



## Features

- Thick film technology
- High power surge withstanding
- RoHS compliant\*
- Halogen free\*\*
- AEC-Q200 compliant

## Applications

- Power supplies
- Digital meters
- Consumer electronics
- LED lighting
- Industry control boards

## CHP-Q Series Ultra-High Power Chip Resistor

### Electrical Characteristics

| Characteristic                                                            | Model             |             |             |
|---------------------------------------------------------------------------|-------------------|-------------|-------------|
|                                                                           | CHP0603Q          | CHP0805Q    | CHP1206Q    |
| Power Rating @ 70 °C                                                      | 0.33 W            | 0.5 W       | 0.75 W      |
| Operating Temperature Range                                               | -55 °C to +155 °C |             |             |
| Derated to Zero Load at                                                   | +155 °C           |             |             |
| Maximum Working Voltage                                                   | 75 V              | 200 V       | 250 V       |
| Maximum Overload Voltage                                                  | 125 V             | 300 V       | 500 V       |
| Resistance Tolerance                                                      | ±1 %, ±5 %        |             |             |
| Temperature Coefficient<br>1 ohm to 9.76 ohms<br>(±1 %, E24 & E96 Series) | ±200 ppm/°C       | ±200 ppm/°C | ±200 ppm/°C |
| 10 ohms to 1 megohm<br>(±1 %, E24 & E96 Series)                           | ±100 ppm/°C       | ±100 ppm/°C | ±100 ppm/°C |
| 1 ohm to 1 megohm<br>(±5 %, E24 Series)                                   | ±200 ppm/°C       | ±200 ppm/°C | ±200 ppm/°C |

Note: Solder pad and trace size should be evaluated and board surface temperature should not exceed +105 °C when applying full rated power.

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

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**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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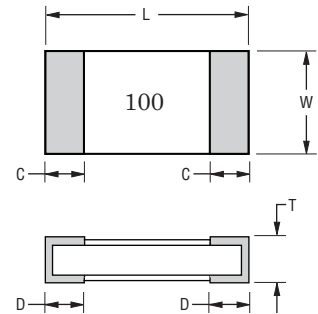
# CHP-Q Series Ultra-High Power Chip Resistor

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## Product Dimensions

| Model    | L                                         | W                                         | C                                         | D                                         | T                                         |
|----------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
| CHP0603Q | $\frac{1.60 \pm 0.10}{(0.062 \pm 0.004)}$ | $\frac{0.80 \pm 0.10}{(0.031 \pm 0.004)}$ | $\frac{0.30 \pm 0.20}{(0.012 \pm 0.008)}$ | $\frac{0.30 \pm 0.20}{(0.012 \pm 0.008)}$ | $\frac{0.45 \pm 0.10}{(0.018 \pm 0.004)}$ |
| CHP0805Q | $\frac{2.00 \pm 0.10}{(0.079 \pm 0.004)}$ | $\frac{1.25 \pm 0.10}{(0.049 \pm 0.004)}$ | $\frac{0.40 \pm 0.20}{(0.016 \pm 0.008)}$ | $\frac{0.40 \pm 0.20}{(0.016 \pm 0.008)}$ | $\frac{0.50 \pm 0.10}{(0.020 \pm 0.004)}$ |
| CHP1206Q | $\frac{3.10 \pm 0.10}{(0.122 \pm 0.004)}$ | $\frac{1.60 \pm 0.10}{(0.062 \pm 0.004)}$ | $\frac{0.50 \pm 0.25}{(0.020 \pm 0.010)}$ | $\frac{0.50 \pm 0.25}{(0.020 \pm 0.010)}$ | $\frac{0.55 \pm 0.10}{(0.022 \pm 0.004)}$ |

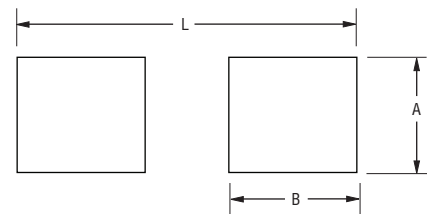
DIMENSIONS:  $\frac{\text{MM}}{(\text{INCHES})}$



