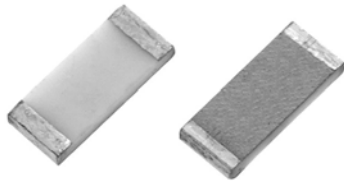


## Bulk Metal<sup>®</sup> Foil Technology

### Discrete High Precision Surface Mount Chip Resistor



Product may not  
be to scale

The VSM1206 Precision Surface Mount Chip Resistor utilizes Ultra Precision Bulk Metal<sup>®</sup> Z Foil (BMZF) for the resistive element.

The BMZF technology provides inherently an extremely low and predictable Temperature Coefficient of Resistance (TCR), remarkable load life stability, low noise and availability of tight tolerance.

The TCR is a process capability not a selection process and for most of the range is independent of ohmic value and lot related variations. The TCR curve on Fig. 1 demonstrates the new revolutionary Z Foil with its TCR nominal of 0.5ppm/°C.

A voltage divider can be fashioned by using two arbitrarily selected VSM1206s with a resultant tracking specification of < 3ppm/°C. Extremely low tracking of < 1ppm/°C can be supplied upon request.

The VSM1206 has a conventional full wrap around robust termination which insures safe handling during manufacturing process, as well as providing stability during the multiple thermal cyclings it will see over its service life.

The availability of tight absolute tolerance provides a good cost solution for the variability of other components when compiling the total error budget. BMZF offers the best stability available; and is more than an order of magnitude better than thin film technology. The noise generated by the resistor is non measurable and its design and construction make it well suited for high frequency applications. The BMZF is the ultimate resistor component for analog applications.

#### FEATURES

- High Precision: Tolerance to  $\pm 0.01\%$  (see table 1)
- Low Temperature Coefficient of Resistance:  
Nominal TCR:  $+ 0.5\text{ppm}/^\circ\text{C}$  ( $- 55^\circ\text{C}$  to  $+ 125^\circ\text{C}$ )
- Resistance Range:  $10\Omega$  to  $30\text{K}\Omega$
- Load Life Stability:  $\pm 0.01\%$  maximum  $\Delta R$  under full rated power at  $+ 70^\circ\text{C}$  for 2000 hours.
- Shelf Life Stability: 50ppm/year (0.005%) maximum  $\Delta R$  non-hermetically sealed
- Power Rating at  $+ 70^\circ\text{C}$ : 125mW
- Maximum Working Voltage: 61V
- Maximum Weight: 11mg
- Voltage Coefficient:  $< 0.00001\%/ \text{volt}$  ( $< 0.1\text{ppm}/\text{V}$ )
- Current Noise:  $< 0.01\mu\text{V}(\text{rms})/\text{volt}$  of applied voltage
- Non Inductive:  $< 0.08\text{nH}$

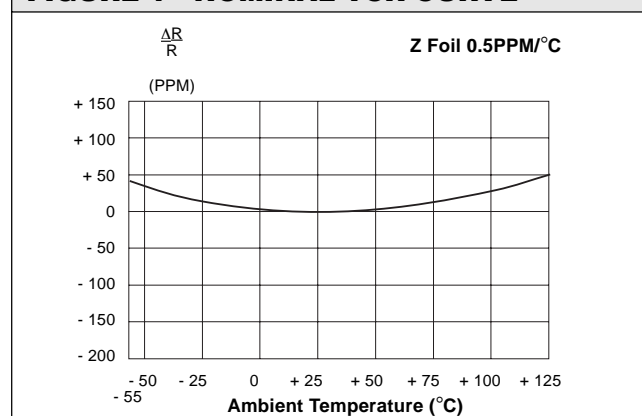
**TABLE 1 TOLERANCE AND TCR VS RESISTANCE VALUE**

VALUE ( $\Omega$ )	STANDARD TOLERANCE* (%)	MAXIMUM TCR**
100 $\Omega$ to 30K $\Omega$	$\pm 0.01$	$\pm 2\text{ppm}/^\circ\text{C}$
50 $\Omega$ to $< 100\Omega$	$\pm 0.05$	$\pm 3\text{ppm}/^\circ\text{C}$
25 $\Omega$ to $< 50\Omega$	$\pm 0.1$	$\pm 3\text{ppm}/^\circ\text{C}$
10 $\Omega$ to $< 25\Omega$	$\pm 0.25$	$\pm 4\text{ppm}/^\circ\text{C}$

\*Tighter tolerances are available. Please contact Vishay Application Engineering.

