

### Ultra High Precision Z-Bulk Metal<sup>®</sup> Foil Technology Low Profile Conformally Coated High Precision Resistor with TCR down to $\pm 0.05 \text{ ppm}/^\circ\text{C}$ , Tight Tolerance from $\pm 0.01 \%$ and Load Life Stability of $\pm 0.01 \%$



#### INTRODUCTION

Bulk Metal<sup>®</sup> Foil (BMF) technology out-performs all other resistor technologies available today for applications that require high precision and high stability, and allows production of customer oriented products designed to satisfy challenging and specific technical requirements.

The BMF provides an inherently low and predictable Temperature Coefficient of Resistance (TCR) and excellent load life stability for high precision analog applications.

Model VSH offers low TCR, excellent load life stability, tight tolerance, excellent shelf life stability, low current noise and low voltage coefficient, all in the same resistor.

Our application engineering department is available to advise and make recommendations. For non-standard technical requirements and special applications, please contact us using the e-mail address in the footer below.

#### FEATURES

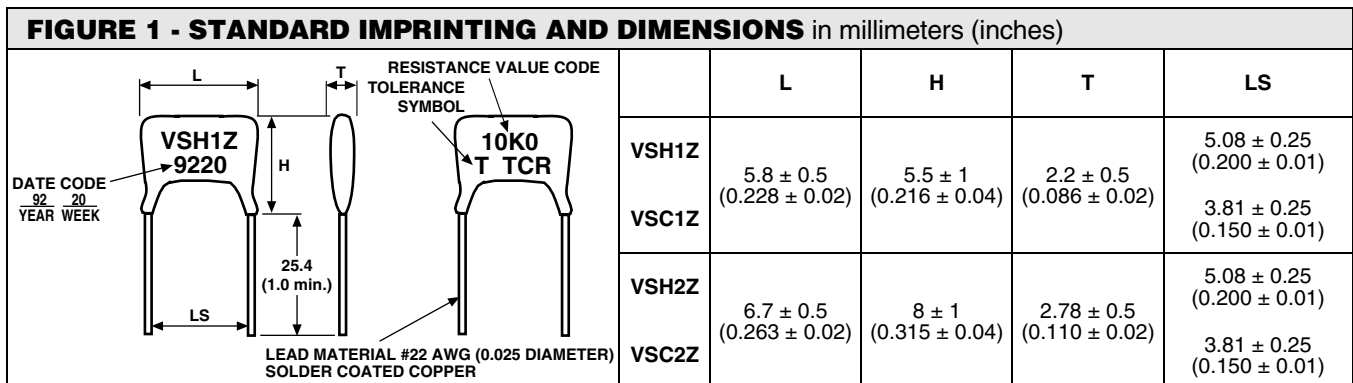
- Temperature coefficient of resistance (TCR):  $\pm 0.2 \text{ ppm}/^\circ\text{C}$  typical (- 55 °C to + 125 °C, + 25 °C ref.) (see table 1)
- Tolerance: to  $\pm 0.01 \%$
- Power rating: to 300 mW at + 70 °C
- Load life stability: to  $\pm 0.01 \%$  at 70 °C, 2000 h at rated power
- Resistance range: 5  $\Omega$  to 120 k $\Omega$
- Vishay Foil resistors are not restricted to standard values, we can supply specific "as required" values at no extra cost or delivery (e.g.100K1234 vs. 100K)
- Instantaneous thermal stabilization < 1 s
- **Electrostatic discharge (ESD) up to 25 000 V**
- Short time overload:  $\leq 0.01 \%$
- Maximum working voltage: 300 V
- Non inductive, non capacitive design
- Rise time: 1 ns effectively no ringing
- Current noise: < - 42 dB
- Voltage coefficient < 0.1 ppm/V
- Non inductive: < 0.08  $\mu\text{H}$
- Non hot spot design
- Terminal finishes available: lead (Pb)-free; tin/lead alloy
- Matched sets are available per request
- Prototype samples available from 72 h. For more information, please contact [foil@vishay.com](mailto:foil@vishay.com)
- For better performances please review **VHP203** Series datasheet



**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)
- Commercial aviation
- Airborne
- Down hole instrumentation
- Communication



