



### features

- PCF series: Coated with UL94V0 flameproof material
- Suitable for automatic machine insertion
- Able to replace carbon composition resistors in most applications
- Marking: HFC size: Reddish brown body color with alpha-numeric marking, PCF size: Light green body color with color-coded bands
- Products with lead-free terminations meet EU RoHS requirements
- Higher reliability against disconnection compared to wirewound resistors and film resistors
- AEC-Q200 Qualified: HPC only

### dimensions and construction

#### HPC



#### PCF



| Type   | Dimensions inches (mm)   |                |                        |               |                         |
|--------|--------------------------|----------------|------------------------|---------------|-------------------------|
|        | L                        | C (max.)       | D                      | d (nom.)      | I                       |
| HPC1/2 | .433±.039<br>(11.0±2.0)  | —              | .138±.039<br>(3.5±1.0) | .031<br>(0.8) | 1.50±.118<br>(38.0±3.0) |
| HPC1   | 0.630±.039<br>(16.0±2.0) | —              | .177±.039<br>(4.5±1.0) |               |                         |
| HPC2   | .827±.039<br>(21.0±2.0)  | —              | .197±.039<br>(5.0±1.0) |               |                         |
| HPC3   | 1.02±.039<br>(26.0±2.0)  | —              | .236±.039<br>(6.0±1.0) |               |                         |
| HPC4   | 1.50±.039<br>(38.0±2.0)  | —              | .276±.039<br>(7.0±1.0) |               |                         |
| HPC5   | 1.73±.039<br>(44.0±2.0)  | —              | .295±.039<br>(7.5±1.0) | .039<br>(1.0) | 1.18±.118<br>(30.0±3.0) |
| PCF1/2 | .354±.039<br>(9.0±1.0)   | .437<br>(11.1) | .138±.02<br>(3.5±0.5)  | .028<br>(0.7) |                         |
| PCF1   | 0.65±.039<br>(16.5±1.0)  | .748<br>(19.0) | .217±.039<br>(5.5±1.0) | .031<br>(0.8) |                         |
| PCF2   | .748±.039<br>(19.0±1.0)  | .886<br>(22.5) | .276±.039<br>(7.0±1.0) |               |                         |

### ordering information

| Part # | PCF        | 1/2  | C                    | T631                | R                  | 102                                  | K                  |
|--------|------------|--|----------------------|---------------------|--------------------|--------------------------------------|--------------------|
| Type   | HPC<br>PCF | Power Rating   | Termination Material | Taping              | Packaging          | Nominal Resistance                   | Tolerance          |
|        |            | 1/2: 0.5W<br>1: 1W<br>2: 2W<br>3: 3W<br>4: 4W<br>5: 5W | C: SnCu              | 1/2: T52<br>1: T631 | A: Ammo<br>R: Reel | 2 significant figures + 1 multiplier | K: ±10%<br>M: ±20% |

For further information on packaging, please refer to Appendix C.

### applications and ratings

| Part Designation | Power Rating @ 70°C | Minimum Dielectric Withstanding Voltage | Resistance Range<br>E-12 (±10%)<br>E-6 (±20%) | Resistance Tolerance | T.C.R. (ppm/°C)                             | Absolute Maximum Working Voltage | Absolute Maximum Overload Voltage | Absolute Maximum Pulse Voltage* | Rated Ambient Temp. | Operating Temp. Range |
|------------------|---------------------|---|---|----------------------|---|----------------------------------|-----------------------------------|---------------------------------|---------------------|-----------------------|
| HPC1/2           | 0.5W                | —                                       | 10Ω - 390KΩ (+10%)<br>3.3Ω - 330KΩ (+20%)     | K: ±10%<br>M: ±20%   | -900±300:<br>R<100Ω<br>-1200±300:<br>R≥100Ω | 200V                             | 400V                              | 8kV                             | +40°C               | -40°C to +200°C       |
| HPC1             | 1.0W                | —                                       |   |                      |   | 300V                             | 600V                              | 15kV                            |                     |                       |
| HPC2             | 2.0W                | —                                       |   |                      |   | 400V                             | 800V                              | 25kV                            |                     |                       |
| HPC3             | 3.0W                | —                                       |   |                      |   | 450V                             | 900V                              | 25kV                            |                     |                       |
| HPC4             | 4.0W                | —                                       |   |                      |   | 500V                             | 1000V                             | 25kV                            |                     |                       |
| HPC5             | 5.0W                | —                                       | 550V  |                      | 1100V                                       | 25kV                             |                                   |                                 |                     |                       |
| PCF1/2           | 0.5W                | 500V                                    | 4.7Ω - 100KΩ                                  |                      | -900±300:<br>R<100Ω<br>-1300±300:<br>R≥100Ω | 200V                             | 400V                              | 10kV                            |                     |                       |
| PCF1             | 1.0W                |   | 3.3Ω - 390KΩ                                  |                      |   | 300V                             | 600V                              | 14kV                            |                     |                       |
| PCF2             | 2.0W                | 700V                                    | 3.3Ω - 390KΩ                                  |                      | 400V  | 800V                             | 20kV                              |                                 |                     |                       |

