Power Metal Strip® Resistors, High Power (7 W), Low Value (Down to 0.001 Ω), Surface Mount

FEATURES
- Improved thermal management incorporated into design
- All welded construction of the Power Metal Strip resistors are ideal for all types of current sensing, voltage division, and pulse applications
- Proprietary processing technique produces extremely low resistance values
- Sulfur resistance by construction that is unaffected by high sulfur environments
- Very low inductance (< 5 nH)
- Solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- Low thermal EMF (< 3 μV/°C)
- AEC-Q200 qualified (1)

PATENT(S): www.vishay.com/patents

Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

STANDARD ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>GLOBAL MODEL</th>
<th>SIZE</th>
<th>POWER RATING</th>
<th>RESISTANCE VALUE RANGE</th>
<th>WEIGHT (typical)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$P_{70, ^\circ C}$ W</td>
<td>$\Omega$</td>
<td>g/1000 pieces</td>
</tr>
<tr>
<td>WSHM2818</td>
<td>2818</td>
<td>7 (1)</td>
<td>TOL. ± 0.5 %</td>
<td>0.010 to 0.1</td>
</tr>
<tr>
<td>WSHM2818</td>
<td>2818</td>
<td>6</td>
<td>TOL ± 1.0 %</td>
<td>0.001 to 0.1</td>
</tr>
</tbody>
</table>

Notes
- Qualified to AEC-Q200 rev. D
- The WSHM2818 is rated at 7 W with maximum surface temperature of 180 °C

GLOBAL PART NUMBER INFORMATION

Global Part Numbering: WSHM2818R1000FEA (visit www.vishay.net Vishay Dale parts numbering manual for all options)

<table>
<thead>
<tr>
<th>W</th>
<th>S</th>
<th>H</th>
<th>M</th>
<th>2</th>
<th>8</th>
<th>1</th>
<th>8</th>
<th>R</th>
<th>1</th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>F</th>
<th>E</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>8</td>
<td>1</td>
<td>8</td>
<td>R</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>F</td>
<td>E</td>
<td>A</td>
</tr>
</tbody>
</table>

GLOBAL MODEL
- WSHM2818

RESISTANCE VALUE
- L = mΩ*
- R = decimal
- 4L000 = 0.004 Ω
- R0100 = 0.01 Ω
- Use “L” for resistance values < 0.01 Ω

TOLERANCE CODE
- D = ± 0.5 %
- F = ± 1.0 %

PACKAGING CODE (1)
- EA = lead (Pb)-free, tape / reel

SPECIAL
- (dash number) (up to 2 digits) from 1 to 99 as applicable

Notes
- SMD Power Metal Strip Marking (www.vishay.com/doc?30327)
- Packaging code: EB (lead (Pb)-free) and TB (tin / lead) are non-standard packaging codes designating 1000 piece reels. These non-standard packaging codes are identical to our standard EA (lead (Pb)-free) and TA (tin / lead), except that they have a package quantity of 1000 pieces

PATENT(S): www.vishay.com/patents

This Vishay product is protected by one or more United States and international patents.
TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNIT</th>
<th>RESISTOR CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component temperature coefficient (including terminal) (1)</td>
<td>ppm/°C</td>
<td>± 250 (4) for 1 mΩ to 1.99 mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 200 (4) for 2 mΩ to 5.99 mΩ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 75 (4) for 6 mΩ to 200 mΩ</td>
</tr>
<tr>
<td>Element TCR (2)</td>
<td>ppm/°C</td>
<td>&lt; 20</td>
</tr>
<tr>
<td>Inductance</td>
<td>nH</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>°C</td>
<td>-65 to +170</td>
</tr>
<tr>
<td>Maximum working voltage (3)</td>
<td>V</td>
<td>((P \times R)^{1/2})</td>
</tr>
</tbody>
</table>

Notes
(1) Component TCR - total TCR that includes the TCR effects of the resistor element and the copper terminal
(2) Element TCR - only applies to the alloy used for the resistor element; refer to item 1 in the construction illustration on the following page
(3) Maximum working voltage - the WSHM is not voltage sensitive, but is limited by power / energy dissipation and is also not ESD sensitive
(4) Typical TCR is positive, for more details contact factory
• Refer to table “Links to Related Documents” for TCR white paper

