

# MP800 Series Kool-Pak® Power Film Resistors

## TO-220 Style and TO-126 Style - Non-Inductive Designs

Use your thermal design experience with power semiconductors in TO-220 and TO-126 style power packages to help you get the most out of this unique family of power resistors. The thermal design issues are the same where power handling capability is based on the case temperature which is maintained in your design.

### MP820 and MP821 TO-220 Style Power Package with Metal Mounting Tab

- 20 Watts at +25°C Case Temperature derated to zero at +175°C.
- Metal Heat Sink Mounting Tab.
- MP820 Resistance Range of 10.0 ohm to 10.0 K.
- MP821 Resistance Range of 0.020 ohm to 9.99 ohm.
- Resistor element is electrically isolated from the mounting surface.
- Non-Inductive design for high speed switching, snubbers, and rf applications.

#### Construction of MP820 and MP821:

The MP820 and MP821 Kool-Tab® Power Film Resistors are constructed with Caddock's Micronox® resistance film fired onto a flat ceramic substrate which is thermally bonded to the copper heat sink tab. The resistor body is then molded with a high temperature molding compound to finish the metal tab TO-220 package. The lead wire attachment and resistance element geometry are configured to provide outstanding non-inductive performance.

### MP825 and MP850 Power Film Resistors Include an Integral Metal Mounting Surface for Highly Efficient Thermal Transfer

#### MP825 TO-126 Style Power Package

- 25 Watts at +25°C Case Temperature derated to zero at +150°C.
- Copper Heat Sink Integral in the Molded Package.
- Resistance Range of 0.020 ohm to 10.0 K.
- Resistor element is electrically isolated from the mounting surface.
- Non-inductive Design.

#### MP850 TO-220 Style Power Package

- 50 Watts at +25°C Case Temperature derated to zero at +150°C.
- Copper Heat Sink Integral in the Molded Package.
- Resistance Range of 0.20 ohm to 10.0 K.
- Resistor element is electrically isolated from the mounting surface.
- Non-inductive Design.

#### Construction of MP825 and MP850:

The MP825 and MP850 Kool-Pak® Power Film Resistors are constructed with Caddock's Micronox® resistance film fired onto a flat ceramic substrate. **The ceramic substrate is bonded to a copper heat sink which becomes the metal mounting surface.** This assembly is molded with the copper heat sink flush with the back surface of the part. The terminal attachment and resistance element geometry are configured to provide outstanding non-inductive performance.

#### Ordering Information:

Model Number: MP850 - 50.0 - 1% Tolerance  
Resistor Value: \_\_\_\_\_

**Packaging:** MP800 Series Resistors are packaged in plastic shipping tubes, 50 pieces per tube when the order quantity permits.

For custom resistance values and tolerances contact applications engineering

Certain products shown in this catalog are covered by one or more patents, there are also patents pending.



#### MP821 Standard Resistance Values:

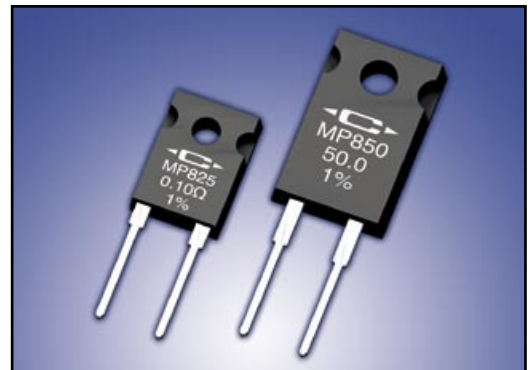
Tolerance MP821: ±1% Standard (0.5%, 2%, 5%, 10%, and 20% are available for most resistance values).

|         |         |        |        |        |        |
|---------|---------|--------|--------|--------|--------|
| 0.020 Ω | 0.050 Ω | 0.25 Ω | 0.75 Ω | 3.00 Ω | 7.50 Ω |
| 0.025 Ω | 0.075 Ω | 0.30 Ω | 1.00 Ω | 3.30 Ω | 8.00 Ω |
| 0.030 Ω | 0.10 Ω  | 0.33 Ω | 1.50 Ω | 4.00 Ω |        |
| 0.033 Ω | 0.15 Ω  | 0.40 Ω | 2.00 Ω | 5.00 Ω |        |
| 0.040 Ω | 0.20 Ω  | 0.50 Ω | 2.50 Ω |        |        |

