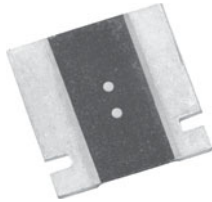


# Bulk Metal® Foil Technology High Precision, Current Sensing, Power Surface Mount, Metal Strip Resistor with Improved Stability 0.05 %, Resistance Value from 10 mΩ, Rated Power to 2 W and TCR to $0 \pm 20 \text{ ppm/}^\circ\text{C}$



## INTRODUCTION

The CSM3637S is a low value current sense resistor, providing power and precision in a four terminal, surface mount configuration. Its all welded construction is made up of a Bulk Metal® resistive element with plated copper terminations.

There are many current sense resistors on the market, until now the combination of very stable and precise resistors with low TCR as much as  $0 \text{ ppm/}^\circ\text{C} \pm 20 \text{ ppm/}^\circ\text{C}$ , tight tolerance of  $\pm 0.2 \%$  and excellent load life stability of  $\pm 0.05 \%$  (2000 h,  $+ 70 \text{ }^\circ\text{C}$  at rated power) were not easily available.

The key performance of the new CSM3637S is stability, which is the ability of this resistor to maintain its value with time under nominal load at various environmental conditions.

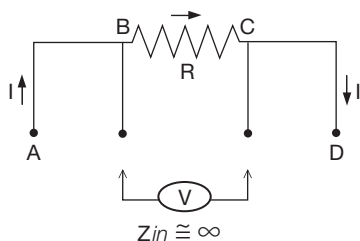
These specifications are based on tests performed in accordance with methods prescribed by appropriate MIL-PRF standards.

The four terminal device separates the current leads from the voltage drop sensing leads. This configuration eliminates the effect of the lead wire resistance from points A to B and C to D.

A key feature of the CSM3637S is its low thermal EMF design. The welded terminals make intimate contact with the chip thereby minimizing temperature variations.

Vishay Foil Resistors' application engineering department is available to advise and make recommendations.

For non-standard technical requirements and special applications, please contact: [foil@vpgsensors.com](mailto:foil@vpgsensors.com)



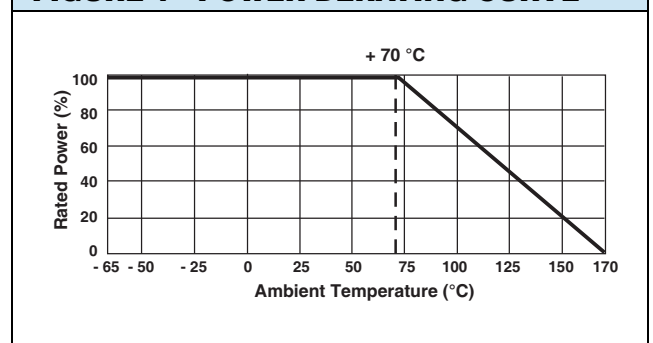
## FEATURES

- Temperature coefficient of resistance (TCR): ( $- 55 \text{ }^\circ\text{C}$  to  $+ 125 \text{ }^\circ\text{C}$ ,  $+ 25 \text{ }^\circ\text{C}$  ref.)  $\pm 20 \text{ ppm/}^\circ\text{C}$  maximum
- Load life stability to  $\pm 0.05 \%$  ( $70 \text{ }^\circ\text{C}$ , 2000 h at rated power)
- Power rating: 2 W
- Resistance tolerance:  $\pm 0.2 \%$
- Resistance range: 10 mΩ to 100 mΩ
- Vishay Foil resistors are not restricted to standard values; specific "as required" values can be supplied at no extra cost or delivery (e.g. 10.2345 mΩ vs. 10 mΩ)
- Short time overload: 0.1 %
- Proprietary processing technique produces extremely low resistance values with improved stability
- All welded construction
- Solderable terminations
- Very low inductance 0.5 nH to 5 nH
- Excellent frequency response to 50 MHz
- Low thermal EMF ( $< 3 \text{ } \mu\text{V/}^\circ\text{C}$ )
- Maximum current: up to 14 A
- Four terminal (Kelvin) design: allows for precise and accurate measurements
- Terminal finishes available: lead (Pb)-free or tin/lead alloy
- Prototype quantities available in just 5 working days or sooner. For more information, please contact [foil@vpgsensors.com](mailto:foil@vpgsensors.com)
- Screening in accordance with EEE-INST002 available (per MIL-PRF-55342 and MIL-PRF-49465; see 303144 and 303145 datasheets)
- For better performances please contact Application Engineering



