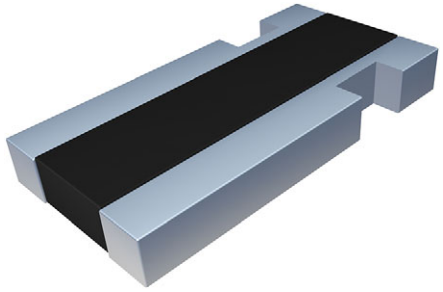
Power Metal Strip® Resistors, High Power, Surface-Mount, 4-Terminal



FEATURES

- 4-terminal design
- 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 low resistance values
- Solid metal nickel-chrome and manganese-copper alloy resistive element with low TCR (< 20 ppm/°C)
- Sulfur resistance by construction that is unaffected by high sulfur environments
- Low thermal EMF (< 3 µV/°C)
- AEC-Q200 qualified (1)
- PATENT(S): www.vishay.com/patents
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free Available

e3

RoHS* Available

HALOGEN FREE Available

GREEN (5-2008) Available

LINKS TO ADDITIONAL RESOURCES

Design Tools | 3D Models | Videos

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

- "SMD Current Sense: AEC-Q200 vs. Vishay Qualification" technical note: www.vishay.com/doc?30416

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

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	SIZE	POWER RATING $P_{70\,°C}$ W	TOLERANCE ± %	RESISTANCE VALUE RANGE (1) Ω	WEIGHT (typical) g/1000 pieces
WSKP0612	0612	3.5	1.0, 5.0	5m	8.5
	0612	4.0	1.0, 5.0	1m to 4m	8.5
	0612	5.0	1.0, 5.0	0.5m	8.5

Notes

- "Thermal Management for Surface-Mount Devices" white paper: www.vishay.com/doc?30380

(1) Other values may be available, contact factory

GLOBAL PART NUMBER INFORMATION

Global Part Numbering Example: WSKP06121L000FEA (visit www.vishay.net Vishay Dale parts numbering manual for all options)

W	S	K	P	0	6	1	2	1	L	0	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)
WSKP0612	**L** = mΩ **L5000** = 0.0005 Ω **5L000** = 0.005 Ω	**F** = ± 1.0 % **J** = ± 5.0 %	**EA** = lead (Pb)-free, tape / reel **EK** = lead (Pb)-free, bulk	(dash number) from **1** to **99** as applicable

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)

(2) 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

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

PATENT(S): www.vishay.com/patents

This Vishay product is protected by one or more United States and international patents.

For technical questions, contact: ww2bresistors@vishay.com

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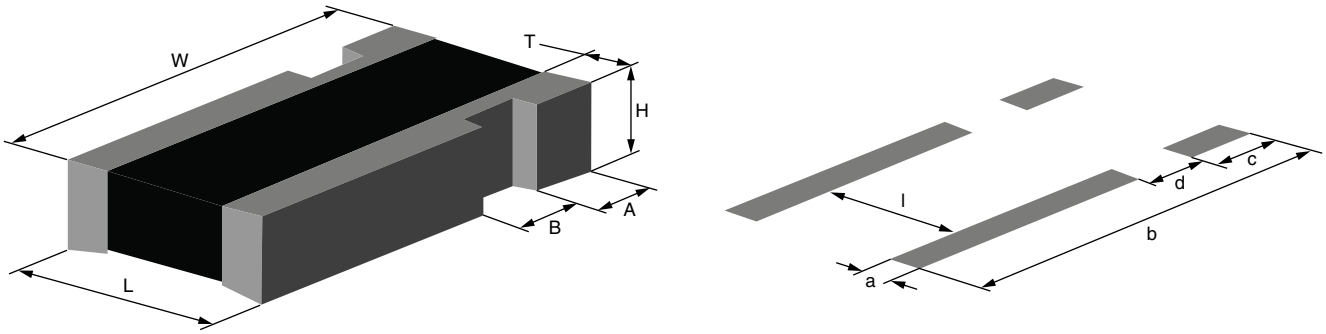
TECHNICAL SPECIFICATIONS		
PARAMETER	**UNIT**	**RESISTOR CHARACTERISTICS**
Component temperature coefficient (including terminal) (1) TCR measured from -55 °C to 150 °C	ppm/°C	-300 / +50 for 0.5 mΩ to 0.99 mΩ
		± 150 for 1 mΩ and 2 mΩ
		± 75 for 3 mΩ to 5 mΩ
Element TCR (2)	ppm/°C	< 20
Operating temperature range	°C	-65 to +170
Maximum working voltage (3)	V	$(P \times R)^{1/2}$

