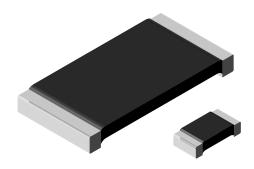


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WSL

Vishay Dale

Power Metal Strip[®] Resistors, Low Value (Down to 0.0005 Ω), Surface-Mount



LINKS TO ADDITIONAL RESOURCES











FEATURES

- 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 $0.0005 \ \Omega$)
- Sulfur resistance by construction that is unaffected by high sulfur environments
- Very low inductance 0.5 nH to 5 nH
- Low thermal EMF (< 3 μV/°C)
- AEC-Q200 qualified ⁽¹⁾
- Material categorization: for definitions of compliance please see www.vishav.com/doc?99912

AUTOMOTIVE









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

STANDARD ELECTRICAL SPECIFICATIONS						
GLOBAL CIZE		POWER RATING P _{70 °C}	RESISTANCE VA	WEIGHT (typical)		
MODEL	SIZE	W	TOL. ± 0.5 %	TOL. ± 1.0 %	g/1000 pieces	
WSL0603	0603	0.1	0.01 to 0.1	0.01 to 0.1	1.9	
WSL0805	0805	0.125	0.005 to 0.2	0.005 to 0.2	4.8	
WSL1206	1206	0.25	0.005 to 0.2	0.0005 to 0.2	16.2	
WSL2010	2010	0.5	0.004 to 0.5	0.001 to 0.5	38.9	
WSL2512	2512	1.0 ⁽¹⁾	0.003 to 0.5	0.0005 to 0.5	63.6	
WSL2816	2816	2.0	0.003 to 0.1	0.002 to 0.1	118	

Notes

- · Part marking: value; tolerance: due to resistor size limitations some resistors will be marked with only the resistance value
- Qualified to AEC-Q200 rev. D
- $^{(1)}$ For values above 0.1 Ω derate linearly to 80 % rated power at 0.5 Ω
- $^{(2)}$ WSL1206 0.0005 Ω to 0.00099 Ω is only available with 2 % tolerance (G tolerance code)

GLOBAL PART NUMBER INFORMATION Global Part Numbering Example: WSL25124L000FEA (visit www.vishav.net Vishay Dale parts numbering manual for all options) **GLOBAL** RESISTANCE **TOLERANCE** PACKAGING CODE (2) SPECIAL (3) MODEL VALUE (1) CODE (2 digits) (up to 2 digits) (7 digits) (1 digit) (5 digits) WSL0603 $L = m\Omega^*$ $D = \pm 0.5 \%$ EA = lead (Pb)-free, tape / reel (dash number) WSL0805 EH = lead (Pb)-free, tape / reel (WSL2816) R = decimal $F = \pm 1.0 \%$ from 1 to 99 as WSL1206 5L000 = 0.005 Ω $J = \pm 5.0 \%$ applicable TA = tin / lead, tape / reel (R86) WSL2010 **R0100** = 0.01 Ω TG = tin / lead, tape / reel (RT1, for WSL0603 and WSL0805)WSL2512 TH = tin / lead, tape / reel (RJ9, WSL2816) WSL2816 Use "L" for resistance SB = tin / lead, tape / reel for DLA drawings values < 0.01 Ω

Notes

- Per PCN-DR-00009-2022-REV-0, WSL marking will be removed effective March 1st, 2023
- (1) WSL marking (www.vishay.com/doc?30327); WSL decade values (www.vishay.com/doc?30117)
- (2) 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

