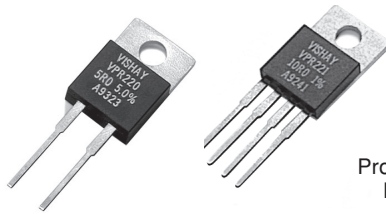


### Bulk Metal<sup>®</sup> Foil Technology Precision Foil Power Resistors in TO-220 Configuration



Product may not be to scale

Models VPR220 AND VPR221, made from Vishay Bulk Metal<sup>®</sup> Foil, offer low TCR, high stability, tight tolerance and fast response time in a small, molded resistor. Model VPR220 is a 2 lead device. Model VPR221 is a 4 lead Kelvin connected device. The 4 leaded version is highly recommended for precision applications requiring ohmic values of 100R or less.

#### FEATURES

- Power: 8 watts chassis mounted (per MIL-R-39009)
- Load Life Stability:  $\pm 0.05\%$  maximum  $\Delta R$  at rated power and temperature for 2,000 hours
- Temperature Coefficient of Resistance: to  $\pm 5\text{ppm}/^\circ\text{C}$
- Resistance Range: 0.5 $\Omega$  to 10K $\Omega$
- Tolerance: To  $\pm 0.01\%$
- Low Thermal EMF: 0.15 $\mu\text{V}/^\circ\text{C}$  maximum (lead effect)
- Non-Inductive Construction
- Heat sink is isolated

**TABLE 1 - SPECIFICATIONS**

<b>Load Life Stability at 2,000 hrs</b>	$\pm 0.05\%$ max $\Delta R$ under full rated power @ + 25 $^\circ\text{C}$
<b>Shelf Life Stability</b>	$\pm 0.0025\%$ $\Delta R/\text{yr}$
<b>Power Rating @ + 25<math>^\circ\text{C}</math></b>	8 watts or 3 amps <sup>2</sup> on heat sink <sup>3</sup> 1.5 watts or 3 amps <sup>2</sup> in free air <b>Further derating not necessary.</b>
<b>Current Noise</b>	< 0.010 $\mu\text{V}$ (rms)/volt of applied voltage (- 40dB)
<b>High Frequency Operation</b>	
Rise/Decay Time	0.2ns @ 1 $\Omega$
Inductance <sup>4</sup> (L)	0.1 $\mu\text{H}$ maximum: 0.03 $\mu\text{H}$ typical <sup>1</sup>
Capacitance (C)	1.0pF maximum: 0.5pF typical <sup>1</sup>
<b>Voltage Coefficient<sup>5</sup></b>	< 0.1ppm/V
<b>Operating Temperature Range</b>	- 55 $^\circ\text{C}$ to + 150 $^\circ\text{C}$
<b>Maximum Working Voltage</b>	300 V. Not to exceed power rating.
<b>Thermal EMF<sup>6</sup></b>	0.15 $\mu\text{V}/^\circ\text{C}$ maximum (lead effect)

#### NOTES:

1. Maximum is 1.0% A.Q.L. standard for all specifications except TCR. Typical is a designers reference which represents that 85% of the units supplied, over a long period of time, will be at least the figure shown or better.
2. Whichever is lower.
3. Heat sink chassis dimensions and requirements per MIL-R-39009/1B:
 

DIMENSION	Inches	mm
L	6.00	152.4
W	4.00	101.6
H	2.00	50.8
T	0.04	1.0
4. Inductance (L) due mainly to the leads.
5. The resolution limit of existing test equipment (within the measurement capability of the equipment, "essentially zero").
6.  $\mu\text{V}/^\circ\text{C}$  relates to EMF due to lead temperature difference.

**TABLE 2 - VPR220**

RESISTANCE RANGE ( $\Omega$ )	TIGHTEST RESISTANCE TOLERANCE	TCR*
50 to 10K	$\pm 0.01\%$	$\pm 5\text{ppm}/^\circ\text{C}$
25 to < 50	$\pm 0.02\%$	$\pm 7\text{ppm}/^\circ\text{C}$
10 to < 25	$\pm 0.05\%$	$\pm 10\text{ppm}/^\circ\text{C}$
5 to < 10	$\pm 0.1\%$	$\pm 13\text{ppm}/^\circ\text{C}$

Weight = 1 gm Maximum

\*Maximum specifications.

Lower values available but not recommended due to high TCR.

