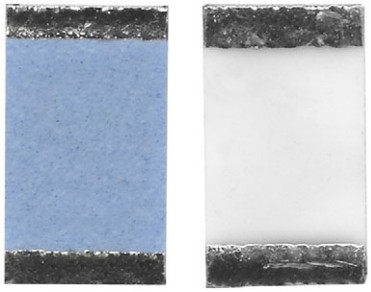
High Precision Wraparound - ± 2 ppm/°C TCR Thin Film Chip Resistors



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 MΩ 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

Pb-free Available

RoHS* Available

HALOGEN FREE Available

GREEN (5-2008) Available

LINKS TO ADDITIONAL RESOURCES

3D Models

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).

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

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE	RESISTANCE RANGE (Ω)	RATED POWER W Pn (1)	RATED POWER W Pd (1)	LIMITING ELEMENT VOLTAGE V	TOLERANCE ± %
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 ± 2 °C, 85 % ± 4 % RH, exposure time 500 h
Test results	Resistance drift < (0.05 % R + 0.05 Ω), no corrosion products observed

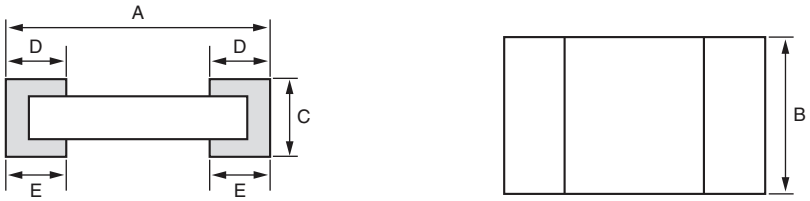
MECHANICAL SPECIFICATIONS

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 **B type:** SnPb over nickel barrier for solder reflow

For technical questions, contact: sferthinfilm@vishay.com

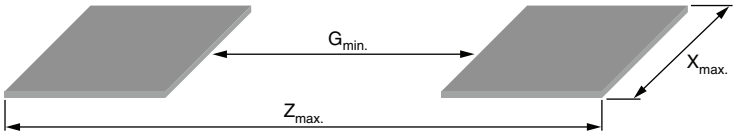
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DIMENSIONS in millimeters (inches)



CASE SIZE	A	B	C	D/E	
	MAX. TOL. +0.152 (+0.006) MIN. TOL. -0.152 (-0.006)	MAX. TOL. +0.127 (+0.005) MIN. TOL. -0.127 (-0.005)			
	NOMINAL	NOMINAL		NOMINAL	TOLERANCE
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)			
1206	3.06 (0.120)	1.60 (0.063)		0.40 (0.016)	
2010	5.08 (0.200)	2.54 (0.100)		0.48 (0.019)	

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)

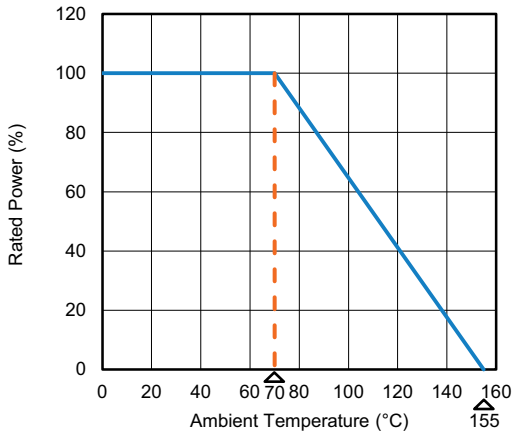
TEMPERATURE COEFFICIENT

TYPICAL TCR (ppm/°C)	TYPICAL TCR AND MAX. SPREAD (ppm/°C)
± 2	± 2 ± 2

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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 IEC 60062
Sizes 1206 and 2010: 4 digits marking according to IEC 60062
Tolerance indicated according to IEC 60062.

