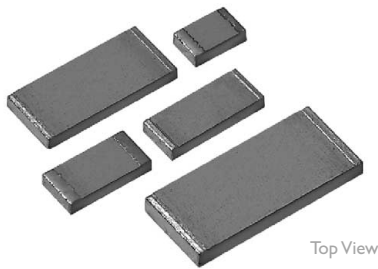


Z Foil Wrap Around Surface Mount Chip Resistor with TCR of $\pm 0.05 \text{ ppm}/^\circ\text{C}$ and Load Life Stability of $\pm 0.005\%$ (50ppm)



Top View

Any value at any tolerance available within resistance range

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® 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® 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

- **Temperature Coefficient of Resistance (TCR):**
 $\pm 0.05 \text{ ppm}/^\circ\text{C}$ (Industrial range)
 $\pm 0.2 \text{ ppm}/^\circ\text{C}$ (MIL range)
- **Power Coefficient "ΔR due to self heating":**
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 125KΩ (for higher and lower values, please contact us)
- Electrostatic Discharge (ESD) above 25 000 Volts
- Short time overload $\leq 0.005\%$
- Non Inductive/Capacitive design
- Tolerance: to 0.01%
- Non hot spot design
- Rise time: 1 ns without ringing
- Current Noise: - 42dB
- Voltage Coefficient < 0.1 ppm/V
- Non Inductive: < 0.08μH
- Thermal EMF: < 0.05μV/°C
- Terminal Finishes Available:
RoHS Compliant
Tin/Lead Alloy
- Matched sets are available per request
- For better performances please contact us

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 - TRIMMING TO VALUES (CONCEPTUAL ILLUSTRATION)

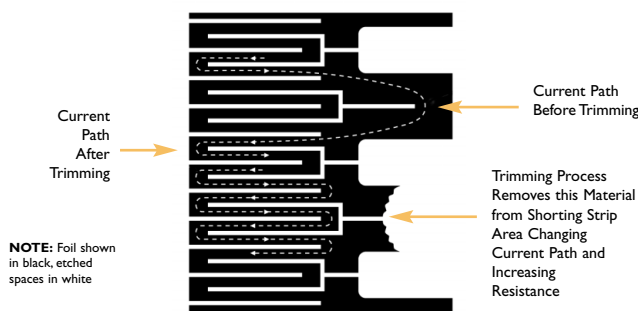


TABLE 1 - TOLERANCE AND TCR VS RESISTANCE VALUE

RESISTANCE VALUE (Ω)	TOLERANCE (%)	TYPICAL TCR & MAX. SPREAD (MIL RANGE) (ppm/°C)
250 to 125K	± 0.01	$\pm 0.2 \pm 1.8$
100 to < 250	± 0.02	$\pm 0.2 \pm 1.8$
50 to < 100	± 0.05	$\pm 0.2 \pm 2.8$
25 to < 50	± 0.1	$\pm 0.2 \pm 3.8$
10 to < 25	± 0.25	$\pm 0.2 \pm 3.8$

Z Foil Wrap Around Surface Mount Chip Resistor with TCR of $\pm 0.05 \text{ ppm}/^\circ\text{C}$ and Load Life Stability of $\pm 0.005\%$ (50ppm)

TABLE 2 - SPECIFICATIONS

CHIP SIZE	RATED POWER (mW) at +70°C	MAXIMUM VOLTAGE RATING ($\leq\sqrt{PxR}$)	RESISTANCE RANGE (Ω)	MAXIMUM WEIGHT (mg)
0805	200	40V	10 to 8K	6
1206	300	87V	10 to 25K	11
1506	300	95V	10 to 30K	12
2010	500	187V	10 to 70K	27
2512	750	220V	10 to 125K	40

TABLE 3 - LOAD LIFE STABILITY (+70°C FOR 2000 HOURS)

