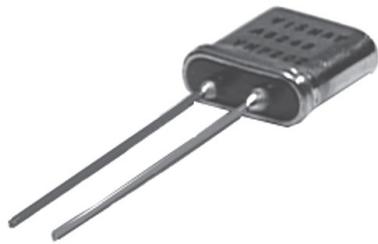


## Hermetically Sealed Miniature Ultra High Precision Z-Foil Technology Resistors

with TCR of 0.05 ppm/°C, Tolerance of ±0.001% and Load Life Stability of ±0.005%, Unaffected by Humidity

### FEATURES

- Temperature coefficient of resistance (TCR): ±0.05 ppm/°C (0°C to 60°C)
- Power coefficient “ΔR due to self heating”: 5 ppm at rated power
- Tolerance: to ±0.001% (10 ppm)
- Load life stability: ±0.002% maximum ΔR (60°C for 2000 h at 0.1 W per chip)
- Resistance range: 10 Ω to 150 kΩ
- Power rating: 0.3 W at +25°C
- Shelf life stability: 2 ppm for at least 6 years



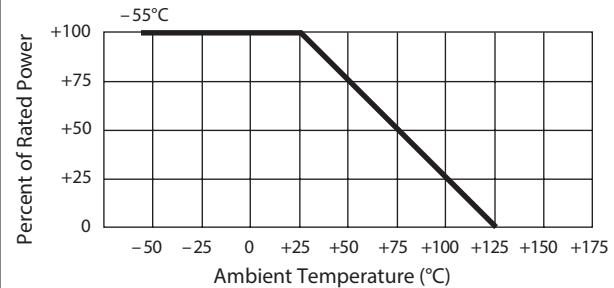
RoHS\*  
COMPLIANT

TCR Vs. Resistance Value	
RESISTANCE VALUE (Ω)	TYPICAL TCR AND MAX. SPREAD (-55°C to +125°C, +25°C ref.) (ppm/°C) <sup>(1)</sup>
100 to <150K	±0.2±2
50 to <100	±0.2±3
10 to <50	±0.2±4

#### Note

<sup>(1)</sup> For lower TCR and for selected TCR tracking, please contact us

### Power Derating Curve



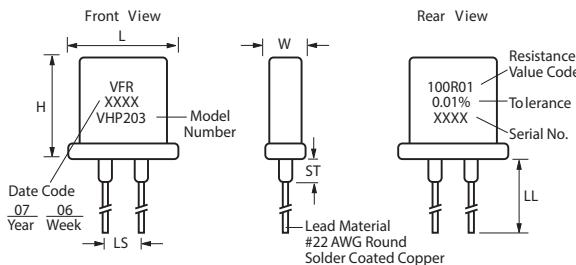
### Model Selection

MODEL NUMBER	RESISTANCE RANGE (Ω)	MAXIMUM WORKING VOLTAGE <sup>(1)</sup>	POWER RATING at +25°C	AVERAGE WEIGHT (g)	CONSTRUCTION BRIEF	DIMENSIONS	
						INCHES	MILLIMETERS
VHP203	10 to 66K 66K to 150K	300	0.2 W	1.4	Oil-filled, tinned copper leads, nickel shell, kovar and glass header	W: 0.162±0.020	4.11±0.51
VHP203J			0.3 W			L: 0.415±0.020	10.54±0.51
						H: 0.375±0.020	9.52±0.51
						LL: 1.000±0.125	25.4±3.18
						LS: 0.150±0.010 <sup>(2)</sup>	3.81±0.25
						ST: 0.095 max.	2.41 max.

#### Note

See next page for numbered footnotes

### Standard Imprinting and Dimensions



**Standard Resistance Tolerance**

TIGHTEST (Ω)	LOOSEST (%)
1K to 150K	±0.001
500R to 1K	±0.0025
50R to 500R	±0.005
30R to 50R	±0.01
20R to 30R	±0.02
10R to 20R	±0.05

**"H" Series Specifications**

<b>Stability<sup>(6)</sup></b> Load life at 2000 h Shelf life	±0.002% maximum ΔR at 0.1 W per chip and at +60°C ±2 ppm (0.0002%) after at least 6 years
<b>Current Noise</b>	<0.010 µV <sub>RMS</sub> /V of applied voltage (-40 dB)
<b>High Frequency Operation</b> Rise time Inductance (L) <sup>(3)</sup> Capacitance (C)	1.0 ns without ringing 0.1 µH maximum; 0.08 µH typical 1.0 pF maximum; 0.5 pF typical
<b>Voltage Coefficient</b>	<0.1 ppm/V <sup>(4)</sup>
<b>Thermal EMF<sup>(5)</sup></b>	0.1 µV/°C maximum; 0.05 µV/°C typical; 1 µV/W maximum
<b>Hermeticity</b>	10 <sup>-7</sup> atmospheric cc/s maximum

