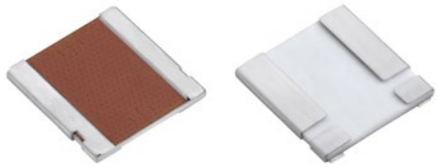
Model 303337 Bulk Metal® Foil Technology CSM3637F, with Screen/Test Flow in Compliance with EEE-INST-002

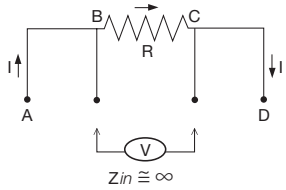
(Tables 2A and 3A, Film/Foil, Level 1) MIL-PRF-55342 and MIL-PRF-49465

FEATURES

- Temperature coefficient of resistance (TCR): 10 ppm/°C max. (–55°C to +125°C, +25°C ref.) For tighter TCR please contact us.
- Power rating: to 3 W
- Resistance tolerance: to ±0.1%
- Resistance range: 20 mΩ to 200 mΩ
- Load-life stability: to ±0.02% typical (70°C, 2000 h at rated power)
- Solderable terminations
- For prototype units, append a “U” to the model number (example: 303337U). These units have all of the table 2A (page 3) 100% tests performed, with no destructive qualification testing required (table 3A, page 3). For more information, please contact foil@vpgsensors.com
- For oriented performances please contact Application Engineering



Top View Bottom View



Four terminal (Kelvin) design:
allows for precise and accurate measurements.

INTRODUCTION

Model 303337 (CSM3637F with screen/test flow in compliance with EEE-INST-002) is a surface mount chip resistor designed with 4 pads for Kelvin connection. Utilizing Bulk Metal® Foil as the resistance element, it provides enhanced characteristic capabilities resulting in superior performance when compared with other resistor technologies. The unique combination of Z Foil technology along with the designed 4 pads lead frame configuration results in significant reduction of the component’s sensitivity to applied power changes such as power coefficient of resistance (PCR) and thermal resistance.

Figure 1—Power Derating Curve

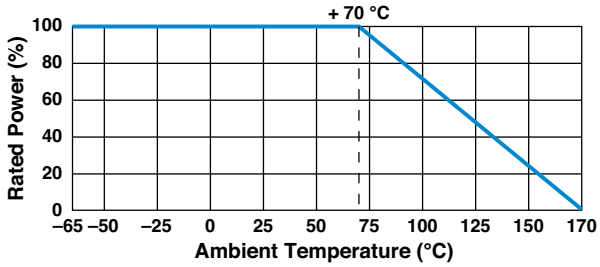
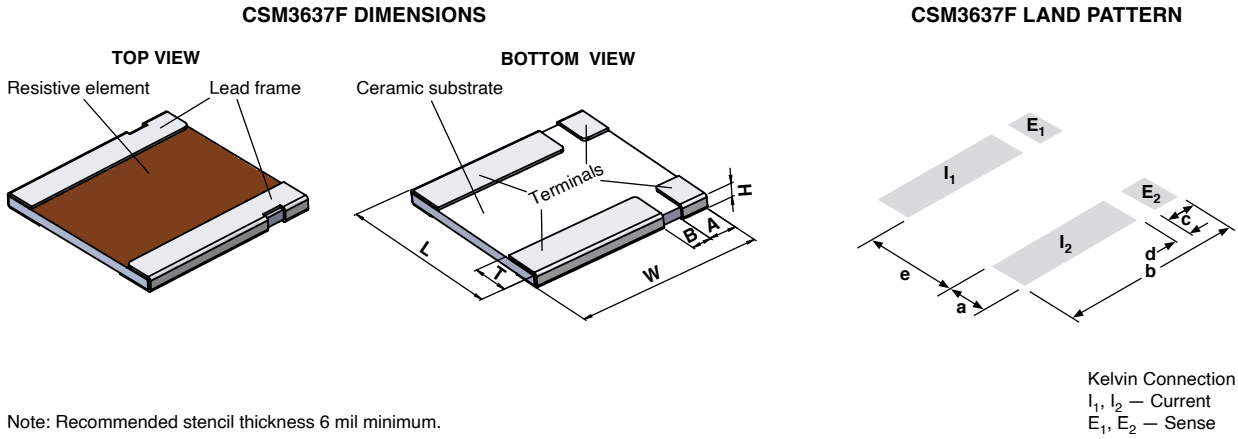


Table 1—Specifications

Parameter	Value
Resistance range	20 mΩ to 200 mΩ[1]
Power rating at 70°C	2 W: 20 mΩ to <50 mΩ 3 W: 50 mΩ to 200 mΩ
Maximum current[2]	10 A
Tolerance	±0.1
Temperature coefficient maximum (–55°C to +125°C, +25°C Ref.)	±15 ppm/°C, R <100 mΩ; ±10 ppm/°C R ≥100 mΩ[3]
Operating temperature range	–65°C to +170°C
Maximum working voltage	$(P \times R)^{1/2}$
Weight (maximum)	0.29 g

Notes
(1) Contact application engineering for values outside this range.
(2) Maximum current for a given resistance value is calculated using $I = \sqrt{P/R}$.
(3) For tighter TCR, please contact application engineering: foil@vpgsensors.com.

