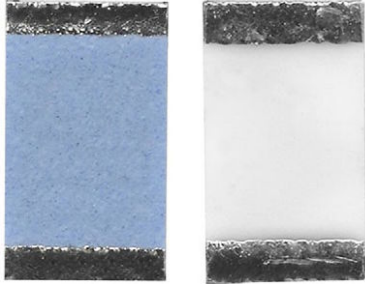


High Precision Wraparound - ± 2 ppm/°C TCR Thin Film Chip Resistors



LINKS TO ADDITIONAL RESOURCES



For low noise and precision applications, superior stability, low temperature coefficient of resistance, and low voltage coefficient, Vishay Sfernice's proven precision thin film wraparound resistors exceed requirements of MIL-PRF-55342G characteristics typical ± 2 ppm/°C (-55 °C; +155 °C).

FEATURES

- Load life stability 0.05 % typical at 2000 h at 70 °C under Pn
- Low temperature coefficient: **± 2 ppm/°C** (-55 °C; +155 °C)
- Very low noise < -35 dB and voltage coefficient < 0.01 ppm/V
- Wide resistance range: 100 Ω to 3.05 M Ω depending on size
- Tolerances to **± 0.01 %**
- Termination: thin film technology
- Sulfur resistant (per ASTM B809-95 humid vapor test)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

STANDARD ELECTRICAL SPECIFICATIONS

| MODEL | SIZE | RESISTANCE RANGE (Ω) | RATED POWER W Pn (1) | RATED POWER W Pd (1) | LIMITING ELEMENT VOLTAGE V | TOLERANCE \pm % |
|----------|------|-------------------------------|----------------------|----------------------|----------------------------|---|
| P2TC0402 | 0402 | 100 to 35K | 0.063 | 0.040 | 50 | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5 |
| P2TC0603 | 0603 | 100 to 128K | 0.125 | 0.100 | 75 | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5 |
| P2TC0805 | 0805 | 100 to 291K | 0.200 | 0.125 | 150 | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5 |
| P2TC1206 | 1206 | 100 to 1.09M | 0.330 | 0.250 | 200 | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5 |
| P2TC2010 | 2010 | 100 to 3.05M | 1 | 0.500 | 300 | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5 |

Notes

- (1) Pn = nominal power : Pd = derated power intended to improve stability
 (2) **For ohmic range versus tolerance and TCR see detailed table on next page**

CLIMATIC SPECIFICATIONS

| | |
|-----------------------------|-----------------|
| Operating temperature range | -55 °C; +155 °C |
|-----------------------------|-----------------|

Note

- For temperature up to 230 °C, see PHT datasheet (www.vishay.com/doc?53050)

PERFORMANCE VS. HUMID SULFUR VAPOR

| | |
|-----------------|--|
| Test conditions | 50 °C \pm 2 °C, 85 % \pm 4 % RH, exposure time 500 h |
| Test results | Resistance drift < (0.05 % R + 0.05 Ω), no corrosion products observed |

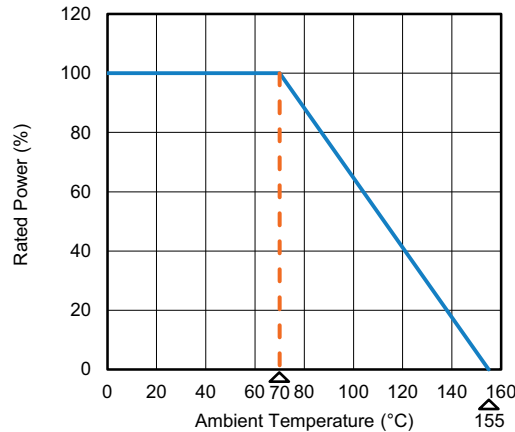
MECHANICAL SPECIFICATIONS

| | |
|--------------|---|
| Substrate | Alumina |
| Technology | Thin film |
| Film | Nickel chromium with mineral passivation |
| Protection | Epoxy + silicone |
| Terminations | N type: SnAg over nickel barrier for solder reflow G type: gold over nickel barrier for other applications |