#### MP820 Standard Resistance Values:

Tolerance MP820: ±1% Standard (0.5%, 2%, 5%, 10%, and 20% are available for most resistance values).

|        |        |        |       |        |        |
|--------|--------|--------|-------|--------|--------|
| 10.0 Ω | 30.0 Ω | 75.0 Ω | 300 Ω | 750 Ω  | 3.30 K |
| 12.0 Ω | 33.0 Ω | 100 Ω  | 330 Ω | 1.00 K | 4.00 K |
| 15.0 Ω | 40.0 Ω | 120 Ω  | 400 Ω | 1.50 K | 5.00 K |
| 20.0 Ω | 47.0 Ω | 150 Ω  | 470 Ω | 2.00 K | 7.50 K |
| 25.0 Ω | 50.0 Ω | 200 Ω  | 500 Ω | 2.50 K | 10.0 K |
| 27.0 Ω | 56.0 Ω | 250 Ω  | 560 Ω | 3.00 K |        |



#### MP825 Standard Resistance Values:

Tolerance MP825: ±1% standard (except as noted), (0.5%, 2%, 5%, 10%, and 20% are available for most resistance values).

|            |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|
| 0.020 Ω 5% | 0.30 Ω | 4.00 Ω | 33.0 Ω | 300 Ω  | 3.00 K |
| 0.025 Ω 5% | 0.33 Ω | 5.00 Ω | 40.0 Ω | 330 Ω  | 3.30 K |
| 0.030 Ω 5% | 0.40 Ω | 7.50 Ω | 47.0 Ω | 400 Ω  | 4.00 K |
| 0.033 Ω 5% | 0.50 Ω | 8.00 Ω | 50.0 Ω | 470 Ω  | 5.00 K |
| 0.040 Ω 5% | 0.75 Ω | 10.0 Ω | 56.0 Ω | 500 Ω  | 7.50 K |
| 0.050 Ω    | 1.00 Ω | 12.0 Ω | 75.0 Ω | 560 Ω  | 10.0 K |
| 0.075 Ω    | 1.50 Ω | 15.0 Ω | 100 Ω  | 750 Ω  |        |
| 0.10 Ω     | 2.00 Ω | 20.0 Ω | 120 Ω  | 1.00 K |        |
| 0.15 Ω     | 2.50 Ω | 25.0 Ω | 150 Ω  | 1.50 K |        |
| 0.20 Ω     | 3.00 Ω | 27.0 Ω | 200 Ω  | 2.00 K |        |
| 0.25 Ω     | 3.30 Ω | 30.0 Ω | 250 Ω  | 2.50 K |        |

#### MP850 Standard Resistance Values:

Tolerance MP850: ±1% standard, (0.5%, 2%, 5%, 10%, and 20% are available for most resistance values).

|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| 0.20 Ω | 2.00 Ω | 12.0 Ω | 50.0 Ω | 330 Ω  | 2.50 K |
| 0.25 Ω | 2.50 Ω | 15.0 Ω | 56.0 Ω | 400 Ω  | 3.00 K |
| 0.30 Ω | 3.00 Ω | 20.0 Ω | 75.0 Ω | 470 Ω  | 3.30 K |
| 0.33 Ω | 3.30 Ω | 25.0 Ω | 100 Ω  | 500 Ω  | 4.00 K |
| 0.40 Ω | 4.00 Ω | 27.0 Ω | 120 Ω  | 560 Ω  | 5.00 K |
| 0.50 Ω | 5.00 Ω | 30.0 Ω | 150 Ω  | 750 Ω  | 7.50 K |
| 0.75 Ω | 7.50 Ω | 33.0 Ω | 200 Ω  | 1.00 K | 10.0 K |
| 1.00 Ω | 8.00 Ω | 40.0 Ω | 250 Ω  | 1.50 K |        |
| 1.50 Ω | 10.0 Ω | 47.0 Ω | 300 Ω  | 2.00 K |        |

