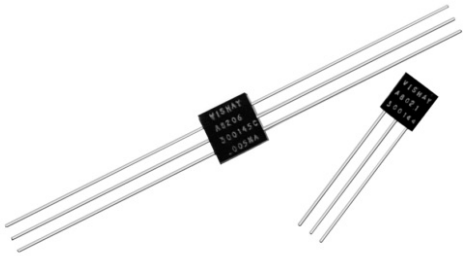
Ultra High Precision Z-Foil Voltage Divider Resistors with TCR Tracking to 0.1 ppm/°C, Power Coefficient Tracking of 5 ppm at Rated Power, and Tolerance Match to 0.005 % (50 ppm)



Any value at any tolerance available within resistance range

INTRODUCTION

The 300144Z, 300145Z voltage dividers are the first choice for ultra high precision, stability and reliable voltage division.

The Z-foil technology provides a significant reduction of the resistive component's sensitivity to ambient temperature variations (TCR) and applied power changes (PCR).
0.05 ppm/°C absolute TCR removes errors due to temperature gradients.

Models 300144Z and 300145Z offer low TCR (both absolute and tracking), low power coefficient, excellent load life stability, tight tolerance, excellent ratio stability, low thermal EMF, low current noise and non sensitivity to ESD - all in one package.

Model 300145Z is a pair-of 300144Z elements back to back in a single molded package.

By taking advantage of the overall stability and reliability of Vishay Bulk Metal® foil resistors, designers can significantly reduce circuit errors and greatly improve overall circuit performances.

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

FEATURES

Pb-free Available

RoHS* COMPLIANT

- Temperature coefficient of resistance (TCR):
  absolute:
  ± 0.05 ppm/°C typical (0 °C to + 60 °C)
  ± 0.2 ppm/°C typical (- 55 °C to + 125 °C, + 25 °C ref.)
  tracking: 0.1 ppm/°C typical
- Tolerance: absolute and matching to 0.005 %
- Power coefficient tracking "ΔR due to self heating": 5 ppm at rated power
- Power rating: 0.2 W at 70 °C, for the entire resistive element R1 and R2, divided proportionally between the two elements
- Ratio stability: < 0.001 % (10 ppm) 0.2 W at 70 °C for 2000 h
- Maximum working voltage: 200 V
- Electrostatic discharge (ESD) above 25 000 V
- Non inductive, non capacitive design
- Rise time: 1 ns without ringing
- Current noise: < - 40 dB
- Thermal EMF: 0.05 µV/°C typical
- Voltage coefficient: < 0.1 ppm/V
- Non inductive: < 0.08 µH
- Non hot spot design
- Terminal finishes available: lead (Pb)-free
  tin/lead alloy
- Any value available within resistance range (e.g. 1K2345)
- Prototype samples available from 48 h. For more information, please contact foil@vishay.com
- For better performances please contact us

APPLICATIONS

- Instrumentation amplifiers
- Bridge networks
- Differential amplifiers
- Military
- Space
- Medical
- Automatic test equipment
- Down-hole (high temperature)

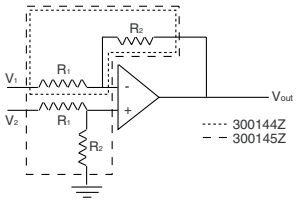


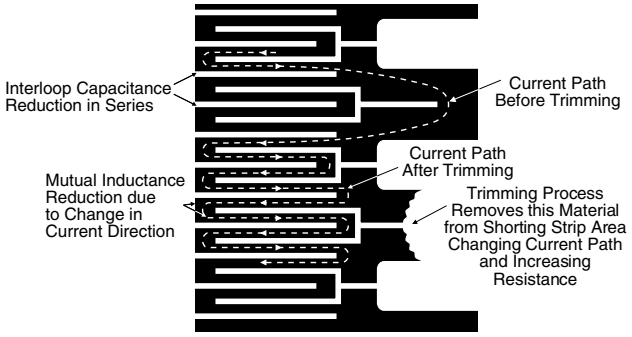
TABLE 1 - MODELS 300144Z AND 300145Z SPECIFICATIONS

