

BOURNS®

Features

- Thick film technology
- Power rating up to 1 watt @ 70 °C
- RoHS compliant*
- Halogen free**
- AEC-Q200 compliant

Additional Information

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CR-A Series - AEC-Q200 Compliant Chip Resistors

Electrical Characteristics

Characteristic	Model No.			
	CR0201A	CR0402A	CR0603A	CR0805A
Power Rating @ 70 °C	0.05 W	0.063 W	0.1 W	0.125 W
Operating Temp. Range	-55 to +125 °C	-55 to +155 °C		
Derated to Zero Load at	+125 °C	+155 °C		
Maximum Working Voltage	25 V	50 V	75 V	150 V
Maximum Overload Voltage	50 V	100 V	150 V	300 V
Resistance Tolerance	±1 %, ±5 %			
Temperature Coefficient @ 1 % (E24 + E96)	1 Ω ~ 9.76 Ω -200 ~ +600 ppm/°C 10 Ω ~ 3M Ω +200 ppm/°C	1 Ω ~ 9.76 Ω -200 ~ +500 ppm/°C 100 Ω ≤ R ≤ 1M Ω ±100 ppm/°C 10 Ω ≤ R < 100 Ω 1M Ω < R ≤ 10M Ω ±200 ppm/°C	1 Ω ~ 9.76 Ω ±400 ppm/°C 10 Ω ≤ R ≤ 1M Ω ±100 ppm/°C 1M Ω < R ≤ 10M Ω ±200 ppm/°C	1 Ω ~ 9.76 Ω ±400 ppm/°C 10 Ω ≤ R ≤ 1M Ω ±100 ppm/°C 1M Ω < R ≤ 10M Ω ±200 ppm/°C
Temperature Coefficient @ 5 % (E24)	1 Ω ~ 9.1 Ω -200 ~ +600 ppm/°C 10 Ω ~ 10M Ω +200 ppm/°C	1 Ω ~ 9.1 Ω -200 ~ +500 ppm/°C 10 Ω ≤ R ≤ 10M Ω ±200 ppm/°C 10M Ω ≤ R ≤ 20M Ω ±400 ppm/°C	1 Ω ~ 9.1 Ω 10M < R ≤ 20M Ω ±400 ppm/°C 10 Ω ≤ R ≤ 10M Ω ±200 ppm/°C	1 Ω ~ 9.1 Ω 10M < R ≤ 20M Ω ±400 ppm/°C 10 Ω ≤ R ≤ 10M Ω ±200 ppm/°C
Zero Ohm Jumper ≤ 0.05 Ω Rated / Max. Current	0.5 A / 1 A	1 A / 2.5 A	1 A / 2.5 A	2 A / 5 A

Environmental Characteristics

Moisture Sensitivity Level..... 1

CALIFORNIA WARNING: Can expose you to lead, a carcinogen and reproductive toxicant.
See www.P65Warnings.ca.gov

* RoHS Directive 2015/863, Mar 31, 2015 and Annex.
** Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

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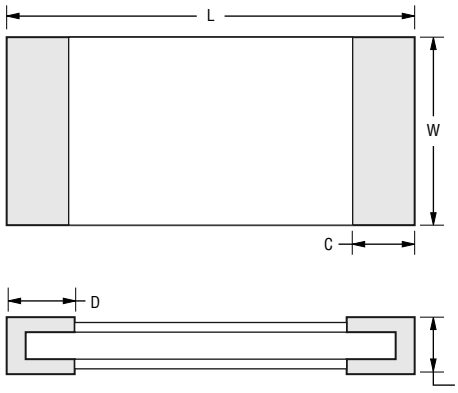
Electrical Characteristics (continued)

Characteristic	Model No.			
	CR1206A	CR1210A	CR2010A	CR2512A
Power Rating @ 70 °C	0.25 W	0.33 W	0.5 W	1 W
Operating Temp. Range	-55 to +155 °C			
Derated to Zero Load at	+155 °C			
Maximum Working Voltage	200 V			
Maximum Overload Voltage	400 V			
Resistance Tolerance	±1 %, ±5 %			
Temperature Coefficient @ 1 % (E24 + E96)	1 Ω ~ 9.76 Ω ±400 ppm/°C 10 Ω ≤ R ≤ 1M Ω ±100 ppm/°C 1M Ω < R ≤ 10M Ω ±200 ppm/°C			
Temperature Coefficient @ 5 % (E24)	1 Ω ~ 9.1 Ω 10M < R ≤ 20M Ω ±400 ppm/°C 10 Ω ≤ R ≤ 10M Ω ±200 ppm/°C			
Zero Ohm Jumper ≤ 0.05 Ω Rated / Max. Current	2 A / 5 A			

