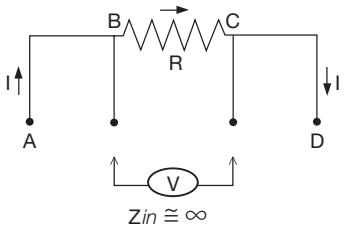
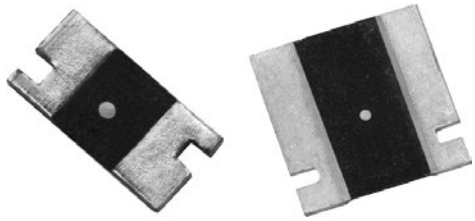
Models 303144 and 303145 – Fixed Resistors CSM2512 and CSM3637

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: ±20 ppm/°C max. (–55°C to +125°C, +25°C ref.) (see Table 1)
- Surface mount configuration
- Four terminal (Kelvin) design: allows for precision accurate measurements
- Power rating: 1 W to 3 W
- Resistance tolerance: ±0.5%
- Resistance range: 2 mΩ to 200 mΩ
- Bulk Metal® Foil resistors are not restricted to standard values; specific “as required” values can be supplied at no extra cost or delivery (e.g., 2.345 mΩ vs. 2 mΩ)
- Short time overload: 0.2% typical
- Thermal EMF: 3 µV/°C
- Maximum current: up to 38 A
- Terminal finish: tin/lead alloy
- For prototype units, append a “U” to the model number (example: 303144U). 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





INTRODUCTION

303144 and 303145 are low value current sense resistors, 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.

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

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

Figure 1 – Power Derating Curve

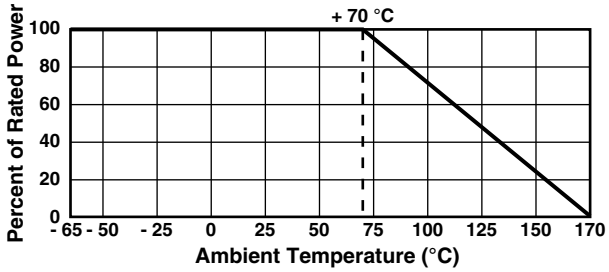
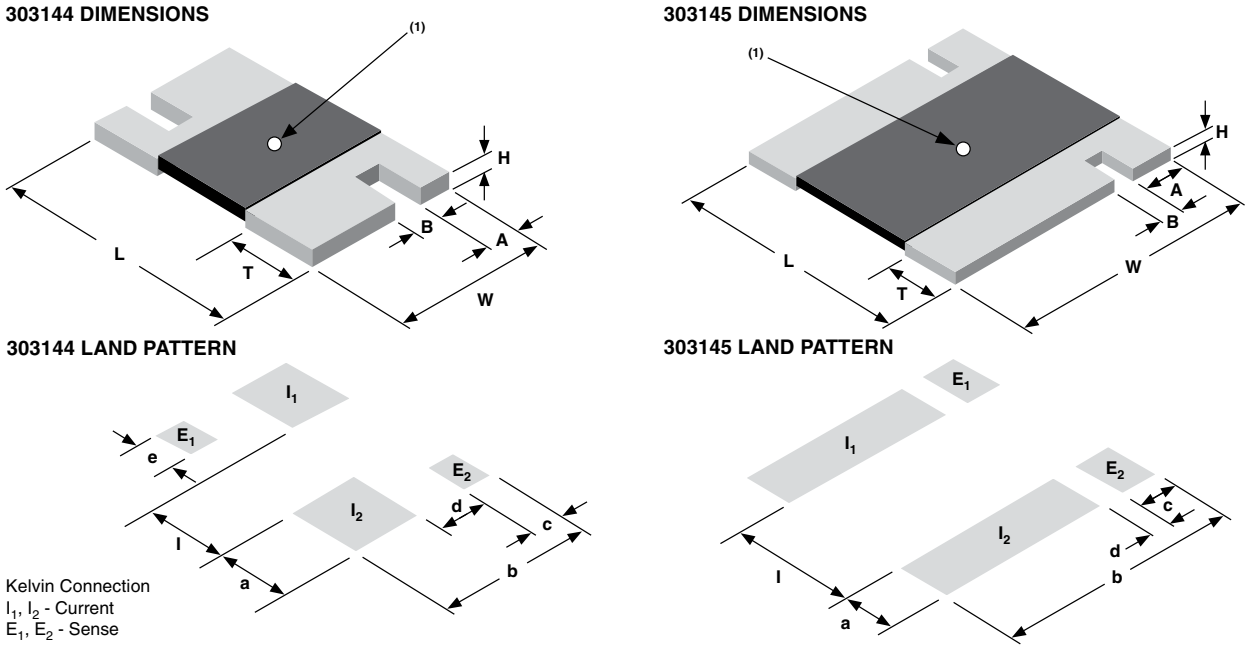


