

### High Precision Bulk Metal<sup>®</sup> Foil Molded Surface Mount Resistor with TCR down to <u>± 2 ppm/°C</u>, Flexible Terminations, and Load Life Stability of <u>± 0.005 %</u> (50 ppm)



Any value at any tolerance available within resistance range

#### INTRODUCTION

The SMRxD is a precision molded surface mountable resistor offering all the elements of precision; including low TCR, tight tolerance, long term stability, low noise, low thermal EMF, and non-measurable voltage coefficient. It utilizes the Bulk Metal<sup>®</sup> Foil technology for the resistive element with its inherent low and predictable TCR and long term stability. This surface mountable product affords similar performance to the time tested S series molded through-hole product.

# The flexible terminations of this product also reduce stress transference from the PCB to the resistor.

Voltage division with tight tracking < 3 ppm/°C can be achieved with 2 **randomly** selected units even with a large ratio between the two values.

Our Application Engineering Department is available to advise and make recommendations. For non-standard technical requirements and special applications, please contact us.

TABLE 1 - THE SMRxD SERIES IS LISTEDINTHE FOLLOWING DSCCSPECIFICATIONS					
MODEL	DSCC	MIL SPEC			
SMR1D	06020	MIL-PRF-55182			
SMR3D	06021	MIL-PRF-55182			

# TABLE 2 - TOLERANCE AND TCR VERSUS RESISTANCE VALUE (-55 °C to + 125 °C + 25 °C ref.)

$(-55 \ \text{C} \ \text{I}0 + 125 \ \text{C}, + 25 \ \text{C} \ \text{Iel.})$						
VALUE	STANDARD TOLERANCE <sup>1)</sup>	TYPICAL TCR AND MAX. SPREAD <sup>1)</sup> (ppm/°C)				
50 $\Omega$ to 80 k $\Omega$	± 0.01 %	± 2 ± 3				
20 $\Omega$ to < 50 $\Omega$	± 0.02 %	$\pm 2 \pm 4$				
10 $\Omega$ to < 20 $\Omega$	± 0.05 %	$\pm 2 \pm 6$				
5 $\Omega$ to < 10 $\Omega$	± 0.1 %	± 2 ± 8				

Note

1. Tighter performances are available

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

- Temperature coefficient of resistance (TCR): ± 2 ppm°C typical (- 55 °C to + 125 °C, + 25 °C ref.)
- Tolerance: to ± 0.01 %

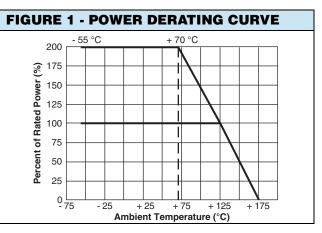


COMPLIANT

- Flexible terminations ensure minimal stress transference from the PCB due to a difference in thermal coefficient of expansions (TCE)
- Electrostatic discharge (ESD) above 25 000 V
- Load life stability: ± 0.005 % (70 °C, 2000 h at rated power) • Resistance range: 5  $\Omega$  to 80 k $\Omega$  (for higher and lower
- values, please contact us)
- Power rating: to 600 mW at 70 °C
- Non inductive, non capacitive design
- Current noise: 40 dB
- Voltage coefficient: < 0.1 ppm/V</li>
- Non inductive: < 0.08  $\mu$ H
- Non hot spot design
- Terminal finishes available: lead (Pb)-free tin/lead alloy
- Matched sets with TCR tracking are available upon request
- Any value available within resistance range (e.g. 1K234)
- Prototype samples available from 48 h. For more information, please contact <u>foil@vishaypg.com</u>
- For better performances please review SMRxDZ datasheet

#### **APPLICATIONS**

- Military, airborne and space
- Precision amplifiers
- High precision instrumentation
- Medical
- Automatic test equipment (ATE)
- Industrial
- Audio (high end stereo equipment)
- EB application
- Pulse application
- Measurement instrumentation



