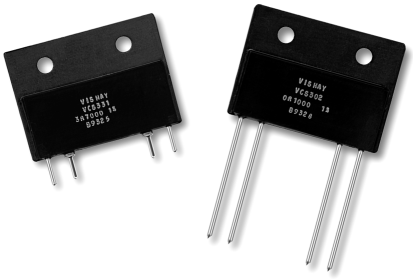
High Precision 4-Terminal Power Current Sensing Resistors with TCR as low as ± 3 ppm/°C Maximum, Tolerance to ± 0.5 % and Load Life Stability ± 0.02 % (200 ppm) at 25 °C, 2000 h at Rated Power



FEATURES

- Temperature coefficient of resistance (TCR): down to ± 3 ppm/°C max. (see table 2)
- Tolerance: to ± 0.5 % (see table 1)
- Power rating (heat-sinked): 10 W
- Load life stability: ± 0.02 % (200 ppm) at 25 °C, 2000 h at rated power
- Resistance range: 0.005 Ω to 0.25 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. 0R123 vs. 0R1)
- Non inductive, non capacitive design
- Rise time: 1.0 ns effectively no ringing
- Thermal EMF: 0.05 µV/°C typical
- Voltage coefficient: < 0.1 ppm/V
- Non inductive: 0.08 µH
- Non hot spot design
- Terminal finish: lead (Pb)-free or tin/lead alloy
- Compliant to RoHS directive 2002/95/EC
- Prototype quantities available in just 5 working days or sooner. For more information, please contact foil@vishaypg.com
- For better performances, please contact application engineering

Pb-free Available

RoHS* COMPLIANT

INTRODUCTION

The VCS301 and VCS302 offer precision resistors as low as 5 mΩ with a temperature coefficient down to 3 ppm/°C maximum and unmatched long term stability. The 4 terminal current sensing resistors, when mounted on a heat sink, can sustain 10 W continuously without an appreciable change in resistance (0.15 % maximum). The typical 50 % power derating specification associated with other technologies is not necessary. A choice of lead configurations is available.

Our application engineering department is available to advise and make recommendations. For non-standard technical requirements and special applications, please contact us.

TABLE 1 - CHARACTERISTICS

MODEL NUMBER	RESISTANCE RANGE	TOLERANCE (1)	POWER RATING (2) at + 25 °C	MAXIMUM CURRENT (2)
VCS301, VCS302	0.005 Ω < R < 0.1 Ω 0.1 Ω ≤ R < 0.25 Ω	± 1 % ± 0.5 %	10 W on heat sink (3) or 3 W in free air	15 A

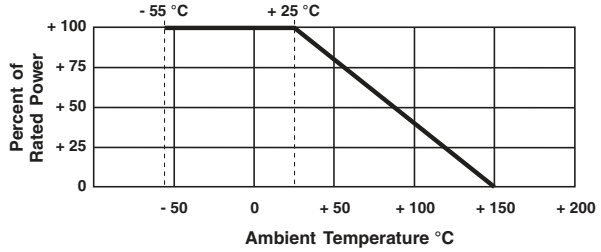
Notes

1. Tighter tolerance is available - for more details contact application engineering
2. The lower of the two limitations (power or current) is decisive
3. Heatsink - aluminum (6" length x 4" width x 2" height x 0.04" thick)

TABLE 2 - TCR CHART (MAXIMUM)

(0 °C TO + 60 °C)			
≥ 0.005 Ω	to	< 0.01 Ω	± 15 ppm/°C
≥ 0.01 Ω	to	< 0.05 Ω	± 10 ppm/°C
≥ 0.05 Ω	to	< 0.1 Ω	± 5 ppm/°C
≥ 0.1 Ω	to	< 0.25 Ω	± 3 ppm/°C

FIGURE 1 - POWER DERATING CURVE

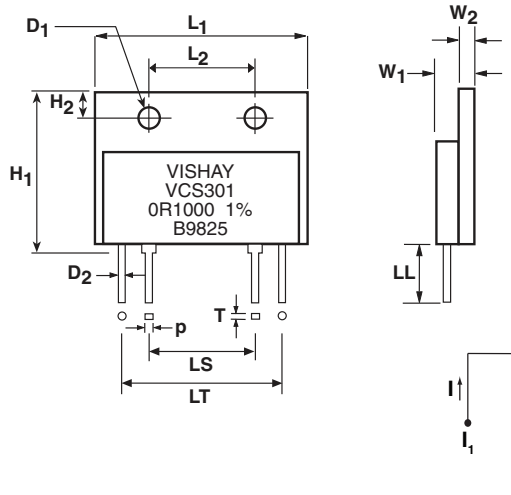


(Further Derating Not Necessary)

