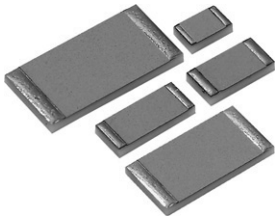
Ultra High Precision Z-Foil Flip Chip Resistor with TCR of ± 0.05 ppm/°C, 35 % Space Saving vs. Wraparound Design and PCR of 5 ppm at Rated Power



Bottom View

INTRODUCTION

One of the most important parameters influencing stability is the temperature coefficient of resistance (TCR). Although the TCR of Bulk Metal® Foil resistors is considered extremely low, this characteristic has been further refined over the years.

The VFCP Series utilizes ultra precision Bulk Metal® Z-Foil.

The Z-Foil technology provides a significant reduction to the resistive element's sensitivity to ambient temperature variations (TCR) and to self heating when power is applied (power coefficient).

Along with the inherently low PCR and TCR, Z-Foil technology also provides remarkably improved load life stablility, low noise and availability of tight tolerance.

The flip chip configuration provides a substantial PCB space saving of more than 35 % vs. a surface mount chip with wraparound terminations. The VFCP is available in any value within the specified resistance range.

Our application engineering department is available to advise and make recommendations. For non-standard technical requirements and special applications, please contact us.

TABLE 1 - TOLERANCE AND TCR VS. RESISTANCE VALUE

RESISTANCE VALUE (Ω)	TOLERANCE (%)	TYPICAL TCR AND MAX. SPREAD (- 55 °C to + 125 °C, + 25 °C Ref.)
250 to 125K	± 0.01	± 0.2 ± 1.6
100 to < 250	± 0.02	± 0.2 ± 1.6
50 to < 100	± 0.05	± 0.2 ± 1.8
25 to < 50	± 0.1	± 0.2 ± 2.8
10 to < 25	± 0.25	± 0.2 ± 2.8

FEATURES

- Temperature coefficient of resistance (TCR): ± 0.05 ppm/°C typical (0 °C to + 60 °C) ± 0.2 ppm/°C typical (- 55 °C to + 125 °C, + 25 °C ref.)
- Tolerance: to ± 0.01 % (100 ppm)
- Power coefficient "ΔR due to self heating" 5 ppm at rated power
- Load life stability (70 °C for 2000 h): ± 0.005 % (50 ppm)
- Power rating to: 600 mW at + 70 °C
- Electrostatic discharge (ESD) up to 25 000 V
- Resistance range: 10 Ω to 125 kΩ (for lower and higher values, please contact us)
- Foil resistors are not restricted to standard values; specific "as required" values can be supplied at no extra cost or delivery (e.g. 1K2345 vs. 1K)
- Non-inductive, non-capacitive design
- Short time overload ≤ 0.005 % (50 ppm)
- Non hot spot design
- Rise time: 1 ns effectively no ringing
- Current noise: - 40 dB
- Voltage coefficient < 0.1 ppm/V
- Non-inductive: < 0.08 µH
- Terminal finishes available: lead (Pb)-free, tin/lead alloy
- Compliant to RoHS directive 2002/95/EC
- Matched sets are available per request
- Prototype quantities available in just 5 working days or sooner. For more information, please contact foil@vishaypg.com
- For better performances please contact us

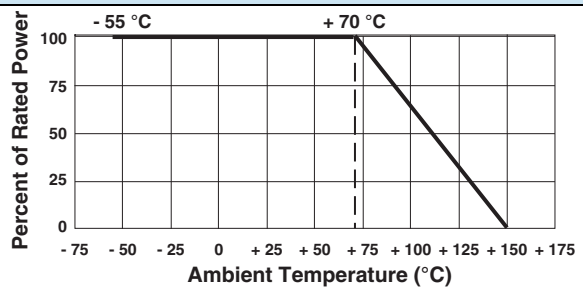
Pb-free Available

RoHS* COMPLIANT

APPLICATIONS

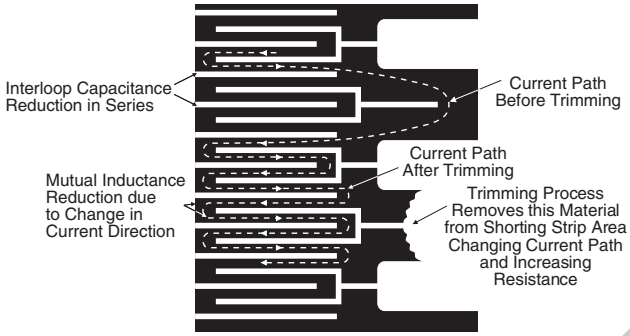
- Automatic test equipment (ATE)
- High precision instrumentation
- Laboratory, industrial and medical
- Audio
- EB applications (electron beam scanning and recording equipment, electron microscopes)
- Military and space
- Airborne
- Down hole instrumentation
- Communication

