

CT Series Chip Resistors – Tin / Gold Terminations Available

HOW TO ORDER

CT G 10 1003 B X M

Packaging
M = Std. Reel O = 1K Reel

TCR (PPM/°C)
L = ± 1 P = ± 5 Y = ± 50
M = ± 2 Q = ± 10 Z = ± 100
N = ± 3 X = ± 25

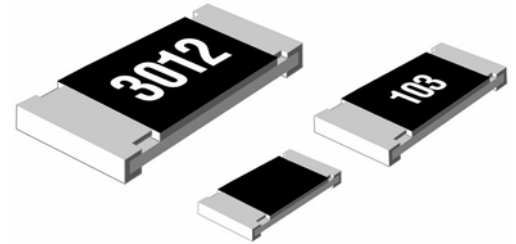
Tolerance (%)
U = ± 0.1 A = ± 0.05 C = ± 0.25 F = ± 1
P = ± 0.2 B = ± 0.10 D = ± 0.50

EIA Resistance Value
Standard decade values

Size
01=2512 05=0402 10=0805
10P=0805P 11=2020 12=2010
13=1217 14=1210 16=0603
16P=0603P 18=1206 18P=1206P
20=0201

Termination Material
Sn = Leave Blank Au = G

Series
CT = Thin Film Precision Resistors

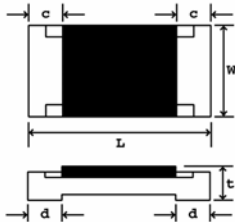


FEATURES

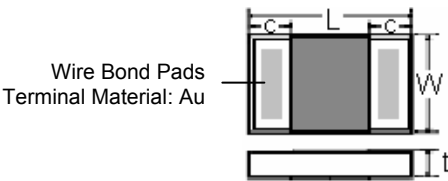
- High Power Available 0603P 1/8W, 0805P 1/4W, 1206P 1/2W
- Nichrome Thin Film Resistor Element
- CTG type constructed with top side terminations, wire bonded pads, and Au termination material.
- Anti-Leaching Nickel Barrier Terminations
- Very Tight Tolerances, as low as $\pm 0.01\%$
- Extremely Low TCR, as low as $\pm 1\text{ppm}$
- Special Sizes available 1217, 2020, and 2045
- Either ISO 9001 or ISO/TS 16949:2002 Certified
- Applicable Specifications: EIA575, IEC 60115-1, JIS C5201-1, CECC 40401, MIL-R-55342D
- Custom Designs Available.

SCHEMATIC

Wraparound Termination



Top Side Termination, Bottom Isolated – CTG Type



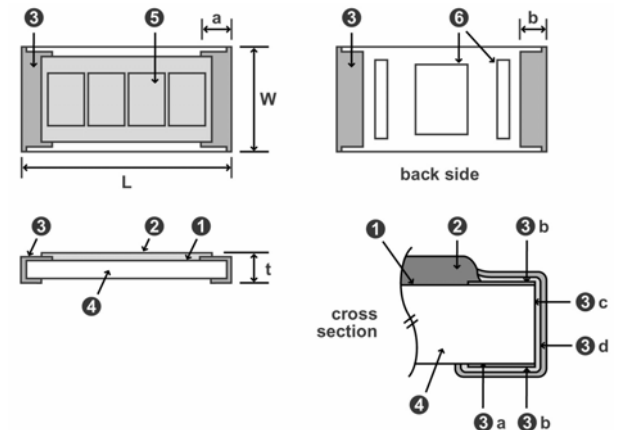
DIMENSIONS (mm)

