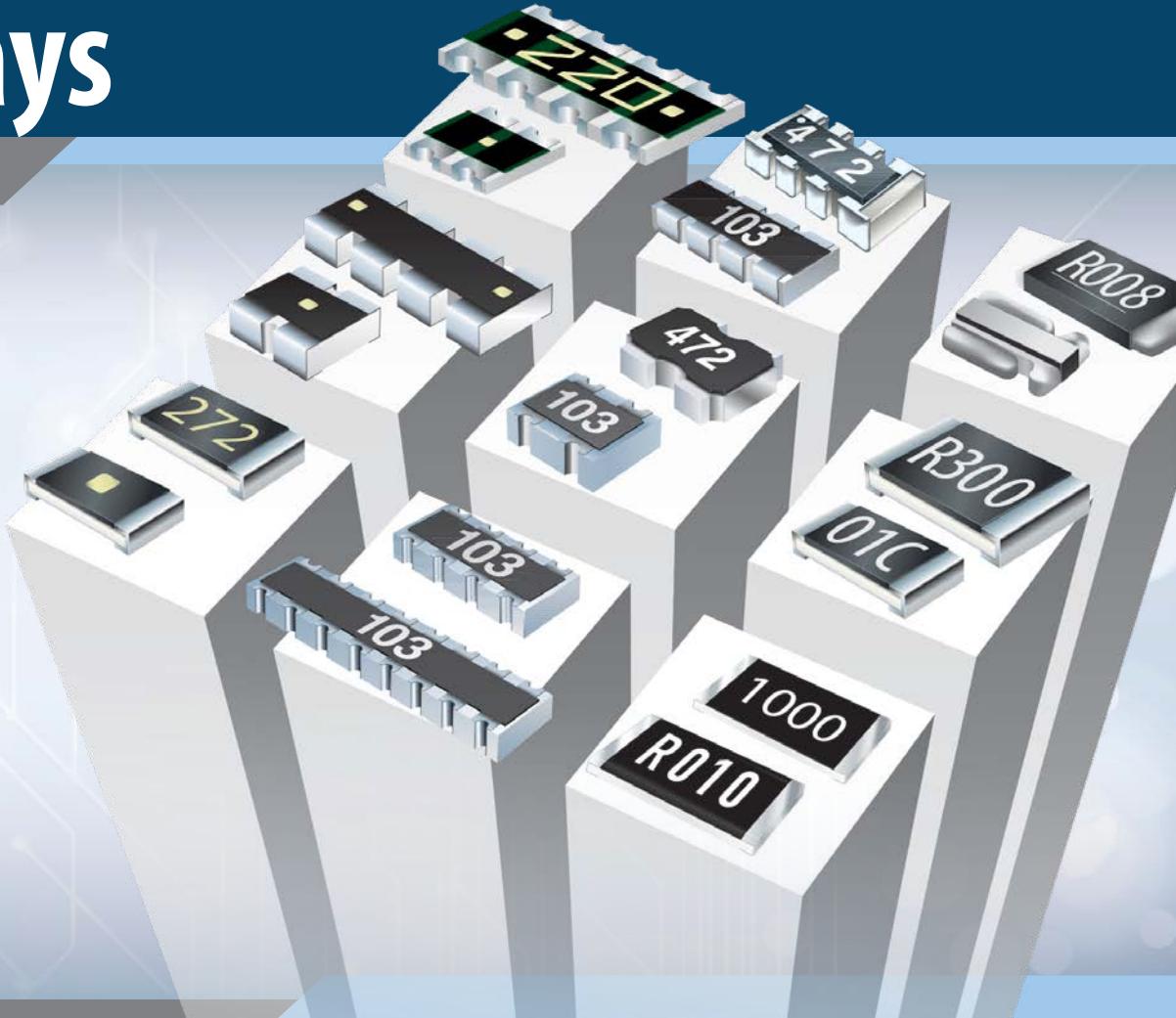




# Chip Resistors & Arrays



**BOURNS®**

# Chip Resistors & Arrays Overview

## POWER RATING (WATTS) AND AVAILABLE SIZES PER PRODUCT SERIES

Type	Series		01005	0201	0402	0603	0612	0805	1206	2010	2512
Thick Film	CR (AS, PF)	General Purpose (AS - Sulfur-Resistant)	0.03	0.05	0.063	0.1	-	0.125	0.25	0.5	1
	CRL	Low Ohmic		-	-	0.1	-	0.125	0.25	0.5	1
	CHV	High Voltage		-	-	0.1	-	0.125	0.25	0.5	1
	CRM (A)	High Power (A - AEC-Q200 Compliant, Sulfur-Resistant)		-	-	0.125	-	0.25	0.5	1	2
	CRS (A)	Surge Withstand (A - AEC-Q200 Compliant, Sulfur-Resistant)		-	-	0.125	-	0.25	0.5	1	2
Thin Film	CHP	Ultra High Power		-	-	0.33	-	0.5	0.75	-	3
	CRT (AS)	High Precision (AS - Sulfur-Resistant)		-	0.063	0.1	-	0.125	0.25	-	-
	CRF	High Power, Current Sense, AEC-Q200 Compliant		-	-	-	-	0.5	1	-	1 & 2
	CRE	High Power, Current Sense, AEC-Q200 Compliant		-	-	-	-	-	-	-	2 & 3
	CRA	High Power, Current Sense, AEC-Q200 Compliant		-	-	-	-	-	-	-	3
Metal Strip	CST	4-Terminal, Current Sense, AEC-Q200 Compliant		-	-	-	1	-	-	-	-

## AVAILABLE RESISTANCE VALUE RANGE (OHMS) PER PRODUCT SERIES

Type	Series		Very Low Ohmic	Low Ohmic	Middle Ohmic	High Ohmic
Thick Film	CR	General purpose			1 – 20M	
	CRL	Low Ohmic		0.02 – 9.1		
	CHV	High Voltage				100k – 100M
	CRM	High Power		0.047 – 1	1 – 1M	
	CRS	Surge Withstand			1 – 1M	
Thin Film	CRT	High Precision			1 – 1M	
Metal Strip	CHP	Ultra High Power	0.001 – 1		1 – 1M	
	CRF	High Power, Current Sense	0.001 – 0.05			
	CRE	High Power, Current Sense	0.001 – 0.009			
