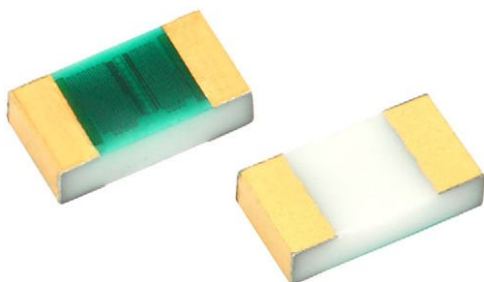


# Precision Automotive High Temperature (155 °C at Full Rated Power) Thin Film Chip Resistor, AEC-Q200 Qualified

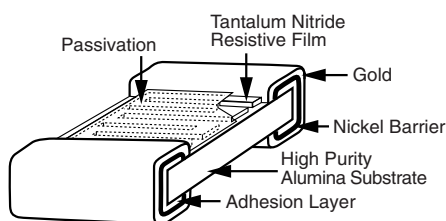


## LINKS TO ADDITIONAL RESOURCES



The terminations consist of an adhesion layer, a leach resistant nickel barrier and gold plating compatible with high temperature solder systems.

## CONSTRUCTION



## FEATURES

- Resistance range: 1.0  $\Omega$  to 1 M $\Omega$
- AEC-Q200 qualified, table 7F
- AEC-Q200 qualified, ESD rated class 1C (< 1 k $\Omega$ : 1 kV; > 1 k $\Omega$ : 2 kV)
- Laser trimmed to any value
- Intrinsic moisture protected resistor element
- Moisture resistant to MIL-STD-202, method 106
- Tantalum nitride resistor film on alumina substrate
- 100 % visual inspected per MIL-PRF-55342
- Laser-trimmed tolerances to  $\pm 0.1$  %
- Load life stability 0.2 % at 1000 h at 155 °C and 100 % rated power
- Very low noise and voltage coefficient (< -30 dB, < 0.1 ppm/V)
- Sulfur resistant (per ASTM B809-95 humid vapor test)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

## TYPICAL PERFORMANCE

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

## STANDARD ELECTRICAL SPECIFICATIONS

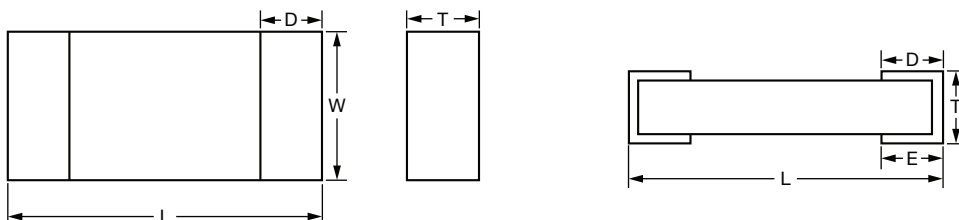
| TEST                                     | SPECIFICATIONS                                            | CONDITIONS                                       |
|------------------------------------------|-----------------------------------------------------------|--------------------------------------------------|
| Material                                 | Tantalum nitride                                          | -                                                |
| Resistance Range                         | 1.0 $\Omega$ to 1 M $\Omega$                              | -                                                |
| TCR: Absolute                            | $\pm 25$ ppm/ $^{\circ}$ C to $\pm 100$ ppm/ $^{\circ}$ C | -55 $^{\circ}$ C to +175 $^{\circ}$ C            |
| Tolerance: Absolute                      | $\pm 0.1$ % to $\pm 1.0$ %                                | +25 $^{\circ}$ C                                 |
| Stability: Absolute                      | $\pm 0.2$ %                                               | 1000 h at 155 $^{\circ}$ C and 100 % rated power |
| Stability: Ratio                         | Not applicable                                            | -                                                |
| Voltage Coefficient                      | Less than 0.1 ppm/V                                       | -                                                |
| Working Voltage                          | 75 V                                                      | -                                                |
| Operating Temperature Range              | -55 $^{\circ}$ C to +250 $^{\circ}$ C                     | -                                                |
| Storage Temperature Range <sup>(1)</sup> | -55 $^{\circ}$ C to +250 $^{\circ}$ C                     | -                                                |
| Noise                                    | < -30 dB                                                  | -                                                |
| Shelf Life Stability: Absolute           | 100 ppm                                                   | 1 year at 25 $^{\circ}$ C                        |

