Power Metal Strip® Resistors, Low Value (Down to 0.0005 Ω), Surface-Mount

**FEATURES**

- 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 (down to 0.0005 Ω)
- Sulfur resistance by construction that is unaffected by high sulfur environments
- Very low inductance 0.5 nH to 5 nH
- Low thermal EMF (< 3 μV/°C)
- AEC-Q200 qualified (1)
- 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 P70 °C W</th>
<th>RESISTANCE VALUE RANGE Ω</th>
<th>WEIGHT (typical) g/1000 pieces</th>
</tr>
</thead>
<tbody>
<tr>
<td>WSL0603</td>
<td>0603</td>
<td>0.1</td>
<td>0.01 to 0.1</td>
<td>1.9</td>
</tr>
<tr>
<td>WSL0805</td>
<td>0805</td>
<td>0.125</td>
<td>0.005 to 0.2</td>
<td>4.8</td>
</tr>
<tr>
<td>WSL1206</td>
<td>1206</td>
<td>0.25</td>
<td>0.005 to 0.2</td>
<td>16.2</td>
</tr>
<tr>
<td>WSL2010</td>
<td>2010</td>
<td>0.5</td>
<td>0.004 to 0.5</td>
<td>38.9</td>
</tr>
<tr>
<td>WSL2512</td>
<td>2512</td>
<td>1.0 (1)</td>
<td>0.003 to 0.5</td>
<td>63.6</td>
</tr>
<tr>
<td>WSL2816</td>
<td>2816</td>
<td>2.0</td>
<td>0.003 to 0.1</td>
<td>118</td>
</tr>
</tbody>
</table>

**GLOBAL PART NUMBER INFORMATION**

Global Part Numbering Example: WSL25124L000FEA (visit www.vishay.net Vishay Dale parts numbering manual for all options)

- **GLOBAL MODEL** (7 digits)
- **RESISTANCE VALUE** (1)
- **TOLERANCE CODE** (1 digit)
- **PACKAGING CODE** (2)
- **SPECIAL** (3)

Notes

- Per PCN-DR-00009-2022-REV-0, WSL marking will be removed effective March 1st, 2023
- (1) 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
- (2) Follow link for customization capabilities: www.vishay.com/doc?48163
### TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNIT</th>
<th>WSL RESISTOR CHARACTERISTICS</th>
</tr>
</thead>
</table>
| Component temperature coefficient (including terminal) (2) | ppm/°C | ± 75 for 50 mΩ to 100 mΩ  
± 110 for 10 mΩ to 49 mΩ  
- | | ± 75 for 7 mΩ to 500 mΩ  
± 110 for 5 mΩ to 6.9 mΩ  
- |
| TCR measured from -55 °C to +155 °C | ppm/°C | ± 150 for 3 mΩ to 4.9 mΩ  
- | | ± 275 for 1 mΩ to 2.9 mΩ  
- |
| Element TCR (3) | ppm/°C | < 20 |
| Operating temperature range | °C | -65 to +170 |
| Maximum working voltage (4) | V | $V = \frac{P \times R}{1/2}$ |

**Notes**

1. Consult factory for detailed TCR performance across temperature range associated with PCN-DR-00003-2020 for WSL0603. TCR performance is improved for +25 °C to +155 °C.
2. Component TCR - total TCR that includes the TCR effects of the resistor element and the copper terminal.
3. Element TCR - only applies to the alloy used for the resistor element; refer to item 1 in the construction illustration on the following page.
4. Maximum working voltage - the WSL is not voltage sensitive, but is limited by power / energy dissipation and is also not ESD sensitive.

