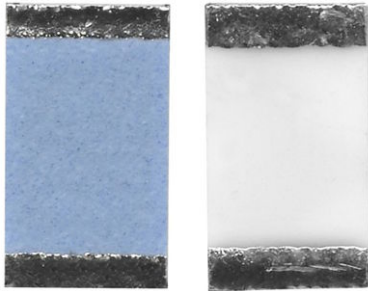


## High Precision Wraparound - Wide Ohmic Value Range Thin Film Chip Resistors



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 Y  $\pm 10$  ppm/ $^{\circ}$ C (- 55  $^{\circ}$ C; + 155  $^{\circ}$ C) down to  $\pm 5$  ppm/ $^{\circ}$ C (- 55  $^{\circ}$ C; + 155  $^{\circ}$ C).

### FEATURES

- Load life stability 0.02 % typical at 8000 h at 70  $^{\circ}$ C under Pd (0.033 % maximum)
- Low temperature coefficient down to **5 ppm/ $^{\circ}$ C** (- 55  $^{\circ}$ C; + 155  $^{\circ}$ C)
- Very low noise < - 35 dB and voltage coefficient < 0.01 ppm/V
- Wide resistance range: 10  $\Omega$  to 200 M $\Omega$  depending on size
- Tolerances to  **$\pm 0.01$  %**
- In lot tracking  $\leq 5$  ppm/ $^{\circ}$ C
- Termination: Thin film technology
- Short circuits (jumpers)  $r < 50$  mR,  $I < 2$  A, see PZR datasheet ([www.vishay.com/doc?53053](http://www.vishay.com/doc?53053))
- Withstand moisture resistance test of AEC-Q200
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://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.

### STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE	RESISTANCE RANGE <sup>(2)</sup> ( $\Omega$ )	RATED POWER W P <sub>n</sub> <sup>(1)</sup>	RATED POWER W P <sub>d</sub> <sup>(1)</sup>	LIMITING ELEMENT VOLTAGE V	TOLERANCE $\pm$ %	TEMPERATURE COEFFICIENT $\pm$ ppm/ $^{\circ}$ C
P0302	0302	10 to 750K	0.040	0.030	25	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100
P0402	0402	10 to 1.5M	0.063	0.040	50	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100
P0505	0505	10 to 4M	0.125	0.050	50	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100
P0603	0603	10 to 3.2M	0.125	0.100	75	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100
P0805 <sup>(3)</sup>	0805	10 to 10M	0.200	0.125	150	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100
P1005	1005	10 to 8.1M	0.250	0.125	75	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100
P1206	1206	10 to 35M	0.330	0.250	200	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100
P1505	1505	10 to 15M	0.350	0.175	200	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100
P2010	2010	10 to 76M	1 <sup>(4)</sup>	0.500	300	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100
P2512	2512	10 to 200M	2 <sup>(4)</sup>	1	300	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100

### Notes

- (1) P<sub>n</sub> = Nominal power - P<sub>d</sub> = Derated power intended to improve stability.
- (2) **For ohmic range versus tolerance and TCR see detailed table on next page.**
- (3) Model P0805 being same size than case 0705 with same performances, only codification of P0805 remains.
- (4) With special assembly care.

### CLIMATIC SPECIFICATIONS

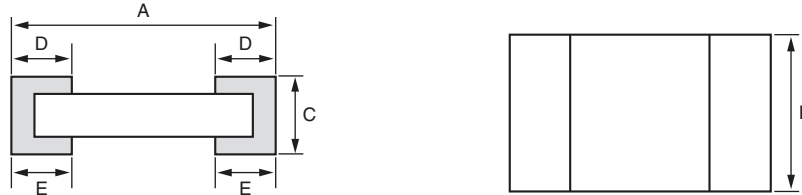
Operating temperature range	- 55 $^{\circ}$ C; + 155 $^{\circ}$ C
-----------------------------	---------------------------------------

