**Features**
- RoHS compliant*
- Tight tolerance of bottom electrode width
- 1% and 5% tolerance options
- Three layer termination process with nickel barrier helps prevent leaching and provides excellent solderability
- Tape and reel packaging

### CR Series - Thick Film Chip Resistors

#### Electrical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Rating @ 70 °C</td>
<td>1/32 W</td>
</tr>
<tr>
<td>Operating Temp. Range</td>
<td>-55 °C to +125 °C</td>
</tr>
<tr>
<td>Derated to Zero Load @</td>
<td>+125 °C</td>
</tr>
<tr>
<td>Max. Working Voltage</td>
<td>15 V</td>
</tr>
<tr>
<td>Max. Overload Voltage</td>
<td>30 V</td>
</tr>
<tr>
<td>Resistance Tolerance</td>
<td>±1 %, ±5 %</td>
</tr>
<tr>
<td>Temperature Coefficient ±1 % (E24 &amp; E96 Series)</td>
<td>10 Ω&lt; R&lt; 100 Ω ±500 ppm/°C</td>
</tr>
<tr>
<td>Temperature Coefficient ±5 % (E24 Series)</td>
<td>10 Ω&lt; R&lt; 100 Ω ±300 ppm/°C</td>
</tr>
<tr>
<td>Zero Ohm Jumper</td>
<td>50 milliohms max.</td>
</tr>
<tr>
<td>Rated Current</td>
<td>0.5 A</td>
</tr>
<tr>
<td>Max. Overload Current</td>
<td>1 A</td>
</tr>
</tbody>
</table>

#### Environmental Characteristics

| Moisture Sensitivity Level | 1 |

### Additional Information

Click these links for more information:

- ![PRODUCT](image)
- ![TECHNICAL LIBRARY](image)
- ![INVENTORY](image)
- ![SAMPLES](image)
- ![CONTACT](image)


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## CR Series - Thick Film Chip Resistors

### Product Dimensions

<table>
<thead>
<tr>
<th>Model</th>
<th>L</th>
<th>W</th>
<th>C</th>
<th>D</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR01005</td>
<td>0.40 ± 0.02 (.016 ± .0008)</td>
<td>0.20 ± 0.03 (.008 ± .001)</td>
<td>0.10 ± 0.03 (.004 ± .001)</td>
<td>0.10 ± 0.03 (.004 ± .001)</td>
<td>0.13 ± 0.02 (.009 ± .0008)</td>
</tr>
<tr>
<td>CR0201</td>
<td>0.60 ± 0.03 (.024 ± .001)</td>
<td>0.30 ± 0.03 (.012 ± .001)</td>
<td>0.10 ± 0.05 (.004 ± .002)</td>
<td>0.15 ± 0.05 (.006 ± .002)</td>
<td>0.23 ± 0.03 (.009 ± .001)</td>
</tr>
<tr>
<td>CR0402</td>
<td>1.00 ± 0.05 (.039 ± .002)</td>
<td>0.50 ± 0.05 (.020 ± .002)</td>
<td>0.20 ± 0.10 (.008 ± .004)</td>
<td>0.25 ± 0.10 (.010 ± .004)</td>
<td>0.32 ± 0.05 (.013 ± .002)</td>
</tr>
<tr>
<td>CR0603</td>
<td>1.60 ± 0.10 (.063 ± .004)</td>
<td>0.80 ± 0.10 (.031 ± .004)</td>
<td>0.30 ± 0.20 (.012 ± .006)</td>
<td>0.30 ± 0.20 (.012 ± .006)</td>
<td>0.45 ± 0.10 (.018 ± .004)</td>
</tr>
<tr>
<td>CR0805</td>
<td>2.00 ± 0.10 (.079 ± .004)</td>
<td>1.25 ± 0.10 (.049 ± .004)</td>
<td>0.40 ± 0.20 (.016 ± .008)</td>
<td>0.40 ± 0.20 (.016 ± .008)</td>
<td>0.50 ± 0.10 (.020 ± .004)</td>
</tr>
<tr>
<td>CR1206</td>
<td>3.10 ± 0.10 (.122 ± .004)</td>
<td>1.55 ± 0.10 (.061 ± .004)</td>
<td>0.50 ± 0.30 (.020 ± .012)</td>
<td>0.40 ± 0.20 (.016 ± .008)</td>
<td>0.55 ± 0.10 (.022 ± .004)</td>
</tr>
<tr>
<td>CR2010</td>
<td>5.00 ± 0.15 (.197 ± .006)</td>
<td>2.50 ± 0.15 (.098 ± .006)</td>
<td>0.60 ± 0.30 (.024 ± .012)</td>
<td>0.50 ± 0.25 (.020 ± .010)</td>
<td>0.60 ± 0.10 (.024 ± .004)</td>
</tr>
<tr>
<td>CR2512</td>
<td>6.30 ± 0.20 (.248 ± .008)</td>
<td>3.20 ± 0.20 (.126 ± .008)</td>
<td>0.60 ± 0.30 (.024 ± .012)</td>
<td>0.50 ± 0.25 (.020 ± .010)</td>
<td>0.60 ± 0.10 (.024 ± .004)</td>
</tr>
</tbody>
</table>

