



## 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

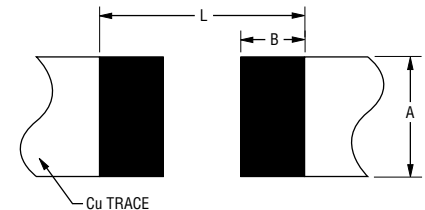
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### Recommended Solder Pad Layout

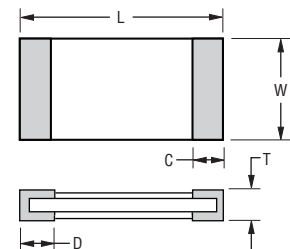
Model	A	B	L
CRS1206Q	$\frac{1.80}{(.071)}$	$\frac{1.30}{(.051)}$	$\frac{4.70}{(.185)}$
CRS2010Q	$\frac{3.00}{(.118)}$	$\frac{1.50}{(.059)}$	$\frac{6.80}{(.268)}$
CRS2512Q	$\frac{3.70}{(.146)}$	$\frac{1.60}{(.063)}$	$\frac{7.60}{(.299)}$



### 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](http://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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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 =  $\pm 5\%$

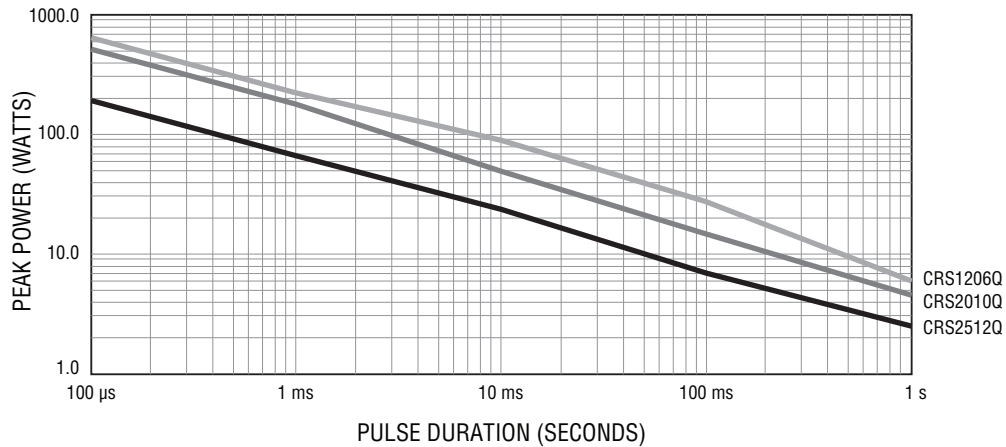
TCR (See Electrical Characteristics chart) \_\_\_\_\_  
 W =  $\pm 200$  PPM/ $^{\circ}$ C  
 X =  $\pm 100$  PPM/ $^{\circ}$ C

Resistance Value \_\_\_\_\_  
1% Tolerance:  
 <100 ohms ..... "R" represents decimal point (example: 24R3 = 24.3 ohms)  
 $\geq 100$  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)  
 $\geq 10$  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

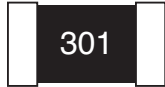


# CRS-Q Series High Power Anti-Surge Resistor

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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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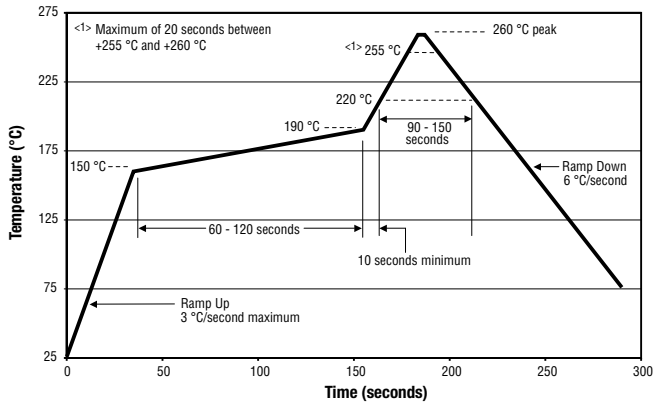
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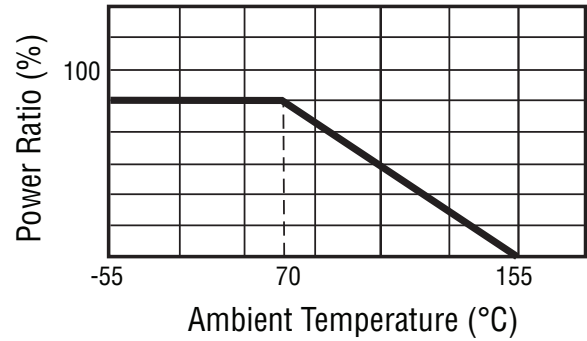
## Soldering Profile