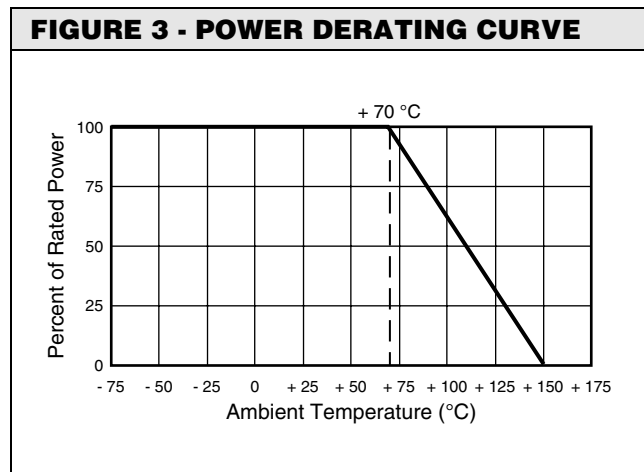
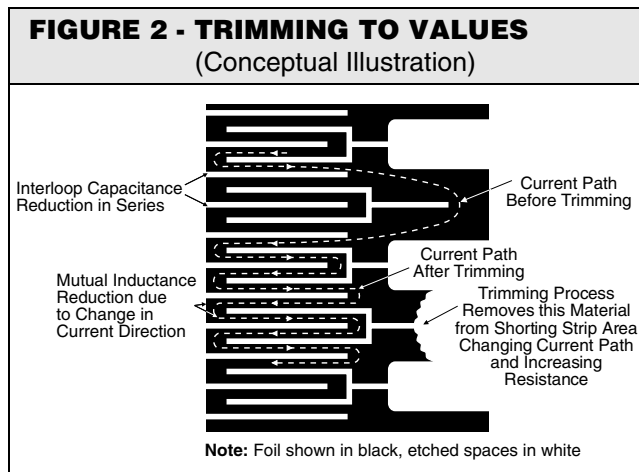
#### Note

1. Letters H and C indicate a difference in lead spacing and -2 is an extension range

Vishay Foil Resistors Ultra High Precision Z-Bulk Metal® Foil Technology Low Profile Conformally Coated High Precision Resistor with TCR down to  $\pm 0.05 \text{ ppm}/^\circ\text{C}$ , Tight Tolerance from  $\pm 0.01 \%$  and Load Life Stability of  $\pm 0.01 \%$

TABLE 1 - TOLERANCE AND TCR VS. RESISTANCE VALUE (- 55 °C to + 125 °C, + 25 °C Ref.)			
RESISTOR	RESISTANCE VALUE ( $\Omega$ )	TYPICAL TCR AND MAX. SPREAD ( $\text{ppm}/^\circ\text{C}$ )	TOLERANCE (%)
VSH2Z VSC2Z	5K to 120K	$\pm 0.2 \pm 1.8$	$\pm 0.01 \%$
VSH1Z VSC1Z	50 to < 80K	$\pm 0.2 \pm 1.8$	$\pm 0.01 \%$
VSH1Z VSC1Z	20 to < 50	$\pm 0.2 \pm 2.8$	$\pm 0.02 \%$
VSH1Z VSC1Z	10 to < 20	$\pm 0.2 \pm 4.8$	$\pm 0.02 \%$
VSH1Z VSC1Z	5 to < 10	$\pm 0.2 \pm 6.8$	$\pm 0.05 \%$