	CRA	High Power, Current Sense		0.01 – 0.1		
	CST	4-Terminal, Current Sense	0.0005 – 0.002			

## CHIP ARRAY SUMMARY

Bourns Model	Sulfur-Resistant	Density	Package Size (EIA)	Package Size (mm)
CAT10-J4		0402 x 4	0804	2.0 x 1.0
CAT16-J2		0603 x 2	0606	1.6 x 1.6
CAT16-J2AS	•	0603 x 2	0606	1.6 x 1.6
CAT16-J4/F4		0603 x 4	1206	3.2 x 1.6
CAT16-J4AS	•	0603 x 4	1206	3.2 x 1.6
CAT16-J8/F8		0603 x 8	2506	6.4 x 1.6
CAT25		0804 x 4	1608	4.0 x 2.1
CAY06-J2		0201 x 2	0202	0.85 x 0.6
CAY06-J2AS	•	0201 x 2	0202	0.85 x 0.6
CAY10-J2		0402 x 2	0404	1.0 x 1.0
CAY10-J2AS	•	0402 x 2	0404	1.0 x 1.0
CAY10-J4		0402 x 4	0804	2.0 x 1.0
CAY10-J4AS	•	0402 x 4	0804	2.0 x 1.0
CAY16-J2		0603 x 2	0606	1.6 x 1.6
CAY16-J4/F4		0603 x 4	1206	3.2 x 1.6
CAY16-J4AS	•	0603 x 4	1206	3.2 x 1.6
CAY16-J8		0602 x 8	1506	3.8 x 1.6
CAY17		0603 x 5	1206	3.2 x 1.6

## CHIP RESISTOR FEATURES

### Thick Film

- 1 % in E96 + E24 series
- 5 % in E24 series

### Thin Film

- 0.01 % to 1 % in E96 + E24 series

### Metal Strip

- Based on the value table in the data sheet

## STANDARD PACKAGING

- 01005 size - 20,000 pcs. / 7 " Plastic Reel
- 0201 and 0402 sizes - 10,000 pcs. / 7 " Plastic Reel
- 0603-1206 sizes - 5,000 pcs. / 7 " Plastic Reel
- 2010, 2512 and 0612 sizes - 4,000 pcs. / 7 " Plastic Reel

## CHIP RESISTOR & CHIP ARRAY APPLICATIONS

- Test equipment
- Consumer electronics
- Appliances
- Telecommunications
- Handheld electronics
- Office equipment
- Industrial equipment
- Small signal instrumentation
- DC/DC converters in power modules
- Current sensing
- Snubbers

