

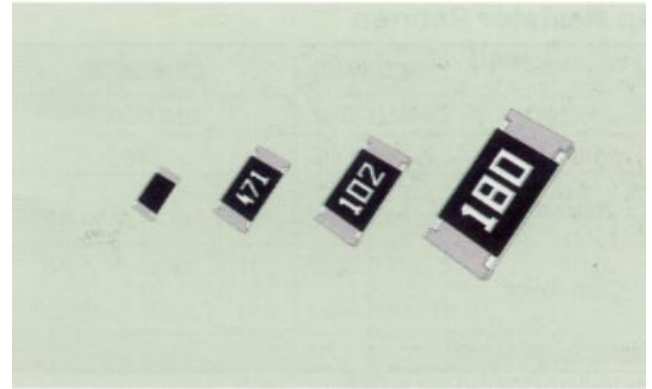
# Thick Film Chip Resistors



## CR05 / CR10 / CR21 / CR32 Series

### Features:

- 1) Wave, IR reflow and vapor phase soldering compatible.
- 2) Wrap-around nickel barrier terminations.
- 3) Suitable size & packaging for surface mount assembly.
- 4) Low noise.



### How To Order:

**CR 32 – 101 J – T**

#### Packaging

- B = Bulk (1,000 pcs/bag)
- T = 7" Reel/Punched Paper Tape (5,000 pcs/reel) except CR05
- H = 7" Reel/Punched Paper Tape (10,000 pcs/reel, 2mm pitch taping) CR05 and CR10
- D = 10" Reel/Punched Paper Tape (10,000 pcs/reel) CR32, CR21, CR10
- K = 13" Reel/Punched Paper Tape (20,000 pcs/reel) except CR05 (optional)

#### Resistance Tolerance

- Blank = Jumper
- K =  $\pm 10\%$
- J =  $\pm 5\%$
- G =  $\pm 2\%$
- F =  $\pm 1\%$
- D =  $\pm 0.5\%$

#### Resistance Code

- For G, J, and K Tolerances: 3 digit code (E-24)  
2 significant digits plus number of zeros  
Examples:  
2.2 $\Omega$  = 2R2  
10 $\Omega$  = 100  
100 $\Omega$  = 101  
1k $\Omega$  = 102  
0 $\Omega$  = 000 (Jumper)
- For D and F Tolerances: 4 digit code (E-96)  
3 significant digits plus number of zeros  
Examples:  
10 $\Omega$  = 10R0  
100 $\Omega$  = 1000  
1k $\Omega$  = 1001

#### Case Size

- 05 = 0402
- 10 = 0603
- 21 = 0805
- 32 = 1206

#### Style

- CR = Chip Resistor
- CJ = Zero Ohm Jumper

### Dimensions:

	CR05 (CJ05)	CR10 (CJ10)	CR21 (CJ21)	CR32 (CJ32)
<b>L</b>	1.00 $\pm$ 0.05 (.039 $\pm$ .002)	1.60 $\pm$ 0.10 (.063 $\pm$ .004)	2.00 $\pm$ 0.10 (.079 $\pm$ .004)	3.10 $\pm$ 0.10 (.122 $\pm$ .004)
<b>W</b>	0.50 $\pm$ 0.05 (.020 $\pm$ .002)	0.80 $^{+0.15}_{-0.10}$ (.031 $^{+0.006}_{-.004}$ )	1.25 $^{+0.15}_{-0.10}$ (.049 $^{+0.006}_{-.004}$ )	1.55 $^{+0.15}_{-0.10}$ (.061 $^{+0.006}_{-.004}$ )
<b>T</b>	0.35 $\pm$ 0.05 (.014 $\pm$ .002)	0.50 $\pm$ 0.10 (.020 $\pm$ .004)	0.55 $\pm$ 0.10 (.022 $\pm$ .004)	0.55 $^{+0.10}_{-0.05}$ (.022 $^{+0.004}_{-.002}$ )
<b>C</b>	0.20 $\pm$ 0.15 (.008 $\pm$ .006)	0.25 $\pm$ 0.20 (.010 $\pm$ .008)	0.35 $\pm$ 0.20 (.014 $\pm$ .008)	0.45 $\pm$ 0.20 (.018 $\pm$ .008)
<b>D</b>	0.20 $\pm$ 0.10 (.008 $\pm$ .004)	0.20 $^{+0.20}_{-0.15}$ (.008 $^{+0.008}_{-.006}$ )	0.40 $\pm$ 0.20 (.016 $\pm$ .008)	0.45 $\pm$ 0.20 (.018 $\pm$ .008)

mm (inches)

## CR05 / CR10 / CR21 / CR32 Series Performance Characteristics

### Chip Resistor Ratings

Spec \ Style	CR05 (0402)		CR10 (0603)				CR21 (0805)					CR32 (1206)				
Power	0.063 (1/16) W		0.063 (1/16) W				0.100 (1/10) W					0.125 (1/8) W*				
Voltage	50V		50V				100V					200V				
Tolerance	J (±5%)	K (±10%)	F (±1%)	G (±2%)	J (±5%)	K (±10%)	D (±0.5%)	F (±1%)	G (±2%)	J (±5%)	K (±10%)	D (±0.5%)	F (±1%)	G (±2%)	J (±5%)	K (±10%)
Value Range	10Ω ↓ 2.2 MΩ	2.2Ω ↓ 10 MΩ	10Ω ↓ 1 MΩ	10Ω ↓ 2.2 MΩ	1.0Ω ↓ 10 MΩ		10Ω ↓ 1 MΩ	10Ω ↓ 1 MΩ	10Ω ↓ 2.2 MΩ	1.0Ω ↓ 10 MΩ	0.47Ω ↓ 10 MΩ	10Ω ↓ 1 MΩ	10Ω ↓ 1 MΩ	10Ω ↓ 2.2 MΩ	1.0Ω ↓ 10 MΩ	0.36Ω ↓ 10 MΩ
Working Temperature	-55°C ~ +125°C															

\*May be rated to 0.250W from 10Ω to 2.2MΩ.