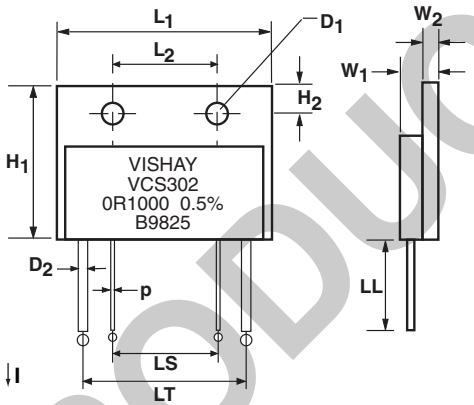
* Pb containing materials are not RoHS compliant, exemptions may apply

FIGURE 2 - DIMENSIONS in inches (millimeters) AND SCHEMATIC

Model VCS301 (E lead rectangular)



Model VCS302 (round leads)



MODEL	L_1 ± 0.008 (± 0.20)	L_2 ± 0.008 (± 0.20)	H_1 MAXIMUM	H_2 ± 0.008 (± 0.20)	W_1 MAXIMUM	W_2 MAXIMUM	LL MINIMUM	LS ± 0.020 (± 0.51)	LT ± 0.020 (± 0.51)	D_1 NOMINAL	D_2 NOMINAL	P NOMINAL	T NO
VCS301	1.340 (34.04)	0.701 (17.81)	1.063 (27.00)	0.197 (5.00)	0.210 (5.33)	0.087 (2.21)	0.216 (5.49)	0.689 (17.50)	1.083 (27.51)	0.138 (3.51)	0.040 (1.02)	0.040 (1.02)	0.016 (0.41)
VCS302	1.340 (34.04)	0.701 (17.81)	1.024 (26.01)	0.197 (5.00)	0.210 (5.33)	0.087 (2.21)	1.000 (25.40)	0.689 (17.50)	1.083 (27.51)	0.138 (3.51)	0.040 (1.02)	0.032 (0.81)	-

TABLE 3 - VISHAY VCS301, VCS302 PERFORMANCE

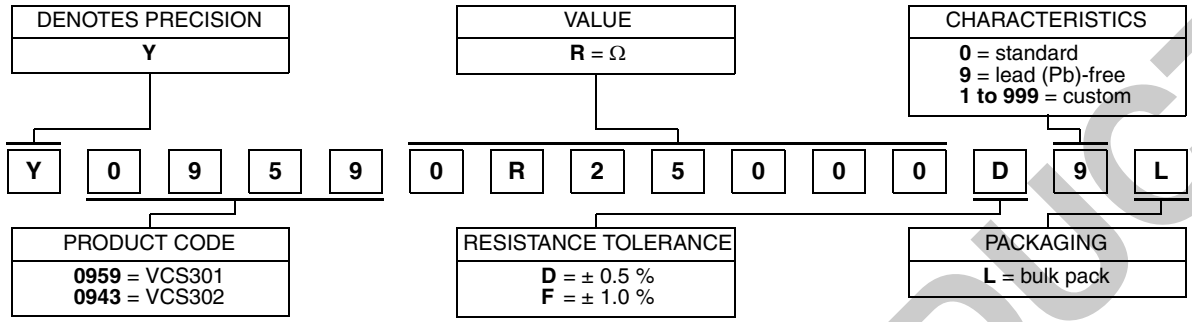
TEST OR CONDITION	VCS301, VCS302 PERFORMANCE (1)	
	TYPICAL ΔR LIMITS	MAXIMUM ΔR LIMITS
Thermal Shock	0.01 %	0.02 %
Short Time Overload (5 x Rated Power for 5 s)	0.01 %	0.02 %
Terminal Strength	0.02 %	0.05 %
High Temperature Exposure (2000 h at 150 °C)	0.02 %	0.05 %
Moisture Resistance	0.03 %	0.05 %
Low Temperature Storage (24 h at - 55 °C)	0.005 %	0.01 %
Shock (Specified Pulse)	0.01 %	0.02 %
Vibration (High Frequency)	0.01 %	0.02 %
Load Life (Rated Power, + 25 °C, 2000 h)	0.02 %	0.05 %
Resistance Tolerance	0.5 %	1 %
Thermal EMF	0.2 µV/°C max. (E terminal)	
Weight	8.1 g maximum	

Notes

1. ΔR's plus additional 0.0005 Ω for measurement error
2. All measurements done in free air

TABLE 4 - GLOBAL PART NUMBER INFORMATION (1)

NEW GLOBAL PART NUMBER: Y09590R25000D9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y0959 0R25000 D 9 L:
TYPE: VCS301
VALUE: 0.25 Ω
ABSOLUTE TOLERANCE: ± 0.5 %
TERMINATION: lead (Pb)-free
PACKAGING: bulk

HISTORICAL PART NUMBER: VCS301T 0R2500 D B (will continue to be used)

VCS301	T	0R2500	D	B
MODEL	TERMINATION	RESISTANCE VALUE	TOLERANCE	PACKAGING
VCS301 **VCS302**	**T** = lead (Pb)-free None = tin/lead alloy	0.25 Ω	**D** = ± 0.5 % **F** = ± 1.0 %	**B** = bulk pack

Note

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

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Тел: +7 (812) 336 43 04 (многоканальный)
Email: org@lifeelectronics.ru

www.lifeelectronics.ru