## HOW TO ORDER - THICK FILM AND METAL STRIP CHIPS

**CR 0201- F W - 8252 E LF**

**Model**

- CR/CRL/CRM/CRS/CHP/CHV/CRA/CRE/CRF/CST

**Size**

- 01005/0201/0402/0603/0612/0805/1206/2010/2512

**Resistance Tolerance**

- J =  $\pm 5\%$
- F =  $\pm 1\%$

**TCR (PPM/ $^{\circ}$ C)**

- Z =  $\pm 50$
- X =  $\pm 100$
- W =  $\pm 200$  ( $\pm 250$  for 01005, 0201)
- V =  $\pm 400$
- U =  $\pm 600$
- / = -250 to +250, and for zero ohm jumper for CR, CRM

**Resistance Value**

- F =  $\pm 1\%$   
Three significant digits; 4th digit is number of zeroes to follow.  
< 100 ohms, 24R3 = 24.3 ohms  
> 100 ohms, 8252 = 82.5 K ohms
- J =  $\pm 5\%$   
Two significant digits; 3rd digit is number of zeroes to follow.  
< 100 ohms, 24R3 = 24.3 ohms  
> 100 ohms, 474 = 470 K ohms
- 000 - zero ohm jumper for CR, CRM

**Packaging**

- E = Paper Tape (5,000 Pieces) on 7" Plastic Reel
- E = Embossed Plastic Tape (4,000 Pieces) on 7" Plastic Reels for 0603, 0612, 0805, 1206, 2010 and 2512
- G = Paper Tape (20,000 pcs.) on 7" Plastic Reel for 01005
- G = Paper Tape (10,000 pcs.) on 7" Plastic Reel for 0201, 0402

**Terminations**

- LF = Tin-Plated (RoHS compliant\*)
- PF = Ultra-Low Lead Content, without RoHS exemptions

## CHIP ARRAYS

### Available Types

- Thick film chip resistor array
- Convex and concave
- Isolated, bussed

### Available Tolerances

- 5 % and 1 % in CAT16, CAY16 series
- 5 % in CAY06, CAT10, CAY10, CAY17, CAT25 series
- 5 % in E24 series
- 1 % in E96 + E24 series

## CHIP ARRAY VS. DIP PACKAGE

### Chip Array

- Ceramic has protective coating on top
- Terminate to metallization on ceramic
- Low power

### DIP Package

- Ceramic covered with molding
- Terminate to pins connected to ceramic
- Higher power rating than chip array

## HOW TO ORDER - THICK FILM CHIP ARRAYS

**CA T 10 - 103 J 4 LF**

**Chip Arrays**

**Type**

- T = Concave
- Y = Convex

**Package Size**

- 06 = 0202
- 10 = xx04
- 16 = xx06
- 17 = 1206
- 25 = 1608

**Resistance Code**

- 103 = 10K ohms  
(Two significant digits; 3rd digit is number of zeros to follow)
- 000 = Zero-ohm Jumper

**Resistance Tolerance**

- J =  $\pm 5\%$
- F =  $\pm 1\%$

**Resistor Quantity**

- 2 = 2 Resistors (CAY06/CAY10/CAT16/CAY16 models)
- 4 = 4 Resistors (CAT10/CAY10/CAT16/CAY16 models)
- 8 = 8 Resistors (CAY16/CAT16 models)
- A = 8 Resistors (CAT25)
- A = Common from Terminal 5 to 10 (CAY17 models)
- B = Common from Terminal 1 to 6 (CAY17 models)

**Terminations**

- LF = Tin-Plated (RoHS compliant\*)

*Note: CAT16 available as J2, F4, J4, F8, J8; CAY16 available as J2, F4, J4, J8*

# Chip Resistor Product Information

## THICK FILM CHIP RESISTORS

Bourns offers several sizes of thick film chip resistors in standard values for most market requirements. These products provide designers off-the-shelf flexibility of performance, space savings and low cost.

