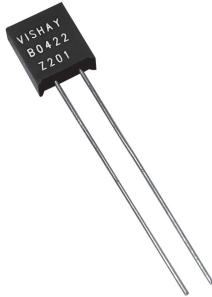


Ultra High Precision Z-Foil Resistor with TCR of ± 0.2 ppm/ $^{\circ}$ C, Tolerance of ± 0.005 % and Load Life Stability of ± 0.005 %

INDUSTRY BREAKTHROUGH



INTRODUCTION

The Z201 (0.150 lead spacing) and Z201L (0.200 lead spacing) Bulk Metal[®] 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 Vishay in 1962. Each represents an improvement on the earlier model. The TCR slope of the Z201 is 0.2 ppm/ $^{\circ}$ C (MIL range) and is an order of magnitude better than the original S102C. The Bulk Metal[®] Foil resistor is the ultimate choice in the most demanding analog applications.

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

Our Application Engineering Department is available to advise and to make recommendation for non-standard technical requirements and special applications, please contact us.

FEATURES

- Low Temperature Coefficient of Resistance (TCR): 0.2 ppm/ $^{\circ}$ C (MIL Range) Typical
- Low Power Coefficient of Resistance (PCR): 5 ppm at rated power
- Load Life Stability: to ± 0.005 % at 70 $^{\circ}$ C, 2000 hrs
- Tight Tolerance: to ± 0.005 %
- New smaller size: Now drop in replacement for S102C/K
- Resistance Range: 10 Ω to 100 k Ω (higher or lower values of resistance are available)
- Rated Power: 0.6 W at 70 $^{\circ}$ C
0.3 W at 125 $^{\circ}$ C
- Current Noise: 0.01 μ V/V (RMS): - 40 dB
- Thermal EMF: 0.1 μ V/ $^{\circ}$ C Max
0.05 μ V/ $^{\circ}$ C Typical
- Rise/Decay Time: 1.0 ns without ringing
- Low Voltage Coefficient: < 0.1 ppm/V
- Non Inductive: 0.08 μ H
- Maximum Working Voltage: 300 V
- Terminal Finishes Available:
Lead (Pb)-free (Sn 100 %)
Tin/Lead Alloy (Sn 60 %, Pb 40 %)
- Matched sets are available per request
- For Tighter performances please contact us



RoHS*
COMPLIANT

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)

TABLE 1 - TOLERANCE AND TCR VERSUS RESISTANCE

VALUE (Ω)	STANDARD TOLERANCE (%)	TYPICAL TCR AND MAXIMUM SPREAD (ppm/ $^{\circ}$ C) - 55 $^{\circ}$ C to + 125 $^{\circ}$ C (+ 25 $^{\circ}$ C Ref.)
100 Ω to 100 k Ω	± 0.005 %	$\pm 0.2 \pm 0.6$ ppm/ $^{\circ}$ C
80 Ω to < 100 Ω	± 0.005 %	$\pm 0.2 \pm 0.8$ ppm/ $^{\circ}$ C
50 Ω to < 80 Ω	± 0.01 %	$\pm 0.2 \pm 1$ ppm/ $^{\circ}$ C
25 Ω to < 50 Ω	± 0.01 %	$\pm 0.2 \pm 1.3$ ppm/ $^{\circ}$ C
10 Ω to < 25 Ω	± 0.02 %	$\pm 0.2 \pm 1.6$ ppm/ $^{\circ}$ C

* Pb containing terminations are not RoHS compliant, exemptions may apply.

TABLE 2 - Z201 SPECIFICATIONS

Stability	
Load Life at 2000 Hrs	± 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 Hrs	± 0.01 % Max ΔR at 0.05 W/+ 125 °C ± 0.05 % Max ΔR at 0.3 W/+ 125 °C
Shelf Life Stability	± 0.0025 % Max ΔR after 1 year ± 0.005 % Max ΔR after 3 years

