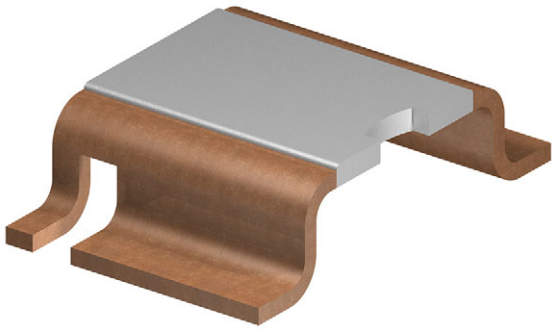
Power Metal Strip® Resistors, Low Value, High Power, Surface Mount, 4-Terminal



FEATURES

- 4-terminal design allows for 1 % tolerance down to 0.0002 Ω
- High power to foot print size ratio
- 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 µV/°C)
- AEC-Q200 qualified (1)
- PATENT(S): www.vishay.com/patents
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

3D Models | Design Tools | Calculators

Notes

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

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	SIZE	POWER RATING $P_{70\,°C}$ W	TOLERANCE ± %	RESISTANCE VALUE RANGE Ω	RESISTANCE VALUES CURRENTLY AVAILABLE (1) Ω	WEIGHT (typical) g/1000 pieces
WSL4026	4026	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

- Qualified to AEC-Q200 rev. D
- 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

(1) Other values may be available, contact factory

GLOBAL PART NUMBER INFORMATION

Global Part Numbering Example: WSL4026L5000FEA (WSL4026, 0.0005 Ω, ± 1 %)
(visit www.vishay.net Vishay Dale parts numbering manual for all options)

W	S	L	4	0	2	6	L	5	0	0	0	F	E	A		

GLOBAL MODEL (7 digits)	RESISTANCE VALUE (5 digits)	TOLERANCE CODE (1 digit)	PACKAGING CODE (1) (2 digits)	SPECIAL (2) (up to 2 digits)
WSL4026	**L** = mΩ **L5000** = 0.0005 Ω **1L000** = 0.0010 Ω	**F** = ± 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) Packaging code: EB (lead (Pb)-free) is non-standard packaging code designating 1000 piece reels. These non-standard packaging code is identical to our standard EA (lead (Pb)-free), except that they have a package quantity of 1000 pieces

(2) 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.

For technical questions, contact: ww2bresistors@vishay.com

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TECHNICAL SPECIFICATIONS		
PARAMETER	**UNIT**	**RESISTOR CHARACTERISTICS**
Component temperature coefficient (including terminal) (1) TCR measured from 0 °C to 150 °C	ppm/°C	± 75 for 0.5 mΩ to 5 mΩ
		± 110 for 0.3 mΩ
		± 75 for 0.2 mΩ
Element TCR (2)	ppm/°C	< 20
Operating temperature range	°C	-65 to +170
Maximum working voltage (3)	V	$(P \times R)^{1/2}$

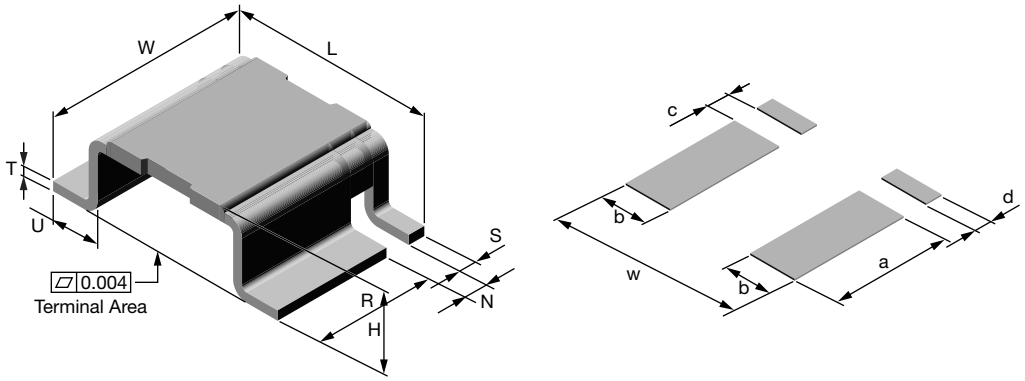
Notes

(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

(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?30311
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

MODEL	DIMENSIONS in inches (millimeters)							
	L	W	H	R (REF.)	S	T	U	N
WSL4026	0.400 ± 0.008 (10.1 ± 0.2)	0.260 + 0.012/- 0.008 (6.6 + 0.3/- 0.2)	Please see table below	0.198 (5.0)	0.028 ± 0.004 (0.7 ± 0.1)	0.016 ± 0.002 (0.4 ± 0.15)	0.078 ± 0.006 (2.0 ± 0.15)	0.039 ± 0.006 (0.99 ± 0.15)