### Chip Zero Ohm Jumper Ratings

Spec \ Style	CJ05 (0402)	CJ10 (0603)	CJ21 (0805)	CJ32 (1206)
Rated Current	1A (70°C)			2A (70°C)
Resistivity	50 mΩ Maximum			
Working Temperature	-55°C ~ +125°C			

### Temperature Coefficient of Resistance

Tolerance	CR05					CR10						
	J (±5%)		K (±10%)			F (±1%)		G (±2%)		J (±5%)		K (±10%)
Resistance Range	10Ω ↓ 1MΩ	1MΩ ↓ 2.2MΩ	2.2Ω ↓ 10Ω	10Ω ↓ 1MΩ	1MΩ ↓ 10MΩ	10Ω ↓ 100Ω	100Ω ↓ 1MΩ	10Ω ↓ 1MΩ	1MΩ ↓ 2.2MΩ	1.0Ω ↓ 10Ω	10Ω ↓ 1MΩ	1MΩ ↓ 10MΩ
TCR (ppm/°C)	±250	-500 ↓ +300	-100 ↓ +600	±250	-500 ↓ +300	±200	±200	±200	-500 ↓ +300	-100 ↓ +600	±200	-500 ↓ +300
Tolerance	CR21											
	D (±0.5%)	F (±1%)		G (±2%)	J (±5%)		K (±10%)					
Resistance Range	10Ω ↓ 1MΩ	10Ω ↓ 100Ω	100Ω ↓ 1MΩ	10Ω ↓ 1MΩ	1MΩ ↓ 2.2MΩ	1.0Ω ↓ 10Ω	10Ω ↓ 1MΩ	1MΩ ↓ 10MΩ	0.47Ω ↓ 1.0Ω	1.0Ω ↓ 10Ω	10Ω ↓ 1MΩ	1MΩ ↓ 10MΩ
TCR (ppm/°C)	±200*	±200*	±200*	±200	-500 ↓ +300	-100 ↓ +600	±200	-500 ↓ +300	-100 ↓ +1000	-100 ↓ +600	±200	-500 ↓ +300
Tolerance	CR32											
	D (±0.5%)	F (±1%)		G (±2%)	J (±5%)			K (±10%)				
Resistance Range	10Ω ↓ 1MΩ	100Ω ↓ 1MΩ	10Ω ↓ 100Ω	1MΩ ↓ 2.2MΩ	10Ω ↓ 1MΩ	10Ω ↓ 1MΩ	1MΩ ↓ 10MΩ	1.0Ω ↓ 10Ω	0.36Ω ↓ 1.0Ω	1.0Ω ↓ 10Ω	10Ω ↓ 1MΩ	1MΩ ↓ 10MΩ
TCR (ppm/°C)	±200*	±200*	±200*	-500 ↓ +300	±200	±200	-500 ↓ +300	-100 ↓ +600	-100 ↓ +1000	-100 ↓ +600	±200	-500 ↓ +300

\*Optional for 1% and 0.5% tolerance ±100ppm/°C

### Standard Decade Values

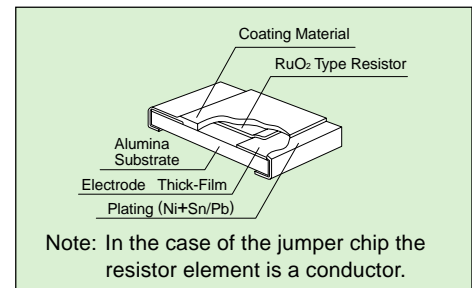
For ±10%, ±5%, ±2%, 1% and ±0.5% Tolerances (E-24)

1.0	1.1	1.2	1.3	1.5
1.6	1.8	2.0	2.2	2.4
2.7	3.0	3.3	3.6	3.9
4.3	4.7	5.1	5.6	6.2
6.8	7.5	8.2	9.1	

For ±1% and ±0.5% Tolerance (E-96)

10.0	10.2	10.5	10.7	11.0	11.3	11.5	11.8	12.1	12.4
12.7	13.0	13.3	13.7	14.0	14.3	14.7	15.0	15.4	15.8
16.2	16.5	16.9	17.4	17.8	18.2	18.7	19.1	19.6	20.0
20.5	21.0	21.5	22.1	22.6	23.2	23.7	24.3	24.9	25.5
26.1	26.7	27.4	28.0	28.7	29.4	30.1	30.9	31.6	32.4
33.2	34.0	34.8	35.7	36.5	37.4	38.3	39.2	40.2	41.2
42.2	43.2	44.2	45.3	46.4	47.5	48.7	49.9	51.1	52.3
53.6	54.9	56.2	57.6	59.0	60.4	61.9	63.4	64.9	66.5
68.1	69.8	71.5	73.2	75.0	76.8	78.7	80.6	82.5	84.5
86.6	88.7	90.9	93.1	95.3	97.6				

### Construction



### Marking

Marking available as follows:  
 Series: CR32, CJ32, CR21, CJ21, CR10, CJ10  
 3 digit indication  
 Example: 473=47 X 10<sup>3</sup>= 47000 Ω = 47 kΩ  
 0 : 0 Ω (Jumper)  
 100 : 10 Ω  
 102 : 1 kΩ  
 105 : 1 MΩ

Series: CR05 and CJ05 - No marking  
 Note: On CR32 4 digit marking is available for ±1% and ±0.5% tolerances.

### Derating Curve

