



Features

- Thick film technology
- Power rating up to 2 watts at 70 °C
- High power surge withstanding
- RoHS compliant* and halogen free**
- AEC-Q200 compliant

Applications

- Power supplies
- Stepper motor drives

CRS-Q Series High Power Anti-Surge Resistor

Electrical Characteristics

| Characteristic | CRS1206Q | CRS2010Q | CRS2512Q |
|--|-------------------|----------|----------|
| Power Rating @ 70 °C | 0.5 W | 1 W | 2 W |
| Operating Temp. Range | -55 °C to +155 °C | | |
| Derated to Zero Load at | +155 °C | | |
| Maximum Working Voltage | 200 V | 200 V | 300 V |
| Maximum Overload Voltage | 400 V | 400 V | 600 V |
| Resistance Tolerance | ±1 %, ±5 % | | |
| Temperature Coefficient | | | |
| 1 Ω to 10 Ω (±1 %, E24 & E96 series) | ±200 PPM/°C | | |
| 10.2 Ω to 1 MΩ (±1 %, E24 & E96 series) | ±100 PPM/°C | | |
| 1 Ω to 1 MΩ (±5 %, E24 series) | ±200 PPM/°C | | |

For Standard Values Used in Capacitors, Inductors and Resistors, [click here](#).

Additional Information

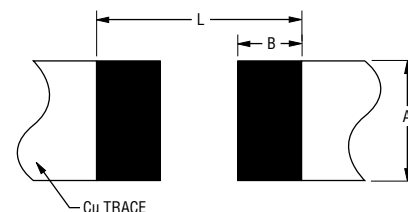
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Recommended Solder Pad Layout

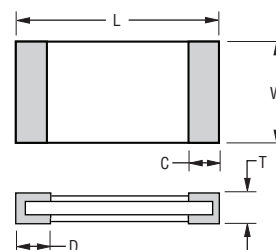
| Model | A | B | L |
|----------|-----------------------|-----------------------|-----------------------|
| CRS1206Q | $\frac{1.80}{(.071)}$ | $\frac{1.30}{(.051)}$ | $\frac{4.70}{(.185)}$ |
| CRS2010Q | $\frac{3.00}{(.118)}$ | $\frac{1.50}{(.059)}$ | $\frac{6.80}{(.268)}$ |
| CRS2512Q | $\frac{3.70}{(.146)}$ | $\frac{1.60}{(.063)}$ | $\frac{7.60}{(.299)}$ |



Product Dimensions

| Model | L | W | C | D | T |
|----------|---|---|---|---|---|
| CRS1206Q | $\frac{3.10 \pm 0.10}{(0.122 \pm 0.004)}$ | $\frac{1.60 \pm 0.10}{(0.063 \pm 0.004)}$ | $\frac{0.50 \pm 0.25}{(0.020 \pm 0.010)}$ | $\frac{0.50 \pm 0.25}{(0.020 \pm 0.010)}$ | $\frac{0.55 \pm 0.10}{(0.022 \pm 0.004)}$ |
| CRS2010Q | $\frac{5.00 \pm 0.20}{(0.197 \pm 0.008)}$ | $\frac{2.50 \pm 0.20}{(0.098 \pm 0.008)}$ | $\frac{0.65 \pm 0.25}{(0.026 \pm 0.010)}$ | $\frac{0.60 \pm 0.25}{(0.024 \pm 0.010)}$ | $\frac{0.60 \pm 0.10}{(0.024 \pm 0.004)}$ |
| CRS2512Q | $\frac{6.40 \pm 0.20}{(0.252 \pm 0.008)}$ | $\frac{3.20 \pm 0.20}{(0.126 \pm 0.008)}$ | $\frac{0.60 \pm 0.25}{(0.024 \pm 0.010)}$ | $\frac{0.90 \pm 0.25}{(0.035 \pm 0.010)}$ | $\frac{0.60 \pm 0.15}{(0.024 \pm 0.006)}$ |

DIMENSIONS: $\frac{\text{MM}}{(\text{INCHES})}$



WARNING Cancer and Reproductive Harm - 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.

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

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CRS-Q Series High Power Anti-Surge Resistor