MODEL	RESISTANCE RATIO	ABSOLUTE TCR (- 55 °C to + 125 °C, + 25 °C Ref.)	TCR TRACKING		TOLERANCE	
		TYPICAL AND MAX. SPREAD	TYPICAL	MAX.	ABSOLUTE	MATCH
300144Z 300145Z	1.1	± 0.2 ppm/°C ± 1.8 ppm/°C	0.1 ppm/°C	0.5 ppm/°C	± 0.005%	0.005%
	4:1		0.5 ppm/°C	0.8 ppm/°C	± 0.005%	0.005%
	10:1		0.5 ppm/°C	1.0 ppm/°C	± 0.01%	0.01%
	> 10:1		0.5 ppm/°C	1.5 ppm/°C	± 0.01%	0.01%

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

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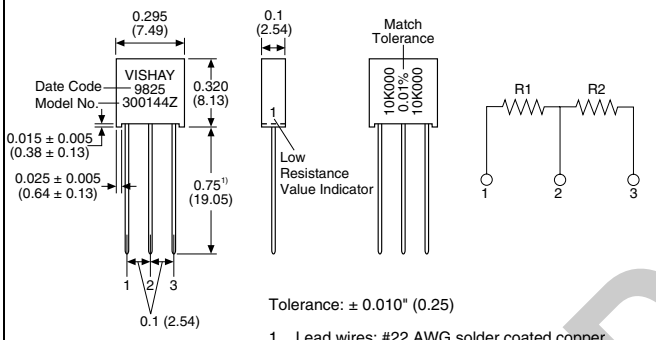
FIGURE 1 - TRIMMING TO VALUES (conceptual illustration)



Note: Foil shown in black, etched spaces in white

FIGURE 2 - STANDARD PRINTING AND DIMENSIONS in inches (millimeters)

Model 300144Z and Schematic[2)]



Tolerance: ± 0.010" (0.25)

1. Lead wires: #22 AWG solder coated copper, 0.75" minimum length
2. Each resistor contains 1 chip of two resistive elements

Model 300145Z and Schematic[2)]

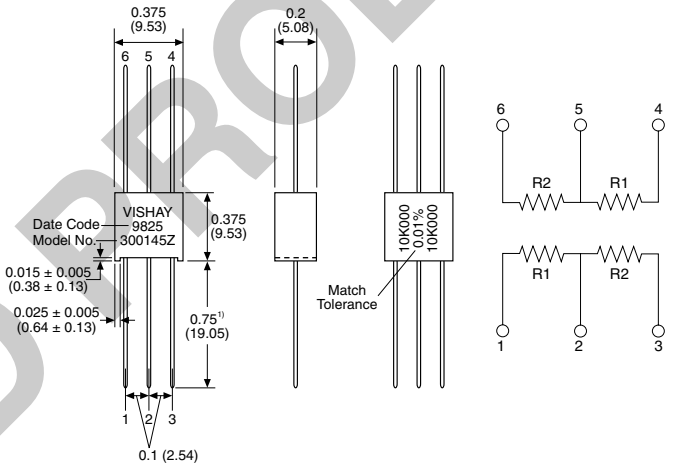
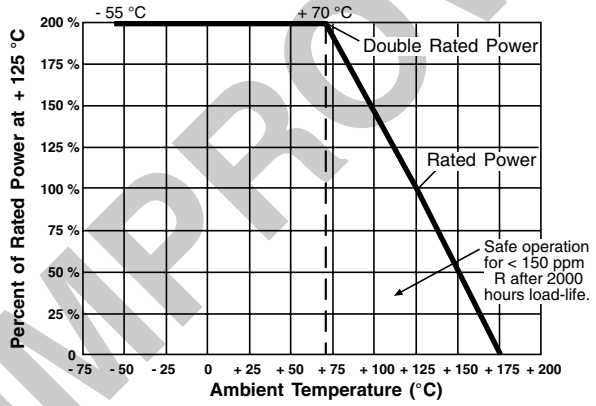


