Power Metal Strip® Resistors, Low Value (Down to 0.0002 Ω), Surface-Mount



LINKS TO ADDITIONAL RESOURCES

3D Models | Design Tools | Calculators | Infographics

FEATURES

- Power Metal Strip® all-welded construction is ideal for all types of current sensing, voltage division, and pulse applications
- Solid metal nickel-chrome, manganese-copper, or manganese-copper-tin alloy resistive element with low TCR (< 20 ppm/°C)
- Proprietary processing technique produces extremely low resistance values, down to 0.0003 Ω
- Sulfur resistance by construction that is unaffected by high sulfur environments
- Very low inductance (< 2 nH)
- Low thermal EMF (< 3 µV/°C)
- AEC-Q200 qualified (1)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

Note

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

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	SIZE	POWER RATING $P_{70\,°C}$ (1) W	POWER RATING $P_{100\,°C}$ (2) W	TOLERANCE %	RESISTANCE VALUE RANGE Ω	RESISTANCE VALUES CURRENTLY AVAILABLE (3) Ω	WEIGHT (typical) g/1000 pieces
WSLF2512	2512	10.0	9.0	1.0, 5.0	0.2m to 0.5m	0.2m, 0.3m, 0.5m	258
	2512	6.0	4.0	1.0, 5.0	1m to 2m	1m, 1.3m, 1.5m, 2m	212
	2512	4.0	3.0	1.0, 5.0	3m	3m	267
	2512	3.0	3.0	1.0, 5.0	4m	4m	267

Notes

- Qualified to AEC-Q200 rev. D
- Part marking: no part marking on these parts

(1) See Fig. 1 - Ambient Temperature Derating
(2) See Fig. 2 - Terminal Temperature Derating
(3) Other values may be available, contact factory

GLOBAL PART NUMBER INFORMATION

Global Part Numbering: WSLF25121L000FEA (WSLF2512, 0.001 Ω, ± 1 %)
(visit www.vishay.net Vishay Dale parts numbering manual for all options)

W	S	L	F	2	5	1	2	1	L	0	0	0	F	E	A		

GLOBAL MODEL (8 digits)	RESISTANCE VALUE (5 digits)	TOLERANCE CODE (1 digit)	PACKAGING CODE (1) (2 digits)	SPECIAL (2) (2 digits)
WSLF2512	**L** = mΩ **L5000** = 0.0005 Ω **1L000** = 0.0010 Ω	**F** = ± 1.0 % **J** = ± 5.0 %	**EA** = lead (Pb)-free, tape / reel	Reserved for future specials

Notes

(1) Packaging code: EB (lead (Pb)-free) are non-standard packaging codes designating 1000 piece reels. These non-standard packaging codes are identical to our standard EA (lead (Pb)-free), except that they have a package quantity of 1000 pieces
(2) Follow link for customization capabilities: www.vishay.com/doc?48163

For technical questions, contact: ww2bresistors@vishay.com

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TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	WSLF RESISTOR CHARACTERISTICS
Component temperature coefficient (including terminal) (1) TCR measured from -55 °C to 150 °C	ppm/°C	325 ± 75 for 0.2 mΩ (4)
		± 200 for 0.3 mΩ and 0.5 mΩ
		± 170 for 1.0 mΩ, 1.3 mΩ, and 1.5 mΩ
		± 70 for 2 mΩ, 3 mΩ, and 4 mΩ
Element TCR (2)	ppm/°C	< 20
Operating temperature range	°C	-65 to +170
Maximum working voltage (3)	V	$(P \times R)^{1/2}$

Notes

- Consult factory for detailed TCR performance across full temperature range as performance is resistance value specific

