

为您的产品保驾护航

PRODUCT DATASHEET

PTC Devices

## A60 Series PTC Devices



### Description



The JDTFUSE A60 Series is designed to provide overcurrent protection to 60Vdc maximum voltage with a maximum 40A short circuit rating.

### Features

- 60Vdc max voltage w/max 40A short circuit rating
- RoHS compliant, Lead-Free and HalogenFree\*
- Resettable feature
- Ideal for a broad range of general electronics using a low voltage power supply

### Agency Approvals

| Agency   | File Number |
|--|-------------|
|  | E460196     |

| Regulation  | Standard   |
|---|------------|
|  | 2002/95/EC |
|  | EN14582    |

### Applications

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

**Performance Specification**

| Model   | I hold<br>@25°C<br>(A) | I trip<br>@25°C<br>(A) | Vmax<br>(V) | I max<br>(A) | P d<br>Typ.<br>(W) | Maximum<br>Time To Trip |               | Resistance     |              |
|---------|------------------------|------------------------|-------------|--------------|--------------------|-------------------------|---------------|----------------|--------------|
|         |                        |                        |             |              |                    | Current<br>(A)          | Time<br>(Sec) | R i min<br>(Ω) | R1max<br>(Ω) |
| A60-003 | 0.03                   | 0.09                   | 60          | 40           | 1.00               | 0.15                    | 10.0          | 33.0           | 110.5        |
| A60-005 | 0.05                   | 0.15                   | 60          | 40           | 1.00               | 0.25                    | 10.0          | 7.50           | 44.2         |
| A60-010 | 0.10                   | 0.25                   | 60          | 40           | 1.00               | 0.50                    | 10.0          | 2.50           | 6.75         |
| A60-017 | 0.17                   | 0.35                   | 60          | 40           | 1.00               | 0.85                    | 10.0          | 2.00           | 4.80         |
| A60-020 | 0.20                   | 0.40                   | 60          | 40           | 1.00               | 1.00                    | 10.0          | 1.50           | 4.26         |
| A60-025 | 0.25                   | 0.50                   | 60          | 40           | 1.00               | 1.25                    | 10.0          | 1.00           | 2.93         |
| A60-030 | 0.30                   | 0.60                   | 60          | 40           | 1.00               | 1.50                    | 10.0          | 0.76           | 2.04         |
| A60-040 | 0.40                   | 0.80                   | 60          | 40           | 1.00               | 2.00                    | 10.0          | 0.52           | 1.29         |
| A60-050 | 0.50                   | 1.00                   | 60          | 40           | 1.00               | 2.50                    | 10.0          | 0.41           | 1.16         |
| A60-065 | 0.65                   | 1.30                   | 60          | 40           | 1.00               | 3.25                    | 10.0          | 0.27           | 0.72         |
| A60-075 | 0.75                   | 1.50                   | 60          | 40           | 1.00               | 3.75                    | 10.0          | 0.18           | 0.60         |
| A60-090 | 0.90                   | 1.80                   | 60          | 40           | 1.00               | 4.50                    | 10.0          | 0.14           | 0.465        |
| A60-110 | 1.10                   | 2.20                   | 60          | 40           | 1.51               | 5.50                    | 10.0          | 0.14           | 0.375        |
| A60-135 | 1.35                   | 2.70                   | 60          | 40           | 1.71               | 6.75                    | 10.0          | 0.12           | 0.285        |
| A60-160 | 1.60                   | 3.20                   | 60          | 40           | 1.98               | 8.00                    | 11.4          | 0.09           | 0.210        |
| A60-185 | 1.85                   | 3.70                   | 60          | 40           | 2.10               | 9.25                    | 12.6          | 0.08           | 0.180        |
| A60-250 | 2.50                   | 5.00                   | 60          | 40           | 2.50               | 12.5                    | 15.6          | 0.05           | 0.120        |
| A60-300 | 3.00                   | 6.00                   | 60          | 40           | 2.80               | 15.0                    | 19.8          | 0.04           | 0.090        |
| A60-375 | 3.75                   | 7.50                   | 60          | 40           | 3.20               | 18.75                   | 24.0          | 0.03           | 0.075        |
| A60-500 | 5.00                   | 10.0                   | 60          | 40           | 3.50               | 25.0                    | 30.0          | 0.015          | 0.075        |

I hold = Hold Current. Maximum current device will not trip in 23°C still air.

