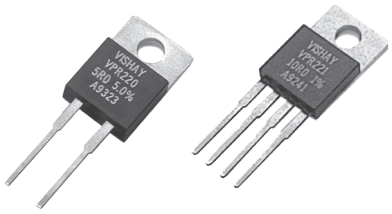
Bulk Metal® Foil Technology Precision Foil Power Resistors in TO-220 Configuration with TCR of ± 2 ppm/°C, Tolerance of to ± 0.01 % and Power Rating to 8 W



Any value at any tolerance within resistance range

Models VPR220 AND VPR221, made from Vishay Bulk Metal® 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

Pb-free Available

RoHS* COMPLIANT

- 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 kΩ
- 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 µH
- Non hot spot design
- Thermal EMF: 0.05 µV/°C typical
- Terminal finishes available: lead (Pb)-free or 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 VPR220Z and VPR221Z datasheets
- Compliant to RoHS directive 2002/95/EC

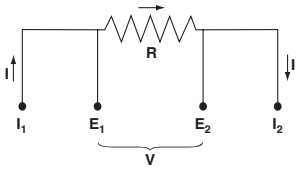


TABLE 1 - VPR220

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 - VPR221

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

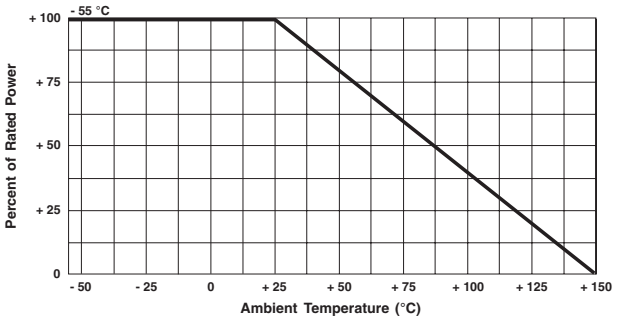
weight = 1.2 g maximum

Notes

(1) Lower or high values available upon request

(2) - 55 °C to + 125 °C, + 25 °C Ref.

FIGURE 1 - POWER DERATING CURVE



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

FIGURE 2 - TYPICAL TCR CURVE

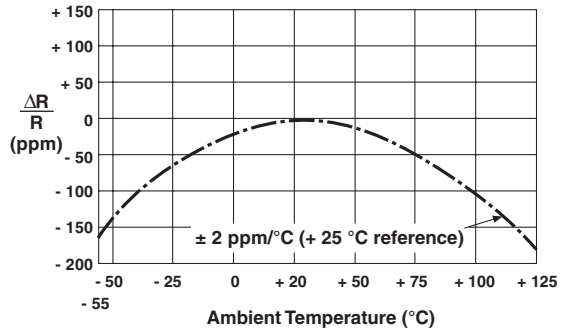
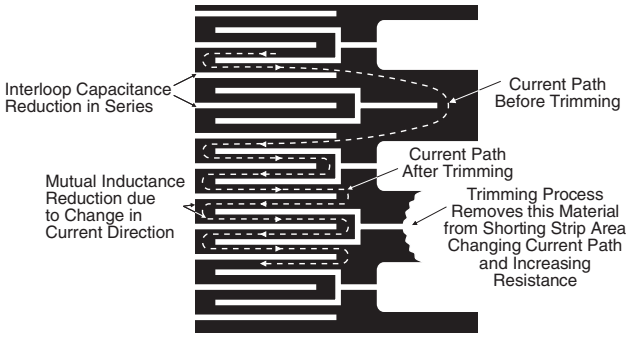


FIGURE 3 - TRIMMING TO VALUES
(conceptual illustration)



Note: Foil shown in black, etched spaces in white

TABLE 3 - SPECIFICATIONS

Load Life Stability at 2000 h	± 0.05 % max ΔR under full rated power at + 25 °C
Power Rating at + 25 °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 µV (rms)/V of applied voltage (- 40 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 ppm/V
Operating Temperature Range	- 55 °C to + 150 °C
Maximum Working Voltage	300 V. Not to exceed power rating
Thermal EMF [5]	0.15 µV/°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) µV/°C relates to EMF due to lead temperature difference

FIGURE 4 - VPR220 DIMENSIONS
in inches (millimeters)

