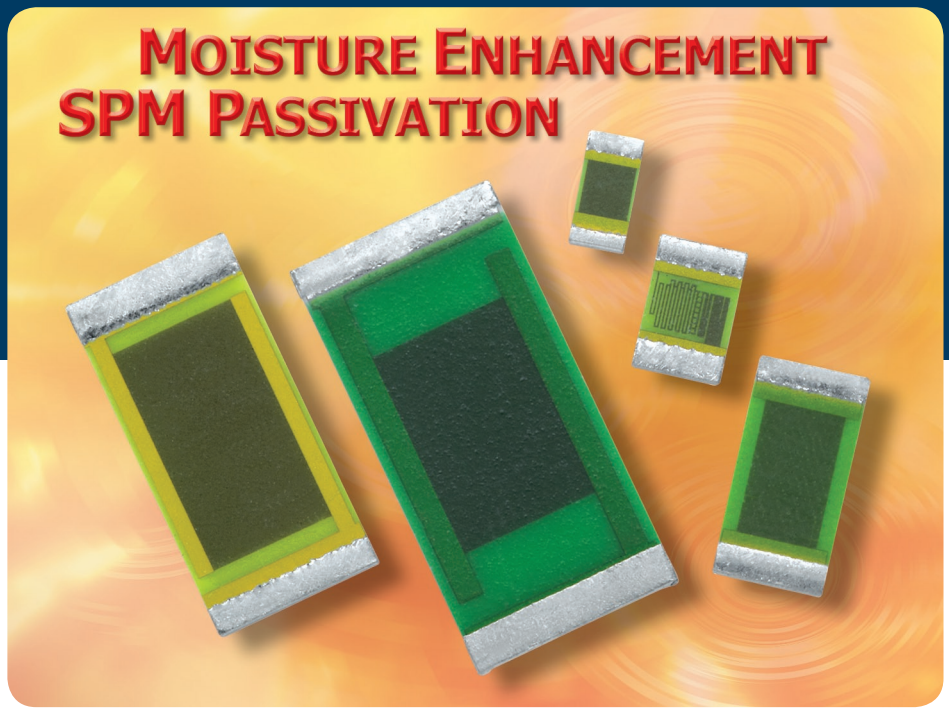
# THIN FILM RESISTORS

P-NS




## Thin Film Precision Surface-Mount Wraparound Chip Resistors

Special Passivation Method (SPM) Moisture Resistance

### KEY BENEFITS

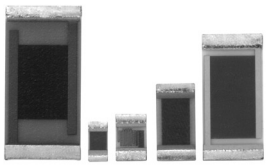
- Wide selection of case sizes
- Tolerances to ± 0.02 %
- TCR of ± 25 ppm/°C (standard) to ± 10 ppm/°C
- Non-standard values available
- Solderable or wire-and-epoxy-bondable

### APPLICATIONS

- Precision reference
- Low-noise instrumentation
- ATE industrial precision voltage dividers

Datasheet is available on our web site at www.vishay.com
for P-NS - http://www.vishay.com/doc?60023

# Commercial Thin Film Chip Resistors



Actual Size
0505

For applications requiring low noise, stability, low temperature coefficient of resistance, and low voltage coefficient, all VISHAY's proven precision thin film wraparound resistors will meet your exact requirements. Manufactured with the same material and processes as QPL and manufactured in a QPL facility.

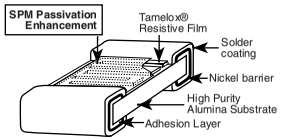
## FEATURES

- Lead (Pb)-free available
- Moisture resistant (SPM) special passivation method
- Non-standard values available
- Pre-tinned terminations over nickel barrier (Gold available)
- Very low noise and voltage coefficient (< - 30 dB, 0.1 ppm/V)
- Non-inductive
- Laser-trimmed tolerances to 0.02 %
- In-lot tracking less than 5 ppm/°C

Pb-free Available

RoHS* COMPLIANT

## CONSTRUCTION




## TYPICAL PERFORMANCE

| | ABS |
|---|---|
| TCR | 25 |
| TOL | 0.1 |

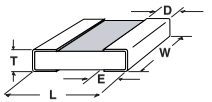
## STANDARD ELECTRICAL SPECIFICATIONS

| TEST | SPECIFICATIONS | CONDITIONS |
|---|---|---|
| MATERIAL | TAMELOX | |
| Absolute TCR | ± 25 ppm/°C (Available to ± 10 ppm/°C) | - 55 °C to + 125 °C |
| Absolute Tolerance | ± 0.1 % (Available to ± 0.02 %) | + 25 °C |
| Power Rating | see table | |
| Voltage Coefficient | 0.1 ppm/Volt typical | |
| Working Voltage | see table | |
| Operating Temperature Range | - 55 °C to + 125 °C | |
| Storage Temperature Range | - 55 °C to + 150 °C | |
| Noise | < - 35 dB typical | |

