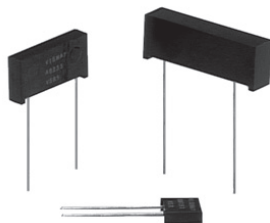


## Bulk Metal® Foil Technology Industrial Precision Resistors with TCR of $\pm 4 \text{ ppm}/^\circ\text{C}$ and Tolerance of $\pm 0.01 \%$



### INTRODUCTION

Bulk Metal® Foil technology out performs all other resistor technologies available today for applications that require high precision and high stability.

This technology has been pioneered and developed by VISHAY, and products based on this technology are the most suitable for a wide range of applications.

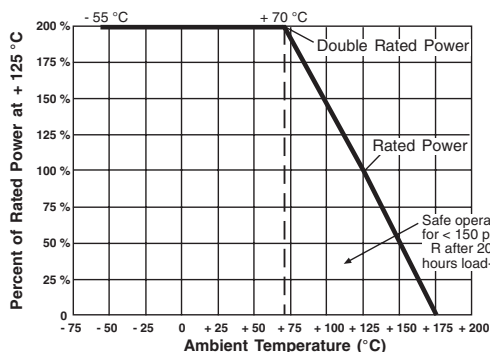
Generally Bulk Metal Foil technology allows us to produce customer orientated products designed to satisfy challenging and specific technical requirements.

The VSR series of resistors is a low cost version of the well established S series of resistors. These resistors are made of foil elements so all of the inherent performance of foil is retained. They do not however, have the same TCR or tolerance ranges (see table 1 for details). These products find a wide range of usage in high end stereo equipment and some grades of test and measurement equipment.

Standoffs are dimensioned to provide a minimum lead clearance of 0.010" between the resistor body and the printed circuit board, when the standoffs are seated on the board. This allows for proper cleaning after the soldering process.

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

**FIGURE 1 - POWER DERATING CURVE**



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

### FEATURES

- Temperature coefficient of resistance (TCR) <sup>(1)</sup>:  
 $\pm 4 \text{ ppm}/^\circ\text{C}$  (0 °C to + 60 °C)  
 $\pm 8 \text{ ppm}/^\circ\text{C}$  (- 55 °C to + 125 °C, + 25 °C ref.)
- Resistance range: 0.5  $\Omega$  to 1 M $\Omega$  (higher or lower values of resistance are available)
- Vishay Foil resistors are not restricted to standard values, we can supply specific "as required" values at no extra cost or delivery (e.g. 1K2345 vs. 1K)
- Tolerance: to  $\pm 0.01 \%$  (100 ppm)
- Load life stability: to  $\pm 0.005 \%$  at 70 °C, 2000 h at rated power
- Electrostatic discharge up to 25 000 V
- Non inductive, non capacitive design
- Rise time: 1 ns effectively no ringing
- Current noise: - 40 dB
- Thermal EMF: 0.05  $\mu\text{V}/^\circ\text{C}$  typical
- Voltage coefficient: < 0.1 ppm/V
- Inductance: 0.08  $\mu\text{H}$
- Matched sets available
- Terminal finish: lead (Pb)-free tin/lead alloy
- Prototype samples available from 72 h. For more information, please contact [foil@vishay.com](mailto:foil@vishay.com)
- For better performances please review the **S Series** datasheet



