

# HIGH POWER THICK FILM CHIP RESISTOR

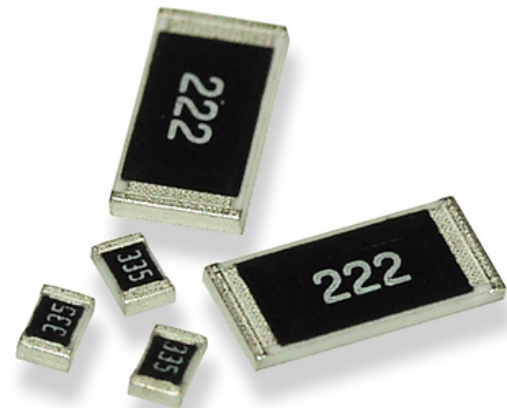
## TYPE CRGH SERIES | AEC-Q200 QUALIFIED

### INTRODUCTION

The resistive element is screen printed and fired, and a passivation layer added. Each resistor is trimmed to tolerance by laser. The pre-scribed tile is then broken into strips, the end plating fired on, and the strips broken into individual components. Final termination finish is electroplated matte Sn over a Ni barrier layer. This high power resistor is now AEC-200 Qualified.

### FEATURES

- Thick film resistors with high power to size ratio, ideally suited to industrial and general purpose use
- Value range from 1Ω to 10MΩ
- Seven Package sizes
- Terminal finish matte Sn over Ni
- AEC-Q200 Qualified
- Moisture Sensitive Level - MSL1



**Note:** SMD (Surface mount devices) resistors and inductors should be kept in their original packaging to protect them from ESD (Electrostatic Discharge). The full reels can be broken into smaller quantities, without exposing them to ESD, as long as the components are still in the plastic or paper tape. These resistors and inductors should not be removed from the plastic or paper tape unless they are in an ESD protected environment.

### CHARACTERISTICS - ELECTRICAL

| Type                                                       | 0402          | 0603 | 0805 | 1206 | 1210 | 2010 | 2512 |
|------------------------------------------------------------|---------------|------|------|------|------|------|------|
| Power Rating (W) @70°C                                     | 0.1           | 0.2  | 0.33 | 0.5  | 0.75 | 1    | 2    |
| Resistance Range E24 Standard<br>Values E96 by negotiation | 1Ω ~ 10MΩ     |      |      |      |      |      |      |
| Tolerance                                                  | 1% ~ 5%       |      |      |      |      |      |      |
| Max. Working Voltage (V)                                   | 50            | 50   | 150  | 200  | 200  | 200  | 250  |
| Max. Overload Voltage (V)                                  | 100           | 100  | 300  | 400  | 500  | 500  | 500  |
| Dielectric strength                                        | 100           | 300  | 500  | 500  | 500  | 500  | 500  |
| Temperature Range                                          | -55°C ~ 155°C |      |      |      |      |      |      |
| Ambient Temperature                                        | 70°C          |      |      |      |      |      |      |

#### Notes:

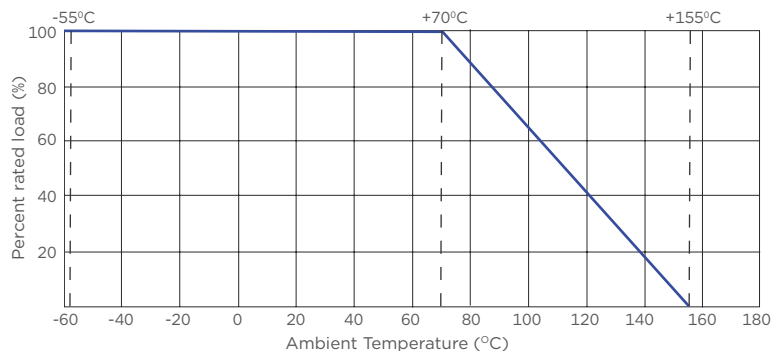
- \* Rated continuous working voltage (RCWV) shall be determined from  $RCWV = \sqrt{(Rated\ Power \times Resistance\ Value)}$ , or Maximum RCWV listed above, whichever is less
- \*\*Recommended Circuit Board Design - If this device is anticipated to run at full continuous power then action to improve the cooling should be taken. This can be a metal substrate, copper pad left under the chip, an opening in the PCB or enlarged silver conductor pads each end.

