25.4            | -/+ 0.5      |
| Pitch tolerance   |                      |                      | 20 consecutive. | -/+ 1        |
| Device pitch: 72R020X-72R090X                             |                      |                      | 12.7            |              |
| Device pitch: 72R110X-72R300X                             |                      |                      | 25.4            |              |
| Tape thickness  | <b>t</b>             | <b>t</b>             | 0.9             | max.         |
| Tape thickness with splice                                | <b>t<sub>1</sub></b> |                      | 2.0             | max.         |
| Splice sprocket hole alignment                            |                      |                      | 0               | -/+ 0.3      |
| Body lateral deviation                                    | <b>Δh</b>            | <b>Δh</b>            | 0               | -/+ 1.0      |
| Body tape plane deviation                                 | <b>Δp</b>            | <b>Δp</b>            | 0               | -/+ 1.3      |
| Ordinate to adjacent component lead*:<br>72R020X-72R090X  | <b>P<sub>1</sub></b> | <b>P<sub>1</sub></b> | 3.81            | -/+ 0.7      |
| Ordinate to adjacent component lead*:<br>72R110X-72R300X  |                      |                      | 7.62            | -/+ 0.7      |
| Lead spacing: 72R020X-72R185X                             | <b>F</b>             | <b>F</b>             | 5.08            | -/+ 0.8      |
| Lead spacing: 72R250X-72R300X                             | <b>F</b>             | <b>F</b>             | 10.18           | -/+ 0.8      |

\*Differs from EIA Specification

**Tape and Ammo Diagram**

**Figure 1**



**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.

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