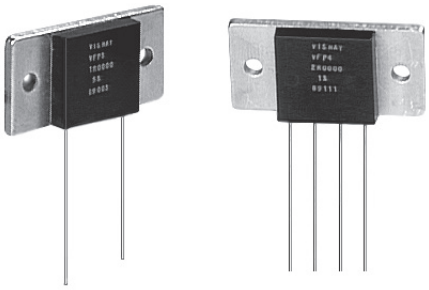
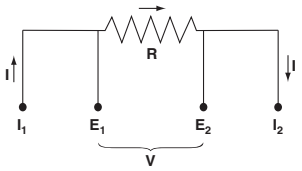
Bulk Metal® Foil Technology Power and Current Sensing Resistors with TCR of 2 ppm/°C, Tolerance to ± 0.01 % and power up to 10 W



Any value available within resistance range

The basic features of Vishay Bulk Metal® Foil resistors; tight resistance tolerance, fast response time, low TCR, and exceptional long-term stability, are available for power-circuit applications. Typical applications are non-inductive design, current sensing applications, deflection amplifiers, constant current power supplies, forced balance electronic scales, graphic display computers, character generation on CRTs, and electron beam controls.

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



FEATURES

Pb-free Available

RoHS* COMPLIANT

- Temperature Coefficient of Resistance (TCR): ± 2 ppm/°C typical (- 55 °C to + 125 °C, + 25 °C Ref.) (see Tables 1 and 2)
- Tolerance: to ± 0.01 % (see Tables 1 and 2)
- Power Rating (heat-sinked): 10 W
- Load Life Stability: ± 0.005 % at 25 °C, 2000 hours at Rated Power
- Resistance Range: 0.05 Ω to 80 kΩ
- Electrostatic Discharge (ESD) above 25 000 V
- Non Inductive, Non Capacitive Design
- Rise Time: 1 ns without Ringing
- Current Noise: < - 40 dB
- Thermal EMF: 0.05 µV/°C typical
- Voltage Coefficient: < 0.1 ppm/V
- Non Inductive: < 0.08 µH
- Non Hot Spot Design
- Terminal Finishes Available: Lead (Pb)-free, Tin/Lead Alloy
- Any Value available within Resistance Range (e.g. 1K2345)
- Prototype Samples available from 48 hours. For more Information, please contact foil@vishaypg.com
- For better Performances, please see VFP-3Z and VFP-4Z Datasheets

TABLE 1 - VFP-3[1] SPECIFICATIONS

RESISTANCE RANGE (Ω)	STANDARD TOLERANCE	TYPICAL TCR[3]	MAXIMUM TCR[3]
50 to 80K	± 0.01 %	± 2 ppm/°C	± 5 ppm/°C
25 to < 50	± 0.02 %		± 7 ppm/°C
10 to < 25	± 0.05 %		± 10 ppm/°C
5 to < 10	± 0.1 %		± 13 ppm/°C
2 to < 5	± 0.25 %		± 20 ppm/°C
1 to < 2	± 0.5 %		± 25 ppm/°C
0.5 to < 1	± 1.0 %		± 50 ppm/°C
0.25 to < 0.5	± 2.0 %		
0.1 to < 0.25	± 5.0 %		

TABLE 2 - VFP-4[1, 2] SPECIFICATIONS

RESISTANCE RANGE (Ω)	STANDARD TOLERANCE	TYPICAL TCR[3]	MAXIMUM TCR[3]
10 to 500	± 0.01 %	± 2 ppm/°C	± 5 ppm/°C
5 to < 10	± 0.02 %		± 6 ppm/°C
2 to < 5	± 0.05 %		± 8 ppm/°C
1 to < 2	± 0.1 %		± 10 ppm/°C
0.5 to < 1	± 0.25 %		± 15 ppm/°C
0.25 to < 0.5	± 0.5 %		± 20 ppm/°C
0.1 to < 0.25	± 1.0 %		± 25 ppm/°C
0.05 to < 0.1	± 2.0 %		± 30 ppm/°C

Notes

Tighter tolerance available upon request

See page 3 in this data sheet for numbered footnotes.

1. Weight = 15 g Max
2. VFP-4 available up to 500 Ω.
3. - 55 °C to + 125 °C, + 25 °C Ref.

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

FIGURE 1 - STANDARD IMPRINTING AND DIMENSIONS in inches (millimeters)