# High Power Thick Film Chip Resistor

Type CRGH Series I AEC-Q200 Qualified

## DERATING CURVE

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70°C. For temperature more than 70°C, the load shall be derated as shown below



## VOLTAGE RATING

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

$$RCWV = \sqrt{P \times R}$$

Where:

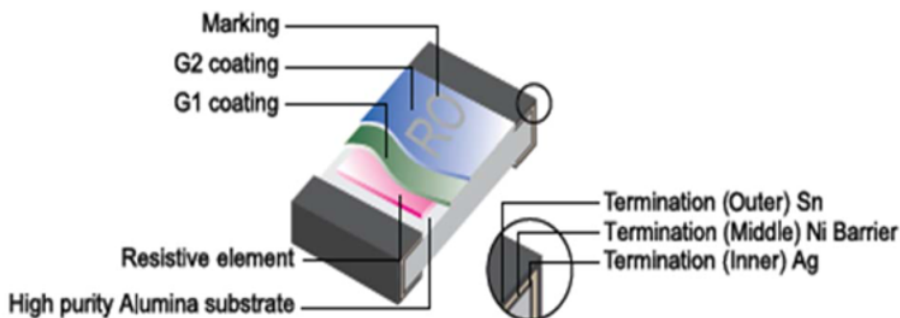
RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

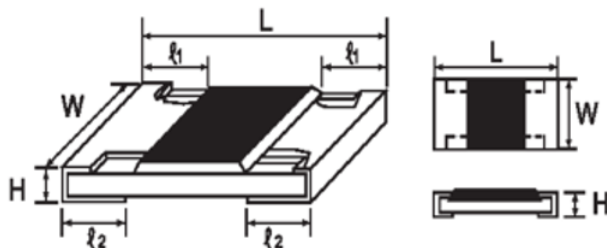
R = Nominal Resistance (ohm)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

## CONSTRUCTION



## DIMENSIONS (mm)



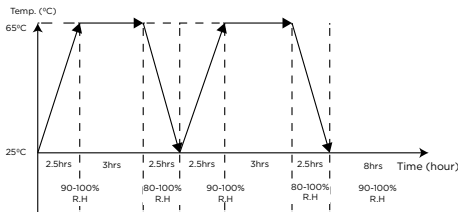
# High Power Thick Film Chip Resistor

Type CRGH Series I AEC-Q200 Qualified

## DIMENSIONS (mm)

| Type | L           | W                  | H           | Ø1          | Ø2          |
|------|-------------|--------------------|-------------|-------------|-------------|
| 0402 | 1.00 ± 0.10 | 0.50 ± 0.05        | 0.35 ± 0.05 | 0.20 ± 0.10 | 0.25 ± 0.10 |
| 0603 | 1.60 ± 0.10 | 0.80 + 0.15/- 0.10 | 0.45 ± 0.10 | 0.30 ± 0.20 | 0.30 ± 0.20 |
| 0805 | 2.00 ± 0.15 | 1.25 + 0.15/- 0.10 | 0.55 ± 0.10 | 0.40 ± 0.20 | 0.40 ± 0.20 |
| 1206 | 3.10 ± 0.15 | 1.55 + 0.15/- 0.10 | 0.55 ± 0.10 | 0.45 ± 0.20 | 0.45 ± 0.20 |
| 1210 | 3.10 ± 0.10 | 2.60 + 0.15/- 0.10 | 0.55 ± 0.10 | 0.50 ± 0.20 | 0.50 ± 0.20 |
| 2010 | 5.00 ± 0.10 | 2.50 + 0.15        | 0.55 ± 0.10 | 0.60 ± 0.25 | 0.50 ± 0.20 |
| 2512 | 6.35 ± 0.10 | 3.20 + 0.15        | 0.55 ± 0.10 | 0.60 ± 0.25 | 0.50 ± 0.20 |

