

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.

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.

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 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



Available
RoHS*
COMPLIANT

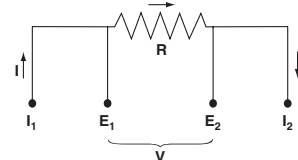
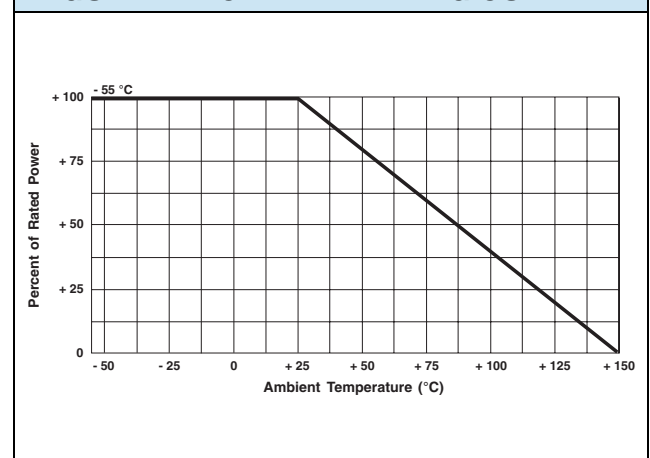


FIGURE 1 - POWER DERATING CURVE



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

FIGURE 2 - TYPICAL TCR CURVE



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 3 - TRIMMING TO VALUES
(conceptual illustration)

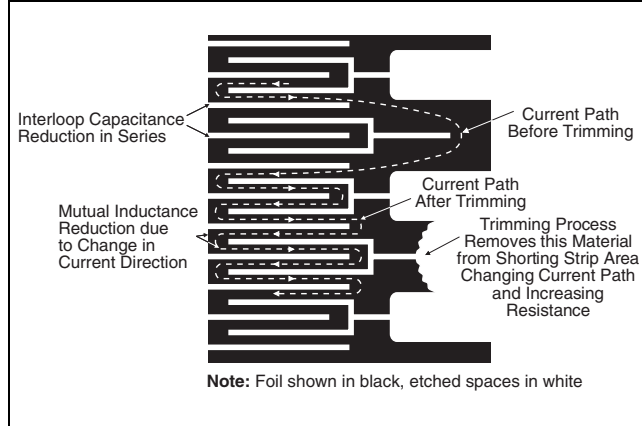


FIGURE 4 - VPR220 DIMENSIONS
in inches (millimeters)

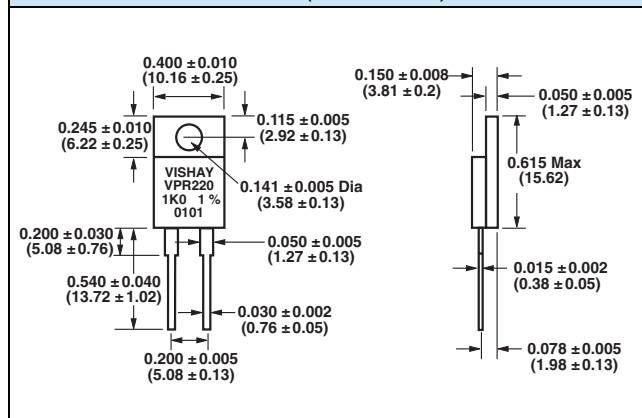
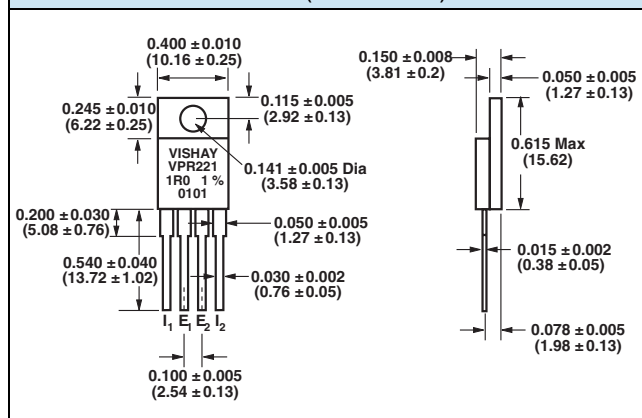


