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 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. Please contact us.

**FEATURES**

- 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) 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. 1K234)
- Prototype samples available from 48 h. For more information, please contact foil@vishaypg.com
- For better performances, please contact us

**TABLE 1 - VHD200 AND VHD144 SPECIFICATIONS**

<table>
<thead>
<tr>
<th>VISHAY MODEL</th>
<th>RESISTANCE RATIO AVAILABLE1) (Ω)</th>
<th>POWER RATING3), 6)</th>
<th>STANDARD RESISTANCE TOLERANCE</th>
<th>TCR TRACKING AVAILABLE TO</th>
<th>SHELF LIFE STABILITY (ppm/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VHD2002)</td>
<td>Any value from 100 Ω to 20K per side</td>
<td>0.1 W at +25 °C (for the entire resistive element (R_1 + R_2)) divided proportionally between the two elements (over 10K),4)</td>
<td>±0.005 %</td>
<td>0.1 ppm/°C</td>
<td>5</td>
</tr>
<tr>
<td>VHD1445)</td>
<td>0.2 W at +70 °C (for the entire resistive element (R_1 + R_2)) divided proportionally between the two elements.</td>
<td>±0.005 %</td>
<td>0.005 %</td>
<td>&lt;0.5 ppm/°C for like values &lt;1 ppm/°C standard</td>
<td>5</td>
</tr>
</tbody>
</table>

Notes
1. For resistance ratios outside the range, contact Vishay’s 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 \(R_1 + R_2\).
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

VHD144

VHD200
### TABLE 2 - GLOBAL PART NUMBER INFORMATION

<table>
<thead>
<tr>
<th>NEW GLOBAL PART NUMBER: Y0076V0058QT9L (preferred part number format)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DENOTES PRECISION</strong></td>
</tr>
<tr>
<td>Y</td>
</tr>
<tr>
<td>V = ± 0.005 %</td>
</tr>
<tr>
<td>Q = ± 0.02 %</td>
</tr>
<tr>
<td>B = ± 0.1 %</td>
</tr>
<tr>
<td>T = ± 0.01 %</td>
</tr>
</tbody>
</table>

**PRODUCT CODE**

- 0076 = VHD144
- 5076 = VHD200

**ABSOLUTE TOLERANCE**

- S = ± 0.001 %
- V = ± 0.005 %
- T = ± 0.01 %
- Q = ± 0.02 %
- A = ± 0.05 %
- B = ± 0.1 %
- D = ± 0.5 %
- F = ± 1.0 %

**PACKAGING**

- L = bulk pack

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**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**

- **MODEL**
  - T

- **TERMINATION**
  - T = lead (Pb)-free
  - None = tin/lead alloy

- **OHMIC VALUE**
  - $R_1 = 2.0 \, \text{k}\Omega$
  - $R_2 = 20.0 \, \text{k}\Omega$

**VHD200**

- **MODEL**
  - T

- **TERMINATION**
  - T = lead (Pb)-free
  - None = tin/lead alloy

- **OHMIC VALUE**
  - $R_1 = 2.0 \, \text{k}\Omega$
  - $R_2 = 20.0 \, \text{k}\Omega$

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**NOTE**

- For non-standard requests, please contact application engineering.
### TABLE 3 - VHD144 AND VHD200 POPULAR RATIOS

(Other values available upon request)

<table>
<thead>
<tr>
<th>VCODE</th>
<th>R1</th>
<th>R2</th>
<th>VCODE</th>
<th>R1</th>
<th>R2</th>
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<tbody>
<tr>
<td>V0009</td>
<td>20K</td>
<td>20K</td>
<td>V0002</td>
<td>5K</td>
<td>5K</td>
</tr>
<tr>
<td>V0010</td>
<td>20K</td>
<td>10K</td>
<td>V0026</td>
<td>3K</td>
<td>19K2</td>
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<tr>
<td>V0100</td>
<td>20K</td>
<td>2K</td>
<td>V0156</td>
<td>3K</td>
<td>6K</td>
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<tr>
<td>V0055</td>
<td>19K4</td>
<td>9K7</td>
<td>V0158</td>
<td>2K7</td>
<td>10K</td>
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<tr>
<td>V0223</td>
<td>17K5</td>
<td>20K</td>
<td>V0058</td>
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<td>20K</td>
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<td>V0030</td>
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<tr>
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<td>20K</td>
<td>V0029</td>
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<td>4K</td>
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<tr>
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<td>V0103</td>
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<td>3K</td>
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<td>V0059</td>
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<tr>
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<td>9K</td>
<td>10K</td>
<td>V0032</td>
<td>1K</td>
<td>16K</td>
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<td>V0003</td>
<td>9K</td>
<td>1K</td>
<td>V0121</td>
<td>1K</td>
<td>2K</td>
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<tr>
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<td>8K</td>
<td>16K</td>
<td>V0004</td>
<td>1K</td>
<td>1K</td>
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<tr>
<td>V0107</td>
<td>6K</td>
<td>20K</td>
<td>V0022</td>
<td>511R</td>
<td>16K2</td>
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<tr>
<td>V0014</td>
<td>6K</td>
<td>7K</td>
<td>V0162</td>
<td>500R</td>
<td>15K</td>
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<tr>
<td>V0159</td>
<td>5K5</td>
<td>7K7</td>
<td>V0091</td>
<td>500R</td>
<td>500R</td>
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<tr>
<td>V0005</td>
<td>5K</td>
<td>10K</td>
<td>V0061</td>
<td>300R</td>
<td>300R</td>
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