### Recommended Pad Layout

<table>
<thead>
<tr>
<th>Model</th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR01005</td>
<td>0.15 ~ 0.20 (.006 ~ .008)</td>
<td>0.50 ~ 0.70 (.020 ~ .028)</td>
<td>0.20 ~ 0.25 (.008 ~ .010)</td>
</tr>
<tr>
<td>CR0201</td>
<td>0.25 ~ 0.30 (.010 ~ .012)</td>
<td>0.70 ~ 0.90 (.028 ~ .035)</td>
<td>0.30 ~ 0.40 (.012 ~ .016)</td>
</tr>
<tr>
<td>CR0402</td>
<td>0.50 ~ 0.60 (.020 ~ .024)</td>
<td>1.40 ~ 1.60 (.055 ~ .063)</td>
<td>0.40 ~ 0.60 (.012 ~ .024)</td>
</tr>
<tr>
<td>CR0603</td>
<td>0.70 ~ 0.90 (.028 ~ .035)</td>
<td>2.00 ~ 2.20 (.079 ~ .087)</td>
<td>0.80 ~ 1.00 (.031 ~ .039)</td>
</tr>
<tr>
<td>CR0805</td>
<td>1.00 ~ 1.40 (.039 ~ .055)</td>
<td>3.20 ~ 3.80 (.126 ~ .150)</td>
<td>0.90 ~ 1.40 (.035 ~ .055)</td>
</tr>
<tr>
<td>CR1206</td>
<td>2.00 ~ 2.40 (.079 ~ .094)</td>
<td>4.40 ~ 5.00 (.173 ~ .197)</td>
<td>1.20 ~ 1.80 (.047 ~ .071)</td>
</tr>
<tr>
<td>CR2010</td>
<td>3.30 ~ 3.70 (.130 ~ .146)</td>
<td>5.70 ~ 6.50 (.224 ~ .256)</td>
<td>2.30 ~ 3.50 (.091 ~ .138)</td>
</tr>
<tr>
<td>CR2512</td>
<td>3.60 ~ 4.00 (.142 ~ .157)</td>
<td>7.60 ~ 8.60 (.299 ~ .339)</td>
<td>2.30 ~ 3.50 (.091 ~ .138)</td>
</tr>
</tbody>
</table>

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CR Series - Thick Film Chip Resistors

