

1. PRODUCT

High voltage pulse load Ceramic body Resistors

FEATURES

- Advanced low temperature co-fired ceramic (LTCC) technology
- Suitable for noise suppression of engine ignition system
- Reliable in pulse / transient / power surge applications
- Excellent overall stability: Class 5.0
- Low noise and voltage coefficient
- Flame proof
- Compliant to RoHS directive 2011/65/EU
- Compliant to REACH (EC No. 1907/2006)) (last updated: 27/06/2018)
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APPLICATIONS

- High voltage utilities
- Power pulse and surge circumstances
- Security inspection devices
- Medical equipment
- Electronic microscopes

Standard applied: IEC 60115-1; JIS C 5201-

2. PART NUMBER: Part number of the resistor is identified by the series name, power rating, tolerance, temperature coefficient, deforming type and resistance value.

Example:

HPC	16	K	0	M	102
Series	Power	Tolerance	TCR	Deforming	Resistance

(1) Series name: HPC SERIES 抗浪涌陶瓷电阻器

(2) Power Rating: 15=1/2W; 16=1W;

(3) Tolerance: J=±5%; K=±10%; M=±20%;

(4) T.C.R.: 0 =(-900~1800ppm/°C)

(5) Packaging Type: B = BULK/BOX

(6) Resistance Value: 500=50Ω; 101=100 Ω; 102=1kΩ; 123=12kΩ; 104=100k

3. MARKING:

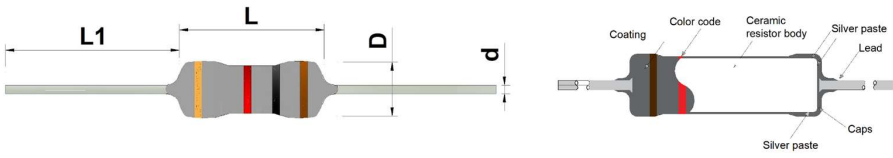
Four color code rings designate the resistance value and tolerance in accordance with IEC 60062.

COLOR	1st	2nd	Multiple	tolerance
black	0	0	1	
brown	1	1	10	
red	2	2	10 ²	G(±2.0%)
orange	3	3	10 ³	
yellow	4	4	10 ⁴	
green	5	5	10 ⁵	
blue	6	6	10 ⁶	
purple	7	7		
gray	8	8		
white	9	9		
golden			10 ⁻¹	J(±5.0%)
silver			10 ⁻²	K(±10%)

Digital marking is available upon request that can include power rating, resistance, and tolerance, etc.

Customer's marking is available upon request.

4. ELECTRICAL CHARACTERISTICS

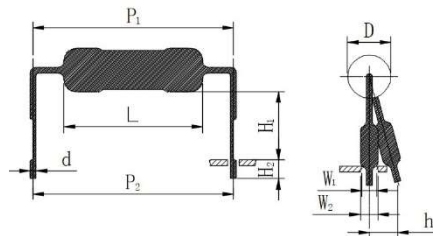
THUNDER type		HPC15	HPC16	HPC17		盛雷城型号
Cross to KOA's		PCF1/2	PCF1	PCF2		对应KOA型号
Rated dissipation	P_{70}	1/2W	1W	2W	P_{70}	70°C 以下额定功率
Max working voltage	U_{max}	200V	300V	400V	U_{max}	最大工作电压
Max Short time overload voltage	$2U_{max}$	400V	600V	800V	$2U_{max}$	最大短时间过负荷电压
Resistance range		5Ω to 100kΩ	5Ω to 200kΩ	5Ω to 330kΩ		标准阻值范围
Tolerance		J=±5%; K=±10%; M=±20%;				电阻精度范围
Temperature coefficient		-600~-2100ppm/°C	-600~-2100ppm/°C	-600~-2100ppm/°C		温度系数范围
Insulation voltage		>500V	>500V	>700V		绝缘耐压
Operating Temperature range		-55°C to 200°C				工作环境温度范围
Dimension	±1(mm)	L=11, D=4	L=15, D=5.5	L=19, D=7	±1(mm)	外形尺寸
	±0.1(mm)	d=0.8	d=0.8	d=0.8	±0.1(mm)	
Outlines						

* Unless otherwise specified, all values are tested at the following condition:
 Temperature: 21°C to 25°C; Relative humidity: 45% to 70%;

* Rated Continuous Working Voltage (RCWV)= $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$

5. Deforming

Deforming size will be the same as customer request.