DIMENSIONS in inches (millimeters)

Notes
• 3D models available: www.vishay.com/doc?30324
• Surface mount solder profile recommendations: www.vishay.com/doc?31052

<table>
<thead>
<tr>
<th>MODEL</th>
<th>RESISTANCE RANGE Ω</th>
<th>DIMENSIONS</th>
<th>SOLDER PAD DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSHM2818</td>
<td>0.001 to 0.2</td>
<td>L</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.280 ± 0.010</td>
<td>0.180 ± 0.010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(7.1 ± 0.25)</td>
<td>(4.6 ± 0.25)</td>
</tr>
</tbody>
</table>

TYPICAL SENSING LAYOUT

SENSING WITH VIA LAYOUT (best performance)

Note
• Sensing locations are based on the construction of the part; terminals are wrapped from the outside to underneath. These options place the sensing location nearest the temperature stable resistance element, which minimizes contact resistance and optimizes TCR

Revision: 07-Dec-2023
Document Number: 30188
For technical questions, contact: ww2bresistors@vishay.com
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DERATING

**TERMINAL TEMPERATURE DERATING**

![Graph showing terminal temperature derating](illustrative purposes only)

**WELDED CONSTRUCTION**

1) Resistive element  
2) Molding material  
3) Terminations  
4) Terminal / element weld  
5) Insert

For technical questions, contact: ww2bresistors@vishay.com

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**Performance**

<table>
<thead>
<tr>
<th>TEST</th>
<th>CONDITIONS OF TEST</th>
<th>TEST LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal shock</td>
<td>-55 °C to +150 °C, 2000 cycles, 15 min at each extreme</td>
<td>± 0.5 %</td>
</tr>
<tr>
<td>Short time overload</td>
<td>Refer to link for short time overload performance and pulse capability; <a href="http://www.vishay.com/en/resistors/power-metal-strip-calculator/">www.vishay.com/en/resistors/power-metal-strip-calculator/</a></td>
<td>± 1.0 %</td>
</tr>
<tr>
<td>Low temperature operation</td>
<td>-65 °C for 24 h</td>
<td>± 0.5 %</td>
</tr>
<tr>
<td>High temperature exposure</td>
<td>2000 h at +170 °C</td>
<td>± 1.0 %</td>
</tr>
<tr>
<td>Bias humidity</td>
<td>+85 °C, 85 % RH, 10 % bias, 1000 h</td>
<td>± 0.5 %</td>
</tr>
<tr>
<td>Mechanical shock</td>
<td>100 g’s for 6 ms, 5 pulses</td>
<td>± 0.5 %</td>
</tr>
<tr>
<td>Vibration</td>
<td>Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h</td>
<td>± 0.5 %</td>
</tr>
<tr>
<td>Load life</td>
<td>2000 h at 70 °C, 1.5 h “ON”, 0.5 h “OFF”</td>
<td>± 1.0 %</td>
</tr>
<tr>
<td>Resistance to solder heat</td>
<td>+260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence</td>
<td>± 0.5 %</td>
</tr>
<tr>
<td>Moisture resistance</td>
<td>MIL-STD-202, method 106, 0 % power, 7b not required</td>
<td>± 0.5 %</td>
</tr>
</tbody>
</table>

**Notes**
- Contact ww2bresistors@vishay.com for application specific performance requirements or qualification data. Typical performance is better than stated test limits.

**Packaging**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>TAPE WIDTH</th>
<th>DIAMETER</th>
<th>PIECES/REEL</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSHM2818</td>
<td>16 mm/embossed plastic</td>
<td>330 mm / 13”</td>
<td>3500</td>
<td>EA</td>
</tr>
</tbody>
</table>

**Notes**
- Embossed carrier tape per EIA-481
- Additional packaging details at www.vishay.com/doc?20051

**Additional Resources**


**Links to Related Documents**

**Selector Guide**

**Technical Notes**

**White Paper**
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