Soldering Profile

<1> Maximum of 20 seconds between +255 °C and +260 °C

60 - 120 seconds

10 seconds minimum

Ramp Up 3 °C/second maximum

Ramp Down 6 °C/second

Derating Curve
### CR Series - Thick Film Chip Resistors

#### Performance Characteristics

<table>
<thead>
<tr>
<th>Test</th>
<th>Procedure (IEC 60115-1)</th>
<th>Test Limits ( \Delta R )</th>
</tr>
</thead>
</table>
| Short Time Overload           | 2.5 x rated voltage for 5 seconds                                                       | \( \pm (1\% + 0.05 \Omega) \)  
Remarks: CR01005, CR0201 \( \pm (3\% + 0.1 \Omega) \)  
CR0402 \( \pm (2\% + 0.1 \Omega) \)  
0 Ω Jumper \( \pm 50 \text{mΩ} \) or less |
| Intermittent Overload         | 3.0 x rated voltage or max. overloading voltage, 1 sec. “ON”, 25 sec. “OFF”, 10,000 cycles | \( \pm (1\% + 0.05 \Omega) \)  
5 %: \( \pm (3\% + 0.1 \Omega) \)  
Remarks: CR01005, CR0201 \( \pm (5\% + 0.1 \Omega) \)  
CR0402 \( \pm (3\% + 0.1 \Omega) \)  
0 Ω Jumper \( \pm 100 \text{mΩ} \) or less |
| Load Life                     | 1000 hours at rated voltage, 70 °C, 1.5 hours “ON”, 0.5 hour “OFF”                     | \( \pm (1\% + 0.05 \Omega) \)  
5 %: \( \pm (3\% + 0.1 \Omega) \)  
Remarks: CR01005, CR0201 \( \pm (5\% + 0.1 \Omega) \)  
CR0402 \( \pm (3\% + 0.1 \Omega) \)  
0 Ω Jumper \( \pm 100 \text{mΩ} \) or less |
| Load Life Humidity            | 1000 hours at rated voltage, 40±2 °C, 90–95 % RH 1.5 hours “ON”, 0.5 hour “OFF”        | \( \pm (1\% + 0.05 \Omega) \)  
5 %: \( \pm (3\% + 0.1 \Omega) \)  
Remarks: CR01005, CR0201 \( \pm (5\% + 0.1 \Omega) \)  
CR0402 \( \pm (3\% + 0.1 \Omega) \)  
0 Ω Jumper \( \pm 100 \text{mΩ} \) or less |
| Rapid Change of Temperature   | -55 °C (30 min.) / +155 °C (30 min.) 5 cycles                                            | \( \pm (1\% + 0.05 \Omega) \)  
5 %: \( \pm (3\% + 0.1 \Omega) \)  
Remarks: CR01005, CR0201 \( \pm (5\% + 0.1 \Omega) \)  
CR0402 \( \pm (3\% + 0.1 \Omega) \)  
0 Ω Jumper \( \pm 50 \text{mΩ} \) or less |
| Resistance to Solder Heat     | 270±5 °C, 10x1 sec.                                                                     | \( \pm (0.5\% + 0.05 \Omega) \)  
5 %: \( \pm (1\% + 0.05 \Omega) \)  
Remarks: CR01005 \( \pm (3\% + 0.05 \Omega) \)  
CR0201 \( \pm (3\% + 0.1 \Omega) \)  
0 Ω Jumper \( \pm 50 \text{mΩ} \) or less |
| Solderability                 | 245±5 °C solder, 2±0.5 seconds dwell  
Solder: Sn96.5 / Ag3.0 / Cu0.5                                                      | Over 95 % of termination must be covered with solder                                     |
| Resistance to Dry Heat        | 155±5 °C for 96±4 hours                                                                 | \( \pm (1\% + 0.05 \Omega) \)  
5 %: \( \pm (1\% + 0.05 \Omega) \)  
Remarks: CR0201 \( \pm (1\% + 0.05 \Omega) \)  
CR0402 \( \pm (1\% + 0.05 \Omega) \)  
0 Ω Jumper \( \pm 50 \text{mΩ} \) or less |
| Bending                      | 3 mm deflection                                                                        | \( \pm (0.5\% + 0.05 \Omega) \)  
5 %: \( \pm (2\% + 0.1 \Omega) \)  
Remarks: CR01005, CR0201 \( \pm (3\% + 0.1 \Omega) \)  
CR0402 \( \pm (2\% + 0.1 \Omega) \)  
0 Ω Jumper \( \pm 50 \text{mΩ} \) or less |
| Dielectric Withstanding Voltage | 500 V, 1 minute  
Remarks: CR01005, CR0201 \( \pm 50 \text{V} \)  
CR0402 \( \pm 300 \text{V} \)                                                    | No abnormalities such as flashover, burning or dielectric breakdown shall appear       |
| Insulation Resistance         | 100 V, 1 minute                                                                        | \( \geq 1 \text{GΩ} \)  
Remarks: CR0201 \( \geq 50 \text{MΩ} \)                                      |
## How to Order