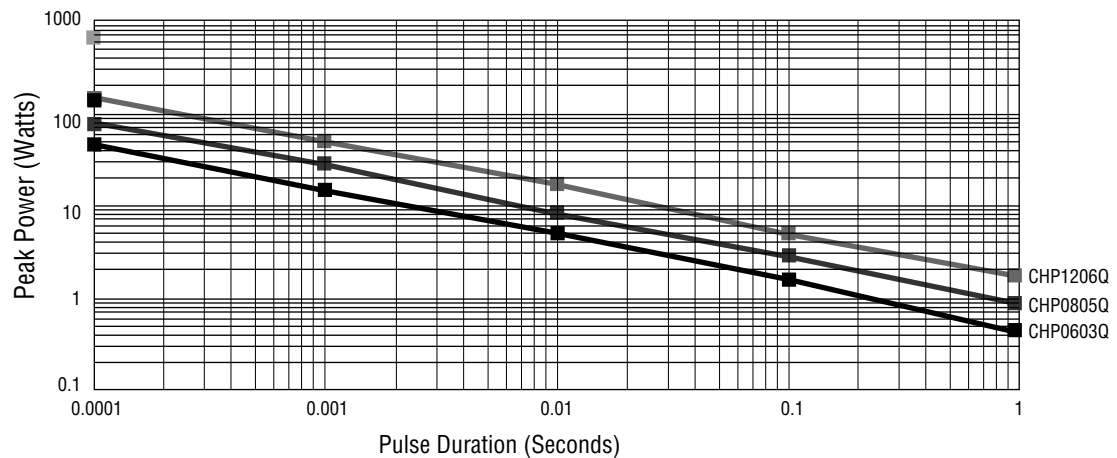
## Recommended Solder Pad Layout

| Model    | A                     | B                     | L                     |
|----------|-----------------------|-----------------------|-----------------------|
| CHP0603Q | $\frac{0.90}{(.035)}$ | $\frac{1.00}{(.039)}$ | $\frac{3.00}{(.118)}$ |
| CHP0805Q | $\frac{1.30}{(.051)}$ | $\frac{1.15}{(.045)}$ | $\frac{3.50}{(.138)}$ |
| CHP1206Q | $\frac{1.80}{(.071)}$ | $\frac{1.30}{(.051)}$ | $\frac{4.70}{(.185)}$ |

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



## Surge Performance



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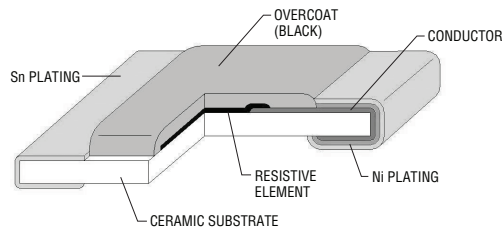
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# CHP-Q Series Ultra-High Power Chip Resistor

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## Construction



## Rated Voltage

The rated voltage is calculated by the following formula:

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

**V:** Rated Voltage (V)

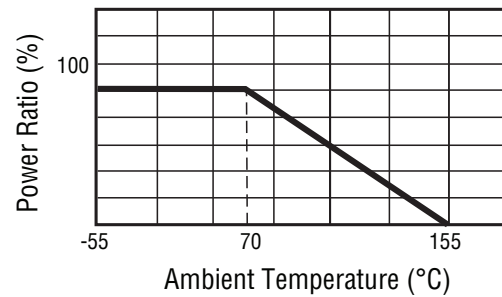
**P:** Rated Power (W)

