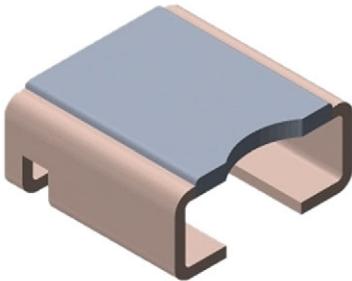


Power Metal Strip® Resistors, Low Value, High Power, Surface-Mount, 4-Terminal



FEATURES

- 4-terminal design allows for 1 % tolerance down to 0.0002 Ω
- High power to foot print size ratio
- Ideal for all types of current sensing, voltage division and pulse applications including switching and linear power supplies, instruments, power amplifiers and shunts
- 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 0.0002 Ω
- Sulfur resistance by construction that is unaffected by high sulfur environments
- Solid metal nickel-chrome, manganese-copper-tin, or manganese-copper alloy resistive element with low TCR (< 20 ppm/ $^{\circ}$ C)
- Very low inductance 0.5 nH to 5 nH
- Low thermal EMF (< 3 μ V/ $^{\circ}$ C)
- AEC-Q200 qualified ⁽¹⁾
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912




RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(IS-2008)

LINKS TO ADDITIONAL RESOURCES



3D Models



Design Tools



Calculators

Note

⁽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 | TOLERANCE \pm % | RESISTANCE VALUE RANGE Ω | RESISTANCE VALUES CURRENTLY AVAILABLE ⁽¹⁾ Ω | WEIGHT (typical) g/1000 pieces |
|--------------|------|---|----------------------|---------------------------------------|---|--------------------------------------|
| WSL2726 | 2726 | 3.0 | 1.0 | 0.2m to 5m | 0.2m, 0.3m, 0.5m, 0.7m, 1m, 1.3m, 2m, 3m, 4m, 5m | 420 |

Notes

- Power rating depends on the max. temperature at the solder point, component placement density and the substrate material
- Part marking: model, value, tolerance, date code
- Qualified to AEC-Q200 rev. D

⁽¹⁾ Other values may be available, contact factory

GLOBAL PART NUMBER INFORMATION

Global Part Numbering Example: WSL2726L5000FEA (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 ⁽³⁾ (up to 2 digits) |
|----------------------------|--|-----------------------------|---|---|
| WSL2726 | $L = \text{m}\Omega$ L5000 = 0.0005 Ω 1L000 = 0.0010 Ω | F = $\pm 1.0\ %$ | EA = lead (Pb)-free, tape / reel EK = lead (Pb)-free, bulk | (dash number) (up to 2 digits) from 1 to 99 as applicable |

Notes

⁽¹⁾ WSL marking (www.vishay.com/doc?30327)

⁽²⁾ Packaging code: EB (lead (Pb)-free) is a non-standard packaging code designating 1000 piece reels. This non-standard packaging code is identical to our standard EA (lead (Pb)-free), except that they have a package quantity of 1000 pieces

⁽³⁾ Follow link for customization capabilities: www.vishay.com/doc?48163

TECHNICAL SPECIFICATIONS

| PARAMETER | UNIT | RESISTOR CHARACTERISTICS |
|---|--------|--------------------------------|
| Component temperature coefficient (including terminal) ⁽¹⁾ TCR measured from -55 °C to 150 °C | ppm/°C | -100 ppm for 0.2 mΩ and 0.3 mΩ |
| | | ± 75 ppm for 0.5 mΩ to 1.0 mΩ |
| | | ± 50 ppm for 1.3 mΩ |
| | | ± 25 ppm for 2 mΩ to 5 mΩ |
| Element TCR ⁽²⁾ | ppm/°C | < 20 |
| Operating temperature range | °C | -65 to +170 |
| Maximum working voltage ⁽³⁾ | V | (P x R) ^{1/2} |

