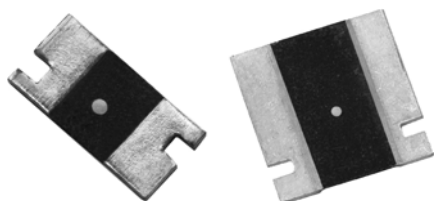


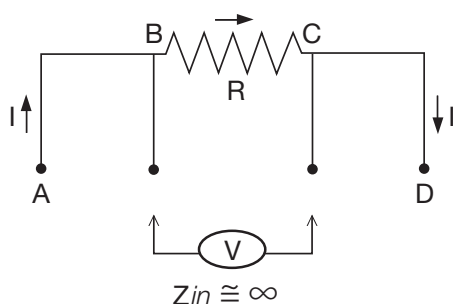
Models # 303144 and 303145 - Fixed Resistors CSM2512 and CSM3637 with Screen/Test Flow in Compliance with EEE-INST-002 (Tables 2A and 3A, Film/Foil, Level 1) MIL-PRF-55342 and MIL-PRF-49465



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.



FEATURES

- Temperature coefficient: ± 20 ppm/ $^{\circ}\text{C}$ max. (- 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$, + 25 $^{\circ}\text{C}$ 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 m Ω to 200 m Ω
- Vishay 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 m Ω vs. 2 m Ω)
- Short time overload: 0.1 %
- Thermal EMF: 3 $\mu\text{V}/^{\circ}\text{C}$
- 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@vishaypg.com
- For oriented performances please contact Application Engineering

FIGURE 1 - POWER DERATING CURVE

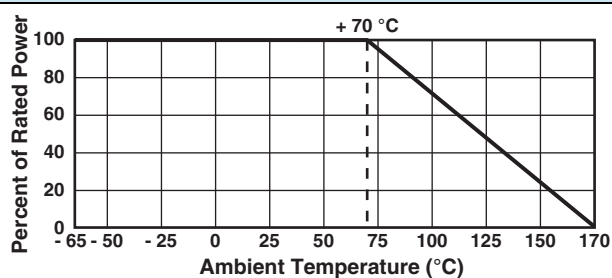
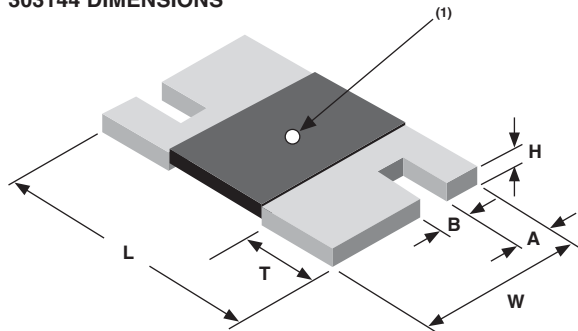


TABLE 1 - SPECIFICATIONS

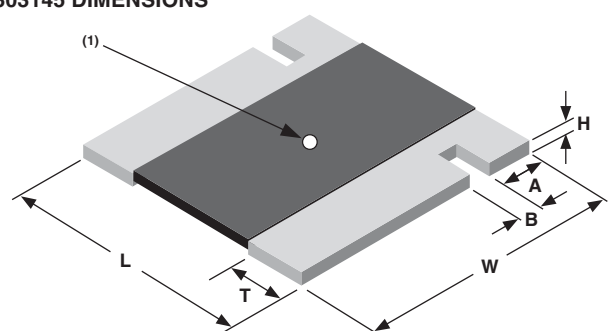
PARAMETER	303144	303145
Resistance Range	3 m Ω to 200 m Ω	2 m Ω to 200 m Ω
Power Rating at 70 $^{\circ}\text{C}$	1 W	3 W (2 m Ω to 10 m Ω) 2 W (> 10 m Ω to 200 m Ω)
Maximum Current	18 A	38 A
Tightest Tolerance	± 0.5 %	
Temperature Coefficient Max. (- 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$, + 25 $^{\circ}\text{C}$ ref.)	± 20 ppm/ $^{\circ}\text{C}$ (3 m Ω to < 100 m Ω) ± 25 ppm/ $^{\circ}\text{C}$ (100 m Ω to 200 m Ω)	± 25 ppm/ $^{\circ}\text{C}$ (2 m Ω to \leq 3 m Ω) ± 25 ppm/ $^{\circ}\text{C}$ (100 m Ω to 200 m Ω) ± 20 ppm/ $^{\circ}\text{C}$ (> 3 m Ω to < 100 m Ω)
Operating Temperature Range	- 55 $^{\circ}\text{C}$ to + 125 $^{\circ}\text{C}$, ref. + 25 $^{\circ}\text{C}$	
Weight (maximum)	0.09 g	0.29 g