FIGURE 2 - POWER DERATING CURVE

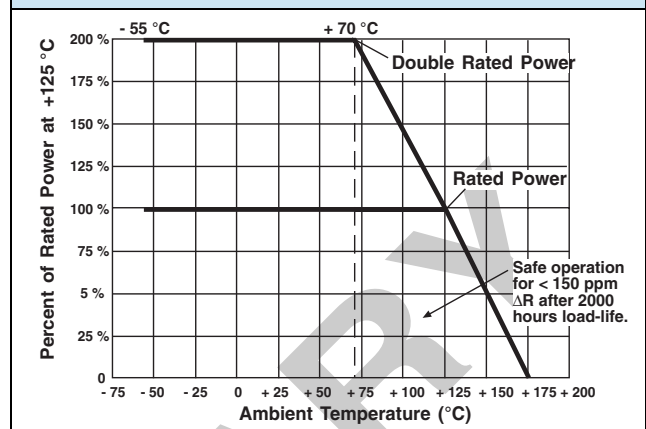


FIGURE 3 - TYPICAL TCR CURVE Z-FOIL

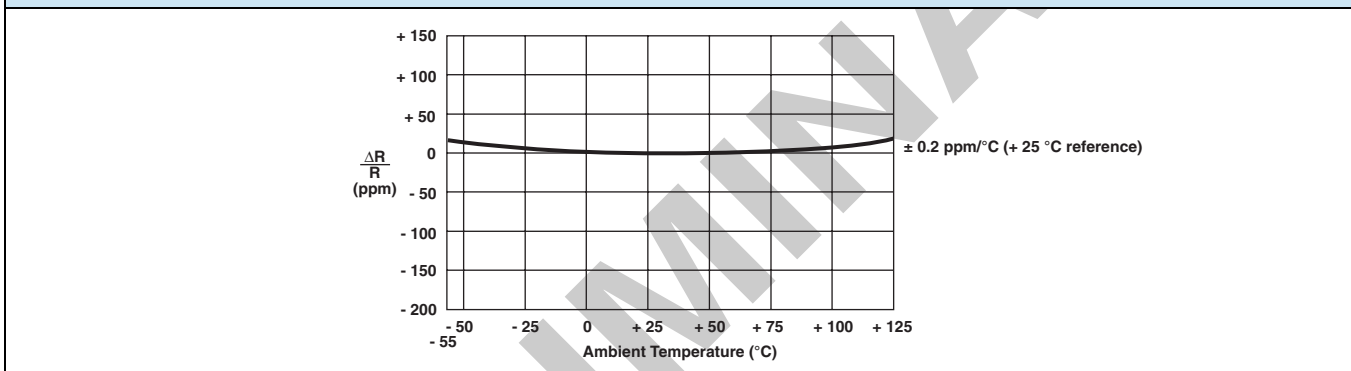
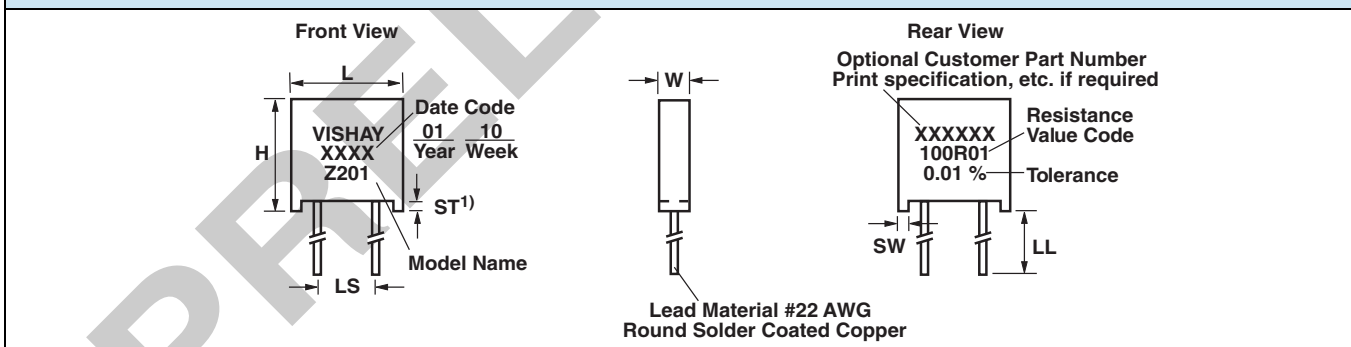


FIGURE 4 - STANDARD IMPRINTING AND DIMENSIONS



NOTE:

1. 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.

