Features

- Thick film technology
- Power rating up to 2 watts at 70 °C
- High power surge withstanding
- Sulfur-resistant design (ASTM B-809)
- RoHS compliant* and halogen free**
- AEC-Q200 compliant

Applications

- Automotive systems:
  - Driver assistant
  - Infotainment
  - Lighting
- Power supplies
- Stepper motor drives

CRS-A Series High Power Anti-Surge Resistor

Electrical Characteristics

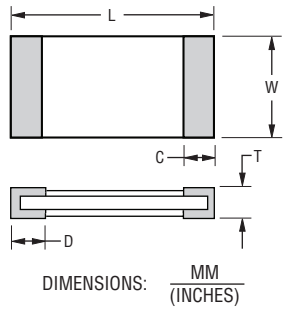
Characteristic	Model					
	CRS0603A	CRS0805A	CRS1206A	CRS1210A	CRS2010A	CRS2512A
Power Rating @ 70 °C	0.125 W	0.25 W	0.5 W	0.5 W	1 W	2 W
Operating Temperature Range	-55 °C to +155 °C					
Derated to Zero Load at	+155 °C					
Maximum Working Voltage	50 V	150 V	200 V	200 V	200 V	300 V
Maximum Overload Voltage	100 V	300 V	400 V	400 V	400 V	600 V
Resistance Tolerance	±1 %, ±5 %					
Temperature Coefficient 1 ohm to 9.76 ohms (±1 %, E24 & E96 Series)	±200 PPM/°C	±150 PPM/°C*	±100 PPM/°C			
10 ohms to 1 megohm (±1 %, E24 & E96 Series)	±100 PPM/°C	±100 PPM/°C	±100 PPM/°C			
1 ohm to 1 megohm (±5 %, E24 Series)	±200 PPM/°C	±200 PPM/°C	±200 PPM/°C			

* TCR code assigned as "X"; see How to Order.

For Standard Values Used in Capacitors, Inductors and Resistors, click here.

Product Dimensions

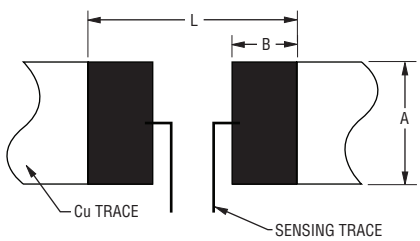
Model	L	W	C	D	T
CRS0603A	1.60 ± 0.10 (0.063 ± 0.004)	0.80 ± 0.10 (0.031 ± 0.004)	0.30 ± 0.20 (0.012 ± 0.008)	0.30 ± 0.20 (0.012 ± 0.008)	0.45 ± 0.10 (0.018 ± 0.04)
CRS0805A	2.00 ± 0.10 (0.079 ± 0.004)	1.25 ± 0.10 (0.049 ± 0.004)	0.40 ± 0.20 (0.016 ± 0.008)	0.40 ± 0.20 (0.016 ± 0.008)	0.50 ± 0.10 (0.020 ± 0.04)
CRS1206A	3.10 ± 0.10 (0.122 ± 0.004)	1.60 ± 0.10 (0.063 ± 0.004)	0.50 ± 0.25 (0.020 ± 0.010)	0.50 ± 0.25 (0.020 ± 0.010)	0.55 ± 0.10 (0.022 ± 0.004)
CRS1210A	3.10 ± 0.10 (0.122 ± 0.004)	2.60 ± 0.10 (0.102 ± 0.004)	0.50 ± 0.25 (0.020 ± 0.010)	0.50 ± 0.25 (0.020 ± 0.010)	0.55 ± 0.10 (0.022 ± 0.004)
CRS2010A	5.00 ± 0.20 (0.197 ± 0.008)	2.50 ± 0.20 (0.098 ± 0.008)	0.65 ± 0.25 (0.026 ± 0.010)	0.60 ± 0.25 (0.024 ± 0.010)	0.60 ± 0.10 (0.024 ± 0.004)
CRS2512A	6.40 ± 0.20 (0.252 ± 0.008)	3.10 ± 0.20 (0.122 ± 0.008)	0.60 ± 0.25 (0.024 ± 0.010)	1.80 ± 0.25 (0.071 ± 0.010)	0.60 ± 0.15 (0.024 ± 0.006)



Recommended Solder Pad Layout

Model	A	B	L
CRS0603A	0.90 (0.035)	1.00 (0.039)	3.00 (0.118)
CRS0805A	1.30 (0.051)	1.15 (0.045)	3.50 (0.138)
CRS1206A	1.80 (0.071)	1.30 (0.051)	4.70 (0.185)

Model	A	B	L
CRS1210A	3.00 (0.118)	1.30 (0.051)	4.70 (0.185)
CRS2010A	3.00 (0.118)	1.50 (0.059)	6.80 (0.268)
CRS2512A	3.70 (0.032)	2.45 (0.096)	7.60 (0.299)



* 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.