CR Series General Purpose							
CR Series	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	01005 to 2512	1 ohm to 20 megohms	1 %/5 %	±100 ppm/±250 ppm	0.03 to 1	Tape & Reel	<ul style="list-style-type: none"> <li>Small package dimensions</li> <li>Nickel barrier prevents leaching</li> <li>Suitable for most types of soldering</li> <li>RoHS compliant*</li> </ul>
CR-AS Series General Purpose - Sulfur-Resistant							
CR-AS Series	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	01005 to 0603	1 ohm to 10 megohms	1 %/5 %	±100 ppm/±250 ppm	0.03 to 0.1	Tape & Reel	<ul style="list-style-type: none"> <li>Small package dimensions</li> <li>Nickel barrier prevents leaching</li> <li>Suitable for most types of soldering</li> <li>RoHS compliant*</li> </ul>
CR-PF Series General Purpose - Ultra-Low Lead Content							
CR-PF Series	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0402 to 1206	1 ohm to 10 megohms	1 %/5 %	±100ppm/±200 ppm/±400 ppm	0.63 to 0.25	Tape & Reel	<ul style="list-style-type: none"> <li>RoHS compliant* - without exemptions</li> </ul>
CRL Series Low Resistance Value - for Current Sensing							
CRL Series	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0603 to 2512	0.02 to 9.1 ohms	1 %/5 %	±200 ppm/±600 ppm	0.1 to 1	Tape & Reel	<ul style="list-style-type: none"> <li>RoHS compliant*</li> </ul>
CHV Series High Voltage							
CHV Series	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0603 to 2512	100K ohms to 100 megohms	1 %/5 %	±100 ppm/±200 ppm	0.1 to 1	Tape & Reel	<ul style="list-style-type: none"> <li>UL 1676 Listed</li> <li>UL/IEC 60950 &amp; 60065 Compatible</li> <li>RoHS compliant*</li> </ul>

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.



<b>CRM Series</b>	High Power - for Current Sensing, Power Supplies, Flyback Power Supplies						
	<b>Size</b>	<b>Resistance Range</b>	<b>Tolerance</b>	<b>Temperature Coefficient</b>	<b>Rated Power (W)</b>	<b>Packaging</b>	<b>Features</b>
	0805 to 2512	0.047 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.25 to 2	Tape & Reel	<ul style="list-style-type: none"> <li>Low resistance value available</li> <li>RoHS compliant*</li> </ul>
<b>CRM-A Series</b>	High Power - AEC-Q200 Compliant, Sulfur-Resistant						
	<b>Size</b>	<b>Resistance Range</b>	<b>Tolerance</b>	<b>Temperature Coefficient</b>	<b>Rated Power (W)</b>	<b>Packaging</b>	<b>Features</b>
	0603 to 2512	0.05 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.125 to 2	Tape & Reel	<ul style="list-style-type: none"> <li>Low resistance value available</li> <li>RoHS compliant*</li> </ul>
<b>CRS Series</b>	High Power Surge-Resistant - for Pulse Power Applications						
	<b>Size</b>	<b>Resistance Range</b>	<b>Tolerance</b>	<b>Temperature Coefficient</b>	<b>Rated Power (W)</b>	<b>Packaging</b>	<b>Features</b>
	0805 to 2512	1 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.25 to 2	Tape & Reel	<ul style="list-style-type: none"> <li>IEC 61000-4-5 1.2/50 µs</li> <li>RoHS compliant*</li> </ul>
<b>CRS-A Series</b>	High Power Surge-Resistant - AEC-Q200 Compliant, Sulfur-Resistant						
	<b>Size</b>	<b>Resistance Range</b>	<b>Tolerance</b>	<b>Temperature Coefficient</b>	<b>Rated Power (W)</b>	<b>Packaging</b>	<b>Features</b>
	0603 to 2512	1 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.125 to 2	Tape & Reel	<ul style="list-style-type: none"> <li>IEC 61000-4-5 1.2/50 µs</li> <li>RoHS compliant*</li> </ul>
<b>CHP-Series</b>	Ultra-High Power Resistor						
	<b>Size</b>	<b>Resistance Range</b>	<b>Tolerance</b>	<b>Temperature Coefficient</b>	<b>Rated Power (W)</b>	<b>Packaging</b>	<b>Features</b>
	0603 to 2512	1 ohm to 1 megohm	1 %/5 %	±100 ppm/±200 ppm	0.33 to 3 W	Tape & Reel	<ul style="list-style-type: none"> <li>RoHS compliant*</li> <li>High power surge withstanding</li> </ul>



# Chip Resistor Product Information

## THIN FILM CHIP RESISTORS

Bourns® CRT series provides tight tolerance and high precision over a wide range of resistance values.

These resistors are typically used in current sense applications and precision circuits, with specific ordering characteristics for size and performance selection.