## ENVIRONMENTAL CHARACTERISTICS

| Characteristics                     | Standards                                                                                                                                                                                                               | Test Methods (AEC Q-200)                                                                                                                                                                                 |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operational Life                    | $\pm(1.0\%+0.1\Omega)\text{max.}$                                                                                                                                                                                       | 125°C, at 35% of operating power, 1000H(1.5 hours “ON”, 0.5 hour “OFF”).<br>(MIL-STD-202 Method 108)                                                                                                     |
|                                     | <100mΩ                                                                                                                                                                                                                  | Apply to rate current for 0Ω                                                                                                                                                                             |
| Electrical Characterization         | $1\Omega \leq R \leq 10\Omega : \pm 400\text{PPM}/^\circ\text{C}$<br>$10\Omega \leq R \leq 100\Omega : \pm 200\text{PPM}/^\circ\text{C}$<br>$100\Omega \leq R \leq 10\text{M}\Omega : \pm 100\text{PPM}/^\circ\text{C}$ | Parametrically test lot and sample size requirements, summary to show Min, Max, Mean and Standard deviation at room as well as Min and Max operating temperature. (User Spec)                            |
| External Visual                     | No mechanical damage                                                                                                                                                                                                    | Electrical test not required. Inspect device construction, marking and workmanship<br>(MIL-STD-883 Method 2009)                                                                                          |
| Physical Dimension                  | Reference 2.0 Dimension Standards                                                                                                                                                                                       | Verify physical dimensions to the applicable device detail specification.<br>Note: User(s) and suppliers spec. Electrical test not required.<br>(JESD22 MH Method JB-100)                                |
| Resistance to Solvent               | Marking Unsmeared                                                                                                                                                                                                       | Note: Add Aqueous wash chemical – OKEM Clean or equivalent.<br>Do not use banned solvents.<br>(MIL-STD-202 Method 215)                                                                                   |
| Terminal Strength                   | Not broken                                                                                                                                                                                                              | Force of 1.8kg for 60 seconds<br>(JIS-C-6429)                                                                                                                                                            |
| High Temperature Exposure (Storage) | $\pm(1.0\%+0.1\Omega)\text{max.}$                                                                                                                                                                                       | 1000hrs. @T=155°C. Unpowered. Measurement at 24±2 hours after test conclusion.<br>(MIL-STD-202 Method 108)                                                                                               |
|                                     | <50mΩ                                                                                                                                                                                                                   | Apply to rate current for 0Ω                                                                                                                                                                             |
| Temperature Cycling                 | Resistance change rate is $\pm(0.5\%+0.1\Omega)\text{max.}$                                                                                                                                                             | 1000 Cycles (-55°C to +155°C). Measurement at 24±2 hours after test conclusion.<br>(JESD22 Method JA-104)                                                                                                |
|                                     | <50mΩ                                                                                                                                                                                                                   | Apply to rate current for 0Ω                                                                                                                                                                             |
| Moisture Resistance                 | Resistance change rate is $\pm(0.5\%+0.1\Omega)\text{max.}$                                                                                                                                                             |  <p>T=24 hours / cycle. Unpowered. Measurement at 24±2 hours after test conclusion.<br/>(MIL-STD-202 Method 106)</p> |