## Environmental Characteristics

Moisture Sensitivity Level ..... 1

## Derating Curve



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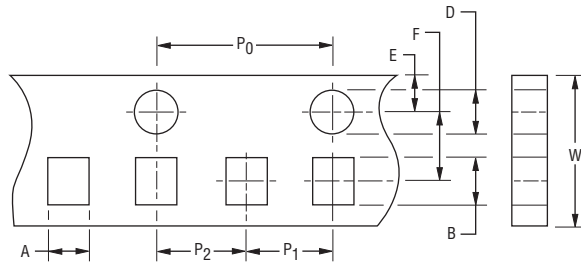
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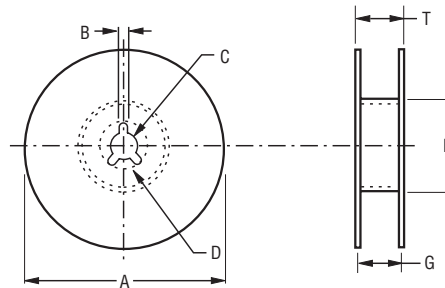
## Packaging Dimensions (Conforms to EIA RS-481A)



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 <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	D
CRS1206Q	Paper	$\frac{2.00 \pm 0.20}{(.079 \pm .008)}$	$\frac{3.60 \pm 0.20}{(.142 \pm .008)}$	$\frac{8.00 \pm 0.30}{(.315 \pm .012)}$	$\frac{3.50 \pm 0.05}{(.138 \pm .002)}$	$\frac{1.75 \pm 0.10}{(.069 \pm .004)}$	$\frac{4.00 \pm 0.10}{(.158 \pm .004)}$	$\frac{2.00 \pm 0.05}{(.079 \pm .002)}$	$\frac{4.00 \pm 0.10}{(.158 \pm .004)}$	$\frac{1.50 \pm 0.10/-0}{(.006 \pm 0.04/-0)}$
CRS2010Q	Plastic	$\frac{2.80 \pm 0.20}{(.110 \pm .008)}$	$\frac{5.50 \pm 0.20}{(.217 \pm .008)}$	$\frac{12.00 \pm 0.30}{(.472 \pm .012)}$	$\frac{3.50 \pm 0.05}{(.138 \pm .002)}$	$\frac{1.75 \pm 0.10}{(.069 \pm .004)}$	$\frac{4.00 \pm 0.10}{(.158 \pm .004)}$	$\frac{2.00 \pm 0.05}{(.079 \pm .002)}$	$\frac{4.00 \pm 0.10}{(.158 \pm .004)}$	$\frac{1.50 \pm 0.10/-0}{(.006 \pm 0.04/-0)}$
CRS2512Q	Plastic	$\frac{3.50 \pm 0.20}{(.138 \pm .008)}$	$\frac{6.70 \pm 0.20}{(.264 \pm .008)}$	$\frac{12.00 \pm 0.30}{(.472 \pm .012)}$	$\frac{3.50 \pm 0.05}{(.138 \pm .002)}$	$\frac{1.75 \pm 0.10}{(.069 \pm .004)}$	$\frac{4.00 \pm 0.10}{(.158 \pm .004)}$	$\frac{2.00 \pm 0.05}{(.079 \pm .002)}$	$\frac{4.00 \pm 0.10}{(.158 \pm .004)}$	$\frac{1.50 \pm 0.10/-0}{(.006 \pm 0.04/-0)}$



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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