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 ± 10 ppm/°C (- 55 °C; + 155 °C) down to ± 5 ppm/°C (- 55 °C; + 155 °C).

FEATURES

- Load life stability 0.02 % typical at 8000 h at 70 °C under Pd (0.033 % maximum)
- Low temperature coefficient down to **5 ppm/°C** (- 55 °C; + 155 °C)
- Very low noise < - 35 dB and voltage coefficient < 0.01 ppm/V
- Wide resistance range: 10 Ω to 76 MΩ depending on size
- Tolerances to **± 0.01 %**
- In lot tracking ≤ 5 ppm/°C
- Termination: Thin film technology
- Short circuits (jumpers) r < 50 mR, I < 2 A, see PZR datasheet (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

Pb-free Available

RoHS* COMPLIANT

GREEN (5-2008) Available

Note

* Lead (Pb)-containing terminations are not RoHS-compliant. Exemptions may apply.

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE	RESISTANCE RANGE (2) (Ω)	RATED POWER W Pn (1)	RATED POWER W Pd (1)	LIMITING ELEMENT VOLTAGE V	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°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 (3)	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	0.500	300	0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1, 2, 5	5, 10, 25, 50, 100

Notes

- Case size 2512 under development. Please consult Vishay Sfernice.

(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.**

(3) Model P0805 being same size than case 0705 with same performances, only codification of P0805 remains.

CLIMATIC SPECIFICATIONS

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

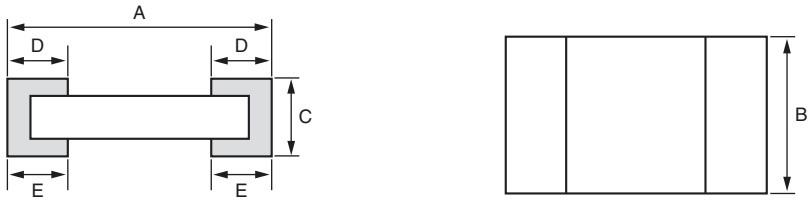
Note

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

MECHANICAL SPECIFICATIONS

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

DIMENSIONS in millimeters (inches)

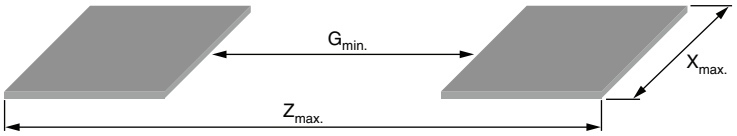


CASE SIZE	A	B	C	D/E	
	MAX. TOL. + 0.152 (+ 0.006) MIN. TOL. - 0.152 (- 0.006)	MAX. TOL. + 0.127 (+ 0.005) MIN. TOL. - 0.127 (- 0.005)			
	NOMINAL	NOMINAL		NOMINAL	TOLERANCE
0302	0.75 (0.029)	0.60 (0.024)	0.5 (0.02) ± 0.127 (0.005)	0.15 (0.006)	0.08 (0.003)
0402	1.00 (0.039)	0.60 (0.024)		0.25 (0.010)	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)		0.40 (0.016)	
1505	3.81 (0.150)	1.32 (0.052)		0.48 (0.019)	
2010	5.08 (0.200)	2.54 (0.100)			

Notes

- Case size 2512 under development. Please consult Vishay Sfernice.
- Case 0805 being same than case 0705, only codification of 0805 remains.

SUGGESTED LAND PATTERN (to IPC-7351A)



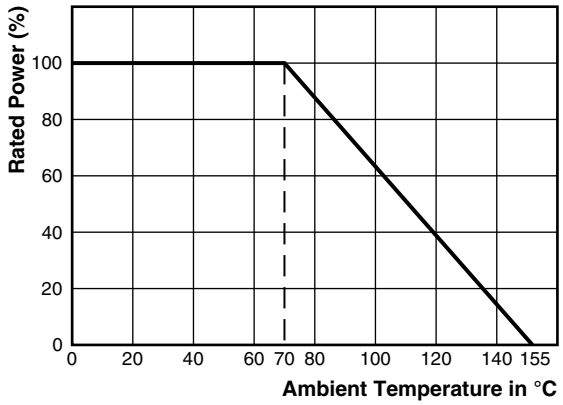
CHIP SIZE	DIMENSIONS (in millimeter)		
	$Z_{max.}$	$G_{min.}$	$X_{max.}$
0302	1.30	0.14	0.73
0402	1.55	0.15	0.73
0505	1.82	0.10	1.40
0603	2.37	0.35	0.98
0805	2.76	0.74	1.40
1005	3.39	1.37	1.40
1206	3.91	1.85	1.73
1505	4.66	2.44	1.45
2010	5.93	3.71	2.67

Note

- Case size 2512 under development. Please consult Vishay Sfernice.