### Note

<sup>(1)</sup> Storage temperature rating is for device only

## COMPONENT RATINGS

| CASE SIZE | POWER RATING (mW) | WORKING VOLTAGE (V) | RESISTANCE RANGE ( $\Omega$ ) |
|-----------|-------------------|---------------------|-------------------------------|
| 0402      | 50                | 75                  | 1.5 to 51K                    |
| 0603      | 150               | 75                  | 2.75 to 120K                  |
| 0805      | 200               | 100                 | 2.75 to 301K                  |
| 1206      | 400               | 200                 | 1.0 to 1M                     |

**DIMENSIONS** in inches


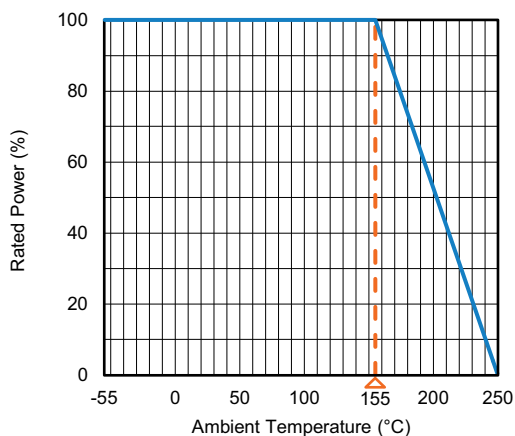
| CASE SIZE | L             | W             | T             | D                      | E                      |
|-----------|---------------|---------------|---------------|------------------------|------------------------|
| 0402      | 0.042 ± 0.008 | 0.022 ± 0.005 | 0.015 ± 0.003 | 0.010 ± 0.005          | 0.010 ± 0.005          |
| 0603      | 0.064 ± 0.006 | 0.032 ± 0.005 | 0.015 ± 0.003 | 0.012 ± 0.005          | 0.015 ± 0.005          |
| 0805      | 0.080 ± 0.006 | 0.050 ± 0.005 | 0.015 ± 0.003 | 0.016 ± 0.008          | 0.015 ± 0.005          |
| 1206      | 0.126 ± 0.008 | 0.063 ± 0.005 | 0.015 ± 0.003 | 0.020 ± 0.005 / - 0.01 | 0.020 ± 0.005 / - 0.01 |

**ENVIRONMENTAL TESTS**

| ENVIRONMENTAL TEST           | CONDITIONS                                                         | TYPICAL VISHAY PERFORMANCE                                                      |
|------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------|
| High temperature storage     | MIL-STD-202 method 108, 1000 h at 125 °C                           | ± 0.05 %                                                                        |
| Temperature cycling          | JESD22 method JA-104, 1000 cycles, -55 °C to +155 °C               | ± 0.115 %                                                                       |
| Moisture resistance          | MIL-STD-202 method 106                                             | ± 0.017 %                                                                       |
| Biased humidity              | MIL-STD-202 method 103, 1000 h at 85 °C, 85 % RH, 10 % rated power | ± 0.133 %                                                                       |
| Life                         | MIL-STD-202 method 108, 1000 h at 155 °C                           | ± 0.20 % at 100 % rated power and 155 °C. Effective film temperature is 200 °C. |
| Mechanical shock             | MIL-STD-202 method 213, condition C                                | ± 0.008 %                                                                       |
| Vibration                    | MIL-STD-202 method 204, 10 Hz to 2 kHz                             | ± 0.008 %                                                                       |
| Resistance to soldering heat | MIL-STD-202 method 210, condition B                                | ± 0.09 %                                                                        |
| Electrostatic discharge      | AEC-Q200-002, human body (< 1 kΩ: 1 kV; > 1 kΩ: 2 kV)              | ± 0.10 % at 2 kV                                                                |
| Solderability                | MIL-STD-883 method 2003 para 2.3.1 and J-STD-002                   | Pass                                                                            |
| Die shear                    | MIL-PRF-55342                                                      | Pass                                                                            |
| Flame retardance             | AEC-Q200-001 para 4.0                                              | Pass                                                                            |