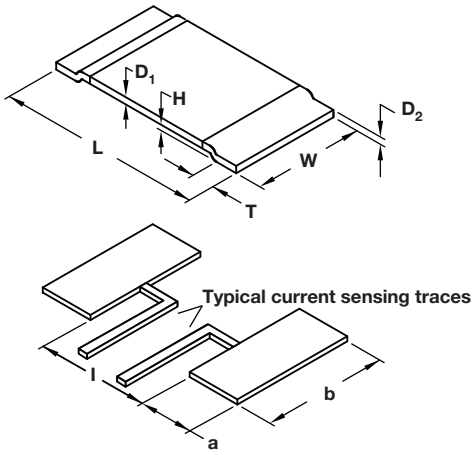
(1) Component TCR - total TCR that includes the TCR effects of the resistor element and the copper terminal

(2) Element TCR - only applies to the alloy used for the resistor element

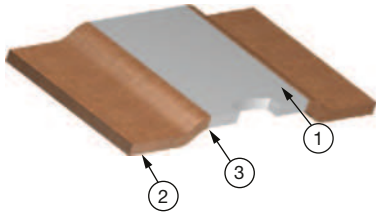
(3) Maximum working voltage - the WSL is not voltage sensitive, but is limited by power / energy dissipation and is also not ESD sensitive

(4) TCR is specified as a nominal positive TCR value with a tolerance range limit (+400 ppm/°C to 250 ppm/°C). Refer to TCR white paper listed in table at the end of datasheet for further details

DIMENSIONS in inches (millimeters)



CONSTRUCTION OUTLINE



(1) Resistive element: element material used is dependent on resistance value. Refer to Element Material in table)

(2) Terminal: solid copper

(3) Terminal / element weld

Notes

- 3D models available: www.vishay.com/doc?30335
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

MODEL	DIMENSIONS				SOLDER PAD DIMENSIONS		
	L	W	H	T (1)	a	b	l
WSLF2512	0.250 ± 0.006 (6.35 ± 0.15)	0.120 ± 0.008 (3.05 ± 0.2)	0.0138 ± 0.0012 (0.35 ± 0.03)	0.045 - 0.016 (1.14 - 0.4)	0.071 (1.80)	0.13 (3.40)	0.13 (3.40)

Note

(1) Terminal dimensional tolerance is 0.045 - 0.027 (1.14 + 0 / - 0.7) for 0.2 mΩ

GLOBAL MODEL	RESISTANCE VALUE (mΩ)	THERMAL RESISTANCE (°C/W)	THICKNESS in inches (millimeters)		ELEMENT MATERIAL
			D_1	D_2	
WSLF2512	0.2	2.5	0.040 (1.02)	0.040 (1.02)	Mn-Cu-Sn
	0.3	3.8	0.040 (1.02)	0.040 (1.02)	Mn-Cu-Sn
	0.5	6.7	0.033 (0.84)	0.033 (0.84)	Mn-Cu
	1.0	12.1	0.017 (0.43)	0.017 (0.43)	Mn-Cu
	1.3	14.6	0.013 (0.33)	0.013 (0.33)	Mn-Cu
	1.5	14.5	0.011 (0.28)	0.011 (0.28)	Mn-Cu
	2.0	17.1	0.028 (0.71)	0.028 (0.71)	Ni-Cr
	3.0	18.2	0.019 (0.48)	0.019 (0.48)	Ni-Cr
	4.0	18.5	0.014 (0.36)	0.014 (0.36)	Ni-Cr

Note

- The full power rating of Power Metal Strip resistors are dependent upon the ability of the circuit board to dissipate the heat energy created in the resistance element. It is recommended to follow common design practices for power semiconductors that ensure the junction temperature is maintained with in thermal limits by using large pad surfaces, thermal vias, heavier copper weights, internal layers as well as other thermal spreading features. The thermal resistance values provided function in the same manner as junction to terminal temperature

For technical questions, contact: ww2bresistors@vishay.com

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DERATING- AMBIENT TEMPERATURE