| DIMENSIONS in millimeters (inches) | | | | | |
|---|------------------------------|------------------------------|-------------------------------|--------------|--------------|
| | | | | | |
| CASE SIZE | A | | C | D/E | |
| | MAX. TOL. +0.152 (+0.006) | MAX. TOL. +0.127 (+0.005) | | NOMINAL | TOLERANCE |
| | MIN. TOL. -0.152 (-0.006) | MIN. TOL. -0.127 (-0.005) | | | |
| NOMINAL | | NOMINAL | | | |
| 0402 | 1.00 (0.039) | 0.60 (0.024) | 0.5 (0.02) ± 0.127 (0.005) | 0.25 (0.010) | 0.1 (0.004) |
| 0603 | 1.52 (0.060) | 0.85 (0.033) | | 0.38 (0.015) | 0.13 (0.005) |
| 0805 | 1.91 (0.075) | 1.27 (0.050) | | 0.40 (0.016) | |
| 1206 | 3.06 (0.120) | 1.60 (0.063) | | 0.48 (0.019) | |
| 2010 | 5.08 (0.200) | 2.54 (0.100) | | | |

| SUGGESTED LAND PATTERN (to IPC-7351A) | | | |
|--|------------------------------------|-------------------|-------------------|
| | | | |
| CHIP SIZE | DIMENSIONS in millimeters (inches) | | |
| | Z _{max.} | G _{min.} | X _{max.} |
| 0402 | 1.55 (0.061) | 0.15 (0.006) | 0.73 (0.029) |
| 0603 | 2.37 (0.093) | 0.35 (0.014) | 0.98 (0.039) |
| 0805 | 2.76 (0.109) | 0.74 (0.029) | 1.40 (0.055) |
| 1206 | 3.91 (0.154) | 1.85 (0.073) | 1.73 (0.068) |
| 2010 | 5.93 (0.233) | 3.71 (0.146) | 2.67 (0.105) |

| TEMPERATURE COEFFICIENT | |
|--------------------------------|---|
| TYPICAL TCR (ppm/°C) | TYPICAL TCR AND MAX. SPREAD (ppm/°C) |
| ± 2 | ± 2 ± 2 |

POWER DERATING CURVE


| BEST TOLERANCE AND TCR VS. OHMIC VALUE | | |
|--|--------------|---|
| STYLE | RANGE (Ω) | TOLERANCE (± %) |
| 0402 | 100 to < 250 | 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |
| | 250 to 35K | 0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |
| 0603 | 100 to < 250 | 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |
| | 250 to 128K | 0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |
| 0805 | 100 to < 250 | 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |
| | 250 to 291K | 0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |
| 1206 | 100 to < 250 | 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |
| | 250 to 1M09 | 0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |
| 2010 | 100 to < 250 | 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |
| | 250 to 3M05 | 0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5 |

POPULAR OPTIONS

For any option it is recommended to consult Vishay Sfernice for availability first.

Option: Marking

Option to order 0013:

Marking of ohmic value and tolerance:

Sizes 0805: 3 digits marking (according to EIA-96)

Sizes 1206 and 2010: 4 digits marking (same codification than in the ordering procedure)

Tolerance indicated by a color dot.

Option to order 0014:

Marking of ohmic value:

Sizes 0805: 3 digits marking (according to EIA-96)

Sizes 1206 and 2010: 4 digits marking (same codification than in the ordering procedure)

No standard marking available for smaller sizes.

A price adder will apply to the unit price of the parts for options 0013 and 0014.



PACKAGING

ESD packaging available: waffle-pack, and plastic tape and reel (low conductivity).

| SIZE | MOQ | NUMBER OF PIECES PER PACKAGE | | TAPE WIDTH | |
|------|-----|------------------------------|---------------|------------|------|
| | | WAFFLE PACK 2" x 2" | TAPE AND REEL | | |
| | | | MIN. | | MAX. |
| 0402 | 100 | 340 | 100 | 8 mm | |
| 0603 | | 100 | | | 5000 |
| 0805 | | | | | 4000 |
| 1206 | | | | | 1000 |
| 2010 | | | | | 60 |

PACKAGING RULES

Waffle Pack

Can be filled up to maximum quantity indicated in the table here above, taking into account the minimum order quantity. When quantity ordered exceeds maximum quantity of a single waffle pack, the waffle packs are stacked up on the top of each other and closed by one single cover.