CRS-A Series High Power Anti-Surge Resistor

BOURNS®

How to Order

CRS 0603 A F W 1002 E LF

Model
(CRS = High Power Anti-Surge Resistor)

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 %

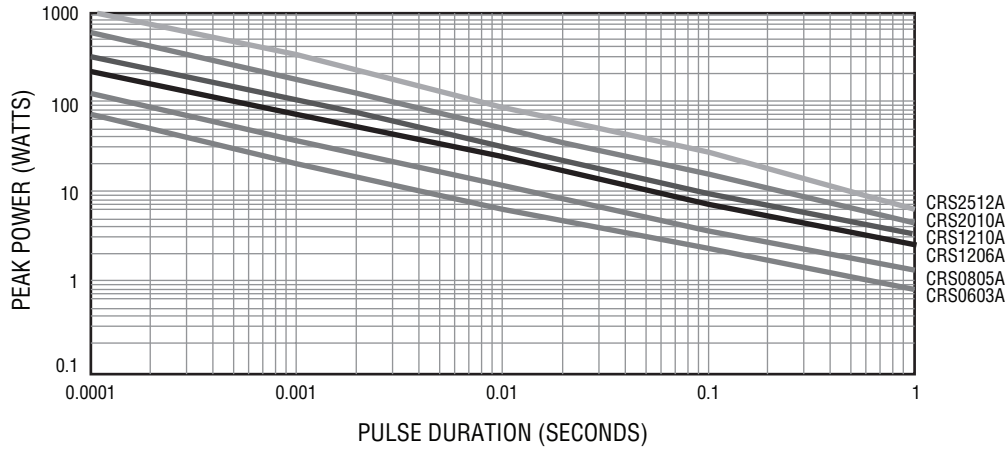
TCR (See Electrical Characteristics chart)
- W = ±200 PPM/°C
- X = ±100 PPM/°C NOTE: CRS0805A 0.5%, 1 ohm to 9.76 ohms: 150 PPM/°C

Resistance Value
- 1 % Tolerance:
  <100 ohms .....“R” represents decimal point *(example: 24R3 = 24.3 ohms)*
  ≥100 ohms .....First three digits are significant, fourth digit represents number of zeros to follow *(example: 8252 = 82.5K ohms)*
- 5 % Tolerance:
  <10 ohms.....“R” represents decimal point *(example: 4R7 = 4.7 ohms)*
  ≥10 ohms.....First two digits are significant, third digit represents number of zeros to follow *(example: 474 = 470K ohms)*

Packaging
- E = 5,000 pieces on 180 mm (7 inch) reel, paper tape - CRS0603A, CRS0805A, CRS1206A, CRS1210A
  4,000 pieces on 180 mm (7 inch) reel, plastic tape - CRS2010A, CRS2512A

Termination
- LF = Tin-plated (RoHS Compliant)

Surge Performance



Typical Part Marking

CRS0603A, CRS0805A, CRS1206A, CRS1210A, CRS2010A, CRS2512A

E96 ±5 %

3 digits identify the resistance value

301 = 30 x 10^1 = 300 ohms

CRS0805A, CRS1206A, CRS1210A, CRS2010A, CRS2512A

E24 / E96 ±1 %

4 digits identify the resistance value

1542 = 154 x 10^2 = 15.4K ohms

CRS0603A

E24 ±1 %

3 digits identify the resistance value

222 = 22 x 10^2 = 2.2K ohms

CRS0603A

E96 ±1 %

3 digits identify the resistance value

01B = 1K ohms
(Refer to Marking Table below)