Option to order 0014:
Marking of ohmic value:
Sizes 0805: 3 digits marking according to IEC 60062
Sizes 1206 and 2010: 4 digits marking according to IEC 60062
No standard marking available for smaller sizes.
A price adder will apply to the unit price of the parts for options 0013 and 0014.

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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" × 2"	TAPE AND REEL		
			MIN.	MAX.	
0402	100	340	100	5000	8 mm
0603		100			
0805				4000	
1206		140			
2010		60		2000	12 mm

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.

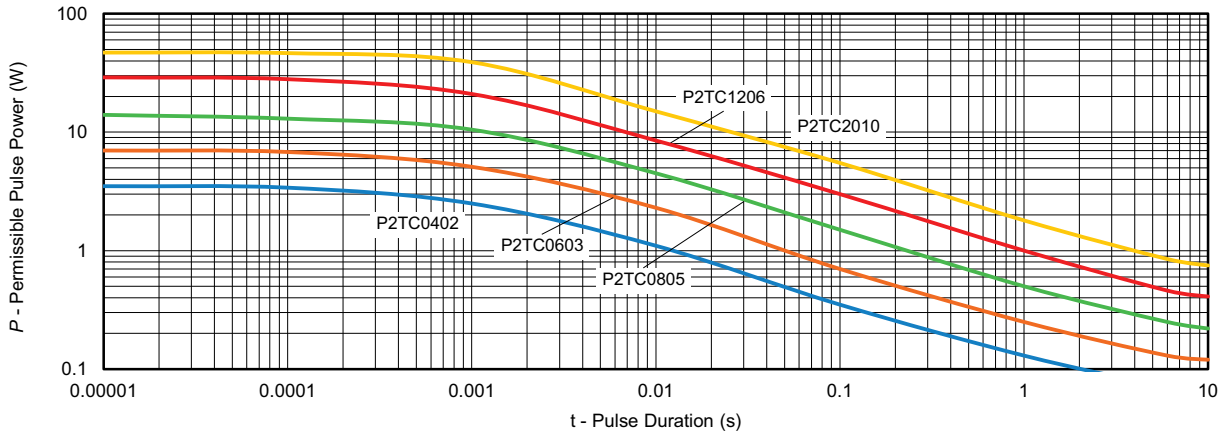
Tape and Reel

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

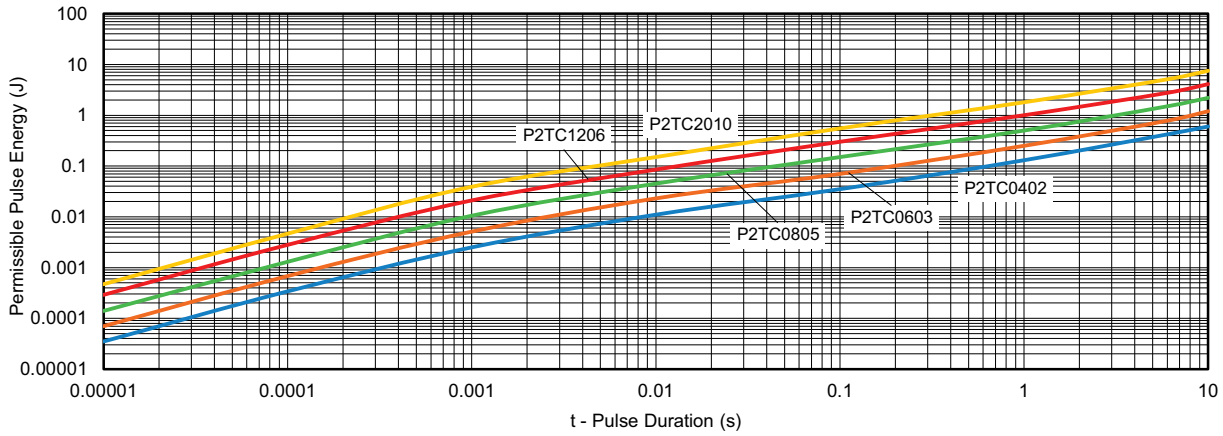
PERFORMANCE			
TESTS	CONDITIONS	MIL OR CECC REQUIREMENTS	TYPICAL PERFORMANCES
Thermal shock	MIL-PRF-55342G MIL-STD-202 F-Method 107 F	± 0.05 %	± 0.02 %
Short time overload	MIL-PRF-55342G PARA 3.10.4.7.5	± 0.05 %	± 0.01 %
Low temperature operation	MIL-PRF-55342G PARA 3.9 and 4.7.4	± 0.05 %	± 0.01 %
Resistance 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)

