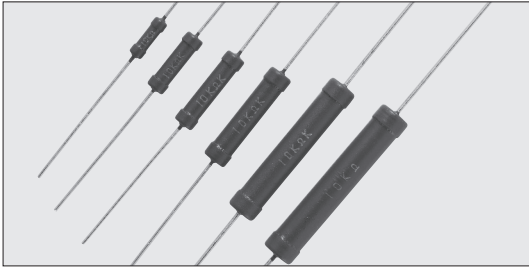
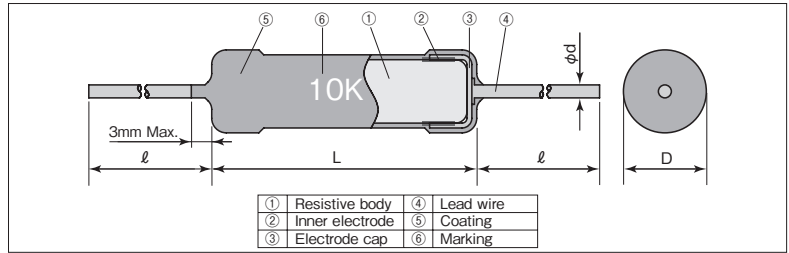


HPC Ceramic Resistors for Anti Pulse • Surge



Coating color : Reddish brown
Marking: Alphanumeric

Construction



Features

- KOA original bulk ceramic resistors.
- Excellent in anti-pulse characteristics.
- Higher reliability against disconnection compared to wirewound resistors and film resistors.
- Products meet EU-RoHS requirements.
- Non-Inductive resistors.
- AEC-Q200 Tested.

Applications

- High voltage circuits for X-ray generators and electron microscopes.
- Power supply circuits for machine tools, etc.
- Active discharge resistors for EV.

Reference Standards

IEC 60115-1
JIS C 5201-1

Dimensions

Type	Dimensions (mm)				Weight (g) (1000pcs)
	L±2	D±1	d (Nominal)	l ±3 ^{*1}	
HPC1/2	11	3.5	0.8	38	690
HPC1	16	4.5			1260
HPC2	21	5.0			1780
HPC3	26	6.0			2830
HPC4	38	7.0	1.0		5880
HPC5	44	7.5			7930

*1 Lead length changes depending on taping type.

Type Designation

Example

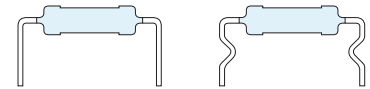
HPC	1	C	T631	R	103	K
Product Code	Power Rating	Terminal Surface Material	Taping	Packaging	Nominal Resistance	Resistance Tolerance
	1/2: 0.5W 1: 1.0W 2: 2.0W 3: 3.0W 4: 4.0W 5: 5.0W	C: SnCu	See table Below	A: AMMO R: Reel Nil: BOX	3 digits	K: ±10% M: ±20%

Contact us when you have control request for environmental hazardous material other than the substance specified by EU-RoHS.

For further information on taping, please refer to APPENDIX C on the back pages.

Taping

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



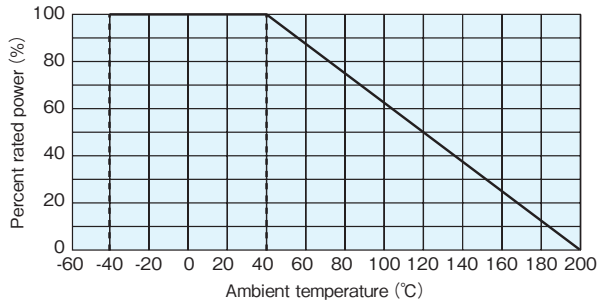
Contact us for lead forming details.

Ratings

Type	Power Rating	Resistance Range (Ω)		T.C.R. (×10 ⁻⁶ /K)	Max. Working Voltage	Max. Overload Voltage	Rated Ambient Temp.	Operating Temp. Range
		K : ±10% E12	M : ±20% E6					
HPC1/2	0.5W	10~390k	3.3~330k	-500~-1300: 3.3Ω ≤ R < 10Ω	200V	400V	+40°C	-40°C ~ +200°C
HPC1	1W			-600~-1500: 10Ω ≤ R < 100Ω	300V	600V		
HPC2	2W			-700~-1800: 100Ω ≤ R < 1kΩ	400V	800V		
HPC3	3W			-900~-1900: 1kΩ ≤ R < 100kΩ	450V	900V		
HPC4	4W			-900~-2000: 100kΩ ≤ R < 200kΩ	500V	1000V		
HPC5	5W			-900~-2200: 200kΩ ≤ R ≤ 390kΩ	550V	1100V		

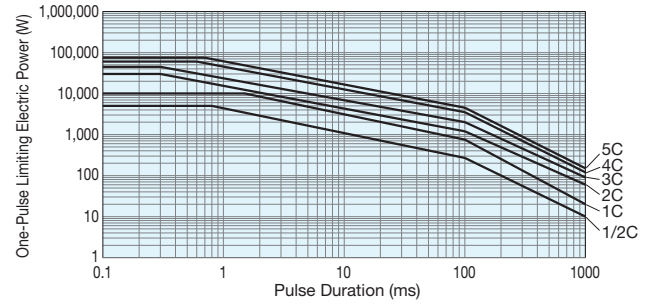
Rated voltage = √(Power Rating × Resistance value) or Max. working voltage, whichever is lower.

Derating Curve



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

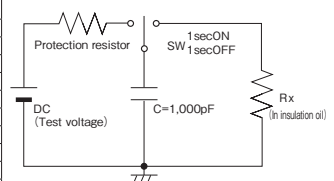
One-Pulse Limiting Electric Power



※The maximum applicable voltage is equal to the max. overload voltage. 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.

