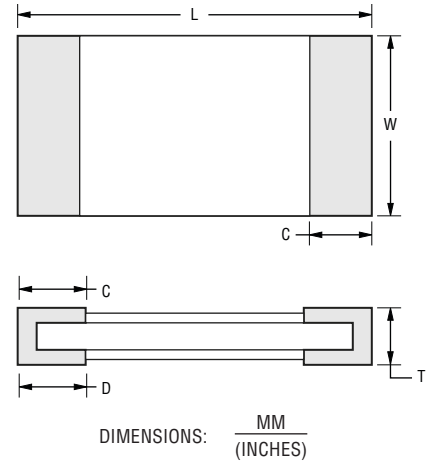


## CR Series - Thick Film Chip Resistors

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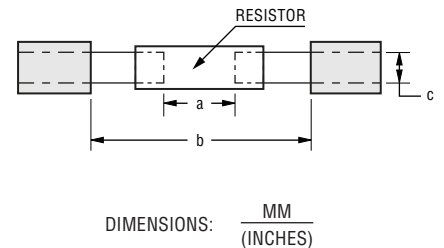
### Product Dimensions

| Model   | L                                        | W                                       | C                                       | D                                       | T                                        |
|---------|------------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|------------------------------------------|
| CR01005 | $\frac{0.40 \pm 0.02}{(.016 \pm .0008)}$ | $\frac{0.20 \pm 0.03}{(.008 \pm .001)}$ | $\frac{0.10 \pm 0.03}{(.004 \pm .001)}$ | $\frac{0.10 \pm 0.03}{(.004 \pm .001)}$ | $\frac{0.13 \pm 0.02}{(.009 \pm .0008)}$ |
| CR0201  | $\frac{0.60 \pm 0.03}{(.024 \pm .001)}$  | $\frac{0.30 \pm 0.03}{(.012 \pm .001)}$ | $\frac{0.10 \pm 0.05}{(.004 \pm .002)}$ | $\frac{0.15 \pm 0.05}{(.006 \pm .002)}$ | $\frac{0.23 \pm 0.03}{(.009 \pm .001)}$  |
| CR0402  | $\frac{1.00 \pm 0.05}{(.039 \pm .002)}$  | $\frac{0.50 \pm 0.05}{(.020 \pm .002)}$ | $\frac{0.20 \pm 0.10}{(.008 \pm .004)}$ | $\frac{0.25 \pm 0.10}{(.010 \pm .004)}$ | $\frac{0.32 \pm 0.05}{(.013 \pm .002)}$  |
| CR0603  | $\frac{1.60 \pm 0.10}{(.063 \pm .004)}$  | $\frac{0.80 \pm 0.10}{(.031 \pm .004)}$ | $\frac{0.30 \pm 0.20}{(.012 \pm .008)}$ | $\frac{0.30 \pm 0.20}{(.012 \pm .008)}$ | $\frac{0.45 \pm 0.10}{(.018 \pm .004)}$  |
| CR0805  | $\frac{2.00 \pm 0.10}{(.079 \pm .004)}$  | $\frac{1.25 \pm 0.10}{(.049 \pm .004)}$ | $\frac{0.40 \pm 0.20}{(.016 \pm .008)}$ | $\frac{0.40 \pm 0.20}{(.016 \pm .008)}$ | $\frac{0.50 \pm 0.10}{(.020 \pm .004)}$  |
| CR1206  | $\frac{3.10 \pm 0.10}{(.122 \pm .004)}$  | $\frac{1.55 \pm 0.10}{(.061 \pm .004)}$ | $\frac{0.50 \pm 0.30}{(.020 \pm .012)}$ | $\frac{0.40 \pm 0.20}{(.016 \pm .008)}$ | $\frac{0.55 \pm 0.10}{(.022 \pm .004)}$  |
| CR2010  | $\frac{5.00 \pm 0.15}{(.197 \pm .006)}$  | $\frac{2.50 \pm 0.15}{(.098 \pm .006)}$ | $\frac{0.60 \pm 0.30}{(.024 \pm .012)}$ | $\frac{0.50 \pm 0.25}{(.020 \pm .010)}$ | $\frac{0.60 \pm 0.10}{(.024 \pm .004)}$  |
| CR2512  | $\frac{6.30 \pm 0.20}{(.248 \pm .008)}$  | $\frac{3.20 \pm 0.20}{(.126 \pm .008)}$ | $\frac{0.60 \pm 0.30}{(.024 \pm .012)}$ | $\frac{0.50 \pm 0.25}{(.020 \pm .010)}$ | $\frac{0.60 \pm 0.10}{(.024 \pm .004)}$  |