| Size | L | W | c | d | t |
|---------|-----------------|--------------------|-----------------|----------------------|-----------------|
| 0201 | 0.60 ± 0.05 | 0.30 ± 0.05 | 0.13 ± 0.05 | $0.25 + 0.05$ | 0.25 ± 0.05 |
| 0402 | 1.00 ± 0.05 | $0.5 + 0.1^{0.05}$ | 0.20 ± 0.10 | $0.25 + 0.05^{0.10}$ | 0.35 ± 0.05 |
| 0603, P | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.20 ± 0.10 | $0.30 + 0.20^{0.10}$ | 0.50 ± 0.10 |
| 0805, P | 2.00 ± 0.15 | 1.25 ± 0.15 | 0.40 ± 0.25 | $0.30 + 0.20^{0.10}$ | 0.50 ± 0.15 |
| 1206, P | 3.20 ± 0.15 | 1.60 ± 0.15 | 0.45 ± 0.25 | $0.40 + 0.20^{0.10}$ | 0.60 ± 0.15 |
| 1210 | 3.20 ± 0.15 | 2.60 ± 0.15 | 0.50 ± 0.30 | $0.40 + 0.20^{0.10}$ | 0.60 ± 0.10 |
| 1217 | 3.00 ± 0.20 | 4.20 ± 0.20 | 0.80 ± 0.30 | 0.80 ± 0.25 | 0.9 max |
| 2010 | 5.00 ± 0.15 | 2.60 ± 0.15 | 0.50 ± 0.30 | $0.40 + 0.20^{0.10}$ | 0.70 ± 0.10 |
| 2020 | 5.08 ± 0.20 | 5.08 ± 0.20 | 0.80 ± 0.30 | 0.80 ± 0.30 | 0.9 max |
| 2045 | 5.00 ± 0.15 | 11.5 ± 0.30 | 0.80 ± 0.30 | 0.80 ± 0.30 | 0.9 max |
| 2512 | 6.30 ± 0.15 | 3.10 ± 0.15 | 0.60 ± 0.25 | 0.50 ± 0.25 | 0.60 ± 0.10 |

CONSTRUCTION MATERIALS

| Item | Part | Material |
|-------|-----------------|--|
| 1 | Resistor | Nichrome Thin Film |
| 2 | Protective Film | Polymide Epoxy Resin |
| 3 | Electrode | |
| 3a | Grounding Layer | Nichrome Thin Film |
| 3b | Electrode Layer | Copper Thin Film |
| 3c | Barrier Layer | Nickel Plating |
| 3d | Solder Layer | Solder Plating (Sn) |
| 4 | Substrate | Alumina |
| 5 & 6 | Marking | Epoxy Resin |
| | | The resistance value is on the front side The production month is on the backside |

CONSTRUCTION FIGURE (Wraparound)





