

# Power Metal Strip® Resistors, High Power (7 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)
- 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 <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)

AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

## Notes

- Follow link to Overview of Automotive Grade Products for more details: [www.vishay.com/doc?49924](http://www.vishay.com/doc?49924)
- (1) 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 % |                                      |
| WSHM2818     | 2818 | 7 <sup>(1)</sup>                              | 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                                |

## Note

- (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](http://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 <sup>(1)</sup>                                 |   |   |   | SPECIAL                                                         |   |  |  |
| WSHM2818     |   |   |   | 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>(up to 2 digits)<br>from 1 to 99 as applicable |   |  |  |

## Notes

- SMD Power Metal Strip Marking ([www.vishay.com/doc?30327](http://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

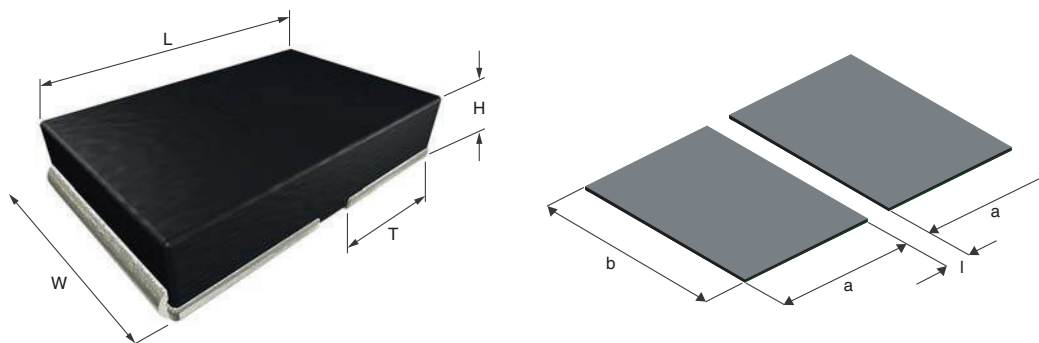
PATENT(S): [www.vishay.com/patents](http://www.vishay.com/patents)

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 | ± 200 for 1 mΩ to 5.99 mΩ |
|                                                                       |        | ± 75 for 6 mΩ to 200 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      | $(P \times R)^{1/2}$      |

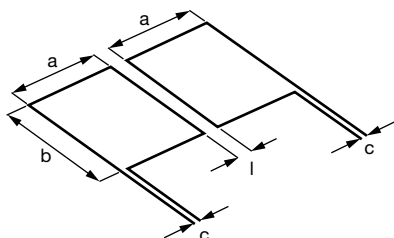
**Notes**

- (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 WSHM is not voltage sensitive, but is limited by power / energy dissipation and is also not ESD sensitive

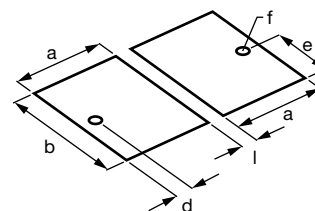
**DIMENSIONS** in inches (millimeters)

**Notes**

- 3D models available: [www.vishay.com/doc?30324](http://www.vishay.com/doc?30324)
- 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               |
| WSHM2818 | 0.001 to 0.2          | 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**


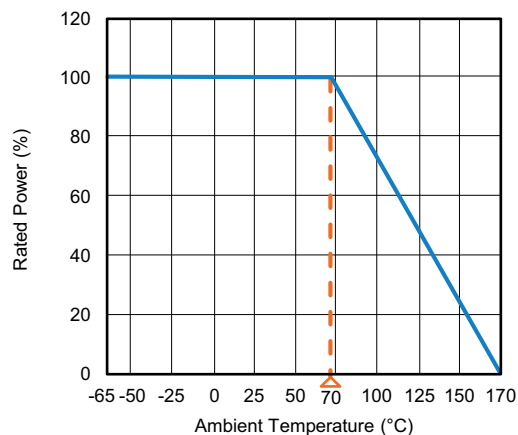
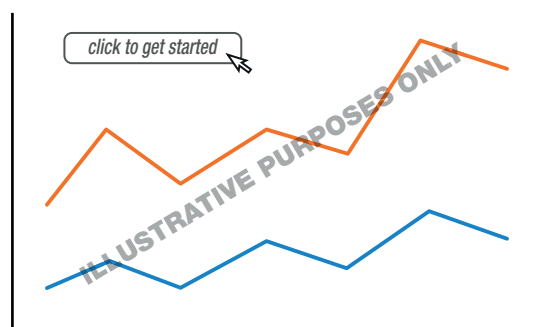
| a               | b               | c               | l               |
|-----------------|-----------------|-----------------|-----------------|
| 0.138<br>(3.51) | 0.210<br>(5.33) | 0.020<br>(0.51) | 0.024<br>(0.61) |

**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 |
| 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](http://www.vishay.com/doc?20051)

| ADDITIONAL RESOURCES                         |                                                                                                                                                                                                                    |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Video: Power Metal Strip Short Time Overload | <a href="http://www.vishay.com/videos/resistors/power-metal-strip174-resistor-short-time-overload-product-demo">www.vishay.com/videos/resistors/power-metal-strip174-resistor-short-time-overload-product-demo</a> |



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