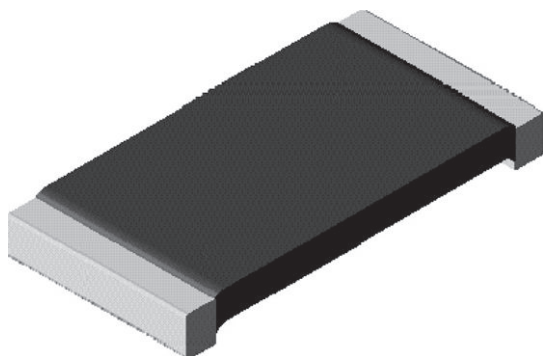


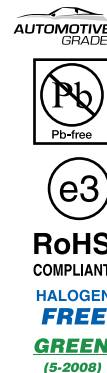


# Power Metal Strip® Resistors, Very High Power (to 3 W), Low Value (Down to 0.0005 Ω), Surface-Mount



## FEATURES

- Very high power to foot print size ratio (3 W in 2512, 2 W in 2010, 1 W in 1206, 0.5 W in 0805, and 0.4 W in 0603 package)
- 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 (<math>3 \mu\text{V}/^\circ\text{C}</math>)
- AEC-Q200 qualified <sup>(1)</sup>
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



## LINKS TO ADDITIONAL RESOURCES



### Notes

- This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details
- Follow link to Overview of Automotive Grade Products for more details: [www.vishay.com/doc?49924](http://www.vishay.com/doc?49924)
- <sup>(1)</sup> Flame retardance test may not be applicable to some resistor technologies

| STANDARD ELECTRICAL SPECIFICATIONS |      |   |  |                |                                      |
|------------------------------------|------|---|--|----------------|--------------------------------------|
| GLOBAL MODEL                       | SIZE | POWER RATING<br>$P_{70^\circ\text{C}}$<br>W | RESISTANCE VALUE RANGE <sup>(1)</sup><br>Ω |                | WEIGHT<br>(typical)<br>g/1000 pieces |
|                                    |      |   | TOL. ± 0.5 %                               | TOL. ± 1.0 %   |                                      |
| WSLP0603                           | 0603 | 0.4   | 0.015 to 0.1                               | 0.01 to 0.1    | 1.9                                  |
| WSLP0805                           | 0805 | 0.5   | 0.005 to 0.1                               | 0.005 to 0.1   | 4.8                                  |
| WSLP1206                           | 1206 | 1.0   | 0.005 to 0.05                              | 0.0005 to 0.05 | 16.2                                 |
| WSLP2010                           | 2010 | 2.0   | 0.004 to 0.03                              | 0.001 to 0.03  | 38.9                                 |
| WSLP2512                           | 2512 | 3.0   | 0.003 to 0.01                              | 0.0005 to 0.01 | 63.6                                 |

### Notes

- Part marking: value; tolerance: due to resistor size limitations some resistors will be marked with only the resistance value
- <sup>(1)</sup> WSLP1206 0.0005 Ω to 0.00099 Ω is only available with 2 % tolerance (G tolerance code)

| GLOBAL PART NUMBER INFORMATION  |   |   |   |   |   |   |   |   |   |   |   |  |   |   |   |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|--|---|---|---|--|--|
| Global Part Numbering Example: WSLP1206R0100FEA (visit <a href="http://www.vishay.net">www.vishay.net</a> Vishay Dale parts numbering manual for all options) |   |   |   |   |   |   |   |   |   |   |   |  |   |   |   |  |  |
| W   | S | L   | P | 1 | 2 | 0 | 6   | R | 0 | 1   | 0 | 0  | F | E | A |  |  |
| GLOBAL MODEL<br>(8 digits)  |   | RESISTANCE VALUE <sup>(1)</sup><br>(5 digits)               |   |   |   |   | TOLERANCE CODE<br>(1 digit)               |   |   | PACKAGING CODE <sup>(2)</sup><br>(2 digits) |   | SPECIAL <sup>(3)</sup><br>(up to 2 digits) |   |   |   |  |  |
| WSLP0603<br>WSLP0805<br>WSLP1206<br>WSLP2010<br>WSLP2512  |   | L = mΩ*<br>R = decimal<br>4L000 = 0.004 Ω<br>R0100 = 0.01 Ω |   |   |   |   | D = ± 0.5 %<br>F = ± 1.0 %<br>G = ± 2.0 % |   |   | EA = lead (Pb)-free, tape / reel            |   | Reserved for future specials               |   |   |   |  |  |
| * Use "L" for resistance values < 0.01 Ω  |   |   |   |   |   |   |   |   |   |   |   |  |   |   |   |  |  |