### Note

- For temperature up to 230  $^{\circ}$ C, see PHT datasheet ([www.vishay.com/doc?53050](http://www.vishay.com/doc?53050))

### MECHANICAL SPECIFICATIONS

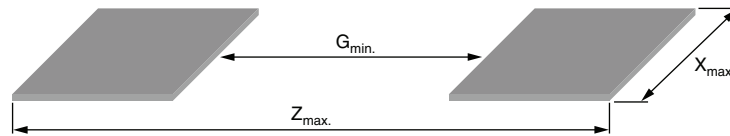
Substrate	Alumina
Technology	Thin film
Film	<b>Nickel chromium</b> with mineral passivation or <b>CrSi</b>
Protection	Silicone
Terminations	<b>B type:</b> SnPb over nickel barrier for solder reflow <b>N type:</b> SnAg over nickel barrier <b>G type:</b> gold over nickel barrier for other applications

**DIMENSIONS** in millimeters (inches)


CASE SIZE	DIMENSIONS in millimeters (inches)		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			
0302	0.75 (0.029)	0.60 (0.024)	0.5 (0.02) ± 0.127 (0.005)	0.15 (0.006)	0.08 (0.003)
0402	1.00 (0.039)	0.60 (0.024)		0.25 (0.010)	0.1 (0.004)
0505	1.27 (0.005)	1.27 (0.050)		0.38 (0.015)	0.13 (0.005)
0603	1.52 (0.060)	0.85 (0.033)			
0805	1.91 (0.075)	1.27 (0.050)			
1005	2.54 (0.100)	1.27 (0.050)			
1206	3.06 (0.120)	1.60 (0.063)			
1505	3.81 (0.150)	1.32 (0.052)			
2010	5.08 (0.200)	2.54 (0.100)			
2512	6.30 (0.248)	3.30 (0.130)			

**Notes**

- Case 0805 being same than case 0705, only codification of 0805 remains.

**SUGGESTED LAND PATTERN** (to IPC-7351A)


CHIP SIZE	DIMENSIONS in millimeters (inches)		
	Z <sub>max.</sub>	G <sub>min.</sub>	X <sub>max.</sub>
0302	1.30 (0.051)	0.15 (0.006)	0.73 (0.029)
0402	1.55 (0.061)	0.15 (0.006)	0.73 (0.029)
0505	1.82 (0.072)	0.10 (0.004)	1.40 (0.055)
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)
1005	3.39 (0.133)	1.37 (0.054)	1.40 (0.055)
1206	3.91 (0.154)	1.85 (0.073)	1.73 (0.068)
1505	4.66 (0.183)	2.44 (0.096)	1.45 (0.057)
2010	5.93 (0.233)	3.71 (0.146)	2.67 (0.105)
2512	7.15 (0.281)	4.93 (0.194)	3.43 (0.135)



TEMPERATURE COEFFICIENT		
TCR	CODE	FILM
± 5 ppm/°C	C (- 55 °C; + 155 °C)	NiCr
± 5 ppm/°C	Z (0 °C; + 70 °C)	NiCr
± 10 ppm/°C	Y	NiCr
± 25 ppm/°C	E	NiCr
± 50 ppm/°C	H	NiCr or CrSi
± 100 ppm/°C	K	NiCr or CrSi

**POWER DERATING CURVE**



BEST TOLERANCE AND TCR VS. OHMIC VALUE			
STYLE	RANGE (Ω)	TOLERANCE (± %)	TCR CODE
0302	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 35K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 35K to 50K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 50K to 75K	0.05; 0.1; 0.25; 0.5; 1; 2; 5	E; H; K
	> 75K to 750K	0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	H; K
0402	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 67K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 67K to 100K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 100K to 150K	0.05; 0.1; 0.25; 0.5; 1; 2; 5	E; H; K
	> 150K to 1M5	0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	H; K
0505	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 187K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 187K to 260K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 260K to 400K	0.05; 0.1; 0.25; 0.5; 1; 2; 5	E; H; K
	> 400K to 4M	0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	H; K
0603	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 160K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 160K to 332K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 332K to 500K	0.05; 0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	E; H; K
	> 500K to 3M2	0.1; 0.25; 0.5; 1; 2; 5	H; K
0805	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 360K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 360K to 511K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 511K to 750K	0.05; 0.1; 0.25; 0.5; 1; 2; 5	E; H; K
	> 750K to 10M	0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	H; K



