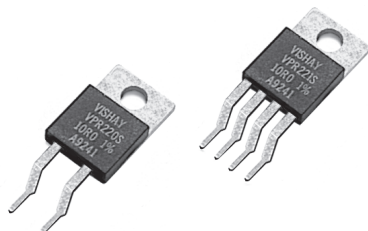


Bulk Metal® Foil Technology Precision Foil Power Surface Mount Resistors in TO-220 Configuration with TCR of ± 2 ppm/°C, Tolerance of to ± 0.01 % and Power Rating to 8 W



Any value at any tolerance within resistance range

Models VPR220S AND VPR221S, made from Vishay Bulk Metal® foil, offer low TCR, high stability, tight tolerance and fast response time in a small, molded resistor. Model VPR220S is a 2 lead device. Model VPR221S is a 4 lead Kelvin connected device. The 4 leaded version is highly recommended for precision applications requiring ohmic values of 100R or less.

TABLE 1 - VPR220S

RESISTANCE RANGE (Ω) ¹	TIGHTEST TOLERANCE	TYPICAL TCR ²	MAXIMUM TCR ²
50 to 10K	± 0.01 %	± 2	± 5 ppm/°C
25 to < 50	± 0.02 %	± 2	± 7 ppm/°C
10 to < 25	± 0.05 %	± 2	± 10 ppm/°C
5 to < 10	± 0.1 %	± 2	± 13 ppm/°C

weight = 1 g maximum

Notes

1. Lower or high values available upon request
2. - 55 °C to + 125 °C, + 25 °C ref.

TABLE 2 - VPR221S

RESISTANCE RANGE (Ω) ¹	TIGHTEST TOLERANCE	TYPICAL TCR ²	MAXIMUM TCR ²
10 to < 500	± 0.01 %	± 2	± 5 ppm/°C
1 to < 10	± 0.02 %	± 2	± 5 ppm/°C
0.5 to < 1	± 0.05 %	± 2	± 5 ppm/°C

weight = 1.2 g maximum

Notes

1. Lower or high values available upon request
2. - 55 °C to + 125 °C, + 25 °C ref.

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

FEATURES

- Temperature coefficient of resistance (TCR): ± 2 ppm/°C typical (- 55 °C to + 125 °C, + 25 °C Ref.)
- Tolerance: to ± 0.01 % (see tables 1 and 2)
- Electrostatic discharge (ESD): above 25 000 V
- Load life stability: ± 0.005 % (25 °C, 2000 h at rated power)
- Resistance range: 0.5 Ω to 10 k Ω
- Power rating: 8 W chassis mounted (per MIL-PRF-39009)
- Non inductive, non capacitive design
- Rise time: 1 ns without ringing
- Current noise: < - 40 dB
- Voltage coefficient: < 0.1 ppm/V
- Non inductive: < 0.08 μ H
- Non hot spot design
- Thermal EMF: 0.05 μ V/°C typical
- Terminal finishes available: lead (Pb)-free tin/lead alloy
- Any value available within resistance range (e.g. 1K234)
- Prototype samples available from 48 h. For more information, please contact foil@vishaypg.com
- For better performances, please see VPR220SZ and VPR221SZ datasheets



