

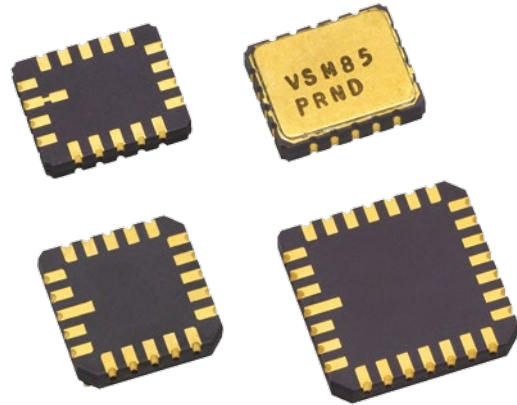
Bulk Metal® Foil Technology Surface Mount Hermetic Resistor Networks In Leadless Chip Carrier (LCC) Configuration

INTRODUCTION

VSM Series networks incorporate all the performance features of Bulk Metal® Foil technology in a product ready for surface mounting. The multi-terminal ceramic LCC has gold plated terminals which wrap around from the side of the package to the underside for either socket or surface mounting. For more information about Bulk Metal® Foil technology please see [ten technical reasons to choose Bulk Metal® Foil resistors for your circuit](#).

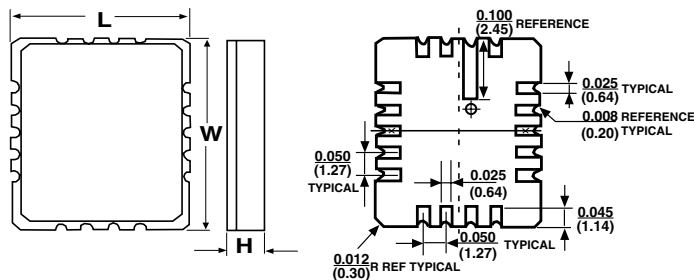
ORDERING INFORMATION—VSM85, VSM86, VSM87, VSM88 OR VSM89 NETWORKS

Networks are built to your requirements. Please don't hesitate to send your schematic and electrical requirements to our Application Engineering Department at foil@vpgsensors.com. A unique part number will be assigned which defines all aspects of your network.



Product may not be to scale

FIGURE 1—PACKAGE SIZES AND CHARACTERISTICS

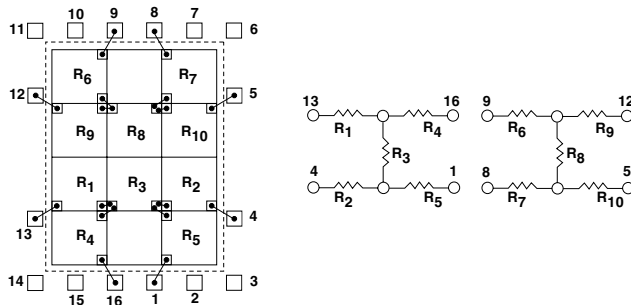


NOTE:

1. These networks utilize Bulk Metal® Foil resistor chips V5X5 and V15X5.
2. The V5X5 and V15X5 chips have maximum resistance values of 10K and 33K respectively in Bulk Metal® Foil technology.
3. The V5X5 and V15X5 chip(s) can be intermixed in a package.

Model	No. of Pins	Maximum Dimensions in Inches (mm)			LL	Chip Capacity		Maximum Power Rating (W) at +70°C
		L	W	H		V5X5	V15X5	
VSM85	16	0.295 (7.493)	0.360 (9.144)	0.090 (2.286)	N/A	12	4	0.4
VSM86	20	0.360 (9.144)	0.360 (9.144)			16	4	0.6
VSM87	24	0.345 (8.763)	0.345 (8.763)			16	5	0.6
VSM88	28	0.460 (11.684)	0.460 (11.684)			25	10	1.0
VSM89	32	0.460 (11.684)	0.560 (14.224)			35	14	1.4

FIGURE 2—SAMPLE CIRCUIT DESIGN AND CHIP LAYOUT



NOTE:

Usable area is represented by the dotted lines—a rectangle 0.150 in x 0.200 in. Illustrations not to scale. Chips shown undersize for clarity. Drawing view is from the top looking down into the package.

