BOURNS®

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

Additional Information

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CR Series - Thick Film Chip Resistors

Electrical Characteristics

Characteristic	Model No.							
	CR01005	CR0201	CR0402	CR0603	CR0805	CR1206	CR2010	CR2512
Power Rating @ 70 °C	1/32 W	1/20 W	1/16 W	1/10 W	1/8 W	1/4 W	1/2 W	1 W
Operating Temp. Range	-55 °C to +125 °C		-55 °C to +155 °C					
Derated to Zero Load @	+125 °C		+155 °C					
Max. Working Voltage	15 V	30 V	50 V	75 V	150 V	200 V	200 V	200 V
Max. Overload Voltage	30 V	50 V	100 V	150 V	300 V	400 V	400 V	400 V
Resistance Tolerance	±1 %, ±5 %							
Temperature Coefficient ±1 % (E24 & E96 Series)	10 Ω≤R<100 Ω ±300 ppm/°C 100 Ω≤R<1 MΩ ±200 ppm/°C	1 Ω≤R<10 Ω -200~+600 ppm/°C 10 Ω≤R≤3 MΩ ±200 ppm/°C	1 Ω≤R<10 Ω -200~+500 ppm/°C 10 Ω≤R≤1 MΩ ±100 ppm/°C 1 MΩ<R≤10 MΩ ±200 ppm/°C	1 Ω≤R<10 Ω ±200 ppm/°C 10 Ω≤R≤1 MΩ ±100 ppm/°C 1 MΩ<R≤10 MΩ ±200 ppm/°C	1 Ω≤R<10 Ω ±200 ppm/°C 10 Ω≤R≤1 MΩ ±100 ppm/°C 1 MΩ<R≤10 MΩ ±200 ppm/°C	1 Ω≤R<10 Ω ±200 ppm/°C 10 Ω≤R≤1 MΩ ±100 ppm/°C 1 MΩ<R≤10 MΩ ±200 ppm/°C	1 Ω≤R<10 Ω ±200 ppm/°C 10 Ω≤R≤1 MΩ ±100 ppm/°C 1 MΩ<R≤10 MΩ ±200 ppm/°C	1 Ω≤R<10 Ω ±200 ppm/°C 10 Ω≤R≤1 MΩ ±100 ppm/°C 1 MΩ<R≤10 MΩ ±200 ppm/°C
Temperature Coefficient ±5 % (E24 Series)	10 Ω≤R<100 Ω ±300 ppm/°C 100 Ω≤R≤1 MΩ ±200 ppm/°C	1 Ω≤R<10 Ω -200~+600 ppm/°C 10 Ω≤R≤10 MΩ ±200 ppm/°C	1 Ω≤R<10 Ω -200~+500 ppm/°C 10 Ω≤R≤10 MΩ ±200 ppm/°C 10 MΩ<R≤20 MΩ ±400 ppm/°C	1 Ω≤R<10 Ω ±400 ppm/°C 10 Ω≤R≤10 MΩ ±200 ppm/°C 10 MΩ<R≤20 MΩ ±400 ppm/°C	1 Ω≤R<10 Ω ±400 ppm/°C 10 Ω≤R≤10 MΩ ±200 ppm/°C 10 MΩ<R≤20 MΩ ±400 ppm/°C	1 Ω≤R<10 Ω ±400 ppm/°C 10 Ω≤R≤10 MΩ ±200 ppm/°C 10 MΩ<R≤20 MΩ ±400 ppm/°C	1 Ω≤R<10 Ω ±400 ppm/°C 10 Ω≤R≤10 MΩ ±200 ppm/°C 10 MΩ<R≤20 MΩ ±400 ppm/°C	1 Ω≤R<10 Ω ±400 ppm/°C 10 Ω≤R≤10 MΩ ±200 ppm/°C 10 MΩ<R≤20 MΩ ±400 ppm/°C
Zero Ohm Jumper	50 milliohms max.							
Rated Current	0.5 A		1 A		2 A			
Max. Overload Current	1 A		2.5 A		5 A			

Environmental Characteristics

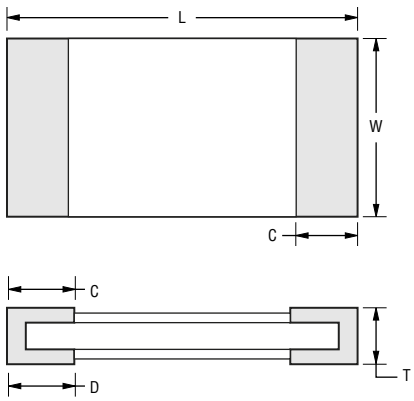
Moisture Sensitivity Level..........1

WARNING
Cancer and Reproductive Harm
www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