# High Power Thick Film Chip Resistor

Type CRGH Series I AEC-Q200 Qualified

## ENVIRONMENTAL CHARACTERISTICS

| Characteristics                                                                                                                                                                                                                                                                                                              | Standards                                                          | Test Methods (AEC Q-200)                                                                                                                                                                                                                                                   |       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| Biased Humidity                                                                                                                                                                                                                                                                                                              | Resistance change rate is $\pm(1.0\%+0.1\Omega)\text{max.}$        | 10% rated power, 85°C/85%RH, 1000H, Measurement at 24 hours after test conclusion.<br>(MIL-STD-202 Method 103)                                                                                                                                                             |       |
|                                                                                                                                                                                                                                                                                                                              | <100mΩ                                                             | Apply to rate current for 0Ω                                                                                                                                                                                                                                               |       |
| Mechanical Shock                                                                                                                                                                                                                                                                                                             | Resistance change rate is $\pm(1.0\%+0.1\Omega)\text{max.}$        | Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.<br>(MIL-STD202 Method 213)                                                                                                                                                 |       |
| Vibration                                                                                                                                                                                                                                                                                                                    | Resistance change rate is $\pm(1.0\%+0.1\Omega)\text{max.}$        | 5g's for 20min., 12 cycle each of 3 orientations.<br>Note: Use 8''*5''PCB. 031'' thick 7 secure points (onone) long side and 2 secure points at corners of opposite sides. Parts mounted within 2' from any secure point. Test from 10-2000Hz.<br>(MIL-STD-202 Method 204) |       |
| Thermal Shock                                                                                                                                                                                                                                                                                                                | Resistance change rate is $\pm(1.0\%+0.1\Omega)\text{max.}$        | -55°C/=155°C,<br>Note: Number of cycles required -300, Maximum transfer time -20 seconds, Dwell time -15 minutes. Air-Air.<br>(MIL-STD-202 Method 107)                                                                                                                     |       |
|                                                                                                                                                                                                                                                                                                                              | <50mΩ                                                              | Apply to rate current for 0Ω                                                                                                                                                                                                                                               |       |
| ESD                                                                                                                                                                                                                                                                                                                          | Resistance change rate is $\pm(10\%+0.1\Omega)\text{max.}$         |                                                                                                                                                                                                                                                                            |       |
|                                                                                                                                                                                                                                                                                                                              | Type                                                               | Max Voltage                                                                                                                                                                                                                                                                | Class |
|                                                                                                                                                                                                                                                                                                                              | 0402                                                               | 0.5KV                                                                                                                                                                                                                                                                      | 1B    |
|                                                                                                                                                                                                                                                                                                                              | 0603                                                               | 1KV                                                                                                                                                                                                                                                                        | 1C    |
|                                                                                                                                                                                                                                                                                                                              | 0805                                                               | 2KV                                                                                                                                                                                                                                                                        | 2     |
|                                                                                                                                                                                                                                                                                                                              | 1206                                                               | 3KV                                                                                                                                                                                                                                                                        | 2     |
|                                                                                                                                                                                                                                                                                                                              | 1210                                                               | 6KV                                                                                                                                                                                                                                                                        | 3A    |
|                                                                                                                                                                                                                                                                                                                              | 2010                                                               | 6KV                                                                                                                                                                                                                                                                        | 3A    |
|                                                                                                                                                                                                                                                                                                                              | 2512                                                               | 10KV                                                                                                                                                                                                                                                                       | 3B    |
| With the electrometer in direct contact with the discharge tip, verify the voltage setting at levels of $\pm 500\text{V}$ , $\pm 1\text{KV}$ , $\pm 2\text{KV}$ , $\pm 4\text{KV}$ , $\pm 8\text{KV}$ , The electrometer reading shall be within $\pm 10\%$ for voltages from 500V to $\leq 800\text{V}$ .<br>(AEC-Q200-002) |                                                                    |                                                                                                                                                                                                                                                                            |       |
| Solderability                                                                                                                                                                                                                                                                                                                | 95% coverage Min.                                                  | For both leaded and SMD. Electrical test not required.<br>Magnification 50X Conditions:<br>a. Method B 4hrs at 155°C dry heat, the dip in bath with 245°C,5s.<br>b. Method B: at 215°C,5S.<br>c. Method D: at 260°C, 60s.<br>(J-STD-002)                                   |       |
| Flammability                                                                                                                                                                                                                                                                                                                 | No ignition of the tissue paper or scorching of the pinewood board | V-0 or V-1 are acceptable. Electrical test not required.<br>(UL-94)                                                                                                                                                                                                        |       |
| Board Flex                                                                                                                                                                                                                                                                                                                   | $\pm(1.0\%+0.05\Omega)\text{max}$                                  | 2mm (Min)<br>(JIS-C-6429)                                                                                                                                                                                                                                                  |       |
|                                                                                                                                                                                                                                                                                                                              | <50mΩ                                                              | Apply to rate current for 0Ω                                                                                                                                                                                                                                               |       |
| Flame Retardance                                                                                                                                                                                                                                                                                                             | No flame                                                           | Temperature sensing at 500°C, Voltage power subjected to 32VDC current clamped up to 500ADC and decreased in 1.0VDC/hour.<br>(AEC-Q200-001)                                                                                                                                |       |
| Resistance to Soldering Heat                                                                                                                                                                                                                                                                                                 | Resistance change rate is $\pm(1.0\%+0.05\Omega)\text{max}$        | Condition B No per-heat of samples.<br>Note: single wave solder-procedure 2 for SMD and procedure 1 for leaded with solder within 1.5mm of device body.<br>(MIL-STD-202 Method 210)                                                                                        |       |
|                                                                                                                                                                                                                                                                                                                              | <50mΩ                                                              | Apply to rate current for 0Ω                                                                                                                                                                                                                                               |       |
| *Sulfuration test: H2S 3-5PPM 50°C $\pm$ 2°C 91%~93%RH 1000H                                                                                                                                                                                                                                                                 |                                                                    |                                                                                                                                                                                                                                                                            |       |