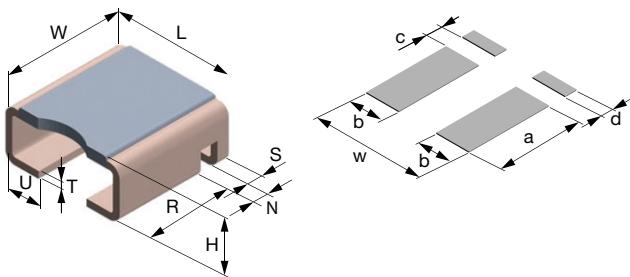
Notes

(1) Component TCR - total TCR that includes the TCR effects of the resistor element and the copper terminal

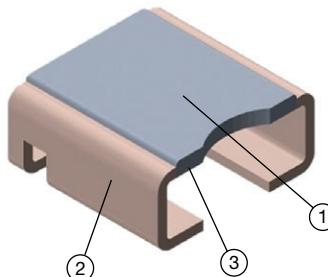
(2) Element TCR - only applies to the alloy used for the resistor element; refer to item 1 in the Construction Outline

(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)



CONSTRUCTION OUTLINE



- (1) Resistive element: refer to table below for element material
- (2) Terminal: solid copper
- (3) Terminal / element weld

Notes

- 3D models available: www.vishay.com/doc?30308
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

| MODEL | DIMENSIONS | | | | | | | |
|---------|------------------------------|--|------------------------|----------------|------------------------------|-------------------------------|------------------------------|--------------------------------|
| | L | W | H | R (REF.) | S | T | U | N |
| WSL2726 | 0.272 ± 0.008 (6.9 ± 0.2) | 0.260 + 0.012/- 0.008 (6.6 + 0.3/- 0.2) | Please see table below | 0.195 (5.0) | 0.028 ± 0.004 (0.7 ± 0.1) | 0.016 ± 0.003 (0.4 ± 0.08) | 0.078 ± 0.004 (2.0 ± 0.1) | 0.039 ± 0.006 (0.99 ± 0.15) |

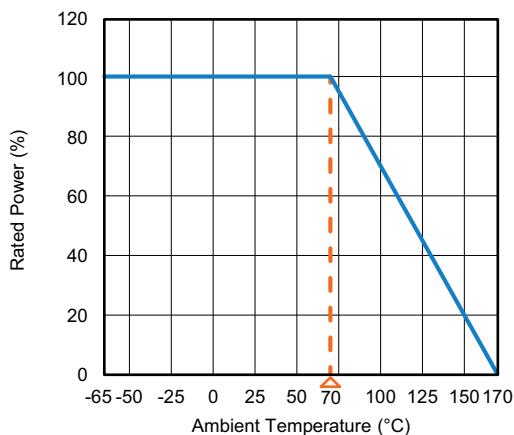
| MODEL | SOLDER PAD DIMENSIONS | | | | |
|---------|-----------------------|--------------|--------------|--------------|-------------|
| | a | b | c | d | w |
| WSL2726 | 0.225 (5.71) | 0.106 (2.69) | 0.035 (0.89) | 0.035 (0.89) | 0.30 (7.62) |

| MODEL | RESISTANCE VALUE (mΩ) | THERMAL RESISTANCE ⁽¹⁾ (°C/W) | ELEMENT MATERIAL | HEIGHT H |
|---------|-----------------------|--|------------------|-----------------------------|
| WSL2726 | 0.2 | 3 | Mn-Cu-Sn | 0.150 ± 0.008 (3.81 ± 0.2) |
| | 0.3 | 4 | Mn-Cu | 0.141 ± 0.008 (3.58 ± 0.2) |
| | 0.5 | 6 | Mn-Cu | 0.116 ± 0.008 (2.95 ± 0.2) |
| | 0.7 | 8 | Mn-Cu | 0.111 ± 0.008 (2.82 ± 0.2) |
| | 1.0 | 10 | Mn-Cu | 0.1055 ± 0.008 (2.68 ± 0.2) |
| | 1.3 | 11 | Ni-Cr | 0.119 ± 0.008 (3.02 ± 0.2) |
| | 2.0 | 16 | Ni-Cr | 0.114 ± 0.008 (2.9 ± 0.2) |
| | 3.0 | 19 | Ni-Cr | 0.110 ± 0.008 (2.79 ± 0.2) |
| | 4.0 | 22 | Ni-Cr | 0.110 ± 0.008 (2.79 ± 0.2) |
| | 5.0 | 38 | Ni-Cr | 0.110 ± 0.008 (2.79 ± 0.2) |