<table>
<thead>
<tr>
<th>Model</th>
<th>CR 1206 - F X - 1003 E LF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td>(CR = Chip Resistor)</td>
</tr>
</tbody>
</table>
| **Size** | 01005 = 01005 size  
0201 = 0201 size  
0402 = 0402 size  
0603 = 0603 size  
0805 = 0805 size  
1206 = 1206 size  
2010 = 2010 size  
2512 = 2512 size |
| **Resistance Tolerance** | F = ±1 %  
J = ±5 % |
| **TCR (ppm/°C)** – See Electrical Characteristics Chart | X = ±100  
W = ±200  
V = ±300  
Z = ±400  
/ = Used for zero Ω (jumper) and values from 1 Ω through 9.76 Ω. |
| **Resistance Value** | For 1 % Tolerance:  
<100 Ω … “R” represents decimal point (example: 24R3 = 24.3 Ω).  
≥100 Ω … First three digits are significant, fourth digit represents number of zeros to follow (example: 8252 = 82.5K Ω).  
For 5 % Tolerance:  
<10 Ω … … “R” represents decimal point (example: 4R7 = 4.7 Ω).  
≥10 Ω … … First two digits are significant, third digit represents number of zeros to follow (example: 474 = 470K Ω; 000 = Jumper). |
| **Packaging** | G = Paper Tape (10,000 pcs.) on 7-inch Plastic Reel – CR01005, CR0201, CR0402  
E = Paper Tape (5,000 pcs.) on 7-inch Plastic Reel – CR0603, CR0805, CR1206 or  
Embossed Tape (4,000 pcs) on 7-inch Plastic Reel – CR2010, CR2512 |
| **Termination** | LF = Tin-plated (RoHS Compliant) |

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### CR Series - Thick Film Chip Resistors

#### EIA-96 Marking for CR0603, 1 %

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
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<tbody>
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<td>01</td>
<td>100</td>
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<td>178</td>
<td>49</td>
<td>316</td>
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<td>02</td>
<td>102</td>
<td>26</td>
<td>182</td>
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<td>324</td>
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<td>03</td>
<td>105</td>
<td>27</td>
<td>187</td>
<td>51</td>
<td>332</td>
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<td>309</td>
<td>72</td>
<td>549</td>
<td>96</td>
<td>976</td>
</tr>
</tbody>
</table>

#### Marking Explanation

**0Ω JUMPER:**

- CR01005, CR0201, CR0402: No marking.
- CR0603:
  - (E-96): EIA-96 marking (see table).
  - If the resistance value is not available in the E-96 list, a 3 digit E-24 marking with underline is used.

**CR0805, CR1206, CR2010, CR2512:**

- 5 % (E-24): 3 digits; first two digits are significant, third digit is number of zeros to follow.
- Letter R is decimal point.
- 1 % (E-24 & E-96): 4 digits; first three digits are significant, fourth digit is number of zeros to follow.
- Letter R is decimal point.

### Multipliers

<table>
<thead>
<tr>
<th>Code</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiplier</td>
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<td>10¹</td>
<td>10²</td>
<td>10³</td>
<td>10⁴</td>
<td>10⁵</td>
<td>10⁶</td>
<td>10⁷</td>
<td>10⁻¹</td>
<td>10⁻²</td>
<td>10⁻³</td>
</tr>
</tbody>
</table>
CR Series - Thick Film Chip Resistors

Packaging Dimensions (Conforms to EIA RS-481A)

**PAPER TAPE (2 mm PITCH)**

- **Model**: CR01005
  - **Tape Type**: Paper Tape (2 mm pitch)
  - **Dimensions**: 
    - A: 0.24 ± 0.05
    - B: 0.45 ± 0.10
    - W: 0.45 ± 0.10
    - E: 0.80 ± 0.20
    - F: 3.50 ± 0.05
    - P1: 2.00 ± 0.10
    - P2: 2.00 ± 0.10
    - P0: 4.00 ± 0.10
    - T: 0.15 ± 0.10