(3) Follow link for customization capabilities: www.vishay.com/doc?48163



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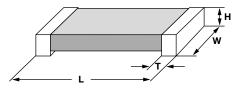
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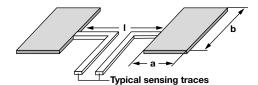
TECHNICAL SPECIFICATIONS							
PARAMETER	UNIT	WSL RESISTOR CHARACTERISTICS					
PARAMETER		WSL0603 (1)	WSL0805	WSL1206	WSL2010	WSL2512	WSL2816
	ppm/°C	\pm 75 for 50 m Ω to 100 m Ω	\pm 75 for 7 m Ω to 500 m Ω				
Component temperature coefficient (including terminal) (2)		\pm 110 for 10 m Ω to 49 m Ω	\pm 110 for 5 m Ω to 6.9 m Ω				
(including terminal) (4) TCR measured from		-	\pm 150 for 3 m Ω to 4.9 m Ω				
-55 °C to +155 °C		-	\pm 275 for 1 m Ω to 2.9 m Ω				
		-	\pm 400 for 0.5 m Ω to 0.99 m Ω				
Element TCR (3)	ppm/°C	< 20					
Operating temperature range	°C	°C -65 to +170					
Maximum working voltage (4)	V	$(P \times R)^{1/2}$					

Notes

- (1) Consult factory for detailed TCR performance across temperature range associated with PCN-DR-00003-2020 for WSL0603. TCR performance is improved for +25 °C to +155 °C
- (2) Component TCR total TCR that includes the TCR effects of the resistor element and the copper terminal
- (3) Element TCR only applies to the alloy used for the resistor element; refer to item 1 in the construction illustration on the following page
- (4) Maximum working voltage the WSL 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?30306
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

MODEL RESISTANCE		DIMENSIONS				SOLDER PAD DIMENSIONS		
MODEL	RANGE (Ω)	L	W	Н	Т	а	b	I
WSL0603 (1)	0.01 to 0.1	0.060 ± 0.010 (1.52 ± 0.254)	0.030 ± 0.010 (0.76 ± 0.254)	0.016 ± 0.005 (0.406 ± 0.127)	0.015 ± 0.010 (0.381 ± 0.254)	0.040 (1.01)	0.040 (1.01)	0.020 (0.50)
WSL0805 (2)	0.005 to 0.2	0.080 ± 0.010 (2.03 ± 0.254)	0.050 ± 0.010 (1.27 ± 0.254)	0.016 ± 0.005 (0.406 ± 0.127)	0.015 ± 0.010 (0.381 ± 0.254)	0.040 (1.02)	0.050 (1.27)	0.020 (0.50)
	0.0005 to 0.00099		0.063 ± 0.010 (1.60 ± 0.254)	0.025 ± 0.010 (0.635 ± 0.254)	0.041 ± 0.010 (1.04 ± 0.254)	0.089 (2.26)	0.076 (1.93)	0.023 (0.58)
WSL1206	0.001 to 0.0019	0.126 ± 0.010				0.086 (2.18)	0.076 (1.93)	0.029 (0.74)
W3L1200	0.002 to 0.0059	(3.20 ± 0.254)			0.025 ± 0.010 (0.635 ± 0.254)	0.070 (1.78)	0.076 (1.93)	0.061 (1.55)
	0.006 to 0.20				0.020 ± 0.010 (0.508 ± 0.254)	0.065 (1.65)	0.076 (1.93)	0.071 (1.80)
WSL2010	0.001 to 0.0069	0.200 ± 0.010	0.100 ± 0.010 (2.54 ± 0.254)	0.025 ± 0.010 (0.635 ± 0.254)	0.058 ± 0.010 (1.47 ± 0.254)	0.093 (2.36)	0.120 (3.05)	0.055 (1.40)
W3L2010	0.007 to 0.5	(5.08 ± 0.254)			0.020 ± 0.010 (0.508 ± 0.254)	0.055 (1.40)	0.120 (3.05)	0.130 (3.30)
	0.0005 to 0.00099		0.125 ± 0.010 (3.18 ± 0.254)	0.025 ± 0.010 (0.635 ± 0.254)	0.107 ± 0.010 (2.72 ± 0.254)	0.120 (3.05) 0.145 0.083 (2.11) 0.145	0.145	0.050 (1.27)
WSL2512	0.001 to 0.0049	0.250 ± 0.010			0.087 ± 0.010 (2.21 ± 0.254)			
WOLZJIZ	0.005 to 0.0069	(6.35 ± 0.254)			0.047 ± 0.010 (1.19 ± 0.254)		0.125 (3.18)	
	0.007 to 0.5				0.030 ± 0.010 (0.762 ± 0.254)	0.065 (1.65)		0.160 (4.06)
WSL2816	0.002 to 0.00399 0.280 ± 0.010		0.165 ± 0.010	0.025 ± 0.010	0.098 ± 0.010 (2.49 ± 0.254)	0.135 (3.43)	0.185	0.060 (1.52)
VVOL2010	0.004 to 0.1	(7.1 ± 0.254)	(4.2 ± 0.254)	(0.635 ± 0.254)	0.062 ± 0.010 (1.57 ± 0.254)	0.096 (2.45) (4.7)	(4.7)	0.125 (3.20)