Product Dimensions

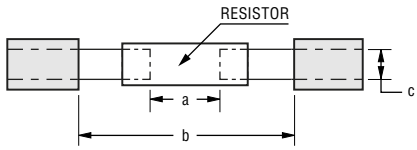
Model	L	W	C	D	T
CR01005	0.40 ± 0.02 (.016 ± .0008)	0.20 ± 0.03 (.008 ± .001)	0.10 ± 0.03 (.004 ± .001)	0.10 ± 0.03 (.004 ± .001)	0.13 ± 0.02 (.009 ± .0008)
CR0201	0.60 ± 0.03 (.024 ± .001)	0.30 ± 0.03 (.012 ± .001)	0.10 ± 0.05 (.004 ± .002)	0.15 ± 0.05 (.006 ± .002)	0.23 ± 0.03 (.009 ± .001)
CR0402	1.00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



DIMENSIONS: MM (INCHES)

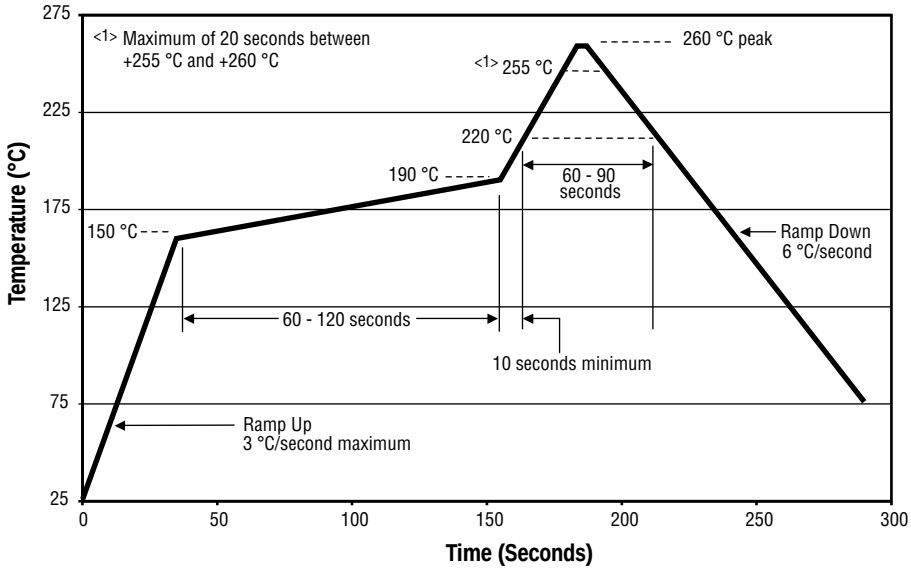
Recommended Pad Layout

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

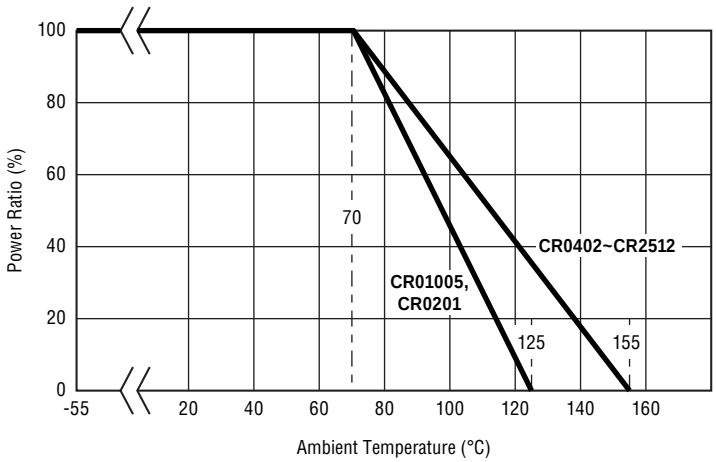


DIMENSIONS: MM (INCHES)

