

ELECTRONICS



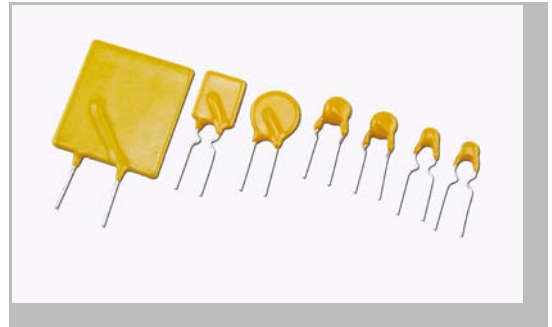
# Positive Thermal Coefficient

RL60 Series

# Positive Thermal Coefficient - RL60 Series

## Features

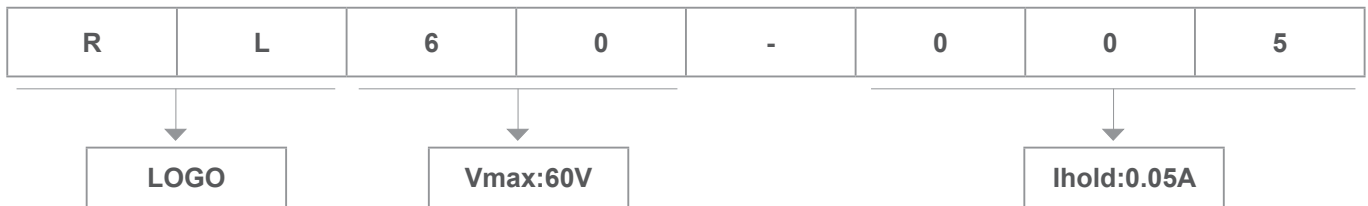
1. I(hold):0.05~500mA
2. 60V Operating voltages
3. Radial leaded devices.
4. Very high voltage surge capabilities.
5. Available in lead-free version.
6. Fast time-to-trip
7. RoHS compliant, Lead- Free and Halogen-Free



## Applications

1. Overcurrent and overtemperature
2. protection of automotive electronics
3. Hard disk drives
4. PC motherboards
5. PC peripherals
- Point-of-sale (POS) equipment
- PCMCIA cards
- USB port protection
- HDMI 1.4 Source protection
- Computers & peripherals
- General Electronics