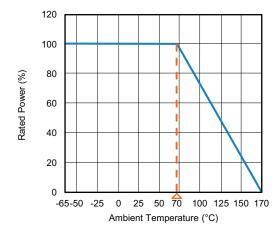
Notes

- (1) PCN-DR-00003-2020 changed terminal height for WSL0603 from 0.013" ± 0.005" for clad construction to 0.016" ± 0.005" for welded construction
- (2) PCN-DR-00021-2021-REV-1 changed terminal height for WSL0805 from 0.013" ± 0.005" for clad construction to 0.016" ± 0.005" for welded construction

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DERATING



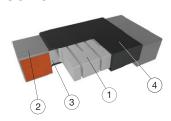
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PULSE CAPABILITY



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

WELDED CONSTRUCTION



- Resistive element: solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- 2 Plated terminal: solid copper, 100 % Sn (100 μ" min.) with 100 % Ni (20 μ" min.) under layer finish
- (3) Terminal / element weld
- (4) Silicone coating with ink print

PERFORMANCE					
TEST	CONDITIONS OF TEST	TEST LIMITS			
Thermal shock	-55 °C to +150 °C, 1000 cycles, 15 min at each extreme	± (0.5 % + 0.0005 Ω)			
Short time overload	Refer to link for short time overload performance and pulse capability; www.vishay.com/en/resistors/power-metal-strip-calculator/	\pm (0.5 % + 0.0005 Ω)			
Low temperature operation	-65 °C for 24 h	± (0.5 % + 0.0005 Ω)			
High temperature exposure	1000 h at + 170 °C	± (1.0 % + 0.0005 Ω)			
Bias humidity	+85 °C, 85 % RH, 10 % bias, 1000 h	± (0.5 % + 0.0005 Ω)			
Mechanical shock	100 g's for 6 ms, 5 pulses	± (0.5 % + 0.0005 Ω)			
Vibration	Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h	± (0.5 % + 0.0005 Ω)			
Load life	1000 h at rated power, + 70 °C, 1.5 h "ON", 0.5 h "OFF"	± (1.0 % + 0.0005 Ω)			
Resistance to solder heat	+260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence	± (0.5 % + 0.0005 Ω)			
Moisture resistance	MIL-STD-202, method 106, 0 % power, 7a and 7b not required	± (0.5 % + 0.0005 Ω)			

Note

 Contact <u>ww2bresistors@vishay.com</u> for application specific performance requirements or qualification data. Typical performance is better than stated test limits

PACKAGING (1)								
MODEL		REEL						
	TAPE WIDTH	DIAMETER	PIECES/REEL	CODE				
WSL0603	8 mm / punched paper	178 mm / 7"	5000	EA				
WSL0805	8 mm / punched paper	178 mm / 7"	5000	EA				
WSL1206	8 mm / embossed plastic	178 mm / 7"	4000	EA				
WSL2010	12 mm / embossed plastic	178 mm / 7"	4000	EA				
WSL2512	12 mm / embossed plastic	178 mm / 7"	2000	EA				
WSL2816	12 mm / embossed plastic	178 mm / 7"	2000	EH				

Notes

- Embossed carrier tape per EIA-481
- (1) Additional packaging details at www.vishay.com/doc?20051

Upgrade for Higher Current to WSLP and for Zero Ohm Jumper to WSL-9



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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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