Figure 2—Dimensions and Land Pattern in Inches (Millimeters)



Kelvin Connection
I_1, I_2 — Current
E_1, E_2 — Sense

Note: Recommended stencil thickness 6 mil minimum.

Dimensions—Tolerances ±0.010 (±0.254)					
L	**W**	**H**	**T**	**A**	**B**
0.365 (9.271)	0.375 (9.525)	0.040 (1.016)	0.091 (2.311)	0.058 (1.473)	0.040 (1.016)
Land Pattern Dimensions—Tolerances ±0.003 (±0.076)					
a	**b**	**c**	**d**	**e**	
0.116 (2.95)	0.390 (9.91)	0.066 (1.68)	0.024 (0.610)	0.178 (4.52)	

NOTES

- Tightest absolute tolerance: 0.1% for any value within the pertinent ohmic value range.
- Measurement error allowed for ΔR limits: 0.0005 Ω.
- For prototype units, append a “U” to the model number (example: 303337U). These units have all of the table 2A 100% tests performed, with no destructive qualification testing required.

Table 2 – EEE-INST-002 (Table 2A Film/Foil, Level 1) 100% Tests/Inspections[1]	
RC Record	In tolerance
Thermal Shock	25 × (–65°C to +150°C)
RC Record	ΔR = 0.1%
High Temperature Exposure	+170°C, 100 h, no power
RC Record	In tolerance ΔR = 0.2%
Final Inspection	5% PDA on ΔR, 10% PDA on out of tolerance
Visual Inspection	Magnification 30 × to 60 ×
Mechanical Inspection	Dimensions, workmanship, 3 units sample size

Note
[1] Vishay Foil Resistors will perform a pre-cap visual inspection 100% in the production flow prior to overcoating

Table 3 – EEE-INST-002 (Table 3A Film/Foil, Level 1) Destructive Tests – MIL-PRF-49465 AND 55342 [1]		
Group 2	Sample size: 3(0)	
	Solderability	MIL-STD-202, method 208
Group 3	Sample size: 10(0) – mounted on FR4	
	TCR measurement per MIL-STD-202, method 304	±15 ppm/°C, R <100 mΩ; ±10 ppm/°C R ≥100 mΩ [3] (-55°C / +25°C / +125°C)
	Low temperature storage per MIL-PRF-49465	ΔR = 0.02% –55°C ±2°C, 24 h ±4 h ambient no load dwell for 2 h to 8 h at +25°C
	Low temperature operation per MIL-PRF-55342	ΔR = 0.02% –65°C ambient no load dwell for 1 h, rated power for 45 min no load dwell at +25°C for 24 h ±4 h
	Short time overload per MIL-STD-49465	ΔR = 0.05% 5 × rated power at +25°C for 5 s, not to exceed maximum current rating
Group 4	Sample size: 9(0) – mounted on FR4	
	Resistance to soldering heat	ΔR = 0.05% performed per MIL-PRF-55342 para. 4.8.8.1
	Moisture resistance per MIL-STD-202, method 106 (7a and 7b not required)	ΔR = 0.02% 240 h, no power
Group 5	Sample size: 9(0)	
	Shock per MIL-STD-202, method 213, condition I	ΔR = 0.05% 100G, 6 ms axes Z and Y, 10 shocks per axis
	Vibration per MIL-STD-202, method 204, condition D	ΔR = 0.05% 10 Hz to 2000 Hz, 20G 2 axes, 6 h per axis
Group 6	Sample size: 12(0) – mounted on FR4	
	Life test per MIL-PRF-49465	ΔR = 0.1% 2000 h, +70°C, rated power 1.5 hours "on" and 0.5 hour "off" cycle
Group 7B	Sample Size: 10(0) – mounted on FR4	
	Solder mounting integrity per MIL-PRF-55342	5 kg force, 30 s
Group 9	Sample size: 5(0) – mounted on FR4	
	High temperature exposure per MIL-PRF-49465	ΔR = 0.3% 1000 h, +170°C ±7°C, no power
Group 10[2]	Sample size: 4	Per ASTM E595

Notes
[1] Units selected randomly from lots which successfully passed the table 2A testing
[2] Optional, per customer request.
[3] For tighter TCR, please contact application engineering: foil@vpgsensors.com.
Measurement error allowed for ΔR limits: 0.0005 Ω.

Figure 3 – Global Part Number Information

Model #	303337
Base Model	CSM3637F
Value Range	20 mΩ to 200 mΩ

Part Number: **{Model} - {Value} - {Tolerance} - {Termination} - {Packaging}**

Absolute Tolerance	Code
0.1%	B
0.2%	E
0.25%	C
0.5%	D
1.0%	F

Termination	Code
Tin/lead	B

Packaging	Code
Waffle	W
Tape and reel	T

Example: 303337 - 0R123 - EBW

303337, 123 mΩ, 0.2%, tin/lead termination, waffle packaging

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