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 (1)	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 (1)	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 (1)	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 (1)	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 (1)	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 (1)	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 (1)	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 (1)	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 (1)	H; K

Note

- Tolerance 0.05 % on request

POPULAR OPTIONS

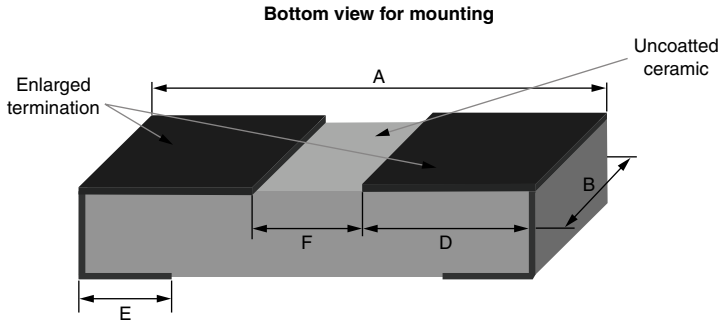
For any option it is recommended to consult Vishay Sfernice for availability first.

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.

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

DIMENSIONS (Option 0063) in millimeters

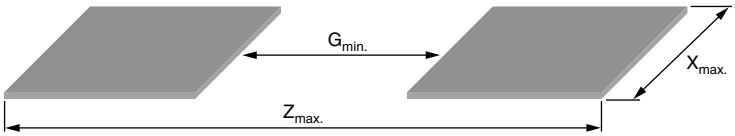


CASE SIZE	A	B	E	D	F		
	MAX. TOL. + 0.152 MIN. TOL. - 0.152	MAX. TOL. + 0.127 MIN. TOL. - 0.127	MAX. TOL. + 0.13 MIN. TOL. - 0.13	MAX. TOL. + 0.13 MIN. TOL. - 0.13			
	NOMINAL	NOMINAL	NOMINAL	NOMINAL	NOMINAL	MIN.	MAX.
1206	3.06	1.60	0.40	1.215	0.63	0.50	0.76
1505	3.81	1.32	0.48	1.59			
2010	5.08	2.54		2.25			

Note

- Case size 2512 under development. Please consult Vishay Sfernice.

SUGGESTED LAND PATTERN (Option 0063)



CHIP SIZE	DIMENSIONS (IN MILLIMETER)		
	$Z_{max.}$	$G_{min.}$	$X_{max.}$
1206	3.91	0.50	1.73
1505	4.66		1.45
2010	5.93		2.67

Note

- Case size 2512 under development. Please consult Vishay Sfernice.

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 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 to 1005: 3 digits marking (according to EIA-96)
Sizes: 1206 to 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.

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).

SIZE	MOQ	NUMBER OF PIECES PER PACKAGE			TAPE WIDTH
		WAFFLE PACK 2" × 2"	TAPE AND REEL		
			MIN.	MAX.	
0302	100	100	100	5000	8 mm
0402					
0505					
0603					
0805				4000	
1005		221			
1206		140			
1505		60			
2010			100	2000	8 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

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.

