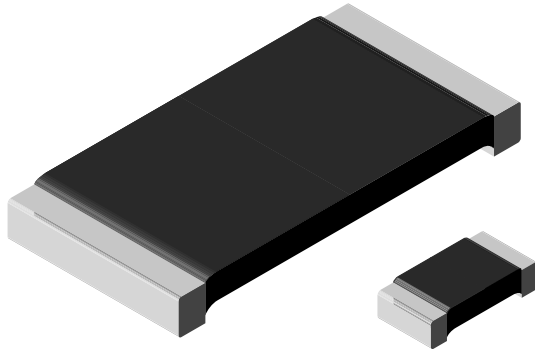


Power Metal Strip® Resistors, Low Value (down to 0.0005 Ω), Surface Mount



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)
- Construction is unaffected by high sulfur environments
- Very low inductance 0.5 nH to 5 nH
- Low thermal EMF ($< 3 \mu\text{V}/^\circ\text{C}$)
- AEC-Q200 qualified ⁽¹⁾
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE



RoHS* Available

HALOGEN FREE Available

GREEN (5-2008) Available

DESIGN SUPPORT TOOLS click logo to get started


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

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

STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | SIZE | POWER RATING $P_{70^\circ\text{C}}$ W | RESISTANCE VALUE RANGE Ω | | WEIGHT (typical) g/1000 pieces |
|--------------|------|--|--------------------------|------------------|-----------------------------------|
| | | | Tol. $\pm 0.5\%$ | Tol. $\pm 1.0\%$ | |
| WSL0603 | 0603 | 0.1 | 0.01 to 0.1 | 0.01 to 0.1 | 1.9 |
| WSL0805 | 0805 | 0.125 | 0.005 to 0.2 | 0.005 to 0.2 | 4.8 |
| WSL1206 | 1206 | 0.25 | 0.005 to 0.2 | 0.001 to 0.2 | 16.2 |
| WSL2010 | 2010 | 0.5 | 0.004 to 0.5 | 0.001 to 0.5 | 38.9 |
| WSL2512 | 2512 | 1.0 ⁽¹⁾ | 0.003 to 0.5 | 0.0005 to 0.5 | 63.6 |
| WSL2816 | 2816 | 2.0 | 0.003 to 0.1 | 0.002 to 0.1 | 118 |

Notes

- Part marking: Value; tolerance: Due to resistor size limitations some resistors will be marked with only the resistance value

⁽¹⁾ For values above 0.1 Ω derate linearly to 80 % rated power at 0.5 Ω

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⁾ (5 digits) | TOLERANCE CODE (1 digit) | PACKAGING CODE ⁽²⁾ (2 digits) | SPECIAL (up to 2 digits) |
|--|--|--|---|---|
| WSL0603 WSL0805 WSL1206 WSL2010 WSL2512 WSL2816 | L = mΩ* R = decimal 5L000 = 0.005 Ω R0100 = 0.01 Ω * Use "L" for resistance values $< 0.01 \Omega$ | D = $\pm 0.5\%$ F = $\pm 1.0\%$ J = $\pm 5.0\%$ | EA = lead (Pb)-free, tape / reel EH = lead (Pb)-free, tape / reel (WSL2816) EK = lead (Pb)-free, bulk TA = tin/lead, tape / reel (R86) TG = tin/lead, tape / reel (RT1, for WSL0603 and WSL0805) TH = tin / lead, tape / reel (RJ9, WSL2816) BA = tin / lead, bulk (B43) | (dash number) from 1 to 99 as applicable |

Notes

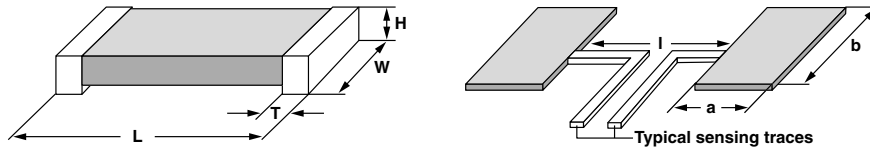
⁽¹⁾ WSL Marking (www.vishay.com/doc?30327); WSL Decade Values (www.vishay.com/doc?30117)

⁽²⁾ 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

| TECHNICAL SPECIFICATIONS | | |
|---|--------|------------------------------|
| PARAMETER | UNIT | WSL RESISTOR CHARACTERISTICS |
| Component temperature coefficient (including terminal) ⁽¹⁾ | ppm/°C | ± 75 for 7 mΩ to 0.5 Ω |
| | | ± 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 ⁽²⁾ | ppm/°C | < 20 |
| Operating temperature range | °C | -65 to +170 |
| Maximum working voltage ⁽³⁾ | V | $(P \times R)^{1/2}$ |