MODEL	SOLDER PAD DIMENSIONS in inches (millimeters)				
	a	b	c	d	w
WSL4026	0.223 (5.66)	0.105 (2.67)	0.027 (0.69)	0.039 (0.99)	0.423 (10.74)

MODEL	RESISTANCE VALUE (mΩ)	THERMAL RESISTANCE (1) (°C/W)	ELEMENT MATERIAL	HEIGHT H
WSL4026	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

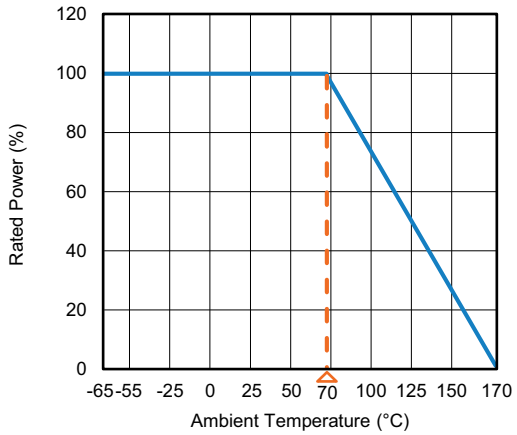
(1) The full power rating of Power Metal Strip resistors are dependent upon the ability of the circuit board to dissipate the heat energy created in the resistance element. It is recommended to follow common design practices for power semiconductors that ensure the junction temperature is maintained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

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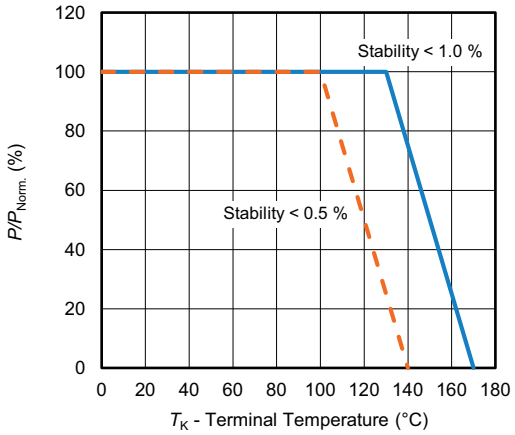
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DERATING - AMBIENT TEMPERATURE

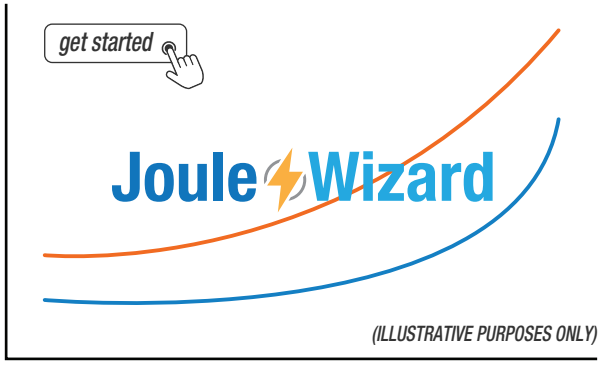


DERATING - TERMINAL TEMPERATURE



Example: WSL4026 0.0005 Ω, 0.001 Ω

PULSE CAPABILITY



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

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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

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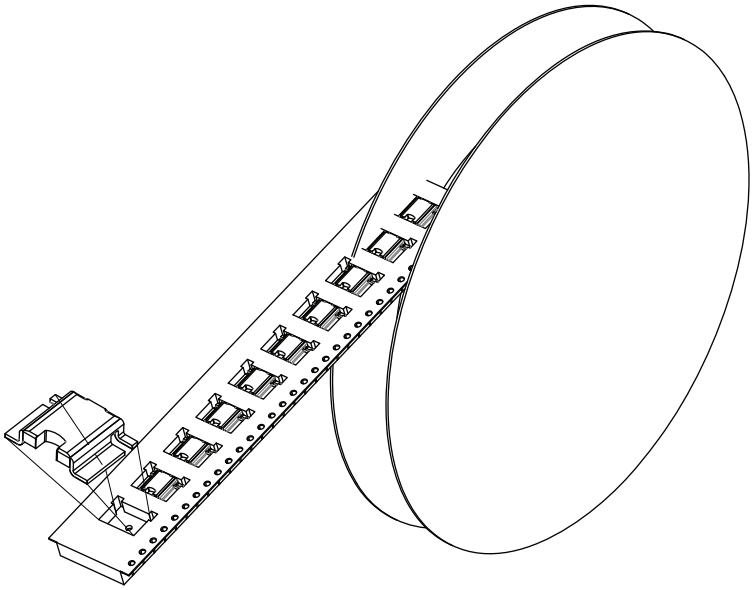
PACKAGING				
MODEL	REEL			
	TAPE WIDTH	DIAMETER	PIECES/REEL	CODE
WSL4026	24 mm / embossed plastic	330 mm / 13"	1500 (1)	EA

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

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