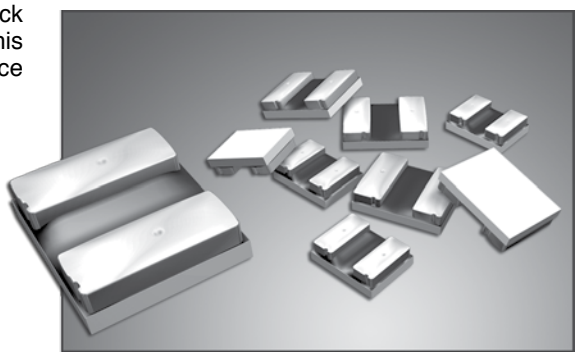
Type CD Low Resistance Precision Chip Resistors

Low Resistance Chip down to 0.010Ω at ±1% with unique Pedestal Terminal Design for Current Sense in Hybrid and SMT Applications

Type CD Low Resistance Precision Chip Resistors utilize the proven Caddock Micronox® resistance films to achieve the unique low resistance range in this family. The special performance features of the Type CD Low Resistance Precision Film Resistor include:

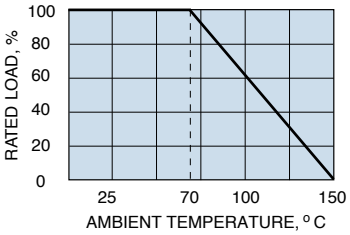


- **Style FC** - Flip Chip version for surface mount applications.
  Style WB - Wire Bond version for hybrid applications with metallized back surface for solder down heat sinking of the chip, includes bondable termination pedestals to receive aluminum wire bonds.
- Resistance as low as 0.010 ohm at ±1%.
- Pedestal terminals in this design provide an ultra low resistance connection pad which maintains the precision 0.010Ω ±1% at the point of customer Kelvin connection to the resistor chip. The pedestal terminal with its copper core also provides heat spreading which enhances the high power handling capability.
- Thermal resistance is provided to optimize high power designs when utilizing higher thermal conductivity circuit board substrates such as IMS or Alumina.
- High pulse handling and overload capability.
- Low inductance provides excellent high frequency and pulse response.

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

Model	Resistance		Power Capability Information			Dimensions in inches and (millimeters)				Comments
			General Applications Power Rating at 70° C (see note 1)	High Power Applications Thermal Resistance - $R_{\theta JC}$ Film (J) to Solder Pad (C) (see note 2)	Max. Chip Temperature	A	B	C	D	
	Min.	Max.								
CD2015FC	0.010 Ω	0.20 Ω	1.0 Watt	12.0°C/Watt	150°C	.200 ±.012 (5.08 ±.30	.150 ±.012 (3.81 ±.30)	.063 ±.006 (1.60 ±.15)	.062 min. (1.57 min.)	Solderable Pedestal
CD2520FC	0.010 Ω	0.20 Ω	1.5 Watts	9.0°C/Watt	150°C	.250 ±.012 (6.35 ±.30)	.200 ±.012 (5.08 ±.30)	.063 ±.006 (1.60 ±.15	.078 min. (1.98 min.)	Solderable Pedestal

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.

Note 2: 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 solder pad temperature at the center of the solderable pedestal (point X in the recommended circuit layout shown below). Maximum temperature of the chip resistor (at the center of chip) should not exceed 150°C through the temperature range of the application.

CD2015FC Standard Resistance Values:

Tolerance CD2015FC ±1% Standard.

0.010 Ω	0.030 Ω	0.075 Ω
0.015 Ω	0.033 Ω	0.10 Ω
0.020 Ω	0.040 Ω	0.20 Ω
0.025 Ω	0.050 Ω	

CD2520FC Standard Resistance Values:

Tolerance CD2520FC ±1% Standard.

0.010 Ω	0.030 Ω	0.075 Ω
0.015 Ω	0.033 Ω	0.10 Ω
0.020 Ω	0.040 Ω	0.20 Ω
0.025 Ω	0.050 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):

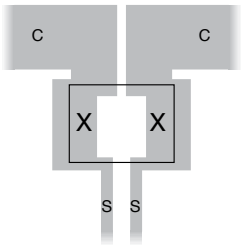


Fig. 1A: Recommended Kelvin layout.

C = Current connection
S = Sense connection

Note: Actual width of current trace is based on magnitude of current. Point of connection should be in the area shown.

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Type CD Low Resistance Precision Chip Resistors

Style WB - Wire Bond Version

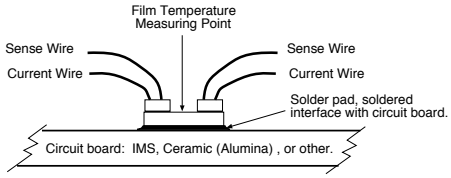
is a hybrid mountable version with copper pedestal terminals and an aluminum surface layer for wire bonding. The back surface of these devices is metallized for solder attachment of the chip resistor to a heat sinking substrate.