FIGURE 1 - POWER DERATING CURVE



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

FIGURE 2 - TRIMMING TO VALUES (Conceptual Illustration)



Note: Foil shown in black, etched spaces in white

TABLE 2 - SPECIFICATIONS

CHIP SIZE	RATED POWER (mW) at + 70 °C	MAXIMUM VOLTAGE RATING ($\leq \sqrt{P \times R}$)	RESISTANCE RANGE (Ω)	MAXIMUM WEIGHT (mg)
0805	100 mW	28 V	10 to 8K	5.2
1206	250 mW	79 V	10 to 25K	10.3
1506	300 mW	95 V	10 to 30K	12
2010	400 mW	167 V	10 to 70K	25
2512	600 mW	220 V	10 to 125K	35

TABLE 3 - LOAD LIFE STABILITY (+ 70 °C for 2000 h)

CHIP SIZE	MAXIMUM ΔR LIMITS
0805	± 0.005 % at 50 mW ± 0.01 % at 100 mW
1206	± 0.005 % at 150 mW ± 0.01 % at 250 mW
1506	± 0.005 % at 150 mW ± 0.01 % at 300 mW
2010	± 0.005 % at 200mW ± 0.01 % at 400 mW
2512	± 0.005 % at 500 mW ± 0.01 % at 600 mW

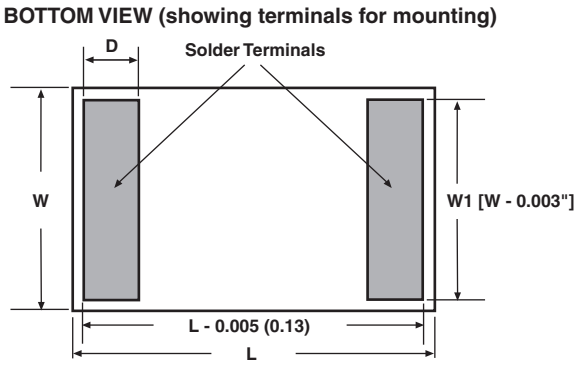
TABLE 4 - PERFORMANCES

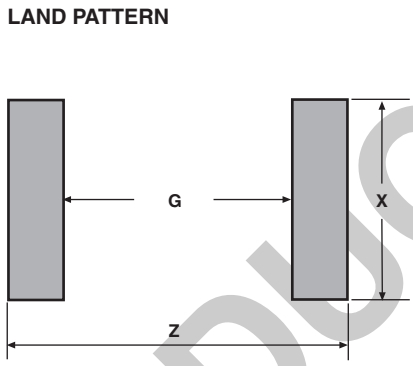
TEST OR CONDITION	MIL-PRF-55342 CHARACTERISTIC E ΔR LIMITS	TYPICAL ΔR LIMITS	MAXIMUM ΔR LIMITS (1)
Thermal Shock	± 0.1 %	± 0.005 % (50 ppm)	± 0.01 % (100 ppm)
Low Temperature Operation	± 0.1 %	± 0.005 % (50 ppm)	± 0.01 % (100 ppm)
Short Time Overload	± 0.1 %	± 0.005 % (50 ppm)	± 0.01 % (100 ppm)
High Temperature Exposure	± 0.1 %	± 0.01 % (100 ppm)	± 0.02 % (200 ppm)
Resistance to Soldering Heat	± 0.2 %	± 0.005 % (50 ppm)	± 0.015 % (150 ppm)
Moisture Resistance	± 0.2 %	± 0.005 % (50 ppm)	± 0.02 % (200 ppm)
Load Life Stability + 70 °C for 2000 hours at Rated Power	± 0.5 %	± 0.005 % (50 ppm)	± 0.01 % (100 ppm)

Note

(1) As shown + 0.01 W to allow for measurement errors at low values.

