AUTOMOTIVE GRADE

ROHS

HALOGEN

FREE

GREEN

(5-2008)



www.vishay.com

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 $0.0002~\Omega$
- 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⁾
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

LINKS TO ADDITIONAL RESOURCES





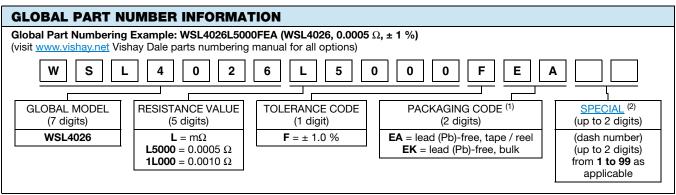
Notes

- Follow link to Overview of Automotive Grade Products for more details: www.vishav.com/doc?49924
- (1) Flame retardance test may not be applicable to some resistor technologies

STANDARD ELECTRICAL SPECIFICATIONS								
GLOBAL MODEL SIZE POWER RATING TOLERANCE FOR W TOLERANCE FOR W		$\begin{array}{c} \textbf{RESISTANCE VALUE} \\ \textbf{RANGE} \\ \Omega \end{array}$	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

- 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



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

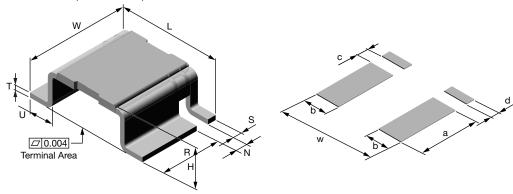


TECHNICAL SPECIFICATIONS					
PARAMETER	UNIT	RESISTOR CHARACTERISTICS			
Component temperature coefficient		\pm 75 for 0.5 m Ω to 5 m Ω			
(including terminal) (1)	ppm/°C	\pm 110 for 0.3 m Ω			
TCR measured from -55 °C to 150 °C		\pm 75 for 0.2 m Ω			
Element TCR (2)	ppm/°C	< 20			
Operating temperature 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: <u>www.vishay.com/doc?30311</u>
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

MODEL	DIMENSIONS in inches (millimeters)							
	L	w	н	R (REF.)	s	Т	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 ± 0.05)	0.078 ± 0.004 (2.0 ± 0.1)	0.039 ± 0.006 (0.99 ± 0.15)

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

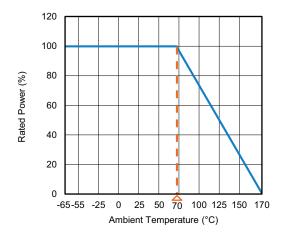
MODEL RESISTANCE VALUE (mΩ) THERM		THERMAL RESISTANCE (1) (°C/W)	ELEMENT MATERIAL	HEIGHT H
	0.2	3	Mn-Cu-Sn	0.150 ± 0.008 (3.81 ± 0.2)
	0.3	4	Mn-Cu	0.141 ± 0.008 (3.58 ± 0.2)
	0.5	6	Mn-Cu	0.116 ± 0.008 (2.95 ± 0.2)
	0.7	8	Mn-Cu	0.111 ± 0.008 (2.82 ± 0.2)
WSL4026	1.0	10	Mn-Cu	$0.1055 \pm 0.008 (2.68 \pm 0.2)$
W3L4020	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

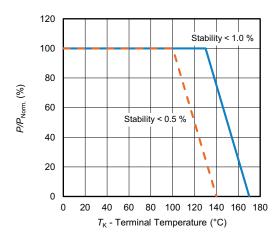
⁽¹⁾ The full power rating of Power Metal Strip resistors are dependent upon the ability of the circuit board to dissipate the heat energy created in the resistance element. It is recommended to follow common design practices for power semiconductors that ensure the junction temperature is maintained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



DERATING - AMBIENT TEMPERATURE

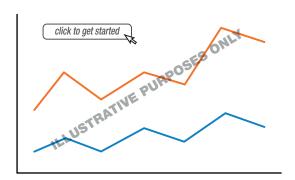


DERATING - TERMINAL TEMPERATURE



Example: WSL4026 0.0005 Ω , 0.001 Ω

PULSE CAPABILITY



www.vishay.com/resistors/power-metal-strip-calculator

PERFORMANCE						
TEST	CONDITIONS OF TEST	TEST LIMITS				
Thermal shock	-55 °C to +150 °C, 1000 cycles, 15 min at each extreme	± 0.5 %				
Short time overload	0.3 m Ω , 0.5 m Ω , 2 m Ω and 3 m Ω - 5 x rated power for 5 s 5 m Ω - 3 x rated power for 5 s	± 0.5 %				
Low temperature operation	-65 °C for 24 h	± 0.5 %				
High temperature exposure	1000 h at +170 °C	± 1.0 %				
Bias humidity	+85 °C, 85 % RH, 10 % bias, 1000 h	± 0.5 %				
Mechanical shock	100 g's for 6 ms, 5 pulses	± 0.5 %				
Vibration	Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h	± 0.5 %				
Load life	1000 h at +70 °C, 1.5 h "ON", 0.5 h "OFF"	± 1.0 %				
Resistance to solder heat	3 x at 250 °C ± 5 °C for 30 s ± 5 s	± 0.5 %				
Moisture resistance	MIL-STD-202, method 106, 0 % power, 7b not required	± 0.5 %				



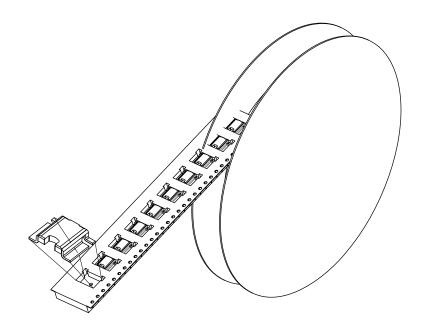
Vishay Dale

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

Notes

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

REEL ORIENTATION





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