THIN FILM PRECISION CHIP RESISTORS

The content of this specification may change without notification 10/12/07



ELECTRICAL CHARACTERISTICS

| Size | Power Rating at 70° (W) | Resistance Range | ±% Tolerance | TCR (10 ⁻⁶ /°C) | Working Voltage | Overload Voltage | Operating Temp Range |
|--------------|-------------------------|------------------|-------------------------------------|----------------------------|-----------------|------------------|----------------------------------|
| 0201 | 0.05 | 10.0 ~ 30.0 | 1 | ±100 | 15V | 30V | -55°C ~ +125°C |
| | | 33.0 ~ 22.0K | 0.5 | ±25 | | | |
| 0402 | 0.031 0.063 | 10.0 ~ 46.4 | 0.1, 0.5, 1 | ±10, ±25, ±50 | 50V | 100V | -55°C ~ +125°C |
| | | 47.0 ~ 97.6 | 0.05, 0.1, 0.25, 0.5, 1 | ±10, ±25, ±50 | | | |
| | | 100 ~ 2.94K | 0.02, 0.05, 0.1, 0.25, 0.5, 1 | ±5, ±10, ±25, ±50 | | | |
| | | 3.00K ~ 100K | 0.05, 0.1, 0.25, 0.5, 1 | ±10, ±25, ±50 | | | |
| 0603 | 0.063 0.100 | 10.0 ~ 100K | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1 | 1,2,3,5,10,25,50 | 75V | 150V | -55°C ~ +125°C -55°C ~ +155°C |
| | | 102K ~ 270K | 0.05, 0.1, 0.25, 0.5, 1 | 10, 25, 50 | | | -55°C ~ +125°C |
| | | 274K ~ 360K | 0.1, 0.25, 0.5, 1 | 10, 25, 50 | | | |
| 0603P | 0.125 | 1.0 - 9.1 | 0.5, 1 | ±50, ±100 | 75V | 150V | -55°C ~ +125°C |
| | | 10 - 390K | 0.1, 1.0 | ±10, ±25, ±50, ±100 | | | |
| 0805 | 0.100 | 10.0 ~ 200K | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1 | 1, 2, 3, 5, 10, 25, 50 | 100V | 200V | -55°C ~ +125°C |
| | | 205K ~ 360K | 0.05, 0.1, 0.25, 0.5 | 10, 25, 50 | | | |
| | | 365K ~ 487K | 0.05, 0.1, 0.25, 0.5 | 10, 25 | | | |
| | | 499K ~ 1.00M | 0.1, 0.5 | 25 | | | |
| 0805P | 0.250 | 1.0 - 9.1 | 0.5, 1 | ±50, ±100 | 150V | 300V | -55°C ~ +125°C |
| | | 10 - 800K | 0.1, 1.0 | ±10, ±25, ±50, ±100 | | | |
| 1206 | 0.125 | 5.01 ~ 560K | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1 | 1, 2, 3, 5, 10, 25, 50 | 150V | 300V | -55°C ~ +125°C |
| | | 562K ~ 1.00M | 0.05, 0.1, 0.25, 0.5 | 10, 25 | | | |
| 1206P | 0.500 | 1.0 - 9.1 | 0.5, 1 | ±50, ±100 | 150V | 300V | -55°C ~ +125°C |
| | | 10 ~ 1.00M | 0.1, 1.0 | ±10, ±25, ±50, ±100 | | | |
| 1210 | 0.250 | 100 ~ 330K | 0.1 | ±5, ±10 | 200V | 400V | -55°C ~ +125°C |
| | | 51.0 ~ 2.00M | 0.1, 0.5 | ±25 | | | |
| | | 10.0 ~ 49.9 | 0.5 | ±50 | | | |
| 1217 | 0.250 | 5.10 ~ 1.00M | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1 | ±1, 2, 3, 5, 10, 25 | 200V | 400V | -55°C ~ +155°C |
| 2010 | 0.250 | 100 ~ 20.0K | 0.01, 0.05, 0.1, 0.25, 0.5 | ±5 | 150V | 300V | -55°C ~ +125°C |
| | | 50.0 ~ 40.0K | 0.01, 0.05, 0.1, 0.25, 0.5 | ±10 | | | |
| | | 10.0 ~ 500K | 0.01, 0.05 | ±25 | | | |
| | | 4.70 - 1.00M | 0.1, 0.25, 0.5, 1 | | | | |
| | | 10.0 ~ 500K | 0.01, 0.05 | ±50 | | | |
| | | 1.00 ~ 1.00M | 0.1, 0.25, 0.5, 1 | | | | |
| 2020 | 0.500 | 5.10 ~ 2.00M | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1 | ±1, 2, 3, 5, 10, 25 | 350V | 700V | -55°C ~ +155°C |
| 2045 | 1.000 | 20.0 ~ 4.99M | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1 | ±1, 2, 3, 5, 10, 25 | 500V | 1000V | -55°C ~ +155°C |
| 2512 | 0.500 | 100 ~ 20.0K | 0.01, 0.05, 0.1, 0.25, 0.5 | ±5 | 150V | 300V | -55°C ~ +125°C |
| | | 50.0 ~ 40.0K | 0.01, 0.05, 0.1, 0.25, 0.5 | ±10 | | | |
| | | 10.0R ~ 500K | 0.01, 0.05 | ±25 | | | |
| | | 4.70 - 1.00M | 0.1, 0.25, 0.5, 1 | | | | |
| | | 10.0R ~ 500K | 0.01, 0.05 | ±50 | | | |
| | | 1.00 1.00M | 0.1, 0.25, 0.5, 1 | | | | |

