

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

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 $P_{70^{\circ}\text{C}}$ 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

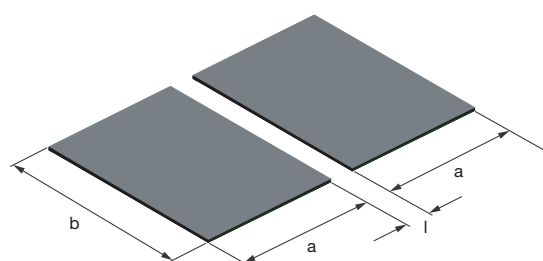
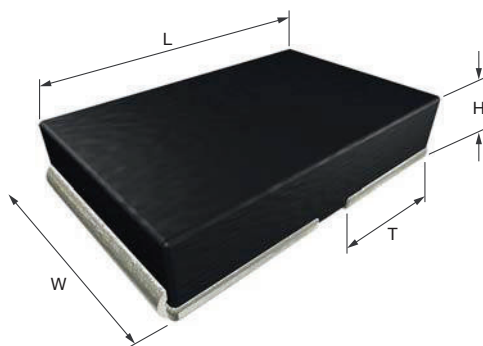
PATENT(S): www.vishay.com/patents

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	$(P \times R)^{1/2}$

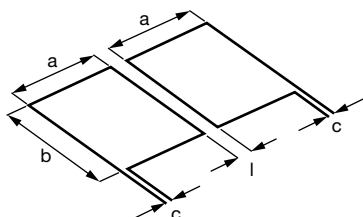
Notes

- ⁽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

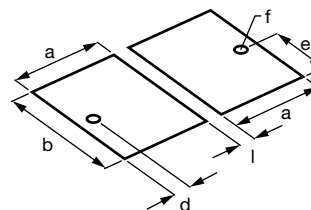
DIMENSIONS in inches (millimeters)

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)

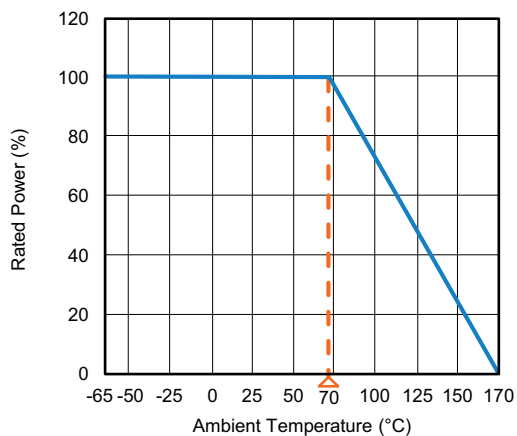
SENSING WITH VIA LAYOUT (best performance)


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)

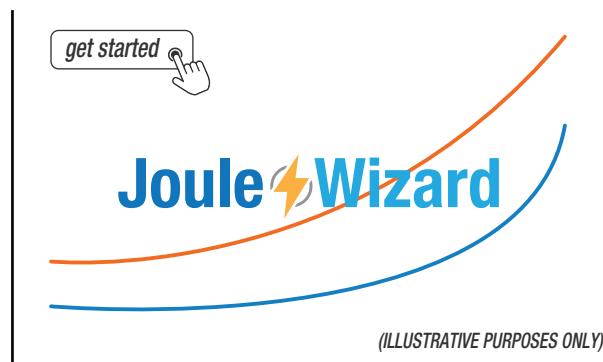
Note

- 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

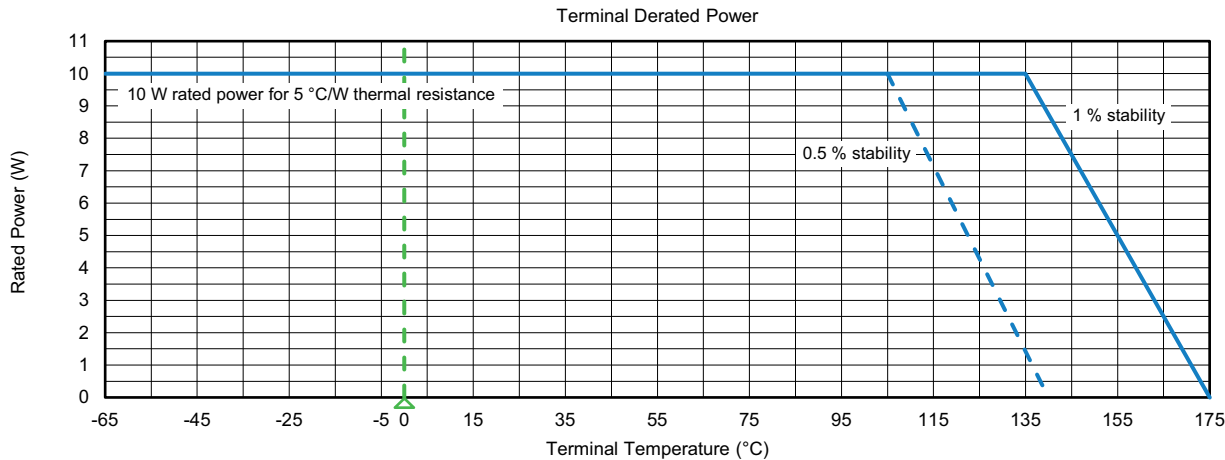


PULSE CAPABILITY



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

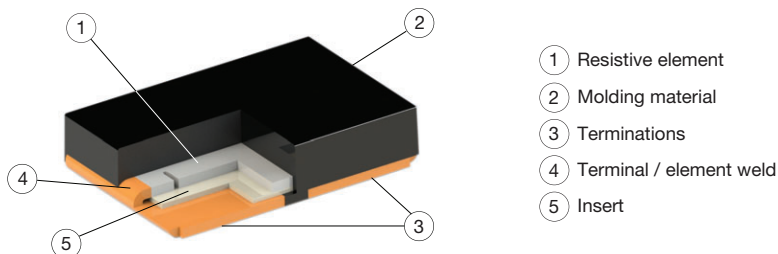
TERMINAL TEMPERATURE DERATING



Note

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

WELDED CONSTRUCTION



**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



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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.