CRT-ST	Precision						
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0402 to 1206	1 ohm to 2.49 megohm	0.01 % to 1 %	$\pm 25$ to $\pm 50$ ppm	0.063 to 0.25	Tape & Reel	<ul style="list-style-type: none"><li>• RoHS compliant*</li></ul>

CRT Series	High Precision						
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0402 to 1206	1 ohm to 1 megohm	0.01 % to 1 %	$\pm 2$ to $\pm 50$ ppm	0.063 to 0.25	Tape & Reel	<ul style="list-style-type: none"><li>• Ultra-tight tolerance</li><li>• RoHS compliant*</li></ul>

CRT-AS Series	High Precision - Sulfur-Resistant						
	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0402 to 1206	1 ohm to 1 megohm	0.05% to 1%	$\pm 10$ to $\pm 50$ ppm	0.063 to 0.25	Tape & Reel	<ul style="list-style-type: none"><li>• Sulfur-resistant</li><li>• Ultra-tight tolerance</li><li>• RoHS compliant*</li></ul>

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.



## METAL STRIP CHIP RESISTORS

There are four series of AEC-Q200 compliant metal strip chip resistors. They offer 1 % and 5 % tolerances and a  $\pm 50$  ppm/ $^{\circ}\text{C}$  temperature coefficient of resistance value with operating temperature ranges from  $-55$   $^{\circ}\text{C}$  to  $+170$   $^{\circ}\text{C}$ .

These products are offered for high precision current sense applications because they have very low resistance, high rated power, good long-term stability and low thermal EMF.

High Power Current Sense Chip Resistor							
CRF Series	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0805, 1206 & 2512	0.001 to 0.05 ohm	1 %, 5 %	$\pm 50$ ppm	0.5 to 2	Tape & Reel	<ul style="list-style-type: none"> <li>High power density</li> <li>AEC-Q200 compliant</li> <li>RoHS compliant*</li> </ul>
High Power Current Sense Chip Resistor							
CRE Series	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	2512	0.001 to 0.009 ohm	1 %	$\pm 50$ ppm	2 & 3	Tape & Reel	<ul style="list-style-type: none"> <li>Mn/Cu alloy resistor</li> <li>Low EMF</li> <li>AEC-Q200 compliant</li> <li>RoHS compliant*</li> </ul>
High Power Current Sense Chip Resistor							
CRA Series	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	2512	0.01 to 0.1 ohm	1 %, 5 %	$\pm 50$ ppm	3	Tape & Reel	<ul style="list-style-type: none"> <li>Special alloy resistor</li> <li>AEC-Q200 compliant</li> <li>RoHS compliant*</li> </ul>
4-Terminal Current Sense Resistor							
CST Series	Size	Resistance Range	Tolerance	Temperature Coefficient	Rated Power (W)	Packaging	Features
	0612	0.0005 to 0.002 ohm	1 %	$\pm 100$ ppm/ $\pm 200$ ppm	1	Tape & Reel	<ul style="list-style-type: none"> <li>Four terminal design</li> <li>AEC-Q200 compliant</li> <li>RoHS compliant*</li> </ul>

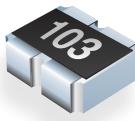
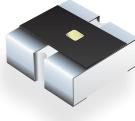
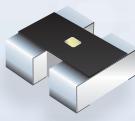


# Chip Array Product Information

## CHIP RESISTOR ARRAYS WITH CONVEX TERMINALS

Bourns provides a wide selection of standard resistance values, in several popular sizes, available with convex terminations. Chip arrays require minimal space, as well as reduce cost and component count.

Beyond standard isolated and bussed configurations, several high-speed termination chip arrays designed for use in terminating FPGAs, using either LVDS or LPVCL I/O standards are available.

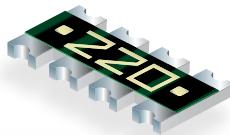
CAY06-J2 Series						
Chip Resistor Array						
	Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
	0202	10 ohms to 1 megohm	±5 %	±250 ppm/°C	0.0625	<ul style="list-style-type: none"><li>Convex termination style</li><li>RoHS compliant*</li></ul>
CAY06-J2 AS Series						
Chip Resistor Array - Sulfur-Resistant						
	Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
	0202	10 ohms to 1 megohm	±5 %	±250 ppm/°C	0.0625	<ul style="list-style-type: none"><li>Sulfur-resistant</li><li>Convex termination style</li><li>RoHS compliant*</li></ul>
CAY10-J2/J4 Series						
Chip Resistor Array						
	Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
	0404, 0804	10 ohms to 1 megohm	±5 %	±250 ppm/°C	0.0625	<ul style="list-style-type: none"><li>Convex termination style</li><li>2/4 isolated resistors in an 0404/0804 size package</li><li>E24 series from 10 ohms to 1 megohm</li><li>RoHS compliant*</li></ul>
CAY10-J2/J4 AS Series						
Chip Resistor Array - Sulfur-Resistant						
	Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
	0404, 0804	10 ohms to 1 megohm	±5 %	±250 ppm/°C	0.0625	<ul style="list-style-type: none"><li>Sulfur-resistant</li><li>2/4 isolated resistors in an 0404/0804 size package</li><li>E24 series from 10 ohms to 1 megohm</li><li>RoHS compliant*</li></ul>

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.