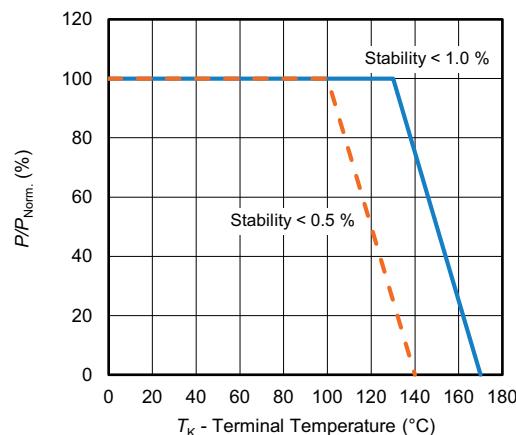
Note

(1) The full power rating of Power Metal Strip resistors are dependent upon the ability of the circuit board to dissipate the heat energy created in the resistance element. It is recommended to follow common design practices for power semiconductors that ensure the junction temperature is maintained within thermal limits by using large pad surfaces, thermal vias, heavier copper weights, internal layers as well as other thermal spreading features. The thermal resistance values provided function in the same manner as junction to terminal temperature

DERATING - AMBIENT TEMPERATURE



DERATING - TERMINAL TEMPERATURE



Example: WSL2726 0.0005 Ω, 0.001 Ω

PULSE CAPABILITY



www.vishay.com/en/resistors/joulewizard/



| PERFORMANCES | | | |
|---|-----------------|--|---|
| DESCRIPTION | AEC TEST NUMBER | TEST CONDITIONS | LIMIT |
| High temperature exposure | 3 | MIL-STD-202, Method 108, 2000 h at T = 170 °C at 0 % power, measurements at 24 h ± 2 h | ± (1.0 %) |
| Temperature cycling | 4 | JESD22 Method JA104, -55 °C to 150 °C, dwell time = 15 min, 2000 cycles; measurement at 24 h ± 2 h after test | ± (0.5 %) |
| Moisture resistance | 6 | MIL-STD-202, Method 106, t = 24 h/cycle Note: steps 7a and 7b not required, 0% power, no polarization test, 65 °C, measurement at 24 h ± 2 h after test | ± (0.5 %) |
| Biased humidity | 7 | MIL-STD-202, Method 103, 2000 h 85 °C/85 % RH Note: specified conditions: 10 % of rated power, measurement at 24 h ± 2 h | ± (0.5 %) |
| Operational life 125 °C | 8 | MIL-STD-202 Method 108 (ambient 125 °C) | ± (1.0 %) |
| Resistance to solvents | 12 | MIL-STD-202, Method 215 aqueous wash chemical- OKEM clean or equivalent | Marking remains legible |
| Mechanical shock | 13 | MIL-STD-202, Method 213 | ± (0.5 %) |
| Vibration | 14 | MIL-STD-202, Method 204, condition D | ± (0.5 %) |
| Resistance to soldering heat | 15 | MIL-STD-202, Method 210, condition K, no preheat of samples, initial readings taken after mounting, final readings taken after 3 more heat cycles Note: maximum temperature is 260 °C | ± (0.5 %) |
| Electrostatic discharge | 17 | AEC-Q200-002 | ± (1.0 %) |
| Lead (Pb)-free functional solderability | 18 | J-STD-002, Method S1, 4 h at 155 °C dry heat, mount on PCB, max. reflow temperature at 260 °C; no electrical test 50x mag | 95 % coverage |
| Electrical characterization | 19 | RTC at -65 °C and 170 °C | Refer to Technical Specifications table |
| Board flex | 21 | AEC-Q200-005, 2 mm min, 60 s min. holding time | ± (1.0 %) |
| Terminal strength | 22 | AEC-Q200-006, force of 1.8 kg for 60 s | ± (1.0 %) |
| Flame retardance | 24 | AEC-Q200-001 | Per AEC-Q200-001 ⁽¹⁾ |
| Short time overload | | Refer to link for short time overload performance and pulse capability: www.vishay.com/en/resistors/power-metal-strip-calculator/ | ± (0.5 %) |
| Low temperature operation | | -65 °C for 24 h | ± (0.5 %) |

