

### Ultra High Precision Z-Foil Surface Mount Power Resistors in TO-220 Configuration with TCR of $\pm 0.05$ ppm/ $^{\circ}$ C, Tolerance to $\pm 0.01$ % and Power Rating to 8 W



#### Any value at any tolerance available within resistance range

Model VPR220SZ, made from Vishay Bulk Metal<sup>®</sup> Z-Foil, offers very low TCR, high stability, tight tolerance, low PCR and fast response time in a small surface mount molded resistor.

The Z-Foil technology provides a significant reduction of the resistive components sensitivity to ambient temperature variations and applied power changes. Designers now can guarantee a high degree of stability and accuracy in fixed resistor applications using solutions based on Vishay's revolutionary Z-Foil technology.

Our Application Engineering Department is available to advise and make recommendations. For non-standard technical requirements and special applications, please contact us.

**TABLE 1 - SPECIFICATIONS**

<b>Load Life Stability at 2000 h</b>	$\pm 0.05$ % max $\Delta R$ under full rated power at + 25 $^{\circ}$ C
<b>Power Rating at + 25 <math>^{\circ}</math>C</b>	8 W or 3 A <sup>1)</sup> on heat sink <sup>2)</sup> 1.5 W or 3 A <sup>1)</sup> in free air <b>Further derating not necessary.</b>
<b>Current Noise</b>	< 0.010 $\mu$ V (rms)/V of applied voltage (- 40 dB)
<b>High Frequency Operation</b> Rise Time Inductance <sup>3)</sup> (L) Capacitance (C)	1 ns 0.1 $\mu$ H maximum: 0.03 $\mu$ H typical 1.0 pF maximum: 0.5 pF typical
<b>Voltage Coefficient<sup>4)</sup></b>	< 0.1 ppm/V
<b>Operating Temperature Range</b>	- 55 $^{\circ}$ C to + 150 $^{\circ}$ C
<b>Maximum Working Voltage</b>	300 V. Not to exceed power rating.
<b>Thermal EMF<sup>5)</sup></b>	0.15 $\mu$ V/ $^{\circ}$ C maximum (lead effect)

#### FEATURES

- Temperature Coefficient of Resistance (TCR):  
 $\pm 0.05$  ppm/ $^{\circ}$ C typical (0  $^{\circ}$ C to + 60  $^{\circ}$ C)  
 $\pm 0.2$  ppm/ $^{\circ}$ C typical (- 55  $^{\circ}$ C to + 125  $^{\circ}$ C, - 25  $^{\circ}$ C Ref.)
- Tolerance: to  $\pm 0.01$  %
- Power Coefficient of Resistance (PCR) " $\Delta R$  due to self heating": 5 ppm at rated power
- Electrostatic Discharge (ESD) above 25 000 V
- Load Life Stability:  $\pm 0.005$  % (25  $^{\circ}$ C, 2000 hours at Rated Power)
- Resistance Range: 5  $\Omega$  to 10 k $\Omega$
- Power Rating: 8 W chassis mounted (per MIL-PRF-39009)
- Non Inductive, Non Capacitive Design
- Current Noise: < - 40 dB
- Voltage Coefficient: < 0.1 ppm/V
- Non Inductive: < 0.08  $\mu$ H
- Non Hot Spot Design
- Thermal EMF: 0.05  $\mu$ V/ $^{\circ}$ C typical
- Terminal Finishes Available: Lead (Pb)-free  
Tin/Lead Alloy
- For higher performances please contact us



**RoHS\***  
COMPLIANT

#### Notes

1. Whichever is lower.
2. Heat sink chassis dimensions and requirements per MIL-PRF-39009:

DIMENSION	INCHES	mm
L	6.00	152.4
W	4.00	101.6
H	2.00	50.8
T	0.04	1.0

3. Inductance (L) due mainly to the leads.
4. The resolution limit of existing test equipment (within the measurement capability of the equipment, or "essentially zero").
5.  $\mu$ V/ $^{\circ}$ C relates to EMF due to lead temperature difference.

**TABLE 2 - VPR220SZ**

RESISTANCE RANGE ( $\Omega$ )	TIGHTEST RESISTANCE TOLERANCE	TCR <sup>1)</sup> - 55 $^{\circ}$ C to + 125 $^{\circ}$ C, Ref. + 25 $^{\circ}$ C
50 to 10K	$\pm 0.01$ %	$\pm 2.5$ ppm/ $^{\circ}$ C
25 to < 50	$\pm 0.02$ %	
10 to < 25	$\pm 0.05$ %	
5 to < 10	$\pm 0.1$ %	