Model	Resistance		Power Capability Information		Dimensions in inches and (millimeters)				Comments
			Thermal Resistance $R_{\theta JC}$ Film (J) to Solder Pad (C) (see note 3)	Max. Chip Temperature					
	Min.	Max.			A	B	C	D	
CD2015WBA	0.010 Ω	0.20 Ω	8.33°C/Watt	150°C	.200 ±.012 (5.08 ±.30)	.150 ±.012 (3.81 ±.30)	.061 ±.005 (1.55 ±.13)	.062 min. (1.57 min.)	Terminals have an Aluminum surface layer for wire bonding. Aluminum wire to be used for bonding.
CD2520WBA	0.010 Ω	0.20 Ω	5.00°C/Watt	150°C	.250 ±.012 (6.35 ±.30)	.200 ±.012 (5.08 ±.30)	.061 ±.005 (1.55 ±.13)	.078 min. (1.98 min.)	Terminals have an Aluminum surface layer for wire bonding. Aluminum wire to be used for bonding.

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:

Note: The sense connection for each pedestal is positioned inboard of the current connection (single or multiple current wires).



WB Resistor mounting

CD2015WBA Standard Resistance Values:

Tolerance CD2015WBA ±1% Standard.

0.010 Ω	0.030 Ω	0.075 Ω
0.015 Ω	0.033 Ω	0.10 Ω
0.020 Ω	0.040 Ω	0.20 Ω
0.025 Ω	0.050 Ω	

CD2520WBA Standard Resistance Values:

Tolerance CD2520WBA ±1% Standard.

0.010 Ω	0.030 Ω	0.075 Ω
0.015 Ω	0.033 Ω	0.10 Ω
0.020 Ω	0.040 Ω	0.20 Ω
0.025 Ω	0.050 Ω	

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

General Information for Type CD - Style FC and Style WB - Chip Resistors

Specifications:

Temperature Coefficient: TC referenced to +25°C, ΔR taken at +150°C.

0.050 ohm to 0.20 ohm, 0 to +100 ppm/°C.
0.010 ohm to 0.049 ohm, 0 to +200 ppm/°C.

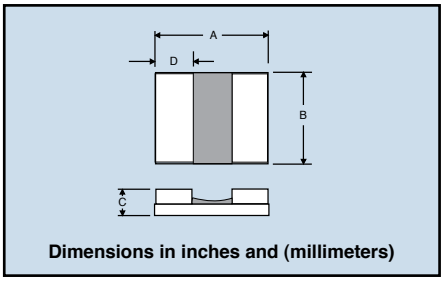
Inductance: Less than 5 nH typical.

Load Life: 1000 hours at rated power, based upon 150°C max. chip temperature, ΔR ± (0.5% + 0.0005 ohm).

Momentary Overload: 1.5 times rated power, for 5 seconds, ΔR ± (0.5% + 0.0005 ohm).

Operating Temperature: -55°C to +150°C.

Measurement Note: All measurements are taken using Kelvin connections per the recommended connection locations.



Dimensions in inches and (millimeters)

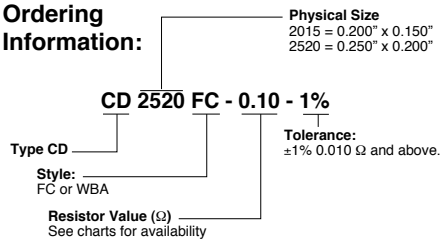
Solder attachment notes:

During soldering of the Type CD Resistor the soldering temperature profile must not cause the pedestal terminals of this device to exceed 220°C.

Style FC - Flip Chip version resistors have a bare ceramic back surface. The recommended solder for flip chip solder attachment is 62Sn / 36Pb / 2Ag.

Style WB - Wire Bond version resistors have a metallized back surface for soldering to a substrate or a heat sink. The recommended solder is 62Sn / 36Pb / 2Ag.

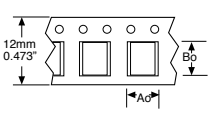
Ordering Information:



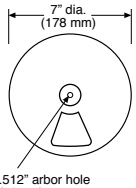
Packaging information:

Style FC, flip chip resistors, are shipped with the bare ceramic side up in the pocket, with the solderable pedestals facing down.
Style WB, wire bondable resistors, are shipped with the wire bondable pedestals facing up in the pocket.

The illustration shows the orientation of the CD2015 chip resistors in the tape. The CD2520 chip resistors are rotated 90° from what is shown in the illustration.



Ko signifies tape thickness and dimension



	Size 2015	Size 2520
Ao	0.189" (4.80mm)	0.271" (6.88mm)
Bo	0.209" (5.31mm)	0.216" (5.49mm)
Ko	0.087" (2.21mm)	0.066" (1.68mm)

Carrier Tape and pocket dimensions: Tape is 12mm Carrier Tape (8mm pitch)

Full reel quantities:
1000 pieces per reel for CD2015 and CD2520

Quantities of less than 250 will be shipped in tape without reel and without tape leader at the option of Caddock.

Tape dimensions and materials will be consistent with EIA-481-1. Reels will be marked with a label containing Caddock logo, part number, resistor value, tolerance, packaging date, and quantity.

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