RoHS*
COMPLIANT

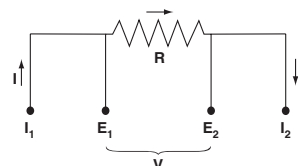


FIGURE 1 - POWER DERATING CURVE

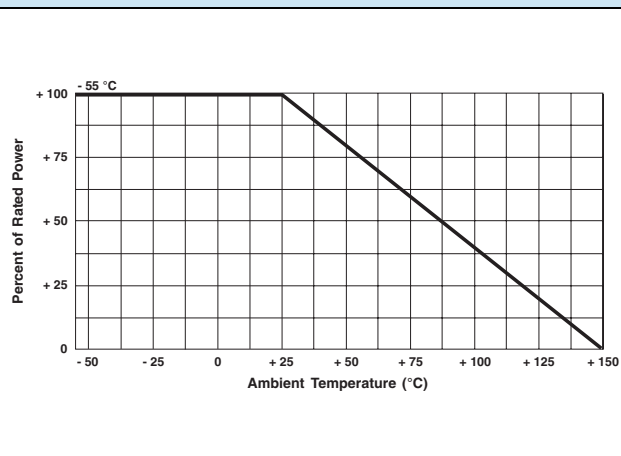
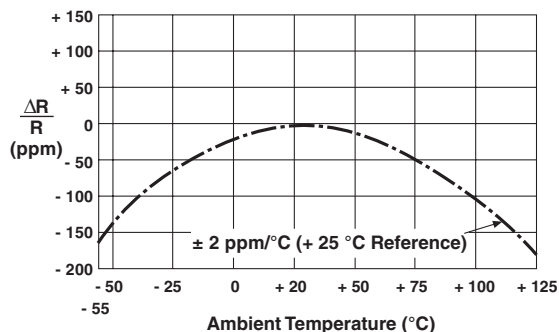
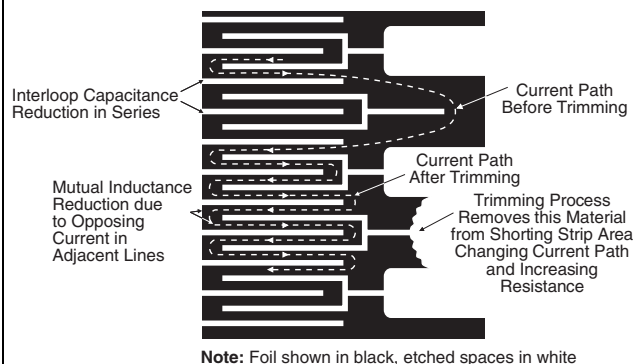


FIGURE 2 - TYPICAL TCR CURVE**FIGURE 3 - TRIMMING TO VALUES**
(Conceptual Illustration)**TABLE 3 - SPECIFICATIONS**

Load Life Stability at 2000 h	$\pm 0.05 \%$ max. ΔR under full rated power at $+ 25 \text{ }^\circ\text{C}$
Power Rating at $+ 25 \text{ }^\circ\text{C}$	8 W or 3 A ¹⁾ on heat sink ²⁾
	1.5 W or 3 A ¹⁾ in free air
	Further derating not necessary
Current Noise	$< 0.010 \text{ } \mu\text{V (rms)/V}$ of applied voltage ($- 40 \text{ dB}$)
High Frequency Operation	
Rise time	1 ns without ringing
Inductance ³⁾ (L)	0.1 μH maximum: 0.03 μH typical
Capacitance (C)	1.0 pF maximum: 0.5 pF typical
Voltage Coefficient ⁴⁾	$< 0.1 \text{ ppm/V}$
Operating Temperature Range	$- 55 \text{ }^\circ\text{C}$ to $+ 150 \text{ }^\circ\text{C}$
Maximum Working Voltage	300 V. Not to exceed power rating
Thermal EMF ⁵⁾	0.15 $\mu\text{V/}^\circ\text{C}$ maximum (lead effect)

Notes

1. Whichever is lower
2. 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

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. $\mu\text{V/}^\circ\text{C}$ relates to EMF due to lead temperature difference

FIGURE 4 - VPR220S AND VPR221S FORMING DIMENSIONS in inches (millimeters)

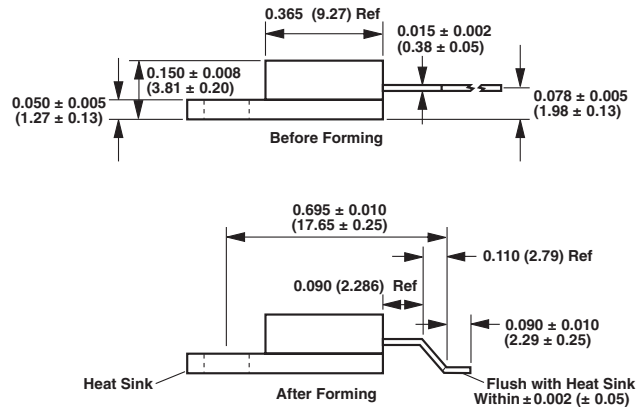


FIGURE 5 - VPR220S DIMENSIONS
in inches (millimeters)