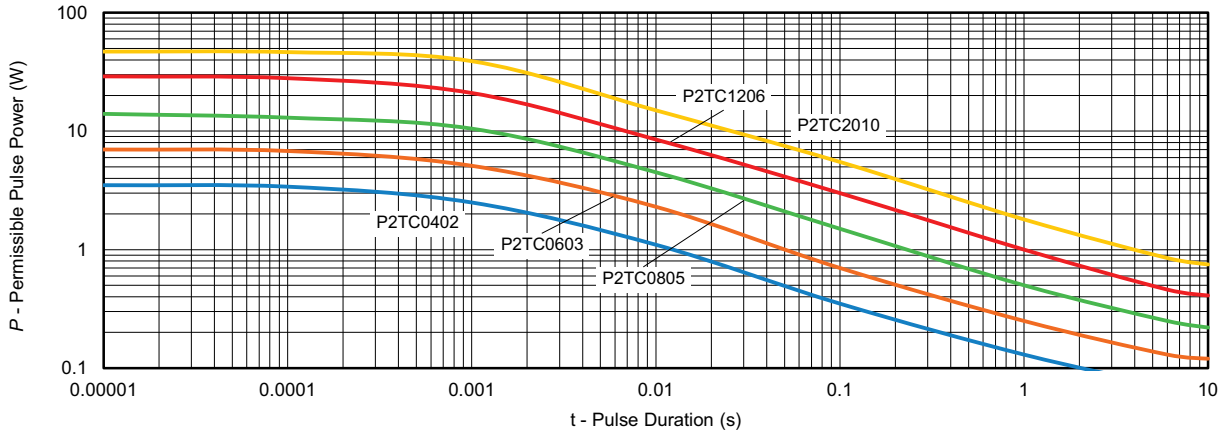
To get “not stacked up” waffle pack in case of ordered quantity > maximum number of pieces per package: Please consult Vishay Sfernice for specific ordering code.

Tape and Reel

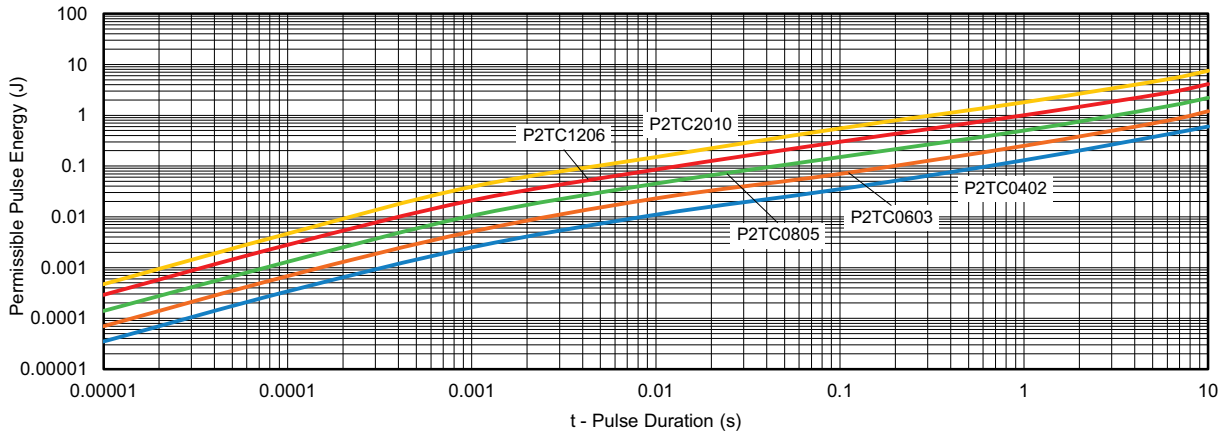
See Part Numbering information to get the quantity desired by tape.