BEST TOLERANCE AND TCR VS. OHMIC VALUE			
STYLE	RANGE (Ω)	TOLERANCE (± %)	TCR CODE
1005	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 400K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 400K to 550K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 550K to 810K	0.05; 0.1; 0.25; 0.5; 1; 2; 5	E; H; K
	> 810K to 8M1	0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	H; K
1206	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 1M3	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 1M3 to 2M	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 2M to 3M5	0.05; 0.1; 0.25; 0.5; 1; 2; 5	E; H; K
	> 3M5 to 35M	0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	H; K
1505	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 720K	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 720K to 1M	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 1M to 1M5	0.05; 0.1; 0.25; 0.5; 1; 2; 5	E; H; K
	> 1M5 to 15M	0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	H; K
2010	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 3M8	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 3M8 to 5M	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 5M to 7M5	0.05; 0.1; 0.25; 0.5; 1; 2; 5	E; H; K
	> 7M5 to 76M	0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	H; K
2512	10 to < 100	0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	100 to 7M6	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	C; Z; Y; E; H; K
	> 7M6 to 10M	0.01; 0.02; 0.05; 0.1; 0.25; 0.5; 1; 2; 5	Z; Y; E; H; K
	> 10M to 15M	0.05; 0.1; 0.25; 0.5; 1; 2; 5	E; H; K
	> 15M to 200M	0.1; 0.25; 0.5; 1; 2; 5 <sup>(1)</sup>	H; K

**Note**

<sup>(1)</sup> Tolerance 0.05 % on request

**POPULAR OPTIONS**

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

**Option: Enlarged Terminations**

For stringent and special power dissipation requirements, the thermal resistance between the resistive layer and the solder joint can be reduced using enlarged terminations chip resistors which are soldered on large and thick copper pads acting as heatsink (see application note: 53048 Power Dissipation in High Precision Vishay Sfernice Chip Resistors and Arrays (P Thin Film, PRA Arrays, CHP Thick Film) [www.vishay.com/doc?53048](http://www.vishay.com/doc?53048)).

Option to order 0063: (applies to size 1206/1505/2010).

<b>DIMENSIONS</b> (Option 0063) in millimeters							
CASE SIZE	A	B	E	D	F		
	MAX. TOL. + 0.152 MIN. TOL. - 0.152	MAX. TOL. + 0.127 MIN. TOL. - 0.127	MAX. TOL. + 0.13 MIN. TOL. - 0.13	MAX. TOL. + 0.13 MIN. TOL. - 0.13			
	NOMINAL	NOMINAL	NOMINAL	NOMINAL	NOMINAL	MIN.	MAX.
1206	3.06	1.60	0.40	1.215	0.63	0.50	0.76
1505	3.81	1.32	0.48	1.59			
2010	5.08	2.54		2.215			
2512	6.30	3.30		2.835			

<b>SUGGESTED LAND PATTERN</b> (Option 0063)			
CHIP SIZE	DIMENSIONS (IN MILLIMETER)		
	Z <sub>max.</sub>	G <sub>min.</sub>	X <sub>max.</sub>
1206	3.91	0.50	1.73
1505	4.66		1.45
2010	5.93		2.67
2512	7.15		3.43



Option: Marking

Option to order 0013:

Marking of ohmic value and tolerance:
Sizes: 0805 to 1005: 3 digits marking (according to EIA-96)
Sizes: 1206 to 2512: 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 to 1005: 3 digits marking (according to EIA-96)
Sizes: 1206 to 2512: 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.

