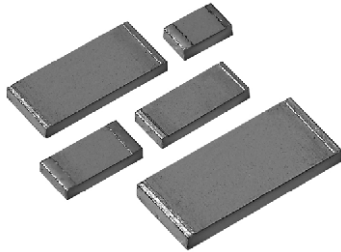


### High Precision Foil Wraparound Surface Mount Chip Resistor with TCR of $\pm 2 \text{ ppm}/^\circ\text{C}$ and Load Life Stability of $\pm 0.01 \%$ (100 ppm)



Top View

**Any value at any tolerance within resistance range**

#### 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 VSM 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.

The VSM has a full wraparound termination which ensures 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 using the e-mail address in the footer below.

**TABLE 1 - TOLERANCE AND TCR VS RESISTANCE VALUE<sup>1)</sup>**

(- 55 °C to + 125 °C, + 25 °C Ref.)

RESISTANCE VALUE (Ω)	TOLERANCE (%)	TYPICAL TCR AND MAX. SPREAD (ppm/°C)
250 to 150K	± 0.01	± 2 ± 2
100 to < 250	± 0.02	± 2 ± 3
50 to < 100	± 0.05	± 2 ± 3
25 to < 50	± 0.1	± 2 ± 4
10 to < 25	± 0.25	± 2 ± 6

**Note**

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

#### FEATURES

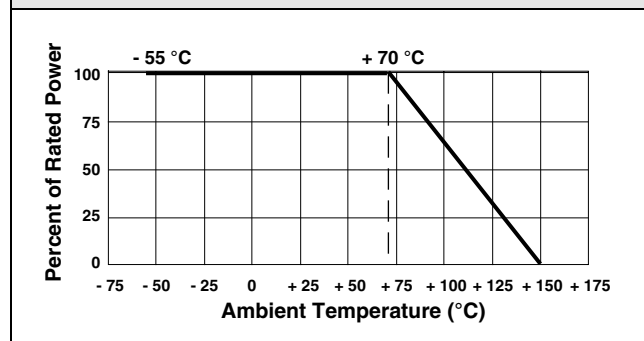
- Temperature Coefficient of Resistance (TCR): ± 2.0 ppm/°C typical (- 55 °C to + 125 °C, + 25 °C Ref.) (see Table 1)
- Tolerance: to ± 0.01 %
- Power Rating: to 400 mW at + 70 °C
- Load Life Stability: to ± 0.01 % at 70 °C, 2000 hours at Rated Power
- Resistance Range: 10 Ω to 150 kΩ (for higher and lower values, please contact us)
- Electrostatic Discharge (ESD) above 25 000 V
- Short Time Overload: ≤ 0.01 %
- Non Inductive, Non Capacitive Design
- Rise Time: 1 ns without ringing
- Current Noise: - 40 dB
- Voltage Coefficient < 0.1 ppm/V
- Non Inductive: < 0.08 μH
- Non Hot Spot Design
- Terminal Finishes Available: Lead (Pb)-free Tin/Lead Alloy
- Matched sets are available per request
- Any value available within resistance range (e.g. 1K2345)
- Prototype samples available from 48 hours. For more information, please contact [foil@vishay.com](mailto:foil@vishay.com)
- For better performances please review **VSMP** and **VFCP** Series datasheets



#### 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 - POWER DERATING CURVE**



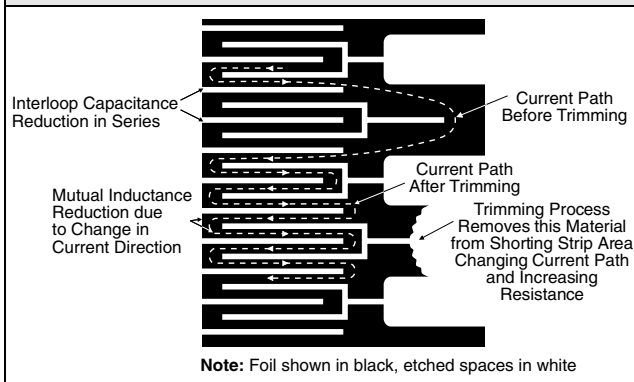
\* Pb containing terminations are not RoHS compliant, exemptions may apply



