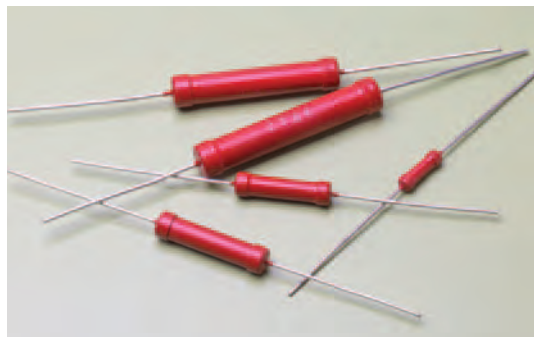
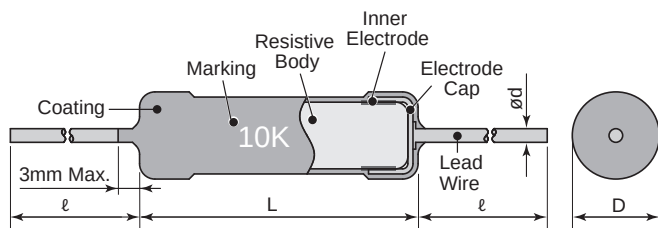




## features

- KOA original bulk ceramic resistors
- Excellent in anti-pulse resistance, inrush current and active discharge characteristics
- Higher reliability against disconnection compared to wirewound resistors and film resistors
- Products meet EU RoHS requirements
- Non-inductive resistors
- AEC-Q200 Tested

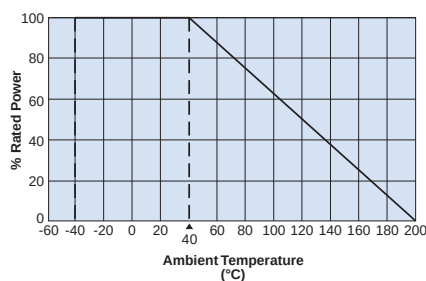
## dimensions and construction



| Type   | Dimensions inches (mm)  |                        |               |                         |
|--------|-------------------------|------------------------|---------------|-------------------------|
|        | L                       | 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   | .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) | .039<br>(1.0) |                         |
| HPC5   | 1.73±.039<br>(44.0±2.0) | .295±.039<br>(7.5±1.0) |               |                         |

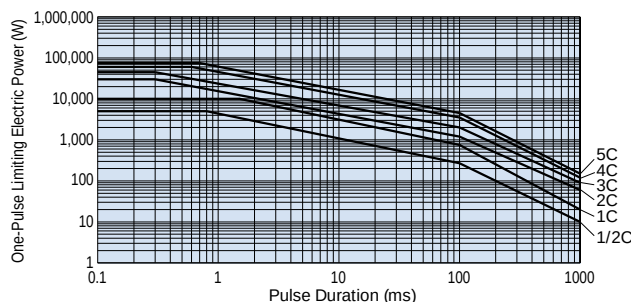
\* Lead length changes depending on taping type

## Derating Curve



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

## One-Pulse Limiting Electric Power



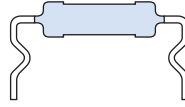
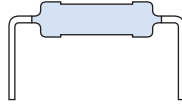
Please ask us about the resistance characteristic of continuous applied pulse. The pulse endurance values are not assured values, so be sure to check the products on actual equipment when you use them.

## ordering information

| HPC  | 1                                                      | C                    | T631            | R                              | 103                                  | K                  |
|------|--------------------------------------------------------|----------------------|-----------------|--------------------------------|--------------------------------------|--------------------|
| Type | Power Rating                                           | Termination Material | Taping          | Packaging                      | Nominal Resistance                   | Tolerance          |
| HPC  | 1/2: 0.5W<br>1: 1W<br>2: 2W<br>3: 3W<br>4: 4W<br>5: 5W | C: SnCu              | See Table Below | A: Ammo<br>R: Reel<br>Nil: Box | 2 significant figures + 1 multiplier | K: ±10%<br>M: ±20% |

## taping

| Type   | Axial Taping |      |
|--------|--------------|------|
|        | T52          | T631 |
| HPC1/2 | ○            | —    |
| HPC1   | —            | ○    |



Contact us for lead forming details.

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

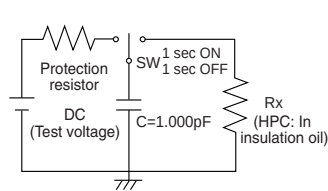
## applications and ratings

| Part Designation | Power Rating @ 40°C | Resistance Range (Ω) |             | T.C.R. (x10 <sup>-6</sup> /K) | Maximum Working Voltage | Maximum Overload Voltage | Rated Ambient Temp. | Operating Temp. Range |
|------------------|---------------------|----------------------|-------------|-------------------------------|-------------------------|--------------------------|---------------------|-----------------------|
|                  |                     | K: ±10% E-12         | M: ±20% E-6 |                               |                         |                          |                     |                       |
| HPC1/2           | 0.5W                | 10 - 390K            | 3.3 - 330K  | -500 ~ -1300: 3.3Ω≤R<10Ω      | 200V                    | 400V                     | +40°C               | -40°C to +200°C       |
| HPC1             | 1.0W                |                      |             | -600 ~ -1500: 10Ω≤R<100Ω      | 300V                    | 600V                     |                     |                       |
| HPC2             | 2.0W                |                      |             | -700 ~ -1800: 100Ω≤R<1kΩ      | 400V                    | 800V                     |                     |                       |
| HPC3             | 3.0W                |                      |             | -900 ~ -1900: 1kΩ≤R<100kΩ     | 450V                    | 900V                     |                     |                       |
| HPC4             | 4.0W                |                      |             | -900 ~ -2000: 100kΩ≤R<200kΩ   | 500V                    | 1000V                    |                     |                       |
| HPC5             | 5.0W                |                      |             | -900 ~ -2200: 200kΩ≤R<390kΩ   | 550V                    | 1100V                    |                     |                       |