**MECHANICAL SPECIFICATIONS**

|                    |                                                |
|--------------------|------------------------------------------------|
| Resistive element  | Tantalum nitride                               |
| Substrate material | Alumina                                        |
| Terminations       | Gold (10 μin. min.) over nickel (50 μin. min.) |

**DERATING CURVE**




## GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: PATT0603E1002BGT1

|                 |                              |                                                                                                                                                       |                                                                                                                                                                                                                               |   |   |   |                                                                                             |   |                                               |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   |   |   |   |
|-----------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---------------------------------------------------------------------------------------------|---|-----------------------------------------------|---|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| P               | A                            | T                                                                                                                                                     | T                                                                                                                                                                                                                             | 0 | 6 | 0 | 3                                                                                           | E | 1                                             | 0 | 0 | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | B | G | T | 1 |
| GLOBAL<br>MODEL | CASE<br>SIZE                 | TCR<br>CHARACTERISTIC                                                                                                                                 | RESISTANCE                                                                                                                                                                                                                    |   |   |   | TOLERANCE                                                                                   |   | TERMINATION                                   |   |   | PACKAGING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |   |   |   |   |
| PATT            | 0402<br>0603<br>0805<br>1206 | E = $\pm 25$ ppm/ $^{\circ}$ C<br>H = $\pm 50$ ppm/ $^{\circ}$ C<br>K = $\pm 100$ ppm/ $^{\circ}$ C <sup>(1)</sup><br>L = $\pm 200$ ppm/ $^{\circ}$ C | The first 3 digits are significant figures and the last digit specifies the number of zeros to follow. "R" designates the decimal point.<br><br>Example:<br>10R0 = 10 $\Omega$<br>1000 = 100 $\Omega$<br>1002 = 10 k $\Omega$ |   |   |   | B = $\pm 0.1$ %<br>D = $\pm 0.5$ %<br>F = $\pm 1.0$ %<br>G = $\pm 2.0$ %<br>J = $\pm 5.0$ % |   | G = wraparound<br>gold over nickel<br>barrier |   |   | BULK<br>BS = 100 min., 1 mult.<br>WAFFLE<br>WS = 100 min., 1 mult.<br>W0 = 100 min., 100 mult.<br>W1 = 100 min., 1 mult.<br>(item single lot date code)<br>WP = 100 min., 1 mult.<br>(package unit single lot date code)<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.<br>(item single lot date code)<br>TP = 100 min., 1 mult.<br>(package unit single lot date code) |   |   |   |   |

## Note

<sup>(1)</sup> Characteristic TCR - ( $R < 10 \Omega$ )

| RESISTANCE                                | TCR<br>(ppm/ $^{\circ}$ C) | TOLERANCE<br>(%)  |
|-------------------------------------------|----------------------------|-------------------|
| 10 $\Omega$ to 1 M $\Omega$               | 25, 50, 100, 200           | 0.1, 0.5, 1, 2, 5 |
| 5 $\Omega$ to 10 $\Omega$ <sup>(1)</sup>  | 100, 200                   | 1, 2, 5           |
| 1.0 $\Omega$ to 5 $\Omega$ <sup>(1)</sup> | 200                        | 1, 2, 5           |

## Note

<sup>(1)</sup> Resistance values from 1.0  $\Omega$  to 10  $\Omega$  are undergoing PPAP qualification; results are expected to be similar to PPAP qualified 10  $\Omega$  to 120 k $\Omega$



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