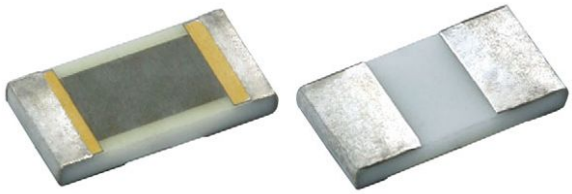
High Power Thin Film Wraparound Chip Resistor



FEATURES

- High purity ceramic substrate
- Power rating to 2.5 W
- Resistance range 10 Ω to 30.1 kΩ
- Resistor tolerance to ± 0.1 %
- TCR to ± 25 ppm/°C
- Flame resistant UL 94 V-0

LINKS TO ADDITIONAL RESOURCES

3D Models Infographics

PHP series chip resistors are designed with enlarged backside terminations to reduce the thermal resistance between the topside resistor layer and the solder joint on the end users circuit board.

Actual power handling capability is limited by the end user mounting process. As with any high power chip resistor the ability to remove the generated heat is critical to the overall performance of the device.

APPLICATIONS

- Power supplies
- Power switching
- Braking system
- Test and measurement equipment
- Motor deflection circuits

TYPICAL PERFORMANCE

	ABSOLUTE
TCR	25
TOL.	0.1

STANDARD ELECTRICAL SPECIFICATIONS		
TEST	**SPECIFICATIONS**	**CONDITIONS**
Material	Nichrome	-
Resistance Range	10 Ω to 30.1 kΩ	-
TCR: Absolute	25 ppm/°C, 50 ppm/°C (standard) and, 100 ppm/°C	-55 °C to +125 °C
Tolerance: Absolute	0.1 %, 0.5 %, 1.0 % and, 5.0 %	+25 °C
Power Rating: Resistor	0.375 W to 2.5 W (1)	Maximum at +70 °C
Stability: Absolute	Δ*R* 0.1 %	2000 h at +70 °C
Stability: Ratio	Not applicable	-
Voltage Coefficient	< 0.1 ppm/V	-
Working Voltage	75 V to 200 V	-
Operating Temperature Range	-55 °C to +155 °C	-
Storage Temperature Range	-55 °C to +155 °C	-
Noise	< -30 dB	-
Shelf Life Stability: Absolute	± 0.01 %	1 year at +25 °C

COMPONENT RATINGS			
CASE SIZE	**POWER RATING (mW)**	**WORKING VOLTAGE (V)**	**RESISTANCE RANGE (Ω)**
0603	375 (1)	75	10 to 30.1K
0805	625 (1)	100	10 to 30.1K
1206	1000 (1)	200	10 to 30.1K
2512	2500 (1)	200	10 to 30.1K

Note

(1) Dependent on component mounting by user

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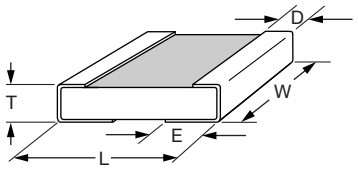
ENVIRONMENTAL TESTS (Vishay Performance vs. MIL-PRF-55342 Requirements)

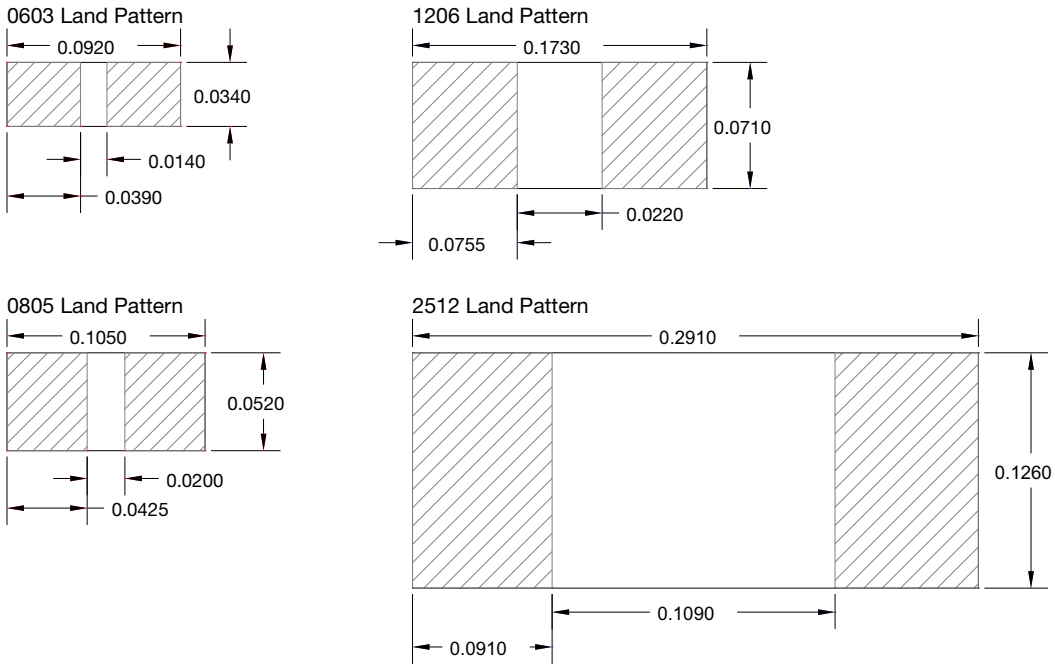
ENVIRONMENTAL TEST	LIMITS MIL-PRF-55342 CHARACTERISTIC "E"	TYPICAL VISHAY PERFORMANCE
Resistance Temperature Characteristic	± 25 ppm/°C	± 15 ppm/°C
Maximum Ambient Temperature at Rated Wattage	+70 °C	+70 °C
Maximum Ambient Temperature at Power Derating	+150 °C	+150 °C
Thermal Shock	± 0.1 %	± 0.04 %
Low Temperature Operation	± 0.1 %	± 0.001 %
Short Time Overload	± 0.1 %	± 0.003 %
High Temperature Exposure	± 0.1 %	± 0.030 %
Resistance to Soldering Heat	± 0.2 %	± 0.007 %
Moisture Resistance	± 0.2 %	± 0.002 %
Life at +70 °C for 2000 h	± 0.5 %	± 0.100 %