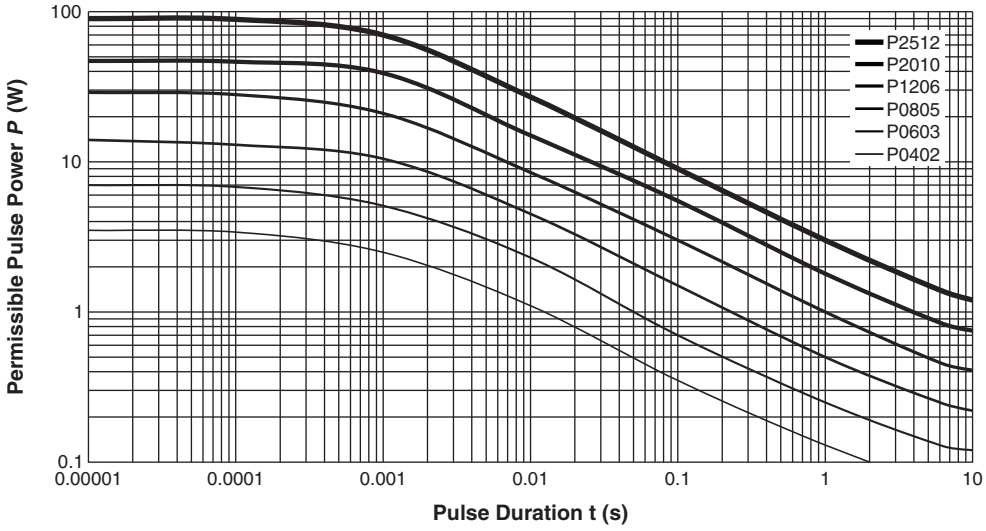
PERFORMANCE

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 %
	AEC-Q200 (1) 85 °C/85 % RH/Pn/10 1000 h	± 0.5 % + 0.05 Ω	Max. < 0.3 % + 0.05 Ω
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 %	± 0.02 % (1)

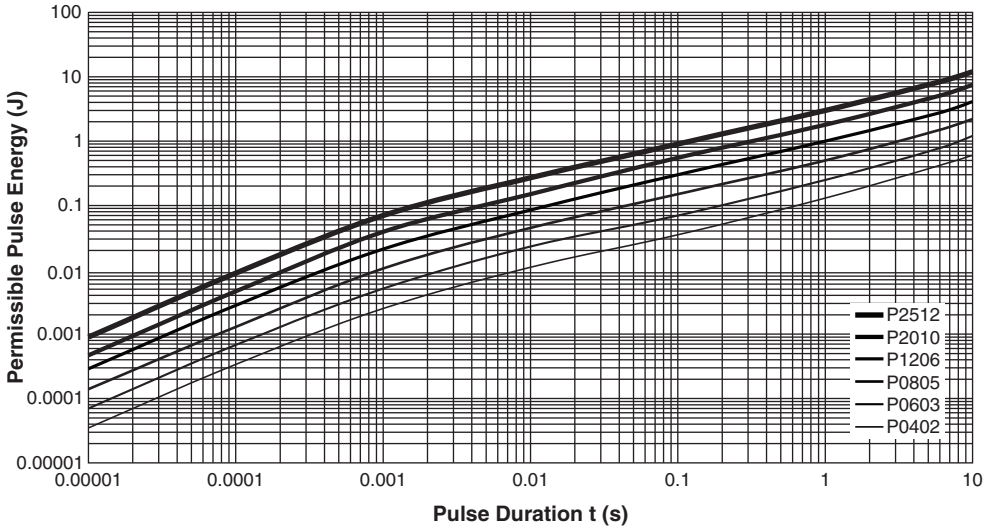
Note

(1) Option to order 0058

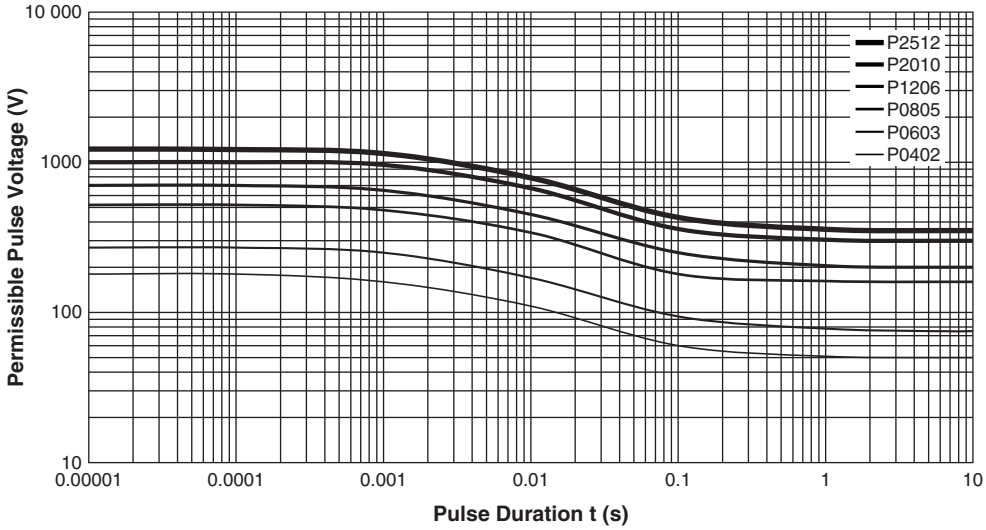
Maximum permissible pulse load P_i max. for single pulse