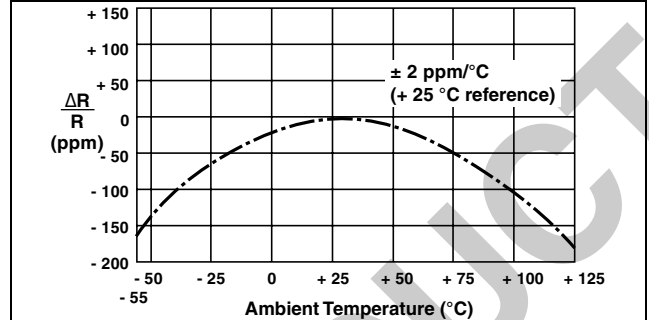
# VSM Series (0805, 1206, 1506, 2010, 2512)

High Precision Foil Wraparound Surface Mount Chip Resistor with TCR of  $\pm 2 \text{ ppm}/^\circ\text{C}$  and Load Life Stability of  $\pm 0.01 \%$  (100 ppm) Vishay Foil Resistors

**FIGURE 2 - TRIMMING TO VALUES**  
(Conceptual Illustration)



**FIGURE 3 - TYPICAL TCR CURVE**  
(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 2 - DIMENSIONS AND LAND PATTERN** in inches (millimeters)

CHIP SIZE	$\pm 0.005$ (0.13)	$\pm 0.005$ (0.13)	THICKNESS MAXIMUM	$\pm 0.005$ (0.13)	Z <sup>1)</sup> MAXIMUM	G <sup>1)</sup> MINIMUM	X <sup>1)</sup> MAXIMUM
0805	0.080 (2.03)	0.050 (1.27)	0.025 (0.64)	0.015 (0.38)	0.122 (3.10)	0.028 (0.71)	0.050 (1.27)
1206	0.126 (3.20)	0.062 (1.57)	0.025 (0.64)	0.020 (0.51)	0.175 (4.45)	0.059 (1.50)	0.071 (1.80)
1506	0.150 (3.81)	0.062 (1.57)	0.025 (0.64)	0.020 (0.51)	0.199 (5.05)	0.083 (2.11)	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 (2.62)
2512	0.249 (6.32)	0.127 (3.23)	0.025 (0.64)	0.032 (0.81)	0.291 (7.39)	0.150 (3.81)	0.127 (3.23)

**Note**  
1. Land Pattern Dimensions are per IPC-782

**TABLE 3 - SPECIFICATIONS**

CHIP SIZE	RATED POWER (mW) at + 70 °C	MAX VOLTAGE RATING ( $\leq \sqrt{P \times R}$ )	RESISTANCE RANGE ( $\Omega$ )	MAXIMUM WEIGHT (mg)
0805	100	34 V	10 to 12K	6
1206	150	67 V	10 to 30K	11
1506	200	89 V	10 to 40K	12
2010	300	173 V	10 to 100K	27
2512	400	220 V	10 to 150K	40

**TABLE 4 - PERFORMANCES**

TEST OR CONDITIONS	MIL-PRF-55342 CHARACTERISTIC E $\Delta R$ LIMITS	TYPICAL $\Delta R$ LIMITS	MAXIMUM $\Delta R$ LIMITS <sup>1)</sup>
Thermal Shock	$\pm 0.1 \%$	$\pm 0.005 \%$ (50 ppm)	$\pm 0.02 \%$ (200 ppm)
Low Temperature Operation	$\pm 0.1 \%$	$\pm 0.01 \%$ (100 ppm)	$\pm 0.02 \%$ (200 ppm)
Short Time Overload	$\pm 0.1 \%$	$\pm 0.01 \%$ (100 ppm)	$\pm 0.02 \%$ (200 ppm)
High Temperature Exposure	$\pm 0.1 \%$	$\pm 0.01 \%$ (100 ppm)	$\pm 0.03 \%$ (300 ppm)
Resistance to Soldering Heat	$\pm 0.2 \%$	$\pm 0.005 \%$ (50 ppm)	$\pm 0.01 \%$ (100 ppm)
Moisture Resistance	$\pm 0.2 \%$	$\pm 0.005 \%$ (50 ppm)	$\pm 0.03 \%$ (300 ppm)
Load Life Stability + 70 °C for 2000 hours at Rated Power	$\pm 0.5 \%$	$\pm 0.005 \%$ (50 ppm)	$\pm 0.01 \%$ (100 ppm)

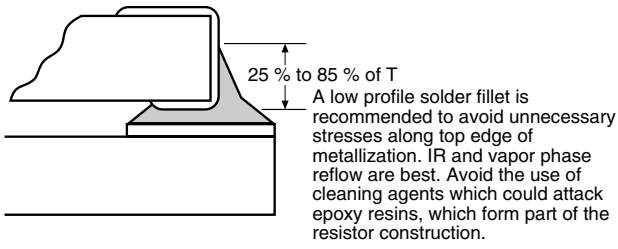
**Note**  
1. As shown + 0.01  $\Omega$  to allow for measurement errors at low values.

