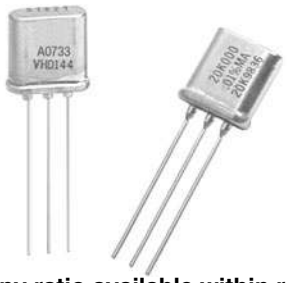
Bulk Metal® Foil Hermetically sealed, Small Package, Voltage Dividers with TCR Tracking of 0.1 ppm/°C and Tolerance Match down to 0.001 %



Any value at any ratio available within resistance range

Vishay Foil Resistors Models VHD200 and VHD144 are hermetic versions of the molded divider 300144. The difference between them is that the VHD144 has the full power rating of the 300144 while the VHD200 has a reduced power rating in exchange for a full spectrum of values without the time delay for new artwork (for values not yet tooled) and without NRE charges. Further, the VHD200 is oil filled, providing additional moisture protection and allowing considerable improvement in ratio match and TCR tracking.

The value of the hermetic enclosure over the molded part is in the long term performance. Moisture and oxygen both pass through plastic and both contribute to long term degradation of resistive elements. Divider ratios of 1:1 are not as likely to lose ratio with time but as the ratios become greater, the imbalance of power has more effect on the ratio stability and the hermetic enclosure becomes of paramount importance.

Our Application Engineering Department is available to advise and make recommendations for non-standard technical requirements and special applications.

FEATURES

Pb-free Available

RoHS* COMPLIANT

- Temperature coefficient of resistance (TCR):
  Absolute: ± 2 ppm/°C typical
  (- 55 °C to + 125 C, 25 °C ref.)
  Tracking: 0.1 ppm/°C typical
- Tolerance: absolute to ± 0.005 %
  match to 0.001 %
- Power rating: VHD144 0.2 W at 70 °C (see table 1)
  VHD200 0.1 W at 70 °C (see table 1)
- Ratio stability: < 0.001 % (10 ppm) 0.2 W at 70 °C for 2000 h
- Electrostatic discharge (ESD) up to 25 000 V
- Non inductive, non capacitive design
- Rise time: 1 ns without ringing
- Current noise: 0.010 µVRMS/V of applied voltage
  (< - 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 or tin/lead alloy
- Foil resistors are not restricted to standard values; specific "as required" values can be supplied at no extra cost or delivery (e.g. 1K2345 vs. 1K)
- Impervious to harmful environments - oil filled (VHD200)
- Prototype quantities available in just 5 working days or sooner. Contact foil@vishaypg.com
- For better performances (values, TCR, tolerance, stability), please contact us

TABLE 1 - VHD200 AND VHD144 SPECIFICATIONS

VFR MODEL	RESISTANCE RATIO AVAILABLE[1] (Ω)	POWER RATING[3], [6]	STANDARD RESISTANCE TOLERANCE		TCR TRACKING AVAILABLE TO	SHELF LIFE STABILITY (ppm/yr)
			ABSOLUTE AVAILABLE TO	MATCH AVAILABLE TO		
VHD200[2]	Any value from 100 Ω to 20K per side	0.1 W at + 25 °C (for the entire resistive element $R_1 + R_2$) divided proportionally between the two elements (over 10K).[4]	± 0.005 %	0.001 %	0.1 ppm/°C	5
VHD144[5]		0.2 W at + 70 °C (for the entire resistive element $R_1 + R_2$) divided proportionally between the two elements.	± 0.005 %	0.005 %	< 0.5 ppm/°C for like values < 1 ppm/°C standard	5

Notes

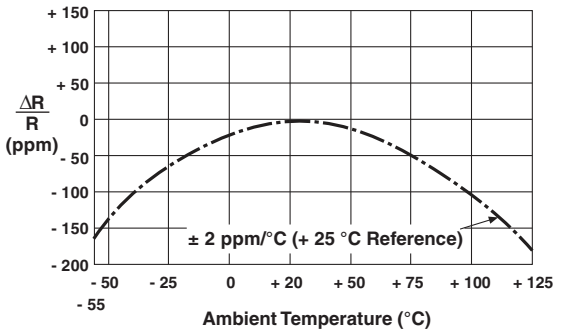
1. For resistance ratios outside the range, contact our Applications Engineering Department.
2. The VHD200 is available in any required ratio between the resistance values of 100 Ω and 20 kΩ, such that R_1 can be any value between 100 Ω and 20 kΩ and R_2 can also be any value between 100 Ω and 20 kΩ.
3. Power is proportional to the divider ratio.
   Example: In a VHD144 (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 $R_1 + R_2$.