### Recommended Pad Layout

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



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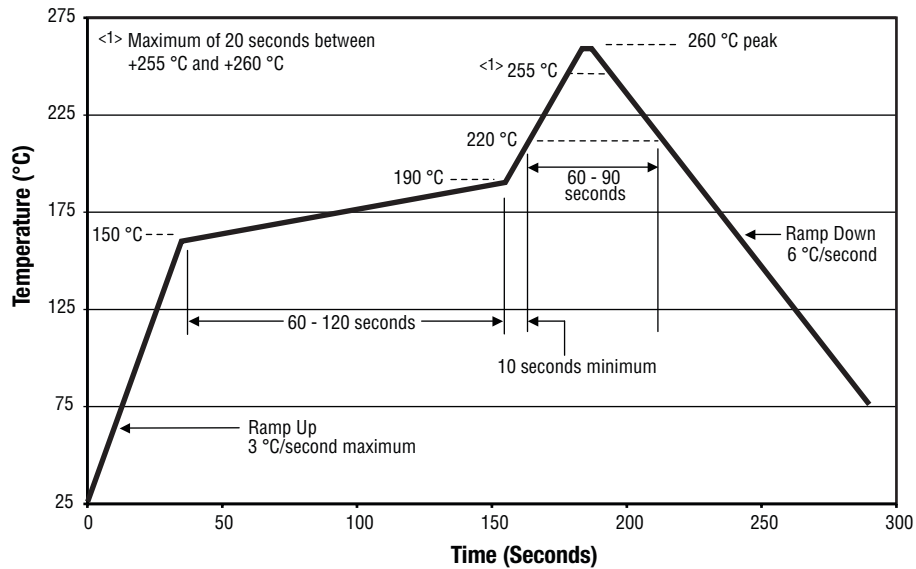
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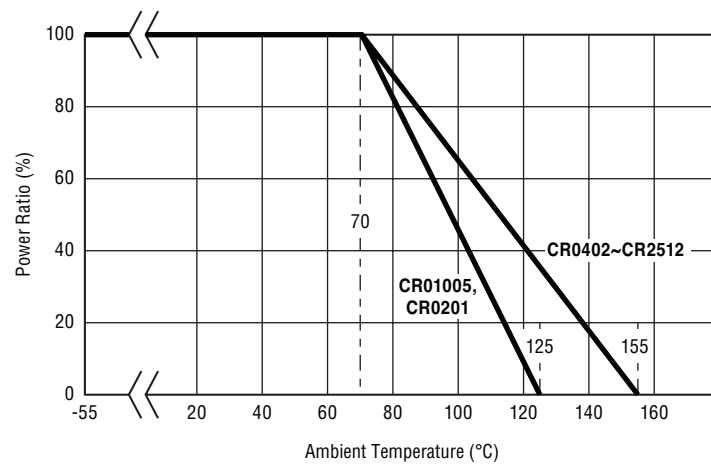
## CR Series - Thick Film Chip Resistors

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### Soldering Profile



### Derating Curve



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# CR Series - Thick Film Chip Resistors