**R:** Resistance Value ( $\Omega$ )

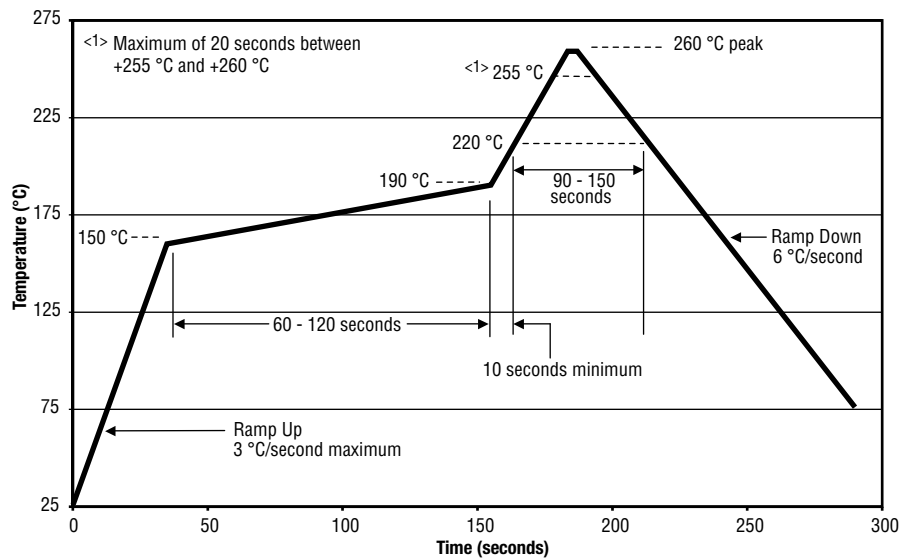
## Environmental Characteristics

Moisture Sensitivity Level ..... 1

## Derating Curve



## Soldering Profile



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## CHP-Q Series Ultra-High Power Chip Resistor

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### How to Order

CHP 0603 Q F X - 1002 E LF

|                                                                                                                                        |     |      |   |   |   |        |   |    |
|----------------------------------------------------------------------------------------------------------------------------------------|-----|------|---|---|---|--------|---|----|
| Model _____                                                                                                                            | CHP | 0603 | Q | F | X | - 1002 | E | LF |
| CHP = High Power Surge Resistor                                                                                                        |     |      |   |   |   |        |   |    |
| Size _____                                                                                                                             |     |      |   |   |   |        |   |    |
| 0603 = 0603 Size                                                                                                                       |     |      |   |   |   |        |   |    |
| 0805 = 0805 Size                                                                                                                       |     |      |   |   |   |        |   |    |
| 1206 = 1206 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 _____                                                                                                                 |     |      |   |   |   |        |   |    |
| <u>1 % Tolerance:</u>                                                                                                                  |     |      |   |   |   |        |   |    |
| <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) |     |      |   |   |   |        |   |    |
| <u>5 % Tolerance:</u>                                                                                                                  |     |      |   |   |   |        |   |    |
| $\geq 10$ 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) plastic reel, paper tape                                                                           |     |      |   |   |   |        |   |    |
| Termination _____                                                                                                                      |     |      |   |   |   |        |   |    |
| LF = Tin-plated (RoHS Compliant)                                                                                                       |     |      |   |   |   |        |   |    |

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# CHP-Q Series Ultra-High Power Chip Resistor

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## Performance Characteristics