6. ENVIRONMENTAL CHARACTERISTICS

(1) Insulation Resistance

IEC 60115-1, 4.6: in V-block for 60 seconds, the test resistance should be high than 10,000 M Ohm.

(2) Dielectric Withstanding Voltage

IEC 60115-1 4.7: Place resistors in V-block for 60 Seconds, no breakdown or flashover.

(3) Temperature Coefficient Test

IEC 60115-1, 4.8: Test of resistors at room temperature and 60°C or 100°C on request above room temperature. Then measure the resistance. The Temperature Coefficient is calculated by the following equation and its value should be within the range requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature

R₀ = Resistance value at the room temperature

t = the 2nd testing temperature

t₀ = Room temperature

(4) Short Time Overload Test

IEC60115-1 4.13: At 2.5 times rated voltage or 2 times the maximum working voltage whichever is lower for 5 seconds, the resistor should be free from defects. The change of the resistance value should be within ±(1%+0.05 Ω) as compared with the value before the test.

(5) Resistance to soldering heat:

IEC 60115-1, 4.18: 260±3°C for 10±1 Seconds, immersed to a point 3±0.5mm from the body. The change of the resistance value should be within ±(1%+0.05 Ω) as compared with the value before the test.

(6) Climatic sequence

IEC 60115-1, 4.19: -55°C to Room Temp. to +155°C to Room Temp. (5 cycles). The change of the resistance value shall be within±(5.0%+0.05 Ω) as compared with the value before the test.

(7) Damp Heat Steady State

IEC 60115-1, 4.24: $40\pm 2^{\circ}\text{C}$, 90-95% RH for 56 days, loaded with 0.1 times RCWV or the maximum working voltage whichever is lower. The change of the resistance value should be within $\pm(5\%+0.05\ \Omega)$ for normal tolerance as compared with the value before the test.

(8) Load Life Test

IEC 60115-1, 4.25: $70\pm 2^{\circ}\text{C}$ at RCWV or the maximum working voltage whichever is lower for 1,000+48/-0 Hr. (1.5Hr. on, 0.5Hr. off). The resistors shall be arranged not much effected mutually by the temperature of others and the excessive ventilation shall not be performed. The change of the resistance value should be within $\pm(5+0.05\ \Omega)$ as compared with the value before the test.

(9) Accidental Overload Test

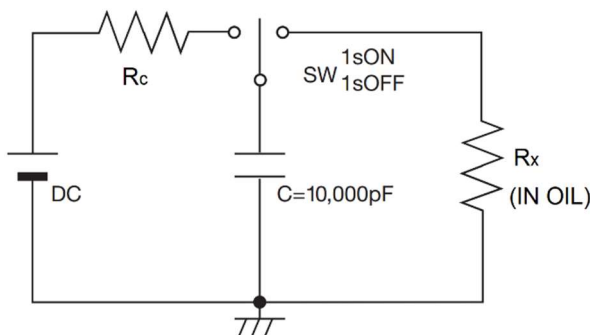
IEC 60115-1, 4.26: 4 times RCWV for 1 Minute. No evidence of flaming or arcing

(10) Resistance to Solvent

IEC 60115-1, 4.30: IPA for 5 ± 0.5 Min. with ultrasonic. No deterioration of coating and color code occurred.

(11) High voltage high pulse overload

Apply 10, 000 circle of pulses to the resistor, the pulses parameter is shown below. The change of the resistance shall be within $\pm(10.0\%+0.05\ \Omega)$ as compared with the value before the load.



Type	Resistance range	Voltage applied	Requirement
PCF1/2	5 Ω ~10k Ω	10kV	$\pm 5\%+0.05\ \Omega$
	10k Ω ~33k Ω	10kV	$\pm 10+0.05\ \Omega$
	33k Ω ~100k Ω	10kV	$\pm 25+0.05\ \Omega$
	10k Ω ~100k Ω	4kV	$\pm 5\%+0.05\ \Omega$
PCF1	5 Ω ~10k Ω	14kV	$\pm 5\%+0.05\ \Omega$
	10k Ω ~330k Ω	14kV	$\pm 10+0.05\ \Omega$
	10k Ω ~330k Ω	7kV	$\pm 5\%+0.05\ \Omega$
PCF2	5 Ω ~10k Ω	20kV	$\pm 5\%+0.05\ \Omega$
	10k Ω ~330k Ω	20kV	$\pm 10+0.05\ \Omega$
	10k Ω ~330k Ω	11kV	$\pm 5\%+0.05\ \Omega$

Disclaimer

All products, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.

Thunder Precision Resistors makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product to the maximum extent permitted by applicable law.