

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



LINKS TO ADDITIONAL RESOURCES



Note

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

| STANDARD ELECTRICAL SPECIFICATIONS | | | | | |
|------------------------------------|------|---|------------------------------------|------------------|--------------------------------------|
| GLOBAL MODEL | SIZE | POWER RATING $P_{70\text{ }^\circ\text{C}}$ W | RESISTANCE VALUE RANGE Ω | | WEIGHT (typical) g/1000 pieces |
| | | | TOL. $\pm 0.5\%$ | TOL. $\pm 1.0\%$ | |
| 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 = $\pm 0.5\%$ F = $\pm 1.0\%$ | | 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

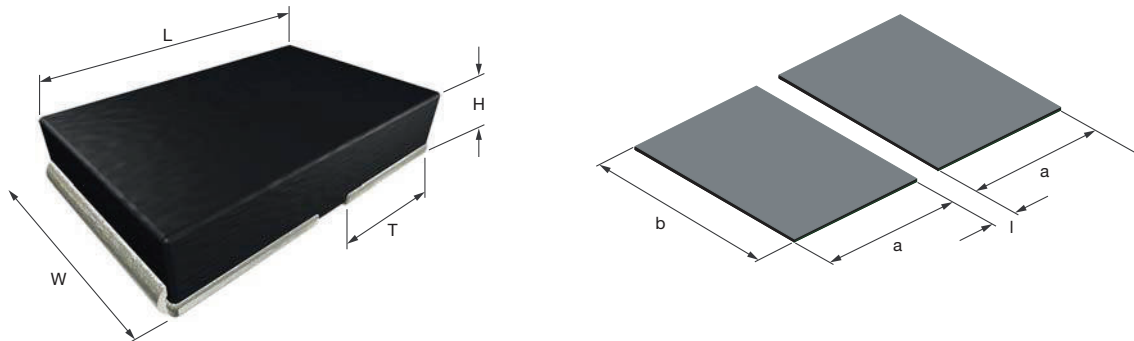
PATENT(S): www.vishay.com/patents

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

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

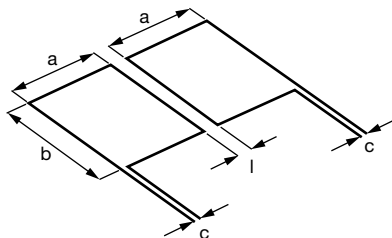
Notes

- (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

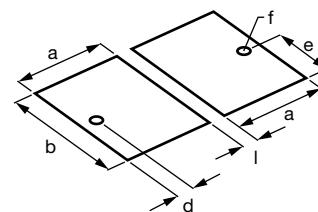
DIMENSIONS in inches (millimeters)

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) |

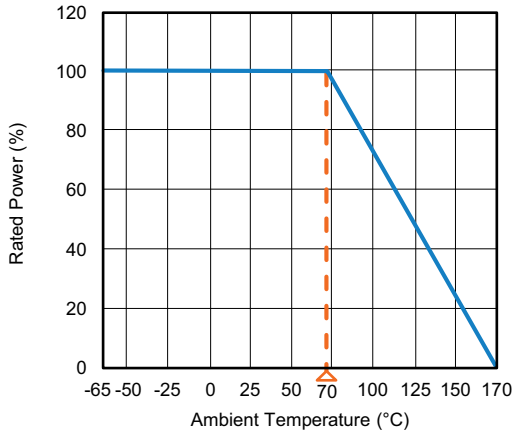
SENSING WITH VIA LAYOUT (best performance)


| a | b | d | e | f | l |
|-----------------|-----------------|-----------------|-----------------|-------------------|-----------------|
| 0.143 (3.63) | 0.210 (5.33) | 0.026 (0.66) | 0.105 (2.67) | ∅ 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

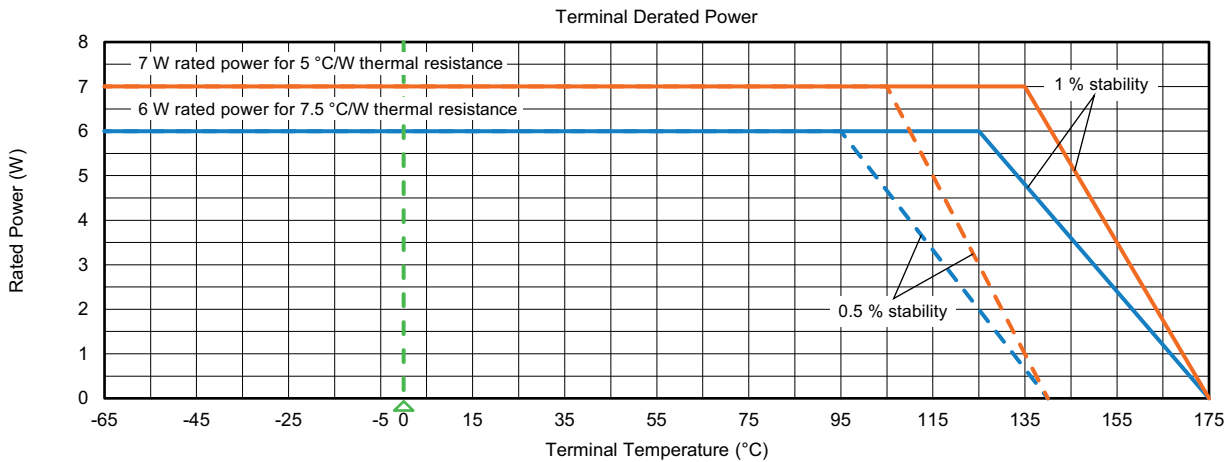


PULSE CAPABILITY

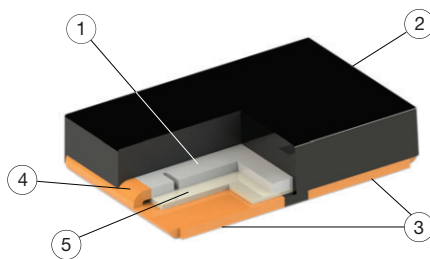


www.vishay.com/en/resistors/joulewizard/

TERMINAL TEMPERATURE DERATING



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 |
| 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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