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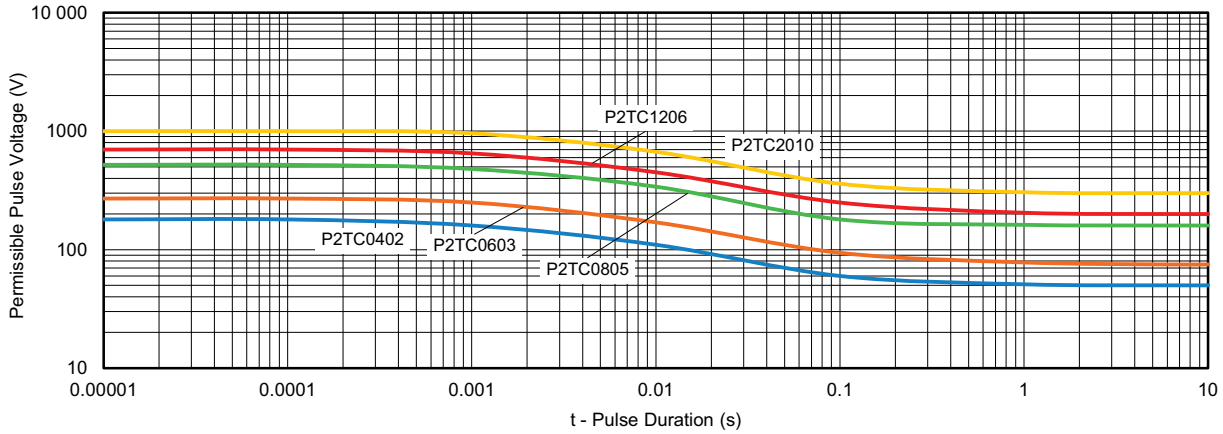
Maximum permissible pulse load P_i max. for single pulse (1)



Energy for single pulse (1)