V<sub>out</sub>

---- SMRxD

## SMR1D/SMR3D

## Vishay Foil Resistors



TABLE 3 - PERFORM	ANCE SPECIFICATIONS					
TEST	CON	DITIONS		ΜΑΧΙΜυ	MAXIMUM LIMIT <sup>1)</sup>	
	SMR1D	SMR3D		SMR1D	SMR3D	
Resistance Range				5 $\Omega$ to 33 k $\Omega$	5 $\Omega$ to 80 k $\Omega$	
Rated Power	5 Ω to 10 kΩ 0.250 W at 70 °C 0.125 W at 125 °C 0.125 W at 125 °C	5 Ω to 30 kΩ         30 kΩ to 80 kΩ           0.6 W at 70 °C         0.4 W at 70 °C           0.3 W at 125 °C         0.2 W at 125 °C		see figure 1		
Maximum Working Voltage		·		73 V	180 V	
Maximum Operating Temperature	+ 175 °C					
Working Temperature Range	- 55 °C to + 1					
Thermal Shock	- 65 °C to + 150 °C; 30 min; 5 cycles			± 0.01 % (100 ppm)		
Short Time Overload	6.25 x rat	± 0.01 % (100 ppm)				
Low Temperature Storage	24 h at - 65 °C			± 0.01 % (100 ppm)		
Low Temperature Operation	45 min, rated	± 0.01 % (100 ppm)				
Dielectric Withstanding Voltage	atmospheric pres	± 0.01 % (100 ppm)				
Insulation Resistance (M $\Omega$ )	DC 100 V; 1 min			over 10 000		
Resistance to Soldering Heat (%)	260 °C; 10 s			± 0.02 %, ± 0.01 % typical		
Moisture Resistance	+ 65 °C to - 10 °C; 90 % to 98 % RH; rated power; 240 h			± 0.02 % (200 ppm)		
Shock	100 G; sawtooth			± 0.01 % (100 ppm)		
Vibration, High Frequency	10 ~ 2000 ~ 10 Hz; 20 G; Y, Z each 4 h			± 0.01 % (100 ppm)		
Load Life Stability (2000 h)	0.04 W at + 70 °C 0.25 W at + 70 °C 0.125 W at + 125 °C	0.6 W a	at + 70 °C at + 70 °C t + 125 °C	Typical 0.005 % 0.02 % 0.02 %	Typical 0.005 % 0.015 % 0.015 %	
High Temperature Exposure	175 °C; no load 2000 h			± 0.05 % (500 ppm)		
Weight				0.1143 g	0.244 g	
Packaging	bulk (loose) or tape and reel, per EIA-481-1					

#### Note

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



**Vishay Foil Resistors** 

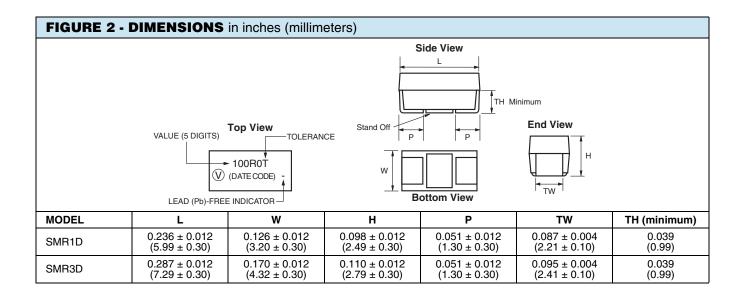
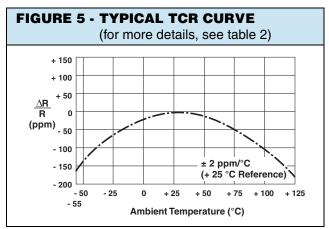


FIGURE 3	FIGURE 3 - RECOMMENDED MOUNTING PAD GEOMETRIES in inches (millimeters)							
	Reflow Solder Pads							
$\begin{array}{c} \hline \\ \\ \hline \\ \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $								
MODEL	METHOD	A MIN.	B REF	C REF	D ± 0.04 (± 1.02)	E REF		
SMR1D	Reflow	0.110 (2.79)	0.106 (2.69)	0.124 (3.15)	0.337 (8.55)	0.050 (1.27)		
SMR3D	Reflow	0.118 (3.00)	0.106 (2.69)	0.175 (4.45)	0.388 (9.86)	0.050 (1.27)		
Per IPC-SM-78	2 Rev. A		•	•	•			

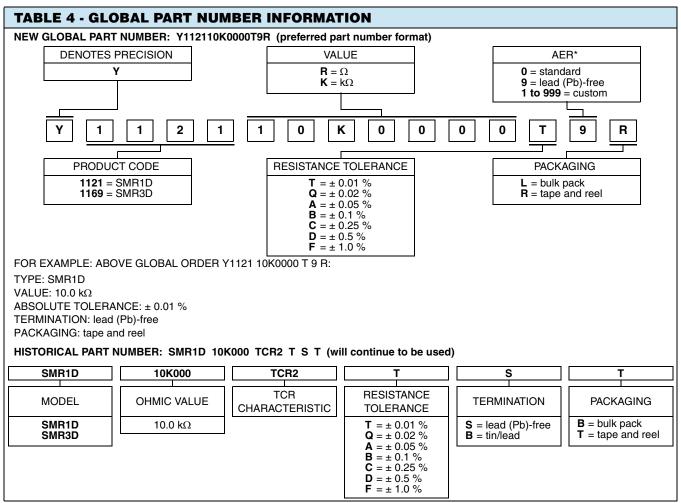
FIGURE 4 - TRIMMING TO VALUES (conceptual illustration)



Note: The TCR values for < 80  $\Omega$  are influenced by the termination composition and the result in deviation from this curve

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Note

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



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