

High Precision Bulk Metal[®] Foil Surface Mount Current Sensing Chip Resistor with TCR of $\pm 2 \text{ ppm}/^\circ\text{C}$ and Load Life Stability of $\pm 0.02 \%$



INTRODUCTION

Model VCS1625 is a surface mount resistor designed with 4 pads for Kelvin connection. Utilizing Vishay Bulk Metal[®] foil as the resistance element, it provides performance capabilities far greater than other resistor technologies can supply in a product of comparable size.

This small device dissipates heat almost entirely through the pads so surface mount users are encouraged to be generous with the board's pads and traces. Gold terminations are available on special order.

Our application engineering department is available to advise and to make recommendations. For non standard technical requirements and special applications, please contact us.

FEATURES

- Temperature coefficient of resistance (TCR): $\pm 2.0 \text{ ppm}/^\circ\text{C}$ typical (- 55 °C to + 125 °C, + 25 °C ref.) (see table 1)
- Resistance range: 0.01 Ω to 10 Ω (for higher or lower values please contact us)
- Vishay Foil resistors are not restricted to standard values, we can supply specific "as required" values at no extra cost or delivery (e.g. 1.2345 Ω vs. 1 Ω)
- Tolerance: to $\pm 0.1 \%$
- Load life stability: $\pm 0.02 \%$ at 70 °C, 2000 h at rated power
- Electrostatic discharge (ESD) up to 25 000 V
- Short time overload $\leq 0.005 \%$
- Non inductive, non capacitive design
- Power rating: 0.5 W at + 70 °C (figure 1) or 5 A, whichever is lower
- Thermal EMF: 0.05 $\mu\text{V}/^\circ\text{C}$ typical
- Non hot spot design
- Current noise: < - 40 dB
- Rise time: 1 ns effectively no ringing
- Voltage coefficient: < 0.1 ppm/V
- Non inductive: < 0.08 μH
- For better performances please review VCS1625Z (Z-foil) datasheet



RoHS*
COMPLIANT

FIGURE 1 - POWER DERATING CURVE (1)



Note

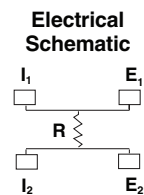
(1) Power rating at + 70 °C: 0.5 W on FR4 PCB

TERMINATIONS

- Two lead (Pb)-free options are available: gold plated or tin plated
- Tin/lead plated

APPLICATIONS

- Automatic test equipment (ATE)
- Airborne (in heads-up display systems)
- High precision instrumentation
- Electron beam recording equipment
- Electron microscopes
- Current sensing applications
- Forced balance electronic scales
- Applications that require superior frequency stability
- Military
- Medical



| TABLE 1 - TOLERANCE AND TCR VS. RESISTANCE VALUE (- 55 °C to + 125 °C, + 25° Ref.) | | | |
|--|-------------------|------------------------------------|-------------------------------------|
| VALUE (Ω) | TOLERANCE | TYPICAL TCR | MAXIMUM TCR |
| > 2R000 to 10R000 | 0.2 %, 0.5 %, 1 % | $\pm 2 \text{ ppm}/^\circ\text{C}$ | $\pm 5 \text{ ppm}/^\circ\text{C}$ |
| > 0R500 to 2R000 | 0.5 %, 1 % | $\pm 2 \text{ ppm}/^\circ\text{C}$ | $\pm 10 \text{ ppm}/^\circ\text{C}$ |
| > 0R100 to 0R500 | 1 % | $\pm 2 \text{ ppm}/^\circ\text{C}$ | $\pm 15 \text{ ppm}/^\circ\text{C}$ |
| > 0R050 to 0R100 | 1 % | $\pm 2 \text{ ppm}/^\circ\text{C}$ | $\pm 20 \text{ ppm}/^\circ\text{C}$ |
| > 0R030 to 0R050 | 1 % | $\pm 2 \text{ ppm}/^\circ\text{C}$ | $\pm 30 \text{ ppm}/^\circ\text{C}$ |
| > 0R010 to 0R030 | 1 % | $\pm 2 \text{ ppm}/^\circ\text{C}$ | $\pm 50 \text{ ppm}/^\circ\text{C}$ |

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

FIGURE 2 - DIMENSIONS in Inches (Millimeters)



| | INCHES | MILLIMETERS |
|---|---------------|--------------|
| L | 0.250 ± 0.010 | 6.35 ± 0.25 |
| H | 0.160 ± 0.010 | 4.06 ± 0.25 |
| W | 0.040 maximum | 1.02 maximum |
| A | 0.080 ± 0.005 | 2.03 ± 0.13 |
| B | 0.040 ± 0.010 | 1.02 ± 0.25 |

FIGURE 1 - TRIMMING TO VALUES
(Conceptual Illustration)

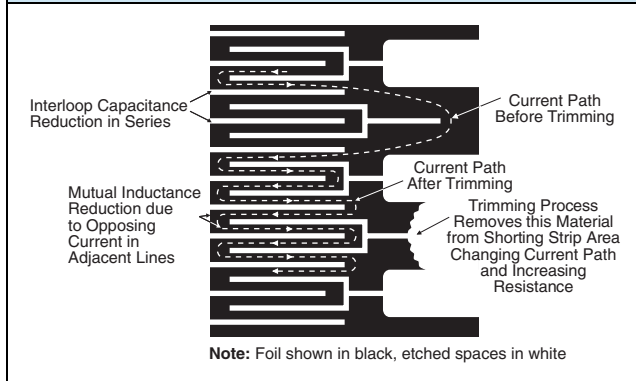


FIGURE 4 - TYPICAL TCR CURVE



TABLE 2 - PERFORMANCE SPECIFICATIONS

| TEST | MIL-PRF-55342 ΔR LIMITS | TYPICAL ΔR LIMITS | MAXIMUM ΔR LIMITS |
|---|----------------------------|----------------------|----------------------|
| Thermal Shock 5 x (- 65 °C to + 150 °C) | ± 0.10 % | ± 0.005 % (50 ppm) | ± 0.01 % (100 ppm) |
| Low Temperature Operation | ± 0.10 % | ± 0.005 % (50 ppm) | ± 0.01 % (100 ppm) |
| Short Time Overload | ± 0.10 % | ± 0.005 % (50 ppm) | ± 0.02 % (200 ppm) |
| High Temperature Exposure | ± 0.10 % | ± 0.01 % (100 ppm) | ± 0.02 % (200 ppm) |
| Resistance to Soldering Heat | ± 0.2 % | ± 0.01 % (100 ppm) | ± 0.03 % (300 ppm) |
| Moisture Resistance | ± 0.20 % | ± 0.01 % (100 ppm) | ± 0.03 % (300 ppm) |
| Load Life 2000 h at 70 °C: Rated Power On Ceramic PCB | ± 0.5 % | ± 0.02 % (200 ppm) | ± 0.04 % (400 ppm) |

Note

- Measurement error 0.001R

TABLE 3 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y08501R50500D9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y0850 1R50500 D 9 W:
 TYPE: VCS1625
 VALUES: 1.505 Ω
 ABSOLUTE TOLERANCE: ± 0.5 %
 TERMINATION: tin plated (lead (Pb)-free)
 PACKAGING: bulk pack

HISTORICAL PART NUMBER: VCS1625 1R5050 TCR2 D S W (will continue to be used)



Note

(1) For non-standard requests or additional values, please contact application engineering.

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