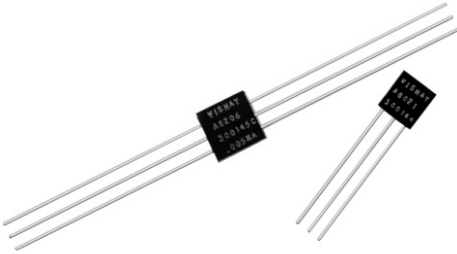


## High Precision Voltage Divider Resistors with TCR Tracking to 0.5 ppm/°C and Tolerance Match to 0.005 % (50 ppm)



Any value at any ratio available within resistance range

### INTRODUCTION

Vishay Bulk Metal® foil technology outperforms all other technologies available today for applications that require high precision and high stability.

Models 300144 and 300145 offer low TCR (both absolute and tracking), 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 300145 is a pair-of 300144 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

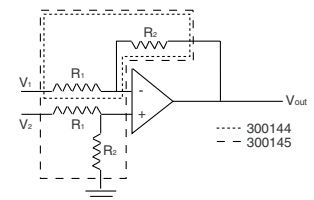
- Temperature coefficient of resistance (TCR):  
absolute:  
 $\pm 2 \text{ ppm/}^\circ\text{C}$  typical ( $- 55 \text{ }^\circ\text{C}$  to  $+ 125 \text{ }^\circ\text{C}$ ,  $+ 25 \text{ }^\circ\text{C}$  ref.)  
tracking:  $0.5 \text{ ppm/}^\circ\text{C}$
- Tolerance: absolute and matching to 0.005 %
- Power rating: 0.2 W at  $70 \text{ }^\circ\text{C}$ , for the entire resistive element R1 and R2, divided proportionally between the two elements
- Ratio stability:  $< 0.001 \text{ %}$  (10 ppm) 0.2 W at  $70 \text{ }^\circ\text{C}$  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:  $< - 40 \text{ dB}$
- Thermal EMF:  $0.05 \text{ } \mu\text{V/}^\circ\text{C}$  typical
- Voltage coefficient:  $< 0.1 \text{ ppm/V}$
- Non inductive:  $< 0.08 \text{ } \mu\text{H}$
- 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](mailto:foil@vishay.com)
- For better performances see 300144Z, 300145Z (Z-Foil) datasheet



