

## Power Metal Strip® Resistors, High Power (10 W), Low Value (Down to 0.001 Ω), Surface-Mount



### FEATURES

- Improved thermal management incorporated into design
- 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
- Sulfur resistance by construction that is unaffected by high sulfur environments
- Very low inductance (< 5 nH)
- Low thermal EMF (< 3 μV/°C)
- Solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- AEC-Q200 qualified <sup>(1)</sup>
- PATENT(S): [www.vishay.com/patents](http://www.vishay.com/patents)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### LINKS TO ADDITIONAL RESOURCES



### Note

- <sup>(1)</sup> Flame retardance test may not be applicable to some resistor technologies

### STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	SIZE	POWER RATING $P_{70\text{ }^\circ\text{C}}$ W	RESISTANCE VALUE RANGE Ω		WEIGHT (typical) g/1000 pieces
			TOL. ± 0.5 %	TOL. ± 1.0 %	
WSHP2818	2818	10 <sup>(1)</sup>	0.010 to 0.1	0.001 to 0.1	167.8

### Notes

- Qualified to AEC-Q200 rev. D
- <sup>(1)</sup> The WSHP2818 is rated at 10 W with maximum surface temperature of 200 °C based on 70 °C ambient temperature

### GLOBAL PART NUMBER INFORMATION

Global Part Numbering: **WSHP2818R1000FEA** (visit [www.vishay.net](http://www.vishay.net) Vishay Dale parts numbering manual for all options)

<b>W</b>	<b>S</b>	<b>H</b>	<b>P</b>	<b>2</b>	<b>8</b>	<b>1</b>	<b>8</b>	<b>R</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>F</b>	<b>E</b>	<b>A</b>		
GLOBAL MODEL (8 digits)			RESISTANCE VALUE (5 digits)			TOLERANCE CODE (1 digit)		PACKAGING CODE <sup>(1)</sup> (2 digits)			SPECIAL (up to 2 digits)						
<b>WSHP2818</b>			L = mΩ* R = decimal <b>4L000</b> = 0.004 Ω <b>R0100</b> = 0.01 Ω  * Use "L" for resistance values < 0.01 Ω			D = ± 0.5 % F = ± 1.0 %		<b>EA</b> = lead (Pb)-free, tape/reel			(dash number) from <b>1</b> to <b>99</b> as applicable						

### Notes

- SMD Power Metal Strip marking ([www.vishay.com/doc?30327](http://www.vishay.com/doc?30327))
- <sup>(1)</sup> EB (lead (Pb) free) is a non-standard packaging code designated for 1000 piece reels. The non-standard packaging code is identical to our standard EA (lead (Pb) free), except that it has a package quantity of 1000 pieces

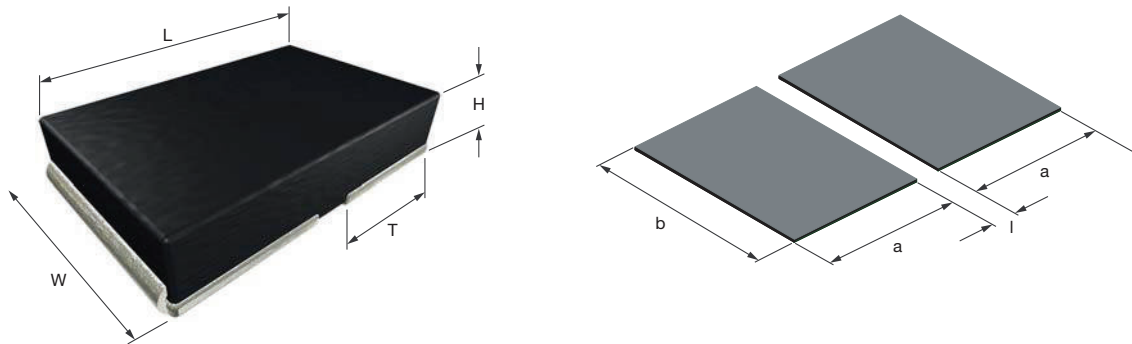
PATENT(S): [www.vishay.com/patents](http://www.vishay.com/patents)