Table 1 – Specifications

PARAMETER	303144	303145
Resistance Range	3 mΩ to 200 mΩ	2 mΩ to 200 mΩ
Power Rating at 70°C	1 W	3 W (2 mΩ to 10 mΩ) 2 W (>10 mΩ to 200 mΩ)
Maximum Current	18 A	38 A
Tightest Tolerance	±0.5%	
Temperature Coefficient Max. (–55°C to +125°C, +25°C ref.)	±20 ppm/°C (3 mΩ to <100 mΩ) ±25 ppm/°C (100 mΩ to 200 mΩ)	±25 ppm/°C (2 mΩ to ≤3 mΩ) ±25 ppm/°C (100 mΩ to 200 mΩ) ±20 ppm/°C (>3 mΩ to <100 mΩ)
Weight (maximum)	0.09 g	0.29 g

Figure 2 – Dimensions and Imprinting in inches (millimeters)



Dimensions – Tolerances ±0.010 (±0.254)

MODEL	RESISTANCE RANGE (mΩ)	L	W	H	T	A	B
303144	3 to <5	0.250 (6.350)	0.125 (3.175)	0.025 (0.635)	0.087 (2.210)	0.030 (0.762)	0.032 (0.813)
	5 to <7				0.047 (1.194)		
	7 to 200				0.030 (0.762)		
303145	2 to 200	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)

MODEL	RANGE	a	b	c	d	e	l
303144	0R003 to 0R0049	0.120 (3.05)	0.145 (3.68)	0.045 (1.14)	0.021 (0.53)	0.055 (1.39)	0.050 (1.27)
	0R005 to 0R0069	0.083 (2.10)	0.145 (3.68)	0.045 (1.14)	0.021 (0.53)	0.055 (1.39)	0.125 (3.17)
	0R007 to 0R2	0.065 (1.65)	0.145 (3.68)	0.045 (1.14)	0.021 (0.53)	0.055 (1.39)	0.160 (4.06)
303145	0R002 to 0R2	0.116 (2.95)	0.390 (9.91)	0.066 (1.68)	0.024 (0.610)	–	0.178 (4.52)

Note

(1) White dot indicates top side of part for mounting purposes

GENERAL NOTES

- Tightest absolute tolerance: 0.5% 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: 303144U). 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[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 –55°C/+25°C/+125°C	303144: 3 mΩ to <100 mΩ: ±20 ppm/°C 100 mΩ to 200 mΩ: ±25 ppm/°C 303145: 2 mΩ to ≤3 mΩ: ±25 ppm/°C >3 mΩ to <100 mΩ: ±20 ppm/°C 100 mΩ to 200 mΩ: ±25 ppm/°C
	Low temperature storage per MIL-PRF-49465	ΔR = 0.2% –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 = 0.2% –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 = 0.5% 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% 10 s to 12 s at +260°C reflow method
	Moisture resistance per MIL-STD-202, method 106 (7a and 7b not required)	ΔR = 0.05% 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 = 1% 2000 h, +70°C, rated power

(1) Units selected randomly from lots which successfully passed the table 2A testing

Table 3 – EEE-INST-002 (Table 3A Film/Foil, Level 1) Destructive Tests – MIL-PRF-49465 [1], Cont.		
Group 7B	Sample Size: 10(0) – mounted on FR4 Solder mounting integrity per MIL-PRF-55342	303144: 3 kg force, 30 s 303145: 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: For 303144: 12 For 303145: 4 Outgassing	Per ASTM E595

Notes
[1] Units selected randomly from lots which successfully passed the table 2A testing
[2] Optional, per customer request.
Measurement error allowed for ΔR limits: 0.0005 Ω.

Figure 3 – Part Number Information

Model #	303144	303145
Base Model	CSM2512	CSM3637
Value Range	3 mΩ to 200 mΩ	2 mΩ to 200 mΩ

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

Absolute Tolerance	Code
0.5%	D

Termination	Code
Tin/lead	B

Packaging	Code
Waffle	W
Tape and reel	T

Example: 303144 - 0R1 - DBW

303144, 100 mΩ, 0.5%, tin/lead termination, waffle packaging

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