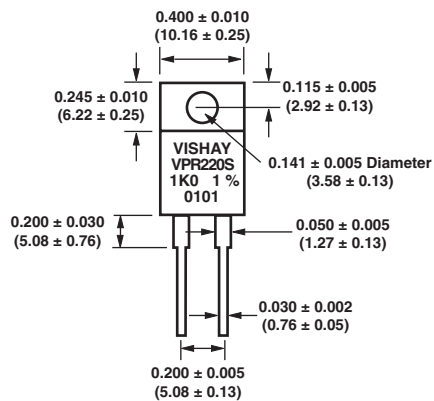


FIGURE 7 - VPR221S DIMENSIONS
in inches (millimeters)

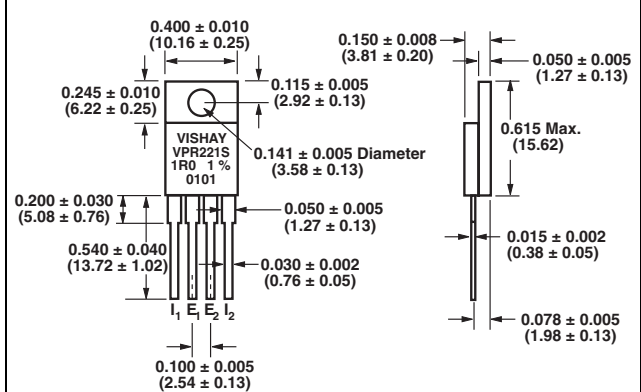


FIGURE 6 - VPR220S LAND PATTERN DIMENSIONS in inches (millimeters)

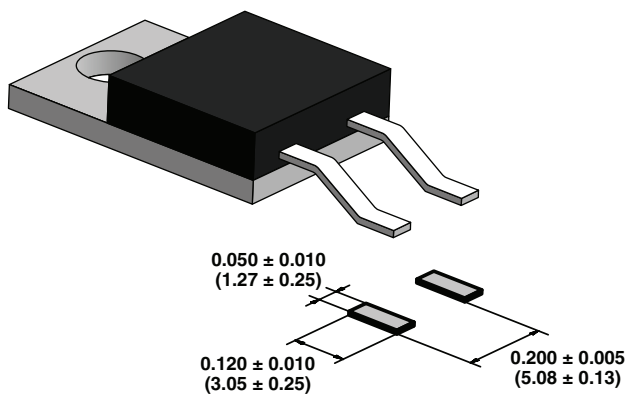


FIGURE 8 - VPR221S LAND PATTERN DIMENSIONS in inches (millimeters)