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Product Dimensions



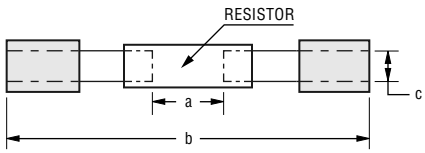
DIMENSIONS: MM / (INCHES)

Model	L	W	C	D	T
CR0201A	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)
CR0402A	1.00 ± 0.10 (.039 ± .004)	0.50 ± 0.05 (.020 ± .002)	0.20 ± 0.10 (.008 ± .004)	0.25 ± 0.10 (.010 ± .004)	0.32 ± 0.05 (.013 ± .002)
CR0603A	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)
CR0805A	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)
CR1206A	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)
CR1210A	3.10 ± 0.10 (.122 ± .004)	2.55 ± 0.10 (.100 ± .004)	0.50 ± 0.30 (.020 ± .012)	0.40 ± 0.20 (.016 ± .008)	0.60 ± 0.10 (.024 ± .004)
CR2010A	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)
CR2512A	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)

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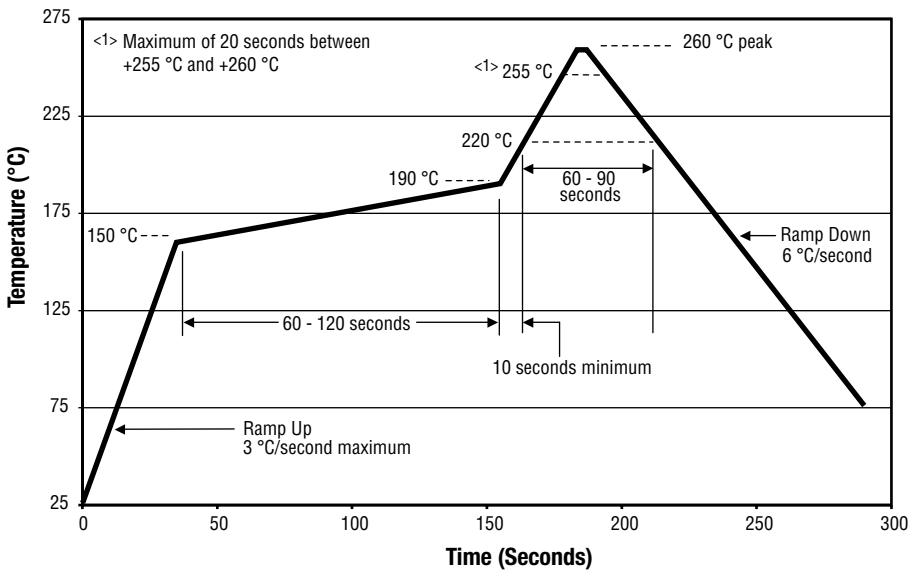
Recommended Pad Layout



DIMENSIONS: MM / (INCHES)

Model	a	b	c
CR0201A	0.25 ~ 0.30 (.010 ~ .012)	0.70 ~ 0.90 (.028 ~ .035)	0.30 ~ 0.40 (.012 ~ .016)
CR0402A	0.50 ~ 0.60 (.020 ~ .024)	1.40 ~ 1.60 (.055 ~ .063)	0.40 ~ 0.60 (.012 ~ .024)
CR0603A	0.70 ~ 0.90 (.028 ~ .035)	2.00 ~ 2.20 (.079 ~ .087)	0.80 ~ 1.00 (.031 ~ .039)
CR0805A	1.00 ~ 1.40 (.039 ~ .055)	3.20 ~ 3.80 (.126 ~ .150)	0.90 ~ 1.40 (.035 ~ .055)
CR1206A	2.00 ~ 2.40 (.079 ~ .094)	4.40 ~ 5.00 (.173 ~ .197)	1.20 ~ 1.80 (.047 ~ .071)
CR1210A	2.00 ~ 2.40 (.079 ~ .094)	4.50 ~ 5.00 (.177 ~ .197)	2.30 ~ 3.50 (.091 ~ .138)
CR2010A	3.30 ~ 3.70 (.130 ~ .146)	5.70 ~ 6.50 (.224 ± .256)	2.30 ~ 3.50 (.091 ~ .138)
CR2512A	3.60 ~ 4.00 (.142 ~ .157)	7.60 ~ 8.60 (.299 ~ .339)	2.30 ~ 3.50 (.091 ~ .138)