Option: AEC-Q200

Moisture resistance

Option to Order 0058:

Specific production process to withstand 85 °C/85 % at Pn/10

PACKAGING

ESD packaging available: waffle-pack, and plastic tape and reel (low conductivity). Paper tape available upon request (ESD only) (for size 0603, 0805, and 1206).

Table with 5 columns: SIZE, MOQ, NUMBER OF PIECES PER PACKAGE (Waffle Pack, Tape and Reel), and TAPE WIDTH. Rows include sizes 0302, 0402, 0505, 0603, 0805, 1005, 1206, 1505, 2010, and 2512.

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

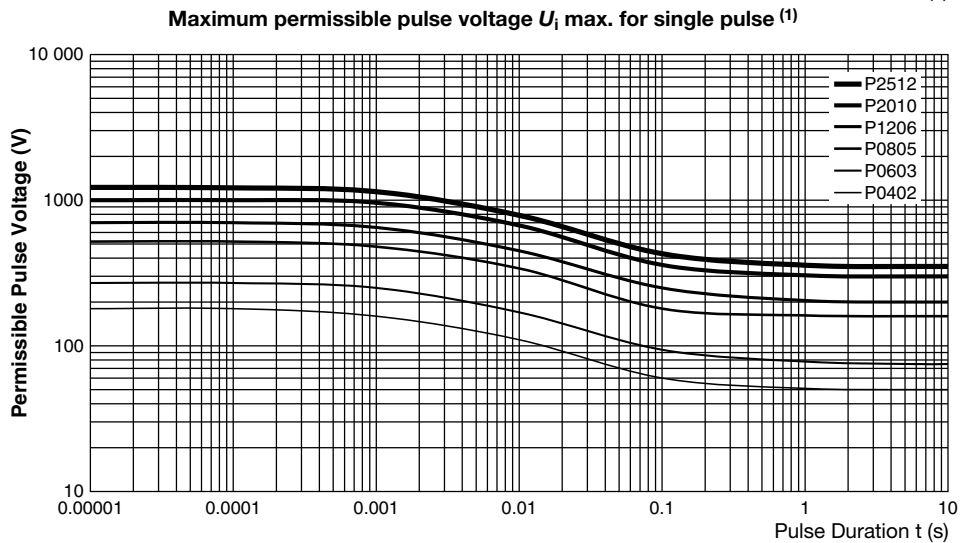
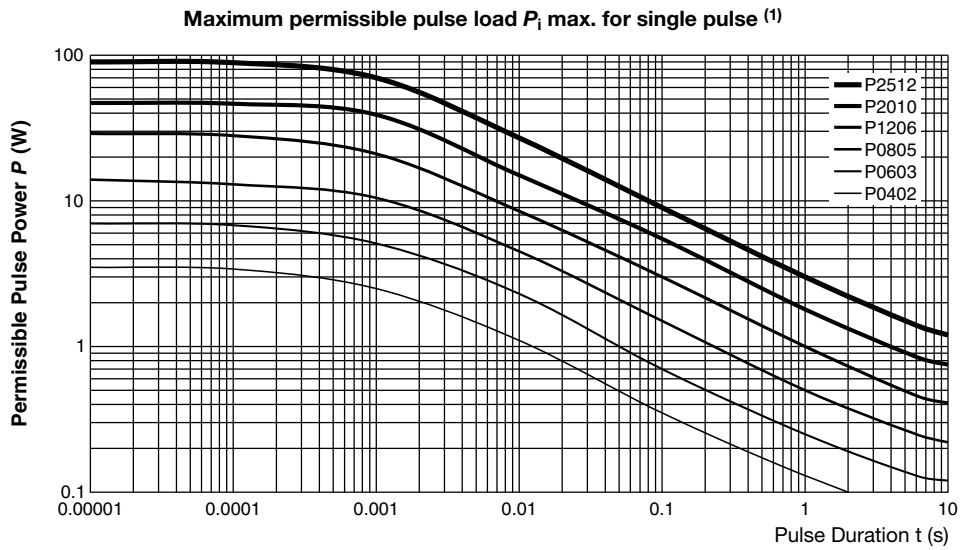
Can be filled up to maximum quantity indicated in the table here above, taking into account the minimum order quantity. When quantity ordered is between the MOQ and the maximum reel capacity, only one reel is provided.

