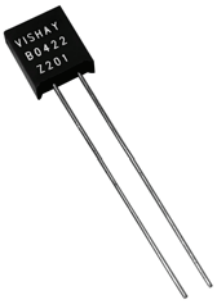
Ultra High Precision Z-Foil Resistor with TCR of ± 0.05 ppm/°C, PCR of 5 ppm at Rated Power, Tolerance of ± 0.005 % and Load Life Stability of ± 0.005 %

INDUSTRY BREAKTHROUGH



Any value at any tolerance available within resistance rage

INTRODUCTION

The Z201 (0.150" lead spacing) and Z201L (0.200" lead spacing) Bulk Metal® Z-Foil resistors represent an industry breakthrough. This is the 3rd in a series of ultra-precision resistors since the first Bulk Metal® Foil resistor was introduced by in 1962. Each represents an improvement on the earlier model. The TCR slope of the Z201 is 0.2 ppm/°C (- 55 °C to + 125 °C, + 25 °C ref.) and is an order of magnitude better than the original S102C. The Bulk Metal® Z-Foil resistor is the ultimate choice in the most demanding analog applications.

The Z-Foil technology provides a significant reduction of the resistive component's sensitivity to ambient temperature variations (TCR) and applied power changes (PCR). Designers can now guarantee a high degree of stability and accuracy in fixed-resistor applications using solutions based on Vishay's revolutionary Z-Foil technology.

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

TABLE 1 - TOLERANCE AND TCR VERSUS

VALUE	STANDARD TOLERANCE	TYPICAL TCR AND MAXIMUM SPREAD - 55 °C TO + 125 °C (+ 25 °C REF.)
100 Ω to 100 kΩ	± 0.005 %	± 0.2 ± 0.6 ppm/°C
80 Ω to < 100 Ω	± 0.005 %	± 0.2 ± 0.8 ppm/°C
50 Ω to < 80 Ω	± 0.01 %	± 0.2 ± 1.0 ppm/°C
25 Ω to < 50 Ω	± 0.01 %	± 0.2 ± 1.3 ppm/°C
10 Ω to < 25 Ω	± 0.02 %	± 0.2 ± 1.6 ppm/°C

* Pb containing terminations are RoHS compliant, exemptions may apply

FEATURES

Pb-free Available

RoHS* COMPLIANT

- Temperature coefficient of resistance (TCR):
  ± 0.05 ppm/°C typical (0 °C to + 60 °C)
  ± 0.2 ppm/°C typical (- 55 °C to + 125 °C, + 25 °C ref.)
- Power coefficient of resistance "ΔR due to self heating": ± 5 ppm at rated power
- Rated power: 0.6 W at 70 °C
  0.3 W at 125 °C
- Resistance tolerance: to ± 0.005 %
- Load life stability: to ± 0.005 % at 70 °C, 2000 h at rated power
- Resistance range: 10 Ω to 100 kΩ (higher or lower values of resistance available)
- Electrostatic discharge (ESD) up to 25 000 V
- Non inductive, non capacitive design
- Rise time: 1.0 ns without ringing
- Current noise: 0.01: - 40 dB
- Thermal EMF: 0.1 μV/°C max.
  0.05 μV/°C typical
- Voltage coefficient: < 0.1 ppm/V
- Non inductive: 0.08 μH
- Terminal finishes available: lead (Pb)-free
  tin/lead alloy
- Maximum working voltage: 300 V
- Drop in replacement for S102C/K
- Matched sets are available per request
- For better performances please contact us

APPLICATIONS

- Precision amplifiers, high precision instrumentation, medical and automatic test equipment
- Laboratory, audio (high end stereo equipment)
- EB applications, military, airborne and space
- Down-hole (high temperature)

FIGURE 1 - POWER DERATING CURVE

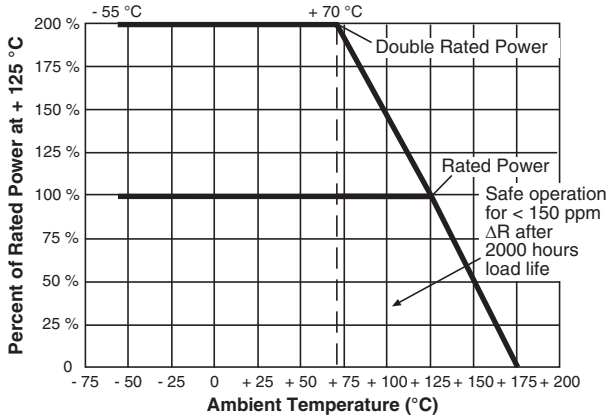
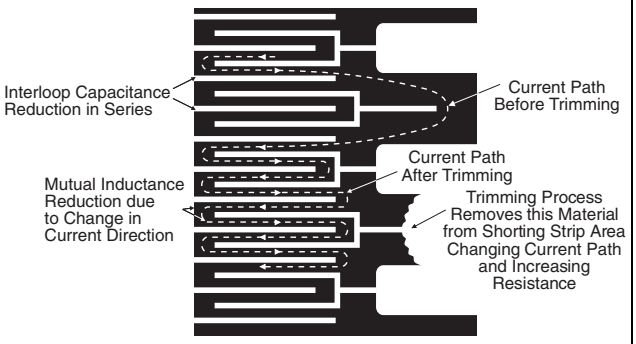