* Rated Voltage: $\sqrt{P \times R}$

** 0.01% may be available under special request



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PERFORMANCE & ENVIRONMENTAL SPECIFICATIONS

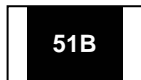
| Test Item | Maximum $\Delta \Omega$ +0.05 Ω (Tolerance) | | | Condition |
|---------------------------|--|--------------|-------------|--|
| | A | B, C | D, F | |
| Short Time Overload | $\pm 0.1\%$ | $\pm 0.1\%$ | $\pm 0.5\%$ | 2.5 times of the rated voltage shall be applied for 5 seconds |
| Load Life | $\pm 0.1\%$ | $\pm 0.25\%$ | $\pm 0.5\%$ | The resistor shall be subjected to rated voltage for 90 min. followed by a pause of 30 min. at a temperature of 70 \pm 3 $^{\circ}$ C. This constitutes 1 cycle. Cycles shall be repeated for 1000 hours. |
| Moisture Load Life | $\pm 0.1\%$ | $\pm 0.25\%$ | $\pm 0.5\%$ | The resistor subjected to rated voltage for 90 min followed by a pause for 30 min at a temperature of 60 \pm 2 $^{\circ}$ C with relative humidity of 90% to 95%. This constitutes 1 cycle. Cycles shall be repeated for 1000 hours. |
| Temperature Cycle | $\pm 0.1\%$ | $\pm 0.1\%$ | $\pm 0.5\%$ | [-55 $^{\circ}$ C 30 min \rightarrow +125 $^{\circ}$ C 30 min \rightarrow R.T. 3 min] The resistor shall be subjected to 5 continuous cycles |
| Resistance to Solder Heat | $\pm 0.05\%$ | $\pm 0.1\%$ | $\pm 0.5\%$ | The resistor shall withstand dipped into solder for 10 \pm 1 sec. At 260 \pm 5 $^{\circ}$ C |
| Terminal Strength | $\pm 0.1\%$ | $\pm 0.1\%$ | $\pm 0.5\%$ | Distance between fulcrums: 90mm; Bending width: 3 mm |
| Solderability | A new uniform coating of solder shall cover minimum of 95% of surface being immersed | | | The resistor shall be dipped into the solder of 235 \pm 5 $^{\circ}$ C for 3 \pm 0.5 seconds |
| Insulation Resistance | DC 500V for 1 minute | | | 1000 Meg Ω or over |

VALUE MARKING

For those parts ordered with an E-24 value, the product will be marked with a 3 digit code. For those products ordered with an E-96 value, the product will be marked with a 4 digit code. For those parts which fall under E-96 and E-24 values (e.g. 1K ohm is both an E-96 and E-24 value), the part will be marked with a 3 digit code; 4 digit markings for this type is available upon special request.



0201, and 0402 Size
No marking
E-24 & E-96 Values
Custom Value Any Size



0603 Size
EIA 96 Digit Code of 3.32K ohm
E-96 Values



0603 ~ 2512 Sizes
EIA 3 Digit Code of 10K ohm resistor
E-24 Values, E-96 Values



0805 ~ 2512 Sizes
EIA 4 Digit Code of 121K ohm resistor
E-96 Values

LABEL DESCRIPTION

One side surface of a reel is marked with a label with the following items of information.

1. Chip Resistor
2. Part Number
3. Tolerance
4. Quantity
5. Lot number for production month/year*
6. Manufacturer's name or symbol

* The suffix "L" indicates that this item is lead free. As of September 2004, all new production items of the series CR and CJ are no longer containing tin/lead (SnPb) terminals; they are lead free and in compliance with Lead Free/RoHS.

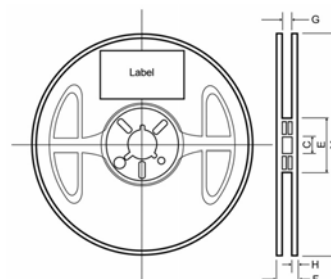
PACKAGE QUANTITY

| Type | 0201 | 0402 | 0603 | 0805 | 1206 |
|------|-------|--------|-------|-------|-------|
| M | 5,000 | 10,000 | 5,000 | 5,000 | 5,000 |
| O | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |

| Type | 1210 | 1217 | 2010 | 2020 | 2045 | 2512 |
|------|-------|-------|-------|-------|-------|-------|
| B | 5,000 | 2,000 | 4,000 | 2,000 | 3,000 | 4,000 |
| O | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |

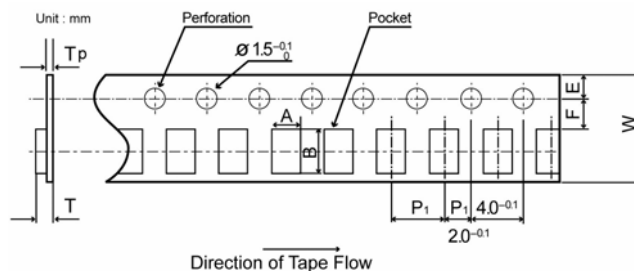
REEL SCHEMATIC & DIMENSIONS (mm)

| | O & M Type | M Type |
|---|---------------------------|---------------------------|
| | 7" Reel | 13" Reel |
| C | $\varnothing 13 \pm 0.2$ | $\varnothing 13 \pm 0.2$ |
| E | 60 \pm 0.5 | 100 \pm 0.2 |
| F | 11.4 \pm 1.0 | 13.5 \pm 1.0 |
| G | 9.0 \pm 0.3 | 9.5 \pm 0.5 |
| H | 1.5 \pm 0.3 | 2.0 \pm 0.5 |
| M | $\varnothing 180 \pm 2.0$ | $\varnothing 330 \pm 2.0$ |



Reel size is dependent upon the package quantity & resistor size. Call for more info.

TAPE SCHEMATIC



TAPE DIMENSIONS (mm)

| | 0201 | 0402 | 0603 | 0805 | 1206 |
|----------------|--------------------|-----------------|----------------|----------------|----------------|
| A | 0.41 \pm 0.1 | 0.65 \pm 0.1 | 1.1 \pm 0.2 | 1.65 \pm 0.2 | 2.0 \pm 0.15 |
| B | 0.71 \pm 0.1 | 1.15 \pm 0.1 | 1.9 \pm 0.2 | 2.4 \pm 0.2 | 3.6 \pm 0.15 |
| W | 8.0 \pm 0.2 | 8.0 \pm 0.2 | 8.0 \pm 0.2 | 8.0 \pm 0.2 | 8.0 \pm 0.2 |
| E | 1.75 \pm 0.10 | 1.75 \pm 0.10 | 1.75 \pm 0.1 | 1.75 \pm 0.1 | 1.75 \pm 0.1 |
| F | 3.5 \pm 0.05 | 3.5 \pm 0.05 | 3.5 \pm 0.05 | 3.5 \pm 0.05 | 3.5 \pm 0.05 |
| P ₁ | 2.0 \pm 0.05 | 2.0 \pm 0.05 | 4.0 \pm 0.1 | 4.0 \pm 0.1 | 4.0 \pm 0.1 |
| T | 0.5 _{max} | 0.55 \pm 0.1 | 0.70 \pm 0.1 | 0.90 \pm 0.1 | 0.90 \pm 0.1 |
| T _p | 0.4 \pm 0.05 | 0.40 \pm 0.05 | 0.60 \pm 0.1 | 0.75 \pm 0.1 | 0.75 \pm 0.1 |

| | 1210 | 1217 | 2010 | 2020 | 2045 | 2512 |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| A | 2.9 \pm 0.1 | 3.5 \pm 0.1 | 2.9 \pm 0.1 | 5.5 \pm 0.1 | 5.4 \pm 0.1 | 2.9 \pm 0.1 |
| B | 3.5 \pm 0.1 | 4.9 \pm 0.1 | 5.3 \pm 0.1 | 5.5 \pm 0.1 | 11.9 \pm 0.1 | 5.3 \pm 0.1 |
| W | 8.0 \pm 0.2 | 12.0 \pm 0.2 | 12.0 \pm 0.2 | 12.0 \pm 0.2 | 24.0 \pm 0.2 | 12.0 \pm 0.2 |
| E | 1.75 \pm 0.1 | 1.75 \pm 0.1 | 1.75 \pm 0.1 | 1.75 \pm 0.1 | 1.75 \pm 0.1 | 1.75 \pm 0.1 |
| F | 3.5 \pm 0.05 | 5.5 \pm 0.1 | 5.5 \pm 0.1 | 5.5 \pm 0.1 | 11.5 \pm 0.1 | 5.5 \pm 0.05 |
| P ₁ | 4.0 \pm 0.1 | 8.0 \pm 0.1 | 4.0 \pm 0.1 | 8.0 \pm 0.1 | 8.0 \pm 0.1 | 4.0 \pm 0.1 |
| T | 0.90 \pm 0.1 | 0.90 \pm 0.1 | 1.0 \pm 0.1 | 1.0 \pm 0.1 | 1.0 \pm 0.1 | 1.0 \pm 0.1 |
| T _p | 0.75 \pm 0.1 | | 0.25 \pm 0.1 | | | 0.25 \pm 0.1 |

Call to find out if the tape material is paper or plastic