I trip = Trip Current. Minimum current at which the device will always trip in 23°C still air.

V max = Maximum operating 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).

Pd = Power dissipation when device is in the tripped state in 23°C still air environment at rated voltage.

Ri min = Minimum device resistance prior to tripping at 23°C.

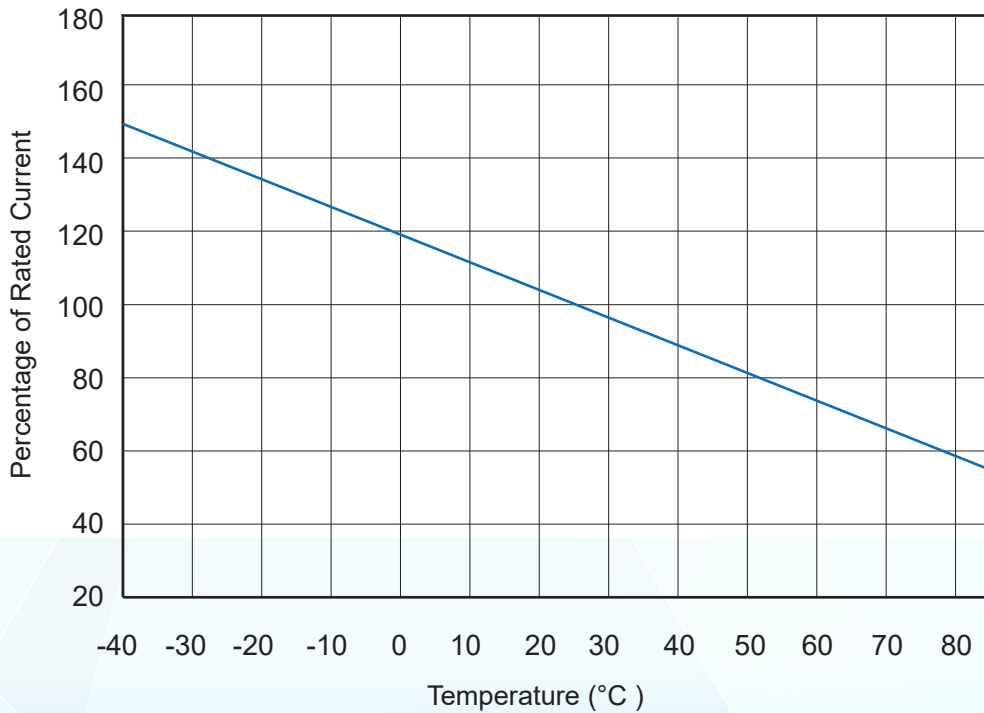
R1max = Maximum device resistance is measured one hour post reflow.

CAUTION : Operation beyond the specified ratings may result in damage and possible arcing and flame.