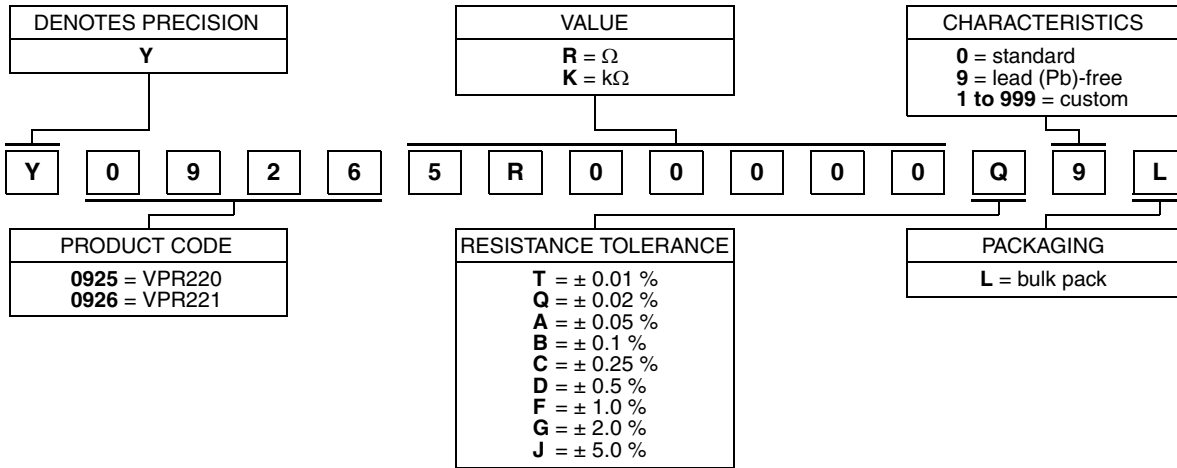
FIGURE 5 - VPR221 DIMENSIONS
in inches (millimeters)



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

TABLE 4 - GLOBAL PART NUMBER INFORMATION (1)

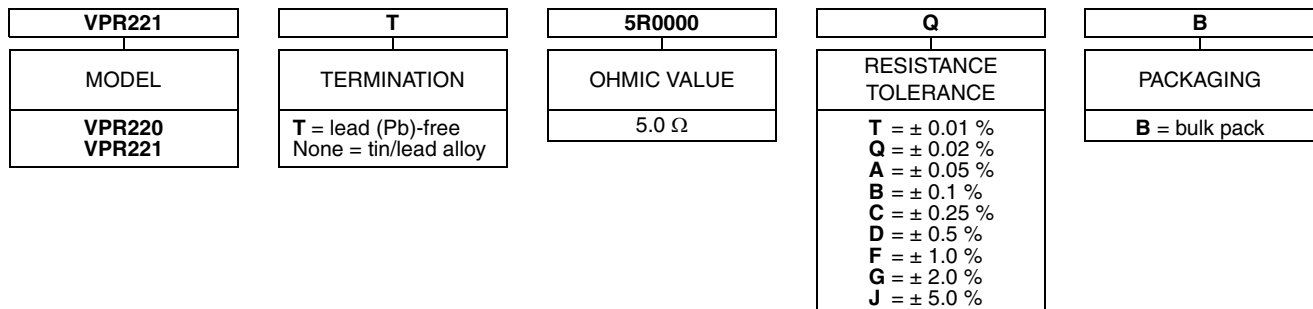
NEW GLOBAL PART NUMBER: Y09265R00000Q9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y0926 5R00000 Q 9 L:

TYPE: VPR221
VALUE: 5.0 Ω
ABSOLUTE TOLERANCE: $\pm 0.02\%$
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

Disclaimer

All product specifications and data are subject to change without notice.

Vishay Precision Group, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay Precision Group"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay Precision Group disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay Precision Group's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay Precision Group.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay Precision Group products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay Precision Group for any damages arising or resulting from such use or sale. Please contact authorized Vishay Precision Group personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.