FIGURE 2 - TRIMMING TO VALUES
(conceptual illustration)



Note: Foil shown in black, etched spaces in white

FIGURE 3 - TYPICAL TCR CURVE Z-FOIL

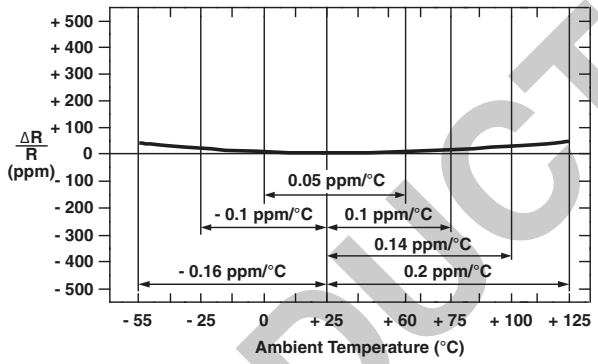
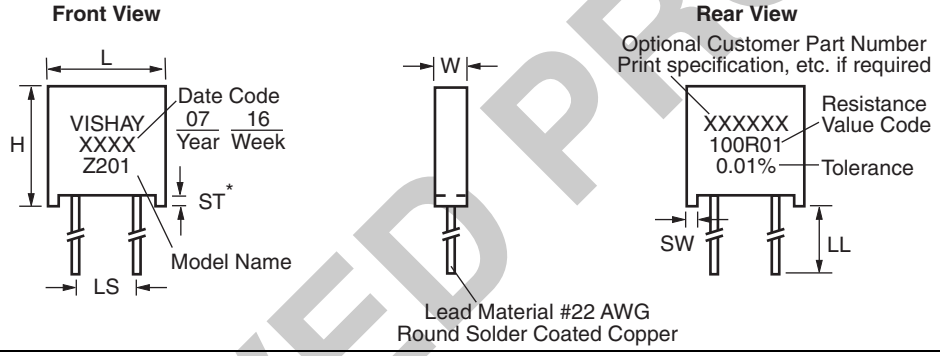


FIGURE 4 - STANDARD IMPRINTING AND DIMENSIONS



* The standoffs shall be so located as to give a lead clearance of 0.010" minimum between the resistor body and the printed circuit board when the standoffs are seated on the printed circuit board. This is to allow for proper cleaning of flux and other contaminants from the unit after all soldering processes.

		LS	W	L	H	ST	SW	LL
Z 201	Inches	0.150 ± 0.005	0.105 ± 0.010	0.300 ± 0.010	0.326 ± 0.010	0.010 min	0.035 ± 0.01	1.000 ± 0.125
	mm	3.81 ± 0.13	2.67 ± 0.25	7.62 ± 0.25	8.28 ± 0.25	0.254 min	1.02 ± 0.13	25.4 ± 3.18
Z 201 L	Inches	0.200 ± 0.005						
	mm	5.08 ± 0.13						

TABLE 2 - Z201 SPECIFICATIONS

Stability	
Load Life at 2000 h	± 0.005 % max. ΔR at 0.1 W/+ 70 °C ± 0.015 % max. ΔR at 0.3 W/+ 125 °C
Load Life at 10 000 h	± 0.01 % max. ΔR at 0.05 W/+ 125 °C ± 0.05 % max. ΔR at 0.3 W/+ 125 °C

TABLE 3 - ENVIRONMENTAL PERFORMANCE COMPARISON			
	MIL-PRF-55182 CHAR J	Z201	
		MAXIMUM ΔR	TYPICAL ΔR
Test Group I Thermal Shock Short Time Overload	 ± 0.2 % ± 0.2 %	 ± 0.01 % (100 ppm) ± 0.01 % (100 ppm)	 ± 0.002 % (20 ppm) ± 0.003 % (30 ppm)
Test Group II Resistance Temperature Characteristic Low Temperature Storage Low Temperature Operation Terminal Strength	 ± 25 ppm/°C ± 0.15 % ± 0.15 % ± 0.2 %	 see Table 1 ± 0.01 % (100 ppm) ± 0.01 % (100 ppm) ± 0.01 % (100 ppm)	 ± 0.05 ppm/°C (0 °C to + 60 °C) ± 0.002 % (20 ppm) ± 0.002 % (20 ppm) ± 0.002 % (20 ppm)
Test Group III DWV Resistance to Solder Heat Moisture Resistance	 ± 0.15 % ± 0.1 % ± 0.4 %	 ± 0.01 % (100 ppm) ± 0.01 % (100 ppm) ± 0.05 % (500 ppm)	 ± 0.002 % (20 ppm) ± 0.005 % (50 ppm) ± 0.01 % (100 ppm)
Test Group IV Shock Vibration	 ± 0.2 % ± 0.2 %	 ± 0.01 % (100 ppm) ± 0.01 % (100 ppm)	 ± 0.002 % (20 ppm) ± 0.002 % (20 ppm)
Test Group V Life Test at 0.3 W/+ 125 °C 2000 hours 10 000 hours	 ± 0.5 % ± 2.0 %	 ± 0.015 % (150 ppm) ± 0.05 % (500 ppm)	 ± 0.01 % (100 ppm) ± 0.03 % (300 ppm)
Test Group Va Life Test at 0.6 W (2 x Rated Power)/+ 70 °C, 2000 hours	± 0.5 %	± 0.015 % (150 ppm)	± 0.01 % (100 ppm)
Test Group VI High Temperature Exposure	± 2.0 %	± 0.1 % (1000 ppm)	± 0.05 % (500 ppm)
Test Group VII Voltage Coefficient	0.005 %/V	< 0.00001 %/V	< 0.00001 %/V