## High Power Thick Film Chip Resistor

Type CRGH Series I AEC-Q200 Qualified

### MARKING

E24 series 0603 – 2512 3 Digits – first two digits denote significant figures of resistance and third digit denotes number of zeros thereafter.

Example

|  |     |  |
|--|-----|--|
|  | 222 |  |
|--|-----|--|

 = 2K2

Marking for E96 Series 0805 – 2512 4 digits – First three digits denote significant figures of resistance and fourth digit denotes number of zeros thereafter.

Example

|  |      |  |
|--|------|--|
|  | 1000 |  |
|--|------|--|

 = 100R

For ohmic values below 100R letter “R” denotes decimal point.

Example

|  |      |  |
|--|------|--|
|  | 1R80 |  |
|--|------|--|

 = 1R8 / 1.8Ω

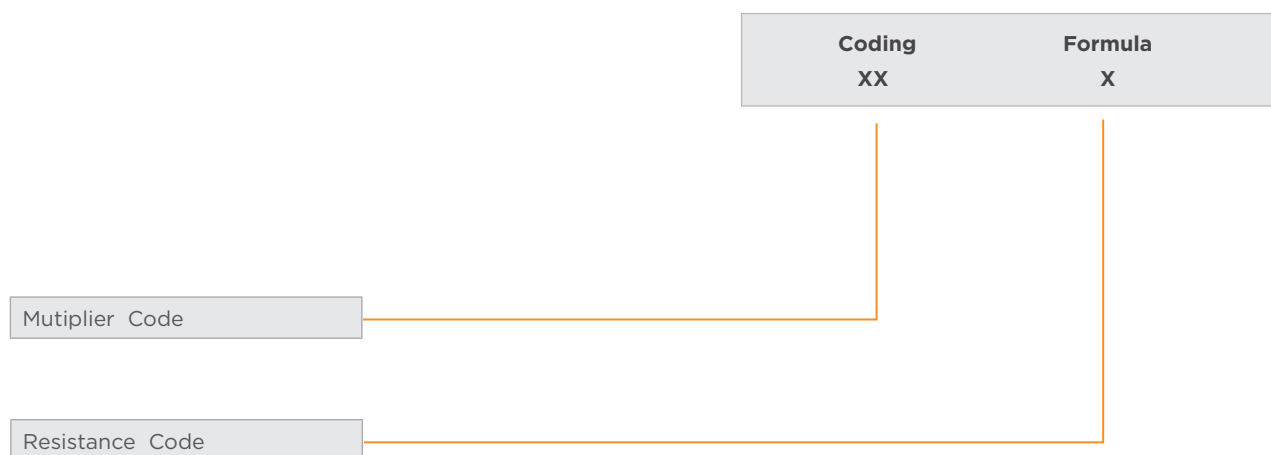
0402 size chips are not marked

0603 E96 3 digit marking.

Resistance Code from table on next page, and Multiplier code from table below

### MULTIPLIER CODE

| Code      | A               | B               | C               | D               | E               | F               | G               | H               | X                | Y                | Z                |
|-----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| Mutiplier | 10 <sup>0</sup> | 10 <sup>1</sup> | 10 <sup>2</sup> | 10 <sup>3</sup> | 10 <sup>4</sup> | 10 <sup>5</sup> | 10 <sup>6</sup> | 10 <sup>7</sup> | 10 <sup>-1</sup> | 10 <sup>-2</sup> | 10 <sup>-3</sup> |



