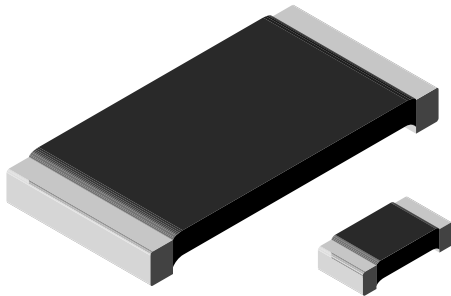




## Power Metal Strip® Resistors, High Power (2 x Standard WSL), Low Value (Down to 0.0005 Ω), Surface-Mount



### LINKS TO ADDITIONAL RESOURCES



### 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 <sup>(1)</sup>
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### 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)
- "SMD Current Sense: AEC-Q200 vs. Vishay Qualification" technical note: [www.vishay.com/doc?30416](http://www.vishay.com/doc?30416)
- <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 %   |                                      |
| WSL0603...18 | 0603 | 0.20                                          | 0.01 to 0.1                                | 0.01 to 0.1    | 1.9                                  |
| WSL0805...18 | 0805 | 0.25                                          | 0.005 to 0.2                               | 0.005 to 0.2   | 4.8                                  |
| WSL1206...18 | 1206 | 0.5                                           | 0.005 to 0.2                               | 0.0005 to 0.2  | 16.2                                 |
| WSL2010...18 | 2010 | 1.0                                           | 0.004 to 0.5                               | 0.001 to 0.5   | 38.9                                 |
| WSL2512...18 | 2512 | 2.0                                           | 0.003 to 0.04                              | 0.0005 to 0.04 | 63.6                                 |

### Notes

- Part marking: value; tolerance: due to resistor size limitations some resistors will be marked with only the resistance value
- "Thermal Management for Surface-Mount Devices" white paper: [www.vishay.com/doc?30380](http://www.vishay.com/doc?30380)
- <sup>(1)</sup> WSL1206...18 0.0005 Ω to 0.00099 Ω is only available with 2 % tolerance (G tolerance code)

### GLOBAL PART NUMBER INFORMATION

Global Part Numbering Example: WSL25124L000FEA18 (visit [www.vishay.net](http://www.vishay.net) Vishay Dale parts numbering manual for all options)

W S L 2 5 1 2 4 L 0 0 0 F E A 1 8

| GLOBAL MODEL                                        | RESISTANCE VALUE <sup>(1)</sup>                                                                              | TOLERANCE CODE                            | PACKAGING CODE <sup>(2)</sup>                                                                                                                                        | SPECIAL                  |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| WSL0603<br>WSL0805<br>WSL1206<br>WSL2010<br>WSL2512 | L = mΩ *<br>R = decimal<br>5L000 = 0.005 Ω<br>R0100 = 0.01 Ω<br><br>* Use "L" for resistance values < 0.01 Ω | D = ± 0.5 %<br>F = ± 1.0 %<br>J = ± 5.0 % | EA = lead (Pb)-free, tape / reel<br>TA = tin / lead, tape / reel (R86)<br>TG = tin / lead, tape / reel (RT1, for WSL0603 and WSL0805)<br>BA = tin / lead, bulk (B43) | 18 = "High power" option |

### Notes

- Per PCN-DR-00009-2022-REV-0, WSL marking will be removed effective March 1st, 2023
- <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



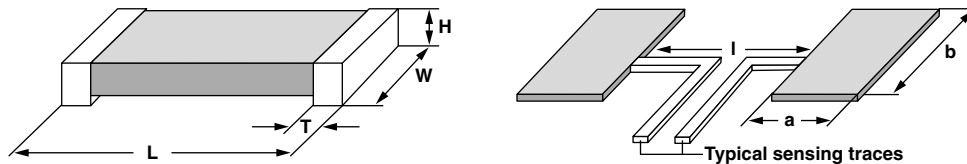
# **TECHNICAL SPECIFICATIONS**

| PARAMETER                                                                                                    | UNIT   | RESISTOR CHARACTERISTICS    |                             |              |              |              |              |
|--------------------------------------------------------------------------------------------------------------|--------|-----------------------------|-----------------------------|--------------|--------------|--------------|--------------|
|                                                                                                              |        | WSL0603...18 <sup>(1)</sup> | WSL0805...18                | WSL1206...18 | WSL2010...18 | WSL2512...18 | WSL2816...18 |
| 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**