| PERFORMANCE | | | |
|---------------------------|---|--------------------------|------------------------|
| TESTS | CONDITIONS | MIL OR CECC REQUIREMENTS | TYPICAL PERFORMANCES |
| Thermal shock | MIL-PRF-55342G MIL-STD-202 F-Method 107 F | ± 0.05 % | ± 0.02 % |
| Short time overload | MIL-PRF-55342G PARA 3.10.4.7.5 | ± 0.05 % | ± 0.01 % |
| Low temperature operation | MIL-PRF-55342G PARA 3.9 and 4.7.4 | ± 0.05 % | ± 0.01 % |
| Resistance to solder heat | MIL-PRF-55342G PARA 3.12, 4.7.7, 4.7.1.2 | ± 0.05 % | ± 0.03 % |
| Moisture resistance | MIL-PRF-55342G PARA 3.13 and 4.7.8 MIL-STD-202 F-Method 106 E | ± 0.10 % | ± 0.01 % |
| | CECC 56 days / 40 °C / 93 % RH | ± 0.10 % | ± 0.01 % |
| High temperature | MIL-PRF-55342G PARA 3.11 and 4.7.6 | ± 0.05 % | ± 0.05 % |
| Load life | MIL-PRF-55342G 8000 h Pn at 70 °C MIL-STD-202 F-Method 108 A | ± 0.5 % | ± 0.1 % ⁽²⁾ |

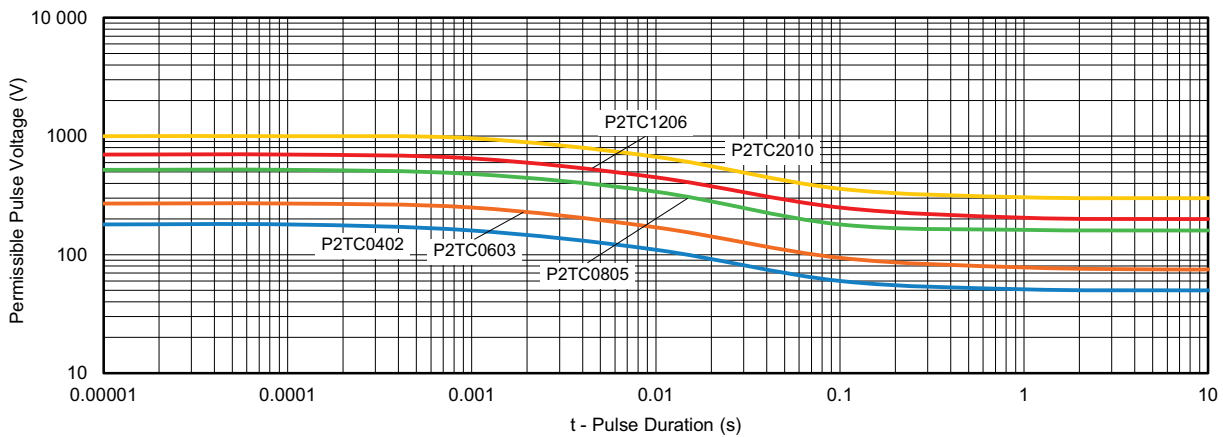
Maximum permissible pulse load P_i max. for single pulse ⁽¹⁾



