

Commercial Thin Film Chip Resistor, Surface-Mount Chip



These chip resistors are available in both “top side” and “wraparound” termination styles in a variety of sizes. They incorporate self passivated, enhanced Tantalum Nitride films, to give superior performance on moisture resistance, voltage coefficient, power handling and resistance stability. The terminations consist of an adhesion layer, a leach resistant nickel barrier, and solder coating. This product will out-perform all requirements of characteristic E of MIL-PRF-55342.

CONSTRUCTION



FEATURES

- Moisture resistant
- High purity alumina substrate
- Non-standard values available
- Will pass +85 °C, 85 % relative humidity and 10 % rated power
- 100 % visual inspected per MIL-PRF-55342
- Non-inductive
- Very low noise and voltage coefficient (< -30 dB)
- Laser-trimmed tolerances to ± 0.05 %
- Wraparound resistance less than 10 m Ω
- Epoxy bondable termination available
- Sulfur resistant (per ASTM B809-95 humid vapor test)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS*
Available

**HALOGEN
FREE**
Available

**GREEN
(5-2008)**
Available

Note

* 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

TYPICAL PERFORMANCE

| | ABSOLUTE |
|------|----------|
| TCR | 10 |
| TOL. | 0.05 |

STANDARD ELECTRICAL SPECIFICATIONS

| TEST | SPECIFICATIONS | CONDITIONS |
|--------------------------------|---|---------------------------------------|
| Material | Tantalum nitride | - |
| Resistance Range | 1.0 Ω to 3 M Ω | - |
| TCR: Absolute | ± 10 ppm/ $^{\circ}$ C to ± 100 ppm/ $^{\circ}$ C | -55 $^{\circ}$ C to +125 $^{\circ}$ C |
| Tolerance: Absolute | ± 0.05 % to ± 5 % | +25 $^{\circ}$ C |
| Stability: Absolute | $\Delta R \pm 0.03$ % | 2000 h at 70 $^{\circ}$ C |
| Stability: Ratio | - | - |
| Voltage Coefficient | 0.1 ppm/V | - |
| Working Voltage | 75 V to 200 V | - |
| Operating Temperature Range | -55 $^{\circ}$ C to +155 $^{\circ}$ C | - |
| Storage Temperature Range | -55 $^{\circ}$ C to +155 $^{\circ}$ C | - |
| Noise | < -30 dB | - |
| Shelf Life Stability: Absolute | - | - |

COMPONENT RATINGS

| CASE SIZE ⁽¹⁾ | POWER RATING (mW) | WORKING VOLTAGE (V) | RESISTANCE RANGE (Ω) |
|--------------------------|-------------------|---------------------|-------------------------------|
| 0402 | 50 | 75 | 1.5 to 51.1K |
| 0502 | 100 | 75 | 1.5 to 65K |
| 0505 | 150 | 75 | 10 to 130K |
| 0603 | 150 | 75 | 1.5 to 130K |
| 0705 | 200 | 100 | 1.0 to 310K |
| 0805 | 200 | 100 | 1.0 to 310K |
| 1005 | 250 | 100 | 1.5 to 360K |
| 1010 | 500 | 150 | 1.0 to 600K |
| 1206 | 400 | 200 | 1.5 to 1M |
| 1505 | 400 | 150 | 1.25 to 1M |
| 2208 | 750 | 150 | 2.0 to 1.75M |
| 2010 | 800 | 200 | 1.0 to 2M |
| 2512 ⁽²⁾ | 2000 | 200 | 1.5 to 3M |

Notes

⁽¹⁾ 0705 and 0805 are the same (only use 0805 when ordering)

⁽²⁾ Reference environmental tests table for short time overload test parameters

DIMENSIONS in inches


| CASE SIZE | L | W | T | D | E |
|---------------------------|---------------|---------------|----------------|-------------------------|-------------------------|
| 0402 | 0.042 ± 0.008 | 0.022 ± 0.005 | 0.012 to 0.033 | 0.010 ± 0.005 | 0.010 ± 0.005 |
| 0502 | 0.055 ± 0.006 | 0.025 ± 0.005 | 0.012 to 0.033 | 0.010 ± 0.005 | 0.015 ± 0.005 |
| 0505 | 0.055 ± 0.006 | 0.050 ± 0.005 | 0.012 to 0.033 | 0.010 ± 0.005 | 0.015 ± 0.005 |
| 0603 | 0.064 ± 0.006 | 0.032 ± 0.005 | 0.020 max. | 0.012 ± 0.005 | 0.015 ± 0.005 |
| 0705, 0805 ⁽¹⁾ | 0.080 ± 0.006 | 0.050 ± 0.005 | 0.015 to 0.033 | 0.016 ± 0.008 | 0.015 ± 0.005 |
| 1005 | 0.105 ± 0.007 | 0.050 ± 0.005 | 0.015 to 0.033 | 0.015 ± 0.005 | 0.015 ± 0.005 |
| 1010 | 0.105 ± 0.007 | 0.100 ± 0.005 | 0.015 to 0.033 | 0.015 ± 0.005 | 0.015 ± 0.005 |
| 1206 | 0.126 ± 0.008 | 0.063 ± 0.005 | 0.015 to 0.033 | 0.020 ± 0.005 / - 0.010 | 0.020 ± 0.005 / - 0.010 |
| 1505 | 0.155 ± 0.007 | 0.050 ± 0.005 | 0.015 to 0.033 | 0.015 ± 0.005 | 0.015 ± 0.005 |
| 2010 | 0.209 ± 0.009 | 0.098 ± 0.005 | 0.015 to 0.033 | 0.020 ± 0.005 | 0.020 ± 0.005 |
| 2208 | 0.230 ± 0.007 | 0.075 ± 0.005 | 0.015 to 0.033 | 0.020 ± 0.005 | 0.020 ± 0.005 |
| 2512 | 0.259 ± 0.009 | 0.124 ± 0.005 | 0.015 to 0.033 | 0.020 ± 0.005 | 0.020 ± 0.005 |