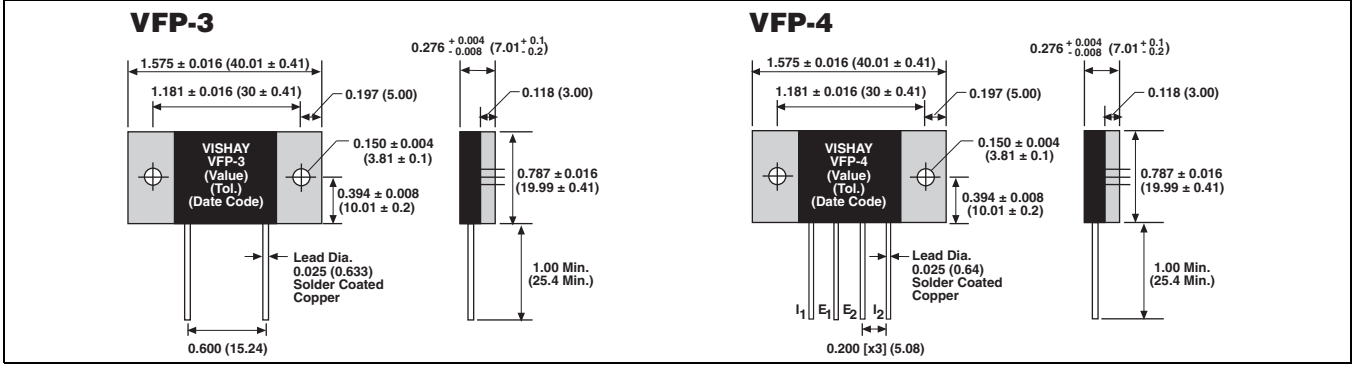


TABLE 3 - SPECIFICATIONS

Stability	
Load Life at 2000 hours	± 0.05 % maximum ΔR under full rated power (3 W at + 25 °C)
Power Rating	
At + 25 °C	10 W or 3 A[1)] on heat sink[2)] 3 W or 3 A[1)] in free air Power rating based on ΔR. Further derating not necessary.
Current Noise	< 0.010 µV (RMS)/V of applied voltage (- 40 dB)
High Frequency Operation	
Rise Time	1.0 ns at 1 kΩ
Inductance (L)[3)]	0.1 µH maximum; 0.08 µH typical
Capacitance (C)	1.0 pF maximum; 0.5 pF typical
Voltage Coefficient	< 0.1 ppm/V[4)]
Operating Temp. Range	- 55 °C to + 150 °C
Maximum Working Voltage[5)]	350 V
Thermal EMF[6)]	0.5 µV/°C typical (lead effect)

FIGURE 2 - POWER DERATING CURVE

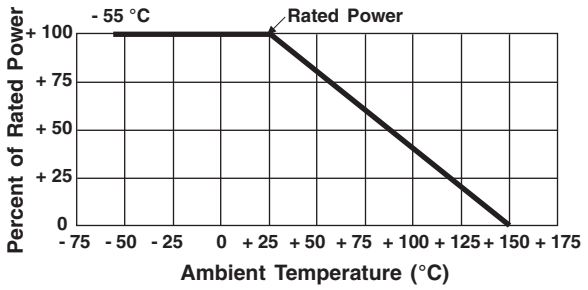
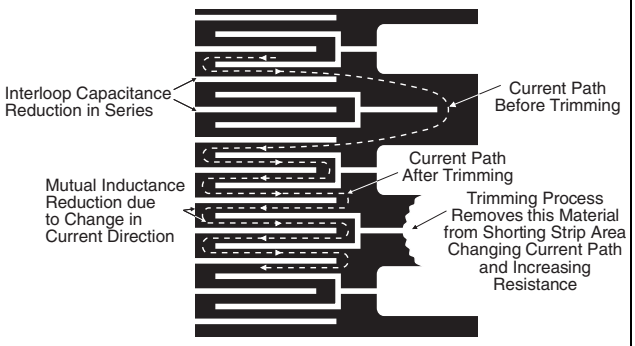


FIGURE 3 - TRIMMING TO VALUES (Conceptual Illustration)



Note: Foil shown in black, etched spaces in white

TABLE 4 - POWER RESISTOR ENVIRONMENTAL PERFORMANCE COMPARISON			
	METHOD PARAGRAPH[7]	MIL-PRF-39009 ΔR LIMITS	VFP-3, VFP-4 MAXIMUM TEST DATA[10]
TEST GROUP I			
Conditioning	4.8.2	± 0.2 % + 0.01 Ω	± 0.03 %
TEST GROUP II			
Resistance Temperature Characteristic (- 55 °C to + 125 °C)	4.8.4	< 1 Ω: ± 100 ppm/°C; 1 Ω to 19.6 Ω: ± 50 ppm/°C; ≥ 20 Ω: ± 30 ppm/°C	See tables 1 and 2
Low Temp Storage	4.8.16	± 0.3 % + 0.01 Ω	± 0.01 %
DWV (750 V at atmosphere pressure)	4.8.5	± 0.2 % + 0.01 Ω	± 0.005 %
Insulation Resistance	4.8.6	10^4 MΩ	> 10^4 MΩ
Low Temp Operation	4.8.7	± 0.3 % + 0.01 Ω	± 0.01 %
Short time Overload[9]	4.8.8	± 0.3 % + 0.01 Ω	± 0.01 %
Moisture Resistance	4.8.9	± 0.5 % + 0.01 Ω	± 0.05 %
Terminal Strength	4.8.10	± 0.2 % + 0.01 Ω	± 0.005 %
TEST GROUP III			
Shock - Specified Pulse	4.8.11	± 0.2 % + 0.01 Ω	± 0.01 %
Vibration - High Frequency	4.8.12	± 0.2 % + 0.01 Ω	± 0.005 %
TEST GROUP IV			
Life Test 10 W at + 25 °C for 2000 hours	4.8.13	± 1.0 % + 0.01 Ω	± 0.05 %
60 % power at + 70 °C for 2000 hours	-	-	± 0.05 %
TEST GROUP V			
High Temp Exposure (2000 hours at + 150 °C)	4.8.14	± 1.0 % + 0.01 Ω	± 0.03 %