When several reels are needed for ordered quantity within MOQ and maximum reel capacity: Please consult Vishay Sfernice for specific ordering code.

PERFORMANCE table with 4 columns: TESTS, CONDITIONS, MIL OR CECC REQUIREMENTS, and TYPICAL PERFORMANCES. Rows include Thermal shock, Short time overload, Low temperature operation, Resistance to solder heat, Moisture resistance, High temperature, and Load life.

Note

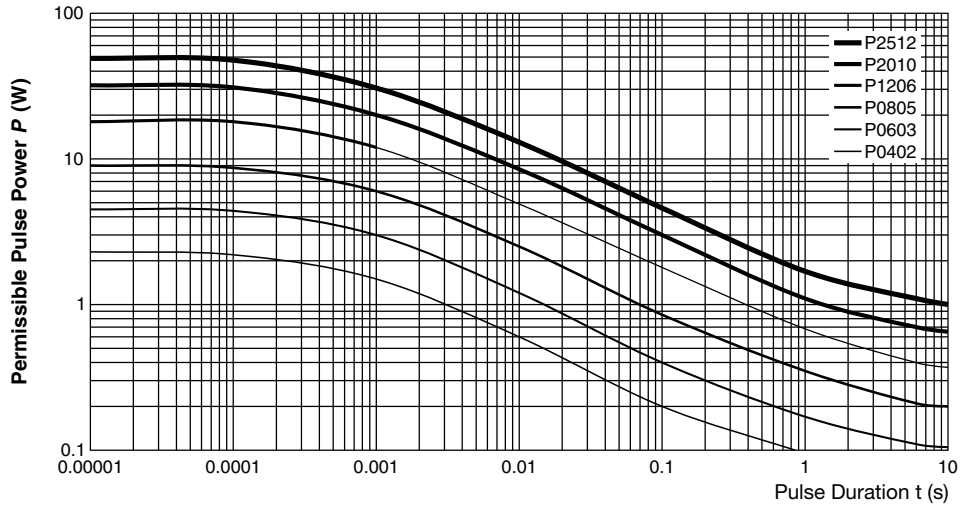
(1) Option to order 0058



**Note**

<sup>(1)</sup> One should apply the datas mentioned on the 3 curves together to get the right performances.

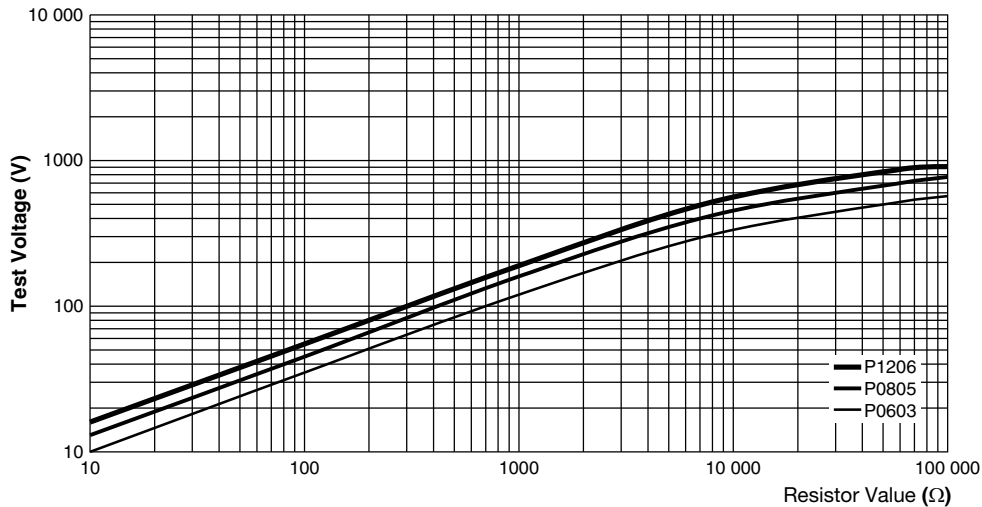
Maximum permissible pulse load  $P_i$  max.