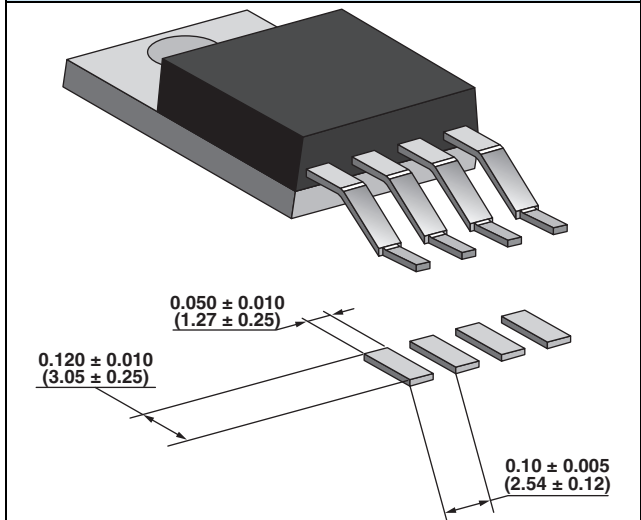
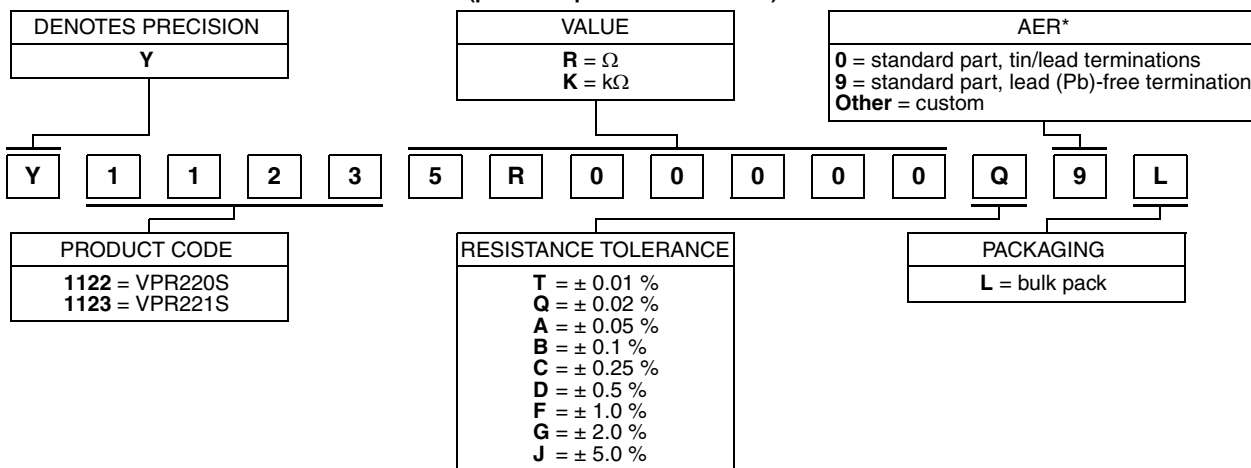


TABLE 4 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y11235R00000Q9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y1123 5R00000 Q 9 L:

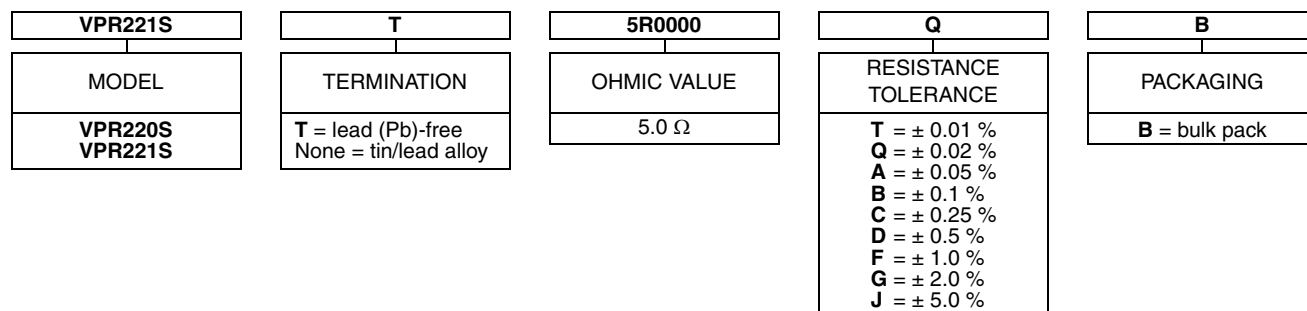
TYPE: VPR221S

VALUE: 5.0Ω ABSOLUTE TOLERANCE: $\pm 0.02\%$

TERMINATION: lead (Pb)-free

PACKAGING: bulk pack

HISTORICAL PART NUMBER: VPR221ST 5R0000 Q B (will continue to be used)

**Note**

* Application engineering release: for non-standard requests, please contact application engineering

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