		W	L	H	ST	SW	LL	LS
Z 201	Inches	0.105 ± 0.010	0.300 ± 0.010	0.326 ± 0.010	0.010 min	0.040 ± 0.005	1.000 ± 0.125	0.150 ± 0.005
	mm	2.67 ± 0.25	7.62 ± 0.25	8.28 ± 0.25	0.254 min	1.02 ± 0.13	25.4 ± 3.18	3.81 ± 0.13
Z 201 L	Inches	0.098 max	0.295 max	0.315 max	0.010 min	0.040 ± 0.005	0.875 min	0.200 ± 0.005
	mm	2.49 max	7.49 max	8.00 max	0.254 min	1.02 ± 0.005	22.23 min	5.08 ± 0.13

TABLE 3 - ORDERING INFORMATION

Specify Vishay Z201 resistors as follows:

MODEL NO.	RESISTANCE VALUE			TOLERANCE	TERMINATION
	RESISTANCE RANGE	LETTER DESIGNATOR	MULTIPLIER FACTOR		
Z201	10 Ω to < 1 k Ω	R	x 1	V = \pm 0.005 % T = \pm 0.01 % Q = \pm 0.02 % A = \pm 0.05 % B = \pm 0.1 % C = \pm 0.25 % D = \pm 0.5 % F = \pm 1.0 %	T = Lead (Pb)-free none = Tin/Lead alloy
	1 k Ω to 100 k Ω	K	x 10 ³		

Resistance Value, in ohms, is expressed by a series of 6 characters, 5 of which represent significant digits while the 6th is a dual purpose letter that designates both the multiplier and the location of the comma or decimal.

NOTE:

For example: Z201 T 250R00 V - Model; Z201, Termination; lead (Pb)-free, Value; 250 Ω , Tolerance; 0.005 %.

TABLE 4 - ENVIRONMENTAL PERFORMANCE COMPARISON

	MIL-PRF-55182 CHAR J	VISHAY Z201	
		MAXIMUM ΔR	TYPICAL ΔR
Test Group I Thermal Shock Overload	\pm 0.2 % \pm 0.2 %	\pm 0.01 % \pm 0.01 %	\pm 0.002 % \pm 0.003 %
Test Group II Resistance Temperature Characteristic Low Temp Storage Low Temp Operation Terminal Strength	\pm 25 ppm/ $^{\circ}$ C \pm 0.15 % \pm 0.15 % \pm 0.2 %	see table 1 \pm 0.01 % \pm 0.01 % \pm 0.01 %	 \pm 0.005 % \pm 0.005 % \pm 0.002 %
Test Group III DWV Resistance to Solder Heat Moisture Resistance	\pm 0.15 % \pm 0.1 % \pm 0.4 %	\pm 0.01 % \pm 0.01 % \pm 0.05 %	\pm 0.005 % \pm 0.002 % \pm 0.02 %
Test Group IV Shock Vibration	\pm 0.2 % \pm 0.2 %	\pm 0.01 % \pm 0.01 %	\pm 0.002 % \pm 0.002 %
Test Group V Life Test at 0.3 W/+125 $^{\circ}$ C 2000 Hours 10 000 Hours	\pm 0.5 % \pm 2.0 %	\pm 0.015 % \pm 0.05 %	\pm 0.01 % \pm 0.03 %
Test Group Va + 70 $^{\circ}$ C Power Rating	\pm 0.5 %	\pm 0.1 %	\pm 0.05 %
Test Group VI High Temperature Exposure	\pm 2.0 %	\pm 0.1 %	\pm 0.05 %
Test Group VII Voltage Coefficient	0.005 %/V	< 0.00001 %/V	< 0.00001 %/V

STANDARD MEASUREMENT (at room temperature)**Standard Test Conditions:**

- Temperature: + 23 $^{\circ}$ C \pm 2 $^{\circ}$ 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 users stability objectives and product that has been screened can be brought down to a potential load life drift of less than 50 ppm. For example, the data sheet "7 Technical Reasons to Specify BMF Resistive Components" shows the drift characteristics of 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 prepared to discuss and recommend appropriate routines given the full spectrum of anticipated stresses and stability requirements.

Disclaimer

All product specifications and data are subject to change without notice.

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