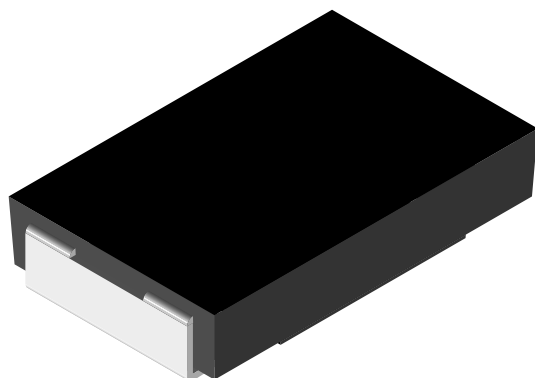


Power Metal Strip® Resistors, Low Value (down to 0.001 Ω), Surface Mount



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

FEATURES

- Molded high temperature encapsulation
- 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
- Excellent frequency response to 50 MHz
- Low thermal EMF (< 3 μV/°C)
- AEC-Q200 qualified (1)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



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 %	
WSR2	4527	2.0	0.005 to 1.0	0.001 to 1.0	440
WSR3	4527	3.0 (1)	0.005 to 0.2	0.001 to 0.2	440

Notes

- Part marking: DALE, model, value, tolerance, date code
- (1) The WSR3 requires a minimum of 1050 sq. mil. circuit traces connecting to the recommended solder pad

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	WSR2 AND WSR3 RESISTOR CHARACTERISTICS
Temperature coefficient	ppm/°C	± 75 for 0.010 Ω to 1.0 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 _{AC}	> 500
Insulation resistance	Ω	> 10 ⁹
Operating temperature range	°C	-65 to +275
Maximum working voltage	V	(P × R) ^{1/2}

GLOBAL PART NUMBER INFORMATION

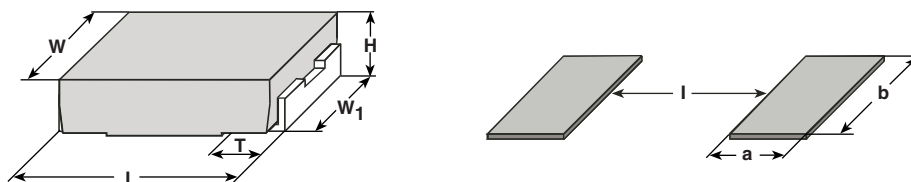
Global Part Numbering example: WSR25L000FEA (visit www.vishay.net Vishay Dale parts numbering manual for all options)

W S R 2 5 L 0 0 0 F E A

GLOBAL MODEL	RESISTANCE VALUE	TOLERANCE CODE	PACKAGING CODE (1)	SPECIAL
WSR2 WSR3	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

Note

- (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

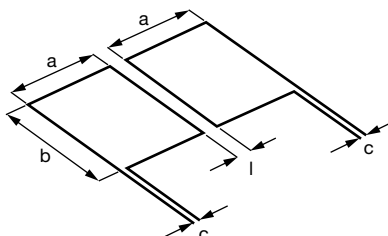
DIMENSIONS in inches (millimeters)

Notes

- 3D models available: www.vishay.com/doc?30336
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

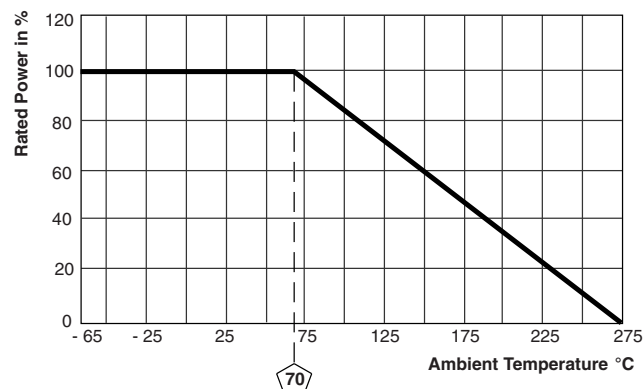
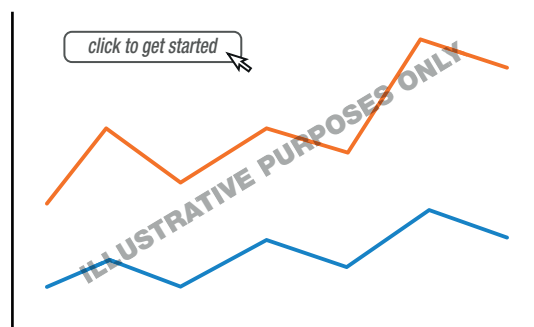
MODEL	DIMENSIONS					SOLDER PAD DIMENSIONS		
	L	H	T	W	W ₁	a	b	l
WSR2, WSR3	0.455 ± 0.032 (11.56 ± 0.813)	0.095 ± 0.005 (2.41 ± 0.127)	0.100 ± 0.010 (2.54 ± 0.254)	0.275 ± 0.005 (6.98 ± 0.127)	0.215 ± 0.005 (5.46 ± 0.127)	0.155 (3.94)	0.230 (5.84)	0.205 (5.21)

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)

DERATING

PULSE CAPABILITY

www.vishay.com/resistors/power-metal-strip-calculator



PERFORMANCE			
TEST	CONDITIONS OF TEST	TEST LIMITS	
		WSR2	WSR3
Thermal shock	-55 °C to +150 °C, 1000 cycles, 15 min at each extreme	$\pm 0.5 \% + 0.0005 \Omega$	$\pm 0.5 \% + 0.0005 \Omega$
Short time overload	WSR2: 5x rated power for 5 s WSR3: 4x rated power for 5 s	$\pm 0.5 \% + 0.0005 \Omega$	$\pm 2.0 \% + 0.0005 \Omega$
Low temperature storage	-65 °C for 24 h	$\pm 0.5 \% + 0.0005 \Omega$	$\pm 0.5 \% + 0.0005 \Omega$
High temperature exposure	1000 h at +275 °C	$\pm 1.0 \% + 0.0005 \Omega$	$\pm 1.0 \% + 0.0005 \Omega$
Bias humidity	+85 °C, 85 % RH, 10 % bias, 1000 h	$\pm 0.5 \% + 0.0005 \Omega$	$\pm 0.5 \% + 0.0005 \Omega$
Mechanical shock	100 g's for 6 ms, 5 pulses	$\pm 0.5 \% + 0.0005 \Omega$	$\pm 0.5 \% + 0.0005 \Omega$
Vibration	Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h	$\pm 0.5 \% + 0.0005 \Omega$	$\pm 0.5 \% + 0.0005 \Omega$
Load life	1000 h at rated power, +70 °C, 1.5 h "ON", 0.5 h "OFF"	$\pm 1.0 \% + 0.0005 \Omega$	$\pm 2.0 \% + 0.0005 \Omega$
Resistance to solder heat	+260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence	$\pm 0.5 \% + 0.0005 \Omega$	$\pm 0.5 \% + 0.0005 \Omega$
Moisture resistance	MIL-STD-202, method 106, 0 % power, 7a and 7b not required	$\pm 0.5 \% + 0.0005 \Omega$	$\pm 0.5 \% + 0.0005 \Omega$

PACKAGING ⁽¹⁾				
MODEL	REEL			
	TAPE WIDTH	DIAMETER	PIECES/REEL	CODE
WSR2 and WSR3	24 mm/embossed plastic	330 mm/13"	1500	EA

Notes

- Embossed Carrier Tape per EIA-481
- ⁽²⁾ Additional packaging details at www.vishay.com/doc?20051



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