**RoHS\***  
COMPLIANT

### APPLICATIONS

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

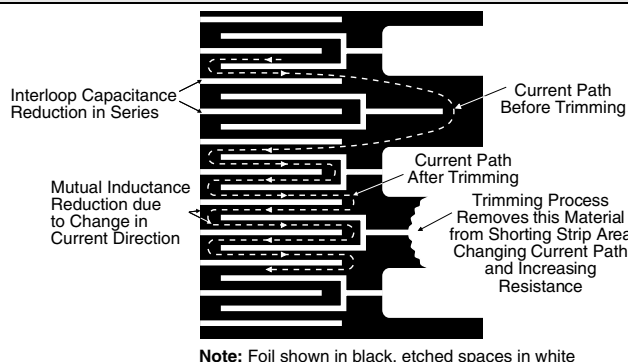


**TABLE 1 - MODELS 300144 AND 300145 SPECIFICATIONS**

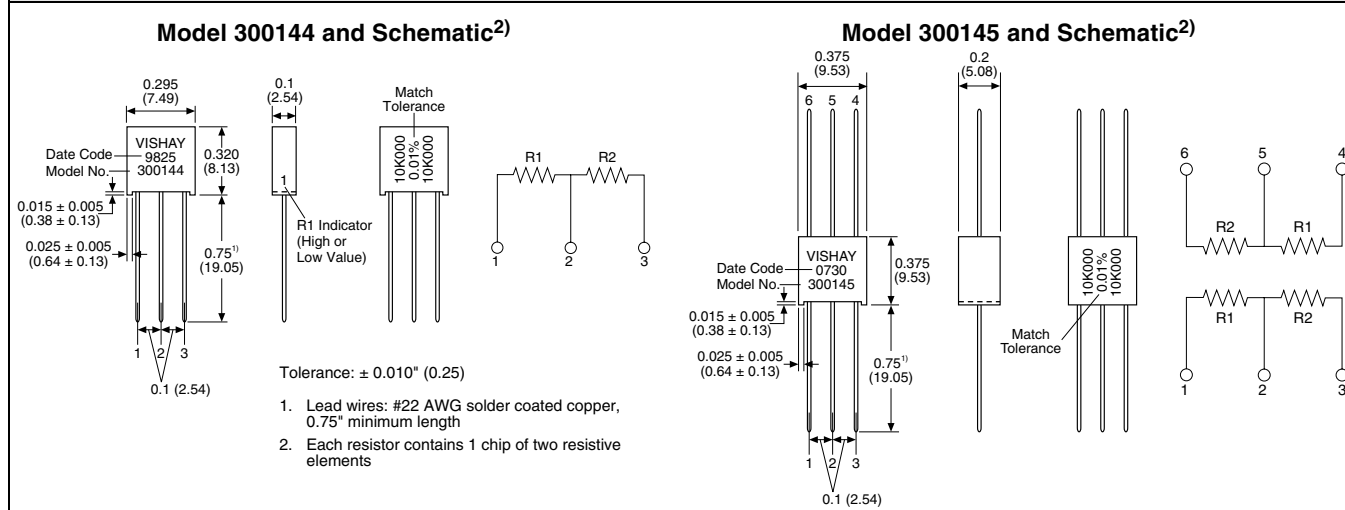
MODEL	RESISTANCE RATIO	ABSOLUTE TCR ( $- 55 \text{ }^\circ\text{C}$ to $+ 125 \text{ }^\circ\text{C}$ , $+ 25 \text{ }^\circ\text{C}$ Ref.)	TCR TRACKING	TOLERANCE	
		TYPICAL AND MAX. SPREAD		ABSOLUTE	MATCH
300144 300145	1:1	$\pm 2 \text{ ppm/}^\circ\text{C} \pm 3 \text{ ppm/}^\circ\text{C}$	0.5 ppm/°C	$\pm 0.005\%$	0.005%
	4:1		1.0 ppm/°C	$\pm 0.005\%$	0.005%
	10:1		1.0 ppm/°C	$\pm 0.01\%$	0.01%
	$> 10:1$		1.5 ppm/°C	$\pm 0.01\%$	0.01%

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

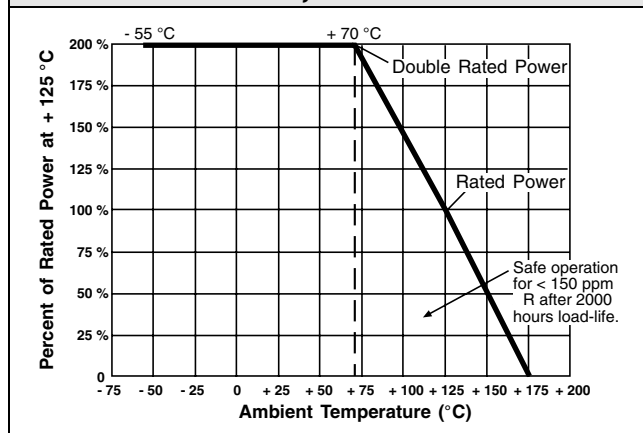
**FIGURE 1 - TRIMMING TO VALUES** (conceptual illustration)



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



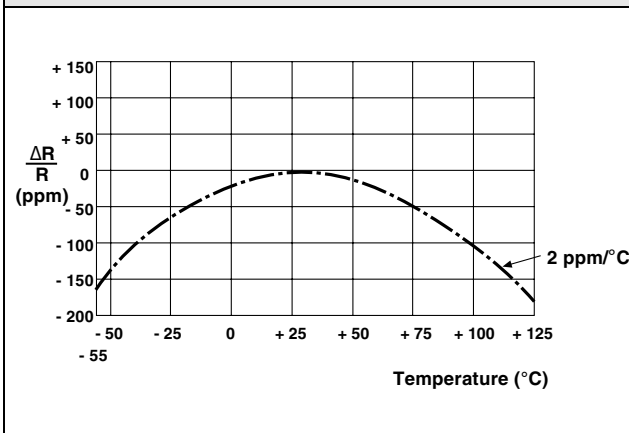
**FIGURE 3 - POWER DERATING CURVE  
300144, 300145**



**Note:** Power is proportional to the divider ratio  
Example: In a 300144 (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.

