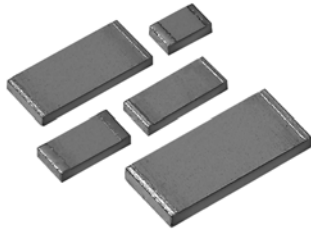


### Z Foil Wrap Around Surface Mount Chip Resistor with TCR of $\pm 0.2 \text{ ppm}/^\circ\text{C}$ and Load Life Stability of $\pm 0.005\%$



Top View

#### INTRODUCTION

**VSMP series is the industry's first device to provide High Rated power, Excellent load life stability along with extremely low TCR all in one resistor.**

Bulk Metal<sup>®</sup> 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 VSMP Series utilizes ultra precision Bulk Metal<sup>®</sup> 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 VSMP has a full wrap around termination which insures safe handling during the manufacturing process, as well as providing stability during multiple thermal cyclings.

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

#### FEATURES

- TCR:  $\pm 0.2 \text{ ppm}/^\circ\text{C}$  typical (see Table 1)
- PCR (Power Coefficient of Resistance): 5 ppm at rated power.
- Load Life Stability (70°C for 2000 hours):  $\pm 0.005\%$
- 750 mW at +70°C
- Resistance Range: 10Ω to 150KΩ (for higher and lower values, please contact us)
- Tolerance: to 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 AND MAX. SPREAD (ppm/°C)
250 to 150K	$\pm 0.01$	$\pm 0.2 \pm 1.8$
100 to < 250	$\pm 0.02$	$\pm 0.2 \pm 1.8$
50 to < 100	$\pm 0.05$	$\pm 0.2 \pm 2.8$
25 to < 50	$\pm 0.1$	$\pm 0.2 \pm 3.8$
10 to < 25	$\pm 0.25$	$\pm 0.2 \pm 3.8$

\*\*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

#### SALES

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# VSMP Series (0805, 1206, 1506, 2010, 2512)

Z Foil Wrap Around Surface Mount Chip Resistor with Vishay Foil Resistors  
TCR of  $\pm 0.2 \text{ ppm}/^\circ\text{C}$  and Load Life Stability of  $\pm 0.005\%$

TABLE 2 - LOAD LIFE STABILITY (+70°C FOR 2000 HOURS)	
CHIP SIZE	MAXIMUM $\Delta R$ LIMITS
0805	$\pm 0.005\%$ at 100 mW $\pm 0.01\%$ at 200 mW
1206, 1506	$\pm 0.005\%$ at 150 mW $\pm 0.01\%$ at 300 mW
2010 <sup>(*)</sup>	$\pm 0.005\%$ at 200 mW <sup>(*)</sup> $\pm 0.01\%$ at 500 mW <sup>(*)</sup>
2512 <sup>(*)</sup>	$\pm 0.005\%$ at 500 mW <sup>(*)</sup> $\pm 0.01\%$ at 750 mW <sup>(*)</sup>

TABLE 3 - SPECIFICATIONS			
CHIP SIZE	MAXIMUM POWER (mW) at +70°C	RESISTANCE RANGE ( $\Omega$ )	MAXIMUM WEIGHT (mg)
0805	200	10 to 12K	6
1206	300	10 to 30K	11
1506	300	10 to 40K	12
2010 <sup>(*)</sup>	500 <sup>(*)</sup>	10 to 100K	27
2512 <sup>(*)</sup>	750 <sup>(*)</sup>	10 to 150K	40

<sup>(\*)</sup> VSMP2010 and VSMP2512 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 $\Delta R$ LIMITS	VSMP MAXIMUM $\Delta R$ 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	$\pm 0.2\%$	$\pm 0.01\%$
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 $\Omega$  to allow for measurement errors at low values.

