Type CC Low Resistance Precision Chip Resistors

- **Style FC** - Flip Chip version for surface mount applications.
- **Style WB** - Wire Bond version for hybrid applications with metallized back surface for solder down heat sinking of the chip, includes bondable termination pads to receive aluminum wire bonds.
- Thermal resistance is provided to optimize high power designs when utilizing higher thermal conductivity circuit board substrates such as IMS or Alumina.
- Resistance range down to 0.010 ohm at ±5%, 0.050 ohm at ±2%, and 0.10 ohm at ±1%.
- Low inductance provides excellent high frequency and pulse response.
- High pulse handling and overload capability.
- Best choice for switching power supplies, motor speed controls, and high current sensing applications.

**Style FC - Flip Chip Version** is a surface mount version with solderable pads for flip chip soldering.

### Power Capability Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Resistance</th>
<th>General Applications</th>
<th>High Power Applications</th>
<th>Max. Chip Temperature</th>
<th>Dimensions in inches (and millimeters)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Max.</td>
<td>Power Rating</td>
<td>Thermal Resistance</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>CC1512FC</td>
<td>0.010 Ω</td>
<td>0.015 Ω</td>
<td>0.050 Watt</td>
<td></td>
<td>1.000 x 0.007</td>
<td>(0.89 min.)</td>
</tr>
<tr>
<td></td>
<td>0.020 Ω</td>
<td>10.0 Ω</td>
<td>0.75 Watt</td>
<td>22.0°C/Watt</td>
<td>0.150 x 0.007</td>
<td>(3.81 x 10)</td>
</tr>
<tr>
<td>CC2015FC</td>
<td>0.020 Ω</td>
<td>10.0 Ω</td>
<td>0.010 Watt</td>
<td>16.0°C/Watt</td>
<td>0.150 x 0.007</td>
<td>(3.81 x 10)</td>
</tr>
<tr>
<td>CC2520FC</td>
<td>0.010 Ω</td>
<td>0.020 Ω</td>
<td>1.0 Watt</td>
<td>25.0°C/Watt</td>
<td>0.250 x 0.007</td>
<td>(6.35 x 18)</td>
</tr>
<tr>
<td></td>
<td>0.025 Ω</td>
<td>10.0 Ω</td>
<td>1.5 Watts</td>
<td>22.0°C/Watt</td>
<td>0.250 x 0.007</td>
<td>(6.35 x 18)</td>
</tr>
</tbody>
</table>

**Style FC Derating Curve For General Applications**

**Note 1:** General Applications - The power rating for general applications is based upon 0.5 sq. in. (300 mm²) of termination pad or trace area (2 oz. copper) connected to each end of the resistor. Maximum chip temperature is 150°C. Use Derating Curve to derate appropriately for the maximum ambient temperature and for the temperature limitations of the adjacent materials.

**CC1512FC Standard Resistance Values:**

- 0.010 Ω 5% 0.033 Ω 5% 0.20 Ω 0.75 Ω 3.30 Ω
- 0.015 Ω 5% 0.040 Ω 5% 0.25 Ω 1.00 Ω 4.00 Ω
- 0.020 Ω 5% 0.050 Ω 2% 0.30 Ω 1.50 Ω 5.00 Ω
- 0.025 Ω 5% 0.075 Ω 2% 0.33 Ω 2.00 Ω 7.50 Ω
- 0.030 Ω 5% 0.100 Ω 2% 0.38 Ω 2.50 Ω 8.00 Ω
- 0.15 Ω 5% 0.50 Ω 3.00 Ω 10.0 Ω

**CC2015FC Standard Resistance Values:**

- 0.010 Ω 5% 0.033 Ω 5% 0.20 Ω 0.75 Ω 3.30 Ω
- 0.015 Ω 5% 0.040 Ω 5% 0.25 Ω 1.00 Ω 4.00 Ω
- 0.020 Ω 5% 0.050 Ω 2% 0.30 Ω 1.50 Ω 5.00 Ω
- 0.025 Ω 5% 0.075 Ω 2% 0.33 Ω 2.00 Ω 7.50 Ω
- 0.10 Ω 5% 0.40 Ω 2.50 Ω 8.00 Ω
- 0.15 Ω 5% 0.50 Ω 3.00 Ω 10.0 Ω