\*\*Over MIL range ( $- 55^\circ\text{C}$  to  $+ 125^\circ\text{C}$ ,  $+ 25^\circ\text{C}$  reference)

**FIGURE 1 - NOMINAL TCR CURVE**



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

VISHAY FOIL • FRANCE +33.4.93.37.28.24 FAX: +33.4.93.37.27.31  
• GERMANY +49.9287.710 FAX: +49.9287.70435  
• ISRAEL +972.3.557.0945 FAX: +972.3.558.9121

• ITALY +39.2.300.11919 FAX: +39.2.300.11999  
• JAPAN +81.3.5464.6411 FAX: +81.3.5464.6433  
• SINGAPORE +65.788.6668 FAX: +65.788.0988

• SWEDEN +46.8.594.70590 FAX: +46.8.594.70581  
• UK +44 191 514 8237 FAX: +44 1953 457 722  
• USA +1 610 407-4800 FAX: +1 610 640-9081

TABLE 2 - TYPICAL PERFORMANCE SPECIFICATIONS		
TEST	MIL-PRF-55342G CHARACTERISTIC E $\Delta R$ LIMITS	VSM1206 MAXIMUM $\Delta R$ LIMITS*
Thermal Shock	$\pm 0.10\%$	$\pm 0.02\%$
Low Temperature Operation	$\pm 0.10\%$	$\pm 0.02\%$
Short Time Overload	$\pm 0.10\%$	$\pm 0.02\%$
High Temperature Exposure	$\pm 0.10\%$	$\pm 0.03\%$
Resistance to Bonding	$\pm 0.20\%$	$\pm 0.01\%$
Moisture Resistance	$\pm 0.20\%$	$\pm 0.03\%$
Life 2000 hours @ +70°C	$\pm 0.50\%$	$\pm 0.01\%$

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

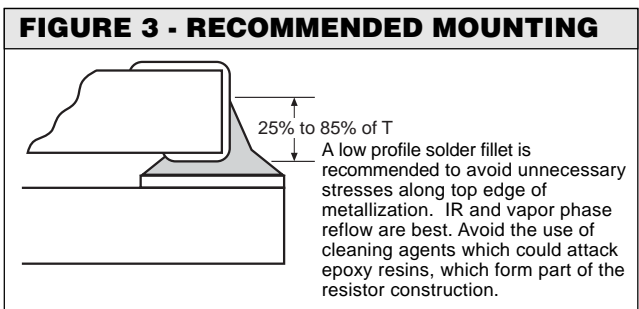
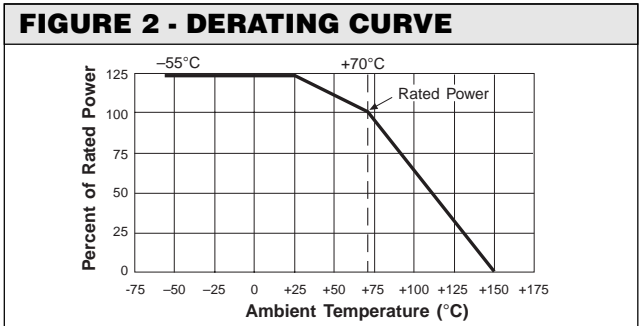
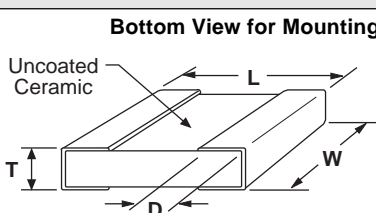
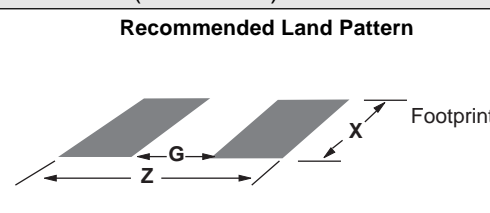


TABLE 3 - DIMENSIONS AND LAND PATTERN in inches (millimeters)						
<p><b>Bottom View for Mounting</b></p> 				<p><b>Recommended Land Pattern</b></p> 		
<b>L</b> $\pm 0.005$ [0.13]	<b>W</b> $\pm 0.005$ [0.13]	<b>T</b> MAXIMUM	<b>D</b> $\pm 0.005$ [0.13]	<b>Z*</b> MAXIMUM	<b>G*</b> MINIMUM	<b>X*</b> MAXIMUM
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 [1.806]

\*Land Pattern Dimensions are per IPC-782

TABLE 4 - ORDERING INFORMATION						
MODEL	CHIP SIZE	RESISTANCE VALUE			TOLERANCE	TERMINATION
VSM	1206	RESISTANCE RANGE	LETTER DESIGNATOR	MULTIPLIER FACTOR	T $\pm 0.01\%$ Q $\pm 0.02\%$ A $\pm 0.05\%$ B $\pm 0.1\%$ C $\pm 0.25\%$ D $\pm 0.5\%$ F $\pm 1.0\%$	B = Solderable
		10 $\Omega$ to < 1K $\Omega$	R	x 1.0		
		1K to 30K	K	x 10 <sup>3</sup>		
		Example: 249R00 = 249 $\Omega$  Example: 10K000 = 10.0K $\Omega$				T = Tape and Reel W = Waffle Pack