### Notes

- <sup>(1)</sup> WSL marking ([www.vishay.com/doc?30327](http://www.vishay.com/doc?30327)); WSL decade values ([www.vishay.com/doc?30117](http://www.vishay.com/doc?30117))
- <sup>(2)</sup> Packaging code: EB (lead (Pb)-free) and TB (tin / lead) are non-standard packaging codes that designate 1000 piece reel quantities. 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
- <sup>(3)</sup> Follow link for customization capabilities: [www.vishay.com/doc?48163](http://www.vishay.com/doc?48163)

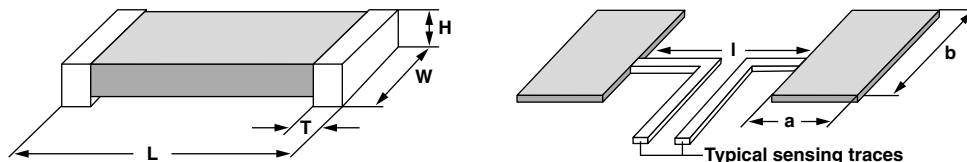


| TECHNICAL SPECIFICATIONS   |        |                          |                             |          |          |
|--|--------|--------------------------|-----------------------------|----------|----------|
| PARAMETER  | UNIT   | RESISTOR CHARACTERISTICS |                             |          |          |
|  |        | WSLP0603 <sup>(1)</sup>  | WSLP0805                    | WSLP1206 | WSLP2010 |
| Component temperature coefficient (including terminal) <sup>(2)</sup><br>TCR measured from -55 °C to +155 °C | ppm/°C | ± 75 for 50 mΩ to 100 mΩ | ± 75 for 7 mΩ to 500 mΩ     |          |          |
|  |        | ± 110 for 10 mΩ to 49 mΩ | ± 110 for 5 mΩ to 6.9 mΩ    |          |          |
|  |        | -                        | ± 150 for 3 mΩ to 4.9 mΩ    |          |          |
|  |        | -                        | ± 275 for 1 mΩ to 2.9 mΩ    |          |          |
|  |        | -                        | ± 400 for 0.5 mΩ to 0.99 mΩ |          |          |
| Element TCR <sup>(3)</sup>   | ppm/°C | < 20                     |                             |          |          |
| Operating temperature range  | °C     | -65 to +170              |                             |          |          |
| Maximum working voltage <sup>(4)</sup>   | V      | $(P \times R)^{1/2}$     |                             |          |          |

**Notes**

- (1) Consult factory for detailed TCR performance across temperature range associated with PCN-DR-00003-2020 for WSLP0603. 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**



**Notes**

- 3D models available. WSLP models: [www.vishay.com/doc?30313](http://www.vishay.com/doc?30313)
- Surface-mount solder profile recommendations: [www.vishay.com/doc?31052](http://www.vishay.com/doc?31052)