Notes

- TCR for Current Sensing (white paper): www.vishay.com/doc?30405

(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

DIMENSIONS



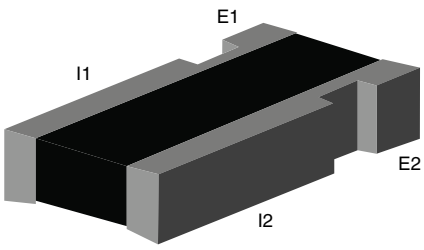
Note

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

MODEL	DIMENSIONS in inches (millimeters)					
	L	**W**	**H**	**T**	**A**	**B**
WSKP0612	0.060 ± 0.010 (1.50 ± 0.254)	0.120 ± 0.010 (3.05 ± 0.254)	0.018 ± 0.010 (0.457 ± 0.254)	0.015 ± 0.010 (0.381 ± 0.254)	0.020 ± 0.005 (0.51 ± 0.127)	0.020 ± 0.005 (0.51 ± 0.127)

MODEL	SOLDER PAD DIMENSIONS in inches (millimeters)				
	a	**b**	**c**	**d**	**l**
WSKP0612	0.040 (1.01)	0.135 (3.43)	0.030 (0.762)	0.015 (0.381)	0.030 (0.76)

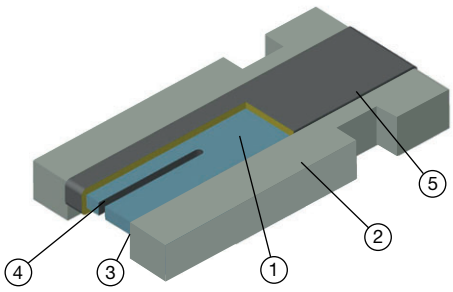
4 TERMINAL KELVIN CONNECTIONS



Notes

- E1 and E2: voltage sense connection
- I1 and I2: current connection

CONSTRUCTION OUTLINE



Notes

1. Resistive element: Mn-Cu
2. Terminal: solid copper and element with 100 % Sn finish
3. Terminal to element weld
4. Laser calibration
5. High temperature encapsulant: siliconized polyester coating material

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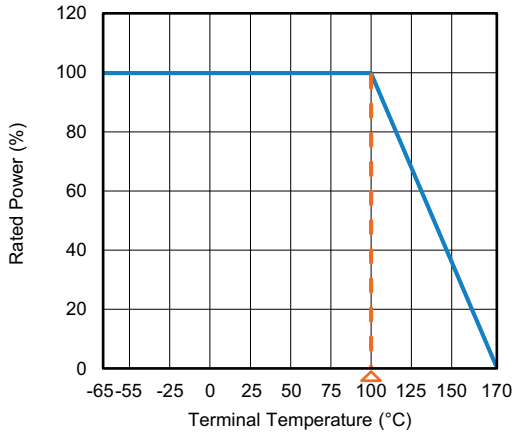
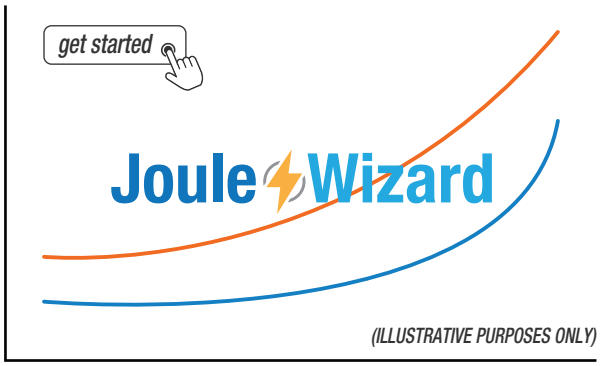
DERATING