Soldering Profile



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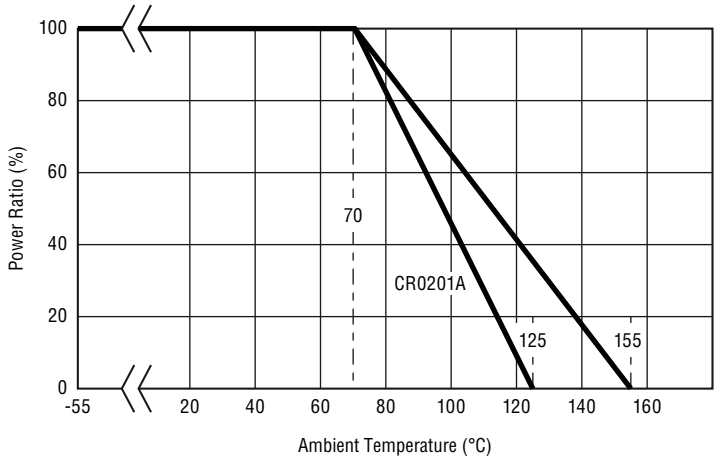
Performance Characteristics (AEC-Q200)

Test	Method	Procedure	Test Limits ΔR
Short Time Overload	IEC 60115-1 4.13	2.5 X rated voltage for 5 sec.	± (1 % + 0.05 Ω) Remarks: 0201: ± (3 % + 0.1 Ω) 0402: ± (2 % + 0.1 Ω) 0 Ω : 50 mΩ or less
High Temperature Exposure (Storage)	AEC-Q200-REV D-Test 3 MIL-STD-202 Method 108	1000 hrs. @ T=125 °C. Unpowered. Measurement at 24 ±2 hours after test conclusion.	1 %: ± (1.0 % + 0.05 Ω) 5 %: ± (2.0 % + 0.1 Ω) 0201: ± (3 % + 0.1 Ω) 0 Ω: 50 mΩ or less
Moisture Resistance	AEC-Q200-REV D-Test 6 MIL-STD-202 Method 106	T=24 hours / Cycle,10 Cycles. Notes: Steps 7a & 7b not required. Unpowered.	1 %: ± (1.0 % + 0.05 Ω) 2 %, 5 %: ± (2.0 % + 0.1 Ω) 0201: ± (3 % + 0.1 Ω) 0 Ω: 50 mΩ or less
Biased Humidity	AEC-Q200-REV D-Test 7 MIL-STD-202 Method 103	1000 hours 85 °C / 85 % RH. Note: Specified conditions: 10 % of operating power (not exceeding max. working voltage). Measurement at 24 ±2 hours after test conclusion.	± (3 % + 0.1 Ω) 0201: ± (5 % + 0.1 Ω) 0 Ω: 100 mΩ or less
Operational Life	AEC-Q200-REV D-Test 8 MIL-STD-202 Method 108	1000 hours T_A=70 °C at rated power. Measurement at 24 ±2 hours after test conclusion.	1 %: ± (1 % + 0.1 Ω) 5 %: ± (3 % + 0.1 Ω) 0201: ± (5 % + 0.1 Ω) 0 Ω: 100 mΩ or less
External Visual	AEC-Q200-REV D-Test 9 MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship.	
Physical Dimension	AEC-Q200-REV D-Test 10 JESD22 Method JB-100	Verify physical dimensions to the applicable device detail spec. Note: User(s) and Suppliers spec. Electrical test not required.	
Resistance to Solvents	AEC-Q200-REV D-Test 12 MIL-STD-202 Method 215	a: Isopropyl Alcohol : Mineral Spirits = 1:3 b: Terpene Defluxer (Bioact EC-7R) c: Deionized water : Propylene Glycol Monomethyl Ether : monoethanolamine = 42:1:1	Marking and protective layer cannot be detached
Mechanical Shock	AEC-Q200-REV D-Test 13 MIL-STD-202 Method 213	Wave Form: Tolerance for half sine shock pulse. Peak value is 100 grams. Normal duration (D) is 6 ms.	± (1 % + 0.1 Ω) 0 Ω: 50 mΩ or less
Vibration	AEC-Q200-REV D-Test 14 MIL-STD-202 Method 204	5 grams for 20 min., 12 cycles each of 3 orientations. Note: Test from 10-2000 Hz.	± (1 % + 0.1 Ω) 0 Ω: 50 mΩ or less
Resistance to Soldering Heat	AEC-Q200-REV D-Test 15 MIL-STD-202 Method 210	Condition B: Immerse the specimens in and eutectic solder at 260 ±5 °C for 10 ±1 S.	1 %: ± (0.5 % + 0.05 Ω) 5 %: ± (1 % + 0.1 Ω) 0201: ± (2 % + 0.1 Ω) 0 Ω: 50 mΩ or less
Thermal Shock	AEC-Q200-REV D-Test 16 MIL-STD-202 Method 107	-55 °C / +155 °C. Note: Number of cycles required: 300, Maximum transfer time: 20 seconds, Dwell time: 15 minutes. Air to Air.	± (1 % + 0.1 Ω) 0201: ± (2 % + 0.1 Ω) 0 Ω: 50 mΩ or less
ESD	AEC-Q200-REV D-Test 17	Verify the voltage setting at 500 V	± (1 % + 0.1 Ω) 0201: ± (2 % + 0.1 Ω)
Solderability	AEC-Q200-REV D-Test 18 J-STD-002	Method B, aging 4 hours at 155 °C dry heat Lead-free solder bath at 245 ±3 °C Dipping time: 3 ±0.5 seconds	> 95 % area covered with tin
Flammability	AEC-Q200-REV D-Test 17 UL-94	V-0 or V-1 are acceptable. Electrical test not required.	V-0 or V-1
Board Flex (Bending)	AEC-Q200-REV D-Test 21	3 mm deflection (0201~1210) 2 mm deflection (2010~2512)	1 %: ± (0.5 % + 0.05 Ω) 5 %: ± (1 % + 0.1 Ω) 0201: ± (1 % + 0.1 Ω) 0 Ω: 50 mΩ or less
Terminal Strength (SMD)	IEC 60115-1 4.32	Force of 1.02 kg for 10±1 seconds. Remarks: 0402, 0.51 kg Remarks: 0201, N/A	± (0.5 % + 0.05 Ω) 0 Ω: 50 mΩ or less