FIGURE 3 - POWER DERATING CURVE 300144Z, 300145Z

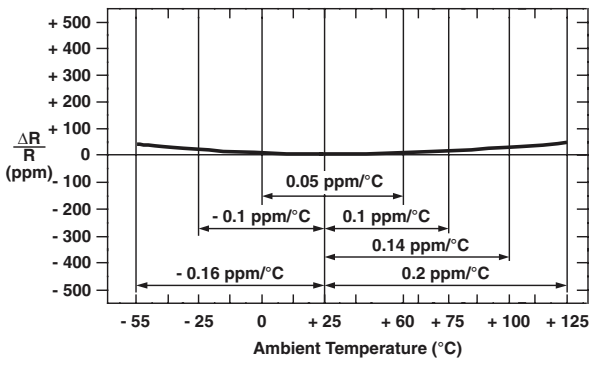


Note: Power is proportional to the divider ratio

Example: In a 300144Z (1K/10K dual), the power rating would be 18 mW on the 1K and 182 mW on the 10K, for a total of 200 mW on R1 + R2.

$$P1 = \left(\frac{R1}{R1 + R2}\right) P \qquad P2 = \left(\frac{R2}{R1 + R2}\right) P$$

FIGURE 4 - TYPICAL TCR CURVE Z-FOIL (for more details see table 1)



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TABLE 2 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y1691V0058QT9L (preferred part number format)

DENOTES PRECISION	VCODE	TOLERANCE MATCH	PACKAGING
Y	RESISTANCE VALUE CODE	**V** = 0.005 % **T** = 0.01 % **Q** = 0.02 % **A** = 0.05 % **B** = 0.1 % **D** = 0.5 % **F** = 1.0 %	**L** = bulk pack

Y	1	6	9	1	V	0	0	5	8	Q	T	9	L

PRODUCT CODE	RESISTANCE TOLERANCE	AER*
1691 = 300144Z **1735** = 300145Z	**V** = ± 0.005 % **T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.1 % **D** = ± 0.5 % **F** = ± 1.0 %	**0** = standard **9** = lead (Pb)-free **1 - 999** = custom

FOR EXAMPLE: ABOVE GLOBAL ORDER Y1691 V0058 Q T 9 L:

TYPE: 300144Z
VALUES: 2K/20K
ABSOLUTE TOLERANCE: ± 0.02 %
TOLERANCE MATCH: 0.01 %
TERMINATION: lead (Pb)-free
PACKAGING: bulk pack

HISTORICAL PART NUMBER: 300144ZT 2K/20K TCR0.2 Q T B (will continue to be used)

300144Z	T	2K/20K	TCR0.2	Q	T	B
MODEL	TERMINATION	OHMIC VALUE	TCR CHARACTERISTIC	ABSOLUTE TOLERANCE	TOLERANCE MATCH	PACKAGING
300144Z **300145Z**	**T** = lead (Pb)-free **None** = tin/lead alloy	R_1 = 2 kΩ R_2 = 20 kΩ		**V** = ± 0.005 % **T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.1 % **D** = ± 0.5 % **F** = ± 1.0 %	**V** = 0.005 % **T** = 0.01 % **Q** = 0.02 % **A** = 0.05 % **B** = 0.1 % **D** = 0.5 % **F** = 1.0 %	**B** = bulk pack

Note

* For non-standard requests, please contact application engineering.

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TABLE 3 - RESISTANCE VALUE CODE LIST FOR POPULAR RATIOS
(other values available on request)

300144Z RATIOS			300145Z RATIOS				
VCODES	**R1**	**R2**	**VCODES**	**R1**	**R2**	**R3**	**R4**
V0009	20K	20K	V0008	10K	10K	10K	10K
V0010	20K	10K	V0019	5K	5K	5K	5K
V0100	20K	2K	V0092	1K	7K812	7K812	1K
V0055	19K4	9K7	V0023	500R	500R	500R	500R
V0223	17K5	20K	V0047	100R	8K8	100R	8K8
V0097	15K	15K	V0051	100R	10K	100R	10K
V0001	10K	10K	V0227	350R	350R	350R	350R
V0042	10K	8K323					
V0006	10K	2K					
V0226	9K	10K					
V0003	9K	1K					
V0013	8K	16K					
V0107	6K	20K					
V0014	6K	7K					
V0005	5K	10K					
V0002	5K	5K					
V0026	3K	19K2					
V0058	2K	20K					
V0030	2K	18K					
V0029	2K	4K					
V0032	1K	16K					
V0004	1K	1K					
V0022	511R	16K2					
V0061	300R	300R					

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