| Test Item                           | Method              | Procedure                                                                                                                    | Test Limits $\Delta R$                                                                                            |
|-------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Electrical Characteristics          | AEC-Q200 Table 7.1  | Measure the resistance value                                                                                                 | DC Resistance:<br>F: $\pm 1\%$ : J : $\pm 5\%$<br>TCR: Within specifications                                      |
| High Temperature Exposure (Storage) | AEC-Q200 Table 7.3  | 1000 hours @ T = 125 °C unpowered;<br>Measurement at 24 $\pm 2$ hours after test conclusion                                  | J: $\Delta R \leq \pm(3\% + 0.1\ \Omega)$<br>F: $\Delta R \leq \pm(1\% + 0.05\ \Omega)$                           |
| Temperature Cycling                 | AEC-Q200 Table 7.4  | 1000 cycles (-55 °C to +125 °C);<br>Measurement at 24 $\pm 2$ hours after test conclusion                                    | J: $\Delta R \leq \pm(1\% + 0.1\ \Omega)$<br>F: $\Delta R \leq \pm(0.5\% + 0.05\ \Omega)$<br>No mechanical damage |
| Moisture Resistance                 | AEC-Q200 Table 7.6  | Test 65 °C / 80-100 % RH / 10 cycles;<br>Measurement at 24 $\pm 2$ hours after test conclusion<br>(t = 24 hours/cycle)       | J: $\Delta R \leq \pm(1\% + 0.1\ \Omega)$<br>F: $\Delta R \leq \pm(0.5\% + 0.05\ \Omega)$                         |
| Biased Humidity                     | AEC-Q200 Table 7.7  | 1000 hours 85 °C / 85 % RH, 10 % of operating power;<br>Measurement at 24 $\pm 2$ hours after test conclusion                | J: $\Delta R \leq \pm(3\% + 0.1\ \Omega)$<br>F: $\Delta R \leq \pm(1\% + 0.05\ \Omega)$                           |
| Operational Life                    | AEC-Q200 Table 7.8  | Test 1000 hours @ T <sub>A</sub> = 125 °C at specified rated power;<br>Measurement at 24 $\pm 2$ hours after test conclusion | J: $\Delta R \leq \pm(3\% + 0.1\ \Omega)$<br>F: $\Delta R \leq \pm(1\% + 0.05\ \Omega)$                           |
| Mechanical Shock                    | AEC-Q200 Table 7.13 | Test peak value: 100 g's, wave: hail-sine;<br>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;<br>Test from 10-2000 Hz                                                 | J: $\Delta R \leq \pm(1\% + 0.1\ \Omega)$<br>F: $\Delta R \leq \pm(0.5\% + 0.05\ \Omega)$<br>No mechanical damage |
| Resistance to Solder Heat           | AEC-Q200 Table 7.15 | Solder dipping @ 270 °C $\pm 5$ °C for 10 sec. $\pm 1$ sec.                                                                  | J: $\Delta R \leq \pm(1\% + 0.1\ \Omega)$<br>F: $\Delta R \leq \pm(0.5\% + 0.05\ \Omega)$<br>No mechanical damage |
| Thermal Shock                       | AEC-Q200 Table 7.16 | -55 to 155 °C / dwell time 15 min /<br>max transfer time 20 sec / 300 cycles                                                 | J: $\Delta R \leq \pm(1\% + 0.1\ \Omega)$<br>F: $\Delta R \leq \pm(0.5\% + 0.05\ \Omega)$<br>No mechanical damage |
| ESD                                 | AEC-Q200-002        | Test contact min. 1 kV                                                                                                       | $\Delta R \leq \pm(1\% + 0.1\ \Omega)$                                                                            |
| Solderability                       | AEC-Q200 Table 7.18 | a) Baking 155 °C 4H, dipping 235 °C 5 sec<br>b) Steam 8H, dipping 215 °C 5 sec<br>c) Steam 8H, 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 (1206Q),<br>3 mm (0805Q, 0603Q)                                                                                 | J: $\Delta R \leq \pm(1\% + 0.1\ \Omega)$<br>F: $\Delta R \leq \pm(0.5\% + 0.05\ \Omega)$<br>No mechanical damage |
| Terminal Strength                   | AEC-Q200 Table 7.22 | Force 1.8 Kg for 60 sec                                                                                                      | No mechanical damage                                                                                              |

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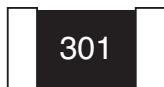
# CHP-Q Series Ultra-High Power Chip Resistor

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## Typical Part Marking

**±5 % (E24):**

**CHP0603Q, CHP0805Q, CHP1206Q**



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):**

**CHP0805Q, CHP1206Q**

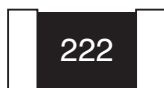


Resistance value is expressed by 4 digits. The first three digits represent the significant figures of the nominal resistance value in ohms; the third digit represents the exponent for a base of 10.

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

**±1 % (E24):**

**CHP0603Q**

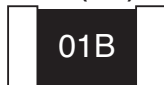


Resistance value is expressed by 3 digits. The first two digits represent the significant figures of the nominal resistance value in ohms; the third digit represents the exponent for a base of 10.

