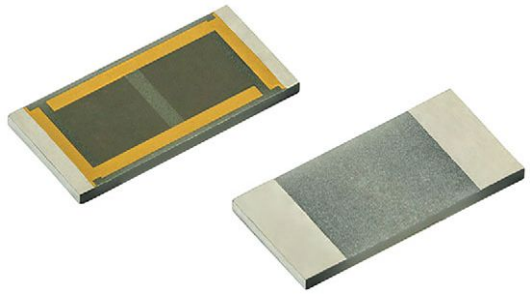
# High Power Aluminum Nitride, Wraparound Surface Mount, Precision Thin Film Non-Magnetic Chip Resistor (Up to 6 W)



## FEATURES

- High thermal conductivity aluminum nitride substrate
- Power rating up to 6.0 W
- Resistance range 2 Ω to 30.1 kΩ
- Resistor tolerance to ± 0.1 %
- TCR to ± 25 ppm/°C
- Flame resistant UL 94 V-0

## APPLICATIONS

- Power supplies
- Power switching
- Braking system

## LINKS TO ADDITIONAL RESOURCES

3D Models

PCNM series chip resistors are designed on aluminum nitride ceramic substrates with enlarged backside terminations to reduce the thermal resistance between the topside resistor layer and the solder joint on the end users circuit assembly.
Actual power handling capability is limited by the end user mounting process. As with any high power chip resistor the ability to remove the heat is critical to the overall performance of the device.

## TYPICAL PERFORMANCE

| | ABSOLUTE |
|---|---|
| TCR | 25 |
| TOL. | 0.1 |

## STANDARD ELECTRICAL SPECIFICATIONS

| TEST | SPECIFICATIONS | CONDITIONS |
|---|---|---|
| **Material** | Nichrome | - |
| **Resistance Range** | 2 Ω to 30.1 kΩ | - |
| **TCR: Absolute** | 25 ppm/°C (standard) and 100 ppm/°C | - |
| **Tolerance: Absolute** | 0.1 %, 0.25 %, 0.5 %, 1.0 % and 5.0 % | -55 °C to +150 °C |
| **Power Rating: Resistor** | 0.5 W to 6.0 W (1) | Maximum at +70 °C |
| **Stability: Absolute** | $\Delta R$ 1.0 % | 1000 h at +70 °C |
| **Voltage Coefficient** | < 0.1 ppm/V | - |
| **Working Voltage** | 75 V to 100 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 |

**Note**

(1) Dependent on component mounting by user

## COMPONENT RATINGS

| CASE SIZE | POWER RATING (mW) | WORKING VOLTAGE (V) | RESISTANCE RANGE (Ω) |
|---|---|---|---|
| 1206 | 2000 (1) | 100 | 2 to 30.1K |
| 2512 | 6000 (1) | 100 | 2 to 30.1K |

**Notes**

- 0603 and 0805 case size under engineering qualification

(1) Dependent on component mounting by user

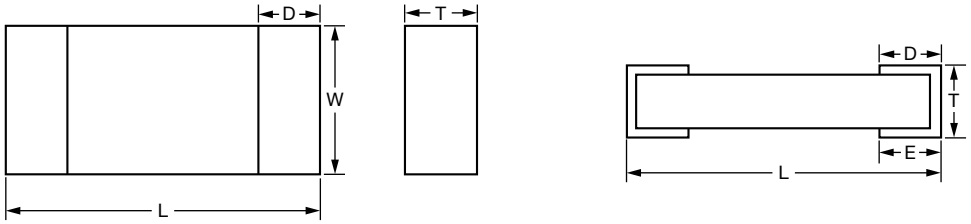
## ENVIRONMENTAL TESTS

| ENVIRONMENTAL TEST (1) | TEST LIMITS | 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 | ± 0.25 % | ± 0.10 % |
| Low temperature operation | ± 0.25 % | ± 0.01 % |
| Short time overload | ± 0.5 % | ± 0.2 % |
| High temperature exposure | ± 0.2 % | ± 0.05 % |
| Resistance to soldering heat | ± 0.25 % | ± 0.02 % |
| Moisture resistance | ± 0.4 % | ± 0.01 % |
| Life at +70 °C for 1000 h | ± 1.00 % | ± 0.02 % |