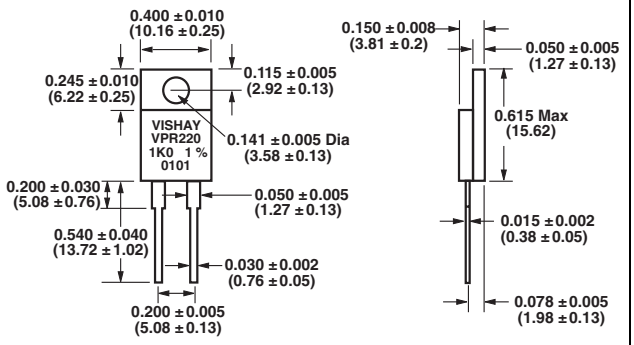
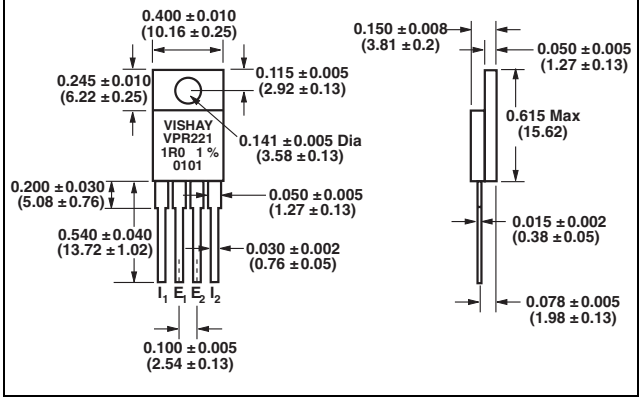


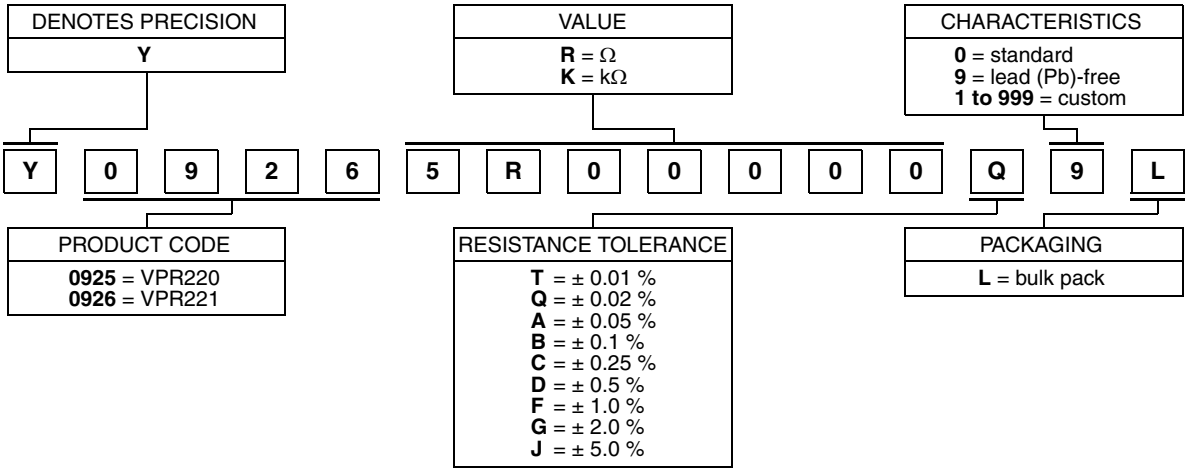
FIGURE 5 - VPR221 DIMENSIONS
in inches (millimeters)



Surface mount versions of these products are available. See datasheets for VPR220S, VPR 221S.

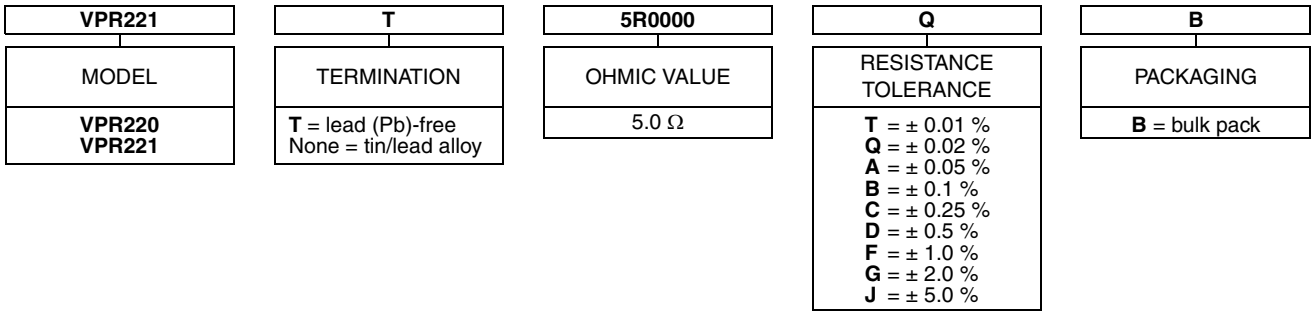
TABLE 4 - GLOBAL PART NUMBER INFORMATION (1)

NEW GLOBAL PART NUMBER: Y09265R00000Q9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y0926 5R00000 Q 9 L:
TYPE: VPR221
VALUE: 5.0 Ω
ABSOLUTE TOLERANCE: ± 0.02 %
TERMINATION: lead (Pb)-free
PACKAGING: bulk

HISTORICAL PART NUMBER: VPR221T 5R0000 Q B (will continue to be used)



Note

(1) For non-standard requests, please contact application engineering

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