TABLE 5 - DIMENSIONS AND LAND PATTERN in inches (millimeters)





CHIP SIZE	L ± 0.005 (0.13)	W ± 0.005 (0.13)	THICKNESS MAXIMUM	D ± 0.005 (0.13)	Z	G	X
0805	0.079 (2.01)	0.049 (1.24)	0.025 (0.64)	0.010 (0.25)	0.078 (1.98)	0.053 (1.35)	0.049 (1.24)
1206	0.126 (3.20)	0.062 (1.57)	0.025 (0.64)	0.015 (0.38)	0.125 (3.18)	0.090 (2.29)	0.062 (1.57)
1506	0.150 (3.81)	0.062 (1.57)	0.025 (0.64)	0.012 (0.30)	0.150 (3.81)	0.120 (3.05)	0.062 (1.57)
2010	0.200 (5.08)	0.100 (2.54)	0.025 (0.64)	0.020 (0.51)	0.199 (5.05)	0.153 (3.89)	0.100 (2.54)
2512	0.250 (6.35)	0.126 (3.20)	0.025 (0.64)	0.024 (0.61)	0.250 (6.35)	0.196 (4.98)	0.126 (3.20)

Notes

- Avoid the use of cleaning agents which could attack epoxy resins, which form part of the resistor construction
- Vacuum pick up is recommended for handling
- Soldering iron is not applicable

FIGURE 3 - CHIP CONFIGURATION

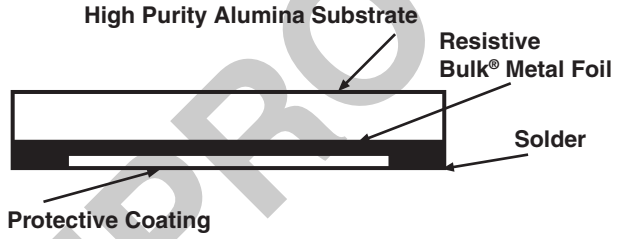
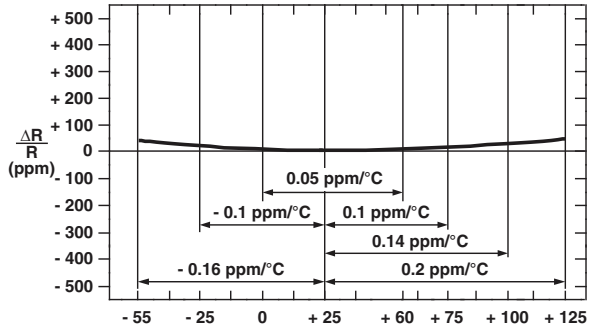


FIGURE 4 - TYPICAL RESISTANCE/ TEMPERATURE CURVE (for more details, see table 1)



Ambient Temperature (°C) and TCR Chord Slopes for Differetn Termperature Ranges

Note

- The TCR values for < 100 Ω are influenced by the termination composition and result in deviation from this curve

TABLE 6 - GLOBAL PART NUMBER INFORMATION [1]

NEW GLOBAL PART NUMBER: Y163010K0000T9W (preferred part number format)

DENOTES PRECISION	VALUE	CHARACTERISTICS
Y	**R** = Ω **K** = kΩ	**0** = standard **9** = lead (Pb)-free **1 to 999** = custom

Y	1	6	3	0	1	0	K	0	0	0	0	T	9	W

PRODUCT CODE	RESISTANCE TOLERANCE	PACKAGING
1629 = VFCP0805 **1630** = VFCP1206 **1631** = VFCP1506 **1632** = VFCP2010 **1633** = VFCP2512	**T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.10 % **C** = ± 0.25 % **D** = ± 0.50 % **F** = ± 1.00 %	**R** = tape and reel **W** = waffle pack

FOR EXAMPLE: ABOVE GLOBAL ORDER Y1630 10K0000 T 9 W:

TYPE: VFCP1206
VALUE: 10.0 kΩ
ABSOLUTE TOLERANCE: ± 0.01 %
TERMINATION: lead (Pb)-free
PACKAGING: waffle pack

HISTORICAL PART NUMBER: VFCP1206 10K000 TCR0.2 T S W (will continue to be used)

VFCP1206	10K000	TCR0.2	T	S	W
MODEL	OHMIC VALUE	TCR	RESISTANCE TOLERANCE	TERMINATION	PACKAGING
VFCP0805 **VFCP1206** **VFCP1506** **VFCP2010** **VFCP2512**	10.0 kΩ	Characteristic	**T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.10 % **C** = ± 0.25 % **D** = ± 0.50 % **F** = ± 1.00 %	**S** = lead (Pb)-free **B** = tin/lead	**T** = tape and reel **W** = waffle pack

Note

[1] For non-standard requests, please contact application engineering.

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