

## CT Series Chip Resistors – Tin / Gold Terminations Available

Custom solutions are 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

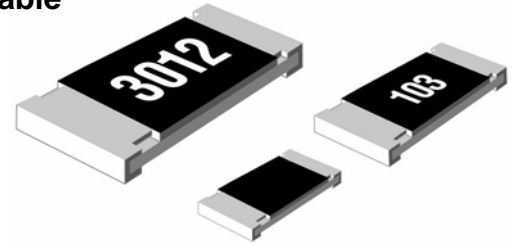
**Tolerance (%)**  
U = ±0.1    A = ±0.05    C = ±0.25    F = ±1  
P = ±0.02    B = ±0.10    D = ±0.50

**EIA Resistance Value**  
Standard decade values

**Size**  
20 = 0201    18 = 1206    11 = 2020  
05 = 0402    14 = 1210    09 = 2045  
16 = 0603    13 = 1217    01 = 2512  
10 = 0805    12 = 2010

**Termination Material**  
Sn = Leave Blank      Au = G

**Series**  
CT = Thin Film Precision Resistors

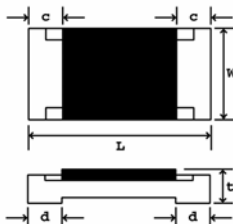


### FEATURES

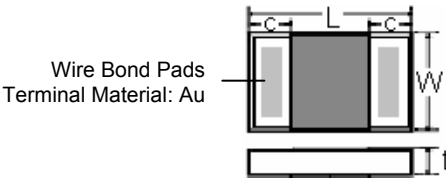
- Nichrome Thin Film Resistor Element
- CTG type constructed with top side terminations, wire bonded pads, and Au termination material.
- Anti-Leaching Nickel Barrier Terminations
- Very Tight Tolerances, as low as ±0.02%
- Extremely Low TCR, as low as ±1ppm
- Special Sizes available 1217, 2020, and 2045
- Either ISO 9001 or ISO/TS 16949:2002 Certified
- Applicable Specifications: EIA575, IEC 60115-1, JIS C5201-1, CECC 40401, MIL-R-55342D

### SCHEMATIC

Wraparound Termination



Top Side Termination, Bottom Isolated – CTG Type



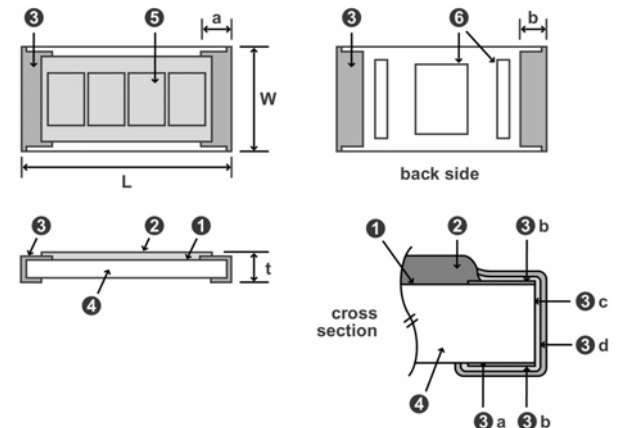
### DIMENSIONS (mm)

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 <sup>-0.05</sup>	0.20 ± 0.10	0.25+0.05 <sup>-0.10</sup>	0.35 ± 0.05
0603	1.60 ± 0.10	0.80 ± 0.10	0.20 ± 0.10	0.30+0.20 <sup>-0.10</sup>	0.50 ± 0.10
0805	2.00 ± 0.15	1.25 ± 0.15	0.40 ± 0.25	0.30+0.20 <sup>-0.10</sup>	0.50 ± 0.15
1206	3.20 ± 0.15	1.60 ± 0.15	0.45 ± 0.25	0.40+0.20 <sup>-0.10</sup>	0.60 ± 0.15
1210	3.20 ± 0.15	2.60 ± 0.15	0.50 ± 0.30	0.40+0.20 <sup>-0.10</sup>	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 <sup>-0.10</sup>	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
6	The resistance value is on the front side The production month is on the backside	

### CONSTRUCTION FIGURE (Wraparound)



## ELECTRICAL CHARACTERISTICS

Size	Power Rating at 70° (W)	Resistance Range	±% Tolerance	TCR (10 <sup>-6</sup> /°C)	Working Voltage	Overload Voltage	Operating Temp Range
<b>0201</b>	0.05	10.0 ~ 30.0	1	±100	15V	30V	-55°C ~ +125°C
		33.0 ~ 22.0K	0.5	±25			
<b>0402</b>	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			
<b>0603</b>	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
		102K ~ 270K	0.05, 0.1, 0.25, 0.5, 1	10, 25, 50			-55°C ~ +155°C
		274K ~ 360K	0.1, 0.25, 0.5, 1	10, 25, 50			-55°C ~ +125°C
<b>0805</b>	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			
<b>1206</b>	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			
<b>1210</b>	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			
<b>1217</b>	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
<b>2010</b>	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	±25			
		10.0 ~ 500K	0.01, 0.05	±50			
		1.00 ~ 1.00M	0.1, 0.25, 0.5, 1	±50			
<b>2020</b>	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
<b>2045</b>	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
<b>2512</b>	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	±25			
		10.0R ~ 500K	0.01, 0.05	±50			
		1.00 1.00M	0.1, 0.25, 0.5, 1	±50			

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

\*\* 0.01% may be available under special request

## PERFORMANCE & ENVIRONMENTAL SPECIFICATIONS

Test Item	Maximum $\Delta \Omega$ +0.05 $\Omega$ (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 cycles. 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 $\Omega$ 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.

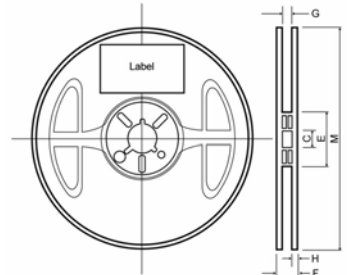
## PACKAGE QUANTITY

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

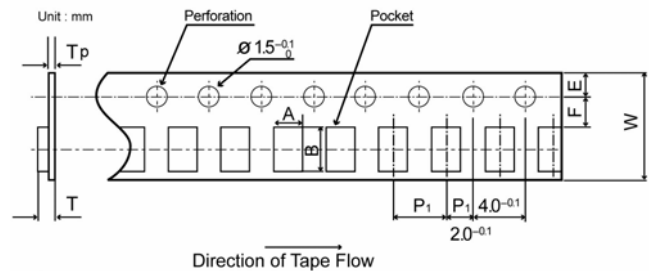
## REEL SCHEMATIC & DIMENSIONS (mm)

	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 <sub>1</sub>	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 <sub>max</sub>	0.55 $\pm$ 0.1	0.70 $\pm$ 0.1	0.90 $\pm$ 0.1	0.90 $\pm$ 0.1
T <sub>p</sub>	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 <sub>1</sub>	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 <sub>p</sub>	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