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) <sup>(1)</sup>	ppm/°C	± 250 <sup>(4)</sup> for 1 mΩ to 1.99 mΩ
		± 200 <sup>(4)</sup> for 2 mΩ to 5.99 mΩ
		± 75 <sup>(4)</sup> for 6 mΩ to 100 mΩ
Element TCR <sup>(2)</sup>	ppm/°C	< 20
Inductance	nH	< 5
Operating temperature range	°C	-65 to +170
Maximum working voltage <sup>(3)</sup>	V	$(P \times R)^{1/2}$

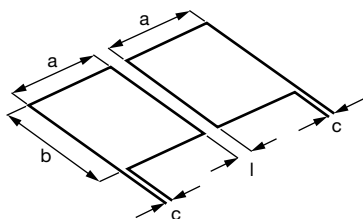
**Notes**

- <sup>(1)</sup> Component TCR - total TCR that includes the TCR effects of the resistor element and the copper terminal
- <sup>(2)</sup> Element TCR - only applies to the alloy used for the resistor element; refer to item 1 in the construction illustration on the following page
- <sup>(3)</sup> Maximum working voltage - the WSHP is not voltage sensitive, but is limited by power / energy dissipation and is also not ESD sensitive
- <sup>(4)</sup> Typical TCR is positive, for more details contact factory
- Refer to table "Links to Related Documents" for TCR white paper

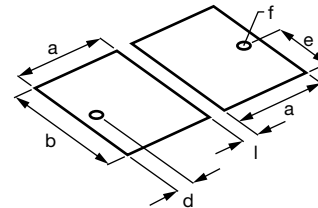
**DIMENSIONS** in inches (millimeters)

**Notes**

- 3D models available: [www.vishay.com/doc?30349](http://www.vishay.com/doc?30349)
- Surface-mount solder profile recommendations: [www.vishay.com/doc?31052](http://www.vishay.com/doc?31052)

MODEL	RESISTANCE RANGE Ω	DIMENSIONS				SOLDER PAD DIMENSIONS		
		L	W	H	T	a	b	l
WSHP2818	0.001 to 0.1	0.280 ± 0.010 (7.1 ± 0.25)	0.180 ± 0.010 (4.6 ± 0.25)	0.059 ± 0.010 (1.50 ± 0.25)	0.125 ± 0.010 (3.18 ± 0.25)	0.143 (3.63)	0.210 (5.33)	0.024 (0.61)

**TYPICAL SENSING LAYOUT**


a	b	c	l
0.143 (3.63)	0.210 (5.33)	0.020 (0.51)	0.024 (0.61)

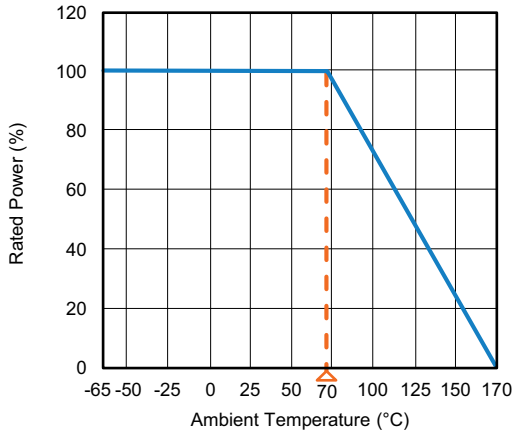
**SENSING WITH VIA LAYOUT** (best performance)


a	b	d	e	f	l
0.143 (3.63)	0.210 (5.33)	0.026 (0.66)	0.105 (2.67)	∅ 0.020 (0.50)	0.024 (0.61)

**Note**

- Sensing locations are based on the construction of the part; terminals are wrapped from the outside to underneath. These options place the sensing location nearest the temperature stable resistance element, which minimizes contact resistance and optimizes TCR