Example: **222** =  $22 \times 10^2 = 2.2K \text{ ohms}$

**±1 % (E96):**

**CHP0603Q**



Resistance value is expressed by 2 digits followed by an alpha character multiplier. (Refer to marking table below.)

Example: **01B** =  $100 \times 10^1 = 1K \text{ ohms}$

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

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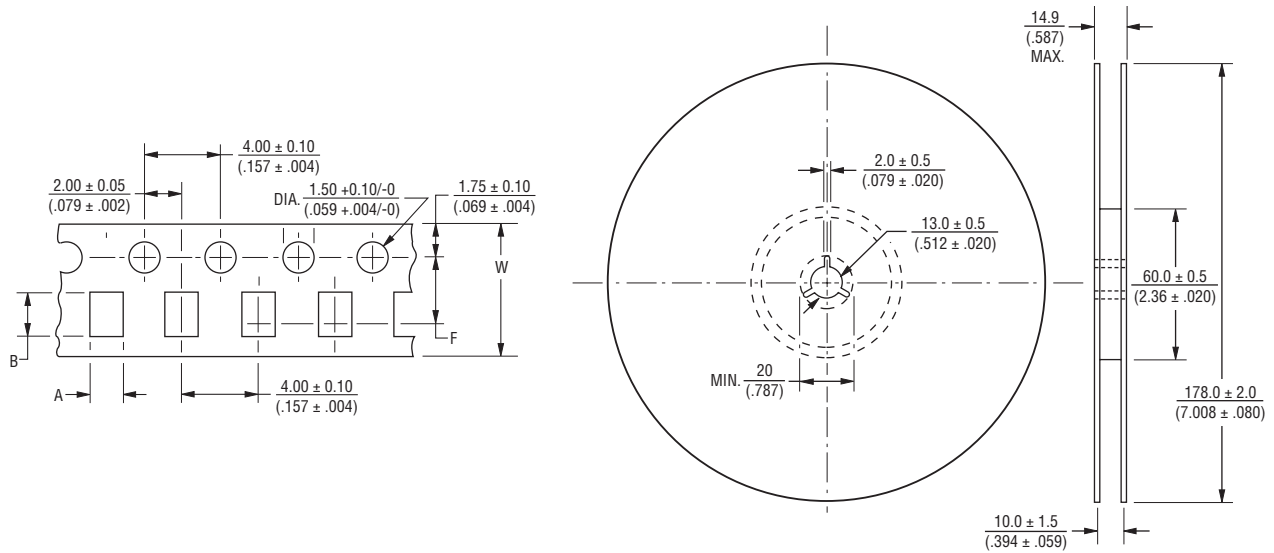
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# CHP-Q Series Ultra-High Power Chip Resistor

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



| Model    | Tape Type | Pieces per Reel | A                                | B                                | W                                | F                                |
|----------|-----------|-----------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| CHP0603Q | Paper     | 5,000           | $1.10 \pm 0.20$<br>(.043 ± .008) | $1.90 \pm 0.20$<br>(.075 ± .008) | $8.00 \pm 0.30$<br>(.315 ± .012) | $3.50 \pm 0.05$<br>(.138 ± .002) |
| CHP0805Q |           |                 | $1.65 \pm 0.20$<br>(.065 ± .008) | $2.40 \pm 0.20$<br>(.094 ± .008) |                                  |                                  |
| CHP1206Q |           |                 | $2.00 \pm 0.20$<br>(.079 ± .008) | $3.60 \pm 0.20$<br>(.142 ± .008) |                                  |                                  |

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

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[CHP0603QJW-220ELF](#) [CHP0805QFW-2R00ELF](#) [CHP0805QFW-3R30ELF](#) [CHP0805QJW-4R7ELF](#) [CHP1206QFW-1R00ELF](#) [CHP1206QFW-2R20ELF](#) [CHP1206QFW-5R10ELF](#) [CHP1206QJW-4R7ELF](#) [CHP0603QFW-1R00ELF](#) [CHP0603QFW-4R70ELF](#) [CHP0603QFX-1001ELF](#)