

## Radial Lead Resettable Polymer PTCs

### JK60 Series

#### Description

JK60 series radial leaded PTCs are designed to provide over-current protection for low voltage ( $\leq 60V$ ) applications where space is not a concern and resettable protection is preferred.

#### Features

- u Cured, flame retardant epoxy polymer meets UL 94V-0 requirements
- u 60V operating voltage
- u Fast time-to-trip
- u RoHS compliant, Lead-Free and Halogen-Free

#### Applicable

- u USB hubs ,ports and peripherals
- u Power ports
- u IEEE1394 ports
- u Motor protection
- u Automotive application
- u Computers and peripherals
- u General electronics



#### Electrical Parameters

| Part Number | $I_{hold}$ (A) | $I_{trip}$ (A) | $V_{max}$ (Vdc) | $I_{max}$ (A) | $P_{dtyp.}$ (W) | Maximum Time To Trip |             | Resistance             |                        |                         |
|-------------|----------------|----------------|-----------------|---------------|-----------------|----------------------|-------------|------------------------|------------------------|-------------------------|
|             |                |                |                 |               |                 | Current (A)          | Time (Sec.) | $R_{min}$ ( $\Omega$ ) | $R_{max}$ ( $\Omega$ ) | $R_{1max}$ ( $\Omega$ ) |
| JK60-005    | 0.05           | 0.10           | 60              | 40            | 0.30            | 0.25                 | 5.0         | 7.30                   | 20.00                  | 30.00                   |
| JK60-010    | 0.10           | 0.20           | 60              | 40            | 0.38            | 0.50                 | 5.0         | 2.50                   | 7.50                   | 12.00                   |
| JK60-017    | 0.17           | 0.34           | 60              | 40            | 0.48            | 0.85                 | 5.0         | 2.00                   | 5.21                   | 8.00                    |
| JK60-020    | 0.20           | 0.40           | 60              | 40            | 0.41            | 1.00                 | 5.0         | 1.50                   | 2.84                   | 4.50                    |
| JK60-025    | 0.25           | 0.50           | 60              | 40            | 0.45            | 1.25                 | 5.0         | 1.00                   | 1.95                   | 3.00                    |
| JK60-030    | 0.30           | 0.60           | 60              | 40            | 0.49            | 1.50                 | 5.0         | 0.76                   | 1.38                   | 2.20                    |
| JK60-040    | 0.40           | 0.80           | 60              | 40            | 0.56            | 2.00                 | 5.0         | 0.55                   | 0.88                   | 1.40                    |
| JK60-050    | 0.50           | 1.00           | 60              | 40            | 0.77            | 2.50                 | 5.0         | 0.50                   | 0.79                   | 1.20                    |
| JK60-065    | 0.65           | 1.30           | 60              | 40            | 0.88            | 3.25                 | 5.0         | 0.31                   | 0.50                   | 0.74                    |
| JK60-075    | 0.75           | 1.50           | 60              | 40            | 0.92            | 3.75                 | 5.0         | 0.25                   | 0.42                   | 0.62                    |
| JK60-090    | 0.90           | 1.80           | 60              | 40            | 0.99            | 4.50                 | 5.0         | 0.20                   | 0.33                   | 0.49                    |
| JK60-110    | 1.10           | 2.20           | 60              | 40            | 1.50            | 5.50                 | 8.0         | 0.15                   | 0.27                   | 0.40                    |
| JK60-135    | 1.35           | 2.70           | 60              | 40            | 1.70            | 6.75                 | 8.0         | 0.12                   | 0.21                   | 0.32                    |
| JK60-160    | 1.60           | 3.20           | 60              | 40            | 1.90            | 8.00                 | 8.0         | 0.09                   | 0.16                   | 0.24                    |
| JK60-185    | 1.85           | 3.70           | 60              | 40            | 2.10            | 9.25                 | 8.0         | 0.08                   | 0.14                   | 0.21                    |
| JK60-200    | 2.00           | 4.00           | 60              | 40            | 2.20            | 10.00                | 8.0         | 0.07                   | 0.14                   | 0.16                    |
| JK60-250    | 2.50           | 5.00           | 60              | 40            | 2.50            | 12.50                | 8.0         | 0.05                   | 0.10                   | 0.15                    |
| JK60-300    | 3.00           | 6.00           | 60              | 40            | 2.80            | 15.00                | 8.0         | 0.04                   | 0.08                   | 0.12                    |
| JK60-375    | 3.75           | 7.50           | 60              | 40            | 3.20            | 18.75                | 24.0        | 0.03                   | 0.06                   | 0.10                    |
| JK60-500    | 5.00           | 10.00          | 60              | 40            | 4.20            | 25.00                | 24.0        | 0.02                   | 0.06                   | 0.10                    |

$I_{hold}$  = Hold current: maximum current device will pass without tripping in 25°C still air.