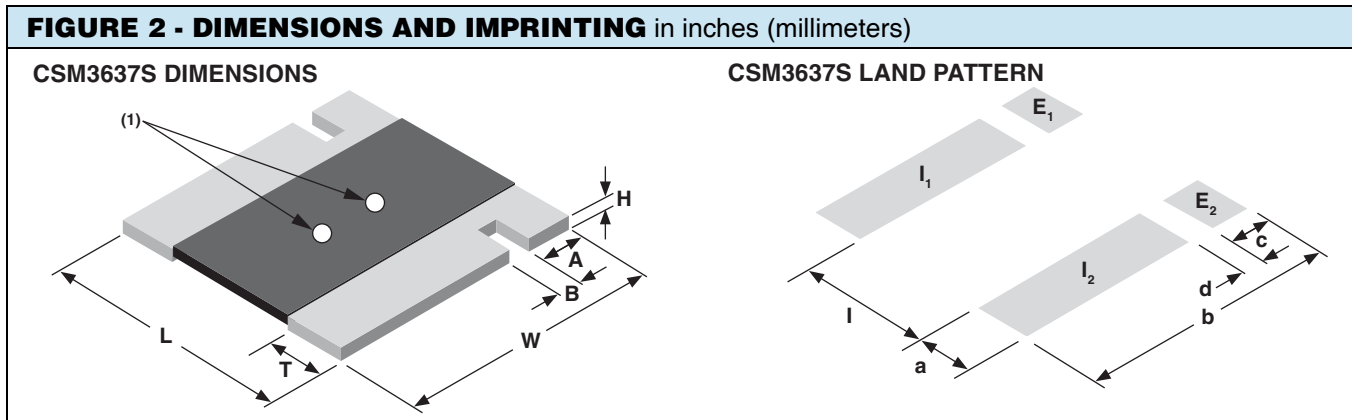
RoHS\*  
COMPLIANT

**FIGURE 1 - POWER DERATING CURVE**



\* Pb containing terminations are RoHS compliant, exemptions may apply

TABLE 1 - PERFORMANCE SPECIFICATIONS	
PARAMETER	CSM3637S
Resistance Range	10 mΩ to 100 mΩ
Power Rating at 70 °C	2 W
Maximum Current	14 A
Tightest Tolerance	± 0.2 %
Temperature Coefficient Maximum (- 55 °C to + 125 °C, + 25 °C ref.)	± 20 ppm/°C
Operating Temperature Range	- 65 °C to + 170 °C
Weight (maximum)	0.29 g



DIMENSIONS - TOLERANCES ± 0.010 (± 0.254)						
RESISTANCE RANGE (mΩ)	L	W	H	T	A	B
10 to 100	0.360 (9.144)	0.370 (9.398)	0.025 (0.635)	0.086 (2.184)	0.061 (1.549)	0.032 (0.813)
LAND PATTERN DIMENSIONS - TOLERANCES ± 0.003 (± 0.076)						
RESISTANCE RANGE (mΩ)	i	b	-	a	c	d
10 to 100	0.178 (4.52)	0.390 (9.91)	-	0.116 (2.95)	0.066 (1.68)	0.024 (0.610)