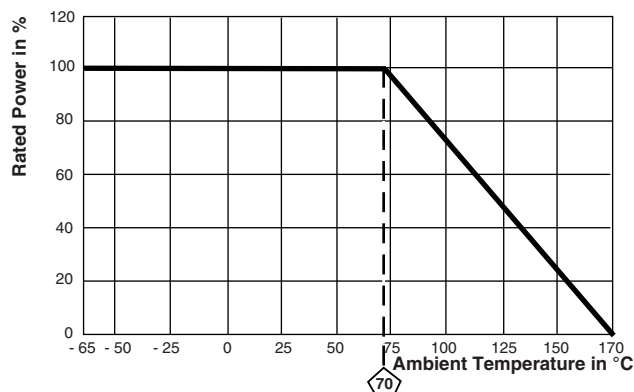
| MODEL                  | RESISTANCE RANGE (Ω) | DIMENSIONS in inches (millimeters) |                                 |                                  |                                  | SOLDER PAD DIMENSIONS in inches (millimeters) |                 |                 |
|------------------------|----------------------|------------------------------------|---------------------------------|----------------------------------|----------------------------------|---|-----------------|-----------------|
|                        |                      | L                                  | W                               | H                                | T                                | a   | b               | l               |
| WSP0603 <sup>(1)</sup> | 0.01 to 0.1          | 0.060 ± 0.010<br>(1.52 ± 0.254)    | 0.030 ± 0.010<br>(0.76 ± 0.254) | 0.016 ± 0.005<br>(0.406 ± 0.127) | 0.015 ± 0.010<br>(0.381 ± 0.254) | 0.040<br>(1.02)                               | 0.040<br>(1.02) | 0.020<br>(0.50) |
| WSP0805                | 0.005 to 0.1         | 0.080 ± 0.010<br>(2.03 ± 0.254)    | 0.050 ± 0.010<br>(1.27 ± 0.254) | 0.013 ± 0.010<br>(0.330 ± 0.254) | 0.015 ± 0.010<br>(0.381 ± 0.254) | 0.040<br>(1.02)                               | 0.050<br>(1.27) | 0.020<br>(0.50) |
| WSP1206                | 0.0005 to 0.00099    | 0.126 ± 0.010<br>(3.20 ± 0.254)    | 0.063 ± 0.010<br>(1.60 ± 0.254) | 0.025 ± 0.010<br>(0.635 ± 0.254) | 0.041 ± 0.010<br>(1.04 ± 0.254)  | 0.089<br>(2.26)                               | 0.076<br>(1.93) | 0.023<br>(0.58) |
|                        | 0.001 to 0.0019      |                                    |                                 |                                  | 0.086<br>(2.18)                  | 0.076<br>(1.93)                               | 0.029<br>(0.74) |                 |
|                        | 0.002 to 0.0059      |                                    |                                 |                                  | 0.025 ± 0.010<br>(0.635 ± 0.254) | 0.070<br>(1.78)                               | 0.076<br>(1.93) | 0.061<br>(1.55) |
|                        | 0.006 to 0.050       |                                    |                                 |                                  | 0.020 ± 0.010<br>(0.508 ± 0.254) | 0.065<br>(1.65)                               | 0.076<br>(1.93) | 0.071<br>(1.80) |
| WSP2010                | 0.001 to 0.0069      | 0.200 ± 0.010<br>(5.08 ± 0.254)    | 0.100 ± 0.010<br>(2.54 ± 0.254) | 0.025 ± 0.010<br>(0.635 ± 0.254) | 0.058 ± 0.010<br>(1.47 ± 0.254)  | 0.093<br>(2.36)                               | 0.120<br>(3.05) | 0.055<br>(1.40) |
|                        | 0.007 to 0.03        |                                    |                                 |                                  | 0.020 ± 0.010<br>(0.508 ± 0.254) | 0.055<br>(1.40)                               |                 | 0.130<br>(3.30) |
| WSP2512                | 0.0005 to 0.00099    | 0.250 ± 0.010<br>(6.35 ± 0.254)    | 0.125 ± 0.010<br>(3.18 ± 0.254) | 0.025 ± 0.010<br>(0.635 ± 0.254) | 0.107 ± 0.010<br>(2.72 ± 0.254)  | 0.120<br>(3.05)                               | 0.145<br>(3.68) | 0.050<br>(1.27) |
|                        | 0.001 to 0.0049      |                                    |                                 |                                  | 0.087 ± 0.010<br>(2.21 ± 0.254)  |   |                 | 0.125<br>(3.18) |
|                        | 0.005 to 0.0069      |                                    |                                 |                                  | 0.047 ± 0.010<br>(1.19 ± 0.254)  | 0.083<br>(2.11)                               |                 | 0.160<br>(4.06) |
|                        | 0.007 to 0.01        |                                    |                                 |                                  | 0.030 ± 0.010<br>(0.762 ± 0.254) | 0.065<br>(1.65)                               |                 |                 |