E96 Marking for CRS0603A, 1 %

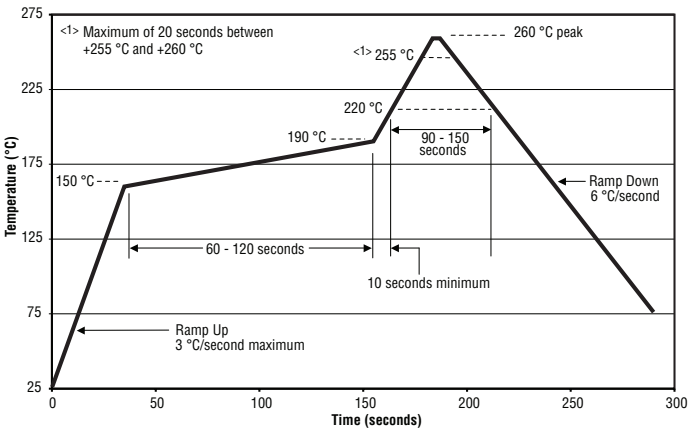
Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value
01	100	13	133	25	178	37	237	49	316	61	422	73	562	85	750
02	102	14	137	26	182	38	243	50	324	62	432	74	576	86	768
03	105	15	140	27	187	39	249	51	332	63	442	75	590	87	787
04	107	16	143	28	191	40	255	52	340	64	453	76	604	88	806
05	110	17	147	29	196	41	261	53	348	65	464	77	619	89	825
06	113	18	150	30	200	42	267	54	357	66	475	78	634	90	845
07	115	19	154	31	205	43	274	55	365	67	487	79	649	91	866
08	118	20	158	32	210	44	280	56	374	68	499	80	665	92	887
09	121	21	162	33	215	45	287	57	383	69	511	81	681	93	909
10	124	22	165	34	221	46	294	58	392	70	523	82	698	94	931
11	127	23	169	35	226	47	301	59	402	71	536	83	715	95	953
12	130	24	174	36	232	48	309	60	412	72	549	84	732	96	976

This table shows the first two digits for the three-digit E96 part marking scheme. The third character is a letter multiplier:
A=10^0 B=10^1 C=10^2 D=10^3 E=10^4 F=10^5 G=10^{-6} H=10^{-7} X=10^{-1} Y=10^{-2} Z=10^{-3}

Performance Characteristics (AEC-Q200)

Test	Method	Procedure	Test Limits ΔR
High Temperature Exposure Storage	AEC-Q200 Table 7.3	1,000 hours @ +125 °C; no power loading	1 % tolerance: ≤±1 % 5 % tolerance: ≤±3 %
Temperature Cycling	AEC-Q200 Table 7.4	-55 °C to +125 °C, 1,000 cycles	1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
Moisture Resistance	AEC-Q200 Table 7.6	+65 °C / 80~100 % RH / 10 cycles	1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
Biased Humidity	AEC-Q200 Table 7.7	1,000 hours @ +85 °C / 85 % RH, 10 % operating power	1 % tolerance: ≤±1 % 5 % tolerance: ≤±3 %
Operational Life	AEC-Q200 Table 7.8	1,000 hours @ +125 °C, at specified rated power	1 % tolerance: ≤±1 % 5 % tolerance: ≤±3 %
Mechanical Shock	AEC-Q200 Table 7.13	100 g, half-sine, 6 ms, velocity: 12.3 ft./sec.	Within product specification tolerance; no visible damage
Vibration	AEC-Q200 Table 7.14	5 g for 20 minutes, 12 cycles each of 3 durations; 10~200 Hz	1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
Resistance to Solder Heat	AEC-Q200 Table 7.15	+270 °C ±5 °C, 10 ±1 seconds	1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
Thermal Shock	AEC-Q200 Table 7.16	-55 °C to +155 °C, dwell time 15 minutes, max. transfer time 20 seconds/300 cycles	1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
ESD	AEC-Q200-002	1 kV min.	≤±1 %
Solderability	AEC-Q200 Table 7.18	a) Backing +155 °C, 4 hours, dipping +235 °C, 5 seconds b) Steam 8 hours, dipping +215 °C, 5 seconds c) Steam 8 hours, dipping +260 °C, 7 seconds	Over 95 % of the termination must be covered with solder
Flammability	AEC-Q200 Table 7.20	UL 94 V-0 or V-1 are acceptable	Refer to UL 94
Board Flex	AEC-Q200 Table 7.21	Bending 2 mm (CRS1206A, 1210A, 2010A, 2512A) Bending 3 mm (CRS0603A, 0805A)	1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
Terminal Strength	AEC-Q200 Table 7.22	Force 1.8 Kg for 60 seconds	No mechanical damage
Sulfur-resistant (Applies only when R ≥1 ohm)	ASTM B-809	+50 °C ±2 °C, 1,000 hours	≤±1 %