**DERATING**

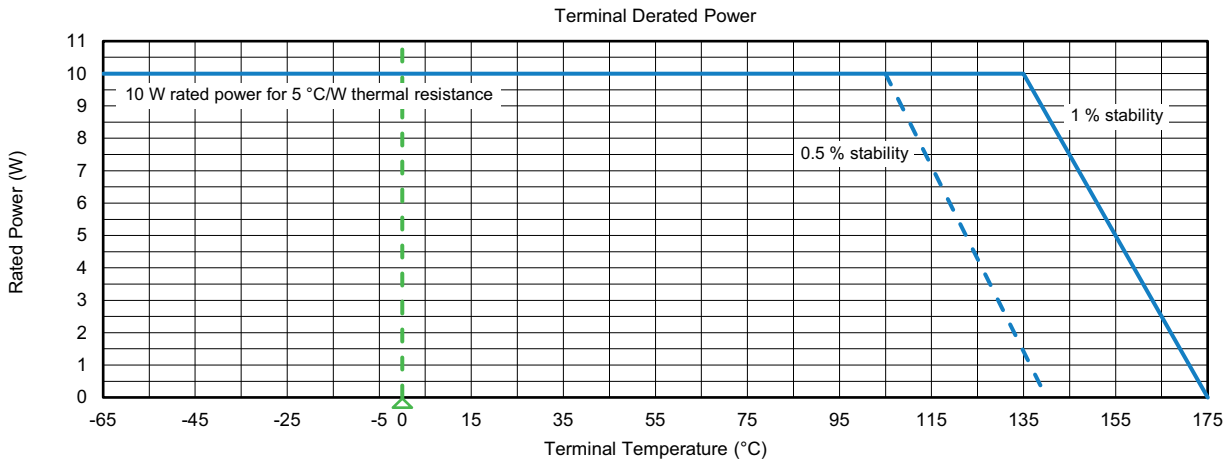


**PULSE CAPABILITY**



[www.vishay.com/en/resistors/joulewizard/](http://www.vishay.com/en/resistors/joulewizard/)

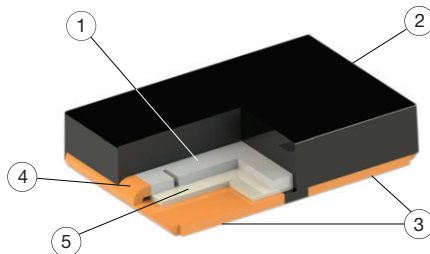
**TERMINAL TEMPERATURE DERATING**



**Note**

- The WSHP2818 is rated at 10 W with maximum surface temperature of 200 °C based on 70 °C ambient temperature

**WELDED CONSTRUCTION**



- ① Resistive element
- ② Molding material
- ③ Terminations
- ④ Terminal / element weld
- ⑤ Insert



PERFORMANCE		
TEST	CONDITIONS OF TEST	TEST LIMITS
Thermal shock	-55 °C to +150 °C, 2000 cycles, 15 min at each extreme	± 0.5 %
Short time overload	Refer to link for short time overload performance and pulse capability; <a href="http://www.vishay.com/en/resistors/power-metal-strip-calculator/">www.vishay.com/en/resistors/power-metal-strip-calculator/</a>	± 1.0 %
Low temperature operation	-65 °C for 24 h	± 0.5 %
High temperature exposure	2000 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	2000 h at 70 °C, 1.5 h "ON", 0.5 h "OFF"	± 1.0 %
Resistance to solder heat	+260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence	± 0.5 %
Moisture resistance	MIL-STD-202, method 106, 0 % power, 7b not required	± 0.5 %

Note

- Contact [ww2bresistors@vishay.com](mailto:ww2bresistors@vishay.com) for application specific performance requirements or qualification data. Typical performance is better than stated test limits

PACKAGING				
MODEL	REEL			
	TAPE WIDTH	DIAMETER	PIECES/REEL	CODE
WSHP2818	16 mm/embossed plastic	330 mm / 13"	3500	EA

Notes

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

ADDITIONAL RESOURCES	
Video: Power Metal Strip Short Time Overload	<a href="http://www.youtube.com/watch?v=8WmjAi9ntX0&amp;t=3s">www.youtube.com/watch?v=8WmjAi9ntX0&amp;t=3s</a>

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



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