**Note**

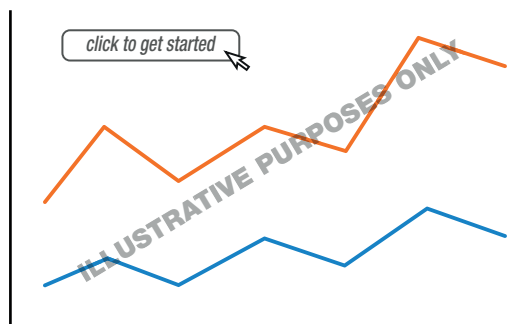
- (1) PCN-DR-00003-2020 changed terminal height for WSP0603 from 0.013" ± 0.005" for clad construction to 0.016" ± 0.005" for welded construction



**DERATING**

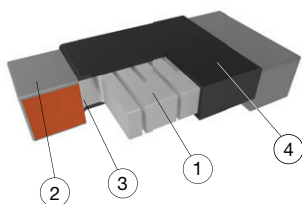


**PULSE CAPABILITY**



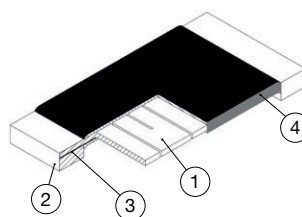
[www.vishay.com/resistors/power-metal-strip-calculator](http://www.vishay.com/resistors/power-metal-strip-calculator)

**WELDED CONSTRUCTION 2512, 2010, 1206, 0603**



- ① Resistive element: solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- ② Terminal: solid copper, 100 % Sn (200 μ" min.) with 100 % Ni (40 μ" min.) under layer finish
- ③ Terminal / element weld
- ④ Silicone coating with ink print

**CLAD CONSTRUCTION 0805**



- ① Resistive element: Ni-Cr
- ② Terminal: solid copper, 100 % Sn (200 μ" min.) with 100 % Ni (40 μ" min.) under layer finish
- ③ Terminal to element cladding
- ④ High temperature encapsulant: "siliconized polyester" coating material

| PERFORMANCE               |  |                    |
|---------------------------|--|--------------------|
| TEST                      | CONDITIONS OF TEST   | TEST LIMITS        |
| Thermal shock             | -55 °C to +150 °C, 1000 cycles, 15 min at each extreme   | ± 0.5 % + 0.0005 Ω |
| Short time overload       | Refer to link for short time overload performance and pulse capability; <a href="http://www.vishay.com/resistors/power-metal-strip-calculator/">www.vishay.com/resistors/power-metal-strip-calculator/</a> | ± 0.5 % + 0.0005 Ω |
| Low temperature operation | -65 °C for 24 h  | ± 0.5 % + 0.0005 Ω |
| High temperature exposure | 1000 h at +170 °C  | ± 1.0 % + 0.0005 Ω |
| Bias humidity             | +85 °C, 85 % RH, 10 % bias, 1000 h   | ± 0.5 % + 0.0005 Ω |
| Mechanical shock          | 100 g's for 6 ms, 5 pulses   | ± 0.5 % + 0.0005 Ω |
| Vibration                 | Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h   | ± 0.5 % + 0.0005 Ω |
| Load life                 | 1000 h at 70 °C, 1.5 h "ON", 0.5 h "OFF"   | ± 1.0 % + 0.0005 Ω |
| Resistance to solder heat | +260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence  | ± 0.5 % + 0.0005 Ω |
| Moisture resistance       | MIL-STD-202, method 106, 0 % power, 7b not required  | ± 0.5 % + 0.0005 Ω |

| PACKAGING (1) |                          |             |               |      |
|---------------|--------------------------|-------------|---------------|------|
| MODEL         | REEL                     |             |               |      |
|               | TAPE WIDTH               | DIAMETER    | PIECES / REEL | CODE |
| WSLP0603      | 8 mm / punched paper     | 178 mm / 7" | 5000          | EA   |
| WSLP0805      | 8 mm / punched paper     | 178 mm / 7" | 5000          | EA   |
| WSLP1206      | 8 mm / embossed plastic  | 178 mm / 7" | 4000          | EA   |
| WSLP2010      | 12 mm / embossed plastic | 178 mm / 7" | 4000          | EA   |
| WSLP2512      | 12 mm / embossed plastic | 178 mm / 7" | 2000          | EA   |

**Notes**

- Embossed carrier tape per EIA-481
- (1) Additional packaging details at [www.vishay.com/doc?20051](http://www.vishay.com/doc?20051)



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