$$P_1 = \left(\frac{R_1}{R_1 + R_2}\right)P \qquad P_2 = \left(\frac{R_2}{R_1 + R_2}\right)P$$

4. For power rating of values below 10K, contact the applications engineering department.
5. Any value from 100 Ω to 20 kΩ inclusive is available with some derating of power.
6. Maximum voltage is 200 V.

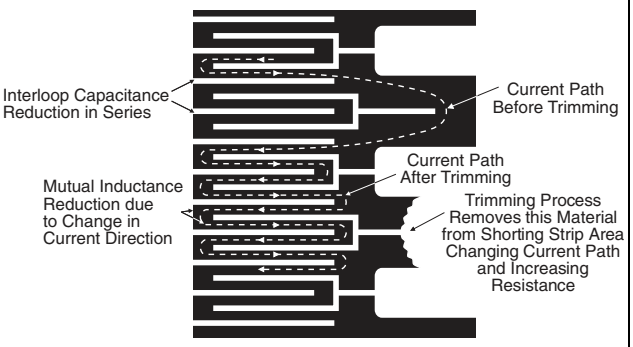
* Pb containing terminations are not RoHS compliant, exemptions may apply

FIGURE 1 - TYPICAL TCR CURVE



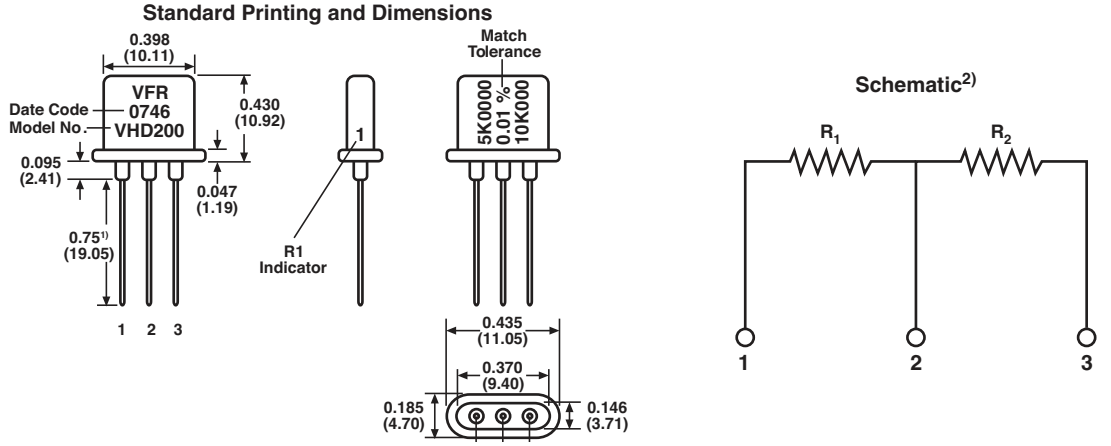
(For more details, see table 1)

FIGURE 2 - TRIMMING TO VALUES



Note: Foil shown in black, etched spaces in white

FIGURE 3 - VHD200 AND VHD144 STANDARD PRINTING AND DIMENSIONS in inches (millimeters)



Notes

1. Lead wires: #22 AWG solder coated copper, 0.75" minimum length.
2. Each resistor contains 1 chip consisting of two resistive elements. Tol: ± 0.020".

