

WSLP

RoHS

COMPLIANT

HALOGEN

FREE

GREEN

(5-2008)

Vishay Dale

Power Metal Strip[®] Resistors, Very High Power (to 3 W), Low Value (Down to 0.0005 Ω), Surface-Mount



LINKS TO ADDITIONAL RESOURCES



FEATURES

- Very high power to foot print size ratio (3 W in 2512, 2 W in 2010, 1 W in 1206, 0.5 W in 0805, and 0.4 W in 0603 package)
- 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 0.0005Ω)
- 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 <u>www.vishav.com/doc?99912</u>

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 MODEL	SIZE	POWER RATING P _{70 °C} W	RESISTANCE V	WEIGHT (typical)		
			TOL. ± 0.5 %	TOL. ± 1.0 %	g/1000 pieces	
WSLP0603	0603	0.4	0.015 to 0.1	0.01 to 0.1	1.9	
WSLP0805	0805	0.5	0.005 to 0.1	0.005 to 0.1	4.8	
WSLP1206	1206	1.0	0.005 to 0.05	0.0005 to 0.05	16.2	
WSLP2010	2010	2.0	0.004 to 0.03	0.001 to 0.03	38.9	
WSLP2512	2512	3.0	0.003 to 0.01	0.0005 to 0.01	63.6	

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⁾ WSLP1206 0.0005 Ω to 0.00099 Ω is only available with 2 % tolerance (G tolerance code)

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	GLOBAL PART NUMBER INFORMATION							
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Global Part Numbering Example: WSLP1206R0100FEA (visit <u>www.vishay.net</u> Vishay Dale parts numbering manual for all options)							
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	WS	L P 1 2 0 6	R 0 1	0 0 F E A				
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$					<u> </u>			
WSLP0805 R = decimal $\mathbf{F} = \pm 1.0 \%$ $\mathbf{G} = \pm 2.0 \%$ future spec WSLP2010 R0100 = 0.01 Ω $\mathbf{G} = \pm 2.0 \%$ $\mathbf{G} = \pm 2.0 \%$ $\mathbf{G} = \pm 2.0 \%$					SPECIAL ⁽³⁾ (up to 2 digits)			
$ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $	WSLP0805 WSLP1206	R = decimal 4L000 = 0.004 Ω R0100 = 0.01 Ω	$F = \pm 1.0 \%$ $G = \pm 2.0 \%$	EA = lead (Pb)-free, tape / reel	Reserved for future specials			

Notes

- Per PCN-DR-00009-2022-REV-0, WSL marking will be removed effective March 1st, 2023
- ⁽¹⁾ WSL marking (<u>www.vishay.com/doc?30327</u>); WSL decade values (<u>www.vishay.com/doc?30117</u>)
- (2) Packaging code: EB (lead (Pb)-free) and TB (tin / lead) are non-standard packaging codes that designate 1000 piece reel quantities. 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: <u>www.vishay.com/doc?48163</u>



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WSLP

TECHNICAL SPECIFICATIONS						
PARAMETER	UNIT	RESISTOR CHARACTERISTICS				
FARAIVIETER	UNIT	WSLP0603 ⁽¹⁾	WSLP0805	WSLP1206	WSLP2010	WSLP2512
	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		\pm 110 for 10 m Ω to 49 m Ω	\pm 110 for 5 m Ω to 6.9 m Ω			
(including terminal) ⁽²⁾		-	\pm 150 for 3 m Ω to 4.9 m Ω			
TCR measured from -55 °C to +155 °C		-		\pm 275 for 1 m Ω to 2.9 m Ω		
		- ± 400 for 0.5 m Ω to 0.99 m Ω			Ω	
Element TCR ⁽³⁾	ppm/°C	< 20				
Operating temperature range	°C	-65 to +170				
Maximum working voltage (4)	V	$(P \times R)^{1/2}$				

Notes

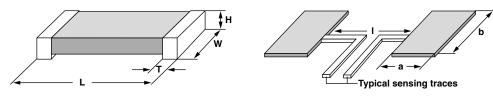
(1) Consult factory for detailed TCR performance across temperature range associated with PCN-DR-00003-2020 for WSLP0603. TCR performance is improved for +25 °C to +155 °C