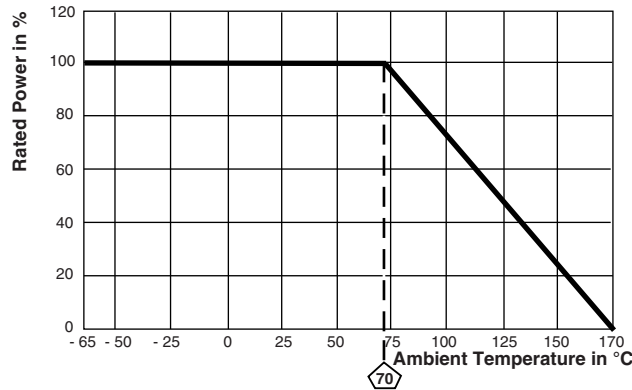
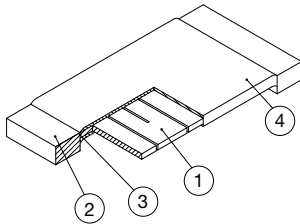
Notes

- (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 WSL is not voltage sensitive, but is limited by power / energy dissipation and is also not ESD sensitive

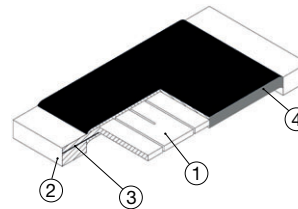
DIMENSIONS in inches (millimeters)

Notes

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

| MODEL | RESISTANCE RANGE (Ω) | DIMENSIONS | | | | SOLDER PAD DIMENSIONS | | | | |
|---------|----------------------|---------------------------------|---------------------------------|----------------------------------|----------------------------------|-----------------------|-----------------|-----------------|-----------------|-----------------|
| | | L | W | H | T | a | b | l | | |
| WSL0603 | 0.01 to 0.1 | 0.060 ± 0.010 (1.52 ± 0.254) | 0.030 ± 0.010 (0.76 ± 0.254) | 0.013 ± 0.005 (0.330 ± 0.127) | 0.015 ± 0.010 (0.381 ± 0.254) | 0.040 (1.01) | 0.040 (1.01) | 0.020 (0.50) | | |
| WSL0805 | 0.005 to 0.2 | 0.080 ± 0.010 (2.03 ± 0.254) | 0.050 ± 0.010 (1.27 ± 0.254) | 0.013 ± 0.005 (0.330 ± 0.127) | 0.015 ± 0.010 (0.381 ± 0.254) | 0.040 (1.02) | 0.050 (1.27) | 0.020 (0.50) | | |
| WSL1206 | 0.001 to 0.0019 | 0.126 ± 0.010 (3.20 ± 0.254) | 0.063 ± 0.010 (1.60 ± 0.254) | 0.025 ± 0.010 (0.635 ± 0.254) | 0.041 ± 0.010 (1.04 ± 0.254) | 0.062 (1.57) | 0.070 (1.78) | 0.030 (0.76) | | |
| | 0.002 to 0.0059 | | | | 0.025 ± 0.010 (0.635 ± 0.254) | | | | | |
| | 0.006 to 0.20 | | | | 0.020 ± 0.010 (0.508 ± 0.254) | | | | | |
| WSL2010 | 0.001 to 0.0069 | 0.200 ± 0.010 (5.08 ± 0.254) | 0.100 ± 0.010 (2.54 ± 0.254) | 0.025 ± 0.010 (0.635 ± 0.254) | 0.058 ± 0.010 (1.47 ± 0.254) | 0.093 (2.36) | 0.120 (3.05) | 0.055 (1.40) | | |
| | 0.007 to 0.5 | | | | 0.020 ± 0.010 (0.508 ± 0.254) | | | 0.055 (1.40) | 0.130 (3.30) | |
| WSL2512 | 0.0005 to 0.00099 | 0.250 ± 0.010 (6.35 ± 0.254) | 0.125 ± 0.010 (3.18 ± 0.254) | 0.025 ± 0.010 (0.635 ± 0.254) | 0.107 ± 0.010 (2.72 ± 0.254) | 0.120 (3.05) | 0.145 (3.68) | 0.050 (1.27) | | |
| | 0.001 to 0.0049 | | | | 0.087 ± 0.010 (2.21 ± 0.254) | | | | | |
| | 0.005 to 0.0069 | | | | 0.047 ± 0.010 (1.19 ± 0.254) | | | | 0.083 (2.11) | 0.125 (3.18) |
| | 0.007 to 0.5 | | | | 0.030 ± 0.010 (0.762 ± 0.254) | | | | 0.065 (1.65) | 0.160 (4.06) |
| WSL2816 | 0.002 to 0.00399 | 0.280 ± 0.010 (7.1 ± 0.254) | 0.165 ± 0.010 (4.2 ± 0.254) | 0.025 ± 0.010 (0.635 ± 0.254) | 0.098 ± 0.010 (2.49 ± 0.254) | 0.135 (3.43) | 0.185 (4.7) | 0.060 (1.52) | | |
| | 0.004 to 0.1 | | | | 0.062 ± 0.010 (1.57 ± 0.254) | | | 0.096 (2.45) | 0.125 (3.20) | |

DERATING

WELDED CONSTRUCTION 2816, 2512, 2010, 1206


- 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 and 0603


- 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 | 5 x rated power for 5 s | ± 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 (1) | | | | |
|---------------|------------------------|-----------|-------------|------|
| 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



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