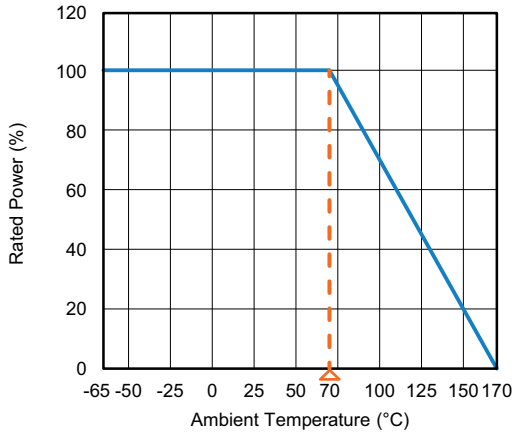


Fig. 1 - $P_{70\ °C}$ of Standard Electrical Specification Table

DERATING - TERMINAL TEMPERATURE

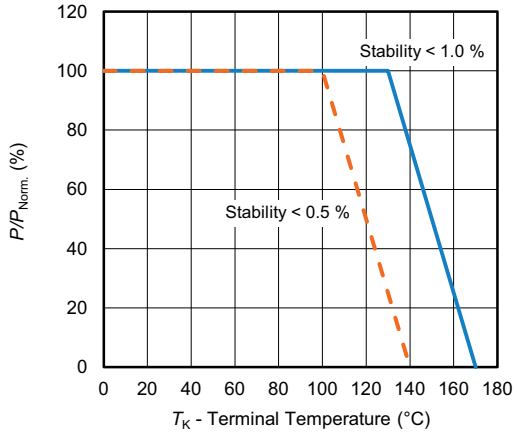
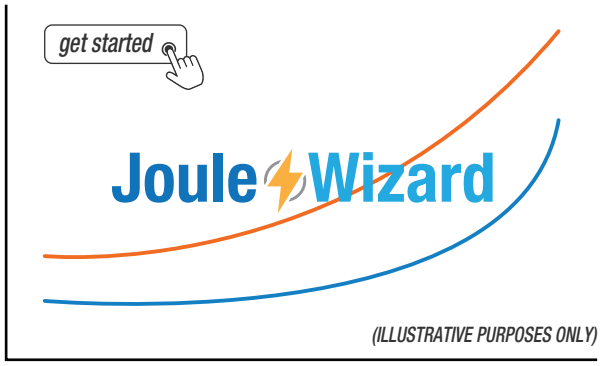


Fig. 2 - $P_{100\ °C}$ Rated Power of Standard Electrical Specification Table (Example L5000)

PULSE CAPABILITY



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

PERFORMANCE		
TEST	**CONDITIONS OF TEST**	**TEST LIMITS**
Thermal shock	-55 °C to +150 °C, 2000 cycles, 15 min at each extreme	± 0.5 %
Short time overload	Refer to link for short time overload performance and pulse capability; www.vishay.com/en/resistors/power-metal-strip-calculator/	± 0.5 %
Low temperature storage	-65 °C for 24 h	± 0.1 %
High temperature exposure	2000 h at +170 °C	± 1.0 %
Bias humidity	+85 °C, 85 % RH, 10 % bias, 1000 h	± 0.5 %
Mechanical shock	100 *g*'s for 6 ms, 5 pulses	± 0.2 %
Vibration	Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h	± 0.2 %
Load life	2000 h at +70 °C, 1.5 h "ON", 0.5 h "OFF"	± 1.0 %
Resistance to solder heat	+260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence	± 0.5 %
Moisture resistance	MIL-STD-202, method 106, 0 % power, 7a and 7b not required	± 0.1 %

Note

- Contact ww2bresistors@vishay.com for application specific performance requirements. Typical performance is better than stated test limits

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PACKAGING (1)				
MODEL	REEL			
	TAPE WIDTH	DIAMETER	PIECES/REEL	CODE
WSLF2512	12 mm / embossed plastic	330 mm / 13"	4000	EA

Notes

- Embossed carrier tape per EIA-481

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

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
OTHER	
WSLF Product Design Tools	www.vishay.com/en/product/30193/tab/designtools-ppg/

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