$I_{trip}$  = Trip current: minimum current at which the device will trip in 25°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 ( $V_{max}$ )

$P_{dtyp.}$  = Power dissipated from device when in the tripped state at 25°C still air.

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

$R_{max}$  = Maximum resistance of device in initial (un-soldered) state.

$R_{1max}$  = Maximum resistance of device at 25°C measured one hour after tripping.

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

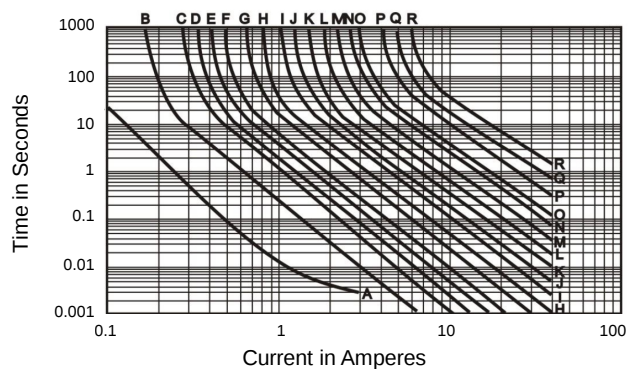
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#### Temperature Derating Chart – $I_{hold}$ (A)

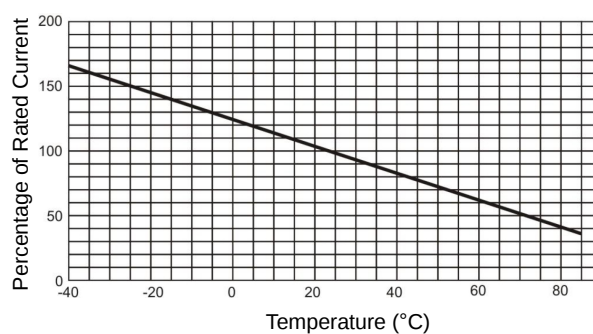
| Part Number | Ambient Operation Temperature |       |      |      |      |       |       |       |      |
|-------------|-------------------------------|-------|------|------|------|-------|-------|-------|------|
|             | -40°C                         | -20°C | 0°C  | 25°C | 40°C | 50°C  | 60°C  | 70°C  | 85°C |
|             | Hold Current (A)              |       |      |      |      |       |       |       |      |
| JK60-005    | 0.078                         | 0.068 | 0.06 | 0.05 | 0.04 | 0.036 | 0.032 | 0.027 | 0.02 |
| JK60-010    | 0.16                          | 0.14  | 0.12 | 0.10 | 0.08 | 0.072 | 0.063 | 0.054 | 0.04 |
| JK60-017    | 0.26                          | 0.23  | 0.20 | 0.17 | 0.14 | 0.12  | 0.11  | 0.09  | 0.07 |
| JK60-020    | 0.31                          | 0.27  | 0.24 | 0.20 | 0.16 | 0.14  | 0.13  | 0.11  | 0.08 |
| JK60-025    | 0.39                          | 0.34  | 0.30 | 0.25 | 0.20 | 0.18  | 0.16  | 0.14  | 0.10 |
| JK60-030    | 0.47                          | 0.41  | 0.36 | 0.30 | 0.24 | 0.22  | 0.20  | 0.16  | 0.12 |
| JK60-040    | 0.62                          | 0.54  | 0.48 | 0.40 | 0.32 | 0.29  | 0.25  | 0.22  | 0.16 |
| JK60-050    | 0.78                          | 0.68  | 0.60 | 0.50 | 0.41 | 0.36  | 0.32  | 0.27  | 0.20 |
| JK60-065    | 1.01                          | 0.88  | 0.77 | 0.65 | 0.53 | 0.47  | 0.41  | 0.35  | 0.26 |
| JK60-075    | 1.16                          | 1.02  | 0.89 | 0.75 | 0.61 | 0.54  | 0.47  | 0.41  | 0.30 |
| JK60-090    | 1.40                          | 1.22  | 1.07 | 0.90 | 0.73 | 0.65  | 0.57  | 0.49  | 0.36 |
| JK60-110    | 1.71                          | 1.50  | 1.31 | 1.10 | 0.89 | 0.79  | 0.69  | 0.59  | 0.44 |
| JK60-135    | 2.09                          | 1.84  | 1.61 | 1.35 | 1.09 | 0.97  | 0.85  | 0.73  | 0.54 |
| JK60-160    | 2.48                          | 2.18  | 1.90 | 1.60 | 1.30 | 1.15  | 1.01  | 0.86  | 0.64 |
| JK60-185    | 2.87                          | 2.52  | 2.20 | 1.85 | 1.50 | 1.33  | 1.17  | 1.00  | 0.74 |
| JK60-250    | 3.88                          | 3.40  | 2.98 | 2.50 | 2.03 | 1.80  | 1.58  | 1.35  | 1.00 |
| JK60-300    | 4.65                          | 4.08  | 3.57 | 3.00 | 2.43 | 2.16  | 1.89  | 1.62  | 1.20 |
| JK60-375    | 5.81                          | 5.10  | 4.46 | 3.75 | 3.04 | 2.70  | 2.36  | 2.03  | 1.50 |

