THE DATASHEET OF

WSHM28181L000FEA

Power Metal Strip® Resistors, High Power (7 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)
- Solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- 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

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

3D Models | Design Tools | Videos | 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 %	
WSHM2818	2818	7 (1)	0.010 to 0.1	0.001 to 0.1	167.8
WSHM2818	2818	6	0.101 to 0.2	0.101 to 0.2	167.8

Notes

- Qualified to AEC-Q200 rev. D

(1) The WSHM2818 is rated at 7 W with maximum surface temperature of 180 °C

GLOBAL PART NUMBER INFORMATION

Global Part Numbering: WSHM2818R1000FEA (visit www.vishay.net Vishay Dale parts numbering manual for all options)

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

GLOBAL MODEL	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING CODE (1)	SPECIAL
WSHM2818	**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) (up to 2 digits) from **1** to **99** as applicable

Notes

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

(1) Packaging code: EB (lead (Pb)-free) and TB (tin / lead) are non-standard packaging codes designating 1000 piece reels. These non-standard packaging codes are identical to our standard EA (lead (Pb)-free) and TA (tin / lead), except that they have 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.

For technical questions, contact: ww2bresistors@vishay.com

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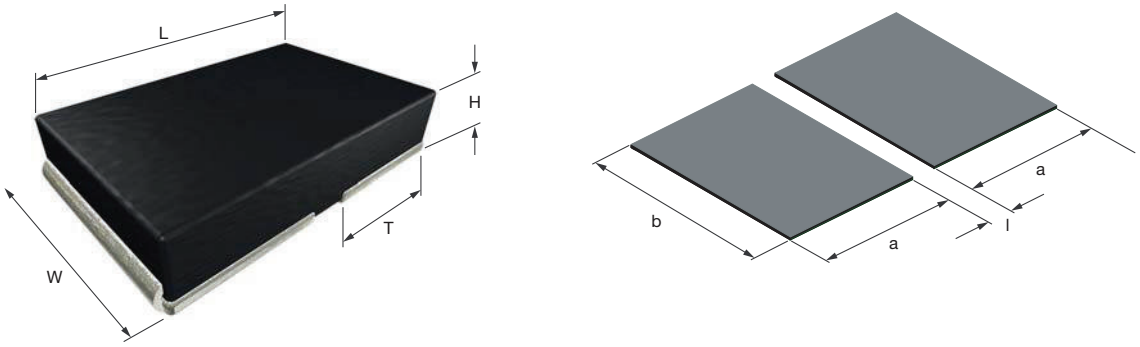
TECHNICAL SPECIFICATIONS		
PARAMETER	**UNIT**	**RESISTOR CHARACTERISTICS**
Component temperature coefficient (including terminal) (1)	ppm/°C	± 250 (4) for 1 mΩ to 1.99 mΩ
		± 200 (4) for 2 mΩ to 5.99 mΩ
		± 75 (4) for 6 mΩ to 200 mΩ
Element TCR (2)	ppm/°C	< 20
Inductance	nH	< 5
Operating temperature 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 WSHM 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)

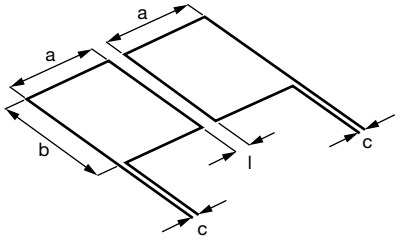


Notes

- 3D models available: www.vishay.com/doc?30324
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

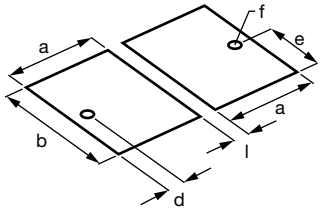
MODEL	RESISTANCE RANGE Ω	DIMENSIONS				SOLDER PAD DIMENSIONS		
		L	W	H	T	a	b	l
WSHM2818	0.001 to 0.2	0.280 ± 0.010 (7.1 ± 0.25)	0.180 ± 0.010 (4.6 ± 0.25)	0.059 ± 0.010 (1.50 ± 0.25)	0.125 ± 0.010 (3.18 ± 0.25)	0.143 (3.63)	0.210 (5.33)	0.024 (0.61)