Notes

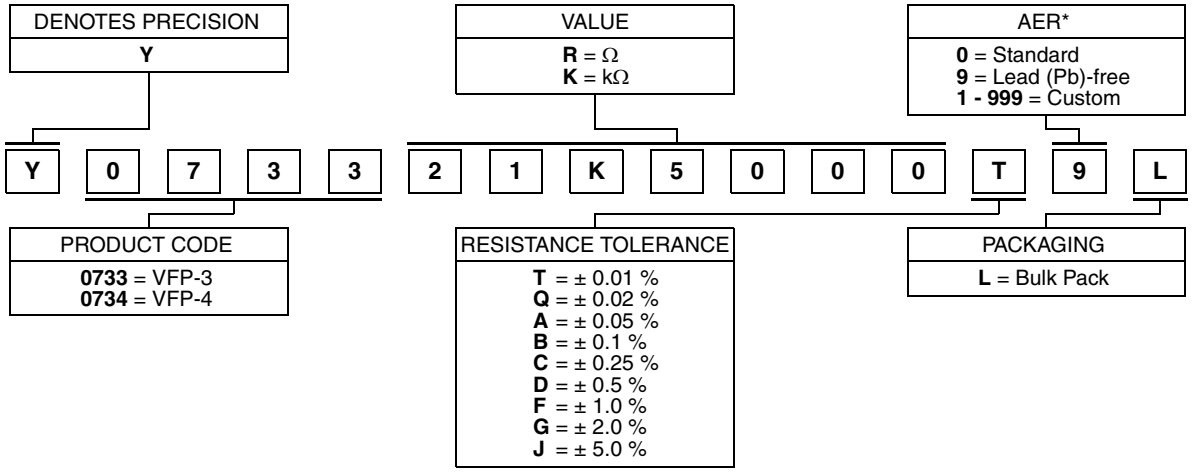
1. Whichever is lower.
2. Heat sink chassis dimensions and requirements per MIL-PRF-39009:

	INCHES	MILLIMETERS
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. Not to exceed power rating of resistor.
6. µV/°C relates to EMF due to lead temperature difference and µV/watt due to power applied to the resistor.
7. Vishay test data as compared to MIL-PRF-39009 is shown for illustration purposes, Vishay test conditions that deviate from the MIL test method are noted within parentheses.
8. Maximum ambient temperature rating is + 150 °C.
9. Maximum overload rating is 15 W (5 x rated power in free air; 1.5 x rated power on heat sink), with applied voltage not to exceed 750 V.
10. ΔR's are as shown plus 0.001 Ω to allow for measurement errors at low resistance values.

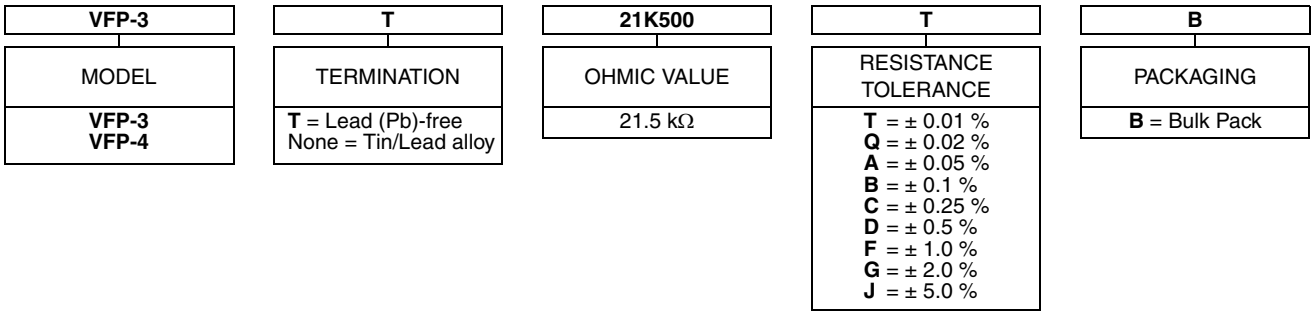
TABLE 5 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y073321K5000T9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y0733 21K5000 T 9 L:
TYPE: VFP-3
VALUE: 21.5 kΩ
ABSOLUTE TOLERANCE: ± 0.01 %
TERMINATION: Lead (Pb)-free
PACKAGING: Bulk Pack

HISTORICAL PART NUMBER: VFP-3T 21K500 T B (will continue to be used)



Note

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

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