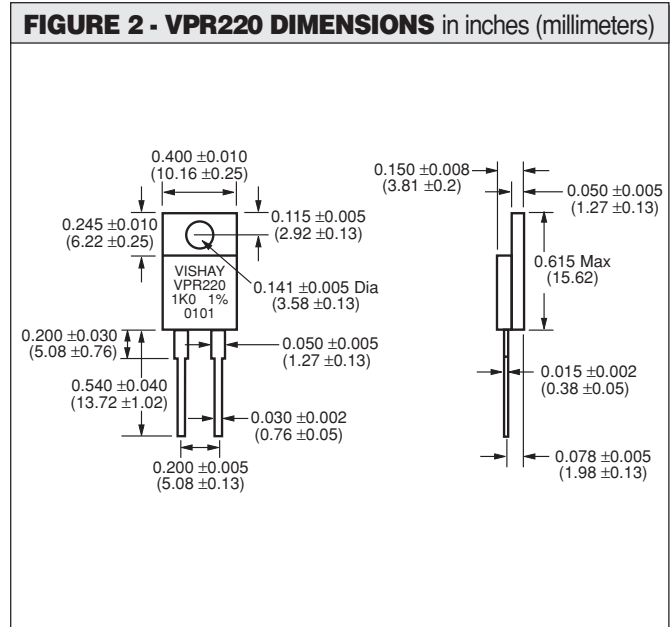
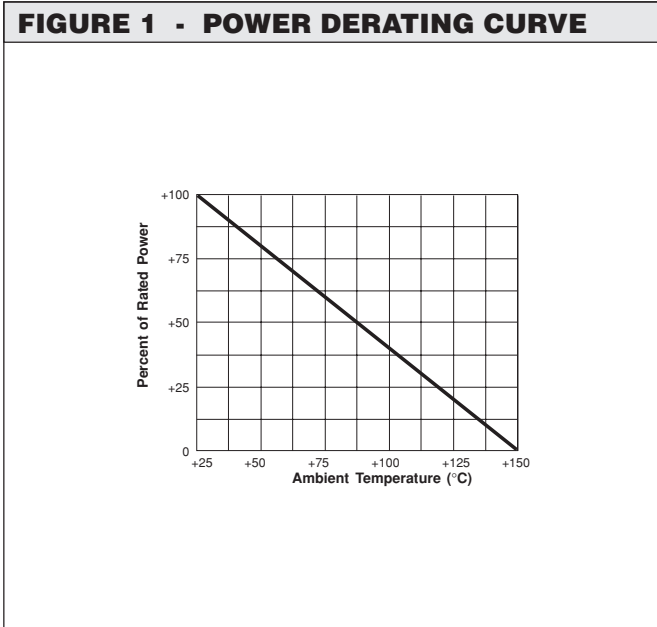
**TABLE 3 - VPR221**

RESISTANCE RANGE ( $\Omega$ )	TIGHTEST RESISTANCE TOLERANCE	TCR*
0.5 to < 1	$\pm 0.05\%$	$\pm 5\text{ppm}/^\circ\text{C}$
1 to < 10	$\pm 0.02\%$	$\pm 5\text{ppm}/^\circ\text{C}$
10 to 500	$\pm 0.01\%$	$\pm 5\text{ppm}/^\circ\text{C}$

Weight = 1.2 gms Maximum

\*Maximum specifications.

Contact Applications Engineering for other available values.



**TABLE 4 - ORDERING INFORMATION**

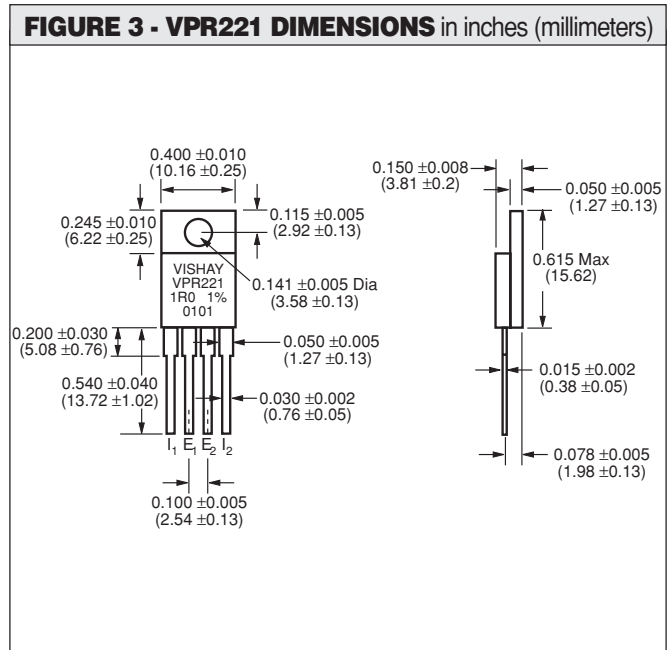
Specify Vishay VPR220 or VPR221 resistors as follows:

Example: **VPR221**                      **5R0000**                      **1.0%**

MODEL NO.      RESISTANCE VALUE      TOLERANCE

Resistance value, in ohms, is expressed by a series of 6 characters, 5 of which represent significant digits while the 6th is a dual purpose letter that designates both the multiplier and the location of the comma or decimal.

RESISTANCE RANGE	LETTER DESIGNATOR	MULTIPLIER FACTOR	EXAMPLE
0.5Ω to < 1KΩ	R	x1	100R01 = 100.01Ω
1KΩ to 10KΩ	K	x10 <sup>3</sup>	5K2310 = 5,231Ω



A surface mount version of this product is available see data sheets for VPR220S, VPR221S

THROUGH HOLE