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 (1)
- PATENT(S): www.vishay.com/patents
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

3D Models | Design Tools | Videos | Infographics | Calculators

Note

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

STANDARD ELECTRICAL SPECIFICATIONS

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

Notes

- Qualified to AEC-Q200 rev. D

(1) 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 Vishay Dale parts numbering manual for all options)

W	S	H	P	2	8	1	8	R	1	0	0	0	F	E	A		

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

Notes

- SMD Power Metal Strip marking (www.vishay.com/doc?30327)

(1) 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

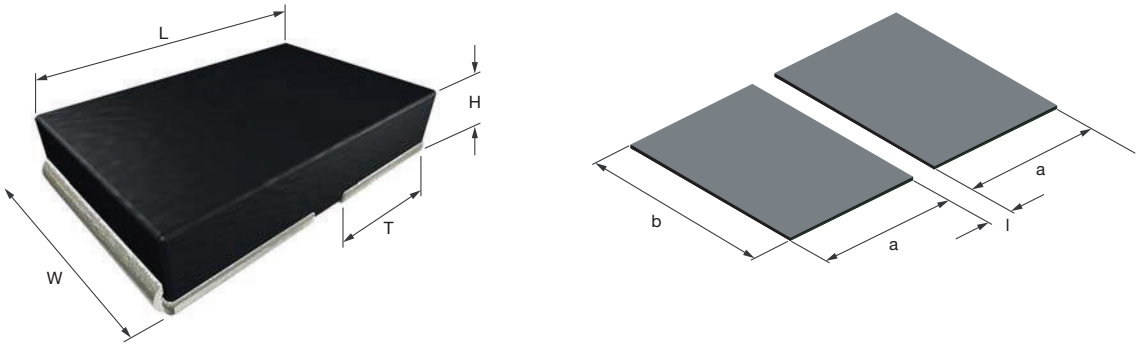
This Vishay product is protected by one or more United States and international patents.

TECHNICAL SPECIFICATIONS		
PARAMETER	**UNIT**	**RESISTOR CHARACTERISTICS**
Component temperature coefficient (including terminal) (1)	ppm/°C	± 250 (4) for 1 mΩ to 1.99 mΩ
		± 200 (4) for 2 mΩ to 5.99 mΩ
		± 75 (4) for 6 mΩ to 100 mΩ
Element TCR (2)	ppm/°C	< 20
Inductance	nH	< 5
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 illustration on the following page
(3) Maximum working voltage - the WSHP is not voltage sensitive, but is limited by power / energy dissipation and is also not ESD sensitive
(4) Typical TCR is positive, for more details contact factory
- Refer to table “Links to Related Documents” for TCR white paper

DIMENSIONS in inches (millimeters)

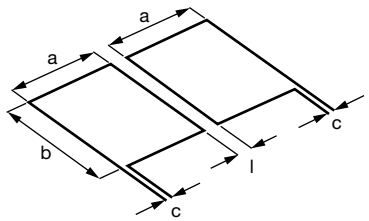


Notes

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

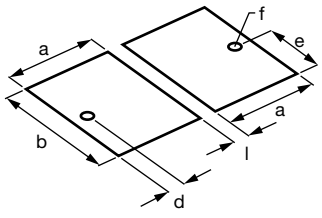
MODEL	RESISTANCE RANGE Ω	DIMENSIONS				SOLDER PAD DIMENSIONS		
		L	W	H	T	a	b	l
WSHP2818	0.001 to 0.1	0.280 ± 0.010 (7.1 ± 0.25)	0.180 ± 0.010 (4.6 ± 0.25)	0.059 ± 0.010 (1.50 ± 0.25)	0.125 ± 0.010 (3.18 ± 0.25)	0.143 (3.63)	0.210 (5.33)	0.024 (0.61)

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)