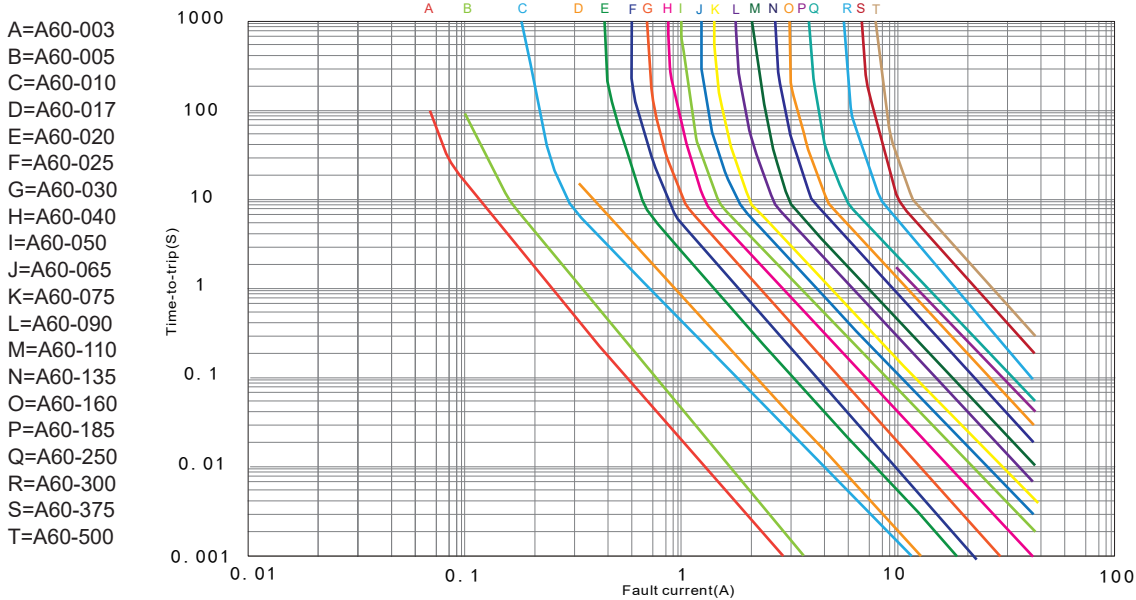
## Environmental Specifications

| Test   | Conditions                  | Resistance change |
|--|-----------------------------|-------------------|
| Passive aging  | +85°C, 1000 hrs.            | ±5% typical       |
| Humidity aging   | +85°C, 85% R.H. , 168 hours | ±5% typical       |
| Thermal shock  | +85°C to -40°C, 20 times    | ±33% typical      |
| Resistance to solvent  | MIL-STD-202,Method 215      | No change         |
| Vibration  | MIL-STD-202,Method 201      | No change         |
| Ambient operating conditions : - 40 °C to +85 °C                         |                             |                   |
| Maximum surface temperature of the device in the tripped state is 125 °C |                             |                   |

