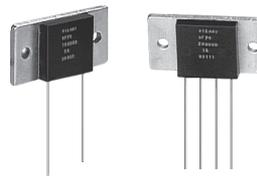


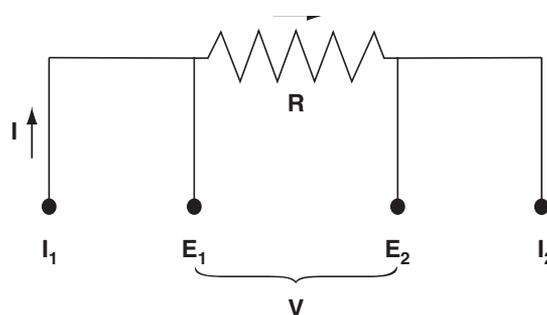
Bulk Metal® Foil Technology Power and Current Sensing Resistors with TCR of 2 ppm/°C, Tolerance to ±0.01% and power up to 10 W

FEATURES

- Temperature coefficient of resistance (TCR): ±2 ppm/°C typical (-55°C to +125°C, +25°C Ref.)
- Tolerance: to ±0.01%
- 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) up to 25 000 V
- Non Inductive, non capacitive design



Pb-free Available
RoHS* COMPLIANT



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%		

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

* This datasheet provides information about parts that are RoHS-compliant and/or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS compliant.

⁽¹⁾ Weight = 15 g Max

⁽²⁾ VFP-4 available up to 500 Ω.

⁽³⁾ -55°C to +125°C, +25°C Ref.

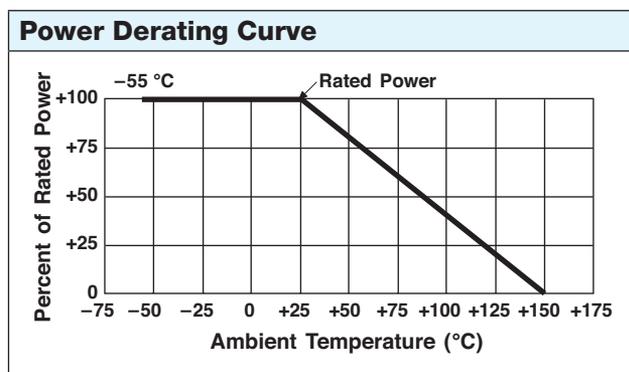
Specifications	
Stability Load Life at 2000 hours	±0.05% maximum ΔR under full rated power (3 W at +25°C)
Power Rating At +25°C	10 W or 3 A ⁽¹⁾ on heat sink ⁽²⁾ 3 W or 3 A ⁽¹⁾ in free air Power rating based on ΔR. Further derating not necessary.
Current Noise	<0.010 μV _{RMS} /V of applied voltage (–40 dB)
High Frequency Operation Rise Time Inductance (L) ⁽³⁾ Capacitance (C)	1.0 ns at 1 kΩ 0.1 μH maximum; 0.08 μH typical 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)

Notes

- ⁽¹⁾ Whichever is lower.
⁽²⁾ Heat sink chassis dimensions and requirements perMIL-PRF-39009:

	INCHES	MILLIMETERS
L	6.00	152.4
W	4.00	101.6
H	2.00	50.8
T	0.04	1.0

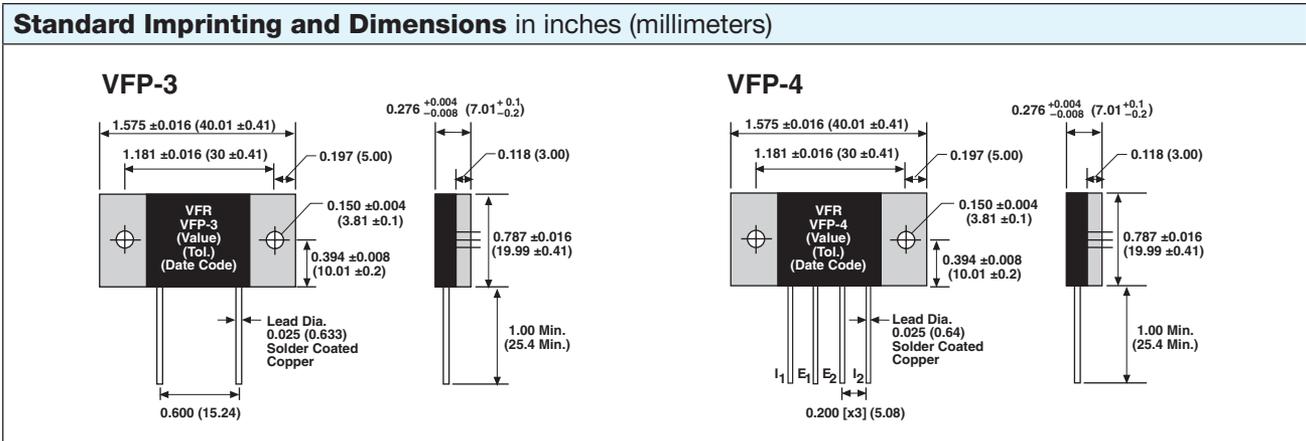
- ⁽³⁾ Inductance (L) due mainly to the leads.
⁽⁴⁾ The resolution limit of existing test equipment (within the measurement capability of the equipment, or “essentially zero”).
⁽⁵⁾ Not to exceed power rating of resistor.
⁽⁶⁾ μV/°C relates to EMF due to lead temperature difference and μV/watt due to power applied to the resistor.



