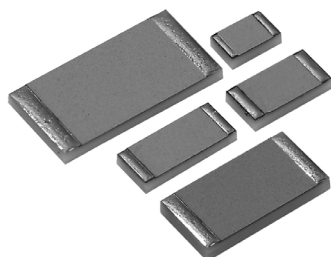


Z Foil Flip Chip Resistor with TCR of ± 0.2 ppm/°C and 35% Space Saving versus Wrap Around Design



Bottom View

INTRODUCTION

Bulk Metal® Foil (BMF) Technology out-performs all other resistor technologies available today for applications that require high precision and high stability.

This technology has been invented, patented and pioneered by Vishay. Products based on this technology are the most suitable for a wide range of analog applications.

BMF technology allows to produce customer oriented products designed to satisfy challenging and specific technical requirements.

One of the important parameters influencing stability is the Temperature Coefficient of Resistance (TCR). Although the TCR of 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 (BMZF).

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

The Z-Foil technology provides inherently an extremely low and predictable Temperature Coefficient of Resistance (TCR), a remarkably improved load life stability, low noise and availability of tight tolerance.

The Flip Chip configuration provides a significant PCB space saving of more than 35 % vs. the surface mount chip with wrap-around 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.

FEATURES

- TCR: ± 0.2 ppm/°C typical (see Table 1)
- PCR (Power Coefficient of Resistance): 5 ppm at rated power
- Load Life Stability (70°C for 2000 hours): $\pm 0.005\%$
- Power Rating to: 750 mW at + 70°C
- Resistance Range: 10Ω to 150KΩ (for lower and higher values, please contact us)
- Tolerance: to $\pm 0.01\%$
- Shelf Life Stability: 0.005%
- Low Current Noise: - 40dB "Noise free component"
- Low Voltage Coefficient < 0.1 ppm/V
- Non Inductive: < 0.08μH
- Thermal EMF: < 0.05μV/°C
- Terminal Finishes Available:
 - Lead (Pb)-Free (Sn 99.3% Cu 0.7%)
 - Tin/Lead Alloy (Sn 62% Pb 36% Ag 2%)
- Matched sets are available per request



TABLE 1 - TOLERANCE AND TCR VS RESISTANCE VALUE**

RESISTANCE VALUE (Ω)	TOLERANCE (%)	TYPICAL TCR AND MAX. SPREAD (ppm/°C)
250 to 150K	± 0.01	$\pm 0.2 \pm 1.6$
100 to < 250	± 0.02	$\pm 0.2 \pm 1.6$
50 to < 100	± 0.05	$\pm 0.2 \pm 1.8$
25 to < 50	± 0.1	$\pm 0.2 \pm 2.8$
10 to < 25	± 0.25	$\pm 0.2 \pm 2.8$

**For Tighter performances, please contact Vishay Application Engineering using the e-mail addresses in the footer below.

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

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

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VFCP Series (0805, 1206, 1506, 2010, 2512)

Z Foil Flip Chip Resistor with TCR of $\pm 0.2 \text{ ppm/}^\circ\text{C}$
and 35% Space Saving versus Wrap Around Design

Vishay Foil Resistors

**TABLE 2 - LOAD LIFE STABILITY
(+70°C FOR 2000 HOURS)**

CHIP SIZE	MAXIMUM ΔR LIMITS
0805	$\pm 0.005\%$ at 50 mW $\pm 0.01\%$ at 100 mW
1206	$\pm 0.005\%$ at 150 mW $\pm 0.01\%$ at 250 mW
1506	$\pm 0.005\%$ at 150 mW $\pm 0.01\%$ at 300 mW
2010 ^(*)	$\pm 0.005\%$ at 200mW ^(*) $\pm 0.01\%$ at 400 mW ^(*)
2512 ^(*)	$\pm 0.005\%$ at 500 mW ^(*) $\pm 0.01\%$ at 750 mW ^(*)

TABLE 3 - SPECIFICATIONS

CHIP SIZE	RATED POWER (mW) at +70°C	RESISTANCE RANGE (Ω)	MAXIMUM WEIGHT (mg)
0805	100 mW	10 to 12K	5.2
1206	250 mW	10 to 30K	10.3
1506	300 mW	10 to 40K	12
2010 ^(*)	500 mW ^(*)	10 to 100K	25
2512 ^(*)	750 mW ^(*)	10 to 150K	35

^(*) VFCP2010 and VFCP2512 data are preliminary, for more details please contact application engineering using the e-mail addresses in the footer below.

Note: See table 1

TABLE 4 - ENVIRONMENTAL PERFORMANCE SPECIFICATIONS

TEST	MIL-PRF-55342 H CHARACTERISTIC E ΔR LIMITS	VFCP MAXIMUM ΔR LIMITS**
Thermal Shock	$\pm 0.1\%$	$\pm 0.01\%$
Low Temperature Operation	$\pm 0.1\%$	$\pm 0.01\%$
Short Time Overload	$\pm 0.1\%$	$\pm 0.01\%$
High Temperature Exposure	$\pm 0.1\%$	$\pm 0.02\%$
Resistance to Soldering Heat	$\pm 0.2\%$	$\pm 0.015\%$
Moisture Resistance	$\pm 0.2\%$	$\pm 0.02\%$
Load Life Stability +70°C for 2000 hours	$\pm 0.5\%$	$\pm 0.01\%$
Maximum Working Voltage (V)	$\sqrt{P \times R}$	