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



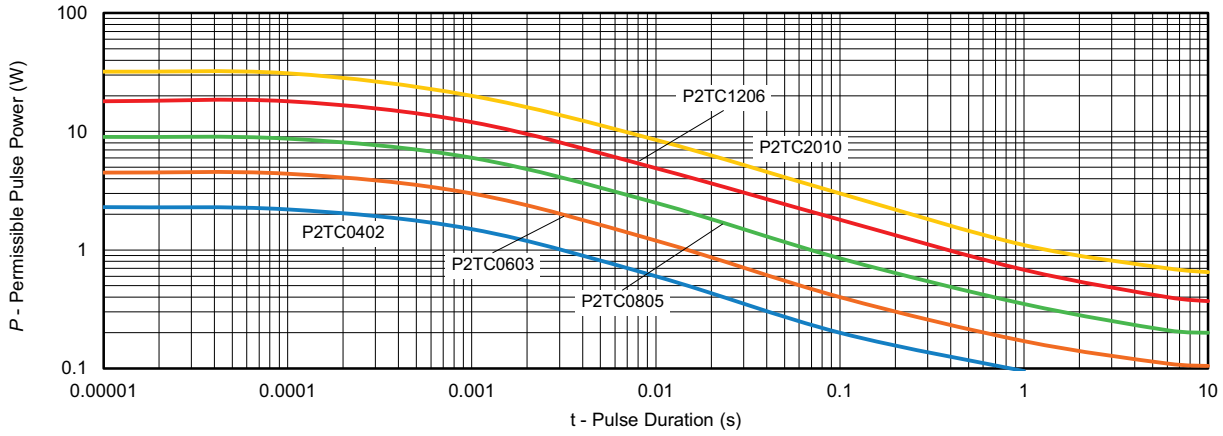
Note

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

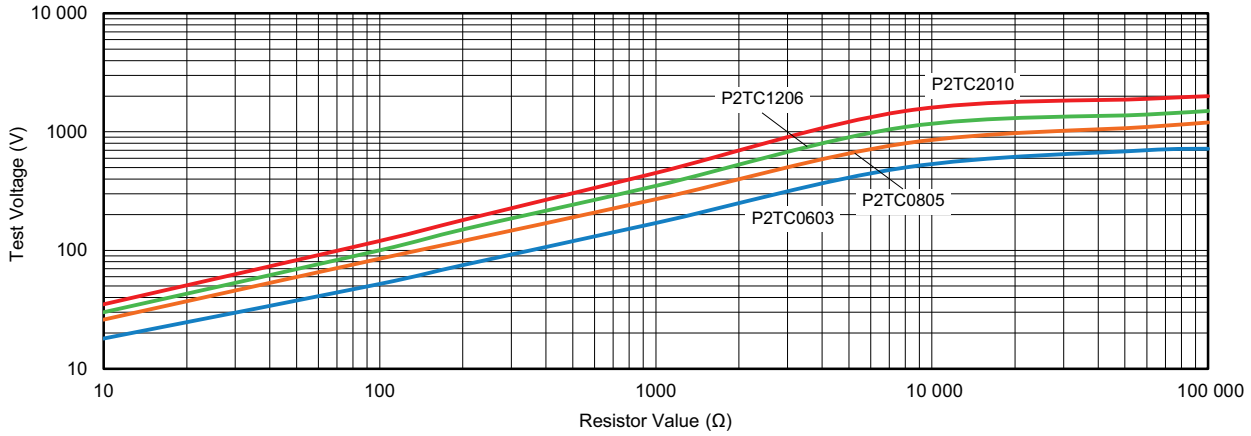
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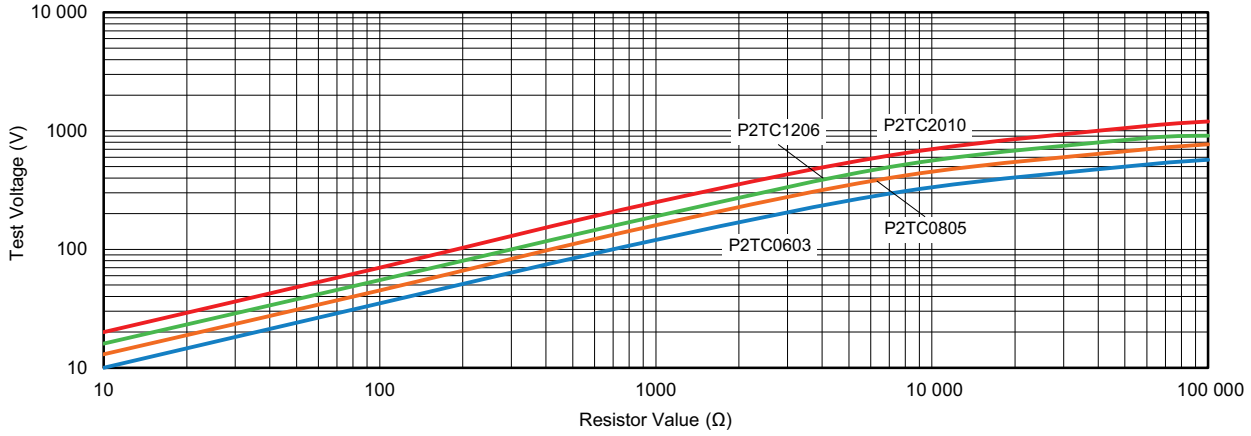
Maximum permissible pulse load P_l max.



1.2/50 µs lightning surge



10/700 µs lightning surge



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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 **B**: SnPb 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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