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## Performance Characteristics

| Test                            | Procedure (IEC 60115-1)                                                                                                                                                                                  | Test Limits $\Delta R$                                                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Short Time Overload             | 2.5 x rated voltage for 5 seconds                                                                                                                                                                        | $\leq \pm (1 \% + 0.05 \Omega)$<br>Remarks:<br>CR01005, CR0201 ..... $\pm (3 \% + 0.1 \Omega)$<br>CR0402 ..... $\pm (2 \% + 0.1 \Omega)$<br>0 $\Omega$ Jumper ..... 50 m $\Omega$ or less                                               |
| Intermittent Overload           | 3.0 x rated voltage or max. overloading voltage,<br>1 sec. "ON", 25 sec. "OFF", 10,000 cycles<br>Remarks:<br>CR01005, CR0201 ..... not applicable<br>CR0402 ..... 2.5 x rated continuous working voltage | 1 %: $\leq \pm (1 \% + 0.05 \Omega)$<br>5 %: $\leq \pm (3 \% + 0.1 \Omega)$<br>Remarks:<br>CR01005, CR0201 ..... $\pm (5 \% + 0.1 \Omega)$<br>CR0402 ..... $\pm (3 \% + 0.1 \Omega)$<br>0 $\Omega$ Jumper ..... 100 m $\Omega$ or less  |
| Load Life                       | 1000 hours at rated voltage, 70 °C ,<br>1.5 hours "ON", 0.5 hour "OFF"                                                                                                                                   | 1 %: $\leq \pm (1 \% + 0.05 \Omega)$<br>5 %: $\leq \pm (3 \% + 0.1 \Omega)$<br>Remarks:<br>CR01005, CR0201 ..... $\pm (5 \% + 0.1 \Omega)$<br>CR0402 ..... $\pm (3 \% + 0.1 \Omega)$<br>0 $\Omega$ Jumper ..... 100 m $\Omega$ or less  |
| Load Life Humidity              | 1000 hours at rated voltage, 40 $\pm$ 2 °C,<br>90~95 % RH 1.5 hours "ON", 0.5 hour "OFF"                                                                                                                 | 1 %: $\leq \pm (1 \% + 0.05 \Omega)$<br>5 %: $\leq \pm (3 \% + 0.1 \Omega)$<br>Remarks:<br>CR01005, CR0201 ..... $\pm (5 \% + 0.1 \Omega)$<br>CR0402 ..... $\pm (3 \% + 0.1 \Omega)$<br>0 $\Omega$ Jumper ..... 100 m $\Omega$ or less  |
| Rapid Change of Temperature     | -55 °C (30 min.) / +155 °C (30 min.) 5 cycles                                                                                                                                                            | 1 %: $\leq \pm (0.5 \% + 0.05 \Omega)$<br>5 %: $\leq \pm (1 \% + 0.05 \Omega)$<br>Remarks:<br>CR01005, CR0201 ..... $\pm (3 \% + 0.1 \Omega)$<br>0 $\Omega$ Jumper ..... 50 m $\Omega$ or less                                          |
| Resistance to Solder Heat       | 270 $\pm$ 5 °C, 10 $\pm$ 1 sec.                                                                                                                                                                          | 1 %: $\leq \pm (0.5 \% + 0.05 \Omega)$<br>5 %: $\leq \pm (1 \% + 0.05 \Omega)$<br>Remarks:<br>CR01005 ..... $\pm (3 \% + 0.05 \Omega)$<br>CR0201 ..... $\pm (3 \% + 0.1 \Omega)$<br>0 $\Omega$ Jumper ..... 50 m $\Omega$ or less       |
| Solderability                   | 245 $\pm$ 5 °C solder, 2 $\pm$ 0.5 seconds dwell<br>Solder: Sn96.5 / Ag3.0 / Cu0.5                                                                                                                       | Over 95 % of termination must be covered with solder                                                                                                                                                                                    |
| Resistance to Dry Heat          | 155 $\pm$ 5 °C for 96 $\pm$ 4 hours<br>Remarks:<br>CR0201 ..... 125 $\pm$ 5 °C                                                                                                                           | 1 %: $\leq \pm (1 \% + 0.05 \Omega)$<br>5 %: $\leq \pm (1 \% + 0.05 \Omega)$<br>Remarks:<br>CR01005, CR0201 ..... $\pm (1 \% + 0.1 \Omega)$<br>0 $\Omega$ Jumper ..... 50 m $\Omega$ or less                                            |
| Bending                         | 3 mm deflection<br>Remarks:<br>CR2010, CR2512 ..... 2 mm deflection                                                                                                                                      | 1 %: $\leq \pm (0.5 \% + 0.05 \Omega)$<br>5 %: $\leq \pm (2 \% + 0.1 \Omega)$<br>Remarks:<br>CR01005, CR0201 ..... $\pm (3 \% + 0.1 \Omega)$<br>CR0402 ..... $\pm (2 \% + 0.1 \Omega)$<br>0 $\Omega$ Jumper ..... 50 m $\Omega$ or less |
| Dielectric Withstanding Voltage | 500 V, 1 minute<br>Remarks:<br>CR01005, CR0201 ..... 50 V<br>CR0402 ..... 300 V                                                                                                                          | No abnormalities such as flashover, burning or dielectric breakdown shall appear                                                                                                                                                        |
| Insulation Resistance           | 100 V, 1 minute<br>Remarks:<br>CR0201 ..... 50 V                                                                                                                                                         | $\geq$ 1 G $\Omega$<br>Remarks:<br>CR01005 ..... $\geq$ 100 M $\Omega$ )                                                                                                                                                                |