DIMENSIONS in inches



CASE SIZE	LENGTH	WIDTH W (± 0.005)	THICKNESS MIN./MAX.	TOP PAD D (± 0.005)	BOTTOM PAD E (± 0.005)
0603	0.064 ± 0.006	0.032	0.020 max.	0.012	0.021
0805	0.080 ± 0.006	0.050	0.015/0.033	0.016	0.025
1206	0.126 ± 0.008	0.063	0.015/0.033	0.020 + 0.005/- 0.010	0.040
2512	0.259 + 0.009/- 0.015	0.124	0.015/0.033	0.02	0.050

LAND PATTERN DIMENSIONS in inches



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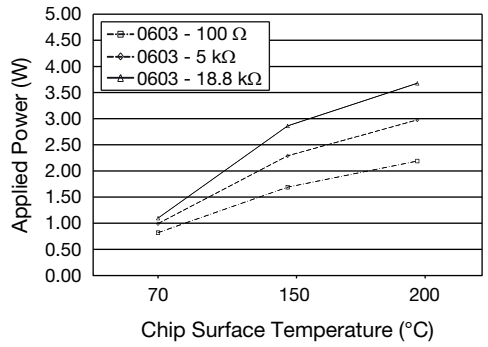
STANDARD MATERIAL SPECIFICATIONS	
Resistive Element	Nichrome
Substrate Material	Alumina (Al_2O_3)
Terminations (Tin/Lead)	Tin/lead solder over nickel barrier
Terminations (Lead (Pb)-free)	Tin/silver/copper (Sn96.5Ag3.0Cu0.5) solder over nickel barrier

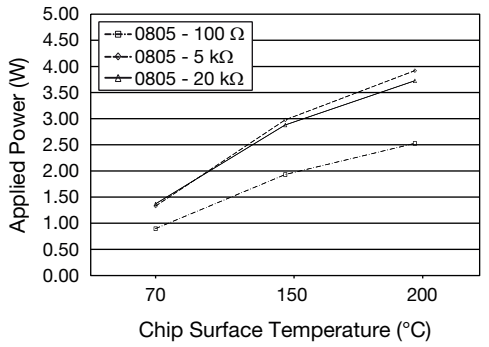
PHP CHIP TEMP. VS. APPLIED POWER



Note

- Chip surface temperature measured using FLIR SC645 thermal imaging system with an approximate test card surface temperature of 85 °C

PHP CHIP TEMP. VS. APPLIED POWER



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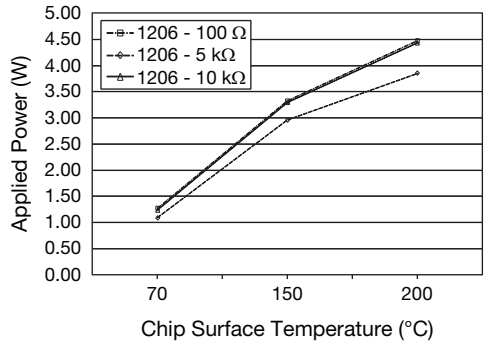
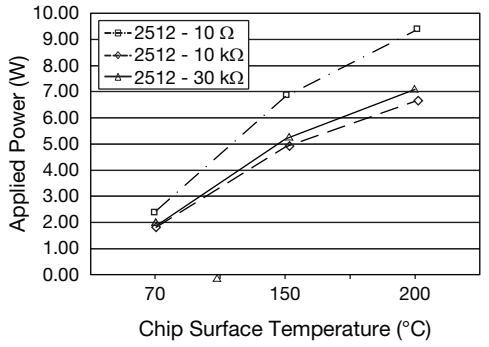
PHP CHIP TEMP. VS. APPLIED POWER