**Note**

(1) Environmental testing was performed based on MIL-STD-202 standard test methods

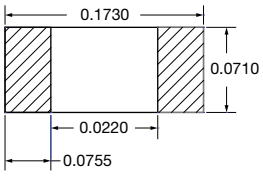
## DIMENSIONS in inches



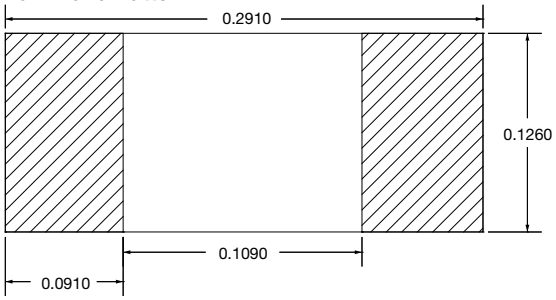

| CASE SIZE | LENGTH L | WIDTH W | THICKNESS T MIN./MAX. | TOP PAD D | BOTTOM PAD E |
|---|---|---|---|---|---|
| 1206 | 0.126 ± 0.008 | 0.063 ± 0.005 | 0.015 ± 0.003 | 0.020 + 0.005 / - 0.010 | 0.040 ± 0.005 |
| 2512 | 0.259 + 0.009 / - 0.015 | 0.124 ± 0.005 | 0.015 ± 0.003 | 0.020 ± 0.005 | 0.050 ± 0.005 |

## LAND PATTERN DIMENSIONS in inches

**1206 Land Pattern**



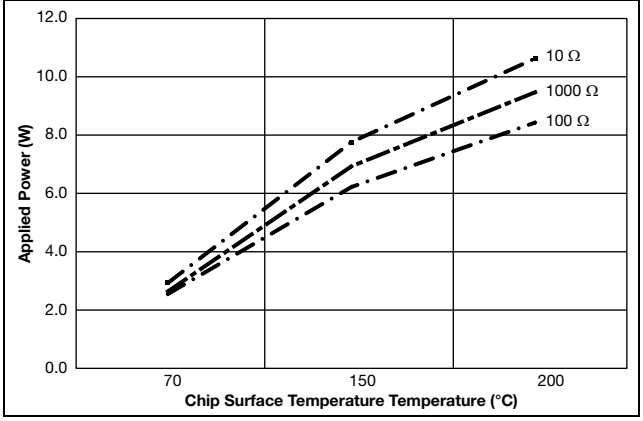

**2512 Land Pattern**



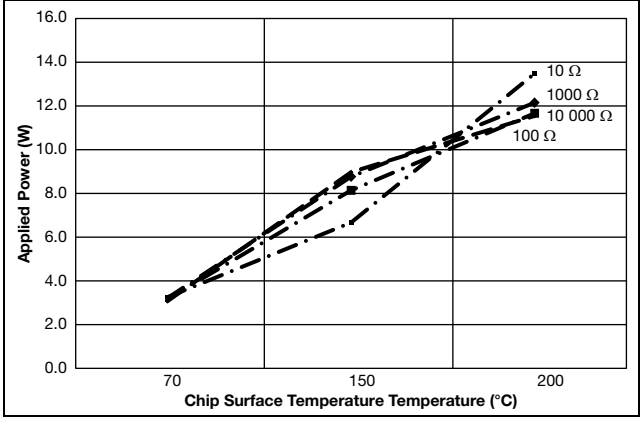

## STANDARD MATERIAL SPECIFICATIONS

| | |
|---|---|
| Resistive element | Nichrome |
| Substrate material | Aluminum nitride |
| Terminations (tin / lead) | Tin / lead solder over copper |
| Terminations (lead (Pb)-free) | Tin / silver / copper (Sn96.5 / Ag3.0 / Cu0.5) solder over copper |