#### Average Time Current Curves



|            |            |            |
|------------|------------|------------|
| A=JK60-005 | G=JK60-040 | M=JK60-135 |
| B=JK60-010 | H=JK60-050 | N=JK60-160 |
| C=JK60-017 | I=JK60-065 | O=JK60-185 |
| D=JK60-020 | J=JK60-075 | P=JK60-250 |
| E=JK60-025 | K=JK60-090 | Q=JK60-300 |
| F=JK60-030 | L=JK60-110 | R=JK60-375 |

#### Temperature Derating Curve



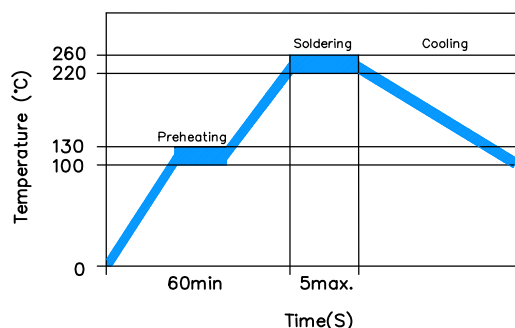
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#### Test Procedures and Requirement

| Test            | Test Conditions                              | Accept/Reject Criteria        |
|-----------------|----------------------------------------------|-------------------------------|
| Resistance      | In still air @25±2°C                         | $R_{min} \leq R \leq R_{max}$ |
| Hold Current    | 60 min, at $I_{hold}$ , In still air @25±2°C | No trip                       |
| Time to Trip    | Specified current, $V_{max}$ , @25±2°C       | $T \leq$ Maximum Time To Trip |
| Trip Cycle Life | $V_{max}$ , $I_{max}$ , 100 cycles           | No arcing or burning          |
| Trip Endurance  | $V_{max}$ , 24 hours                         | No arcing or burning          |

#### Soldering Parameters



|                         |                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Pre-Heating Zone</b> | Refer to the condition recommended by the manufacturer. Max. ramping rate should not exceed 4°C/Sec |
| <b>Soldering Zone</b>   | Max. solder temperature should not exceed 260°C                                                     |
| <b>Cooling Zone</b>     | Cooling by natural convection in air                                                                |

#### Physical Specifications

|                                  |                                                                      |
|----------------------------------|----------------------------------------------------------------------|
| <b>Lead Material</b>             | 0.05-0.4A Tin-plated Copper clad steel<br>0.5-5.0A Tin-plated Copper |
| <b>Soldering Characteristics</b> | Solder ability per MIL-STD-202, Method 208E                          |
| <b>Insulating Material</b>       | Cured, flame retardant epoxy polymer meets UL 94V-0 requirements.    |
| <b>Device Labeling</b>           | Marked with 'UN', voltage, current rating                            |