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How to Order

CRS 1206 Q F X - 1002 E LF

Model _____
 CRS = High Power Anti-Surge Resistor

Size _____
 1206 = 1206 Size
 2010 = 2010 Size
 2512 = 2512 Size

Feature _____
 Q = AEC-Q200 Compliant

Resistance Tolerance _____
 F = $\pm 1\%$
 J = $\pm 5\%$

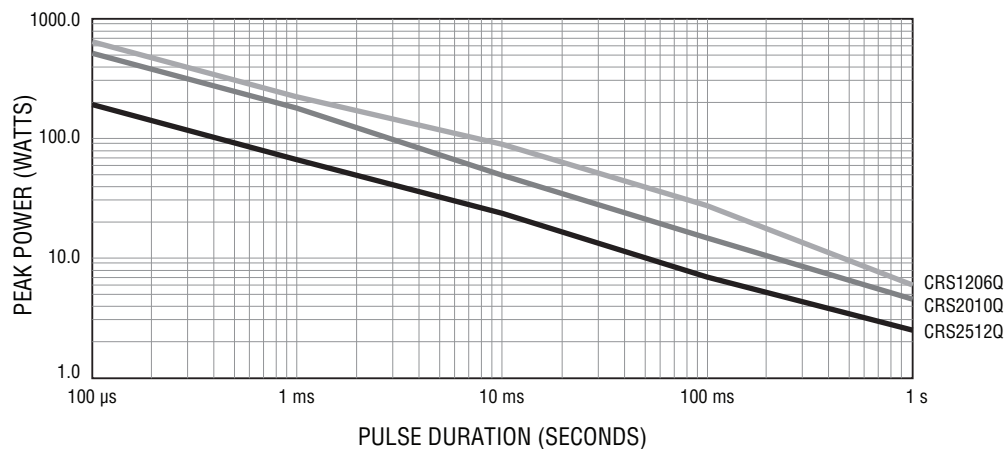
TCR (See Electrical Characteristics chart) _____
 W = ± 200 PPM/ $^{\circ}$ C
 X = ± 100 PPM/ $^{\circ}$ C

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 - CRS1206Q
 4,000 pieces on 180 mm (7 inch) reel, plastic tape - CRS2010Q, CRS2512Q

Termination _____
 LF = Tin-plated (RoHS Compliant)

Surge Performance



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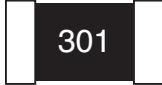
CRS-Q Series High Power Anti-Surge Resistor

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Typical Part Marking

±5 % (E96):

CRS1206Q, CRS2010Q, CRS2512Q



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

Example: **301** = $30 \times 10^1 = 300 \text{ ohms}$

±1 % (E24/E96):

CRS1206Q, CRS2010Q, CRS2512Q



Resistance value is expressed by 4 digits. The first three digits represent the significant figures of the nominal resistance value in ohms; the third digit represents the exponent for a base of 10.

Example: **1542** = $154 \times 10^2 = 15.4K \text{ ohms}$

Performance Characteristics

| Test Item | Method | Procedure | Test Limits ΔR |
|-------------------------------------|---------------------|--|--|
| High Temperature Exposure (Storage) | AEC-Q200 Table 7.3 | 1,000 hrs. @ 125 °C. No power loading. | 1 % tolerance: ≤ ±1 % 5 % tolerance: ≤ ±3 % |
| Temperature Cycling | AEC-Q200 Table 7.4 | 1000 cycles (-55 °C to +125 °C) | 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 | 1000 hours @ 85 °C / 85 % RH, 10 % of operating power | 1 % tolerance: ≤ ±1 % 5 % tolerance: ≤ ±3 % |
| Operational Life | AEC-Q200 Table 7.8 | 1000 hours @ 125 °C at specified rated power | 1 % tolerance: ≤ ±1 % 5 % tolerance: ≤ ±3 % |
| Mechanical Shock | AEC-Q200 Table 7.13 | 100 g's, wave: hail-sine; Duration: 6 ms, Velocity: 12.3 ft/sec. | Within product specification tolerance and no visible damage |
| Vibration | AEC-Q200 Table 7.14 | 5 g's for 20 min., 12 cycles each of 3 orientations; Test from 10-200 Hz | 1 % tolerance: ≤ ±0.5 % 5 % tolerance: ≤ ±1 % |
| Resistance to Solder Heat | AEC-Q200 Table 7.15 | Solder dipping @ 270 °C ±5 °C for 10 sec. ±1 sec. | 1 % tolerance: ≤ ±0.5 % 5 % tolerance: ≤ ±1 % |
| Thermal Shock | AEC-Q200 Table 7.16 | -55 to 155 °C / dwell time 15 min / max transfer time 20 sec / 300 cycles | 1 % tolerance: ≤ ±0.5 % 5 % tolerance: ≤ ±1 % |
| ESD | AEC-Q200-002 | Test contact min. 1 kV | ≤ ±1 % |
| Solderability | AEC-Q200 Table 7.18 | a) Baking 155 °C 4 hrs.; dipping 235 °C, 5 sec b) Steam 8 hrs., dipping 215 °C, 5 sec c) Steam 8 hrs., dipping 260 °C, 7 sec | Over 95 % of 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 | 1 % tolerance: ≤ ±0.5 % 5 % tolerance: ≤ ±1 % |
| Terminal Strength | AEC-Q200 Table 7.22 | Force 1.8 Kg for 60 sec | No mechanical damage |
| Short Term Overload | IEC 60115-1, 4.13 | 5X rated power for 5 sec | 1 % tolerance: ≤ ±0.5 % 5 % tolerance: ≤ ±1 % |