TABLE 1 – Performances										
Test or Condition		MIL-PRF-83401							Bulk Metal Foil ^(1,2,3)	
		Y	R	C	V	H	K	M	Typical	Max
Resistance Temp Characteristic	ppm/°C	±5	±25	±50	±50	±50	±100	±300	±2	±5
Tracking To Reference Element (-55 to +125°C)	ppm/°C	±5	±5	±5	±5	NA	NA	NA	±2	±5
Max Ambient Temp at Rated Wattage		+70°C								
Max Ambient Temp at Zero Power		+125°C								
Thermal Shock and Power Conditioning	ΔR	±0.02%	±0.08%	±0.25%	±0.25%	±0.50%	±0.70%	±0.70%	±0.003%	±0.015%
	ΔRatio	±0.01%	±0.04%	±0.03%	±0.03%	NA	NA	NA	±0.01%	±0.015%
Low Temperature Operation	ΔR	±0.02%	±0.03%	±0.10%	±0.10%	±0.10%	±0.25%	±0.50%	±0.005%	±0.01%
	ΔRatio	±0.02%	±0.02%	±0.02%	±0.02%	NA	NA	NA	±0.005%	±0.01%
Short Time Overload	ΔR	±0.02%	±0.03%	±0.10%	±0.10%	±0.10%	±0.25%	±0.50%	±0.002%	±0.01%
	ΔRatio	±0.01%	±0.02%	±0.02%	±0.02%	NA	NA	NA	±0.002%	±0.01%
Resistance to Soldering Heat	ΔR	±0.01%	±0.05%	±0.10%	±0.10%	±0.10%	±0.25%	±0.25%	±0.002%	±0.01%
	ΔRatio	±0.01%	±0.02%	±0.02%	±0.02%	NA	NA	NA	±0.001%	±0.01%
Moisture Resistance	ΔR	±0.02%	±0.05%	±0.20%	±0.20%	±0.40%	±0.50%	±0.50%	±0.003%	±0.01%
	ΔRatio	±0.01%	±0.02%	±0.02%	±0.02%	NA	NA	NA	±0.003%	±0.01%
Shock (Specified Pulse)	ΔR	±0.02%	±0.03%	±0.25%	±0.25%	±0.25%	±0.25%	±0.25%	±0.001%	±0.01%
	ΔRatio	±0.02%	±0.02%	±0.03%	±0.03%	NA	NA	NA	±0.001%	±0.01%
Vibration, High Frequency	ΔR	±0.02%	±0.03%	±0.25%	±0.25%	±0.25%	±0.25%	±0.25%	±0.001%	±0.01%
	ΔRatio	±0.02%	±0.02%	±0.03%	±0.03%	NA	NA	NA	±0.001%	±0.01%
Load Life (+70°C, Full Power, 1000 h)	ΔR	±0.05%	±0.1%	±0.10%	±0.10%	±0.50%	±0.50%	±2.00%	±0.015%	±0.025%
	ΔRatio	±0.025%	±0.03%	±0.03%	±0.03%	NA	NA	NA	±0.005%	±0.01%
25°C Power Rating (1000 h)	ΔR	±0.05%	±0.1%	±0.10%	±0.10%	±0.50%	±0.50%	±2.00%	±0.002%	±0.01%
	ΔRatio	±0.025%	±0.03%	±0.03%	±0.03%	NA	NA	NA	±0.001%	±0.01%
High Temperature Exposure (+125°C, 100 h)	ΔR	±0.02%	±0.05%	±0.10%	±0.10%	±0.20%	±0.50%	±1.00%	±0.005%	±0.01%
	ΔRatio	±0.01%	±0.02%	±0.03%	±0.03%	NA	NA	NA	±0.005%	±0.01%
Low Temperature Storage	ΔR	±0.01%	±0.03%	±0.10%	±0.10%	±0.10%	±0.25%	±0.50%	±0.002%	±0.01%
	ΔRatio	±0.01%	±0.02%	±0.02%	±0.02%	NA	NA	NA	±0.002%	±0.01%
Insulation Resistance		10,000 MΩ								
Resistance Tolerance and, when applicable, Resistance Ratio Accuracy		±0.005% (V)	±0.05% (A)	±0.1% (B)	±0.1% (B)	±0.1% (B)	±0.5% (D)	±1.0% (F)	±0.005% (V)	±0.1% (B)
		±0.01% (T)	±0.1% (B)	±0.5% (D)	±0.5% (D)	±0.5% (D)	±1.0% (F)	±2.0% (G)	±0.01% (T)	±0.5% (D)
		±0.05% (A)	±0.5% (D)	±1.0% (F)	±1.0% (F)	±1.0% (F)	±2.0% (G)	±5.0% (J)	±1.0% (F)	
		±0.1% (B)								
		±0.5% (D)								
		±1.0% (F)								

(1) ΔR's are not cumulative. For purposes of determining reliability calculations, consider the characteristics shown as figures of merit and allow no more than ±0.05% ΔR lifetime. Allow proportionately less if the severity of anticipated environmental stress is small compared to the tests as defined in MIL-PRF-83401.

(2) Post Manufacturing Operations (PMO)—screening has the effect of minimizing ΔR's. Consult our Application Engineering for details.

(3) ΔRatio refers to the change in ratio between resistors within the network package from before, to after, the specific test.



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