**Notes**

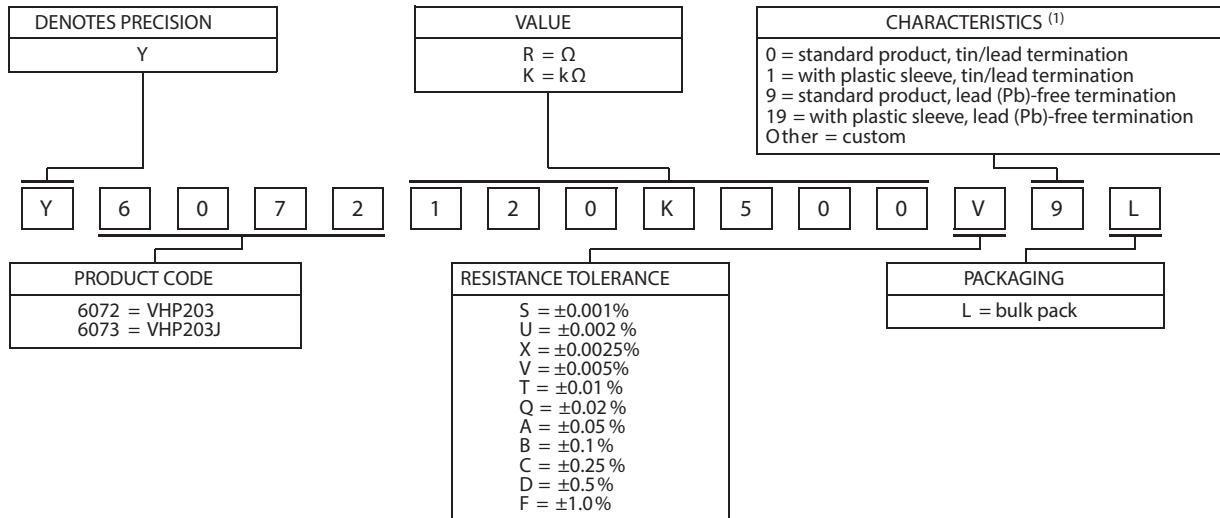
- <sup>(1)</sup> Not to exceed power rating of resistor
- <sup>(2)</sup> 0.200 in (5.08 mm) lead spacing available – specify VHP203J
- <sup>(3)</sup> Inductance (L) due mainly to the leads
- <sup>(4)</sup> The resolution limit of existing test equipment (within measurement capability of the equipment, or "essentially zero")
- <sup>(5)</sup> µV/°C relates to EMF due to lead temperature difference and µV/W due to power applied to the resistor
- <sup>(6)</sup> Load life ΔR max. can be reduced through in-house oriented processes

**Environmental Performance Comparison**

	MIL-PRF-55182 CHAR J	VHP203 MAXIMUM ΔR	VHP203 TYPICAL ΔR
<b>Test Group I</b> Thermal shock, 5 x (-55°C to +125°C) Short time overload, 6.25 x rated power, 5 s	±0.2% ±0.2%	±0.01% (100 ppm) ±0.01% (100 ppm)	±0.002% (20 ppm) ±0.003% (30 ppm)
<b>Test Group II</b> Resistance temperature characteristics Characteristic Low temperature storage (24 h at -65°C) Low temperature operation (45 min, rated power at -65°C) Terminal strength	±25 ppm/°C ±0.15% ±0.15% ±0.2%	TCR Vs. Resistance Value table ±0.01% (100 ppm) ±0.01% (100 ppm) ±0.01% (100 ppm)	±0.05 ppm/°C ±0.002% (20 ppm) ±0.002% (20 ppm) ±0.002% (20 ppm)
<b>Test Group III</b> DWV Resistance to solder heat, 20 s at +260°C Moisture resistance	±0.15% ±0.1% ±0.4%	±0.01% (100 ppm) ±0.01% (100 ppm) ±0.005% (50 ppm)	±0.002% (20 ppm) ±0.005% (50 ppm) ±0.001% (10 ppm)
<b>Test Group IV</b> Shock Vibration	±0.2% ±0.2%	±0.01% (100 ppm) ±0.01% (100 ppm)	±0.002% (20 ppm) ±0.002% (20 ppm)
<b>Test Group V</b> Life test at 0.3 W at +25°C, 2000 h	±0.5%	±0.008% (80 ppm)	±0.002% (20 ppm)
<b>Test Group Va</b> Life test at 0.1 W at +60°C	±0.5%	±0.008% (80 ppm)	±0.002% (20 ppm)
<b>Test Group VI</b> High temperature exposure (2000 h at +125°C)	±2.0%	±0.02% (200 ppm)	±0.005% (50 ppm)
<b>Test Group VII</b> Voltage coefficient	5 ppm/V	<0.1 ppm/V	<0.1 ppm/V

### Global Part Number Information

NEW GLO BAL PART NUMBER: Y6072120 K500V9L (pre ferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y6072 120K500 V 9 L:

TYPE: VHP203

VALUE: 120.5 k $\Omega$

ABSOLUTE TOLERANCE:  $\pm 0.005\%$

TERMINATION: lead (Pb)-free

PACKAGING: bulk pack

HISTORICAL PART NUMBER: VHP203T 120K50 V B (will continue to be used)

VHP203	T		120K50	V	B
MODEL	TERMINATION	PLASTIC SLEEVE	OHMIC VALUE	TOLERANCE	PACKAGING
VHP203 VHP203J	T = lead (Pb)-free None = tin/lead	P = plastic sleeve None = standard	120K50 = 120.5 k $\Omega$	S = $\pm 0.001\%$ U = $\pm 0.002\%$ X = $\pm 0.0025\%$ V = $\pm 0.005\%$ T = $\pm 0.01\%$ Q = $\pm 0.02\%$ A = $\pm 0.05\%$ B = $\pm 0.1\%$ C = $\pm 0.25\%$ D = $\pm 0.5\%$ F = $\pm 1.0\%$	B = bulk pack

#### Note

<sup>(1)</sup> For non-standard requests, please contact application engineering.