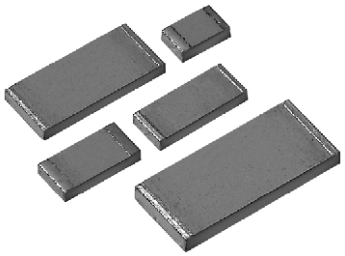
VSM Series (0805, 1206, 1506, 2010, 2512)

Vishay Foil Resistors

Foil Wrap Around Surface Mount Chip Resistor with TCR of ± 2 ppm/°C and Load Life Stability of ± 0.01 % (100 ppm)



Top View

Any value at any tolerance within resistance range

INTRODUCTION

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 applications.

BMF technology allows to produce 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 thermal EMF, low current noise and low voltage coefficient, all in the same resistor.

The VSM has a full wrap around 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.

FEATURES

Pb-free Available

RoHS* COMPLIANT

- Temperature Coefficient of Resistance (TCR): ± 2.0 ppm/°C typical (- 55 °C to + 125 °C, + 25 °C Ref.) (see Table 1)
- Power Rating: to 400 mW at + 70 °C
- Tolerance: to ± 0.01 %
- 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 Volts
- Short Time Overload: ≤ ± 0.01 %
- Rise Time: 1 ns without ringing
- Current Noise: - 40 dB
- Thermal EMF: < 0.05 µV/°C
- Voltage Coefficient < 0.1 ppm/V
- Non Inductive: < 0.08 µH
- Non Inductive, Non Capacitive Design
- Non Hot Spot Design
- Terminal Finishes Available:
  - Lead (Pb)-free
  - Tin/Lead Alloy
- Matched sets are available per request
- 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

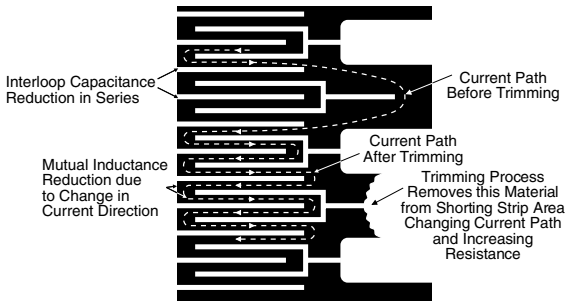
TABLE 1 - TOLERANCE AND TCR VS RESISTANCE VALUE[1)]
(- 55 °C to + 125 °C, + 25 °C Ref.)

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.

FIGURE 1 - TRIMMING TO VALUES
(Conceptual Illustration)



NOTE: Foil shown in black, etched spaces in white

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

Foil Wrap Around Surface Mount Chip Resistor with TCR of ± 2 ppm/°C and Load Life Stability of ± 0.01 % (100 ppm)

FIGURE 2 - POWER DERATING CURVE

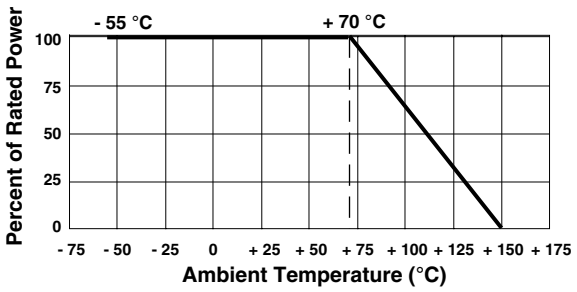
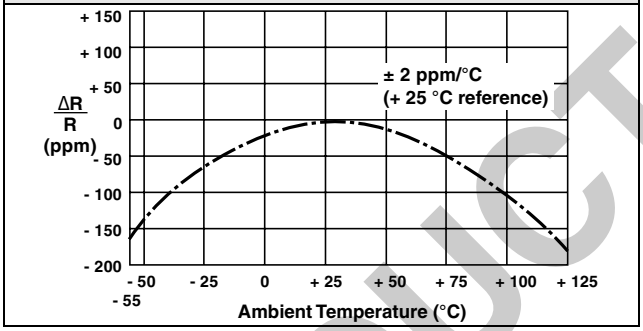