Performance

Test Items	Performance Requirements $\Delta R \pm (\% + 0.05\Omega)$		Test Methods																								
	Limit	Typical																									
Resistance	Within specified tolerance	—	25°C																								
			Resistance	Measuring voltage																							
			$3.3\Omega \leq R < 10\Omega$	0.3V																							
			$10\Omega \leq R < 100\Omega$	1.0V																							
T.C.R.	-500~ -1300 : $3.3\Omega \leq R < 10\Omega$ -600~ -1500 : $10\Omega \leq R < 100\Omega$ -700~ -1800 : $100\Omega \leq R < 1k\Omega$ -900~ -1900 : $1k\Omega \leq R < 100k\Omega$ -900~ -2000 : $100k\Omega \leq R < 200k\Omega$ -900~ -2200 : $200k\Omega \leq R \leq 390k\Omega$	—	+25°C / -40°C and +25°C / +125°C																								
			Voltage coefficient (Apply for 1kΩ or over)	—	0 ~ -0.2% / V (HPC1/2)																						
					0 ~ -0.1% / V (HPC1)																						
					0 ~ -0.05% / V (HPC2,3,4,5)																						
					Rated voltage and rated voltage × 10%																						
Overload (Short time)	2	0.4	Rated voltage × 2.5 or Max. overload vol., whichever is lower, for 5s.																								
Resistance to pulse	Refer to the right table	—	The resistor mounted on to the test circuit as below is applied with high voltage impulse 10,000 cycles.																								
			<table border="1"> <thead> <tr> <th>Type</th> <th>Test voltage</th> <th>Performance Requirements $\Delta R \pm (\% + 0.05\Omega)$</th> </tr> </thead> <tbody> <tr><td rowspan="3">HPC1/2</td><td>8kV : $3.3\Omega \leq R < 30k\Omega$</td><td>5</td></tr> <tr><td>8kV : $30k\Omega \leq R \leq 390k\Omega$</td><td>10</td></tr> <tr><td>5kV : $30k\Omega \leq R \leq 390k\Omega$</td><td>5</td></tr> <tr><td rowspan="3">HPC1</td><td>15kV : $3.3\Omega \leq R < 30k\Omega$</td><td>5</td></tr> <tr><td>15kV : $30k\Omega \leq R \leq 390k\Omega$</td><td>10</td></tr> <tr><td>7kV : $30k\Omega \leq R \leq 390k\Omega$</td><td>5</td></tr> <tr><td rowspan="2">HPC2</td><td>25kV : $3.3\Omega \leq R < 30k\Omega$</td><td>5</td></tr> <tr><td>25kV : $30k\Omega \leq R \leq 390k\Omega$</td><td>10</td></tr> <tr><td rowspan="2">HPC3, HPC4, HPC5</td><td>15kV : $30k\Omega \leq R \leq 390k\Omega$</td><td>5</td></tr> <tr><td>25kV</td><td>5</td></tr> </tbody> </table>	Type	Test voltage	Performance Requirements $\Delta R \pm (\% + 0.05\Omega)$	HPC1/2	8kV : $3.3\Omega \leq R < 30k\Omega$	5	8kV : $30k\Omega \leq R \leq 390k\Omega$	10	5kV : $30k\Omega \leq R \leq 390k\Omega$	5	HPC1	15kV : $3.3\Omega \leq R < 30k\Omega$	5	15kV : $30k\Omega \leq R \leq 390k\Omega$	10	7kV : $30k\Omega \leq R \leq 390k\Omega$	5	HPC2	25kV : $3.3\Omega \leq R < 30k\Omega$	5	25kV : $30k\Omega \leq R \leq 390k\Omega$	10	HPC3, HPC4, HPC5	15kV : $30k\Omega \leq R \leq 390k\Omega$
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HPC2	25kV : $3.3\Omega \leq R < 30k\Omega$	5																									
	25kV : $30k\Omega \leq R \leq 390k\Omega$	10																									
HPC3, HPC4, HPC5	15kV : $30k\Omega \leq R \leq 390k\Omega$	5																									
	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, 1000h 1.5h ON / 0.5h OFF cycle																								
Load life	5	0.4	40°C ± 2°C, 1000h 1.5h ON / 0.5h OFF cycle																								
High temperature exposure	5	1.7	+200°C, 1000h																								
Resistance to solvent	No abnormality in appearance. Marking shall be easily legible.	—	Dipping in IPA or Xylene for 3 min. and leaving for 10 min. after removing drops, then brushing 10 times.																								



High Voltage Type Resistors

Precautions for Use

- Under the environment where surge like thunders etc. is apt to happen, the resistors used for open circuit, resistors connected directly to input, output or ground, and resistors used for the circuit pulse applied to, may be destructed by surge or pulse. Therefore, the resistors need to be selected after sufficient check on the supposition of the worst condition against possible surge and pulse.
- The coating of this product is used to make the marking easy to see, and there is no electric characteristic (dielectric withstanding voltage etc.). The coating of this product is weak to an external impact. So, the coating of the cap might peel off while transporting it. Please judge the product which reads the marking easily even if there are peeling off, a bruise, and a pinhole in the coating to be a non-defective unit.
- Be careful to handle these resistors because coating are weak to outer shock. please wash them to a minimum. No external force is given to the coating films until they are well dried because the coating films become weaker right after washing. Please pay attention not to apply any external force onto the coating film of resistors for 20 minutes after drying. Especially no PC boards shall be piled up.
- When overload is impressed continuously by the trouble of the circuit part because this product is hard to be snapped, a resistor body continues being overheated and emits smoke from a resistor and neighboring flammable materials and may catch fire. In a steady use state and heterology, please design the circuit so that the surface temperature of this product is not as above 200 degrees Celsius.