TABLE 5 - DIMENSIONS AND LAND PATTERN in inches (millimeters)							
CHIP SIZE	L $\pm 0.005$ (0.13)	W $\pm 0.005$ (0.13)	THICKNESS MAXIMUM	D $\pm 0.005$ (0.13)	Z*** MAXIMUM	G*** MINIMUM	X*** MAXIMUM
0805	0.080 (2.03)	0.050 (1.27)	0.025 (0.64)	0.015 (0.38)	0.122 (3.10)	0.028 (0.70)	0.050 (1.27)
1206	0.126 (3.2)	0.062 (1.57)	0.025 (0.64)	0.020 (0.50)	0.175 (4.4)	0.059 (1.5)	0.071 (1.80)
1506	0.150 (3.81)	0.062 (1.57)	0.025 (0.64)	0.020 (0.50)	0.199 (5.05)	0.083 (2.1)	0.071 (1.80)
2010	0.198 (5.03)	0.097 (2.46)	0.025 (0.64)	0.025 (0.64)	0.247 (6.27)	0.115 (2.92)	0.103 (2.63)
2512	0.249 (6.32)	0.127 (3.22)	0.025 (0.64)	0.032 (0.81)	0.291 (7.40)	0.150 (3.8)	0.127 (3.22)

\*\*\*Land Pattern Dimensions are per IPC-782

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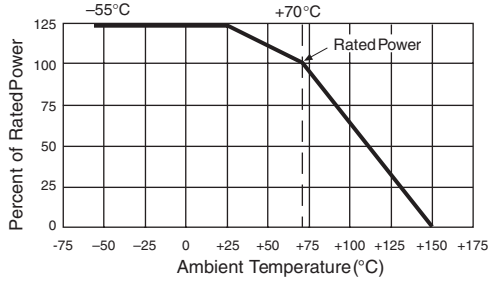
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# VSMP Series (0805, 1206, 1506, 2010, 2512)

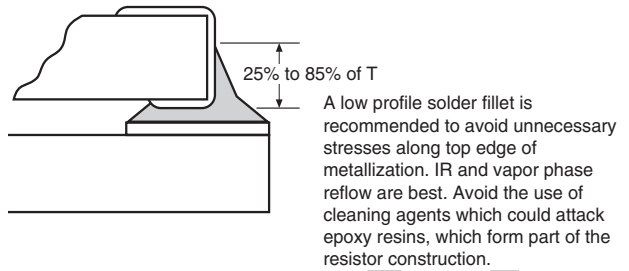


Vishay Foil Resistors Z Foil Wrap Around Surface Mount Chip Resistor with  
TCR of  $\pm 0.2 \text{ ppm}/^\circ\text{C}$  and Load Life Stability of  $\pm 0.005\%$

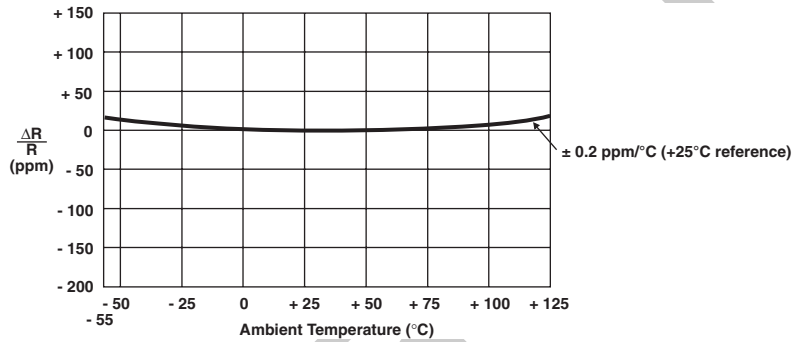
**FIGURE 1 - POWER DERATING CURVE**



**FIGURE 2 - RECOMMENDED MOUNTING**



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



Note: The TCR for values < 100Ω 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
		RESISTANCE RANGE	LETTER DESIGNATOR	MULTIPLIER FACTOR				
VSMP	0805	10Ω to < 1KΩ	R	X 1.0	TCR0.2	T = 0.01% Q = 0.02% A = 0.05% B = 0.1% C = 0.25% D = 0.5% F = 1.0%	S = Lead (Pb)-Free B = Tin/Lead	T = Tape and Reel W = Waffle Pack
	1206							
	1506							
	2010	Example: 249R00 = 249Ω						
	2512	1KΩ to 150KΩ	K	X 10 <sup>3</sup>				
		Example: 10K000 = 10.0KΩ						

Example:  
VSMP0805 10k000 TCR0.2 TSW  
Model: VSMP0805  
Value: 10KΩ  
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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