\* Resistance to pulse: change shall be ±5% of the pre-test values. 1 sec. ON, 1 second OFF, 10,000 cycles. The voltage is applied with maximum pulse voltage.

### environmental applications

#### Derating Curve

##### PCF



For resistors operated at an ambient temperature of 70°C or above, a power rating shall be derated in accordance with the derating curve.

##### HPC



For resistors operated at an ambient temperature of 40°C or above, a power rating shall be derated in accordance with the derating curve.

### Performance Characteristics

| Parameter                                | Requirement Δ R ±(% + 0.05Ω)   |                | Test Method  |   |
|--|--|----------------|--|---|
|  | Limit  | Typical        |  |   |
| Resistance                               | Within regulated to tolerance  | —              | Resistance<br>3.3Ω~8.2Ω<br>10Ω~82Ω<br>100Ω~390kΩ   | Measurement voltage<br>0.3V<br>1.0V<br>3.0V   |
| T.C.R                                    | HPC: -900±300×10 <sup>-6</sup> /K;<br>R<100Ω<br>-1200±300×10 <sup>-6</sup> /K;R≥100Ω<br>PCF: -900±300;R<100Ω<br>-1300±300;R>100Ω | —              | HPC: +25°C/-40°C and +25°C/+125°C<br>PCF: +25°C/-40°C, +25°C/+75°C and +25°C/+125°C  |   |
| Voltage Coefficient (Apply for over 1kΩ) | 0~0.2%/V (HPC1/2, PCF)<br>0~0.1%/V (HPC1)<br>0~0.05%/V (HPC2,3,4,5)  | —              | Rated voltage and rated voltage x 10%  |   |
| Overload                                 | 2%   | 0.4%           | Rated voltage x 2.5 or maximum overload voltage for 5s, whichever less   |   |
| Resistance to pulse                      | 5%   | —              | The resistor mounted to the test circuit as below.<br>1 sec. ON and 1 sec. OFF. 10,000 cycles.<br>The voltage is applied with maximum pulse voltage. |  |
| Resistance to soldering heat             | 2%   | 0.8%           | 350°C±10°C, 3.5s±0.5s  |   |
| Rapid change of temperature              | 2%   | 0.4%           | -40°C(30min.)/+85°C(30min.), 5 cycles  |   |
| Moisture resistance                      | 5%   | 0.6%           | 40°C±2°C, 90%~95%RH, 1000 hours, 1.5h ON/0, 5h OFF cycles  |   |
| Load life                                | 5%   | 0.4%           | HPC: 40°C±2°C, 1000h, 1.5h ON/0, 5h OFF cycles<br>PCF: 70°C±3°C, 1000h, 1.5h ON/0, 5h OFF cycles   |   |
| Resistance to Solvent                    | No abnormality in appearance. Marking shall be easily legible.   | —              | Dipping in IPA or Xylene for 3 minutes and leaving for 10 minutes after removing drops, then brushing 10 times.                                      |   |
| High Temperature Exposure                | HPC only: 5%   | HPC only: 1.7% | HPC only: +200°C, 1000 hours   |   |