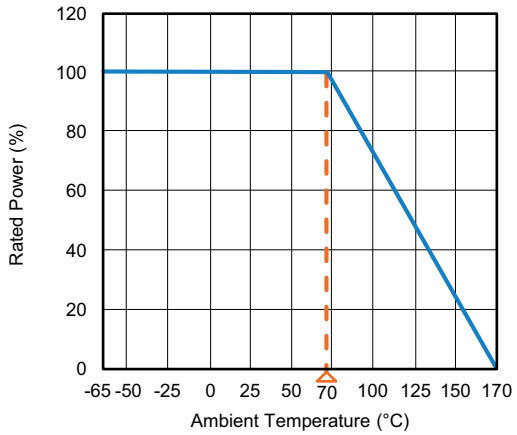


a	b	d	e	f	l
0.143 (3.63)	0.210 (5.33)	0.026 (0.66)	0.105 (2.67)	Ø 0.020 (0.50)	0.024 (0.61)

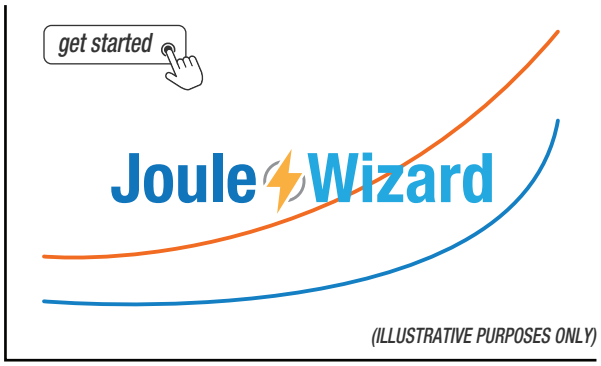
Note

- 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

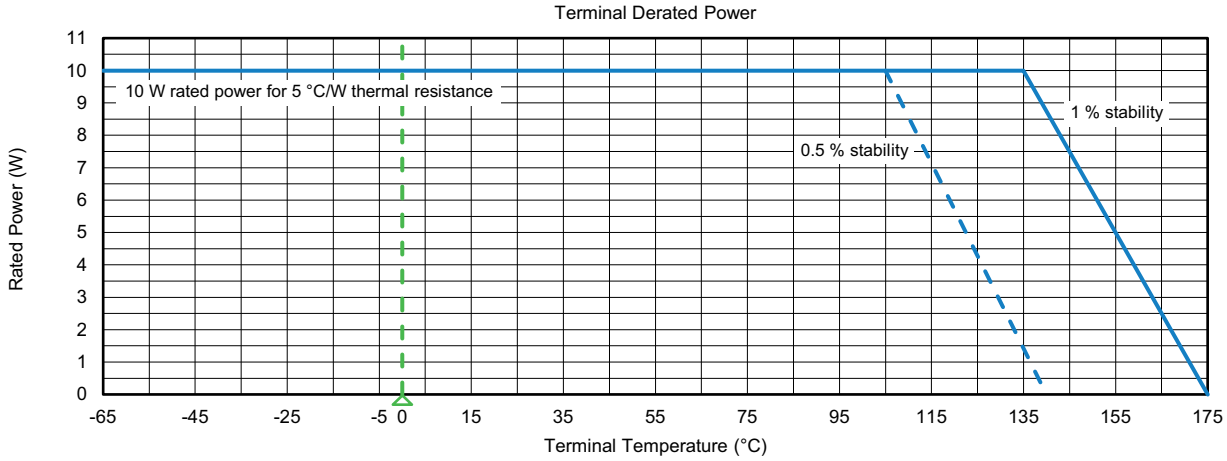


PULSE CAPABILITY



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

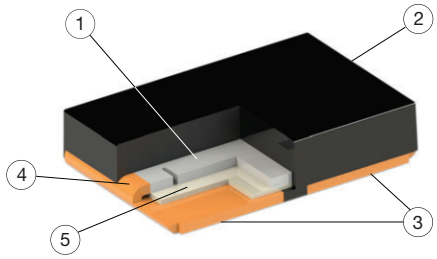
TERMINAL TEMPERATURE DERATING



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; www.vishay.com/en/resistors/power-metal-strip-calculator/	± 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 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

ADDITIONAL RESOURCES	
Video: Power Metal Strip Short Time Overload	www.vishay.com/en/videos/resistors/short-time-overload-wshm2818/

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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