

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 lead 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

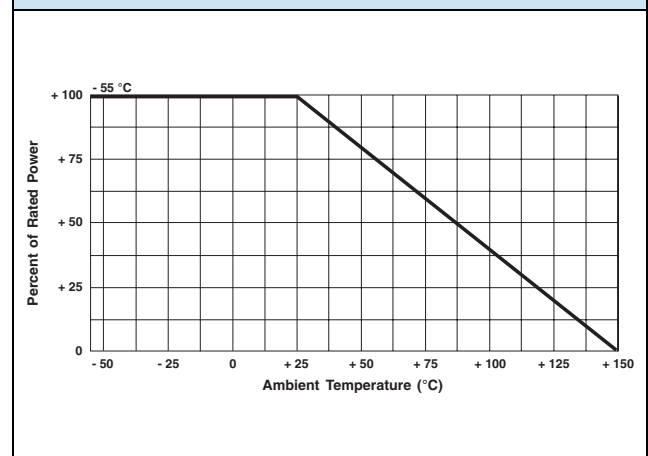
- Temperature coefficient of resistance (TCR): ± 2 ppm/°C typical (- 55 °C to + 125 °C, + 25 °C ref.)
- Tolerance: to ± 0.01 % (see tables 1 and 2)
- Electrostatic discharge (ESD): above 25 000 V
- Load life stability: ± 0.005 % (25 °C, 2000 h at rated power)
- Resistance range: 0.5 Ω to 10 k Ω
- Power 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)

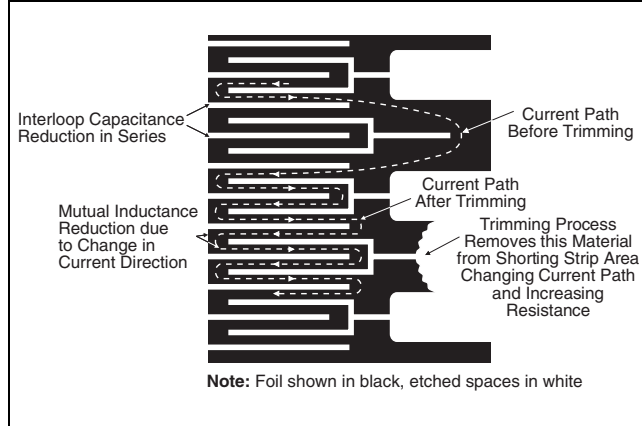


FIGURE 4 - VPR220 DIMENSIONS
in inches (millimeters)

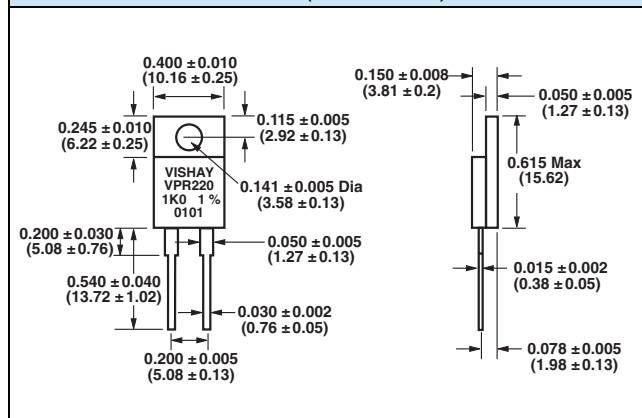
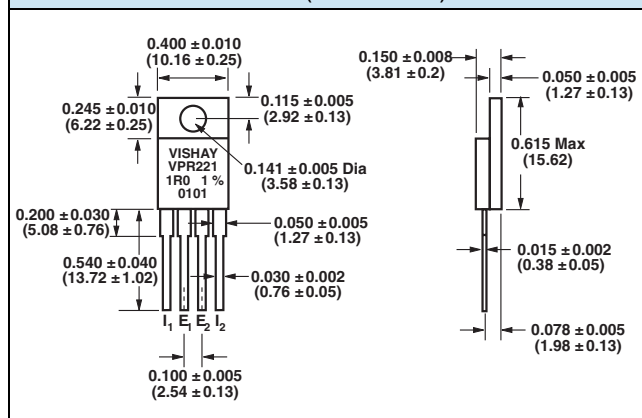


