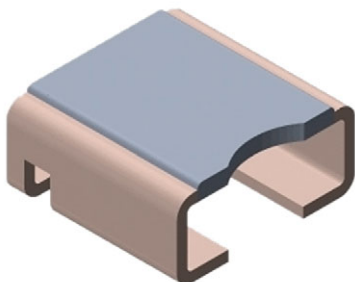




Power Metal Strip® Resistors, Low Value, High Power, Surface-Mount, 4-Terminal



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/°C)
- Very low inductance 0.5 nH to 5 nH
- Low thermal EMF (< 3 μ V/°C)
- AEC-Q200 qualified ⁽¹⁾
- PATENT(S): www.vishay.com/patents
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

HALOGEN
FREE

GREEN
(5-2008)

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)

W S L 2 7 2 6 L 5 0 0 0 F E A

GLOBAL MODEL
(7 digits)
WSL2726

RESISTANCE VALUE ⁽¹⁾
(5 digits)
L = m Ω
L5000 = 0.0005 Ω
1L000 = 0.0010 Ω

TOLERANCE CODE
(1 digit)
F = $\pm$ 1.0 %

PACKAGING CODE ⁽²⁾
(2 digits)
EA = lead (Pb)-free, tape / reel
EK = lead (Pb)-free, bulk

SPECIAL ⁽³⁾
(up to 2 digits)
(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

PATENT(S): www.vishay.com/patents

This Vishay product is protected by one or more United States and international patents.



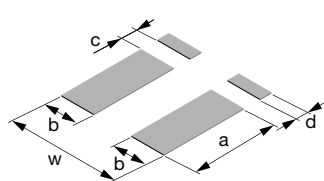
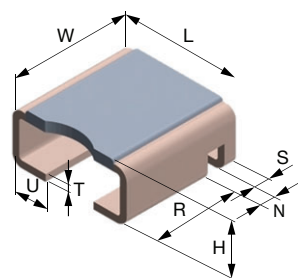
TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	RESISTOR CHARACTERISTICS
Component temperature coefficient (including terminal) ⁽¹⁾ TCR measured from 0 °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	$(P \times R)^{1/2}$

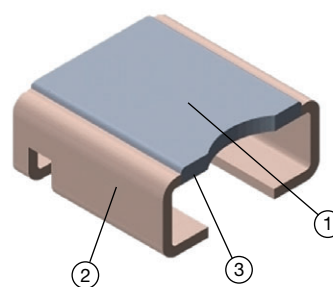
Notes

- (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 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 ± 0.006 (2.0 ± 0.15)	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)

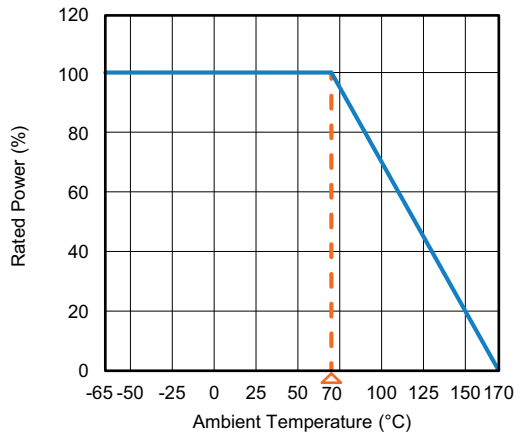
MODEL	RESISTANCE VALUE (mΩ)	THERMAL RESISTANCE ⁽¹⁾ (°C/W)	ELEMENT MATERIAL	HEIGHT H
WSL2726	0.2	3	Mn-Cu-Sn	0.150 ± 0.008 (3.81 ± 0.2)
	0.3	4	Mn-Cu	0.141 ± 0.008 (3.58 ± 0.2)
	0.5	6	Mn-Cu	0.116 ± 0.008 (2.95 ± 0.2)
	0.7	8	Mn-Cu	0.111 ± 0.008 (2.82 ± 0.2)
	1.0	10	Mn-Cu	0.1055 ± 0.008 (2.68 ± 0.2)
	1.3	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

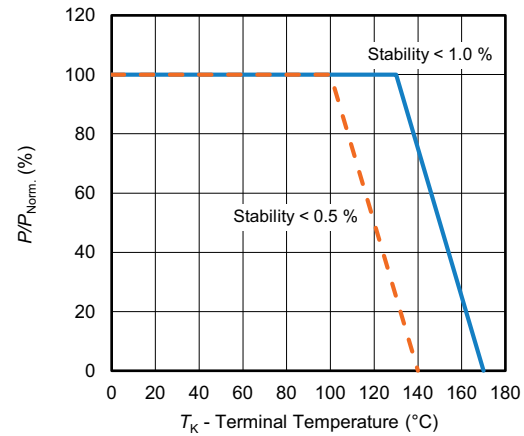
- (1) The full power rating of Power Metal Strip resistors are dependent upon the ability of the circuit board to dissipate the heat energy created in the resistance element. It is recommended to follow common design practices for power semiconductors that ensure the junction temperature is maintained 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

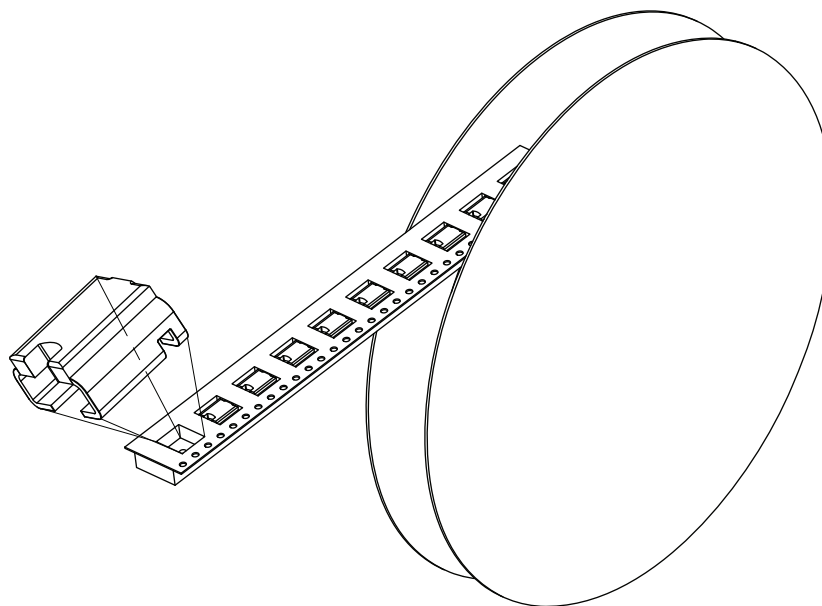
**PACKAGING**

MODEL	REEL			
	TAPE WIDTH	DIAMETER	PIECES/REEL	CODE
WSL2726	16 mm / embossed plastic	330 mm / 13"	1500 ⁽¹⁾	EA

Notes

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

⁽¹⁾ 0.2 mΩ = 1300 pcs/reel (PCN-DR-00008-2026-Rev-0)

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



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.