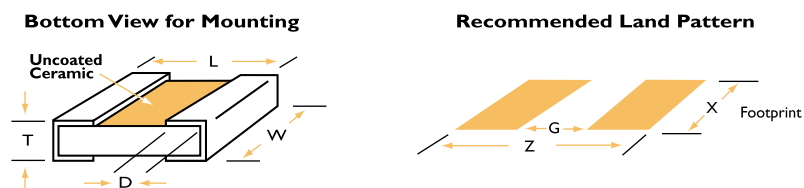
CHIP SIZE	MAXIMUM ΔR LIMITS
0805	$\pm 0.005\%$ at 100 mW $\pm 0.01\%$ at 200 mW
1206, 1506	$\pm 0.005\%$ at 150 mW $\pm 0.01\%$ at 300 mW
2010	$\pm 0.005\%$ at 200 mW $\pm 0.01\%$ at 500 mW
2512	$\pm 0.005\%$ at 500 mW $\pm 0.01\%$ at 750 mW

TABLE 4 - PERFORMANCES

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

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

TABLE 5 - DIMENSIONS AND LAND PATTERN in millimeters



CHIP SIZE	L ± 0.13	W ± 0.13	THICKNESS MAXIMUM	D ± 0.13	Z*** MAXIMUM	G*** MINIMUM	X*** MAXIMUM
0805	2.03	1.27	0.64	0.38	3.10	0.70	1.27
1206	3.20	1.57	0.64	0.50	4.40	1.50	1.80
1506	3.81	1.57	0.64	0.50	5.05	2.10	1.80
2010	5.03	2.46	0.64	0.64	6.27	2.92	2.63
2512	6.32	3.22	0.64	0.81	7.40	3.80	3.22

***Land Pattern Dimensions are per IPC-782

Z Foil Wrap Around Surface Mount Chip Resistor with TCR of $\pm 0.05 \text{ ppm}/^\circ\text{C}$ and Load Life Stability of $\pm 0.005\%$ (50ppm)

FIGURE 2 - POWER DERATING CURVE

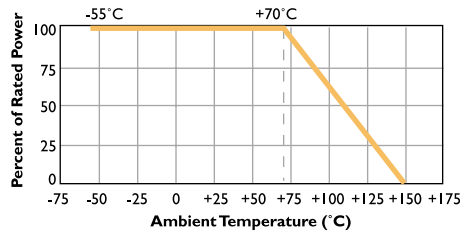
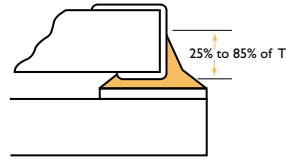
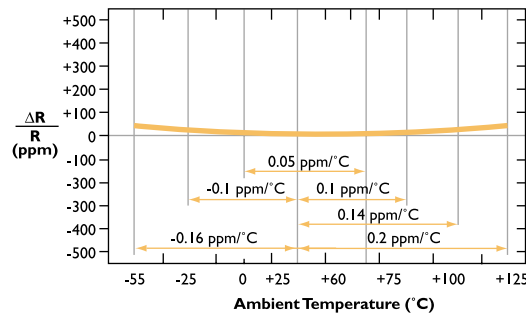


FIGURE 3 - RECOMMENDED MOUNTING



A low profile solder fillet is recommended to avoid unnecessary stresses along top edge of metallization. IR and vapor phase reflow are best. Avoid the use of cleaning agents which could attack epoxy resins, which form part of the resistor construction.

FIGURE 4 - TYPICAL TCR CURVE Z-FOIL (For more details, see Table I)



Note: The TCR for values $<100\Omega$ 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
		RESISTANCE RANGE	LETTER DESIGNATOR	MULTIPLIER FACTOR				
CE-VSMP	0805	10Ω to < 1KΩ Example: 249R00 = 249Ω	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 = RoHS compliant B = Tin/Lead alloy	T = Tape and Reel W = Waffle Pack
CE-VSMP	1206							
CE-VSMP	1506							
CE-VSMP	2010							
CE-VSMP	2512							
		1KΩ to 125KΩ	K	X 10 ³				
		Example: 10K000 = 10.0KΩ						

Ordering information example:

CE-VSMP0805 1K000 TCR0.2 TSW Model: CE-VSMP0805 Value: 1KΩ

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

Tolerance: $\pm 0.01\%$ Termination: RoHS compliant Packaging: Waffle Pack