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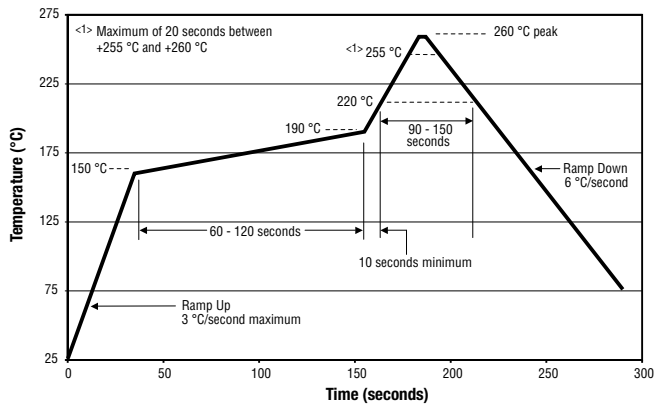
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CRS-Q Series High Power Anti-Surge Resistor

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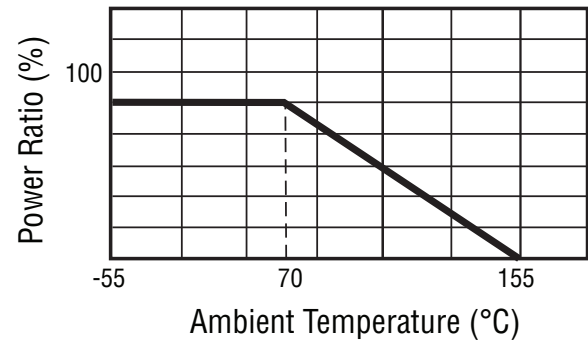
Soldering Profile



Environmental Characteristics

Moisture Sensitivity Level 1

Derating Curve



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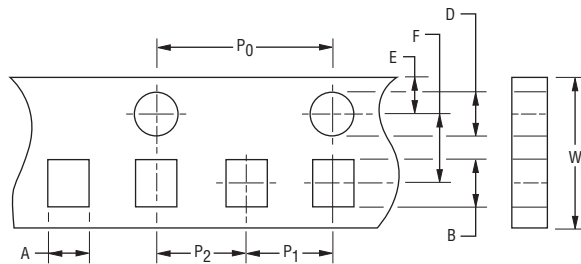
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CRS-Q Series High Power Anti-Surge Resistor

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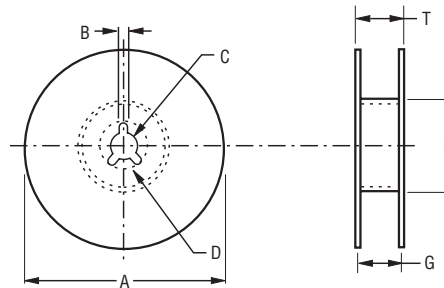
Packaging Dimensions (Conforms to EIA RS-481A)



Accumulated dimensional tolerance $\frac{40 \pm 0.2}{(1.575 \pm .008)}$

DIMENSIONS: $\frac{\text{MM}}{(\text{INCHES})}$

| Model | Tape Type | A | B | W | F | E | P ₁ | P ₂ | P ₀ | D |
|----------|-----------|---|---|--|---|---|---|---|---|---|
| CRS1206Q | Paper | $\frac{2.00 \pm 0.20}{(.079 \pm .008)}$ | $\frac{3.60 \pm 0.20}{(.142 \pm .008)}$ | $\frac{8.00 \pm 0.30}{(.315 \pm .012)}$ | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{1.50 \pm 0.10/-0}{(.006 \pm .004/-0)}$ |
| CRS2010Q | Plastic | $\frac{2.80 \pm 0.20}{(.110 \pm .008)}$ | $\frac{5.50 \pm 0.20}{(.217 \pm .008)}$ | $\frac{12.00 \pm 0.30}{(.472 \pm .012)}$ | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{1.50 \pm 0.10/-0}{(.006 \pm .004/-0)}$ |
| CRS2512Q | Plastic | $\frac{3.50 \pm 0.20}{(.138 \pm .008)}$ | $\frac{6.70 \pm 0.20}{(.264 \pm .008)}$ | $\frac{12.00 \pm 0.30}{(.472 \pm .012)}$ | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.158 \pm .004)}$ | $\frac{1.50 \pm 0.10/-0}{(.006 \pm .004/-0)}$ |



DIMENSIONS: $\frac{\text{MM}}{(\text{INCHES})}$

| Model | Packaging Quantity | A | N | C | D Min. | B | G | T Max. |
|----------|---------------------|--|--|---|------------------------|---|--|-----------------------|
| CRS1206Q | 5,000 pcs. per reel | $\frac{178 \pm 2.00}{(7.00 \pm .079)}$ | $\frac{60 \pm 0.50}{(2.362 \pm .020)}$ | $\frac{13.0 \pm 0.50}{(.512 \pm .020)}$ | $\frac{20.0}{(8.661)}$ | $\frac{2.00 \pm 0.50}{(.079 \pm .020)}$ | $\frac{10.00 \pm 1.50}{(.394 \pm .006)}$ | $\frac{14.9}{(.587)}$ |
| CRS2010Q | 4,000 pcs. per reel | | | | | | $\frac{13.80 \pm 1.50}{(.543 \pm .006)}$ | $\frac{16.7}{(.657)}$ |
| CRS2512Q | | | | | | | | |

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