## Thermal Derating Curve



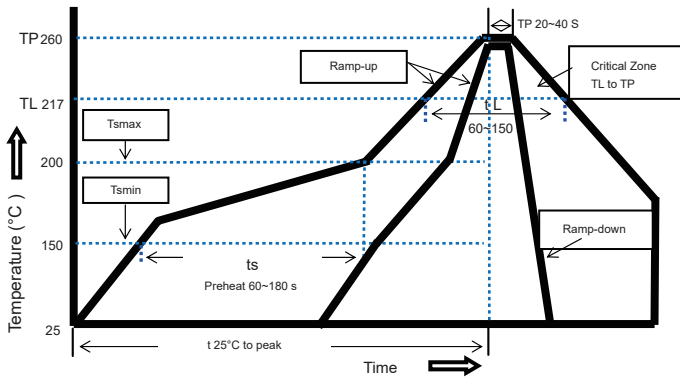
## Average Time-Current Curve



## I<sub>hold</sub> Versus Temperature

| Model   | Maximum ambient operating temperature (T <sub>mao</sub> ) vs. hold current (I <sub>hold</sub> ) |       |       |       |       |       |       |       |       |       |
|---------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|         | -40°C   | -20°C | 0°C   | 23°C  | 30°C  | 40°C  | 50°C  | 60°C  | 70°C  | 85°C  |
| A60-003 | 0.047   | 0.041 | 0.036 | 0.030 | 0.027 | 0.024 | 0.021 | 0.018 | 0.015 | 0.011 |
| A60-005 | 0.079   | 0.069 | 0.060 | 0.050 | 0.045 | 0.041 | 0.035 | 0.030 | 0.025 | 0.018 |
| A60-010 | 0.158   | 0.138 | 0.119 | 0.100 | 0.090 | 0.081 | 0.070 | 0.060 | 0.050 | 0.036 |
| A60-017 | 0.269   | 0.235 | 0.202 | 0.170 | 0.153 | 0.138 | 0.119 | 0.102 | 0.085 | 0.061 |
| A60-020 | 0.316   | 0.276 | 0.238 | 0.200 | 0.180 | 0.162 | 0.140 | 0.120 | 0.100 | 0.072 |
| A60-025 | 0.395   | 0.345 | 0.298 | 0.250 | 0.225 | 0.203 | 0.175 | 0.150 | 0.125 | 0.090 |
| A60-030 | 0.474   | 0.414 | 0.357 | 0.300 | 0.270 | 0.243 | 0.210 | 0.180 | 0.150 | 0.108 |
| A60-040 | 0.632   | 0.552 | 0.476 | 0.400 | 0.360 | 0.324 | 0.280 | 0.240 | 0.200 | 0.144 |
| A60-050 | 0.790   | 0.690 | 0.595 | 0.500 | 0.450 | 0.405 | 0.350 | 0.300 | 0.250 | 0.180 |
| A60-065 | 1.027   | 0.897 | 0.774 | 0.650 | 0.585 | 0.527 | 0.455 | 0.390 | 0.325 | 0.234 |
| A60-075 | 1.185   | 1.035 | 0.893 | 0.750 | 0.675 | 0.608 | 0.525 | 0.450 | 0.375 | 0.270 |
| A60-090 | 1.422   | 1.242 | 1.071 | 0.900 | 0.810 | 0.729 | 0.630 | 0.540 | 0.450 | 0.324 |
| A60-110 | 1.738   | 1.518 | 1.309 | 1.100 | 0.990 | 0.891 | 0.770 | 0.660 | 0.550 | 0.396 |
| A60-135 | 2.133   | 1.863 | 1.607 | 1.350 | 1.215 | 1.094 | 0.945 | 0.810 | 0.675 | 0.486 |
| A60-160 | 2.528   | 2.208 | 1.904 | 1.600 | 1.440 | 1.296 | 1.120 | 0.960 | 0.800 | 0.576 |
| A60-185 | 2.923   | 2.553 | 2.202 | 1.850 | 1.665 | 1.499 | 1.295 | 1.110 | 0.925 | 0.666 |
| A60-250 | 3.950   | 3.450 | 2.975 | 2.500 | 2.250 | 2.025 | 1.750 | 1.500 | 1.250 | 0.900 |
| A60-300 | 4.740   | 4.140 | 3.570 | 3.000 | 2.700 | 2.430 | 2.100 | 1.800 | 1.500 | 1.080 |
| A60-375 | 5.925   | 5.175 | 4.463 | 3.750 | 3.375 | 3.038 | 2.625 | 2.250 | 1.875 | 1.350 |
| A60-500 | 7.900   | 6.900 | 5.950 | 5.000 | 4.500 | 4.050 | 3.500 | 3.000 | 2.500 | 1.800 |

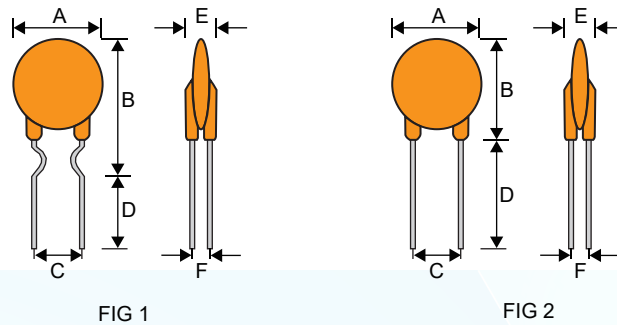
## Soldering Parameters



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.

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

## Physical Dimensions(mm.)



### PHYSICAL SPECIFICATIONS :

Lead Materials : A60-030~A60-185:Tinned copper clad steel wire (CP wire);  
 A60-250~A60-500:Tinned copper wire.  
 Lead Solderability: MIL-STD-202.  
 Encapsulation: Flame retardant epoxy resin, This meets the requirements of UL-94V-0.