#### Example:

|               |   |                          |
|---------------|---|--------------------------|
| 10.2K Ω = 102 | X | 10 Ω = 2C                |
| ↓             |   | ↓                        |
| 02            |   | C                        |
| 33.2 Ω = 332  | X | 10 <sup>-1</sup> Ω = 51X |
| ↓             |   | ↓                        |
| 51            |   | X                        |

High Power Thick Film Chip Resistor

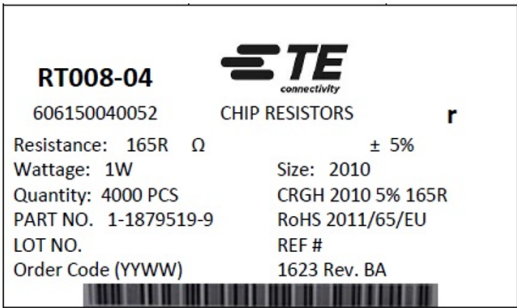
Type CRGH Series I AEC-Q200 Qualified

| Value | Code | Value | Code | Value | Code | Value | Code |     |    |
|-------|------|-------|------|-------|------|-------|------|-----|----|
| 100   | 1    | 162   | 21   | 261   | 41   | 422   | 61   | 698 | 82 |
| 102   | 2    | 165   | 22   | 267   | 42   | 432   | 62   | 715 | 83 |
| 105   | 3    | 169   | 23   | 274   | 43   | 442   | 63   | 732 | 84 |
| 107   | 4    | 174   | 24   | 280   | 44   | 453   | 64   | 750 | 85 |
| 110   | 5    | 178   | 25   | 287   | 45   | 464   | 65   | 768 | 86 |
| 113   | 6    | 182   | 26   | 294   | 46   | 475   | 66   | 787 | 87 |
| 115   | 7    | 187   | 27   | 301   | 47   | 487   | 67   | 806 | 88 |
| 118   | 8    | 191   | 28   | 309   | 48   | 499   | 68   | 825 | 89 |
| 121   | 9    | 196   | 29   | 316   | 49   | 511   | 69   | 845 | 90 |
| 124   | 10   | 200   | 30   | 324   | 50   | 523   | 70   | 866 | 91 |
| 127   | 11   | 205   | 31   | 332   | 51   | 536   | 71   | 887 | 92 |
| 130   | 12   | 210   | 32   | 340   | 52   | 549   | 72   | 909 | 93 |
| 133   | 13   | 215   | 33   | 348   | 53   | 562   | 73   | 931 | 94 |
| 137   | 14   | 221   | 34   | 357   | 54   | 576   | 74   | 953 | 95 |
| 140   | 15   | 226   | 35   | 365   | 55   | 590   | 75   | 976 | 96 |
| 143   | 16   | 232   | 36   | 374   | 56   | 604   | 76   |     |    |
| 147   | 17   | 237   | 37   | 383   | 57   | 619   | 77   |     |    |
| 150   | 18   | 243   | 38   | 392   | 58   | 634   | 78   |     |    |
| 154   | 19   | 249   | 39   | 402   | 59   | 649   | 79   |     |    |
| 158   | 20   | 255   | 40   | 412   | 60   | 665   | 80   |     |    |

LABEL

Label shall be marked with the following item:

- A. Nominal Resistance and Resistance Tolerance
- B. Power Rating and Size
- C. Quantity and description
- D. Part No.
- E. Lot No.



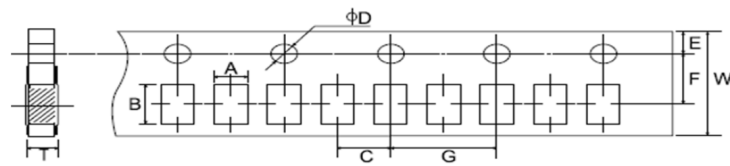
# High Power Thick Film Chip Resistor

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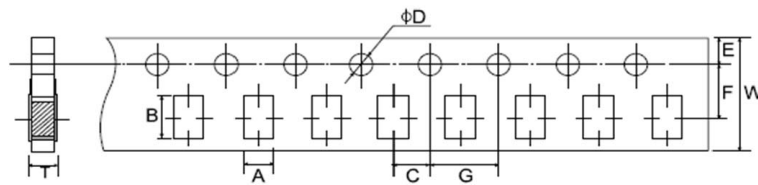
## PACKAGING SPECIFICATION