Notes

- Chip surface temperature measured using FLIR A40 thermal imaging system with an approximate test card surface temperature of 25 °C
- Thermal imaging was conducted under ambient conditions resulting in a steady state test card surface temperature of 85 °C over the full range of power levels
- Thermal imaging and load life testing was conducted mounting one device to 2" x 3" test cards with 2.5 mil copper plating on both surfaces. Thermal vias on 120 mil centers were utilized for heat transfer between surfaces of the test card

PHP CHIP TEMP. VS. APPLIED POWER



Notes

- Chip surface temperature measured using FLIR A40 thermal imaging system with an approximate test card surface temperature of 25 °C

Case Size	2512	2512	2512
Resistance Value	Up to 10 Ω	Up to 10 kΩ	Up to 30 kΩ
Temperature	Power (W)		
70	2.44	1.81	1.87
150	6.82	4.89	5.19
200	9.33	6.63	7.09

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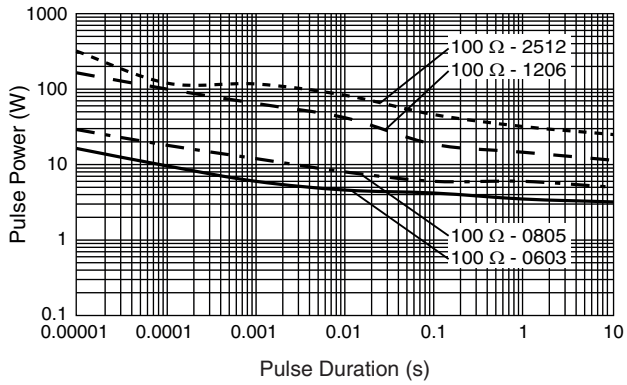
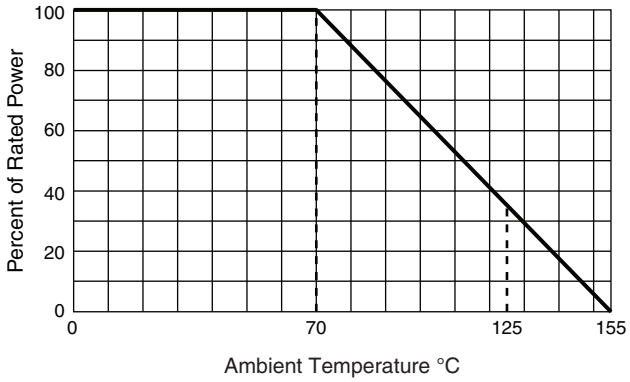
SINGLE PULSE CURVES



DERATING CURVE



GLOBAL PART NUMBER INFORMATION

P	H	P	0	1	2	0	6	E	1	0	0	2	B	B	T	1

GLOBAL MODEL	SUBSTRATE	CASE SIZE	TCR	RESISTANCE	TOLERANCE	TERMINATION	PACKAGING
PHP	**0** = alumina	**0603** **0805** **1206** **2512**	**E** = ± 25 ppm/°C **H** = ± 50 ppm/°C **K** = ± 100 ppm/°C	The first 3 digits are significant figures and the last digit specifies the number of zeros to follow. “R” designates the decimal point. Example: 10R0 = 10 Ω 1000 = 100 Ω 1001 = 1 kΩ	**B** = ± 0.1 % **D** = ± 0.5 % **F** = ± 1.0 % **G** = ± 2.0 % **J** = ± 5.0 %	**B** = wraparound Sn/Pb solder w/nickel barrier **S** = wraparound lead (Pb)-free solder SAC-305 RoHS-compliant - e1	**BS** = BULK 100 min., 1 mult. **WS** = WAFFLE 100 min., 1 mult. **WI** = WAFFLE (item single lot day code) 100 min., 1 mult. TAPE AND REEL **T1** = 1000 min., 1000 mult. **T3** = 300 min., 300 mult. **T5** = 500 min., 500 mult. **TF** = full reel **TS** = 100 min., 1 mult. **TI** = 100 min., 1 mult. (item single lot date code) **TP** = 100 min., 1 mult. (package unit single lot date)

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