| Model   | A Max. | B Max. | C Typ.   | D Min. | E Max. | F Typ. | Lead $\phi$ | FIG |
|---------|--------|--------|----------|--------|--------|--------|-------------|-----|
| A60-003 | 7.40   | 12.0   | 5.1±0.5  | 7.60   | 3.10   | 1.10   | 0.50        | 1   |
| A60-005 | 7.40   | 12.0   | 5.1±0.5  | 7.60   | 3.10   | 1.10   | 0.50        | 1   |
| A60-010 | 7.40   | 12.0   | 5.1±0.5  | 7.60   | 3.10   | 1.10   | 0.50        | 1   |
| A60-017 | 7.40   | 12.0   | 5.1±0.5  | 7.60   | 3.10   | 1.10   | 0.50        | 1   |
| A60-020 | 7.40   | 12.0   | 5.1±0.5  | 7.60   | 3.10   | 1.10   | 0.50        | 1   |
| A60-025 | 7.40   | 12.0   | 5.1±0.5  | 7.60   | 3.10   | 1.10   | 0.50        | 1   |
| A60-030 | 7.40   | 13.0   | 5.1±0.5  | 7.60   | 3.10   | 1.10   | 0.50        | 1   |
| A60-040 | 7.60   | 13.5   | 5.1±0.5  | 7.60   | 3.10   | 1.10   | 0.50        | 1   |
| A60-050 | 7.90   | 13.7   | 5.1±0.5  | 7.60   | 3.10   | 1.10   | 0.50        | 1   |
| A60-065 | 9.40   | 15.6   | 5.1±0.5  | 7.60   | 3.10   | 1.20   | 0.60        | 1   |
| A60-075 | 10.2   | 16.4   | 5.1±0.5  | 7.60   | 3.10   | 1.20   | 0.60        | 1   |
| A60-090 | 11.2   | 16.7   | 5.1±0.5  | 7.60   | 3.10   | 1.20   | 0.60        | 1   |
| A60-110 | 12.8   | 17.7   | 5.1±0.5  | 7.60   | 3.10   | 1.40   | 0.80        | 2   |
| A60-135 | 14.5   | 18.7   | 5.1±0.5  | 7.60   | 3.10   | 1.40   | 0.80        | 2   |
| A60-160 | 16.3   | 20.5   | 5.1±0.5  | 7.60   | 3.10   | 1.40   | 0.80        | 2   |
| A60-185 | 17.5   | 21.6   | 5.1±0.5  | 7.60   | 3.10   | 1.40   | 0.80        | 2   |
| A60-250 | 21.0   | 25.3   | 10.2±0.5 | 7.60   | 3.10   | 1.40   | 0.80        | 2   |
| A60-300 | 24.5   | 28.6   | 10.2±0.5 | 7.60   | 3.10   | 1.40   | 0.80        | 2   |
| A60-375 | 27.2   | 31.8   | 10.2±0.5 | 7.60   | 3.10   | 1.40   | 0.80        | 2   |
| A60-500 | 27.2   | 31.8   | 10.2±0.5 | 7.60   | 3.10   | 1.40   | 0.80        | 2   |

## Packaging Quantity

| Model      | Bag QTY |
|------------|---------|
| A60 Series | 500     |

Tape & Reel packaging per EIA468-B standard.

**Cross Reference**

| Model   | Cross Reference    |                     |                         |
|---------|--------------------|---------------------|-------------------------|
|         | Tyco / PolySwitch® | Bourns / POLY-FUSE® | Polytronics / EVERFUSE® |
| A60-003 | RXEF003            | MF-R003             | RLD60P003XF             |
| A60-005 | RXEF005            | MF-R005             | RLD60P005XF             |
| A60-010 | RXEF010            | MF-R010             | RLD60P010XF             |
| A60-017 | RXEF017            | MF-R017             | RLD60P017XF             |
| A60-020 | RXEF020            | MF-R020             | RLD60P020XF             |
| A60-025 | RXEF025            | MF-R025             | RLD60P025XF             |
| A60-030 | RXEF030            | MF-R030             | RLD60P030XF             |
| A60-040 | RXEF040            | MF-R040             | RLD60P040XF             |
| A60-050 | RXEF050            | MF-R050             | RLD60P050XF             |
| A60-065 | RXEF065            | MF-R065             | RLD60P065XF             |
| A60-075 | RXEF075            | MF-R075             | RLD60P075XF             |
| A60-090 | RXEF090            | MF-R090             | RLD60P090XF             |
| A60-110 | RXEF110            | MF-RX110            | RLD60P110XF             |
| A60-135 | RXEF135            | MF-RX135            | RLD60P135XF             |
| A60-160 | RXEF160            | MF-RX160            | RLD60P160XF             |
| A60-185 | RXEF185            | MF-RX185            | RLD60P185XF             |
| A60-250 | RXEF250            | MF-RX250            | RLD60P250XF             |
| A60-300 | RXEF300            | MF-RX300            | RLD60P300XF             |
| A60-375 | RXEF375            | MF-RX375            | RLD60P375XF             |

“PolySwitch” is a registered trademark of Tyco Electronics.

“POLY-FUSE” is a registered trademark of Littelfuse, Inc.

“EVERFUSE” is a registered trademark of Polytronics Technology Corp.