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## CR Series - Thick Film Chip Resistors

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### How to Order

CR 1206 - F X - 1003 E LF

#### Model

(CR = Chip Resistor)

#### 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 =  $\pm 1\%$   
J =  $\pm 5\%$

#### TCR (ppm/°C) – See Electrical Characteristics Chart

X =  $\pm 100$   
W =  $\pm 200$   
V =  $\pm 300$   
Z =  $\pm 400$   
/ = Used for zero  $\Omega$  (jumper) and values from 1  $\Omega$  through 9.76  $\Omega$ .

#### Resistance Value

##### For 1 % Tolerance:

<100  $\Omega$  ..... "R" represents decimal point (example: 24R3 = 24.3  $\Omega$ ).

$\geq 100 \Omega$  ..... First three digits are significant, fourth digit represents number of zeros to follow (example: 8252 = 82.5K  $\Omega$ ).

##### For 5 % Tolerance:

<10  $\Omega$  ..... "R" represents decimal point (example: 4R7 = 4.7  $\Omega$ ).

$\geq 10 \Omega$  ..... First two digits are significant, third digit represents number of zeros to follow (example: 474 = 470K  $\Omega$ ; 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

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

| Code | R Value | Code | R Value | Code | R Value | Code | R Value |
|------|---------|------|---------|------|---------|------|---------|
| 01   | 100     | 25   | 178     | 49   | 316     | 73   | 562     |
| 02   | 102     | 26   | 182     | 50   | 324     | 74   | 576     |
| 03   | 105     | 27   | 187     | 51   | 332     | 75   | 590     |
| 04   | 107     | 28   | 191     | 52   | 340     | 76   | 604     |
| 05   | 110     | 29   | 196     | 53   | 348     | 77   | 619     |
| 06   | 113     | 30   | 200     | 54   | 357     | 78   | 634     |
| 07   | 115     | 31   | 205     | 55   | 365     | 79   | 649     |
| 08   | 118     | 32   | 210     | 56   | 374     | 80   | 665     |
| 09   | 121     | 33   | 215     | 57   | 383     | 81   | 681     |
| 10   | 124     | 34   | 221     | 58   | 392     | 82   | 698     |
| 11   | 127     | 35   | 226     | 59   | 402     | 83   | 715     |
| 12   | 130     | 36   | 232     | 60   | 412     | 84   | 732     |
| 13   | 133     | 37   | 237     | 61   | 422     | 85   | 750     |
| 14   | 137     | 38   | 243     | 62   | 432     | 86   | 768     |
| 15   | 140     | 39   | 249     | 63   | 442     | 87   | 787     |
| 16   | 143     | 40   | 255     | 64   | 453     | 88   | 806     |
| 17   | 147     | 41   | 261     | 65   | 464     | 89   | 825     |
| 18   | 150     | 42   | 267     | 66   | 475     | 90   | 845     |
| 19   | 154     | 43   | 274     | 67   | 487     | 91   | 866     |
| 20   | 158     | 44   | 280     | 68   | 499     | 92   | 887     |
| 21   | 162     | 45   | 287     | 69   | 511     | 93   | 909     |
| 22   | 165     | 46   | 294     | 70   | 523     | 94   | 931     |
| 23   | 169     | 47   | 301     | 71   | 536     | 95   | 953     |
| 24   | 174     | 48   | 309     | 72   | 549     | 96   | 976     |

