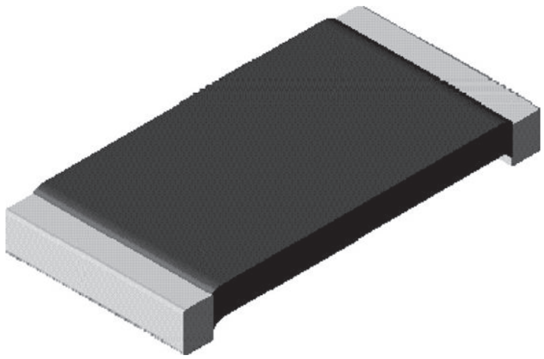
Power Metal Strip® Resistors, Very High Power (to 3 W), Low Value (Down to 0.0005 Ω), Surface-Mount



LINKS TO ADDITIONAL RESOURCES

3D Models Design Tools Videos

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

AUTOMOTIVE GRADE

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

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

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	SIZE	POWER RATING $P_{70\ °C}$ W	RESISTANCE VALUE RANGE [1] Ω		WEIGHT (typical) g/1000 pieces
			TOL. ± 0.5 %	TOL. ± 1.0 %	
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

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

GLOBAL PART NUMBER INFORMATION

Global Part Numbering Example: WSLP1206R0100FEA (visit www.vishay.net Vishay Dale parts numbering manual for all options)

W	S	L	P	1	2	0	6	R	0	1	0	0	F	E	A		

GLOBAL MODEL (8 digits)	RESISTANCE VALUE [1] (5 digits)	TOLERANCE CODE (1 digit)	PACKAGING CODE [2] (2 digits)	SPECIAL [3] (up to 2 digits)
WSLP0603 **WSLP0805** **WSLP1206** **WSLP2010** **WSLP2512**	**L** = mΩ* **R** = decimal **4L000** = 0.004 Ω **R0100** = 0.01 Ω * Use "**L**" for resistance values < 0.01 Ω	**D** = ± 0.5 % **F** = ± 1.0 % **G** = ± 2.0 %	**EA** = lead (Pb)-free, tape / reel	Reserved for future specials

Notes

[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 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: www.vishay.com/doc?48163

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	RESISTOR CHARACTERISTICS				
		WSLP0603 (1)	WSLP0805	WSLP1206	WSLP2010	WSLP2512
Component temperature coefficient (including terminal) (2) TCR measured from -55 °C to +155 °C	ppm/°C	± 75 for 50 mΩ to 100 mΩ	± 75 for 7 mΩ to 500 mΩ			
		± 110 for 10 mΩ to 49 mΩ	± 110 for 5 mΩ to 6.9 mΩ			
		-	± 150 for 3 mΩ to 4.9 mΩ			
		-	± 275 for 1 mΩ to 2.9 mΩ			
		-	± 400 for 0.5 mΩ to 0.99 mΩ			
Element TCR (3)	ppm/°C	< 20				
Operating temperature range	°C	-65 to +170				
Maximum working voltage (4)	V	$(P \times R)^{1/2}$				

Notes

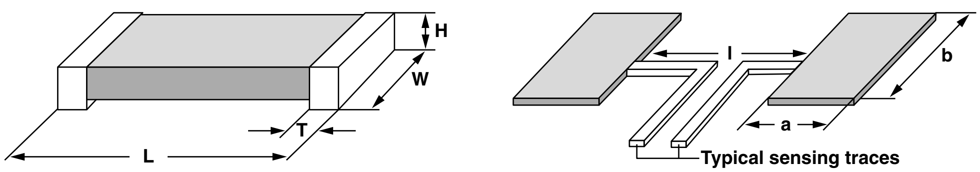
(1) Consult factory for detailed TCR performance across temperature range associated with PCN-DR-00003-2020 for WSLP0603. TCR performance is improved for +25 °C to +155 °C

(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

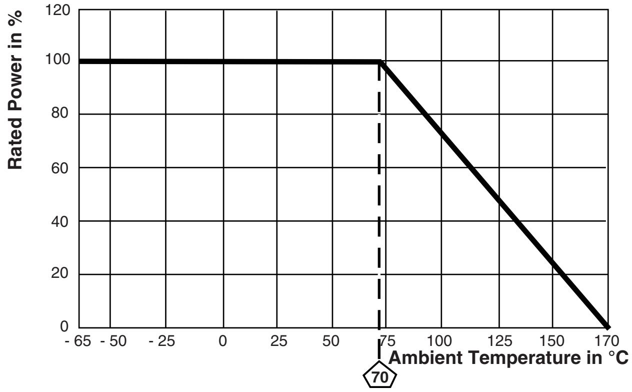
- 3D models available. WSLP models: www.vishay.com/doc?30313
- Surface-mount solder profile recommendations: www.vishay.com/doc?31052

MODEL	RESISTANCE RANGE (Ω)	DIMENSIONS in inches (millimeters)				SOLDER PAD DIMENSIONS in inches (millimeters)		
		L	W	H	T	a	b	l
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	0.005 to 0.1	0.080 ± 0.010 (2.03 ± 0.254)	0.050 ± 0.010 (1.27 ± 0.254)	0.013 ± 0.010 (0.330 ± 0.254)	0.015 ± 0.010 (0.381 ± 0.254)	0.040 (1.02)	0.050 (1.27)	0.020 (0.50)
WSLP1206	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				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				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 (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 (3.68)	0.050 (1.27)
	0.001 to 0.0049				0.087 ± 0.010 (2.21 ± 0.254)			
	0.005 to 0.0069				0.047 ± 0.010 (1.19 ± 0.254)	0.083 (2.11)		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)

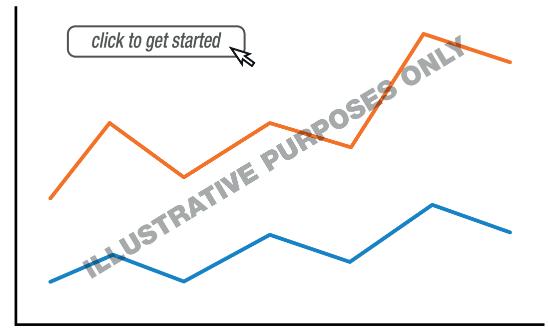
Note

(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

DERATING

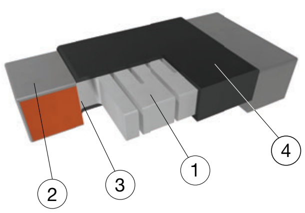


PULSE CAPABILITY



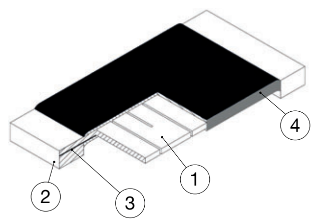
www.vishay.com/resistors/power-metal-strip-calculator

WELDED CONSTRUCTION 2512, 2010, 1206, 0603



1. Resistive element: solid metal nickel-chrome or manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
2. Terminal: solid copper, 100 % Sn (200 μ" min.) with 100 % Ni (40 μ" min.) under layer finish
3. Terminal / element weld
4. Silicone coating with ink print

CLAD CONSTRUCTION 0805



1. Resistive element: Ni-Cr
2. Terminal: solid copper, 100 % Sn (200 μ" min.) with 100 % Ni (40 μ" min.) under layer finish
3. Terminal to element cladding
4. High temperature encapsulant: “siliconized polyester” coating material

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/resistors/power-metal-strip-calculator/	± 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 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

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 www.vishay.com/doc?20051

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