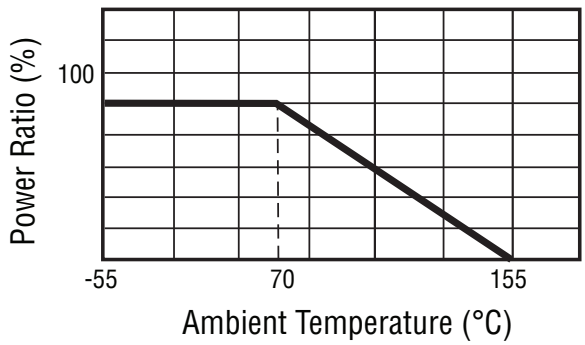
Soldering Profile



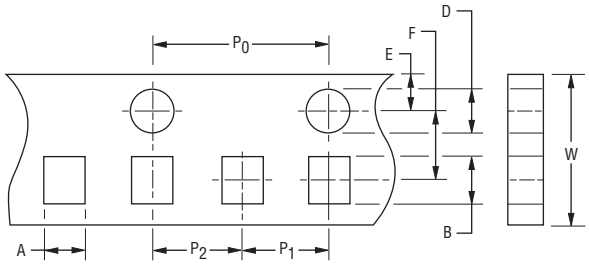
Environmental Characteristics

Moisture Sensitivity Level..... 1
ESD Classification (HBM)..... 1A

Derating Curve



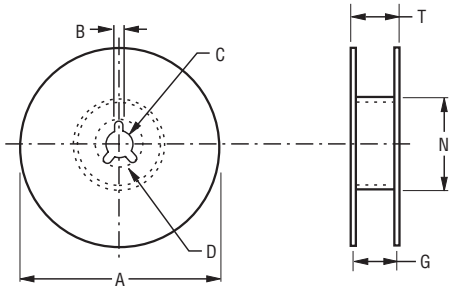
Packaging Dimensions (Conforms to EIA RS-481A)



Accumulated dimensional tolerance 40 ± 0.2 (1.575 ± .008)

DIMENSIONS: MM (INCHES)

Model	Tape Type	A	B	W	F	E	P_1	P_2	P_0	D
CRS0603A	Paper	1.10 ± 0.20 (.043 ± .008)	1.90 ± 0.20 (.075 ± .008)	8.00 ± 0.30 (.315 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRS0805A	Paper	1.65 ± 0.20 (.065 ± .008)	2.40 ± 0.20 (.094 ± .008)	8.00 ± 0.30 (.315 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRS1206A	Paper	2.00 ± 0.20 (.079 ± .008)	3.60 ± 0.20 (.142 ± .008)	8.00 ± 0.30 (.315 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRS1210A	Paper	3.00 ± 0.20 (.118 ± .008)	3.60 ± 0.20 (.142 ± .008)	8.00 ± 0.30 (.315 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRS2010A	Plastic	2.80 ± 0.20 (.110 ± .008)	5.50 ± 0.20 (.217 ± .008)	12.00 ± 0.30 (.472 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRS2512A	Plastic	3.50 ± 0.20 (.138 ± .008)	6.70 ± 0.20 (.264 ± .008)	12.00 ± 0.30 (.472 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)



DIMENSIONS: MM (INCHES)

Model	Packaging Quantity	A	N	C	D Min.	B	G	T Max.
CRS0603A	5,000 pcs. per reel	1.78 ± 2.00 (.070 ± .079)	60 ± 0.50 (2.362 ± .020)	13.0 ± 0.50 (.512 ± .020)	20.0 (8.661)	2.00 ± 0.50 (.079 ± .020)	10.00 ± 1.50 (.394 ± .006)	14.9 (.587)
CRS0805A								
CRS1206A								
CRS1210A								
CRS2010A	4,000 pcs. per reel						13.80 ± 1.50 (.543 ± .006)	16.7 (.657)
CRS2512A								

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