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| Model No. | Package      | Resistance     |               | Power Rating | Max. Voltage  | Thermal Resistance $R_{\theta JC}$ Film (J) to Case (C) | Max. Temp. $T_{MAX}$ | Dimensions | Comments  |
|-----------|--------------|----------------|---------------|--------------|---------------|---|----------------------|------------|---|
|           |              | Min.           | Max.          |              |               |   |                      |            |   |
| MP820     | TO-220 Style | 10.0 $\Omega$  | 10.0 K        | 20 Watts*    | 300           | 7.50°C/Watt   | 175°C                | Figure 1   | Metal Mounting Tab                                |
| MP821     | TO-220 Style | 0.020 $\Omega$ | 9.99 $\Omega$ | 20 Watts*    | Power Limited | 7.50°C/Watt   | 175°C                | Figure 1   | Metal Mounting Tab                                |
| MP825     | TO-126 Style | 0.020 $\Omega$ | 10.0 K        | 25 Watts*    | 300           | 5.00°C/Watt   | 150°C                | Figure 2   | Integral Metal Mounting Surface in Molded Package |
| MP850     | TO-220 Style | 0.20 $\Omega$  | 10.0 K        | 50 Watts*    | 300           | 2.50°C/Watt   | 150°C                | Figure 3   | Integral Metal Mounting Surface in Molded Package |



**Specifications:**

**Temperature Coefficient:**  
TC referenced to +25°C,  $\Delta R$  taken at  $T_{MAX}$

5.00 ohms and above, -20 to +50 ppm/°C  
0.50 ohm to 4.99 ohms, -20 to +80 ppm/°C  
0.050 ohm to 0.49 ohm, 0 to +200 ppm/°C  
0.020 ohm to 0.049 ohm, 0 to +300 ppm/°C

**Operating Temperature:** -55°C to  $T_{MAX}$

**Inductance:** 10nH typical in series when measured at a point 0.2 inches from the resistor body.

**DWV:** The dielectric strength rating of 1500  $V_{rms} AC$  is based upon connections made between terminals shorted and either the metal surface the part is mounted to or a metal clip in contact with the top surface of the part.

**Insulation Resistance:** 10,000 Megohms, min.  
The resistor element is electrically isolated from the mounting surface.

**Load Stability:** 2,000 hours at rated power.  
 $\Delta R \pm(1.0 \text{ percent} + 0.001 \text{ ohm}) \text{ max.}$  Power rating dependent upon case temperature. See derating curve.

**Momentary Overload:**  
MP820, MP821, MP850: 2 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds.  
 $\Delta R \pm(0.3 \text{ percent} + 0.001 \text{ ohm}) \text{ max.}$

MP825: 1.5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds.  
 $\Delta R \pm(0.3 \text{ percent} + 0.001 \text{ ohm}) \text{ max.}$

**Moisture Resistance:** Mil-Std-202, Method 106.  
 $\Delta R \pm(0.5 \text{ percent} + 0.001 \text{ ohm}) \text{ max.}$

**Thermal Shock:** Mil-Std-202, Method 107, Cond. F.  
 $\Delta R \pm(0.3 \text{ percent} + 0.001 \text{ ohm}) \text{ max.}$

**Shock:** 100G, Mil-Std-202, Method 213, Cond. I.  
 $\Delta R \pm(0.2 \text{ percent} + 0.001 \text{ ohm}) \text{ max.}$

**Vibration, High Frequency:** Mil-Std-202, Method 204, Cond. D.  $\Delta R \pm(0.2 \text{ percent} + 0.001 \text{ ohm}) \text{ max.}$

**Terminal Strength:** Mil-Std-202, Method 211, Cond. A (Pull Test) 5 lbs.  $\Delta R \pm(0.2 \text{ percent} + 0.001 \text{ ohm}) \text{ max.}$

**Terminal Material:** Solderable

**Measurement Note:** For these specifications, resistance measurement shall be made at a point 0.2 inch (5.08 mm) from the resistor body.



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