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Derating Curve



Packaging Dimensions (Conforms to EIA RS-481A)

Model	Tape Type	A	B	W	F	E	P1	P2	P0	T
CR0201A	Paper Tape (2 mm pitch)	0.37 ± 0.05 (.010 ± .002)	0.67 ± 0.10 (.026 ± .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)	0.37 ± 0.10 (.015 ± .004)
CR0402A		0.70 ± 0.05 (.028 ± .002)	1.20 ± 0.05 (.047 ± .002)					2.00 ± 0.10 (.079 ± .004)		0.45 ± 0.10 (.018 ± .004)
CR0603A	Paper Tape (4 mm pitch)	1.10 ± 0.10 (.043 ± .004)	1.90 ± 0.10 (.075 ± .004)				4.00 ± 0.10 (.157 ± .004)	2.00 ± 0.05 (.079 ± .002)		0.64 ± 0.10 (.025 ± .004)
CR0805A		1.65 ± 0.15 (.065 ± .006)	2.40 ± 0.20 (.094 ± .008)							0.84 ± 0.10 (.033 ± .004)
CR1206A		2.00 ± 0.15 (.079 ± .006)	3.60 ± 0.20 (.142 ± .008)							0.84 ± 0.10 (.033 ± .004)
CR1210A		2.80 ± 0.20 (.110 ± .008)	3.60 ± 0.20 (.142 ± .008)							0.84 ± 0.10 (.033 ± .004)
CR2010A	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)
CR2512A		3.60 ± 0.20 (.142 ± .008)	6.90 ± 0.20 (.272 ± .008)							0.85 ± 0.15 (.033 ± .006)