FIGURE 3 -TYPICAL TCR CURVE

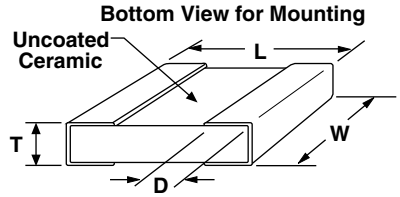
(For more details, see Table 1)

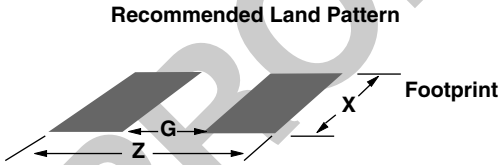


Note

- The TCR values for < 100 Ω are influenced by the termination composition and result in deviation from this curve.

TABLE 2 - DIMENSIONS AND LAND PATTERN in inches (millimeters)





CHIP SIZE	L ± 0.005 (0.13)	W ± 0.005 (0.13)	THICKNESS MAXIMUM	D ± 0.005 (0.13)	Z[1] MAXIMUM	G[1] MINIMUM	X[1] 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)

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 (Ω)	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

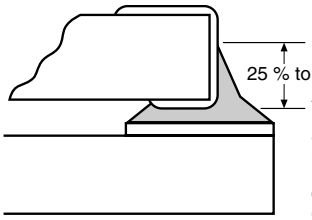
TABLE 4 - PERFORMANCES

TEST OR CONDITIONS	MIL-PRF-55342 H CHARACTERISTIC E ΔR LIMITS	TYPICAL ΔR LIMITS	MAXIMUM ΔR LIMITS[2]
Thermal Shock	± 0.1 %	± 0.005 % (50 ppm)	± 0.02 % (200 ppm)
Low Temperature Operation	± 0.1 %	± 0.01 % (100 ppm)	± 0.02 % (200 ppm)
Short Time Overload	± 0.1 %	± 0.01 % (100 ppm)	± 0.02 % (200 ppm)
High Temperature Exposure	± 0.1 %	± 0.01 % (100 ppm)	± 0.03 % (300 ppm)
Resistance to Soldering Heat	± 0.2 %	± 0.005 % (50 ppm)	± 0.01 % (100 ppm)
Moisture Resistance	± 0.2 %	± 0.005 % (50 ppm)	± 0.03 % (300 ppm)
Load Life Stability + 70 °C for 2000 hours at Rated Power	± 0.5 %	± 0.005 % (50 ppm)	± 0.01 % (100 ppm)

Note

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

FIGURE 4 - 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.

TABLE 5 - DSCC SPECIFICATIONS

Vishay resistors are listed on the dollowing DSCC specifications

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

TABLE 6 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y145512K7565T9R (preferred part number format)

DENOTES PRECISION	VALUE	AER*
Y	**R** = Ω **K** = kΩ	**0** = Standard **9** = Lead (Pb)-free **1 - 999** = Custom

Y	1	4	5	5	1	2	K	7	5	6	5	T	9	R

PRODUCT CODE	RESISTANCE TOLERANCE	PACKAGING
1172 = VSM0805 **1496** = VSM1206 **1455** = VSM1506 **1611** = VSM2010 **1612** = VSM2512	**T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.10 % **C** = ± 0.25 % **D** = ± 0.5 % **F** = ± 1.0 %	**R** = Tape and Reel **W** = Waffle Pack

Note

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

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

TYPE: VSM1506
VALUES: 12.7565 kΩ
ABSOLUTE TOLERANCE: 0.01 %
TERMINATION: Lead (Pb)-free
PACKAGING: Tape and Reel

HISTORICAL PART NUMBER: VSM1506 12K7565 TCR2 T S T (will continue to be used)

VSM1506	12K7565	TCR2	T	S	T
MODEL	RESISTANCE VALUE	TCR CHARACTERISTICS	TOLERANCE	TERMINATION	PACKAGING
			T = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.10 % **C** = ± 0.25 % **D** = ± 0.5 % **F** = ± 1.0 %	**S** = Lead (Pb)-free **B** = Tin/Lead	**T** = Tape and Reel **W** = Waffle Pack

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