### Multipliers

| Code       | A               | B               | C               | D               | E               | F               | G               | H               | X                | Y                | Z                |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| Multiplier | 10 <sup>0</sup> | 10 <sup>1</sup> | 10 <sup>2</sup> | 10 <sup>3</sup> | 10 <sup>4</sup> | 10 <sup>5</sup> | 10 <sup>6</sup> | 10 <sup>7</sup> | 10 <sup>-1</sup> | 10 <sup>-2</sup> | 10 <sup>-3</sup> |

### Marking Explanation

0Ω JUMPER:



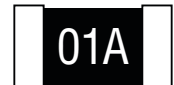
CR01005, CR0201,  
CR0402:

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.



(Value = 100 Ω)



(Value = 120 Ω)

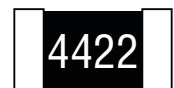
CR0805, CR1206,  
CR2010, CR2512:

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



(Value = 10K Ω)

- 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.



(Value = 44.2K Ω)

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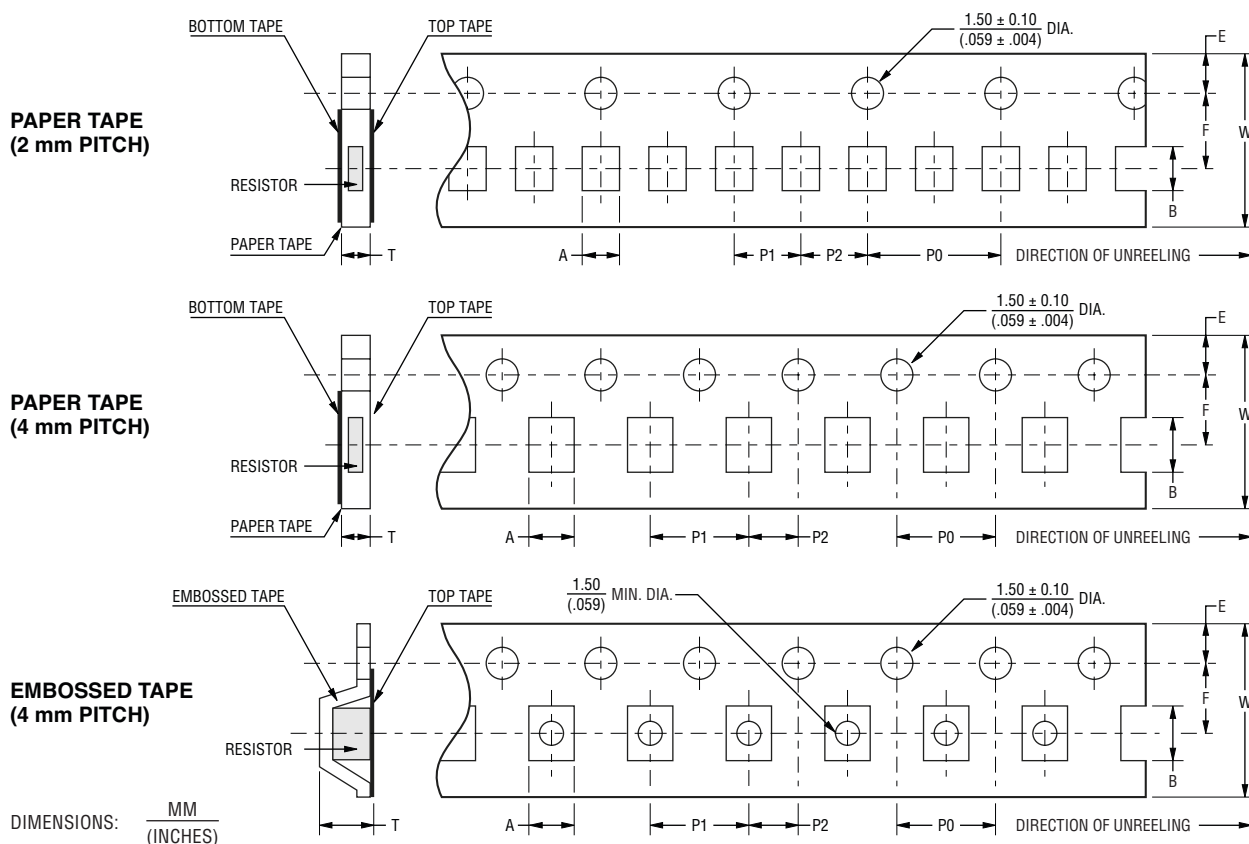
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# CR Series - Thick Film Chip Resistors