PULSE CAPABILITY



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

PERFORMANCES

DESCRIPTION	AEC TEST NUMBER	TEST CONDITIONS	LIMIT
High temperature exposure (storage)	3	MIL-STD-202, Method 108, 2000 h at T = 170 °C at 0 % power, measurements at 24 h ± 4 h	± (1.0 %)
Temperature cycling	4	JESD22 Method JA-104, -55 °C to 155 °C, dwell time = 15 min, 2000 cycles. 1 min. maximum transition time.	± (1.0 %)
Moisture resistance	6	MIL-STD-202, Method 106, t = 24 h/cycle. Note: steps 7a and 7b not required, 0 % power, no polo, 65 °C. Measurement at 24 h ± 4 h after test.	± (1.0 %)
Biased humidity	7	MIL-STD-202, Method 103, 1000 h 85 °C / 85 % RH. Note: specified conditions: 10 % of operating power. Measurement at 24 h ± 4 h after test.	± (0.5 %)
Operational life [1]	8	MIL-STD 202, Method 108, Condition F; 1.5 h “ON”, 0.5 h “OFF”; T_A = 100 °C at rated power from derating curve. Measurements at 24 h ± 4 h after test. Test to 2000 h.	± (1.0 %)
External visual	9	MIL-STD-883 Method 2009; electrical test not required. Inspect device construction, marking, and workmanship	Per MIL-STD-883 2009.15
Physical dimension	10	JESD22 Method JB-100, verify physical dimensions to the standard WSKP0612 datasheet. Note: user(s) and suppliers spec. Electrical test not required.	Per datasheet
Resistance to solvents	12	MIL-STD-202, Method 215 aqueous wash chemical - OKEM clean or equivalent.	Marking remains legible
Mechanical shock	13	MIL-STD-202, Method 213, Condition C	± (0.5 %)
Vibration	14	MIL-STD-202, Method 204, Condition D	± (0.5 %)
Resistance to solder heat	15	MIL-STD-202, Method 210, Condition K	± (0.5 %)
ESD	17	AEC-Q200-002	± (1.0 %)
Solderability	18.1	J-STD-002, Test B1, preconditioning E 4 h at 155 °C dry heat, lead (Pb)-free solder at 245 °C, magnification 50 x.	> 95 % coverage
Solderability	18.2	J-STD-002, Test B (backward compatibility), preconditioning category E, 4 h at 155 °C dry heat, lead (Pb) solder at 215 °C, magnification 50 x.	> 95 % coverage
Solderability	18.3	J-STD-002, Test D (resistance to dissolution), preconditioning category E, 4 h at 155 °C dry heat, lead (Pb)-free solder at 260 °C, magnification 50 x.	> 95 % coverage
Electrical characterization	19	RTC at -65 °C and 175 °C	± 75 ppm/°C
Flammability	20	UL-94	n/a
Board flex	21	AEC-Q200-005 2 mm min.	± (1.0 %)
Terminal strength (SMD)	22	AEC-Q200-006 force of 1.8 kg for 60 s	± (1.0 %)
Flame retardance	24	AEC-Q200-001	0
Short time overload		Refer to link for short time overload performance and pulse capability; www.vishay.com/en/resistors/power-metal-strip-calculator/	± (1.0 %)
Low temperature storage		MIL-PRF-26 Paragraph 4.7.12 -65 °C for 24 h	± (0.5 %)

Note

[1] Ambient temperature performance is derived from terminal temperature qualification and component thermal resistance

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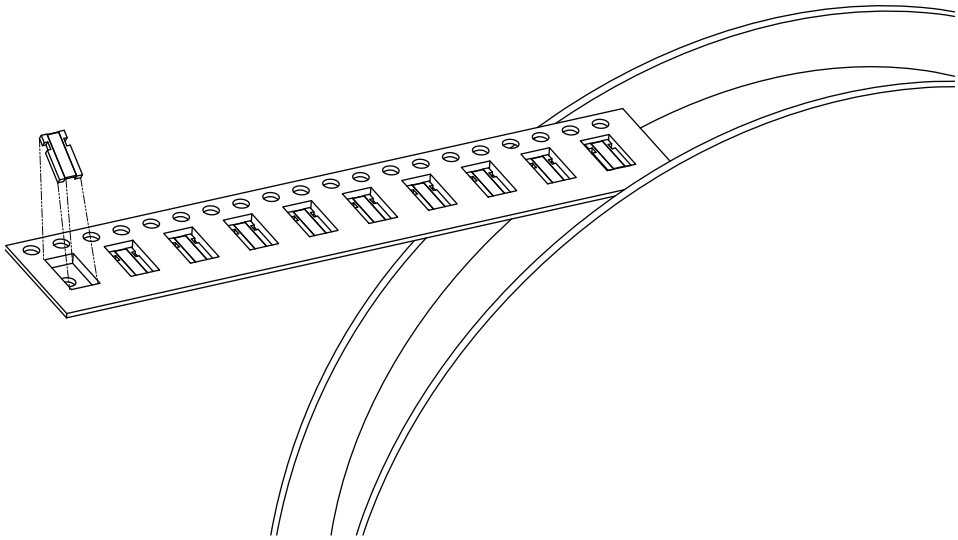
PACKAGING (1)				
MODEL	REEL			
	TAPE WIDTH	DIAMETER	PIECES/REEL	CODE
WSKP0612	8 mm / embossed plastic	178 mm / 7"	4000	EA

Notes

- Embossed carrier tape per EIA-481

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

REEL ORIENTATION



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