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



Vishay Foil Resistors High Precision Foil Wraparound Surface Mount Chip Resistor with TCR of  $\pm 2 \text{ ppm}/^\circ\text{C}$  and Load Life Stability of  $\pm 0.01 \%$  (100 ppm)

**FIGURE 4 - RECOMMENDED MOUNTING**



**TABLE 5 - DSCC SPECIFICATIONS**

Vishay resistors are listed on the following DSCC specifications

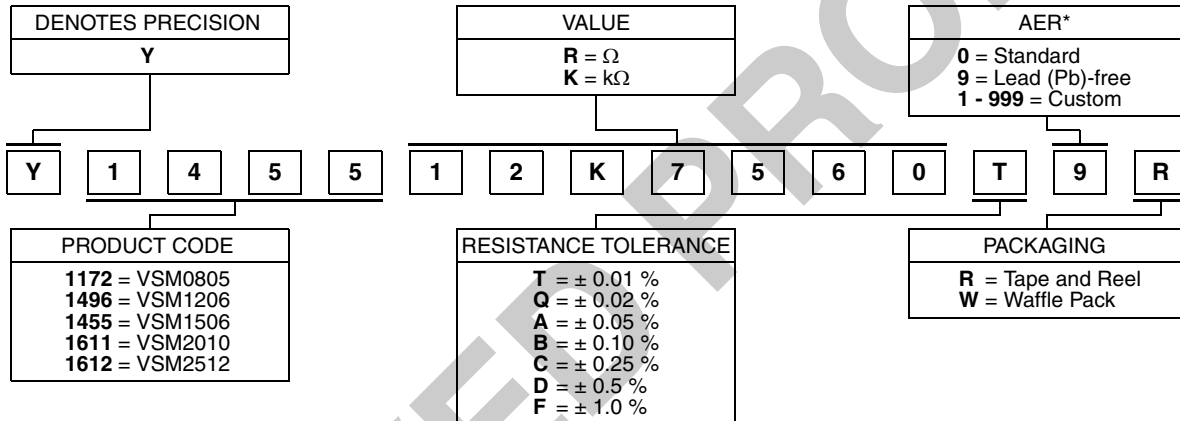
MODEL	DSCC	MIL SPEC
VSM1506	03010	MIL-PRF-55342
VSM2010	06001	MIL-PRF-55342
VSM2512	06002	MIL-PRF-55342

**Note**

- For VSM0805 and VSM1206 DSCC drawings, please contact [foil@vishay.com](mailto:foil@vishay.com)

**TABLE 6 - GLOBAL PART NUMBER INFORMATION**

NEW GLOBAL PART NUMBER: Y145512K7560T9R (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y1455 12K7565 T 9 R:

TYPE: VSM1506  
 VALUES: 12.7560 kΩ  
 ABSOLUTE TOLERANCE: 0.01 %  
 TERMINATION: Lead (Pb)-free  
 PACKAGING: Tape and Reel

HISTORICAL PART NUMBER: VSM1506 12K756 TCR2 T S T (will continue to be used)

VSM1506	12K756	TCR2	T	S	T
MODEL	RESISTANCE VALUE	TCR CHARACTERISTICS	TOLERANCE	TERMINATION	PACKAGING
VSM0805 VSM1206 VSM1506 VSM2010 VSM2512	12.756 kΩ		T = $\pm 0.01 \%$ Q = $\pm 0.02 \%$ A = $\pm 0.05 \%$ B = $\pm 0.10 \%$ C = $\pm 0.25 \%$ D = $\pm 0.5 \%$ F = $\pm 1.0 \%$	S = Lead (Pb)-free B = Tin/Lead	T = Tape and Reel W = Waffle Pack

**Note**

\* For non-standard requests, please contact Application Engineering.



## Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.