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



| Model   | Tape Type                        | A                                       | B                                       | W                                        | F                                       | E                                       | P1                                      | P2                                      | P0                                      | T                                       |
|---------|----------------------------------|-----------------------------------------|-----------------------------------------|------------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|
| CR01005 | Paper Tape<br>(2 mm pitch)       | $\frac{0.24 \pm 0.05}{(.010 \pm .002)}$ | $\frac{0.45 \pm 0.10}{(.018 \pm .004)}$ | $\frac{8.00 \pm 0.20}{(.315 \pm .008)}$  | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{2.00 \pm 0.10}{(.079 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.157 \pm .004)}$ | $\frac{0.15 \pm 0.10}{(.006 \pm .004)}$ |
| CR0201  | Paper Tape<br>(2 mm pitch)       | $\frac{0.37 \pm 0.05}{(.014 \pm .002)}$ | $\frac{0.67 \pm 0.10}{(.026 \pm .004)}$ |                                          |                                         |                                         |                                         |                                         |                                         | $\frac{0.37 \pm 0.10}{(.015 \pm .004)}$ |
| CR0402  |                                  | $\frac{0.70 \pm 0.05}{(.028 \pm .002)}$ | $\frac{1.20 \pm 0.05}{(.047 \pm .002)}$ |                                          |                                         |                                         |                                         |                                         |                                         | $\frac{0.45 \pm 0.10}{(.018 \pm .004)}$ |
| CR0603  | Paper Tape (4<br>mm pitch)       | $\frac{1.10 \pm 0.10}{(.043 \pm .004)}$ | $\frac{1.90 \pm 0.10}{(.075 \pm .004)}$ |                                          |                                         |                                         | $\frac{0.64 \pm 0.10}{(.025 \pm .004)}$ |                                         |                                         |                                         |
| CR0805  |                                  | $\frac{1.60 \pm 0.15}{(.063 \pm .006)}$ | $\frac{2.40 \pm 0.20}{(.094 \pm .008)}$ |                                          |                                         |                                         | $\frac{0.84 \pm 0.10}{(.033 \pm .004)}$ |                                         |                                         |                                         |
| CR1206  |                                  | $\frac{2.00 \pm 0.15}{(.079 \pm .006)}$ | $\frac{3.60 \pm 0.20}{(.142 \pm .008)}$ |                                          |                                         |                                         |                                         |                                         |                                         | $\frac{0.84 \pm 0.10}{(.033 \pm .004)}$ |
| CR2010  | Embossed<br>Tape<br>(4 mm pitch) | $\frac{2.80 \pm 0.20}{(.110 \pm .008)}$ | $\frac{5.30 \pm 0.20}{(.209 \pm .008)}$ | $\frac{12.00 \pm 0.20}{(.472 \pm .008)}$ | $\frac{5.50 \pm 0.05}{(.217 \pm .002)}$ |                                         | $\frac{0.85 \pm 0.15}{(.033 \pm .006)}$ |                                         |                                         |                                         |
| CR2512  |                                  | $\frac{3.60 \pm 0.20}{(.142 \pm .008)}$ | $\frac{6.90 \pm 0.20}{(.272 \pm .008)}$ |                                          |                                         |                                         |                                         |                                         |                                         | $\frac{0.85 \pm 0.15}{(.033 \pm .006)}$ |