**RoHS\***  
COMPLIANT

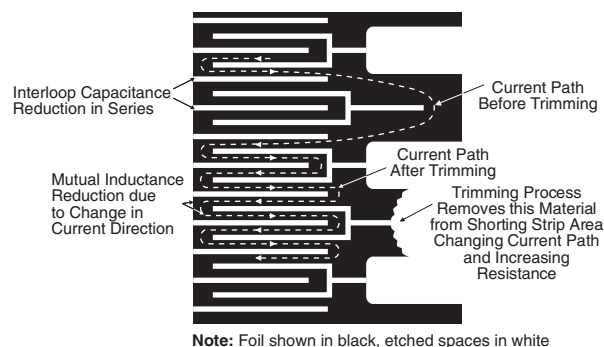
### Note

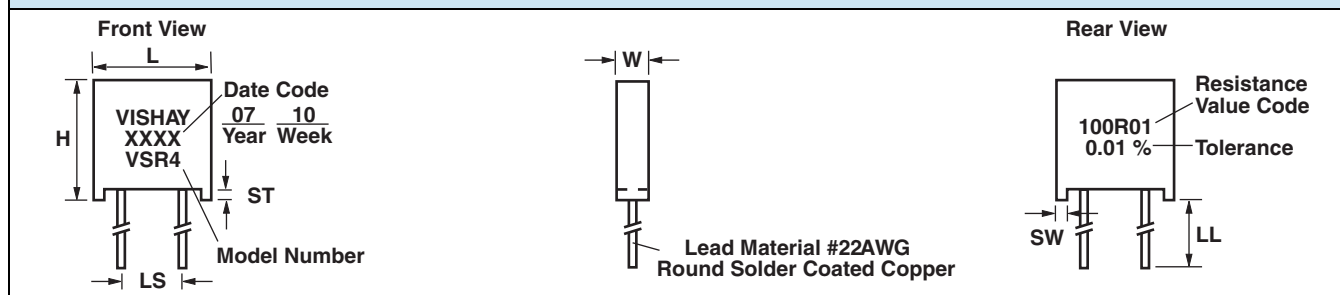
<sup>(1)</sup> For values below 50  $\Omega$  please contact application engineering

### APPLICATIONS

- Industrial
- Medical
- Audio (high end stereo equipment)
- Test and measurement equipment
- Precision amplifiers