**CAY16-J2/F4/J4/J8 Series****Chip Resistor Array**

Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
0606 - 1506	10 ohms to 1 megohm	$\pm 1\%, \pm 5\%$	$\pm 200 \text{ ppm}/^\circ\text{C}$	0.0625	<ul style="list-style-type: none"><li>Convex termination style</li><li>2, 4 or 8 isolated elements available</li><li>RoHS compliant*</li></ul>

**CAY16-J4 AS Series****Chip Resistor Array - Sulfur-Resistant**

Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
0606 - 1206	10 ohms to 1 megohm	$\pm 5\%$	$\pm 200 \text{ ppm}/^\circ\text{C}$	0.0625	<ul style="list-style-type: none"><li>Sulfur-resistant</li><li>Convex termination style</li><li>RoHS compliant*</li></ul>

**CAY17 Series****Chip Resistor Array**

Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
1206	10 ohms to 100K ohms	$\pm 5\%$	$\pm 250 \text{ ppm}/^\circ\text{C}$	0.0625	<ul style="list-style-type: none"><li>Convex termination style</li><li>10 pin with 8 resistors in bussed type for pull up/down circuit</li><li>E24 series from 10 ohms to 43K ohms</li><li>RoHS compliant*</li></ul>

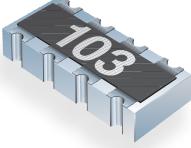


# Chip Array Product Information

## CHIP RESISTOR ARRAYS WITH CONCAVE TERMINALS

Bourns provides a wide selection of standard resistance values in several popular sizes  $\pm$  terminations. Chip arrays require minimal space, as well as reduce cost and component count.

Beyond standard isolated and bussed configurations, several high-speed termination chip arrays designed for use in terminating FPGAs, using either LVDS or LVPCL I/O standards are available.

CAT10-J4 Series	Chip Resistor Array					Features
	Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	
	0804	10 ohms to 1 megohm	$\pm 5\%$	$\pm 250 \text{ ppm}/^\circ\text{C}$	0.0625	<ul style="list-style-type: none"><li>Concave termination style</li><li>E24 series from 10 ohms to 1 megohm</li><li>RoHS compliant*</li></ul>

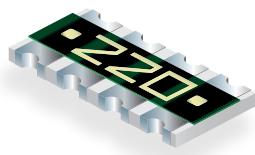
  

CAT16-J2/F4/J4/F8/J8 Series	Chip Resistor Array					Features
	Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	
	0606 - 2406	10 ohms to 1 megohm	$\pm 1\%, \pm 5\%$	$\pm 200 \text{ ppm}/^\circ\text{C}$	0.0625	<ul style="list-style-type: none"><li>Concave termination style</li><li>2, 4 or 8 isolated elements available</li><li>RoHS compliant*</li></ul>

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.



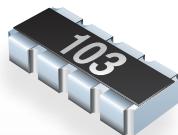
## CAT16-J2/J4 AS Series



## Chip Resistor Array - Sulfur-Resistant

Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
0606 - 1206	10 ohms to 1 megohm	$\pm 5\%$	$\pm 200 \text{ ppm}/^\circ\text{C}$	0.0625	<ul style="list-style-type: none"><li>Sulfur-resistant</li><li>Concave termination style</li><li>2/4 isolated elements available</li><li>RoHS compliant*</li></ul>

## CAT25 Series



## Chip Resistor Array

Size	Resistance Range	Tolerance	Temperature Coefficient	Power per Resistor (W)	Features
1608	10 ohms to 1 megohms	$\pm 5\%$	$\pm 200 \text{ ppm}/^\circ\text{C}$	0.0625	<ul style="list-style-type: none"><li>Concave termination style</li><li>10 pins/ 8 bussed resistors</li><li>For 8-bit multiple applications</li><li>RoHS compliant*</li></ul>





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