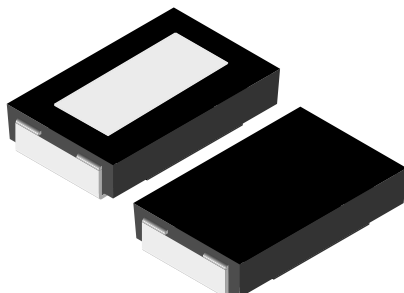


## Power Metal Strip® Resistors, Low Value (Down to 0.001 Ω), Surface Mount



### LINKS TO ADDITIONAL RESOURCES



3D Models



Design Tools



Calculators

### 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)
- Sulfur resistance by construction that is unaffected by high sulfur environments
- 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)

AUTOMOTIVE  
GRADE

Pb-free  
Available

RoHS\*  
Available

HALOGEN  
**FREE**  
Available

**GREEN**  
(5-2008)  
Available

### 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
- <sup>(1)</sup> Flame retardance test may not be applicable to some resistor technologies

### STANDARD ELECTRICAL SPECIFICATIONS

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

- Qualified to AEC-Q200 rev. D
- 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)

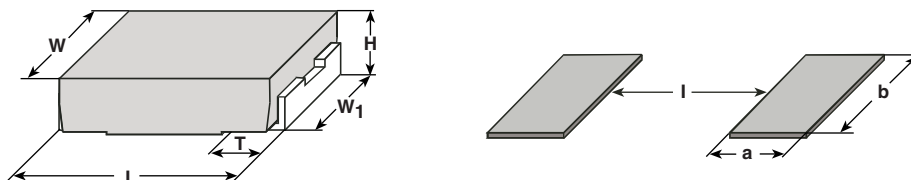
W	S	R	5	R	0	1	0	0	F	E	A		
GLOBAL MODEL		RESISTANCE VALUE <sup>(1)</sup>			TOLERANCE CODE			PACKAGING CODE <sup>(2)</sup>			SPECIAL <sup>(3)</sup>		
WSR5		L = mΩ* R = decimal 5L000 = 0.005 Ω R0100 = 0.01 Ω * use "L" for resistance values < 0.01 Ω			D = ± 0.5 % F = ± 1.0 % J = ± 5.0 %			EA = lead (Pb)-free, tape / reel EK = lead (Pb)-free, bulk TA = tin / lead, tape / reel (R86) BA = tin / lead, bulk (B43)			(dash number) (up to 2 digits) from 1 to 99 as applicable		

### Notes

- <sup>(1)</sup> WSR marking ([www.vishay.com/doc?30327](http://www.vishay.com/doc?30327))
- <sup>(2)</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
- <sup>(3)</sup> Follow link for customization capabilities: [www.vishay.com/doc?48163](http://www.vishay.com/doc?48163)

TECHNICAL SPECIFICATIONS		
PARAMETER	UNIT	WSR5 RESISTOR CHARACTERISTICS
Temperature coefficient measured from -55 °C to +150 °C	ppm/°C	± 75 for 0.01 Ω to 0.3 Ω
		± 110 for 0.005 Ω to 0.0099 Ω
		± 300 for 0.004 Ω to 0.0049 Ω
		± 450 for 0.003 Ω to 0.0039 Ω
		± 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

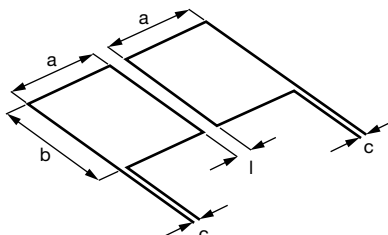
- 3D models available: [www.vishay.com/doc?30342](http://www.vishay.com/doc?30342)
- Surface mount solder profile recommendations: [www.vishay.com/doc?31052](http://www.vishay.com/doc?31052)

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

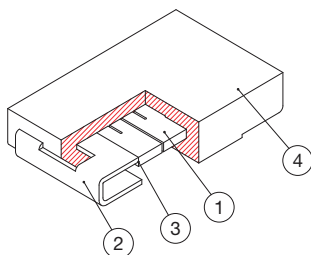


a	b	c	l
0.155 (3.94)	0.230 (5.84)	0.020 (0.51)	0.205 (5.21)

## CONSTRUCTION

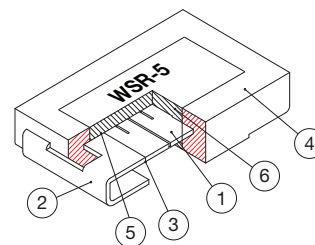
### All Resistance Values

- ① Resistive element
- ② Plated copper terminal
- ③ Terminal / element weld
- ④ High temperature LCP mold compound

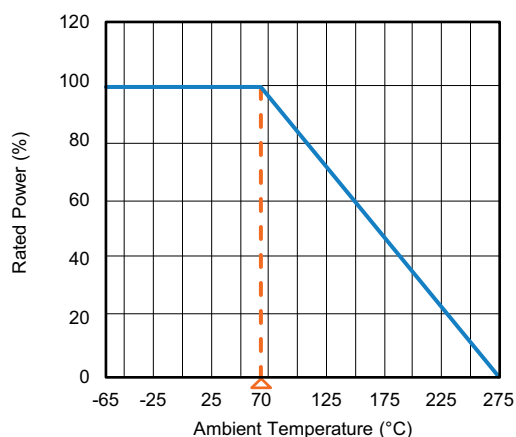


### ≥ 0.0075 W Includes Heat Spreader

- ⑤ Thermally conductive adhesive
- ⑥ Heat spreader



## DERATING



## PULSE CAPABILITY



[www.vishay.com/en/resistors/joulewizard/](http://www.vishay.com/en/resistors/joulewizard/)

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	3 x 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 %



<b>PACKAGING (1)</b>				
<b>MODEL</b>	<b>REEL</b>			
	<b>TAPE WIDTH</b>	<b>DIAMETER</b>	<b>PIECES/REEL</b>	<b>CODE</b>
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)

<b>LINKS TO RELATED DOCUMENTS</b>	
<b>SELECTOR GUIDE</b>	
Overview of Automotive Grade Products	<a href="http://www.vishay.com/doc?49924">www.vishay.com/doc?49924</a>
<b>TECHNICAL NOTES</b>	
SMD Current Sense: AEC-Q200 vs. Vishay Qualification	<a href="http://www.vishay.com/doc?30416">www.vishay.com/doc?30416</a>
MIL-PRF vs. AEC-Q200: Do You Know What You Are Getting?	<a href="http://www.vishay.com/doc?11000">www.vishay.com/doc?11000</a>
<b>WHITE PAPER</b>	
Thermal Management for Surface-Mount Devices	<a href="http://www.vishay.com/doc?30380">www.vishay.com/doc?30380</a>
Temperature Coefficient of Resistance for Current Sensing	<a href="http://www.vishay.com/doc?30405">www.vishay.com/doc?30405</a>



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