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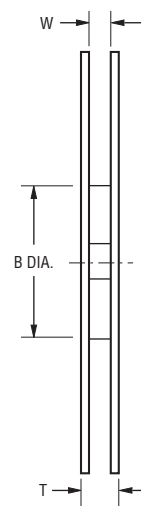
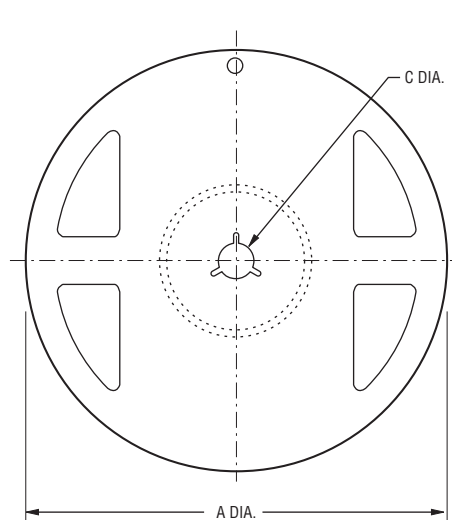
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## CR Series - Thick Film Chip Resistors

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



DIMENSIONS:  $\frac{\text{MM}}{(\text{INCHES})}$

| Model   | Packaging Quantity | A                                      | B                                     | C                                      | W                                      | T                                      |
|---------|--------------------|----------------------------------------|---------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|
| CR01005 | 10K pcs./reel      | $\frac{178 \pm 2.0}{(7.008 \pm .079)}$ | $\frac{60 \pm 1.0}{(2.362 \pm .039)}$ | $\frac{13.0 \pm 1.0}{(.512 \pm .039)}$ | $\frac{9.0 \pm 1.0}{(.354 \pm .039)}$  | $\frac{11.5 \pm 1.0}{(.453 \pm .039)}$ |
| CR0201  |                    |                                        |                                       |                                        |                                        |                                        |
| CR0402  |                    |                                        |                                       |                                        |                                        |                                        |
| CR0603  | 5K pcs./reel       |                                        |                                       |                                        |                                        |                                        |
| CR0805  |                    |                                        |                                       |                                        |                                        |                                        |
| CR1206  |                    |                                        |                                       |                                        |                                        |                                        |
| CR2010  | 4K pcs./reel       |                                        |                                       |                                        | $\frac{13.0 \pm 1.0}{(.512 \pm .039)}$ | $\frac{15.5 \pm 1.0}{(.610 \pm .039)}$ |
| CR2512  |                    |                                        |                                       |                                        |                                        |                                        |

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Bourns expressly identifies those Bourns® standard products that are suitable for use in automotive applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard products in an automotive application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk. If Bourns expressly identifies a sub-category of automotive application in the data sheet for its standard products (such as infotainment or lighting), such identification means that Bourns has reviewed its standard product and has determined that if such Bourns® standard product is considered for potential use in automotive applications, it should only be used in such sub-category of automotive applications. Any reference to Bourns® standard product in the data sheet as compliant with the AEC-Q standard or "automotive grade" does not by itself mean that Bourns has approved such product for use in an automotive application.

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The use and level of testing applicable to Bourns® custom products shall be negotiated on a case-by-case basis by Bourns and the user for which such Bourns® custom products are specially designed. Absent a written agreement between Bourns and the user regarding the use and level of such testing, the above provisions applicable to Bourns® standard products shall also apply to such Bourns® custom products.

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