FIGURE 2 - DIMENSIONS AND IMPRINTING in inches (millimeters)

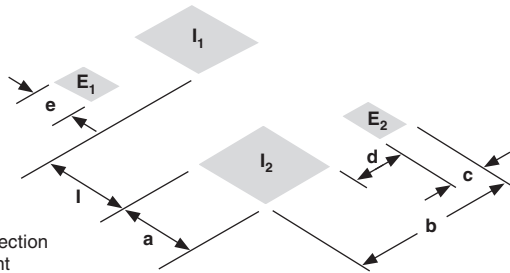
303144 DIMENSIONS



303145 DIMENSIONS

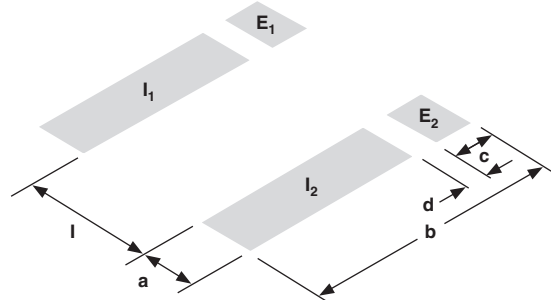


303144 LAND PATTERN



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

303145 LAND PATTERN



DIMENSIONS - TOLERANCES ± 0.010 (± 0.254), * ± 0.015 (± 0.381)

MODEL	RESISTANCE RANGE (m Ω)	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

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 x (- 65 °C to + 150 °C)
RC Record	$\Delta R = 0.1 \%$
High Temperature Exposure	+ 170 °C, 100 h, no power
RC Record	In tolerance $\Delta R = 0.2 \%$
Final Inspection	5 % PDA on ΔR , 10 % PDA on out of tolerance
Visual Inspection	Magnification 30 x to 60 x
Mechanical Inspection	Dimensions, workmanship, 3 units sample size

Note

(1) VFR 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(2)	
Group 2	<p>Sample size: 3(0)</p> <p>Solderability MIL-STD-202, method 208</p>
Group 3	<p>Sample size: 10(0) - mounted on FR4</p> <p>TCR measurement per MIL-STD-202, method 304 - 55 °C/+ 25 °C/+ 125 °C</p> <p>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</p> <p>Low temperature storage per MIL-PRF-49465 $\Delta R = 0.2 \%$ - 55 °C ± 2 °C, 24 h ± 4 h ambient no load dwell for 2 h to 8 h at + 25 °C</p> <p>Low temperature operation per MIL-PRF-55342 $\Delta R = 0.2 \%$ - 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</p> <p>Short time overload per MIL-STD-49465 $\Delta R = 0.3 \%$ 5 x rated power at + 25 °C for 5 s, not to exceed maximum current rating</p>
Group 4	<p>Sample size: 9(0) - mounted on FR4</p> <p>Resistance to soldering heat $\Delta R = 0.05 \%$ 10 s to 12 s at + 260 °C reflow method</p> <p>Moisture resistance per MIL-STD-202, method 106 (7a and 7b not required) $\Delta R = 0.05 \%$ 240 h, no power</p>
Group 5	<p>Sample size: 9(0)</p> <p>Shock per MIL-STD-202, method 213, condition I $\Delta R = 0.05 \%$ 100G, 6 ms axes Z and Y, 10 shocks per axis</p> <p>Vibration per MIL-STD-202, method 204, condition D $\Delta R = 0.05 \%$ 10 Hz to 2000 Hz, 20G 2 axes, 6 h per axis</p>
Group 6	<p>Sample size: 12(0) - mounted on FR4</p> <p>Life test per MIL-PRF-49465 $\Delta R = 1 \%$ 2000 h, + 70 °C, rated power</p>

TABLE 3 - EEE-INST-002 (Table 3A Film/Foil, level 1) DESTRUCTIVE TESTS - MIL-PRF-49465⁽²⁾

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	$\Delta R = 0.3\%$ 1000 h, + 170 °C \pm 7 °C, no power
Group 10⁽³⁾	Sample size: For 303144: 12 For 303145: 4	Per ASTM E595
	Outgassing	

Notes

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

⁽³⁾ Optional, per customer request.

PART NUMBER IDENTIFICATION

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

Part Number:

{Model} - {Value} - {Tolerance} - {Termination} - {Packaging}

Absolute Tolerance	Code	Termination	Code	Packaging	Code
0.5 %	D	Tin/lead	B	Waffle	W
				Tape and reel	T

Example: 303144 - 0R1 - DBW

303144, 100 m Ω , 0.5 %, tin/lead termination, waffle packaging

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