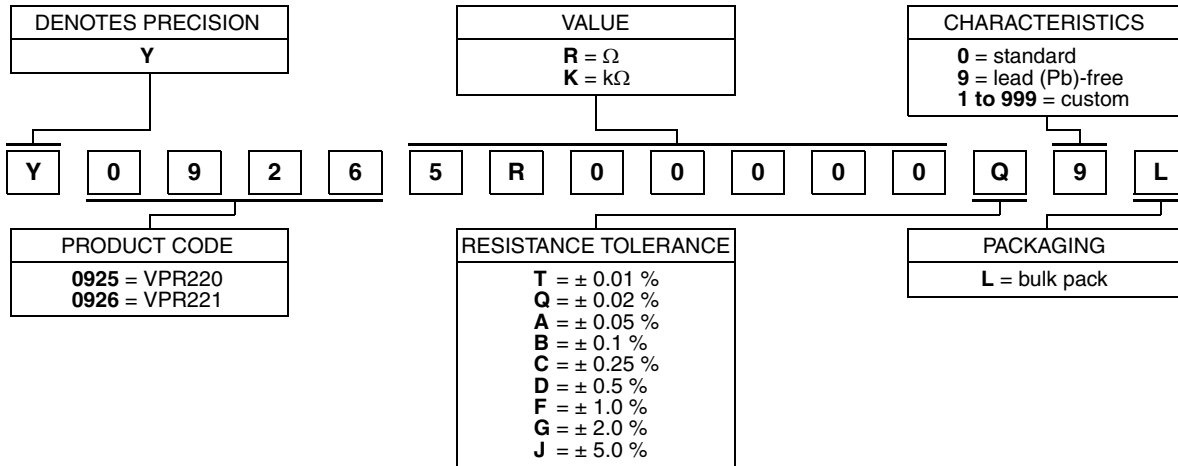
FIGURE 5 - VPR221 DIMENSIONS
in inches (millimeters)



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

TABLE 4 - GLOBAL PART NUMBER INFORMATION (1)

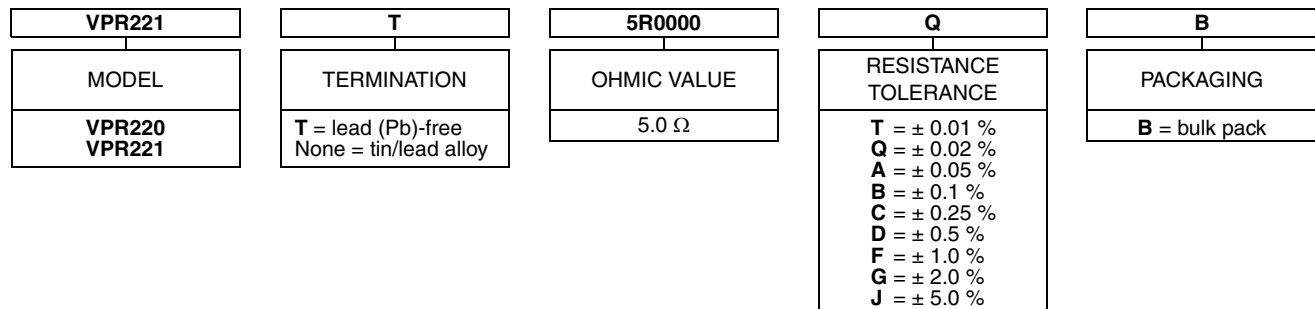
NEW GLOBAL PART NUMBER: Y09265R00000Q9L (preferred part number format)



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



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