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

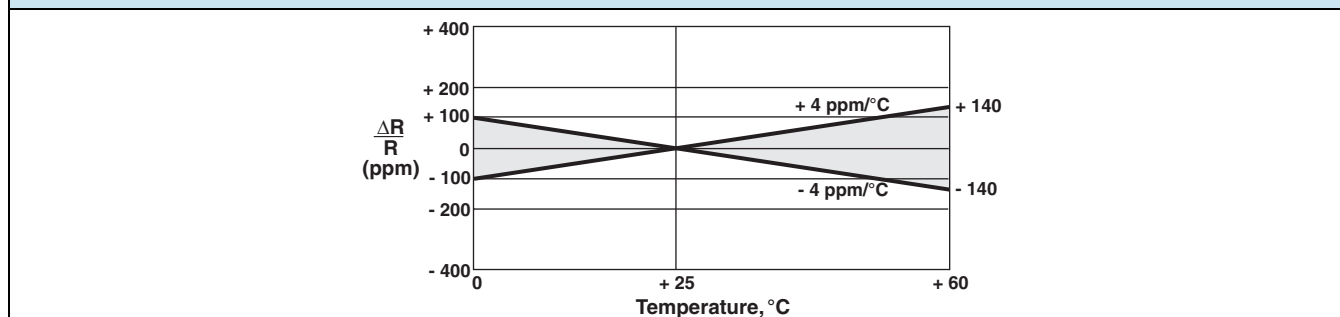


**FIGURE 3 - IMPRINTING AND DIMENSIONS****TABLE 1 - MODEL SELECTION**

| MODEL NUMBER        | RESISTANCE ( $\Omega$ ) | POWER at +70 °C | POWER at +125 °C | MAXIMUM WORKING VOLTAGE | DIMENSIONS                           |                  | LOAD LIFE STABILITY (MAXIMUM $\Delta R$ ) | MAXIMUM TEMPERATURE COEFFICIENT OF RESISTANCE (+25 °C REF.)                 | TIGHTEST TOLERANCE % VS. LOWEST RESISTANCE VALUE ( $\Omega$ )                                                       |
|---------------------|-------------------------|-----------------|------------------|-------------------------|--------------------------------------|------------------|-------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
|                     |                         |                 |                  |                         | INCHES                               | mm               |                                           |                                                                             |                                                                                                                     |
| VSR                 | 1 to 150K               | 0.3 W           | 0.2 W            | 300                     | W: 0.105 $\pm$ 0.010                 | 2.67 $\pm$ 0.25  | 0.05 %<br>2000 hours<br>at +125 °C        | 0 °C to +60 °C<br>$\pm$ 4 ppm/°C<br><br>-55 °C to +125 °C<br>$\pm$ 8 ppm/°C | $\pm$ 0.01/50<br>$\pm$ 0.02/30<br>$\pm$ 0.05/5<br>$\pm$ 0.1/2<br>$\pm$ 0.5/1                                        |
| VSRJ <sup>(1)</sup> |                         | up to 100K      | 0.15 W           |                         | L: 0.300 $\pm$ 0.010                 | 7.62 $\pm$ 0.25  |                                           |                                                                             |                                                                                                                     |
|                     |                         | over 100K       |                  |                         | H: 0.326 $\pm$ 0.010                 | 8.28 $\pm$ 0.25  |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | ST: 0.010 minimum                    | 0.254 minimum    |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | SW: 0.040 $\pm$ 0.005                | 1.02 $\pm$ 0.13  |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | LL: 1.000 $\pm$ 0.125                | 25.4 $\pm$ 3.18  |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | LS: 0.150 $\pm$ 0.005 <sup>(1)</sup> | 3.81 $\pm$ 0.13  |                                           |                                                                             |                                                                                                                     |
| VSR4                | 1 to 500K               | 0.5 W           | 0.4 W            | 350                     | W: 0.160 maximum                     | 4.06 maximum     | 0.05 %<br>2000 hours<br>at +125 °C        | 0 °C to +60 °C<br>$\pm$ 4 ppm/°C<br><br>-55 °C to +125 °C<br>$\pm$ 8 ppm/°C | $\pm$ 0.005/100<br><br>$\pm$ 0.01/50<br><br>$\pm$ 0.02/30<br><br>$\pm$ 0.05/5<br><br>$\pm$ 0.1/2<br><br>$\pm$ 0.5/1 |
|                     |                         | up to 200K      | 0.2 W            |                         | L: 0.575 maximum                     | 14.61 maximum    |                                           |                                                                             |                                                                                                                     |
|                     |                         | over 200K       |                  |                         | H: 0.413 maximum                     | 10.49 maximum    |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | ST: 0.035 $\pm$ 0.005                | 0.89 $\pm$ 0.13  |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | SW: 0.050 $\pm$ 0.005                | 1.27 $\pm$ 0.13  |                                           |                                                                             |                                                                                                                     |
| VSR5                | 1 to 750K               | 0.75 W          | 0.6 W            | 350                     | W: 0.160 maximum                     | 4.06 maximum     | 0.05 %<br>2000 hours<br>at +125 °C        | 0 °C to +60 °C<br>$\pm$ 4 ppm/°C<br><br>-55 °C to +125 °C<br>$\pm$ 8 ppm/°C | $\pm$ 0.005/100<br><br>$\pm$ 0.01/50<br><br>$\pm$ 0.02/30<br><br>$\pm$ 0.05/5<br><br>$\pm$ 0.1/2<br><br>$\pm$ 0.5/1 |
|                     |                         | up to 300K      | 0.3 W            |                         | L: 0.820 maximum                     | 20.83 maximum    |                                           |                                                                             |                                                                                                                     |
|                     |                         | over 300K       |                  |                         | H: 0.413 maximum                     | 10.49 maximum    |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | ST: 0.035 $\pm$ 0.005                | 0.89 $\pm$ 0.13  |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | SW: 0.050 $\pm$ 0.005                | 1.27 $\pm$ 0.13  |                                           |                                                                             |                                                                                                                     |
| VSR6                | 0.5 to 1M               | 1.0 W           | 0.8 W            | 500                     | W: 0.260 maximum                     | 6.60 maximum     | 0.05 %<br>2000 hours<br>at +125 °C        | 0 °C to +60 °C<br>$\pm$ 4 ppm/°C<br><br>-55 °C to +125 °C<br>$\pm$ 8 ppm/°C | $\pm$ 0.005/100<br><br>$\pm$ 0.01/50<br><br>$\pm$ 0.02/30<br><br>$\pm$ 0.05/5<br><br>$\pm$ 0.1/2<br><br>$\pm$ 0.5/1 |
|                     |                         | up to 400K      | 0.4 W            |                         | L: 1.200 maximum                     | 30.48 maximum    |                                           |                                                                             |                                                                                                                     |
|                     |                         | over 400K       |                  |                         | H: 0.413 maximum                     | 10.49 maximum    |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | ST: 0.035 $\pm$ 0.005                | 0.89 $\pm$ 0.13  |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | SW: 0.050 $\pm$ 0.005                | 1.27 $\pm$ 0.13  |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | LL: 1.000 $\pm$ 0.125                | 25.4 $\pm$ 3.18  |                                           |                                                                             |                                                                                                                     |
|                     |                         |                 |                  |                         | LS: 0.900 $\pm$ 0.020                | 22.86 $\pm$ 0.51 |                                           |                                                                             |                                                                                                                     |