### DIMENSIONS in inches (millimeters)

**Notes**

- 3D models available: www.vishay.com/doc?30306
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

**Notes**

1. PCN-DR-00003-2020 changed terminal height for WSL0603 from 0.013" ± 0.005" for clad construction to 0.016" ± 0.005" for welded construction.
2. PCN-DR-00021-2021-REV-1 changed terminal height for WSL0805 from 0.013" ± 0.005" for clad construction to 0.016" ± 0.005" for welded construction.
Upgrade for Higher Current to WSLP and for Zero Ohm Jumper to WSL-9

WELDED CONSTRUCTION

1. Resistive element: solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
2. Plated terminal: solid copper, 100 % Sn (100 μ" min.) with 100 % Ni (20 μ" min.) under layer finish
3. Terminal / element weld
4. Silicone coating with ink print

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, 1000 cycles, 15 min at each extreme</td>
<td>± (0.5 % + 0.0005 Ω)</td>
</tr>
<tr>
<td>Short time overload</td>
<td>Refer to link for short time overload performance and pulse capability; <a href="www.vishay.com/en/resistors/power-metal-strip-calculator/">www.vishay.com/en/resistors/power-metal-strip-calculator/</a></td>
<td>± (0.5 % + 0.0005 Ω)</td>
</tr>
<tr>
<td>Low temperature operation</td>
<td>-65 °C for 24 h</td>
<td>± (0.5 % + 0.0005 Ω)</td>
</tr>
<tr>
<td>High temperature exposure</td>
<td>1000 h at + 170 °C</td>
<td>± (1.0 % + 0.0005 Ω)</td>
</tr>
<tr>
<td>Bias humidity</td>
<td>+85 °C, 85 % RH, 10 % bias, 1000 h</td>
<td>± (0.5 % + 0.0005 Ω)</td>
</tr>
<tr>
<td>Mechanical shock</td>
<td>100 g' s for 6 ms, 5 pulses</td>
<td>± (0.5 % + 0.0005 Ω)</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 % + 0.0005 Ω)</td>
</tr>
<tr>
<td>Load life</td>
<td>1000 h at rated power, + 70 °C “ON”, 0.5 h “OFF”</td>
<td>± (1.0 % + 0.0005 Ω)</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 % + 0.0005 Ω)</td>
</tr>
<tr>
<td>Moisture resistance</td>
<td>MIL-STD-202, method 106, 0 % power, 7a and 7b not required</td>
<td>± (0.5 % + 0.0005 Ω)</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 (1)

<table>
<thead>
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<th>MODEL</th>
<th>TAPE WIDTH</th>
<th>DIAMETER</th>
<th>PIECES/REEL</th>
<th>REEL</th>
</tr>
</thead>
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<tr>
<td>WSL0603</td>
<td>8 mm / punched paper</td>
<td>178 mm / 7&quot;</td>
<td>5000</td>
<td>EA</td>
</tr>
<tr>
<td>WSL0805</td>
<td>8 mm / punched paper</td>
<td>178 mm / 7&quot;</td>
<td>5000</td>
<td>EA</td>
</tr>
<tr>
<td>WSL1206</td>
<td>8 mm / embossed plastic</td>
<td>178 mm / 7&quot;</td>
<td>4000</td>
<td>EA</td>
</tr>
<tr>
<td>WSL2010</td>
<td>12 mm / embossed plastic</td>
<td>178 mm / 7&quot;</td>
<td>4000</td>
<td>EA</td>
</tr>
<tr>
<td>WSL2512</td>
<td>12 mm / embossed plastic</td>
<td>178 mm / 7&quot;</td>
<td>2000</td>
<td>EA</td>
</tr>
<tr>
<td>WSL2816</td>
<td>12 mm / embossed plastic</td>
<td>178 mm / 7&quot;</td>
<td>2000</td>
<td>EH</td>
</tr>
</tbody>
</table>

Notes
- Embossed carrier tape per EIA-481
# Upgrade for Higher Current to WSLP and for Zero Ohm Jumper to WSL-9

## Links to Related Documents

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<th>Technical Notes</th>
<th>White Paper</th>
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<td>Overview of Automotive Grade Products</td>
<td>SMD Current Sense: AEC-Q200 vs. Vishay Qualification</td>
<td>Thermal Management for Surface-Mount Devices</td>
</tr>
<tr>
<td></td>
<td>MIL-PRF vs. AEC-Q200: Do You Know What You Are Getting?</td>
<td>Temperature Coefficient of Resistance for Current Sensing</td>
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<td></td>
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</tbody>
</table>

For technical questions, contact: ww2bresistors@vishay.com

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