Soldering Profile



Derating Curve



Performance Characteristics

Test	Procedure (IEC 60115-1)	Test Limits ΔR
Short Time Overload	2.5 x rated voltage for 5 seconds	≤± (1 % + 0.05 Ω) *Remarks:* CR01005, CR0201 ..... ± (3 % + 0.1 Ω) CR0402 ..... ± (2 % + 0.1 Ω) 0 Ω Jumper..... 50 mΩ or less
Intermittent Overload	3.0 x rated voltage or max. overloading voltage, 1 sec. "ON", 25 sec. "OFF",10,000 cycles *Remarks:* CR01005, CR0201 ..... not applicable CR0402 ..... 2.5 x rated continuous working voltage	1 %: ≤± (1 % + 0.05 Ω) 5 %: ≤± (3 % + 0.1 Ω) *Remarks:* CR01005, CR0201 ..... ± (5 % + 0.1 Ω) CR0402 ..... ± (3 % + 0.1 Ω) 0 Ω Jumper..... 100 mΩ or less
Load Life	1000 hours at rated voltage, 70 °C , 1.5 hours "ON ", 0.5 hour "OFF"	1 %: ≤± (1 % + 0.05 Ω) 5 %: ≤± (3 % + 0.1 Ω) *Remarks:* CR01005, CR0201 ..... ± (5 % + 0.1 Ω) CR0402 ..... ± (3 % + 0.1 Ω) 0 Ω Jumper..... 100 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"	1 %: ≤± (1 % + 0.05 Ω) 5 %: ≤± (3 % + 0.1 Ω) *Remarks:* CR01005, CR0201 ..... ± (5 % + 0.1 Ω) CR0402 ..... ± (3 % + 0.1 Ω) 0 Ω Jumper..... 100 mΩ or less
Rapid Change of Temperature	-55 °C (30 min.) / +155 °C (30 min.) 5 cycles	1 %: ≤± (0.5 % + 0.05 Ω) 5 %: ≤± (1 % + 0.05 Ω) *Remarks:* CR01005, CR0201 ..... ± (3 % + 0.1 Ω) 0 Ω Jumper..... 50 mΩ or less
Resistance to Solder Heat	270±5 °C, 10±1 sec.	1 %: ≤± (0.5 % + 0.05 Ω) 5 %: ≤± (1 % + 0.05 Ω) *Remarks:* CR01005 ..... ± (3 % + 0.05 Ω) CR0201 ..... ± (3 % + 0.1 Ω) 0 Ω Jumper..... 50 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 *Remarks:* CR0201 ..... 125±5 °C	1 %: ≤± (1 % + 0.05 Ω) 5 %: ≤± (1 % + 0.05 Ω) *Remarks:* CR01005, CR0201 ..... ± (1 % + 0.1 Ω) 0 Ω Jumper..... 50 mΩ or less
Bending	3 mm deflection *Remarks:* CR2010, CR2512 ..... 2 mm deflection	1 %: ≤± (0.5 % + 0.05 Ω) 5 %: ≤± (2 % + 0.1 Ω) *Remarks:* CR01005, CR0201 ..... ± (3 % + 0.1 Ω) CR0402 ..... ± (2 % + 0.1 Ω) 0 Ω Jumper..... 50 mΩ or less
Dielectric Withstanding Voltage	500 V, 1 minute *Remarks:* CR01005, CR0201 ..... 50 V CR0402 ..... 300 V	No abnormalities such as flashover, burning or dielectric breakdown shall appear
Insulation Resistance	100 V, 1 minute *Remarks:* CR0201 ..... 50 V	≥1 GΩ *Remarks:* CR01005 .....≥100 MΩ)

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 = ±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)

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	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

Marking Explanation

0Ω JUMPER:

CR01005, CR0201, CR0402:

No marking.

CR0603, CR0805, CR1206, CR2010, CR2512:

- 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)

- E-96: 4 digits; first three digits are significant, fourth digit is number of zeros to follow.
  Letter R is decimal point.

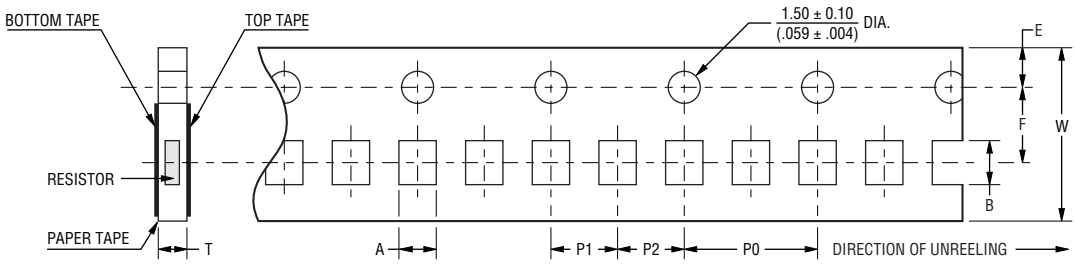
(Value = 44.2K Ω)

- CR0603 E-96: EIA-96 marking (see table).