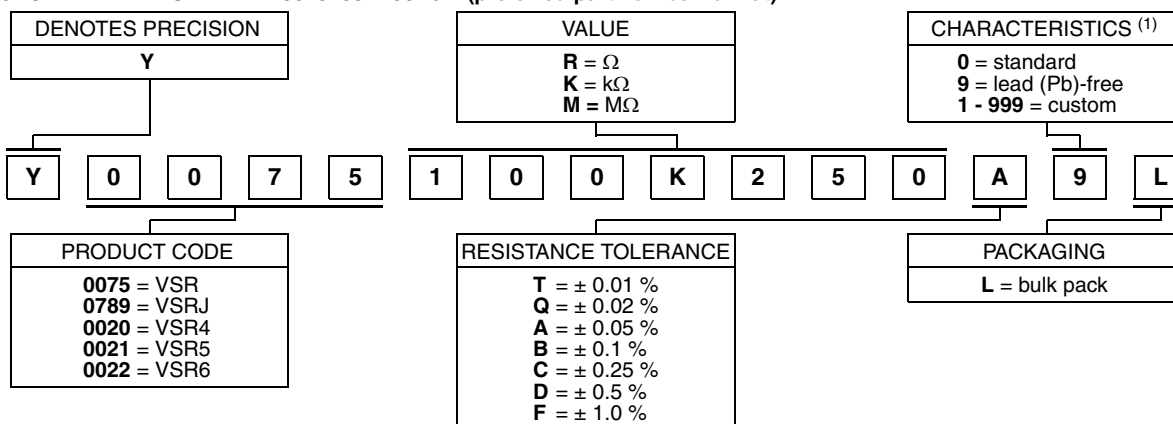
**Note**

(1) 0.200" (5.08 mm) lead spacing available - specify VSRJ.

**FIGURE 4 - TEMPERATURE COEFFICIENT OF RESISTANCE**

**TABLE 2 - GLOBAL PART NUMBER INFORMATION**

**NEW GLOBAL PART NUMBER: Y0075100K250A9L (preferred part number format)**



FOR EXAMPLE: ABOVE GLOBAL ORDER Y0075 100K250 A 9 L:

TYPE: VSR

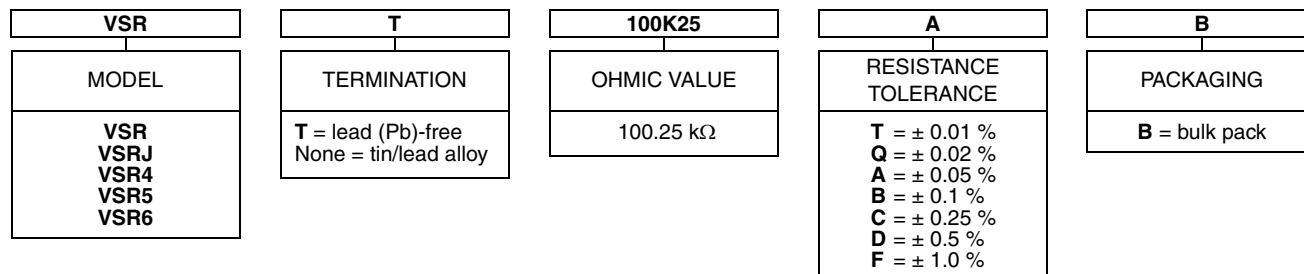
VALUE: 100.25  $k\Omega$

ABSOLUTE TOLERANCE:  $\pm 0.05\%$

TERMINATION: lead (Pb)-free

PACKAGING: bulk pack

**HISTORICAL PART NUMBER EXAMPLE: VSRT 100K25 A B (will continue to be used)**



**Note**

<sup>(1)</sup> For non-standard requests, please contact application engineering.

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