Notes

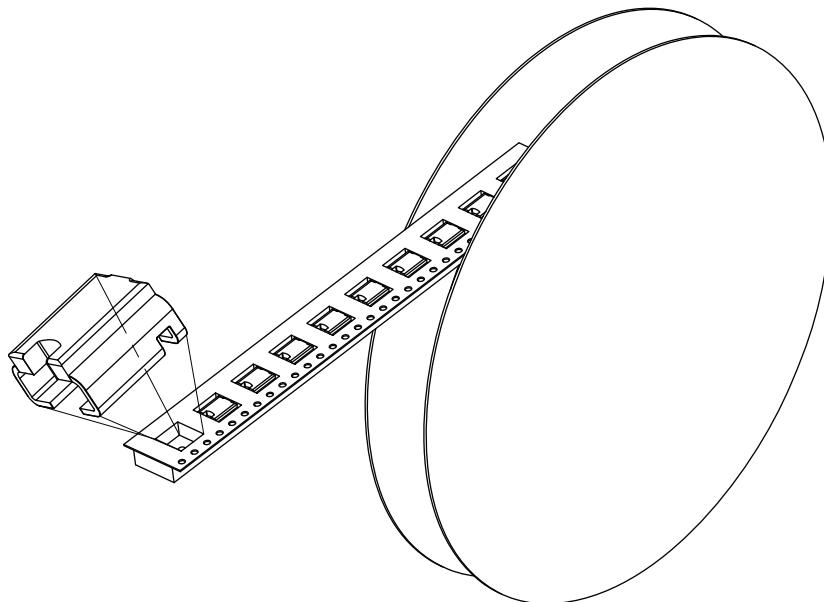
- Full qualification data available upon request at ww2bresistors@vishay.com

⁽¹⁾ Flame retardance requires the application of 9 V for 1 h on a low resistance value current sense resistor, which causes the device to be substantially overpowered. The Power Metal Strip® technology does not fuse as a thick film resistor would under these conditions, resulting in temperatures that exceeds 350 °C for > 10 s

| PACKAGING | | | | |
|-----------|--------------------------|--------------|-------------|------|
| MODEL | REEL | | | |
| | TAPE WIDTH | DIAMETER | PIECES/REEL | CODE |
| WSL2726 | 16 mm / embossed plastic | 330 mm / 13" | 1500 | EA |

Notes

- Embossed carrier tape per EIA-481
- Additional packaging details at www.vishay.com/doc?20051

REEL ORIENTATION

| LINKS TO RELATED DOCUMENTS | |
|---|--|
| SELECTOR GUIDE | |
| Overview of Automotive Grade Products | www.vishay.com/doc?49924 |
| TECHNICAL NOTES | |
| SMD Current Sense: AEC-Q200 vs. Vishay Qualification | www.vishay.com/doc?30416 |
| MIL-PRF vs. AEC-Q200: Do You Know What You Are Getting? | www.vishay.com/doc?11000 |
| WHITE PAPER | |
| Thermal Management for Surface-Mount Devices | www.vishay.com/doc?30380 |
| Temperature Coefficient of Resistance for Current Sensing | www.vishay.com/doc?30405 |

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