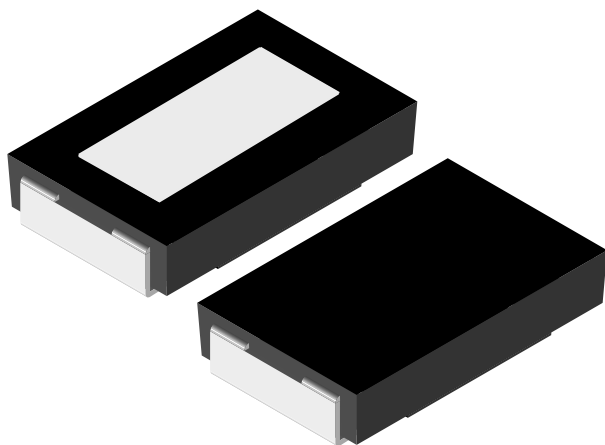


## Power Metal Strip® Resistors, Low Value (down to 0.001 Ω), Surface Mount



### FEATURES

- Molded high temperature encapsulation
- 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 (down to 0.001 Ω)
- Solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- Very low inductance 0.5 nH to 5 nH
- Low thermal EMF (< 3 μV/°C)
- Integral heat sink not utilized for resistance values less than 0.0075 Ω
- AEC-Q200 qualified <sup>(1)</sup>
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### DESIGN TOOLS (click logo to get started)



### Notes

- \* This datasheet provides information about parts that are RoHS-compliant and/or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information/tables in this datasheet for details.
- 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 % |                                      |
| WSR5         | 4527 | 5.0 <sup>(1)</sup>                            | 0.01 to 0.3                 | 0.001 to 0.3 | 476                                  |

### Notes

- Part marking: DALE, model, value, tolerance, date code.
- <sup>(1)</sup> The WSR5 is rated at 5 W with terminal temperature maintained ≤ 120 °C.

### GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: WSR5R0100FEA (preferred part numbering format)

(visit [www.vishay.net](http://www.vishay.net) Vishay Dale parts numbering manual for all options)

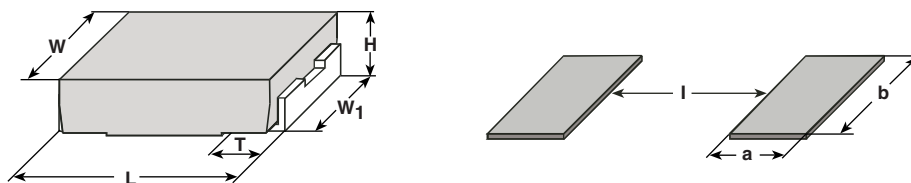
|              |   |                                                                                                         |   |                                           |   |                                                                                                                                    |   |                                                                 |   |   |   |  |  |
|--------------|---|---------------------------------------------------------------------------------------------------------|---|-------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------|---|-----------------------------------------------------------------|---|---|---|--|--|
| W            | S | R                                                                                                       | 5 | R                                         | 0 | 1                                                                                                                                  | 0 | 0                                                               | F | E | A |  |  |
| GLOBAL MODEL |   | VALUE                                                                                                   |   | TOLERANCE CODE                            |   | PACKAGING <sup>(1)</sup>                                                                                                           |   | SPECIAL                                                         |   |   |   |  |  |
| WSR5         |   | L = mΩ*<br>R = decimal<br>5L000 = 0.005 Ω<br>R0100 = 0.01 Ω<br>* use "L" for resistance values < 0.01 Ω |   | D = ± 0.5 %<br>F = ± 1.0 %<br>J = ± 5.0 % |   | EA = lead (Pb)-free, tape / reel<br>EK = lead (Pb)-free, bulk<br>TA = tin / lead, tape / reel (R86)<br>BA = tin / lead, bulk (B43) |   | (dash number)<br>(up to 2 digits)<br>from 1 to 99 as applicable |   |   |   |  |  |

### Note

- <sup>(1)</sup> 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.

| TECHNICAL SPECIFICATIONS        |                 |                                                                                                                                                                                           |
|---------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PARAMETER                       | UNIT            | WSR5 RESISTOR CHARACTERISTICS                                                                                                                                                             |
| Temperature coefficient         | ppm/°C          | ± 75 for 0.01 Ω to 0.3 Ω; ± 110 for 0.005 Ω to 0.0099 Ω;<br>± 300 for 0.004 Ω to 0.0049 Ω; ± 450 for 0.003 Ω to 0.0039 Ω;<br>± 600 for 0.002 Ω to 0.0029 Ω; ± 750 for 0.001 Ω to 0.0019 Ω |
| Element TCR                     | ppm/°C          | < 20                                                                                                                                                                                      |
| Dielectric withstanding voltage | V <sub>AC</sub> | > 500                                                                                                                                                                                     |
| Insulation resistance           | Ω               | > 10 <sup>9</sup>                                                                                                                                                                         |
| Operating temperature range     | °C              | -65 to +275                                                                                                                                                                               |
| Maximum working voltage         | V               | (P × R) <sup>1/2</sup>                                                                                                                                                                    |

