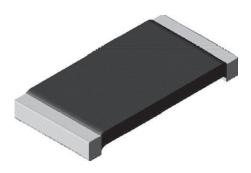




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# Power Metal Strip® Resistors, Very High Power (to 3 W), Low Value (Down to 0.0005 $\Omega$ ), Surface-Mount



#### 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 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)</li>
- AEC-Q200 qualified (1)
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912">www.vishay.com/doc?99912</a>

# 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	SIZE	POWER RATING P <sub>70 °C</sub> W	RESISTANCE V	WEIGHT (typical)		
MODEL			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  $\Omega$  to 0.00099  $\Omega$  is only available with 2 % tolerance (G tolerance code)

#### GLOBAL PART NUMBER INFORMATION Global Part Numbering Example: WSLP1206R0100FEA (visit www.vishav.net Vishay Dale parts numbering manual for all options) S 2 0 1 RESISTANCE VALUE (1) PACKAGING CODE (2) **GLOBAL MODEL TOLERANCE CODE** SPECIAL (3) (5 digits) (1 digit) (up to 2 digits) (8 digits) (2 digits) **WSLP0603 EA** = lead (Pb)-free, tape / reel $\mathbf{L} = \mathbf{m}\Omega^*$ $D = \pm 0.5 \%$ Reserved for **WSLP0805** $F = \pm 1.0 \%$ R = decimal future specials WSLP1206 **4L000** = $0.004 \Omega$ $G = \pm 2.0 \%$ WSLP2010 **R0100** = 0.01 $\Omega$ WSLP2512 Use "L" for resistance values < 0.01 $\Omega$

- Per PCN-DR-00009-2022-REV-0, WSL marking will be removed effective March 1st, 2023
- WSL marking (www.vishay.com/doc?30327); WSL decade values (www.vishay.com/doc?30117)
- 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: <a href="https://www.vishay.com/doc?48163">www.vishay.com/doc?48163</a>





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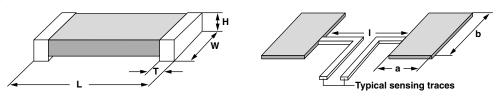
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TECHNICAL SPECIFICATIONS						
PARAMETER	UNIT	RESISTOR CHARACTERISTICS				
PARAMETER	UNIT	WSLP0603 (1)	WSLP0805	WSLP1206	WSLP2010	WSLP2512
	ppm/°C	$\pm$ 75 for 50 m $\Omega$ to 100 m $\Omega$	$\pm$ 75 for 7 m $\Omega$ to 500 m $\Omega$			
Component temperature coefficient		$\pm$ 110 for 10 m $\Omega$ to 49 m $\Omega$	$\pm$ 110 for 5 m $\Omega$ to 6.9 m $\Omega$			
(including terminal) (2)		-	$\pm$ 150 for 3 m $\Omega$ to 4.9 m $\Omega$			
TCR measured from -55 °C to +155 °C		-	$\pm$ 275 for 1 m $\Omega$ to 2.9 m $\Omega$			
		-	±	400 for 0.5 r	$n\Omega$ to 0.99 $m$	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: <a href="www.vishay.com/doc?31052">www.vishay.com/doc?31052</a>

MODEL	RESISTANCE RANGE	DIMENSIONS in inches (millimeters)				SOLDER PAD DIMENSIONS in inches (millimeters)		
	<b>(</b> Ω <b>)</b>	L	W	Н	Т	а	b	ı
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)	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				0.041 ± 0.010	0.089 (2.26)	0.076 (1.93)	0.023 (0.58)
WSLP1206	0.001 to 0.0019	0.126 ± 0.010 (3.20 ± 0.254)	0.063 ± 0.010 (1.60 ± 0.254)	0.025 ± 0.010 (0.635 ± 0.254)	(1.04 ± 0.254)	0.086 (2.18)	0.076 (1.93)	0.029 (0.74)
	0.002 to 0.0059				0.025 ± 0.010 (0.635 ± 0.254)	0.070 (1.78)	0.076 (1.93)	0.061 (1.55)
	0.006 to 0.050	to 0.050			0.020 ± 0.010 (0.508 ± 0.254)	0.065 (1.65)	0.076 (1.93)	0.071 (1.80)
WSLP2010	0.001 to 0.0069	0.200 ± 0.010		0.025 ± 0.010	0.058 ± 0.010 (1.47 ± 0.254)	0.093 (2.36)	0.120	0.055 (1.40)
W5LP2010	0.007 to 0.03	$(5.08 \pm 0.254)$	$(2.54 \pm 0.254)$	$(0.635 \pm 0.254)$	$0.020 \pm 0.010$ (0.508 ± 0.254)	0.055 (1.40)	(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 (3.68)	0.050
WSLP2512	0.001 to 0.0049	0.250 ± 0.010 (6.35 ± 0.254)			0.087 ± 0.010 (2.21 ± 0.254)			(1.27)
	0.005 to 0.0069				$0.047 \pm 0.010$ (1.19 ± 0.254)	0.083 (2.11)		0.125 (3.18)
	0.007 to 0.01				$0.030 \pm 0.010$ (0.762 ± 0.254)	0.065 (1.65)		0.160 (4.06)

#### **Notes**

<sup>(1)</sup> 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

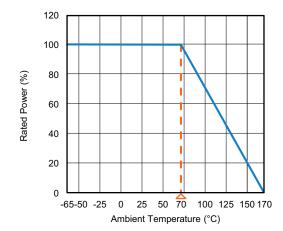
<sup>(2)</sup> PCN-DR-000023-2021-REV-1 changed terminal height for WSLP0805 from 0.013" ± 0.005" for clad construction to 0.016" ± 0.005" for welded construction



**WSLP** 

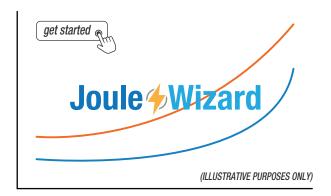
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### **DERATING**



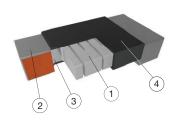
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### **PULSE CAPABILITY**



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  $\mu$ " min.) with 100 % Ni (20  $\mu$ " 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/joulewizard/		± (0.5 % + 0.0005 Ω)			
Low temperature operation -65 °C for 24 h		± (0.5 % + 0.0005 Ω)			
High temperature exposure	emperature exposure 1000 h at +170 °C				
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 70 °C, 1.5 h "ON", 0.5 h "OFF"	± (1.0 % + 0.0005 Ω)			
Resistance to solder heat	esistance to solder heat +260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence				
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



## **WSLF**

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PACKAGING (1)							
MODEL	REEL						
MODEL	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

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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 <a href="https://www.vishay.com/doc?30416">www.vishay.com/doc?30416</a>				
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 <a href="https://www.vishay.com/doc?30380">www.vishay.com/doc?30380</a>				
Temperature Coefficient of Resistance for Current Sensing <a href="https://www.vishay.com/doc?30405">www.vishay.com/doc?30405</a>				

<sup>(1)</sup> Additional packaging details at <a href="https://www.vishay.com/doc?20051">www.vishay.com/doc?20051</a>



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