Rated voltage =  $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$  or Max. working voltage, whichever is lower

## environmental applications

### Performance Characteristics

| Parameter                                   | Requirement Δ R ±(% + 0.05%)                                                                                                                              |                                              | Test Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------|------|--------------|----------------------------------------------|--------|-----------------|---|------------------|----|------------------|---|------|------------------|---|-------------------|----|------------------|---|------|------------------|---|-------------------|----|------|-------------------|---|--------------|------|---|
|                                             | Limit                                                                                                                                                     | Typical                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| Resistance                                  | Within regulated to tolerance                                                                                                                             | —                                            | Resistance<br>3.3Ω=<R<10Ω<br>10Ω=<R<100Ω<br>100Ω=<R=<390kΩ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Measurement voltage<br>0.3V<br>1.0V<br>3.0V | 25°C |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| T.C.R                                       | -500~-1300:3.3Ω≤R<10Ω<br>-600~-1500:10Ω≤R<100Ω<br>-700~-1800:100Ω≤R<1kΩ<br>-900~-1900:1kΩ≤R<100kΩ<br>-900~-2000:100kΩ≤R<200kΩ<br>-900~-2200:200kΩ≤R≤390kΩ | —                                            | +25°C/-40°C and +25°C/+125°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| Voltage Coefficient<br>(Apply for over 1kΩ) | 0—0.2%/V (HPC1/2)<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 × 2.5 or Max. overload vol., whichever is lower, for 5s.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| Resistance to pulse                         | Refer to the table on the right                                                                                                                           | —                                            | <div>The resistor mounted to the test circuit as below is applied with high voltage impulse 10,000 cycles.</div> <table><thead><tr><th>Type</th><th>Test Voltage</th><th>Performance Requirements ~<br/>R ±(% + 0.05%)</th></tr></thead><tbody><tr><td rowspan="3">HPC1/2</td><td>8kV:3.3Ω≤R&lt;30kΩ</td><td>5</td></tr><tr><td>8kV:30kΩ≤R&lt;390kΩ</td><td>10</td></tr><tr><td>5kV:30kΩ≤R&lt;390kΩ</td><td>5</td></tr><tr><td rowspan="3">HPC1</td><td>15kV:3.3Ω≤R&lt;30kΩ</td><td>5</td></tr><tr><td>15kV:30kΩ≤R&lt;390kΩ</td><td>10</td></tr><tr><td>7kV:30kΩ≤R&lt;390kΩ</td><td>5</td></tr><tr><td rowspan="2">HPC2</td><td>25kV:3.3Ω≤R&lt;30kΩ</td><td>5</td></tr><tr><td>25kV:30kΩ≤R&lt;390kΩ</td><td>10</td></tr><tr><td>HPC3</td><td>15kV:30kΩ≤R&lt;390kΩ</td><td>5</td></tr><tr><td>HPC4<br/>HPC5</td><td>25kV</td><td>5</td></tr></tbody></table> <div></div> |                                             |      | Type | Test Voltage | Performance Requirements ~<br>R ±(% + 0.05%) | HPC1/2 | 8kV:3.3Ω≤R<30kΩ | 5 | 8kV:30kΩ≤R<390kΩ | 10 | 5kV:30kΩ≤R<390kΩ | 5 | HPC1 | 15kV:3.3Ω≤R<30kΩ | 5 | 15kV:30kΩ≤R<390kΩ | 10 | 7kV:30kΩ≤R<390kΩ | 5 | HPC2 | 25kV:3.3Ω≤R<30kΩ | 5 | 25kV:30kΩ≤R<390kΩ | 10 | HPC3 | 15kV:30kΩ≤R<390kΩ | 5 | HPC4<br>HPC5 | 25kV | 5 |
| Type                                        | Test Voltage                                                                                                                                              | Performance Requirements ~<br>R ±(% + 0.05%) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| HPC1/2                                      | 8kV:3.3Ω≤R<30kΩ                                                                                                                                           | 5                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
|                                             | 8kV:30kΩ≤R<390kΩ                                                                                                                                          | 10                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
|                                             | 5kV:30kΩ≤R<390kΩ                                                                                                                                          | 5                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| HPC1                                        | 15kV:3.3Ω≤R<30kΩ                                                                                                                                          | 5                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
|                                             | 15kV:30kΩ≤R<390kΩ                                                                                                                                         | 10                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
|                                             | 7kV:30kΩ≤R<390kΩ                                                                                                                                          | 5                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| HPC2                                        | 25kV:3.3Ω≤R<30kΩ                                                                                                                                          | 5                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
|                                             | 25kV:30kΩ≤R<390kΩ                                                                                                                                         | 10                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| HPC3                                        | 15kV:30kΩ≤R<390kΩ                                                                                                                                         | 5                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| HPC4<br>HPC5                                | 25kV                                                                                                                                                      | 5                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |
| 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%                                         | 40°C±2°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                   | 5%                                                                                                                                                        | 1.7%                                         | +200°C, 1000 hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                             |      |      |              |                                              |        |                 |   |                  |    |                  |   |      |                  |   |                   |    |                  |   |      |                  |   |                   |    |      |                   |   |              |      |   |

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[HPC5L102K](#) [HPC5L471K](#) [HPC1C333K](#) [HPC1CT631R220K](#) [HPC1C101K](#) [HPC1C220K](#) [HPC1C562K](#) [HPC1C821K](#)  
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