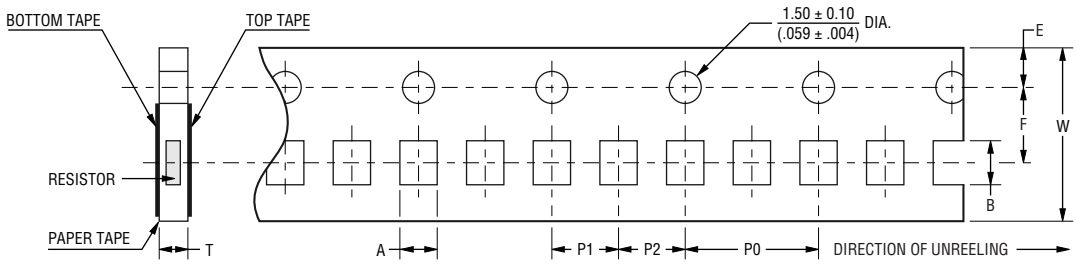
DIMENSIONS: MM (INCHES)

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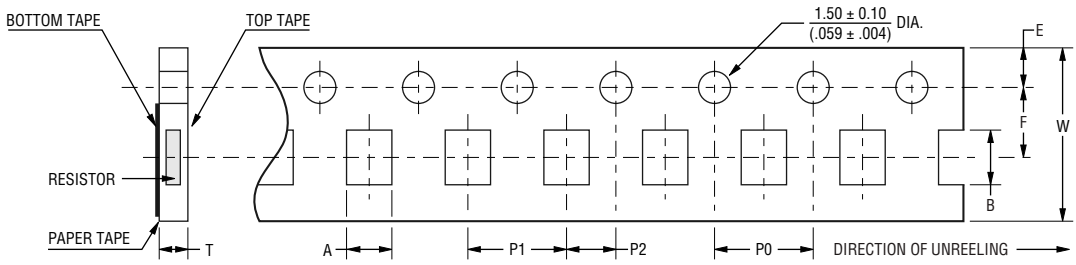
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Packaging Dimensions (Conforms to EIA RS-481A)

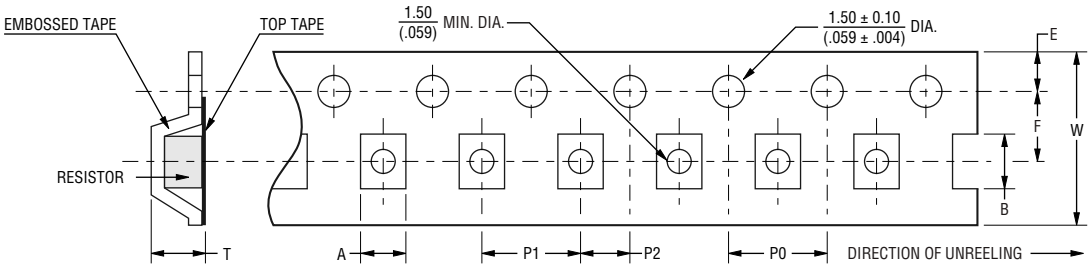
PAPER TAPE (2 mm PITCH)



PAPER TAPE (4 mm PITCH)



EMBOSSED TAPE (4 mm PITCH)

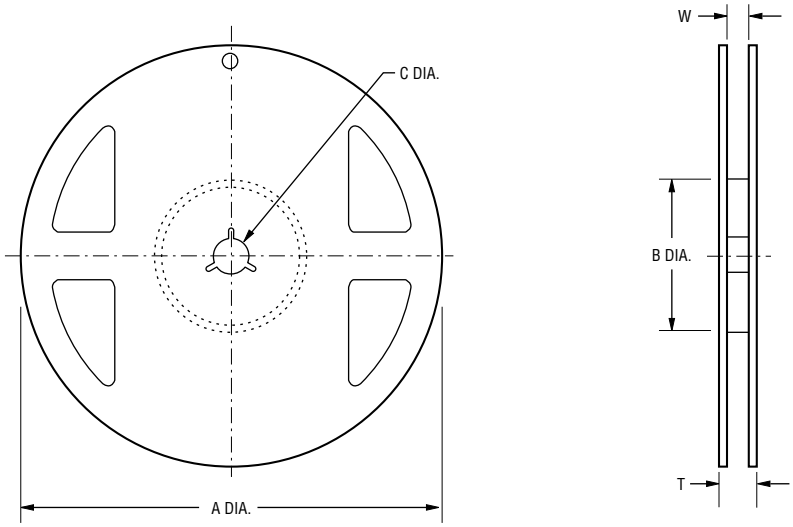


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Packaging Dimensions (Conforms to EIA RS-481A)