TABLE 2 - PERFORMANCE SPECIFICATIONS			
TEST	CONDITIONS	$\Delta R$ (%) - TYPICAL	$\Delta R$ (%) - MAXIMUM
Moisture Resistance	MIL-STD-202, method 106	$\pm 0.005$	$\pm 0.03$
Pressure Cooker Test	2 atmospheres absolute pressure, 121 °C, 100 % R.H. for 100 h	$\pm 0.2$	$\pm 0.4$
Short Time Overload	$6.25 \times P_{\text{nom}}$ , 5 s	$\pm 0.005$	$\pm 0.05$
Resistance to Solder Heat	+ 260 °C, 20 s	$\pm 0.01$	$\pm 0.03$
Terminal Strength	2 lbs, 10 s	$\pm 0.0025$	$\pm 0.03$
Insulation Resistance	DC 100 V, 2 min	> 10 000M	> 10 000M
Dielectric Withstanding Voltage	AC 300 V, 1 min	$\pm 0.0025$	$\pm 0.03$
Thermal Shock	- 65 °C to + 150 °C, 5 cycles	$\pm 0.01$	$\pm 0.02$
Shock	MIL-STD-202, method 213, condition I	$\pm 0.005$	$\pm 0.03$
Vibration	MIL-STD-202, method 204, condition D	$\pm 0.01$	$\pm 0.03$
Load Life Stability	0.3 W, + 70 °C, 2000 h	$\pm 0.01$	$\pm 0.015$
Thermal EMF	-	0.07 $\mu\text{V}/^\circ\text{C}$	0.1 $\mu\text{V}/^\circ\text{C}$
Current Noise	Quan-Tech	- 42 dB	- 32 dB
Low Temperature Storage	24 h at - 65 °C	$\pm 0.005$	$\pm 0.01$
Low Temperature Operation	45 min at - 65 °C	$\pm 0.005$	$\pm 0.01$
High Temperature Exposure	+ 150 °C	$\pm 0.01$	$\pm 0.03$



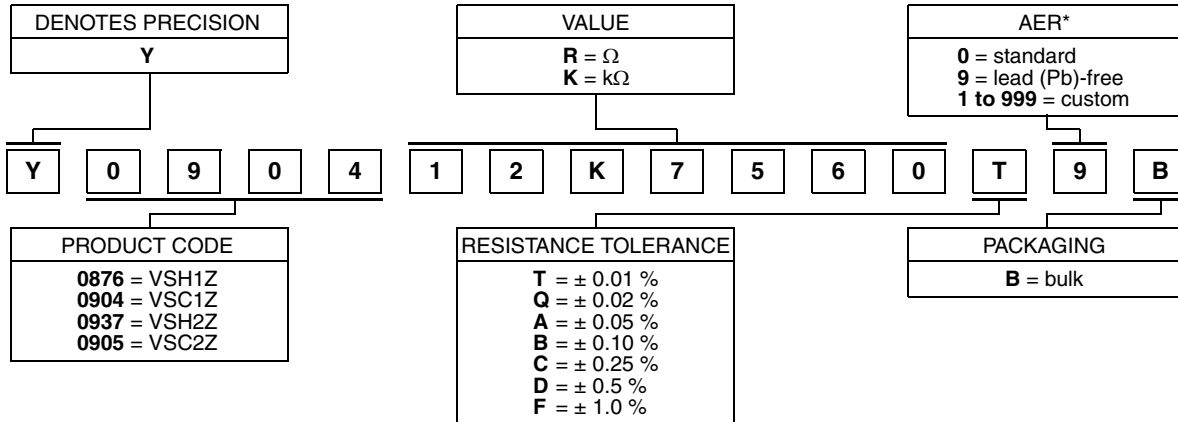


# VSHZ, VSCZ (Z-Foil)

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**TABLE 3 - GLOBAL PART NUMBER INFORMATION**

NEW GLOBAL PART NUMBER: Y090412K7560T9R (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y0904 12K7560 T 9 B:

TYPE: VSC1Z  
VALUES: 12.7560  $k\Omega$   
ABSOLUTE TOLERANCE: 0.01 %  
TERMINATION: lead (Pb)-free  
PACKAGING: bulk

HISTORICAL PART NUMBER: VSC1Z 12K756 TCR0.2 T S B (will continue to be used)

<b>VSC1Z</b>	<b>12K756</b>	<b>TCR0.2</b>	<b>T</b>	<b>S</b>	<b>B</b>
MODEL	RESISTANCE VALUE	TCR CHARACTERISTICS	TOLERANCE	TERMINATION	PACKAGING
VSH1Z VSC1Z VSH2Z VSC2Z	12.756 $k\Omega$		<b>T</b> = $\pm 0.01 \%$ <b>Q</b> = $\pm 0.02 \%$ <b>A</b> = $\pm 0.05 \%$ <b>B</b> = $\pm 0.10 \%$ <b>C</b> = $\pm 0.25 \%$ <b>D</b> = $\pm 0.5 \%$ <b>F</b> = $\pm 1.0 \%$	<b>S</b> = lead (Pb)-free <b>B</b> = tin/lead	<b>B</b> = bulk

**Note**

\* For non-standard requests, please contact application engineering.



## Disclaimer

All product specifications and data are subject to change without notice.

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