Energy for single pulse ⁽¹⁾



Maximum permissible pulse voltage U_i max. for single pulse ⁽¹⁾

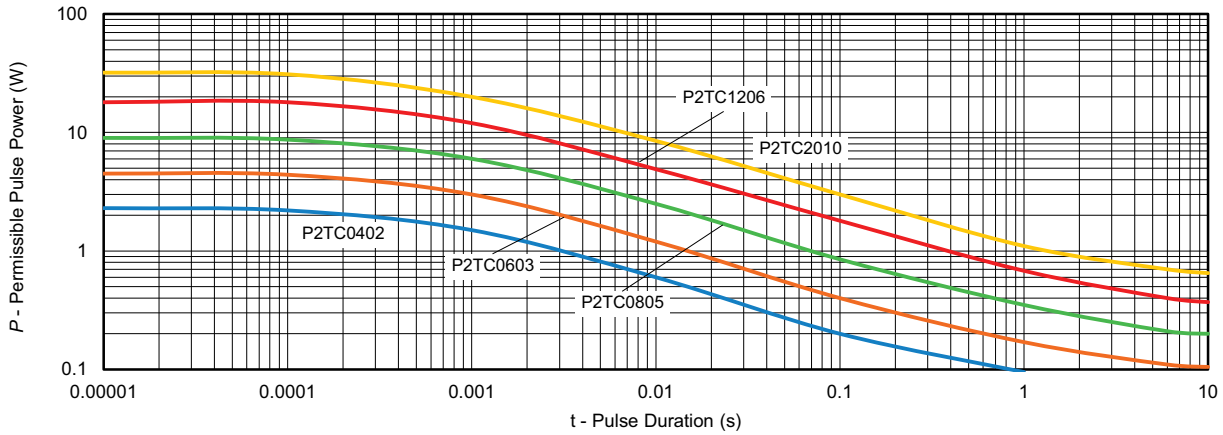


Note

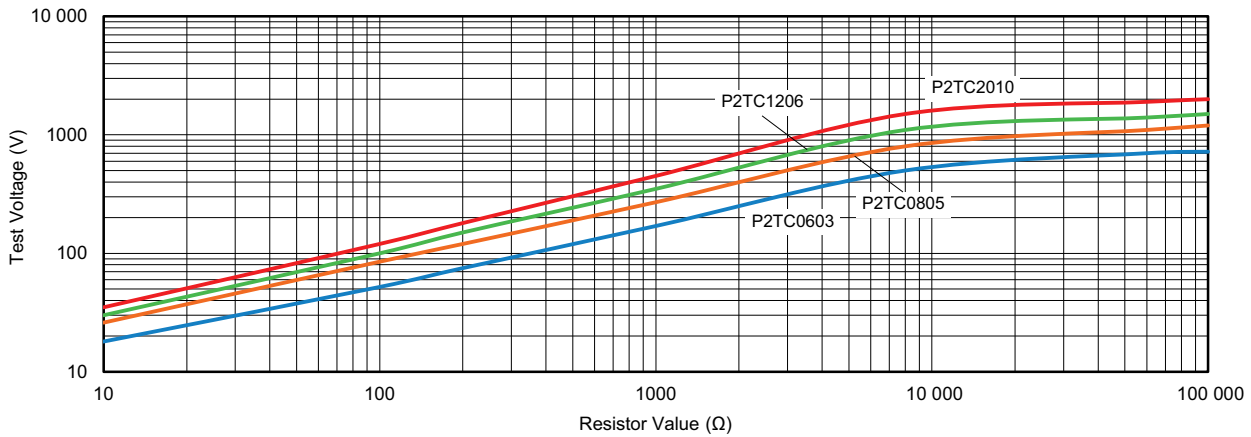
⁽¹⁾ One should apply the datas mentioned on the 3 curves together to get the right performances