### BOX DIMENSIONS (mm)

#### Paper taping

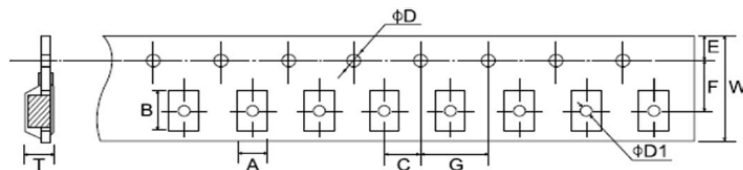


| Type | A ± 0.1 | B ± 0.1 | C ± 0.05 | ØD +0.1 -0 | E ± 0.1 | F ± 0.05 | G ± 0.1 | W ± 0.2 | T ± 0.05 |
|------|---------|---------|----------|------------|---------|----------|---------|---------|----------|
| 0402 | 0.65    | 1.2     | 2.0      | 1.5        | 1.75    | 3.5      | 4.0     | 8.0     | 0.42     |



| Type | A ± 0.2 | B ± 0.2 | C ± 0.05 | ØD +0.1 -0 | E ± 0.1 | F ± 0.05 | G ± 0.1 | W ± 0.2 | T ± 0.1 |
|------|---------|---------|----------|------------|---------|----------|---------|---------|---------|
| 0603 | 1.10    | 1.90    | 2.0      | 1.5        | 1.75    | 3.5      | 4.0     | 8.0     | 0.67    |
| 0805 | 1.65    | 2.40    | 2.0      | 1.5        | 1.75    | 3.5      | 4.0     | 8.0     | 0.81    |
| 1206 | 2.00    | 3.60    | 2.0      | 1.5        | 1.75    | 3.5      | 4.0     | 8.0     | 0.81    |
| 1210 | 2.80    | 3.50    | 2.0      | 1.5        | 1.75    | 3.5      | 4.0     | 8.0     | 0.75    |

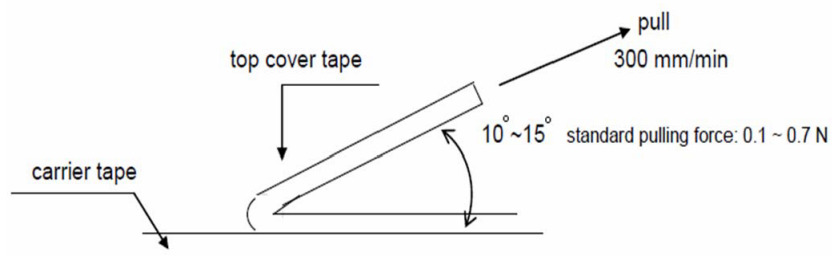
#### Embossed Taping



| Type | A ± 0.2 | B ± 0.2 | C ± 0.05 | ØD +0.1 -0 | E ± 0.1 | F ± 0.05 | G ± 0.1 | W ± 0.2 | T ± 0.01 |
|------|---------|---------|----------|------------|---------|----------|---------|---------|----------|
| 2010 | 2.90    | 5.60    | 2.0      | 1.5        | 1.75    | 5.5      | 4.0     | 12.0    | 1.00     |
| 2512 | 3.50    | 6.70    | 2.0      | 1.5        | 1.75    | 5.5      | 4.0     | 12.0    | 1.00     |

### PEELING STRENGTH OF TOP COVER TAPE

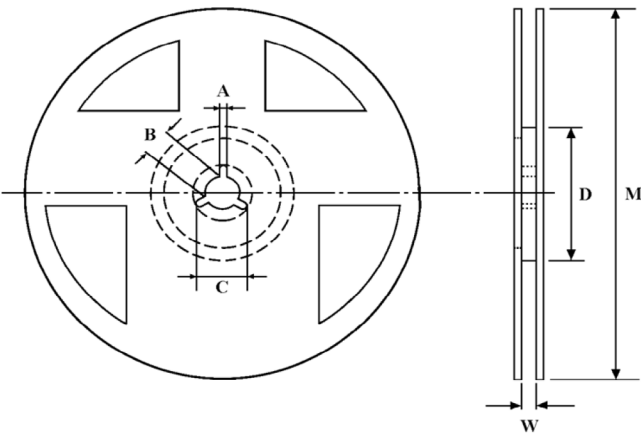
Test Condition: 0.1 to 0.7 N at a peel-off speed of 300 mm / min.