- "Temperature Coefficient of Resistance for Current Sensing" white paper: [www.vishay.com/doc?30405](http://www.vishay.com/doc?30405)
- (1) Consult factory for detailed TCR performance across temperature range associated with PCN-DR-00003-2020 for WSL0603...18. 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)



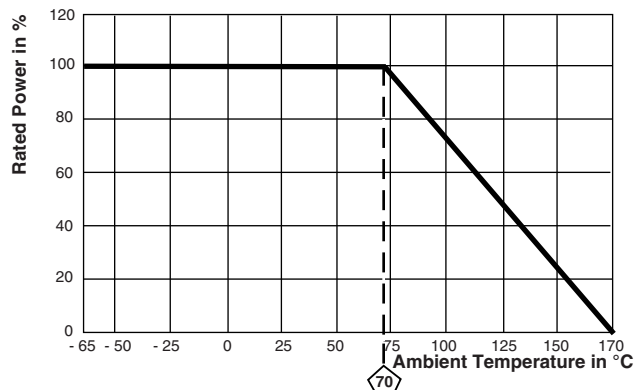
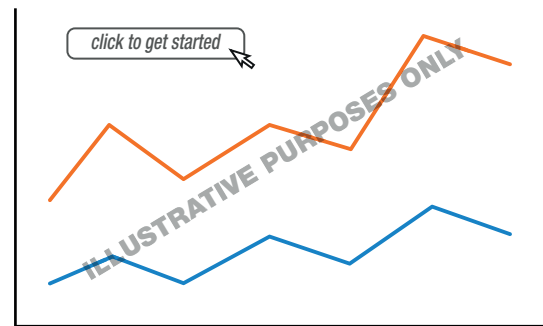
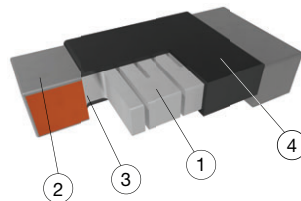
## **Notes**

- 3D models available: [www.vishay.com/doc?30307](http://www.vishay.com/doc?30307)
- 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...18 <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 ± 0.005<br>(0.381 ± 0.127) | 0.040<br>(1.01)       | 0.040<br>(1.01) | 0.020<br>(0.50) |
| WSL0805...18                | 0.005 to 0.2         | 0.080 ± 0.010<br>(2.03 ± 0.254) | 0.050 ± 0.010<br>(1.27 ± 0.254) | 0.016 ± 0.005<br>(0.406 ± 0.127) | 0.015 ± 0.005<br>(0.381 ± 0.127) | 0.040<br>(1.02)       | 0.050<br>(1.27) | 0.020<br>(0.50) |
| WSL1206...18                | 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)       | 0.076<br>(1.93) | 0.071<br>(1.80) |
| WSL2010...18                | 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...18                | 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)       |                 |                 |
|                             | 0.007 to 0.04        |                                 |                                 |                                  | 0.030 ± 0.010<br>(0.762 ± 0.254) | 0.065<br>(1.65)       |                 | 0.160<br>(4.06) |

## **Note**

- (1) PCN-DR-00003-2020 changed terminal height for WSL0603...18 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**

- ① Resistive element: solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- ② Plated terminal
- ③ Terminal / element weld
- ④ Silicone coating with ink print

| 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 storage   | -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...18             | 8 mm / punched paper     | 178 mm / 7" | 5000        | EA   |
| WSL0805...18             | 8 mm / punched paper     | 178 mm / 7" | 5000        | EA   |
| WSL1206...18             | 8 mm / embossed plastic  | 178 mm / 7" | 4000        | EA   |
| WSL2010...18             | 12 mm / embossed plastic | 178 mm / 7" | 4000        | EA   |
| WSL2512...18             | 12 mm / embossed plastic | 178 mm / 7" | 2000        | EA   |

**Notes**

- Embossed carrier tape per EIA-481

<sup>(1)</sup> Additional packaging details at [www.vishay.com/doc?20051](http://www.vishay.com/doc?20051)



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