## Product Name



# Positive Thermal Coefficient - RL60 Series

## Dimension

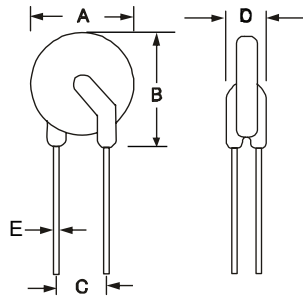


Fig.1

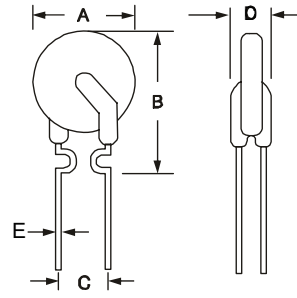


Fig.2

| Type Number | Ihold | Vmax | Itrip | I <sub>max</sub> | R <sub>max</sub> | R <sub>min</sub> | Pd <sub>typ</sub> | Package Dimensions (mm) |      |      |   |     | Circuit Figure |
|-------------|-------|------|-------|------------------|------------------|------------------|-------------------|-------------------------|------|------|---|-----|----------------|
|             | A     | V    | A     | A                | Ω                | Ω                | W                 | A                       | B    | C    | D | E   |                |
| RL60-005    | 0.05  | 60   | 0.1   | 40               | 20               | 7.3              | 0.3               | 5                       | 8.5  | 5.1  | 3 | 0.8 | Fig.1/2        |
| RL60-010    | 0.1   | 60   | 0.2   | 40               | 7.5              | 2.5              | 0.38              | 5.5                     | 9.5  | 5.1  | 3 | 0.8 | Fig.1/2        |
| RL60-017    | 0.17  | 60   | 0.34  | 40               | 5.21             | 2.84             | 0.48              | 7.4                     | 12.7 | 5.1  | 3 | 0.8 | Fig.1/2        |
| RL60-020    | 0.2   | 60   | 0.4   | 40               | 2.84             | 1.83             | 0.41              | 7.4                     | 12.7 | 5.1  | 3 | 0.8 | Fig.1/2        |
| RL60-025    | 0.25  | 60   | 0.5   | 40               | 1.95             | 1                | 0.45              | 7.4                     | 12.7 | 5.1  | 3 | 0.8 | Fig.1/2        |
| RL60-030    | 0.3   | 60   | 0.6   | 40               | 1.38             | 0.76             | 0.49              | 7.4                     | 13   | 5.1  | 3 | 0.8 | Fig.1/2        |
| RL60-040    | 0.4   | 60   | 0.8   | 40               | 0.88             | 0.55             | 0.56              | 7.8                     | 13.5 | 5.1  | 3 | 0.8 | Fig.2          |
| RL60-050    | 0.5   | 60   | 1     | 40               | 0.79             | 0.5              | 0.77              | 7.8                     | 13.5 | 5.1  | 3 | 0.8 | Fig.2          |
| RL60-065    | 0.65  | 60   | 1.3   | 40               | 0.5              | 0.31             | 0.88              | 9.7                     | 14.5 | 5.1  | 3 | 0.8 | Fig.2          |
| RL60-075    | 0.75  | 60   | 1.5   | 40               | 0.42             | 0.25             | 0.92              | 10.4                    | 15.2 | 5.1  | 3 | 0.8 | Fig.2          |
| RL60-090    | 0.9   | 60   | 1.8   | 40               | 0.33             | 0.2              | 0.99              | 11.7                    | 15.8 | 5.1  | 3 | 0.8 | Fig.2          |
| RL60-110    | 1.1   | 60   | 2.2   | 40               | 0.27             | 0.15             | 1.5               | 13                      | 18   | 5.1  | 3 | 0.8 | Fig.1          |
| RL60-135    | 1.35  | 60   | 2.7   | 40               | 0.21             | 0.12             | 1.7               | 14.5                    | 19.6 | 5.1  | 3 | 0.8 | Fig.1          |
| RL60-160    | 1.6   | 60   | 3.2   | 40               | 0.16             | 0.09             | 1.9               | 16.3                    | 21.3 | 5.1  | 3 | 0.8 | Fig.1          |
| RL60-185    | 1.85  | 60   | 3.7   | 40               | 0.14             | 0.08             | 2.1               | 17.8                    | 22.9 | 5.1  | 3 | 0.8 | Fig.1          |
| RL60-250    | 2.5   | 60   | 5     | 40               | 0.1              | 0.05             | 2.5               | 21.3                    | 26.4 | 10.5 | 3 | 0.8 | Fig.1          |
| RL60-300    | 3     | 60   | 6     | 40               | 0.08             | 0.04             | 2.8               | 21.3                    | 26.4 | 10.5 | 3 | 0.8 | Fig.1          |
| RL60-375    | 3.75  | 60   | 7.5   | 40               | 0.07             | 0.03             | 3.2               | 28.5                    | 33.5 | 10.5 | 3 | 0.8 | Fig.1          |
| RL60-500    | 5     | 60   | 10    | 40               | 0.02             | 0.03             | 4.2               | 28.5                    | 33.5 | 10.5 | 3 | 0.8 | Fig.1          |

I hold = Hold Current. Maximum current device will not trip in 25°C still air.

I trip = Trip Current. Minimum current at which the device will always trip in 25°C still air.

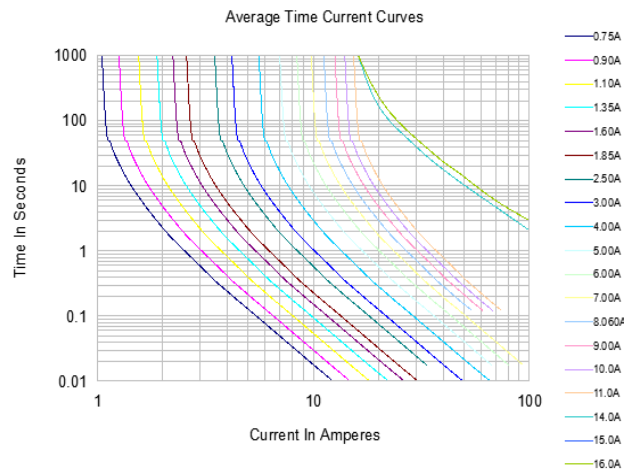
V max = Maximum operating voltage device can withstand without damage at rated current (I<sub>max</sub>).

I max = Maximum fault current device can withstand without damage at rated voltage (V max).

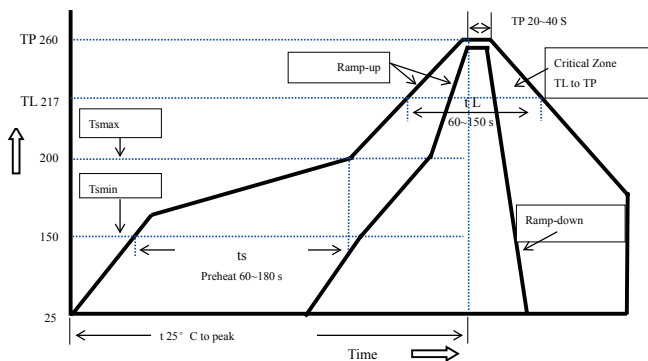
R min/max = Minimum/Maximum device resistance prior to tripping at 25°C.