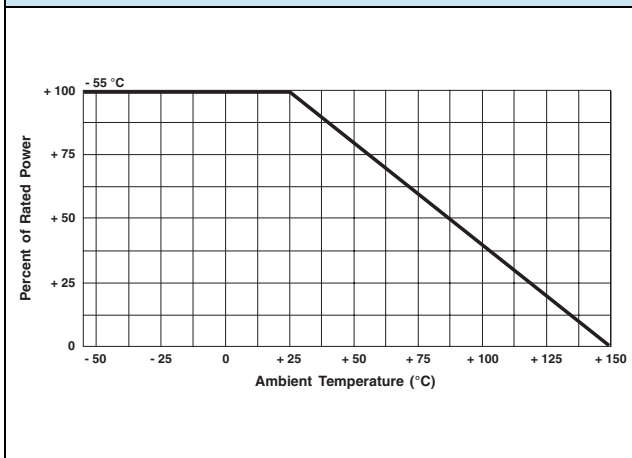
Weight = 1 g Maximum

#### Note

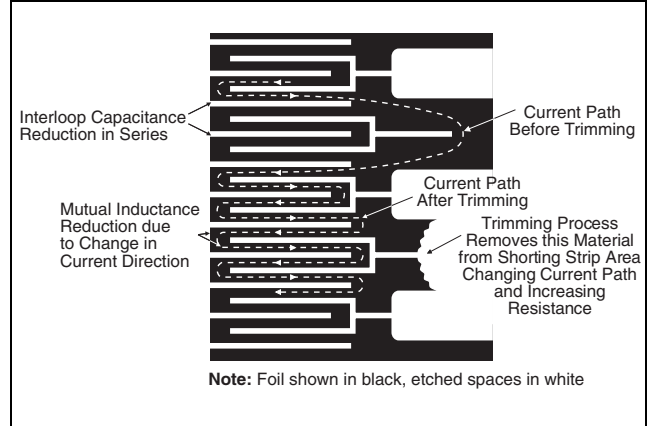
1. Maximum specifications.

\* Pb containing terminations are not RoHS compliant, exemptions may apply

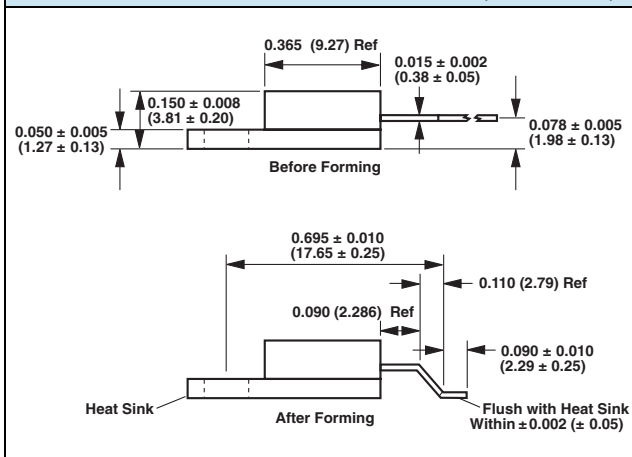
**FIGURE 1 - POWER DERATING CURVE**



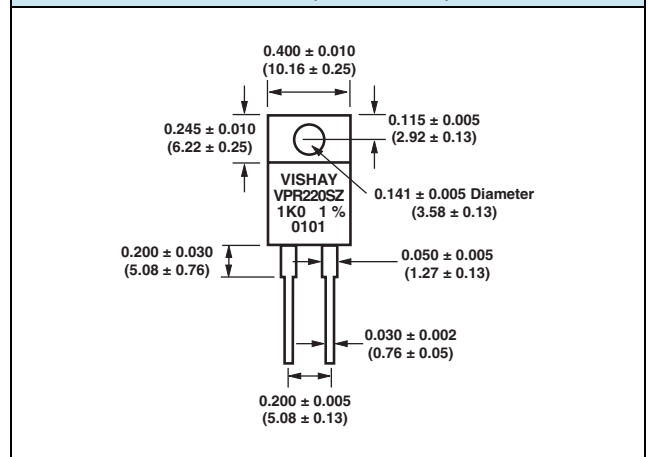
**FIGURE 2 - TRIMMING TO VALUES**  
(Conceptual Illustration)



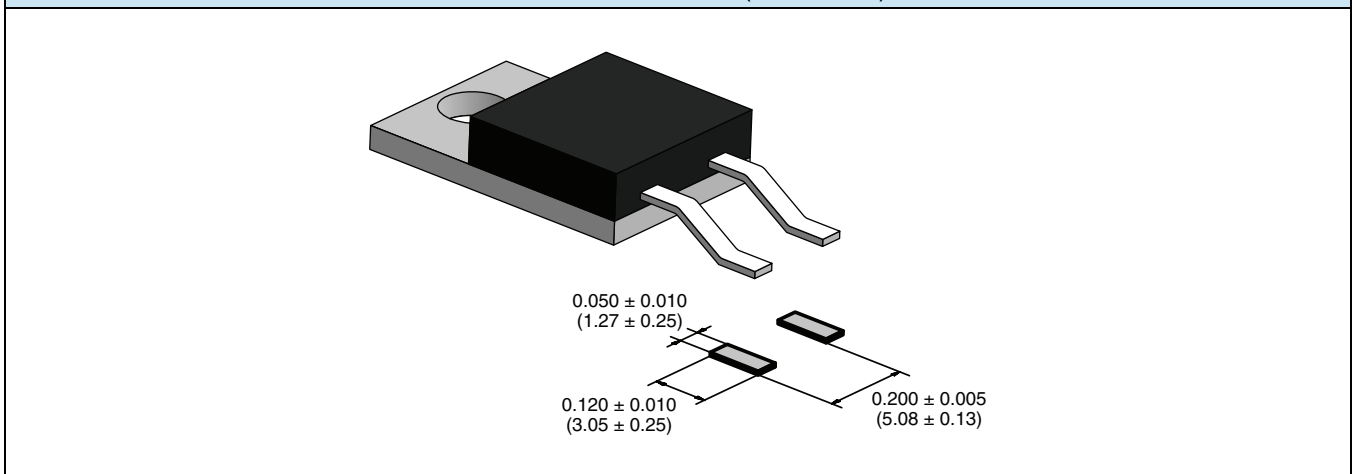
**FIGURE 3 - VPR220SZ FORMING DIMENSIONS** in inches (millimeters)