FIGURE 2 - POWER DERATING CURVE

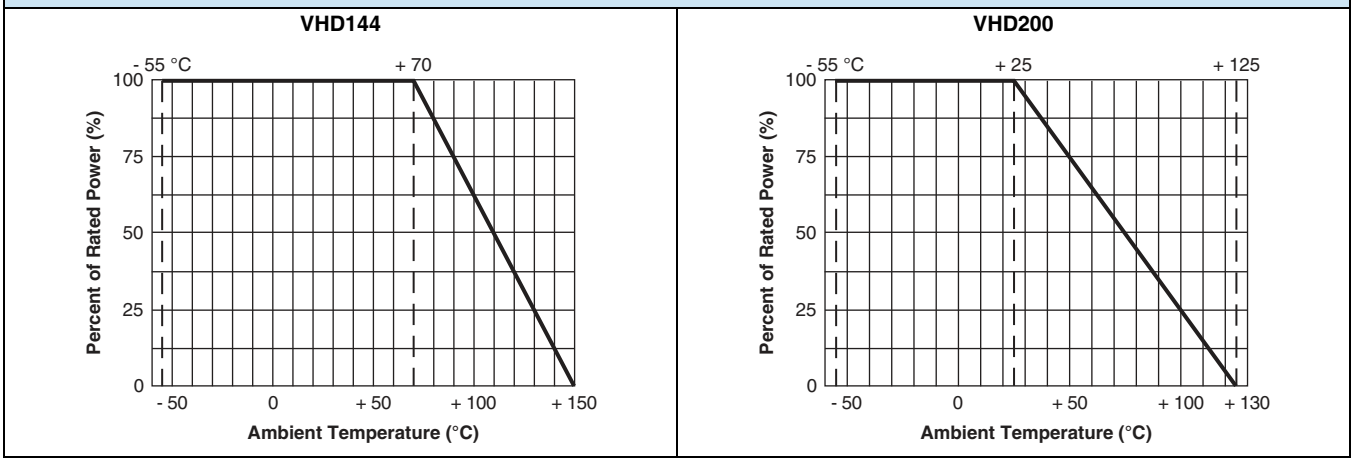


TABLE 2 - GLOBAL PART NUMBER INFORMATION

NEW GLOBAL PART NUMBER: Y0076V0058QT9L (preferred part number format)

DENOTES PRECISION	RESISTANCE VALUE CODE	TOLERANCE MATCH	AER*
Y	**VCODE**	**S** = 0.001 % **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

Y	0	0	7	6	V	0	0	5	8	Q	T	9	L

PRODUCT CODE	ABSOLUTE TOLERANCE	PACKAGING
0076 = VHD144 **5076** = VHD200	**S** = ± 0.001 % **V** = ± 0.005 % **T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.1 % **D** = ± 0.5 % **F** = ± 1.0 %	**L** = bulk pack

FOR EXAMPLE: ABOVE GLOBAL ORDER Y0076 V0058 Q T 9 L:
TYPE: VHD144
VALUE: 2K/20K
ABSOLUTE TOLERANCE: ± 0.02 %
TOLERANCE MATCH: 0.01 %
TERMINATION: lead (Pb)-free
PACKAGING: bulk pack

HISTORICAL PART NUMBER: VHD144T 2K/20K TCR2 Q T B (will continue to be used)

VHD144	T	2K/20K	TCR2	Q	T	B
MODEL	TERMINATION	OHMIC VALUE	TCR	ABSOLUTE TOLERANCE	TOLERANCE MATCH	PACKAGING
VHD144 **VHD200**	**T** = lead (Pb)-free None = tin/lead alloy	R_1 = 2.0 kΩ R_2 = 20.0 kΩ	Characteristic	**V** = ± 0.005 % **T** = ± 0.01 % **Q** = ± 0.02 % **A** = ± 0.05 % **B** = ± 0.1 % **D** = ± 0.5 % **F** = ± 1.0 %	**S** = 0.001 % **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 - VHD144 AND VHD200 POPULAR RATIOS (other values available upon request)					
VCODE	**R1**	**R2**	**VCODE**	**R1**	**R2**
V0009	20K	20K	V0002	5K	5K
V0010	20K	10K	V0026	3K	19K2
V0100	20K	2K	V0156	3K	6K
V0055	19K4	9K7	V0158	2K7	10K
V0223	17K5	20K	V0058	2K	20K
V0097	15K	15K	V0030	2K	18K
V0094	10K	20K	V0029	2K	4K
V0001	10K	10K	V0103	2K	3K
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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