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

**FIGURE 4 - FOIL RESISTOR TCR COMPARISON  
OF FOIL ALLOYS IN MILITARY RANGE**



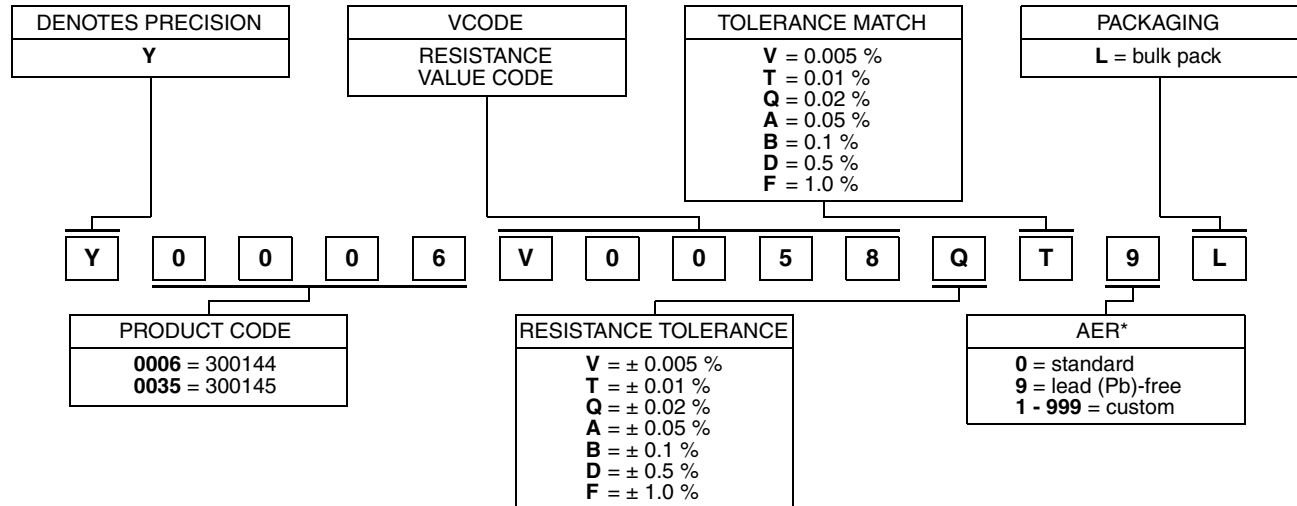


High Precision Voltage Divider Resistors  
with TCR Tracking to  $0.5 \text{ ppm}/^{\circ}\text{C}$  and  
Tolerance Match to  $0.005 \%$  (50 ppm)

Vishay Foil Resistors

**TABLE 2 - GLOBAL PART NUMBER INFORMATION**

NEW GLOBAL PART NUMBER: Y0006V0058QT9L (preferred part number format)



FOR EXAMPLE: ABOVE GLOBAL ORDER Y0006 V0058 Q T 9 L:

TYPE: 300144

VALUES: 2K/20K

ABSOLUTE TOLERANCE:  $\pm 0.02 \%$

TOLERANCE MATCH: 0.01 %

TERMINATION: lead (Pb)-free

PACKAGING: bulk pack

HISTORICAL PART NUMBER: 300144T 2K/20K TCR2 Q T B (will continue to be used)

300144	T	2K/20K	TCR2	Q	T	B
MODEL	TERMINATION	OHMIC VALUE	TCR CHARACTERISTIC	ABSOLUTE TOLERANCE	TOLERANCE MATCH	PACKAGING
300144 300145	T = lead (Pb)-free None = tin/lead alloy	R <sub>1</sub> = 2 kΩ R <sub>2</sub> = 20 kΩ		V = $\pm 0.005 \%$ T = $\pm 0.01 \%$ Q = $\pm 0.02 \%$ A = $\pm 0.05 \%$ B = $\pm 0.1 \%$ D = $\pm 0.5 \%$ F = $\pm 1.0 \%$	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.

**TABLE 3 - RESISTANCE VALUE CODE LIST FOR POPULAR RATIOS**

(other values available on request)

300144 RATIOS						300145 RATIOS				
VCODES	R1	R2	VCODES	R1	R2	VCODES	R1	R2	R3	R4
V0009	20K	20K	V0002	5K	5K	V0008	10K	10K	10K	10K
V0010	20K	10K	V0026	3K	19K2	V0019	5K	5K	5K	5K
V0100	20K	2K	V0156	3K	6K	V0092	1K	7K812	7K812	1K
V0055	19K4	9K7	V0158	2K7	10K	V0023	500R	500R	500R	500R
V0223	17K5	20K	V0058	2K	20K	V0047	100R	8K8	100R	8K8
V0097	15K	15K	V0030	2K	18K	V0051	100R	10K	100R	10K
V0094	10K	20K	V0029	2K	4K	V0051	100R	10K	100R	10K
V0001	10K	10K	V0103	2K	3K	V0227	350R	350R	350R	350R
V0042	10K	8K323	V0059	2K	2K	-	-	-	-	-
V0006	10K	2K	V0103	1K5	3K	-	-	-	-	-
V0226	9K	10K	V0032	1K	16K	-	-	-	-	-
V0003	9K	1K	V0121	1K	2K	-	-	-	-	-
V0013	8K	16K	V0004	1K	1K	-	-	-	-	-
V0107	6K	20K	V0022	511R	16K2	-	-	-	-	-
V0014	6K	7K	V0162	500R	15K	-	-	-	-	-
V0159	5K5	7K7	V0091	500R	500R	-	-	-	-	-
V0005	5K	10K	V0061	300R	300R	-	-	-	-	-



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