High Power Thick Film Chip Resistor

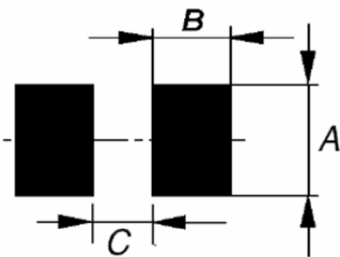
Type CRGH Series I AEC-Q200 Qualified

REEL DIMENSION (mm)



| Type | Packaging | Quantity Per Reel | A ± 0.5 | B ± 0.5 | C ± 0.5 | D ± 1.00 | M ± 2 | W ± 1.00 |
|------|-----------|-------------------|---------|---------|---------|----------|-------|----------|
| 0402 | Paper     | 10,000 pcs        | 2       | 13      | 21      | 60       | 178   | 10       |
| 0603 | Paper     | 5,000 pcs         | 2       | 13      | 21      | 60       | 178   | 10       |
| 0805 | Paper     | 5,000 pcs         | 2       | 13      | 21      | 60       | 178   | 10       |
| 1206 | Paper     | 5,000 pcs         | 2       | 13      | 21      | 60       | 178   | 10       |
| 1210 | Paper     | 5,000 pcs         | 2       | 13      | 21      | 60       | 178   | 10       |
| 2010 | Embossed  | 4,000 pcs         | 2       | 13      | 21      | 60       | 178   | 13.8     |
| 2512 | Embossed  | 4,000 pcs         | 2       | 13      | 21      | 60       | 178   | 13.8     |

RECOMMENDED SOLDER PAD



| Type | A Width (mm) | B Width (mm) | C Width (mm) |
|------|--------------|--------------|--------------|
| 0402 | 0.6          | 0.6          | 0.5          |
| 0603 | 1.0          | 1.0          | 0.6          |
| 0805 | 1.3          | 1.2          | 1.0          |
| 1206 | 1.8          | 1.2          | 2.2          |
| 1210 | 2.8          | 1.2          | 2.1          |
| 2010 | 3.0          | 1.5          | 3.8          |
| 2512 | 3.0          | 1.5          | 5.0          |

## High Power Thick Film Chip Resistor

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### ENVIRONMENT RELATED SUBSTANCE

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

### OZONE LAYER DEPLETING SUBSTANCES

Ozone depleting substances are not used in our manufacturing process of this product.

This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

### STORAGE CONDITION (MSL1)

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of  $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$  and a relative humidity of  $60\%\text{RH} \pm 10\%\text{RH}$ , chemical and dust free atmosphere.

Even within the above guarantee periods, do not store these products in the following conditions otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g., taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as  $\text{Cl}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ ,  $\text{SO}_2$ , or  $\text{NO}_2$ .
2. In direct sunlight.

## ORDERING INFORMATION

**Part Number**  
**CRGH 0603 J 10K**

### Common Part

|             |                                     |
|-------------|-------------------------------------|
| <b>CRGH</b> | High Power Thick Film Chip Resistor |
|-------------|-------------------------------------|

### Size

|             |
|-------------|
| <b>0402</b> |
| <b>0603</b> |
| <b>0805</b> |
| <b>1206</b> |
| <b>1210</b> |
| <b>2010</b> |
| <b>2512</b> |

### Tolerance

|          |    |
|----------|----|
| <b>F</b> | 1% |
| <b>J</b> | 5% |

### Resistance Value

|             |                        |
|-------------|------------------------|
| <b>1R0</b>  | 1 ohm = 1000 milliohms |
| <b>1K0</b>  | 1K ohm = 1000 ohms     |
| <b>100K</b> | 100K ohm = 100000 ohms |
| <b>1M0</b>  | 1M ohm = 1000000 ohms  |

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