# Positive Thermal Coefficient - RL60 Series

## Average Time Current Curves



## Soldering Parameters



| Profile Feature                      | Pb-Free Assembly |
|--------------------------------------|------------------|
| Average Ramp-Up Rate(Ts max to T p)  | 3°C/second mac.  |
| <b>Preheat</b>                       |                  |
| -Temperature Min(Ts min)             | 150°C            |
| -Temperature Max(Ts max)             | 200°C            |
| -Time(Ts min to Ts max)              | 60~180 seconds   |
| <b>Time maintained above:</b>        |                  |
| -Temperature(TL)                     | +217°C           |
| -Time(tL)                            | 60~150 seconds   |
| <b>Peak Temperature(Tp)</b>          | 260°C            |
| <b>Ramp-Down Rate</b>                | 6°C/second max.  |
| <b>Time 25°C to Peak Temperature</b> | 8 minutes max    |
| <b>Storage Condition</b>             | 0°C~35°C,70%RH   |

Recommended reflow methods: IR, vapor phase oven, hot air oven, N2 environment for lead-free

Recommended maximum paste thickness is 0.25mm

Devices can be cleaned using standard industry methods and solvents.

Note 1: All temperature refer to topside of the package, measured on the package body surface.

Note 2: If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

## Positive Thermal Coefficient - RL60 Series

### Ihold Versus Temperature

| Type Number | -40°C | -20°C | 0°C  | 25°C | 40°C | 50°C | 60°C | 70°C | 85°C |
|-------------|-------|-------|------|------|------|------|------|------|------|
| RL60-010    | 0.16  | 0.14  | 0.12 | 0.10 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 |
| RL60-017    | 0.26  | 0.23  | 0.20 | 0.17 | 0.14 | 0.12 | 0.11 | 0.09 | 0.07 |
| RL60-020    | 0.31  | 0.27  | 0.24 | 0.20 | 0.16 | 0.14 | 0.13 | 0.11 | 0.08 |
| RL60-025    | 0.39  | 0.34  | 0.30 | 0.25 | 0.20 | 0.18 | 0.16 | 0.14 | 0.10 |
| RL60-030    | 0.47  | 0.41  | 0.36 | 0.30 | 0.24 | 0.22 | 0.19 | 0.16 | 0.12 |
| RL60-040    | 0.62  | 0.54  | 0.48 | 0.40 | 0.32 | 0.29 | 0.25 | 0.22 | 0.16 |
| RL60-050    | 0.78  | 0.68  | 0.60 | 0.50 | 0.41 | 0.36 | 0.32 | 0.27 | 0.20 |
| RL60-065    | 1.01  | 0.88  | 0.77 | 0.65 | 0.53 | 0.47 | 0.41 | 0.35 | 0.26 |
| RL60-075    | 1.16  | 1.02  | 0.89 | 0.75 | 0.61 | 0.54 | 0.47 | 0.41 | 0.30 |
| RL60-090    | 1.40  | 1.22  | 1.07 | 0.90 | 0.73 | 0.65 | 0.57 | 0.49 | 0.36 |
| RL60-110    | 1.71  | 1.50  | 1.31 | 1.10 | 0.89 | 0.79 | 0.69 | 0.59 | 0.44 |
| RL60-135    | 2.09  | 1.84  | 1.61 | 1.35 | 1.09 | 0.97 | 0.85 | 0.73 | 0.54 |
| RL60-160    | 2.48  | 2.18  | 1.90 | 1.60 | 1.30 | 1.15 | 1.01 | 0.86 | 0.64 |
| RL60-185    | 2.87  | 2.52  | 2.20 | 1.85 | 1.50 | 1.33 | 1.17 | 1.00 | 0.74 |
| RL60-250    | 3.88  | 3.40  | 2.98 | 2.50 | 2.03 | 1.80 | 1.58 | 1.35 | 1.00 |
| RL60-300    | 4.65  | 4.08  | 3.57 | 3.00 | 2.43 | 2.16 | 1.89 | 1.62 | 1.20 |
| RL60-375    | 5.81  | 5.10  | 4.46 | 3.75 | 3.04 | 2.70 | 2.36 | 2.03 | 1.50 |

### Warehouse Storage Conditions of Products

- Storage Conditions:
  1. Storage Temperature: -10°C~+40°C
  2. Relative Humidity: ≤75%RH
  3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year

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