- **Model**: CR0201
  - **Tape Type**: Paper Tape (2 mm pitch)
  - **Dimensions**: 
    - A: 0.37 ± 0.05
    - B: 0.67 ± 0.10
    - W: 0.67 ± 0.10
    - E: 1.20 ± 0.05
    - F: 3.15 ± 0.06
    - P1: 2.00 ± 0.10
    - P2: 2.00 ± 0.10
    - P0: 4.00 ± 0.10
    - T: 0.15 ± 0.05

- **Model**: CR0402
  - **Tape Type**: Paper Tape (2 mm pitch)
  - **Dimensions**: 
    - A: 0.70 ± 0.05
    - B: 1.20 ± 0.05
    - W: 1.20 ± 0.05
    - E: 2.40 ± 0.20
    - F: 3.18 ± 0.02
    - P1: 2.00 ± 0.10
    - P2: 2.00 ± 0.10
    - P0: 4.00 ± 0.10
    - T: 0.15 ± 0.05

**PAPER TAPE (4 mm PITCH)**

- **Model**: CR0603
  - **Tape Type**: Paper Tape (4 mm pitch)
  - **Dimensions**: 
    - A: 1.10 ± 0.10
    - B: 1.90 ± 0.10
    - W: 1.90 ± 0.10
    - E: 3.15 ± 0.06
    - F: 3.15 ± 0.06
    - P1: 1.75 ± 0.10
    - P2: 2.00 ± 0.05
    - P0: 4.00 ± 0.10
    - T: 0.15 ± 0.05

- **Model**: CR0805
  - **Tape Type**: Paper Tape (4 mm pitch)
  - **Dimensions**: 
    - A: 1.60 ± 0.15
    - B: 2.40 ± 0.20
    - W: 2.40 ± 0.20
    - E: 3.60 ± 0.20
    - F: 3.60 ± 0.20
    - P1: 2.00 ± 0.10
    - P2: 2.00 ± 0.10
    - P0: 4.00 ± 0.10
    - T: 0.15 ± 0.05

- **Model**: CR1206
  - **Tape Type**: Paper Tape (4 mm pitch)
  - **Dimensions**: 
    - A: 2.00 ± 0.15
    - B: 3.60 ± 0.20
    - W: 3.60 ± 0.20
    - E: 4.00 ± 0.10
    - F: 4.00 ± 0.10
    - P1: 2.00 ± 0.10
    - P2: 2.00 ± 0.10
    - P0: 4.00 ± 0.10
    - T: 0.15 ± 0.05

**EMBOSSED TAPE (4 mm PITCH)**

- **Model**: CR2010
  - **Tape Type**: Embossed Tape (4 mm pitch)
  - **Dimensions**: 
    - A: 2.80 ± 0.20
    - B: 5.30 ± 0.20
    - W: 5.30 ± 0.20
    - E: 12.00 ± 0.20
    - F: 12.00 ± 0.20
    - P1: 5.50 ± 0.05
    - P2: 5.50 ± 0.05
    - P0: 8.50 ± 0.15
    - T: 0.15 ± 0.05

- **Model**: CR2512
  - **Tape Type**: Embossed Tape (4 mm pitch)
  - **Dimensions**: 
    - A: 3.60 ± 0.20
    - B: 6.90 ± 0.20
    - W: 6.90 ± 0.20
    - E: 12.00 ± 0.20
    - F: 12.00 ± 0.20
    - P1: 5.50 ± 0.05
    - P2: 5.50 ± 0.05
    - P0: 8.50 ± 0.15
    - T: 0.15 ± 0.05

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Users should verify actual device performance in their specific applications.
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## CR Series - Thick Film Chip Resistors

### Packaging Dimensions (Conforms to EIA RS-481A)

<table>
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<tr>
<th>Model</th>
<th>Packaging Quantity</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>W</th>
<th>T</th>
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<tr>
<td>CR01005</td>
<td>10K pcs./reel</td>
<td>178 ± 2.0 (7.008 ± .079)</td>
<td>60 ± 1.0 (2.362 ± .039)</td>
<td>13.0 ± 1.0 (.512 ± .039)</td>
<td>9.0 ± 1.0 (.354 ± .039)</td>
<td>11.5 ± 1.0 (.453 ± .039)</td>
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</table>

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