## PCAN1206 CHIP TEMP VS. APPLIED POWER



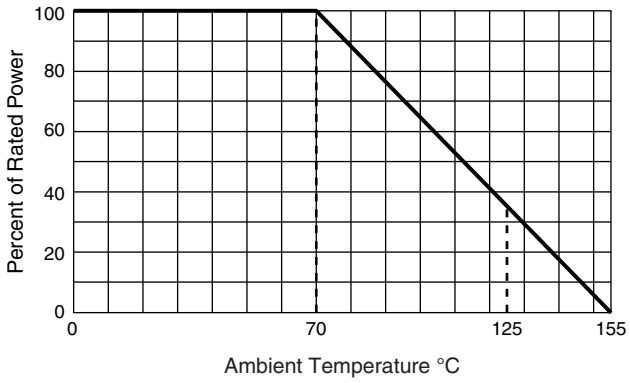

## PCNM2512 CHIP TEMP VS. APPLIED POWER



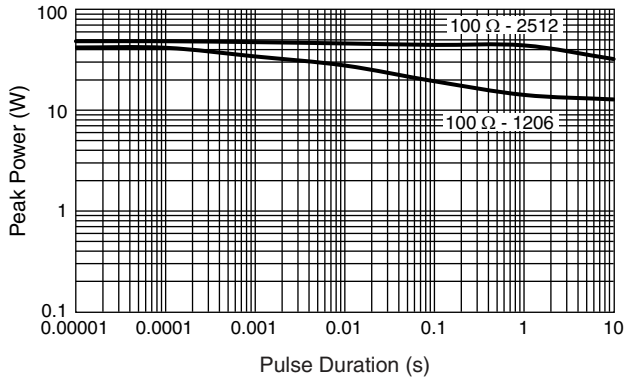

**Notes**

- Chip surface temperature measured using FLIR SC645 thermal imaging system with an approximate test card surface temperature of 85 °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 a 1.6" x 3.7" test card with 3.5 mil copper plating on both surfaces. Thermal vias on 50 mil centers were utilized for heat transfer between surfaces of the test card

## DERATING CURVE




## PULSE HANDLING RESULTS



## GLOBAL PART NUMBER INFORMATION

**New Global Part Numbering: PCNM1206H1000BBT1**

| P | C | N | M | 1 | 2 | 0 | 6 | H | 1 | 0 | 0 | 0 | B | B | T | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| GLOBAL MODEL | CASE SIZE | TCR CHARACTERISTIC | RESISTANCE | TOLERANCE | TERMINATION | PACKAGING |
|---|---|---|---|---|---|---|
| **PCNM** | **1206**<br>**2512** | **E** = ± 25 ppm/°C (1)<br>**H** = ± 50 ppm/°C (1)<br>**K** = ± 100 ppm/°C | The first 3 digits are significant figures and the last digit specifies the number of zeros to follow.<br>"R" designates the decimal point.<br><br>Example:<br>**10R0** = 10 Ω<br>**1000** = 100 Ω | **B** = ± 0.1 % (1)<br>**C** = ± 0.25 % (1)<br>**D** = ± 0.5 % (1)<br>**F** = ± 1.0 %<br>**G** = ± 2.0 % | **B** = wraparound Sn/Pb solder w/ nickel barrier<br>**S** = wraparound lead (Pb)-free solder (e1) RoHS compliant | **BS** = BULK 100 min., 1 mult.<br>**WS** = WAFFLE 100 min., 1 mult.<br>**W0** = 100 pc min. waffle, 1 mult.<br>**WI** = 100 min., 1 mult. (package unit single lot date code)<br><br>TAPE AND REEL<br>**T0** = 100 min., 100 mult.<br>**T1** = 1000 min., 1000 mult.<br>**T3** = 300 min., 300 mult.<br>**T5** = 500 min., 500 mult.<br>**TF** = full reel<br>**TS** = 100 min., 1 mult.<br>**TI** = 100 min., 1 mult. (item single lot date code)<br>**TP** = 100 min., 1 mult. (package unit single lot date code) |

**Note**

(1) Available on 10 Ω and higher; less than 10 Ω 100 ppm/°C and 1 % tolerance best

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