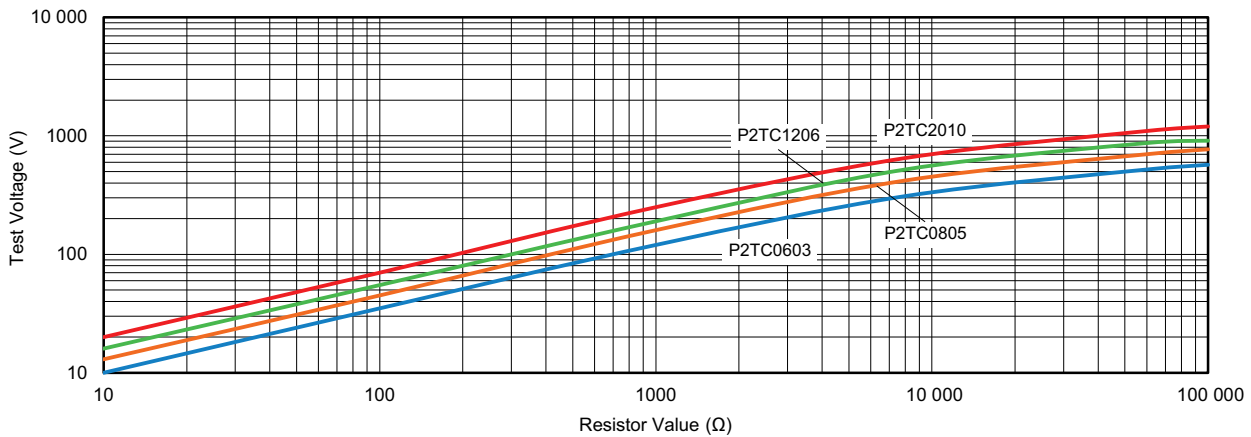
Maximum permissible pulse load P_i max.



1.2/50 μ s lightning surge



10/700 μ s lightning surge





| GLOBAL PART NUMBER INFORMATION | | | | | | | | | | | | | | | | | |
|---|--------------------------------------|-------------|--|---|---|---|---|---|---|--|--|--|---|---|---|---|---|
| New Global Part Numbering: P2TC1206D1003BNT99 | | | | | | | | | | | | | | | | | |
| P | 2 | T | C | 1 | 2 | 0 | 6 | D | 1 | 0 | 0 | 3 | B | N | T | 9 | 9 |
| GLOBAL MODEL | SIZE | TCR | VALUE | | | | | | TOLERANCE | TERMINATION | PACKAGING | OPTION | | | | | |
| P2TC | 0402 0603 0805 1206 2010 | D = ± 2 ppm | The first three digits are significant figures and the last digit specifies the number of zeros to follow, R designates decimal point Examples: 1000 = 100 Ω 3901 = 3900 Ω 1004 = 1 MΩ | | | | | | L = ± 0.01 % P = ± 0.02 % W = ± 0.05 % B = ± 0.1 % C = ± 0.25 % D = ± 0.5 % F = ± 1 % G = ± 2 % J = ± 5 % | N: SnAg over nickel barrier G: gold over nickel barrier | For more information see "Codification of packaging" table | For more information see "Codification of packaging" table Leave blank if no option | | | | | |

| CODIFICATION OF OPTIONS ON TWO DIGITS | |
|---------------------------------------|-----------------|
| OPTION | OPTION 2 DIGITS |
| .. | .. |
| 0099 | 99 |
| 0100 | 0A |
| 0101 | 0A |
| 0102 | 0C |
| 0103 | 0D |
| 0104 | 0E |
| 0105 | 0F |
| .. | .. |
| 0124 | 0Y |
| 0125 | 0Z |
| 0126 | 1A |
| 0127 | 1B |
| 0128 | 1C |
| .. | .. |
| 0320 | 8M |
| 0321 | 8N |
| 0322 | 8O |
| 0323 | 8P |
| 0324 | 8Q |
| 0325 | 8R |
| .. | .. |

| CODIFICATION OF SIZES | |
|-----------------------|---------|
| CODE 18 | CODE 40 |
| 9 | 0402 |
| C | 0603 |
| D | 0805 |
| H | 1206 |
| J | 2010 |

| CODIFICATION OF PACKAGING | |
|---|---|
| CODE 18 | PACKAGING |
| WAFFLE PACK | |
| W | 100 min., 1 mult. |
| WA | 100 min., 100 mult. (available only in size 1206) |
| PLASTIC TAPE (in standard for all sizes) | |
| T | 100 min., 1 mult. |
| TA | 100 min., 100 mult. |
| TB | 250 min., 250 mult. |
| TC | 500 min., 500 mult. |
| TD | 1000 min., 1000 mult. |
| TE | 2500 min., 2500 mult. |
| TF | Full tape (quantity depending on size of chips) |



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