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

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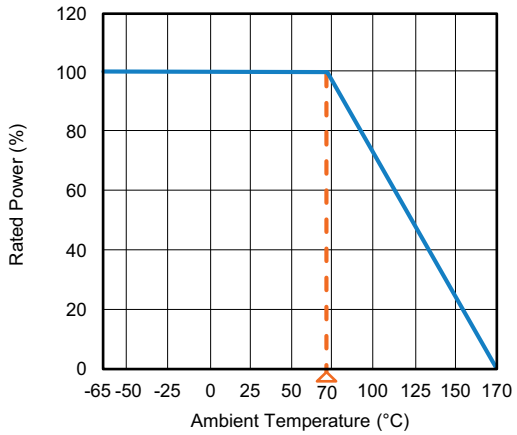
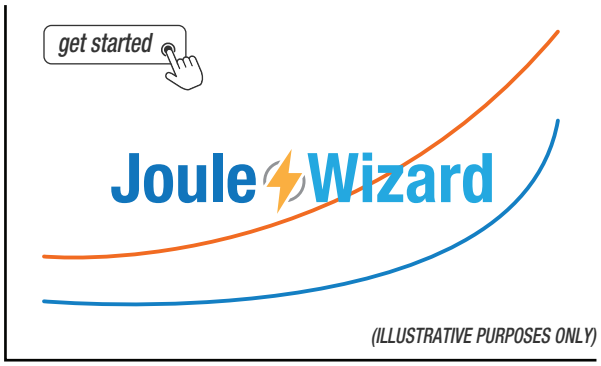
DERATING

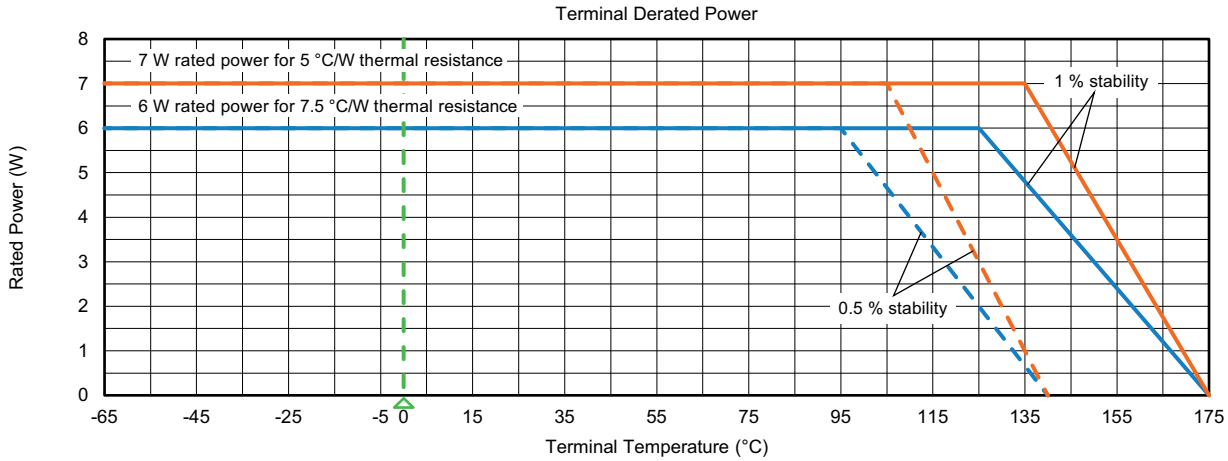


PULSE CAPABILITY

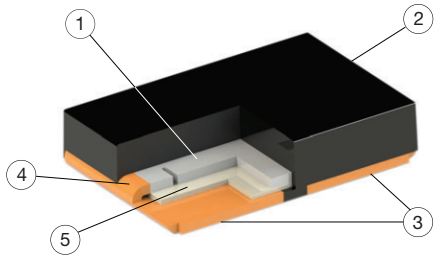


www.vishay.com/en/resistors/joulewizard/

TERMINAL TEMPERATURE DERATING



WELDED CONSTRUCTION



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

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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**
WSHM2818	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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