Power Resistor Environmental Performance Comparison			
	METHOD PARAGRAPH ⁽¹⁾	MIL-PRF-39009 ΔR LIMITS	VFP-3, VFP-4 MAXIMUM TEST DATA ⁽⁴⁾
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 ⁽³⁾	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%

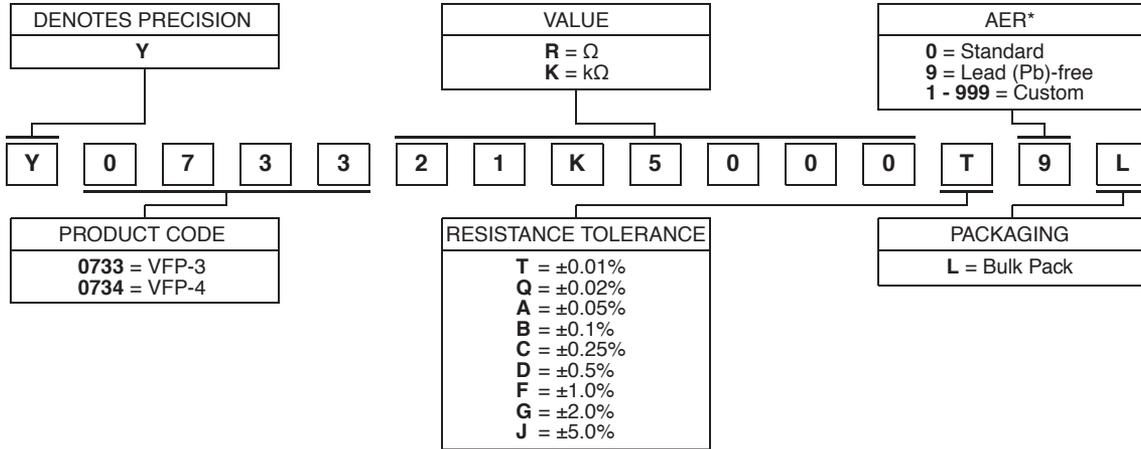
Notes

- (1) VFR test data as compared to MIL-PRF-39009 is shown for illustration purposes, VFR test conditions that deviate from the MIL test method are noted within parentheses.
- (2) Maximum ambient temperature rating is +150°C.
- (3) 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.
- (4) ΔR's are as shown plus 0.001 Ω to allow for measurement errors at low resistance values.



Global Part Number Information

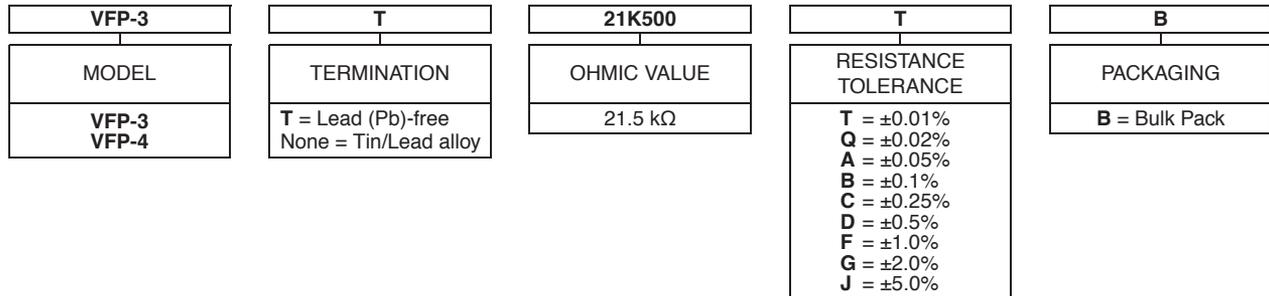
NEW GLOBAL PART NUMBER: Y073321K5000T9L (preferred part number format)



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

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