**As shown + 0.01 Ω to allow for measurement errors at low values.

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

BOTTOM VIEW (showing terminals for mounting)				LAND PATTERN			
CHIP SIZE	L ± 0.005 (0.13)	W ± 0.005 (0.13)	THICKNESS MAXIMUM	D ± 0.005 (0.13)	Z*** MAXIMUM	G*** MINIMUM	X*** MAXIMUM
0805	0.079 (2.01)	0.049 (1.25)	0.025 (0.64)	0.010 (0.25)	0.078 (2.07)	0.053 (1.35)	0.049 (1.25)
1206	0.126 (3.20)	0.062 (1.57)	0.025 (0.64)	0.015 (0.38)	0.125 (3.20)	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 (3.84)	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)

***Land Pattern Dimensions are per IPC-782

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Vishay Foil Resistors

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FIGURE 1 - POWER DERATING CURVE

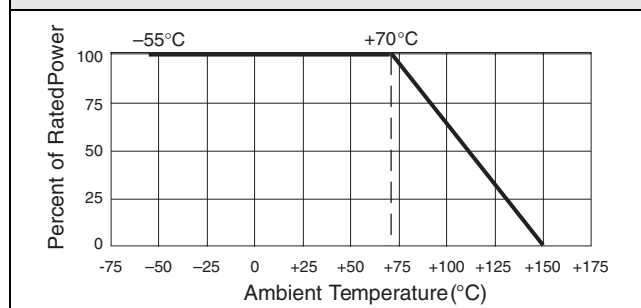


FIGURE 2 - CHIP CONFIGURATION

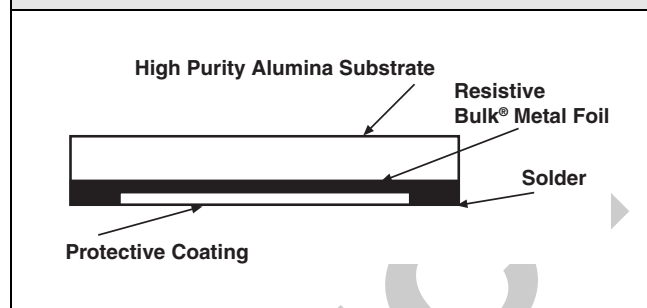
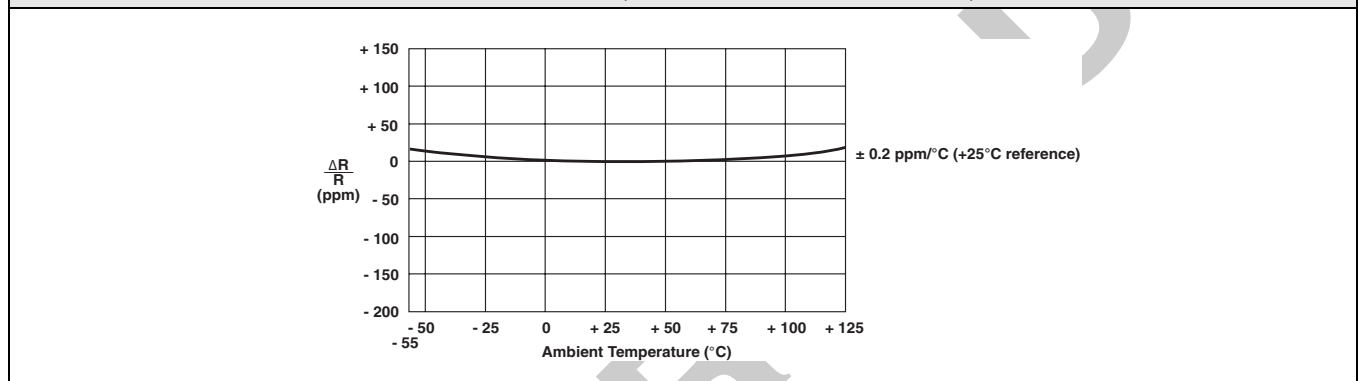


FIGURE 3 - TYPICAL TCR CURVE Z-FOIL (For more details, see Table 1)



Note: The TCR values for $< 100\Omega$ are influenced by the termination composition and result in deviation from this curve

TABLE 6 - ORDERING INFORMATION

MODEL	CHIP SIZE	RESISTANCE VALUE			TCR	TOLERANCE	TERMINATION	PACKAGING
VFCP	0805	RESISTANCE RANGE	LETTER DESIGNATOR	MULTIPLIER FACTOR	TCR0.2	T = 0.01%	S = Lead (Pb)-Free B = Tin/Lead	T = Tape and Reel W = Waffle Pack
	1206					Q = 0.02%		
	1506	10Ω to < 1KΩ	R	X 1.0		A = 0.05%		
	2010	Example: 249R00 = 249Ω				B = 0.1%		
	2512	1KΩ to 150KΩ	K	X 10 ³		C = 0.25%		
		Example: 10K000 = 10.0KΩ				D = 0.5%		
						F = 1.0%		

Example:

VFCP0805 10K000 TCR0.2 TSW

Model: VFCP0805

Value: 10K Ω

TCR0.2: 0.2 ppm/°C typical refers to any value in the resistance range (see table 1)

Tolerance: $\pm 0.01\%$

Termination: Lead (Pb)-Free

Packaging: Waffle Pack

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