Model	Packaging Quantity	A	B	C	W	T
CR0201A	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)
CR0402A						
CR0603A	5K pcs/reel					
CR0805A						
CR1206A						
CR1210A						
CR2010A	4K pcs/reel	178 ± 2.0 (7.008 ± .079)	60 ± 0.5 (2.362 ± .020)	13.0 ± 0.5 (.512 ± .020)	13.0 ± 1.0 (.512 ± .039)	15.5 ± 1.0 (.610 ± .039)
CR2512A						

DIMENSIONS: MM / (INCHES)

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How to Order

CR 0603 A F X - 1002 E LF

Model
(CR = Fixed Resistor)

Size
0201 = 0201 size
0402 = 0402 size
0603 = 0603 size
0805 = 0805 size
1206 = 1206 size
1210 = 1210 size
2010 = 2010 size
2512 = 2512 size

Feature
A = AEC-Q200 Compliant

Resistance Tolerance
F = ±1 %
J = ±5 %

TCR (ppm/°C) – See Electrical Characteristics Chart
X = ±100
W = ±200
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).

Packaging
G = Paper Tape (10,000 pcs.) on 7 ″ Reel – CR0201A, CR0402A
E = Paper Tape (5,000 pcs.) on 7 ″ Reel – CR0603A, CR0805A, CR1206A, CR1210A
E = Embossed Tape (4,000 pcs) on 7 ″ Reel – CR2010A, CR2512A

Termination
LF = Tin-plated (RoHS Compliant)

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Symbol for E96 Series Nominal Resistance Value

Symbol	E96	Symbol	E96	Symbol	E96	Symbol	E96
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

Symbol for Multipliers

Symbol	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



±5 % (E24): CR0603A / CR0805A / CR1206A / CR1210A / CR2010A / CR2512A

Resistance value is expressed by 3 digits. The first two digits represent the significant figures of nominal resistance value in Ω. And the third digit represents exponent for base of 10.

EX: 102 = 10 x 10^2 = 1000 Ω = 1K Ω

±1 % (E96): CR0805A / CR1206A / CR1210A / CR2010A / CR2512A

Resistance value is expressed by 3 digits. The first two digits represent the significant figures of nominal resistance value in Ω. And the third digit represents exponent for base of 10.

EX: 102 = 10 x 10^2 = 1000 Ω = 1K Ω



±1 % (E96): CR0603A

When the marking space is too small in such small-sized resistors as CR0603A, the marking cannot be made by 4 digits and may be made by two digits combined with one English capital.

EX: 01A = 100 x 10^0 = 100 Ω

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Unless Bourns has explicitly designated an individual Bourns® product as meeting the requirements of a particular industry standard (e.g., IATF 16949) or a particular qualification (e.g., UL listed or recognized), Bourns is not responsible for any failure of an individual Bourns® product to meet the requirements of such industry standard or particular qualification even if such industry standard or qualification is a "state of art". Users of Bourns® products are responsible for ensuring compliance with safety-related requirements and standards applicable to their devices or applications.

Bourns® products are not recommended, authorized or intended for use in applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage, such as without limitation nuclear, life-critical medical and certain automotive and aviation applications. Except as set forth in the bullet points below or unless expressly and specifically approved in writing on a case-by-case basis by an authorized Bourns' representative, use of any Bourns® products in such unauthorized high-risk applications is at the user's sole risk.

- Bourns considers implantable/invasive devices and devices/procedures designed as life-supporting or life-sustaining by the U.S. Food and Drug Administration or equivalent organizations outside of the United States as "life-critical" medical applications. Bourns expressly identifies those Bourns® standard products that are suitable for use in typical medical applications that are not life-critical in its publication entitled "Bourns Medical Grade Component Guide."

- Bourns expressly identifies those Bourns® standard products that are suitable for use in typical automotive applications associated with any Automotive Safety Integrity Level (ASIL) in its publication entitled "Bourns Automotive Grade Component Guide." Bourns' designation of Bourns® product as compliant with the AEC-Q standard does not by itself mean that Bourns has approved such product for use in an automotive application.

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