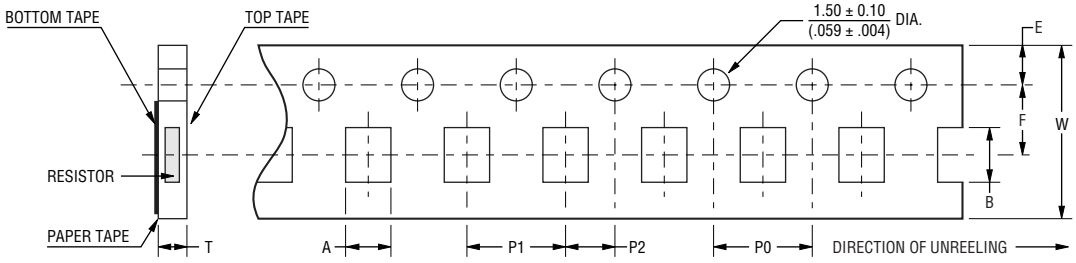
(Value = 12.4K Ω)

Packaging Dimensions (Conforms to EIA RS-481A)

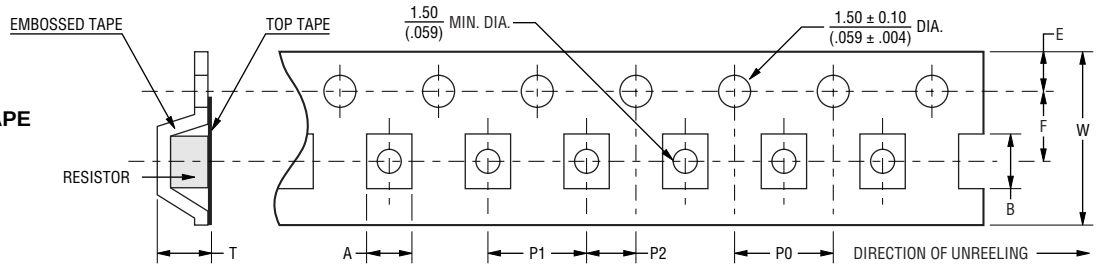
PAPER TAPE (2 mm PITCH)



PAPER TAPE (4 mm PITCH)

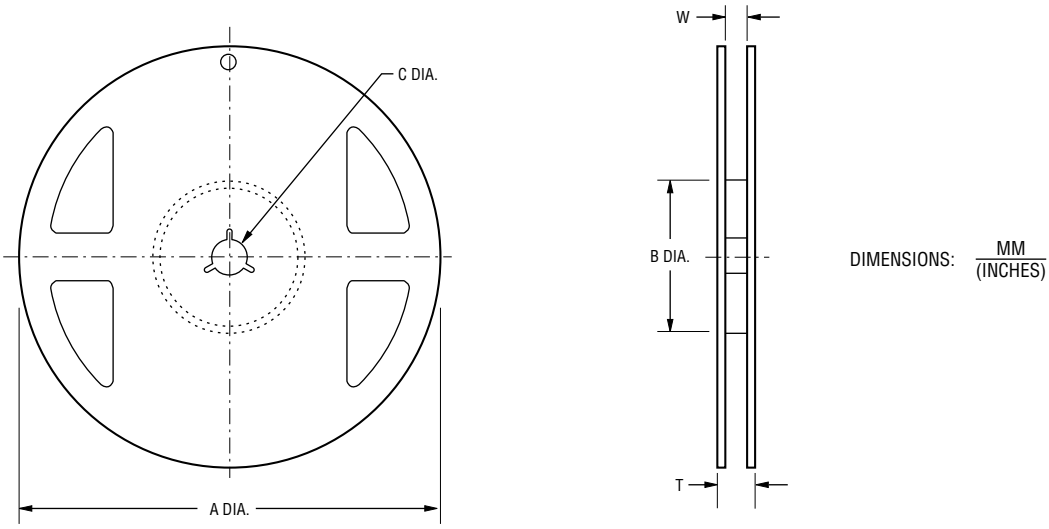


EMBOSSED TAPE (4 mm PITCH)



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

Packaging Dimensions (Conforms to EIA RS-481A)



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

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REV. 03/21

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