### DIMENSIONS in inches (millimeters)



#### Notes

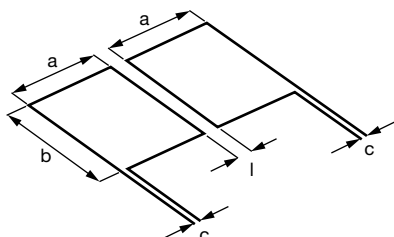
- 3D models available: [www.vishay.com/doc?30342](http://www.vishay.com/doc?30342).
- Surface mount solder profile recommendations: [www.vishay.com/doc?31052](http://www.vishay.com/doc?31052).

| MODEL | DIMENSIONS                       |                                 |                                 |                                 |                                 | SOLDER PAD DIMENSIONS |                 |                 |
|-------|----------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|-----------------------|-----------------|-----------------|
|       | L                                | H                               | T                               | W                               | W <sub>1</sub>                  | a                     | b               | l               |
| WSR5  | 0.455 ± 0.032<br>(11.56 ± 0.813) | 0.095 ± 0.005<br>(2.41 ± 0.127) | 0.100 ± 0.010<br>(2.54 ± 0.254) | 0.275 ± 0.005<br>(6.98 ± 0.127) | 0.215 ± 0.005<br>(5.46 ± 0.127) | 0.155<br>(3.94)       | 0.230<br>(5.84) | 0.205<br>(5.21) |

#### Note

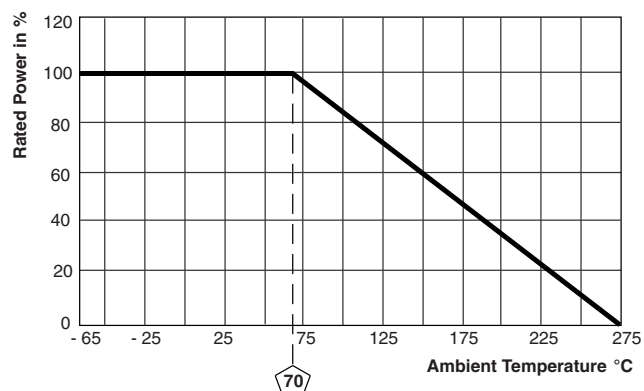
- Sensing locations are based on the construction of the part; terminals are wrapped from the outside to underneath. These options place the sensing location nearest the temperature stable resistance element, which minimizes contact resistance and optimizes TCR.

### TYPICAL SENSING LAYOUT



| a               | b               | c               | l               |
|-----------------|-----------------|-----------------|-----------------|
| 0.155<br>(3.94) | 0.230<br>(5.84) | 0.020<br>(0.51) | 0.205<br>(5.21) |

### DERATING





| PERFORMANCES              |                                                                |             |
|---------------------------|----------------------------------------------------------------|-------------|
| TEST                      | CONDITIONS OF TEST                                             | TEST LIMITS |
| Thermal shock             | -55 °C to +150 °C, 1000 cycles, 15 min at each extreme         | ± 0.5 %     |
| Short time overload       | 3x rated power for 5 s                                         | ± 2.0 %     |
| Low temperature storage   | -65 °C for 24 h                                                | ± 0.5 %     |
| High temperature exposure | 1000 h at + 275 °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                 | 1000 h at 70 °C                                                | ± 2.0 %     |
| Resistance to solder heat | 260 ± 3 °C 10 s to 12 s dwell, 25 mm/s emergence               | ± 0.5 %     |
| Moisture resistance       | MIL-STD-202, method 106, 0 % power, 7a and 7b not required     | ± 0.5 %     |

| PACKAGING (1) |                        |            |             |      |
|---------------|------------------------|------------|-------------|------|
| MODEL         | REEL                   |            |             |      |
|               | TAPE WIDTH             | DIAMETER   | PIECES/REEL | CODE |
| WSR5          | 24 mm/embossed plastic | 330 mm/13" | 1500        | EA   |

**Notes**

- Embossed Carrier Tape per EIA-481.

(1) Additional packaging details at [www.vishay.com/doc?20051](http://www.vishay.com/doc?20051).



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