**FIGURE 4 - VPR220SZ DIMENSIONS** in inches (millimeters)

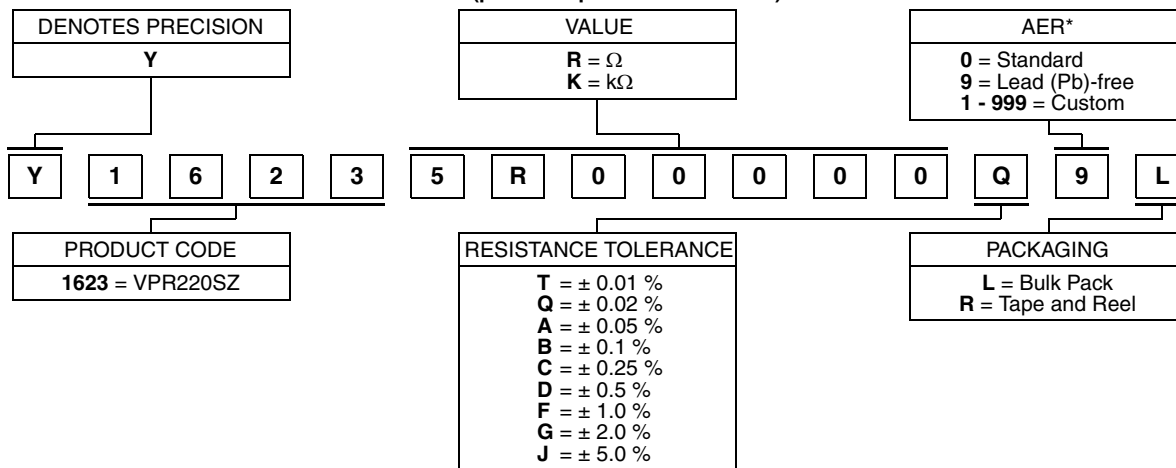


**FIGURE 5 - LAND PATTERN DIMENSIONS** in inches (millimeters)



**TABLE 3 - GLOBAL PART NUMBER INFORMATION**

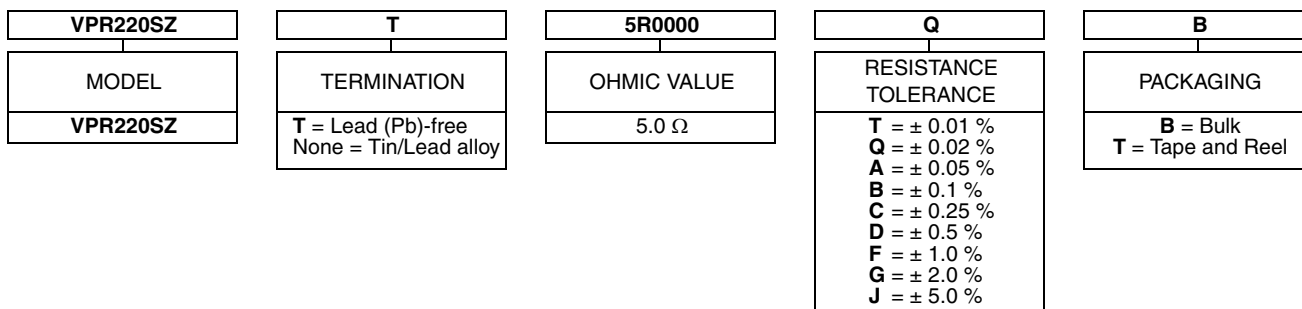
NEW GLOBAL PART NUMBER: Y16235R00000Q9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y1623 5R0000 Q 9 L:

TYPE: VPR220SZ  
 VALUE:  $5.0\ \Omega$   
 ABSOLUTE TOLERANCE:  $\pm 0.02\%$   
 TERMINATION: Lead (Pb)-free  
 PACKAGING: Bulk

HISTORICAL PART NUMBER: VPR220SZT 5R0000 Q B (will continue to be used)



**Note**

\* For non-standard requests, please contact Application Engineering.

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