Note

⁽¹⁾ 0705 and 0805 are the same (only use 0805 when ordering)

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 |
| Max. Ambient Temp. at Rated Wattage | +70 °C | +70 °C |
| Max. Ambient Temp. at Power Derating | +150 °C | +150 °C |
| Thermal Shock ΔR | ± 0.1 % | ± 0.040 % |
| Low Temperature Operation ΔR | ± 0.1 % | ± 0.001 % |
| Short Time Overload ⁽¹⁾ ΔR | ± 0.10 % | ± 0.002 % |
| High Temperature Exposure ΔR | ± 0.1 % | ± 0.04 % |
| Resistance to Soldering Heat ΔR | ± 0.2 % | ± 0.008 % |
| Moisture Resistance ΔR | ± 0.2 % | ± 0.004 % |
| Life +70 °C at 1000 h ΔR | ± 0.50 % | ± 0.02 % |
| Insulation Resistance | 10 000 Ω minimum | > 100 000 MΩ |

Note

⁽¹⁾ 2512 short time overload test is based on 1 W power level below critical value of 20 kΩ

FILM LOAD LIFE STABILITY (at +125 °C)

DERATING CURVE




GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: **PTN1206E1002BBT1**

| | | | | | | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| P | T | N | 1 | 2 | 0 | 6 | E | 1 | 0 | 0 | 2 | B | B | T | 1 |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|

| GLOBAL MODEL | CASE SIZE | TCR CHARACTERISTIC | RESISTANCE | TOLERANCE | TERMINATION | PACKAGING |
|--------------|--|--|--|--|--|---|
| PTN | 0402 0502 0505 0603 0805 1005 1010 1206 1505 2208 2010 2512 | D = ± 15 ppm/°C ⁽¹⁾ E = ± 25 ppm/°C ⁽²⁾ H = ± 50 ppm/°C ⁽²⁾ K = ± 100 ppm/°C L = ± 200 ppm/°C Y = ± 10 ppm/°C ⁽³⁾ | 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 | A = ± 0.05 % ⁽⁴⁾ B = ± 0.1 % D = ± 0.5 % F = ± 1 % G = ± 2 % J = ± 5 % | B = wraparound Sn/Pb solder Sn63 w/nickel barrier G = wraparound Au over Ni (gold) termination epoxy bondable RoHS-compliant - e4 S = wraparound electroplated 100 % pure matte tin RoHS-compliant - e3 | BS = BULK 100 min., 1 mult. W0 = WAFFLE 100 min., 100 mult. WS = WAFFLE 100 min., 1 mult. W1 = 100 min., 1 mult. (item single lot date code) WP = 100 min., 1 mult. (package unit single lot date code) TAPE AND REEL T0 = 100 min., 100 mult. T1 = 1000 min., 1000 mult. ⁽⁵⁾ 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 code) |

Historical Part Number example: PTN0805H8801BBT (for reference purposes only)

| | | | | | | |
|------------|-------------|--------------------|-------------|-----------|-------------|-----------|
| PTN | 0805 | H | 8801 | B | B | T |
| STYLE | CASE SIZE | TCR CHARACTERISTIC | OHMIC VALUE | TOLERANCE | TERMINATION | PACKAGING |

Notes

- (1) Not available below 50 Ω
- (2) Not available below 10 Ω
- (3) Not available below 100 Ω
- (4) Only available in ≥ 1 kΩ
- (5) Preferred packaging code

| RESISTANCE | TCR (ppm/°C) | TOLERANCE (%) |
|----------------|--------------------------|-------------------------|
| 10 Ω to 49.9 Ω | 25, 50, 100, 200 | 0.1, 0.5, 1, 2, 5 |
| 50 Ω to 99 Ω | 15, 25, 50, 100, 200 | 0.1, 0.5, 1, 2, 5 |
| 100 Ω to 999 Ω | 10, 15, 25, 50, 100, 200 | 0.1, 0.5, 1, 2, 5 |
| 1 kΩ to 3 MΩ | 10, 15, 25, 50, 100, 200 | 0.05, 0.1, 0.5, 1, 2, 5 |
| 5 Ω to 10 Ω | 100, 200 | 1, 2, 5 |
| 1.0 Ω to 5 Ω | 200 | 1, 2, 5 |



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