1.2/50  $\mu$ s lightning surge



10/700  $\mu$ s lightning surge







GLOBAL PART NUMBER INFORMATION																
New Global Part Numbering: P0505Y1003BBT0999																
P	0	5	0	5	Y	1	0	0	3	B	B	T	0	9	9	9
GLOBAL MODEL	SIZE	TCR	VALUE	TOLERANCE	TERMINATION	PACKAGING	OPTION									
P	0302 0402 0505 0603 0805 1005 1206 1505 2010 2512	K = ± 100 ppm/°C H = ± 50 ppm/°C E = ± 25 ppm/°C Y = ± 10 ppm/°C Z = ± 5 ppm (0.70 °C) C = ± 5 ppm (- 55 °C; + 155 °C)	The first three digits are significant figures and the last digit specifies the number of zeros to follow, R designates decimal point  10R0 = 10 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 %	B: SnPb over nickel barrier N: SnAg over nickel barrier G: Gold over nickel barrier  B: Lead bearing version N and G: Lead (Pb)-free/RoHS version	Blank = Waffle pack T = Tape <sup>(1)</sup> PT = Paper tape <sup>(2)</sup>	Leave blank if no option									
Historical Part Number example: P 0505 Y 1003 B B TR R0999 e2																
HISTORICAL MODEL	SIZE	TCR	VALUE	TOLERANCE	TERMINATION	PACKAGING	OPTION	RoHS								
P	0302 0402 0505 0603 0805 1005 1206 1505 2010 2512	K = ± 100 ppm/°C H = ± 50 ppm/°C E = ± 25 ppm/°C Y = ± 10 ppm/°C Z = ± 5 ppm (0.70 °C) C = ± 5 ppm (- 55 °C; + 155 °C)	The first three digits are significant figures and the last digit specifies the number of zeros to follow, R designates decimal point  10R0 = 10 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 %	B: SnPb over nickel barrier N: SnAg over nickel barrier G: Gold over nickel barrier  B: Lead bearing version N and G: Lead (Pb)-free/RoHS version	Blank = Waffle pack TR = Tape <sup>(1)</sup>	Leave blank if no option	e2: Tin/silver e4: Gold Blank: SnPb								

**Notes**

- (1) For specific quantity of parts per packaging please consult Vishay Sfernice.
- (2) For paper tape please consult Vishay Sfernice (0603, 0805, and 1206 only).

**FAST TRACK SERVICE**

Vishay Sfernice offers fast track service - For conditions and availability please contact you Customer Service Representative.

**PTRIM**

Chips ready to be trimmed available. Please consult Vishay Sfernice.

**Notes**

- For CECC qualified, see RV datasheet ([www.vishay.com/doc?60022](http://www.vishay.com/doc?60022))
- For ESCC qualified, see PHR datasheet ([www.vishay.com/doc?53037](http://www.vishay.com/doc?53037)) or PFRR datasheet ([www.vishay.com/doc?53046](http://www.vishay.com/doc?53046))
- For High Temperature (230 °C), see PHT datasheet ([www.vishay.com/doc?53050](http://www.vishay.com/doc?53050))
- For Strap (0 Ω), see PZR datasheet ([www.vishay.com/doc?53053](http://www.vishay.com/doc?53053))



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**