#### Part Numbering

#### Part Marking

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#### Dimensions

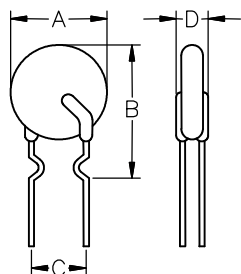


Figure1

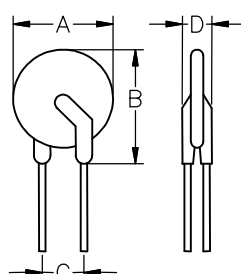


Figure2

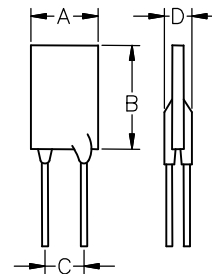


Figure3

| Part Number | Figure     | A       | B       | C       | D       | Lead (dia) |     | Packaging (Bulk Pack) |
|-------------|------------|---------|---------|---------|---------|------------|-----|-----------------------|
|             |            | mm Max. | mm Max. | mm Typ. | mm Max. | Inches     | Mm  |                       |
| JK60-005    | Figure1(2) | 5.0     | 8.5     | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-010    | Figure1(2) | 5.5     | 9.5     | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-017    | Figure1(2) | 7.4     | 12.7    | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-020    | Figure1(2) | 7.4     | 12.7    | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-025    | Figure1(2) | 7.4     | 12.7    | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-030    | Figure1(2) | 7.4     | 13.0    | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-040    | Figure1    | 7.8     | 13.5    | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-050    | Figure1    | 7.8     | 13.5    | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-065    | Figure1    | 9.7     | 14.5    | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-075    | Figure1    | 10.4    | 15.2    | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-090    | Figure1    | 11.7    | 15.8    | 5.1     | 3.1     | 0.020      | 0.5 | 1000                  |
| JK60-110    | Figure2(3) | 13.0    | 18.0    | 5.1     | 3.1     | 0.031      | 0.8 | 1000                  |
| JK60-135    | Figure2    | 14.5    | 19.6    | 5.1     | 3.1     | 0.031      | 0.8 | 1000                  |
| JK60-160    | Figure2    | 16.3    | 21.3    | 5.1     | 3.1     | 0.031      | 0.8 | 500                   |
| JK60-185    | Figure2    | 17.8    | 22.9    | 5.1     | 3.1     | 0.031      | 0.8 | 500                   |
| JK60-200    | Figure2    | 17.8    | 22.9    | 5.1     | 3.1     | 0.031      | 0.8 | 500                   |
| JK60-250    | Figure2    | 21.3    | 26.4    | 10.5    | 3.1     | 0.031      | 0.8 | 500                   |
| JK60-300    | Figure2    | 21.3    | 26.4    | 10.5    | 3.1     | 0.031      | 0.8 | 200                   |
| JK60-375    | Figure2    | 28.5    | 33.5    | 10.5    | 3.1     | 0.031      | 0.8 | 200                   |
| JK60-500    | Figure2    | 28.5    | 33.5    | 10.5    | 3.1     | 0.031      | 0.8 | 200                   |

#### Warning



- u This product should not be used in an application where the maximum interrupt voltage or maximum interrupt current in a fault condition. Operation beyond the maximum rating or improper use may result in device damage and possible electrical arcing and flame.
- u A PPTC device is not a fuse. It is a nonlinear thermistor that limits current. Because under a fault condition all PPTC devices go into a high resistance state but not open circuit hazardous voltage may be present at PPTC.
- u The devices are intended for protection against occasional over-current or over-temperature fault conditions and should not be used when repeated fault conditions or prolonged trip events.
- u In most application, power must be removed and the fault condition cleared in order to reset a PPTC device.
- u PPTC devices are not recommended to be installed in applications where the device is constrained such that its PPTC properties are inhibited, for example in rigid potting materials or Add devices surface coating, Bundled devices ontology, which lack adequate clearance to accommodate device expansion.
- u Contamination on of the PPTC material with certain silicone-based oils or some aggressive solvents can adversely impact the performance of the devices. For example, Organic solvents to cleaning.