Power Metal Strip® Resistors, High Power (10 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)
• Low thermal EMF (< 3 μV/°C)
• Solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
• AEC-Q200 qualified (1)
• PATENT(S): www.vishay.com/patents
• Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Note
(1) Flame retardance test may not be applicable to some resistor technologies

STANDARD ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>GLOBAL MODEL</th>
<th>SIZE</th>
<th>POWER RATING $P_{70 \degree C}$ W</th>
<th>RESISTANCE VALUE RANGE Ω</th>
<th>WEIGHT (typical) g/1000 pieces</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSHP2818</td>
<td>2818</td>
<td>10 (1)</td>
<td>TOL. ± 0.5 % 0.010 to 0.1</td>
<td>167.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOL. ± 1.0 % 0.001 to 0.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes
• Qualified to AEC-Q200 rev. D
(1) The WSHP2818 is rated at 10 W with maximum surface temperature of 200 °C based on 70 °C ambient temperature

GLOBAL PART NUMBER INFORMATION

Global Part Numbering: WSHP2818R1000FEA (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>P</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>F</th>
<th>E</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

GLOBAL MODEL (8 digits)
WSHP2818

RESISTANCE VALUE (5 digits)
L = mΩ
R = decimal 4L000 = 0.004 Ω
R0100 = 0.01 Ω
* Use “L” for resistance values < 0.01 Ω

TOLERANCE CODE (1 digit)
D = ± 0.5 %
F = ± 1.0 %

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

SPECIAL (up to 2 digits)
(1) EB (lead (Pb) free) is a non-standard packaging code designated for 1000 piece reels. The non-standard packaging code is identical to our standard EA (lead (Pb) free), except that it has a package quantity of 1000 pieces

Notes
• SMD Power Metal Strip marking (www.vishay.com/doc?730327)
(1) EB (lead (Pb) free) is a non-standard packaging code designated for 1000 piece reels. The non-standard packaging code is identical to our standard EA (lead (Pb) free), except that it has 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.

Revision: 07-Dec-2023
Document Number: 30347
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 100 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 WSHP 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)

<table>
<thead>
<tr>
<th>MODEL</th>
<th>RESISTANCE RANGE</th>
<th>DIMENSIONS</th>
<th>SOLDER PAD DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ø</td>
<td>L</td>
<td>W</td>
</tr>
<tr>
<td>WSHP2818</td>
<td>0.001 to 0.1</td>
<td>0.280 ± 0.010 (7.1 ± 0.25)</td>
<td>0.180 ± 0.010 (4.6 ± 0.25)</td>
</tr>
</tbody>
</table>

TYPICAL SENSING LAYOUT

SENSING WITH VIA LAYOUT (best performance)

Notes
• 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
DERATING

TERMINAL TEMPERATURE DERATING

Note
- The WSHP2818 is rated at 10 W with maximum surface temperature of 200 °C based on 70 °C ambient temperature

WELDED CONSTRUCTION

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

**Note**
- Contact [ww2bresistors@vishay.com](mailto: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>WSHP2818</td>
<td>16 mm/embossed plastic</td>
<td>330 mm / 13&quot;</td>
<td>3500</td>
<td>EA</td>
</tr>
</tbody>
</table>

**Notes**
- Embossed carrier tape per EIA-481

### ADDITIONAL RESOURCES


### LINKS TO RELATED DOCUMENTS

#### SELECTOR GUIDE

#### TECHNICAL NOTES

#### WHITE PAPER
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