**CC2520FC Standard Resistance Values:**

- 0.010 Ω 5% 0.033 Ω 5% 0.20 Ω 0.75 Ω 3.30 Ω
- 0.015 Ω 5% 0.040 Ω 5% 0.25 Ω 1.00 Ω 4.00 Ω
- 0.020 Ω 5% 0.050 Ω 2% 0.30 Ω 1.50 Ω 5.00 Ω
- 0.025 Ω 5% 0.075 Ω 2% 0.33 Ω 2.00 Ω 7.50 Ω
- 0.030 Ω 5% 0.100 Ω 2% 0.38 Ω 2.50 Ω 8.00 Ω
- 0.15 Ω 5% 0.50 Ω 3.00 Ω 10.0 Ω

Custom resistance values and non-standard tolerances can be manufactured for high quantity applications. Please contact Caddock Applications Engineering.

**Recommended Circuit Board Layout (current and sense connections):**

**Fig. 1A:** Kelvin layout recommended for values below 0.20Ω

**Fig. 1B:** Kelvin layout recommended for higher resistance values.

**Note:** Actual width of current trace is based on magnitude of current. Point of connection should be in the area shown.
Type CC Low Resistance Precision Chip Resistors

Style WB - Wire Bond Version

is a hybrid mountable version with metallized pads for wire bonding utilizing aluminum wire and a metallized back surface for solder attachment of the back surface to a heat sinking substrate.

<table>
<thead>
<tr>
<th>Model</th>
<th>Resistance</th>
<th>Power Capability Information</th>
<th>Dimensions in inches and (millimeters)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Thermal Resistance $R_{th}$ Film (J) to Solder Pad (C) (see note 3)</td>
<td>Max. Chip Temperature</td>
<td>A</td>
</tr>
<tr>
<td>CC2015WB</td>
<td>0.020 Ω</td>
<td></td>
<td>150°C</td>
<td>300 ± 0.07 (5.06 ± 0.16)</td>
</tr>
<tr>
<td>CC2520WB</td>
<td>0.025 Ω</td>
<td></td>
<td>150°C</td>
<td>250 ± 0.007 (6.35 ± 0.18)</td>
</tr>
</tbody>
</table>

Note 3: Thermal Resistance - In High Power Applications where the circuit board material provides high heat sinking benefits (such as IMS, Alumina, or other) the thermal resistance of the chip resistor is useful to establish the maximum power capability of the chip resistor in the application. The film temperature is measured at the center of the resistor element and the solder pad temperature is measured at the soldered interface with the circuit board. Maximum temperature of the chip resistor (at the center of chip) should not exceed 150°C through the temperature range of the application.

Location for Sense (Potential) Connection:

Solder attachment note:
Style FC has a bare ceramic back surface. The recommended solders for flip chip solder attachment are 62Sn / 36Pb / 2Ag, 96.5Sn / 3.5Ag, or standard Sn / Ag / Cu solder alloys.

Style WB has a metallized back surface for soldering to a substrate or a heat sink. The recommended solders to be used are 62Sn / 36Pb / 2Ag, 96.5Sn / 3.5Ag, or standard Sn / Ag / Cu solder alloys.

Ordering Information:

Full reel quantities:
1500 pieces per reel for CC1512
1000 pieces per reel for CC2015 and CC2520

Quantities of less than 250 will be shipped in tape without reel and quantities of 250 to 1500 pieces per reel. The illustration shows the orientation of the CC1512 and CC2015 chip resistors with the bare ceramic side up in the Pocket, with the solderable pads facing up.

Caddock chip resistors, flip chip resistors, are shipped with the bare ceramic side up in the Pocket, with the solderable pads facing up.

Custom resistance values and non-standard tolerances can be manufactured for high quantity applications. Please contact Caddock Applications Engineering.

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