

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



## LINKS TO ADDITIONAL RESOURCES



## 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)



## Notes

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

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | SIZE | POWER RATING<br>$P_{70^{\circ}\text{C}}$<br>W | RESISTANCE VALUE RANGE<br>Ω |              | WEIGHT<br>(typical)<br>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                                |

## Note

- <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)

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

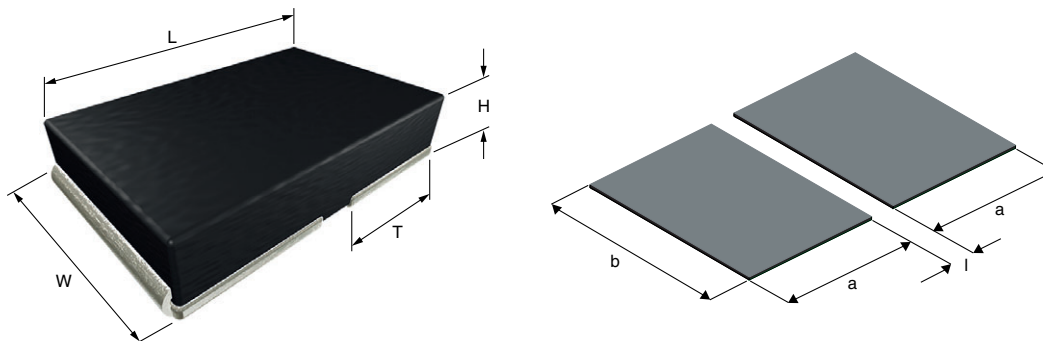
PATENT(S): [www.vishay.com/patents](http://www.vishay.com/patents)

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 | $\pm 200$ <sup>(4)</sup> for 1 mΩ to 5.99 mΩ |
|                                                                       |        | $\pm 75$ <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      | $(P \times R)^{1/2}$                         |

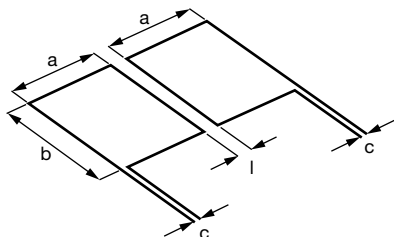
**Notes**

- (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

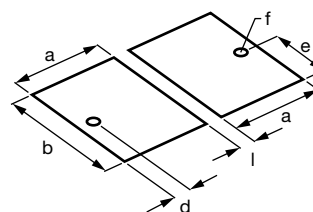
**DIMENSIONS** in inches (millimeters)

**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<br>Ω | DIMENSIONS                    |                               |                                |                                | SOLDER PAD DIMENSIONS |                |                 |
|----------|-----------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|-----------------------|----------------|-----------------|
|          |                       | L                             | W                             | H                              | T                              | a                     | b              | l               |
| WSHP2818 | 0.001 to 0.1          | 0.280 ± 0.010<br>(7.1 ± 0.25) | 0.180 ± 0.010<br>(4.6 ± 0.25) | 0.059 ± 0.010<br>(1.50 ± 0.25) | 0.125 ± 0.010<br>(3.18 ± 0.25) | 0.138<br>(3.5)        | 0.200<br>(5.1) | 0.024<br>(0.61) |

**TYPICAL SENSING LAYOUT**


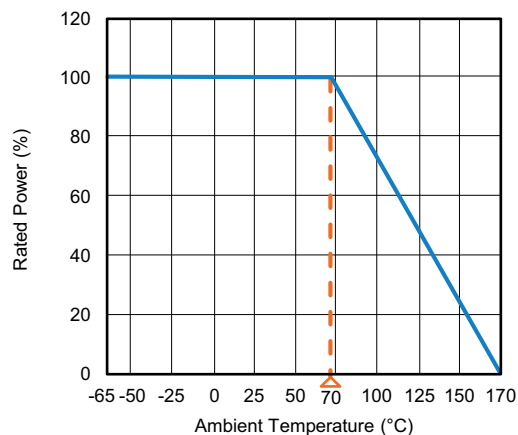
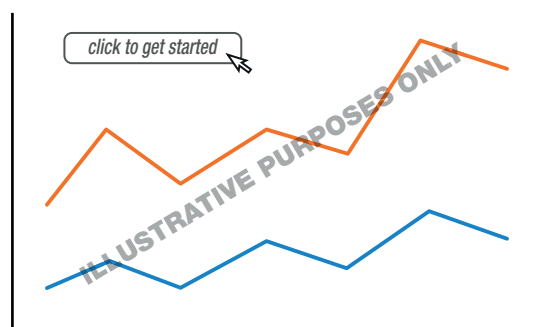
| a               | b               | c               | l               |
|-----------------|-----------------|-----------------|-----------------|
| 0.138<br>(3.51) | 0.210<br>(5.33) | 0.020<br>(0.51) | 0.024<br>(0.61) |

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


| a               | b               | d               | e               | f                 | l               |
|-----------------|-----------------|-----------------|-----------------|-------------------|-----------------|
| 0.143<br>(3.63) | 0.210<br>(5.33) | 0.026<br>(0.66) | 0.105<br>(2.67) | Ø 0.020<br>(0.50) | 0.024<br>(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/resistors/power-metal-strip-calculator](http://www.vishay.com/resistors/power-metal-strip-calculator)**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;<br><a href="http://www.vishay.com/resistors/power-metal-strip-calculator/">www.vishay.com/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 %     |

**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?220051](http://www.vishay.com/doc?220051)

**ADDITIONAL RESOURCES**

|                                                              |                                                                                                                                                                                    |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">Video: Power Metal Strip Short Time Overload</a> | <a href="http://www.vishay.com/videos/resistors/vishay-dale-power-metal-strip174-wshmwshp.html">www.vishay.com/videos/resistors/vishay-dale-power-metal-strip174-wshmwshp.html</a> |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## 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.