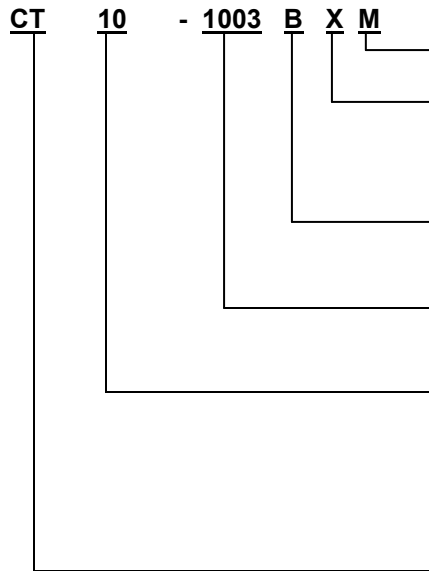


HOW TO ORDER



Packaging
M = Std. Reel O = Cutting Tape

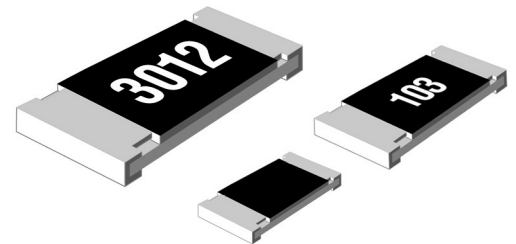
TCR (PPM/°C)
L = ± 1 P = ± 5 Y = ± 50
M = ± 2 Q = ± 10 Z = ± 100
N = ± 3 X = ± 25

Tolerance (%)
U = ± 0.01 A = ± 0.05 C = ± 0.25 F = ± 1
P = ± 0.02 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

Series
CT = Lead Free Thin Film Precision Resistors
Sn Termination

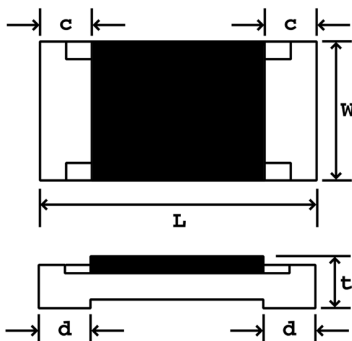


FEATURES

- High Power Available 0603P 1/8W, 0805P 1/4W, 1206P 1/2W
- Nichrome Thin Film Resistor Element
- Anti-Leaching Nickel Barrier Terminations
- Very Tight Tolerances, as low as $\pm 0.01\%$
- Extremely Low TCR, as low as ± 1 ppm
- Reference Standard = IEC 60115-8, JIS C 5201-8

SCHEMATIC

Wraparound Termination



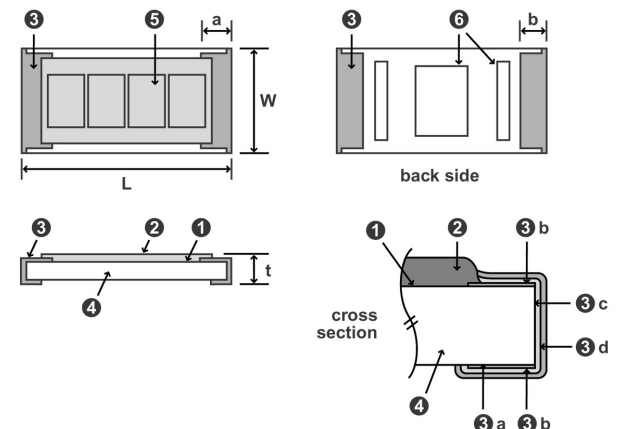
DIMENSIONS (mm)

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
⑥	The resistance value is on the front side The production month is on the backside	

CONSTRUCTION FIGURE (Wraparound)



The content of this specification may change without notification 05/15/2015

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	22 ~ 75K	0.1, 0.5, 1.0	±25 ±50 ±100	25V	50V	-55°C ~ +125°C
		1K ~ 10K	0.05	±10			
0402	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
		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			-55°C ~ +125°C
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	±50			
		10.0 ~ 500K	0.01, 0.05	±50			
		1.00 ~ 1.00M	0.1, 0.25, 0.5, 1	±50			
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	±50			
		10.0R ~ 500K	0.01, 0.05	±50			
		1.00 1.00M	0.1, 0.25, 0.5, 1	±50			

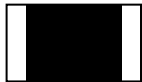
* Rated Voltage: √PxR

PERFORMANCE & ENVIRONMENTAL SPECIFICATIONS

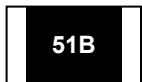
Test Item	Maximum $\Delta \Omega$ +0.05 Ω (Tolerance)			Condition
	A	B, C	D, F	
Short Time Overload	$\pm 0.1\%$	$\pm 0.1\%$	$\pm 0.5\%$	2.5 times of the rated voltage shall be applied for 5 seconds
Load Life	$\pm 0.1\%$	$\pm 0.25\%$	$\pm 0.5\%$	The resistor shall be subjected to rated voltage for 90 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.

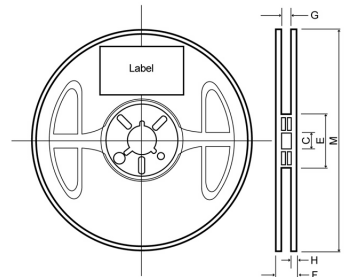
PACKAGE QUANTITY

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

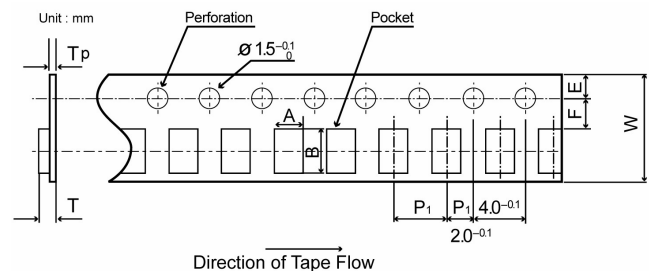
REEL SCHEMATIC & DIMENSIONS (mm)

	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 0.1	1.6 \pm 0.15	2.0 \pm 0.15
B	0.71 \pm 0.1	1.15 \pm 0.1	1.9 \pm 0.1	2.4 \pm 0.2	3.6 \pm 0.2
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	0.64 \pm 0.1	0.84 \pm 0.1	0.84 \pm 0.1
T _p	0.4 \pm 0.05	0.40 \pm 0.05			

	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