STANDARD MEASUREMENT (at room temperature)

Standard Test Conditions:

- Temperature: + 23 °C ± 2 °C
- Relative humidity: 35 to 65 % RH
- Lead test point: 0.5" (12.7 mm) from resistor body

IMPROVED PERFORMANCE TESTING

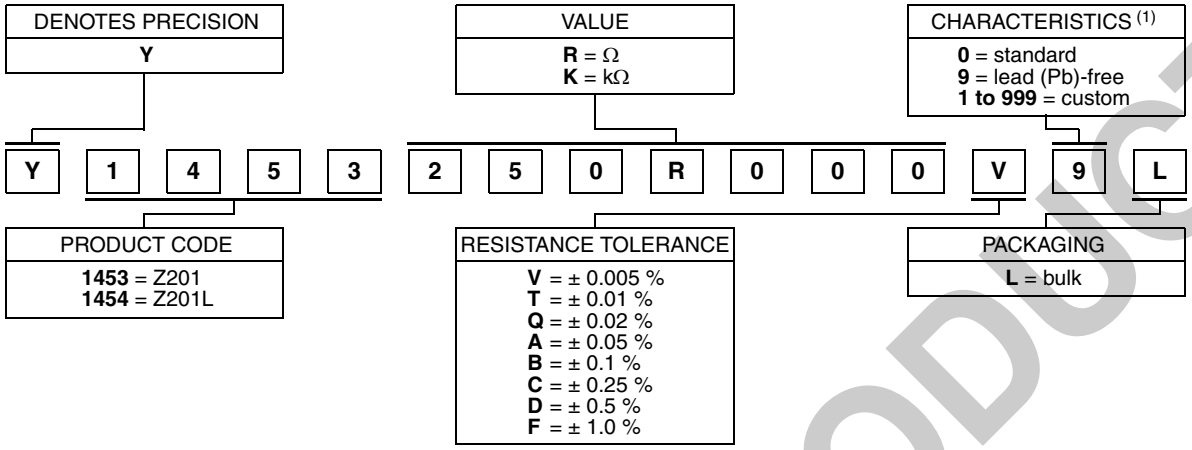
The preceding information is based on product directly off the production line. Improved performance (meaning increased time stability with load and other stresses) is available through factory conducted "Improved Performance Testing". The test routine is usually tailored to the user's stability objectives. A screened product can be brought down to a potential load life drift of less than 50 ppm.

For example, the datasheet "7 Technical Reasons to Specify BMF Resistive Components" shows the drift characteristics of a standard product.

Various screen test routines are available and all anticipated stresses must be taken into account before settling on one specific test routine. Our applications engineering department is available to discuss and recommend appropriate routines given the full spectrum of anticipated stresses and stability requirements.

TABLE 4 - GLOBAL PART NUMBER INFORMATION

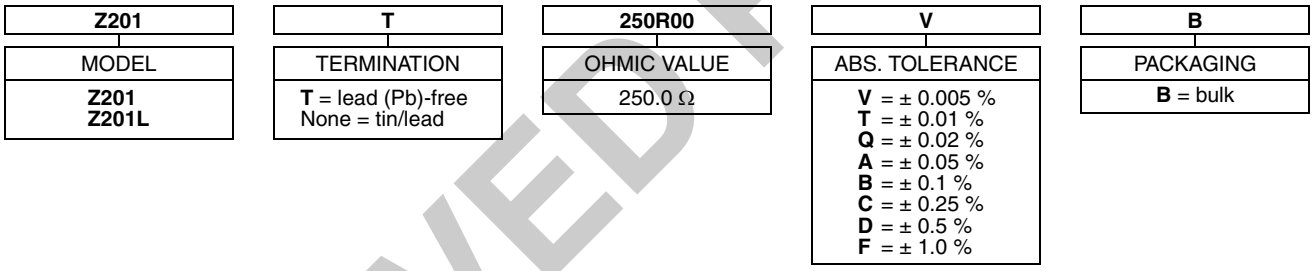
NEW GLOBAL PART NUMBER: Y1453250R000V9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y1453 250R000 V 9 L:

TYPE: Z201
VALUE: 250.0 Ω
ABSOLUTE TOLERANCE: ± 0.005 %
TERMINATION: lead (Pb)-free
PACKAGING: bulk

HISTORICAL PART NUMBER: Z201T 250R00 V B (will continue to be used)



Note

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

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