(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



Notes

• 3D models available. WSLP models: www.vishay.com/doc?30313

Surface-mount solder profile recommendations: <u>www.vishay.com/doc?31052</u>

MODEL	RESISTANCE RANGE	DIMENSIONS in inches (millimeters)				SOLDER PAD DIMENSIONS in inches (millimeters)		
	(Ω)	L	w	н	т	а	b	I
WSLP0603 (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 (1.02)	0.040 (1.02)	0.020 (0.50)
WSLP0805 (2)	0.005 to 0.1	0.080 ± 0.010 (2.03 ± 0.254)	0.050 ± 0.010 (1.27 ± 0.254)	0.016 ± 0.005 (0.406 ± 0.127)	$\begin{array}{c} 0.015 \pm 0.010 \\ (0.381 \pm 0.254) \end{array}$	0.040 (1.02)	0.050 (1.27)	0.020 (0.50)
WSLP1206 WSLP2010	0.0005 to 0.00099	0.126 ± 0.010 (3.20 ± 0.254)	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)
	0.001 to 0.0019					0.086 (2.18)	0.076 (1.93)	0.029 (0.74)
	0.002 to 0.0059				$\begin{array}{c} 0.025 \pm 0.010 \\ (0.635 \pm 0.254) \end{array}$	0.070 (1.78)	0.076 (1.93)	0.061 (1.55)
	0.006 to 0.050				$\begin{array}{c} 0.020 \pm 0.010 \\ (0.508 \pm 0.254) \end{array}$	0.065 (1.65)	0.076 (1.93)	0.071 (1.80)
	0.001 to 0.0069	0.200 ± 0.010 (5.08 ± 0.254)	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)
	0.007 to 0.03				0.020 ± 0.010 (0.508 ± 0.254)	0.055 (1.40)		0.130 (3.30)
WSLP2512	0.0005 to 0.00099	0.250 ± 0.010 (6.35 ± 0.254)	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		0.050
	0.001 to 0.0049				0.087 ± 0.010 (2.21 ± 0.254)		0.145	(1.27)
	0.005 to 0.0069				0.047 ± 0.010 (1.19 ± 0.254)	0.083 (2.11)	(3.68)	0.125 (3.18)
	0.007 to 0.01				0.030 ± 0.010 (0.762 ± 0.254)	0.065 (1.65)		0.160 (4.06)

Notes

(1) PCN-DR-00003-2020 changed terminal height for WSLP0603 from 0.013" ± 0.005" for clad construction to 0.016" ± 0.005" for welded construction

(2) PCN-DR-000023-2021-REV-1 changed terminal height for WSLP0805 from 0.013" ± 0.005" for clad construction to 0.016" ± 0.005" for welded construction

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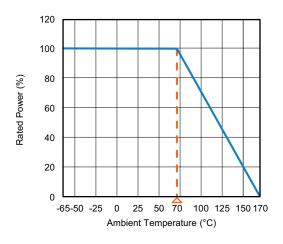
Upgrade for Wider Resistance Range to WFM



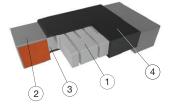
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DERATING



WELDED CONSTRUCTION



PULSE CAPABILITY



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

- 1 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 $\mu^{\rm m}$ min.) with 100 % Ni (20 $\mu^{\rm m}$ 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	\pm (0.5 % + 0.0005 Ω)			
Short time overload	Refer to link for short time overload performance and pulse capability; www.vishay.com/en/resistors/joulewizard/	± (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	\pm (0.5 % + 0.0005 Ω)			
Mechanical shock	100 <i>g</i> 's for 6 ms, 5 pulses	\pm (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 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, 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

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PACKAGING ⁽¹⁾							
MODEL		REEL					
	TAPE WIDTH	DIAMETER	PIECES / REEL	CODE			
WSLP0603	8 mm / punched paper	178 mm / 7"	5000	EA			
WSLP0805	8 mm / punched paper	178 mm / 7"	5000	EA			
WSLP1206	8 mm / embossed plastic	178 mm / 7"	4000	EA			
WSLP2010	12 mm / embossed plastic	178 mm / 7"	4000	EA			
WSLP2512	12 mm / embossed plastic	178 mm / 7"	2000	EA			

Notes

• Embossed carrier tape per EIA-481

⁽¹⁾ Additional packaging details at <u>www.vishay.com/doc?20051</u>

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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