| | POWER RATING - (mW) | | MAX WORKING VOLTAGE | | RESISTANCE RANGE - (Ω) | |
|---|---|---|---|---|---|---|
| CASE SIZE | ≥ 0.1 % | < 0.1 % | ≥ 0.1 % | < 0.1 % | ≥ 0.1 % | < 0.1 % |
| 0402 | 50 | 50 | 75 | 75 | 25 - 75K | 250 Ω - 70K |
| 0502 | 100 | 100 | 75 | 75 | 20 - 130K | 250 Ω - 130K |
| 0505 | 150 | 150 | 75 | 75 | 20 - 301K | 250 Ω - 301K |
| 0603 | 150 | 150 | 75 | 75 | 10 - 175K | 250 Ω - 175K |
| 0805, 0705 | 250 | 200 | 100 | 100 | 10 - 475K | 250 Ω - 475K |
| 1005 | 250 | 250 | 100 | 100 | 10 - 649K | 250 Ω - 649K |
| 1010 | 500 | 500 | 150 | 100 | 50 - 1M | 250 Ω - 1M |
| 1206 | 400 | 400 | 200 | 200 | 10 - 1M | 250 Ω - 1M |
| 1505 | 400 | 400 | 150 | 150 | 10 - 1M | 250 Ω - 1M |
| 2208 | 800 | 750 | 150 | 150 | 10 - 1.75M | 250 Ω - 1M |
| 2010 | 800 | 750 | 200 | 150 | 10 - 2M | 250 Ω - 1M |
| 2512 | 1000 | 750 | 200 | 200 | 10 - 3M | 250 Ω - 1M |

* Pb-containing terminations are not RoHS compliant, exemptions may apply

## DIMENSIONS in inches

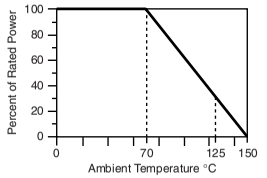



| CASE SIZE | TERM | L | W | T | D | E |
|---|---|---|---|---|---|---|
| 0402 | B | 0.042 ± 0.008 | 0.022 ± 0.005 | 0.012 to 0.033 | 0.010 ± 0.005 | 0.010 ± 0.005 |
| 0502 | B | 0.055 ± 0.006 | 0.025 ± 0.005 | 0.012 to 0.033 | 0.010 ± 0.005 | 0.015 ± 0.005 |
| 0505 | B | 0.055 ± 0.006 | 0.050 ± 0.005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

## ENVIRONMENTAL TESTS

| Environmental Test | 10 kΩ ΔR ± (%) | 100 kΩ ΔR ± (%) |
|---|---|---|
| Thermal Shock | 0.02 | 0.02 |
| Short Time Overload | 0.01 | 0.01 |
| Low Temperature Operation | 0.01 | 0.01 |
| Resistance to Solder Heat | 0.04 | 0.03 |
| Moisture Resistance | 0.02 | 0.01 |
| High Temperature Exposure | 0.03 | 0.06 |
| Load life (10 000 hrs, + 70 °C) | 0.05 | 0.05 |
| TCR | ± 25 ppm/°C | ± 25 ppm/°C |

## DERATING CURVE




## GLOBAL PART NUMBER INFORMATION

**New Global Part Numbering: P-1206E1002BBTS (preferred part number format)**

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

**GLOBAL MODEL**
P-

**CASE SIZE**
0402
0502
0505
0603
0805
1005
1010
1206
1505
2208
2010
2512

**TCR CHARACTERISTIC**
Y = ± 10 ppm/°C
D = ± 15 ppm/°C
E = ± 25 ppm/°C
H = ± 50 ppm/°C
K = ± 100 ppm/°C

**RESISTANCE**
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
1001 = 1 kΩ
1002 = 10 kΩ

**TOLERANCE**
Q = ± 0.02 %
A = ± 0.05 %
B = ± 0.1 %
D = ± 0.5 %
F = ± 1 %
G = ± 2 %
J = ± 5 %

**TERMINATION**
B = Solderable
G = Epoxy/Solderable
S = Lead (Pb)-free (e1)

**PACKAGING**
TAPE AND REEL
T0 = 100 Min 100 Mult
T1 = 1000 Min 1000 Mult
T3 = 300 Min 300 Mult
T5 = 500 Min 500 Mult
TF = Full Reel 2500
TS = 100 Min 1 Mult

UF = TUBED

**Historical Part Number example: P0805H6801BBT (will continue to be accepted)**

| P | 0805 | H | 6801 | B | B | T |
|---|---|---|---|---|---|---|
| STYLE | CASE SIZE | TCR CHARACTERISTIC | OHMIC VALUE | TOLERANCE | TERMINATION | PACKAGING |

Revision 10-May-06