



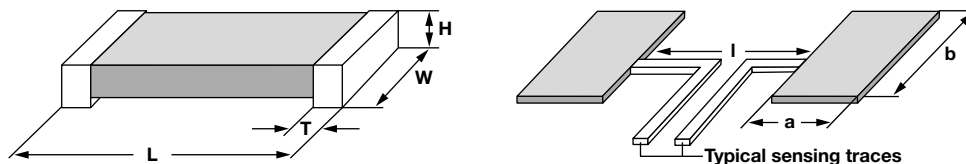
# **TECHNICAL SPECIFICATIONS**

| PARAMETER                                                                                                          | UNIT   | WSL RESISTOR CHARACTERISTICS |                             |         |         |         |         |
|--------------------------------------------------------------------------------------------------------------------|--------|------------------------------|-----------------------------|---------|---------|---------|---------|
|                                                                                                                    |        | WSL0603 <sup>(1)</sup>       | WSL0805                     | WSL1206 | WSL2010 | WSL2512 | WSL2816 |
| Component temperature coefficient<br>(including terminal) <sup>(2)</sup><br>TCR measured from<br>-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 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)



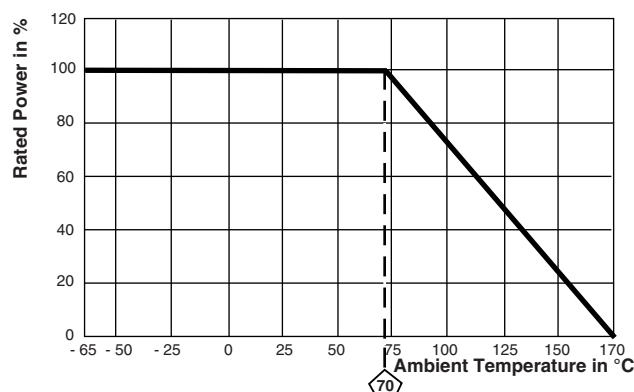
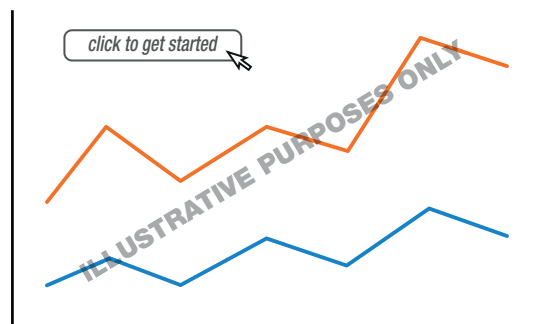
## **Notes**

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

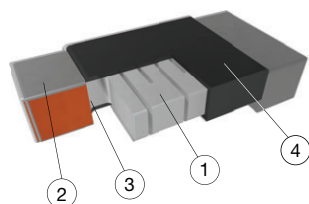
| MODEL                  | RESISTANCE RANGE (Ω) | DIMENSIONS                      |                                 |                                  |                                  | SOLDER PAD DIMENSIONS            |                 |                 |
|------------------------|----------------------|---------------------------------|---------------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------|-----------------|
|                        |                      | L                               | W                               | H                                | T                                | a                                | b               | l               |
| WSL0603 <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>(1.01)                  | 0.040<br>(1.01) | 0.020<br>(0.50) |
| WSL0805                | 0.005 to 0.2         | 0.080 ± 0.010<br>(2.03 ± 0.254) | 0.050 ± 0.010<br>(1.27 ± 0.254) | 0.013 ± 0.005<br>(0.330 ± 0.127) | 0.015 ± 0.010<br>(0.381 ± 0.254) | 0.040<br>(1.02)                  | 0.050<br>(1.27) | 0.020<br>(0.50) |
| WSL1206                | 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      |                                 |                                 |                                  | 0.025 ± 0.010<br>(0.635 ± 0.254) | 0.086<br>(2.18)                  | 0.076<br>(1.93) | 0.029<br>(0.74) |
|                        | 0.002 to 0.0059      |                                 |                                 |                                  |                                  | 0.070<br>(1.78)                  | 0.076<br>(1.93) | 0.061<br>(1.55) |
|                        | 0.006 to 0.20        |                                 |                                 |                                  |                                  | 0.020 ± 0.010<br>(0.508 ± 0.254) | 0.065<br>(1.65) | 0.071<br>(1.80) |
| WSL2010                | 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 0.5         |                                 |                                 |                                  | 0.020 ± 0.010<br>(0.508 ± 0.254) | 0.055<br>(1.40)                  | 0.120<br>(3.05) | 0.130<br>(3.30) |
| WSL2512                | 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)  |                                  |                 |                 |
|                        | 0.007 to 0.5         |                                 |                                 |                                  | 0.030 ± 0.010<br>(0.762 ± 0.254) |                                  |                 | 0.160<br>(4.06) |
| WSL2816                | 0.002 to 0.00399     | 0.280 ± 0.010<br>(7.1 ± 0.254)  | 0.165 ± 0.010<br>(4.2 ± 0.254)  | 0.025 ± 0.010<br>(0.635 ± 0.254) | 0.098 ± 0.010<br>(2.49 ± 0.254)  | 0.135<br>(3.43)                  | 0.185<br>(4.7)  | 0.060<br>(1.52) |
|                        | 0.004 to 0.1         |                                 |                                 |                                  | 0.062 ± 0.010<br>(1.57 ± 0.254)  |                                  |                 | 0.125<br>(3.20) |

## **Note**

- (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

**DERATING****PULSE CAPABILITY**
[www.vishay.com/resistors/power-metal-strip-calculator](http://www.vishay.com/resistors/power-metal-strip-calculator)
**WELDED CONSTRUCTION**

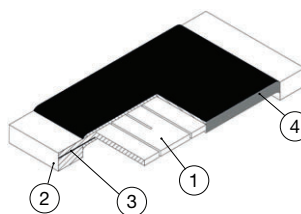
2816, 2512, 2010, 1206, 0603



- 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

**CLAD CONSTRUCTION**

0805



- ① Resistive element: Ni-Cr
- ② Terminal: solid copper, 100 % Sn (100 μ" min.) with 100 % Ni (20 μ" min.) under layer finish
- ③ Terminal to element weld
- 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;<br><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 rated power, + 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, 7a and 7b not required                                                                                                                                                    | ± 0.5 % + 0.0005 Ω |

**PACKAGING <sup>(1)</sup>**

| MODEL   | REEL                     |             |             |      |
|---------|--------------------------|-------------|-------------|------|
|         | TAPE WIDTH               | DIAMETER    | PIECES/REEL | CODE |
| WSL0603 | 8 mm / punched paper     | 178 mm / 7" | 5000        | EA   |
| WSL0805 | 8 mm / punched paper     | 178 mm / 7" | 5000        | EA   |
| WSL1206 | 8 mm / embossed plastic  | 178 mm / 7" | 4000        | EA   |
| WSL2010 | 12 mm / embossed plastic | 178 mm / 7" | 4000        | EA   |
| WSL2512 | 12 mm / embossed plastic | 178 mm / 7" | 2000        | EA   |
| WSL2816 | 12 mm / embossed plastic | 178 mm / 7" | 2000        | EH   |

**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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