**Note**  
(1) White dots indicate top side of part for mounting purposes

TABLE 2 - CSM3637S PERFORMANCE SPECIFICATIONS				
TEST	CONDITIONS	MIL-PRF-49465B ΔR LIMITS	TYPICAL ΔR LIMITS	MAXIMUM ΔR LIMITS
Thermal Shock	- 55 °C to + 150 °C, 1000 cycles, 15 min at each extreme	± (0.5 % + 0.0005R)	0.1 %	0.2 %
Load Life Stability	2000 h, 70 °C at rated power	± (1.0 % + 0.0005R)	0.05 %	0.2 %
Bias Humidity	85 °C, 85 % humidity, 10 % bias, 1000 h	± (0.5 % + 0.0005R)	0.05 %	0.2 %
Short Time Overload	5 x rated power for 5 s	± (0.5 % + 0.0005R)	0.1 %	0.2 %
High Temperature Exposure	1000 h, 170 °C	± (1.0 % + 0.0005R)	0.2 %	0.3 %
Low Temperature Storage	MIL-PRF-49465	± (0.5 % + 0.0005R)	0.05 %	0.1 %
Moisture Resistance	MIL-STD-202, method 106, 0 % power, 7a and 7b not required	± (0.5 % + 0.0005R)	0.02 %	0.05 %
Shock	100 g, 6 ms	± (0.1 % + 0.0005R)	0.02 %	0.05 %
Vibration	(10 Hz to 2000 Hz) 20 g	± (0.1 % + 0.0005R)	0.02 %	0.05 %
Resistance to Soldering Heat	10 s to 12 s at + 260 °C	± (0.25 % + 0.0005R)	0.05 %	0.1 %
Solderability	MIL-STD-202	95 % coverage	-	

**Note**  
• Measurement error 0.0005R per MIL-PRF-49465

**CSM3637S CONSTRUCTION**

1. Resistive element
2. Copper terminal with solderable finish
3. Terminal-to-element weld
4. High temperature encapsulation

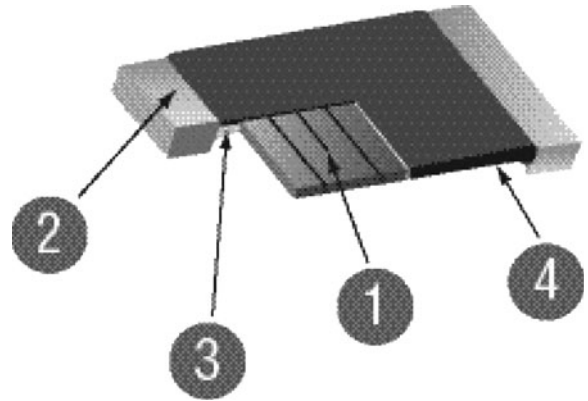


TABLE 3 - GLOBAL PART NUMBER INFORMATION (1)										
NEW GLOBAL PART NUMBER: Y14720R10000E0R (preferred part number format)										
DENOTES PRECISION <b>Y</b>			VALUE <b>R = Ω</b>				CHARACTERISTICS			
Y			0 R 1 0 0 0 0				0 = standard part, tin/lead termination 9 = standard part, lead (Pb)-free termination 1 to 999 = custom			
1	4	7	2					E	0	R
PRODUCT CODE 1472 = CSM3637S			RESISTANCE TOLERANCE				PACKAGING			
			E = ± 0.2 % C = ± 0.25 % D = ± 0.5 % F = ± 1.0 %				W = waffle pack R = tape and reel			
FOR EXAMPLE: ABOVE GLOBAL ORDER Y1472 0R10000 E 0 R:										
TYPE: CSM3637S										
VALUE: 100.0 mΩ										
ABSOLUTE TOLERANCE: ± 0.2 %										
TERMINATION: standard tin/lead										
PACKAGING: tape and reel										
HISTORICAL PART NUMBER: CSM3637S 0R1000 E B T (will continue to be used)										
CSM3637S		0R1000		E		B		T		
MODEL		OHMIC VALUE		ABS. TOLERANCE		TERMINATION		PACKAGING		
		0R1000 = 0.100 Ω		E = ± 0.2 % C = ± 0.25 % D = ± 0.5 % F = ± 1.0 %		S = lead (Pb)-free B = tin/lead		T = tape and reel W = waffle pack		

**Note**

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



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