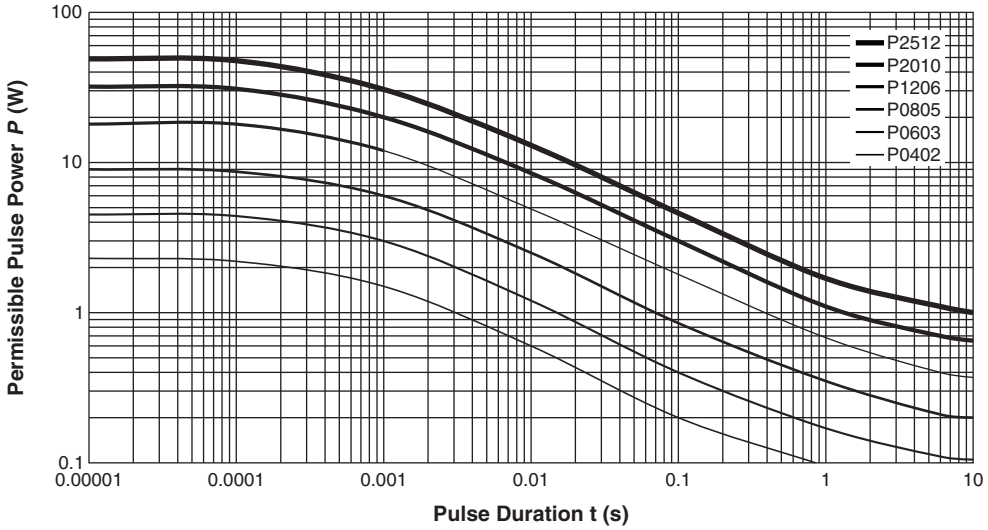
Energy for single pulse



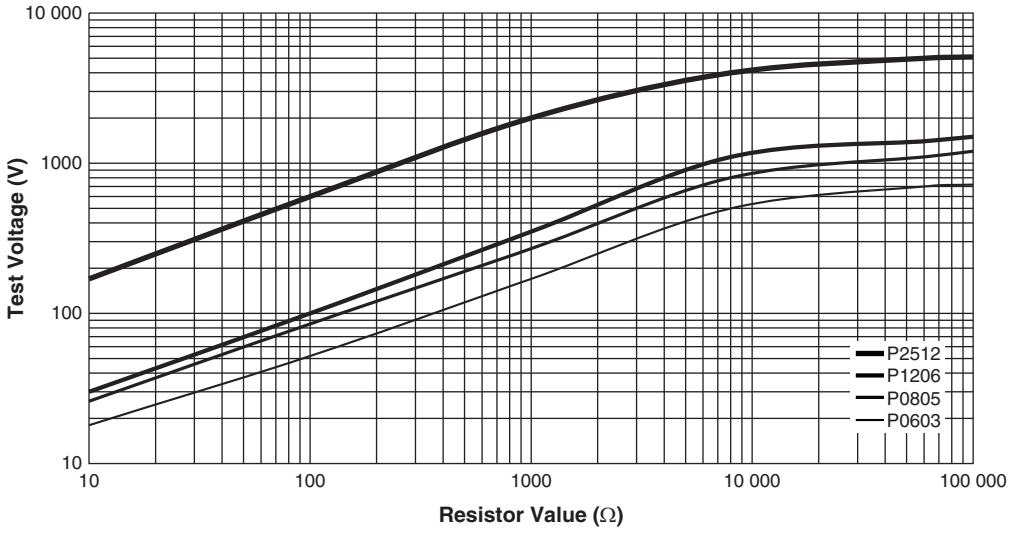
Maximum permissible pulse voltage U_i max.



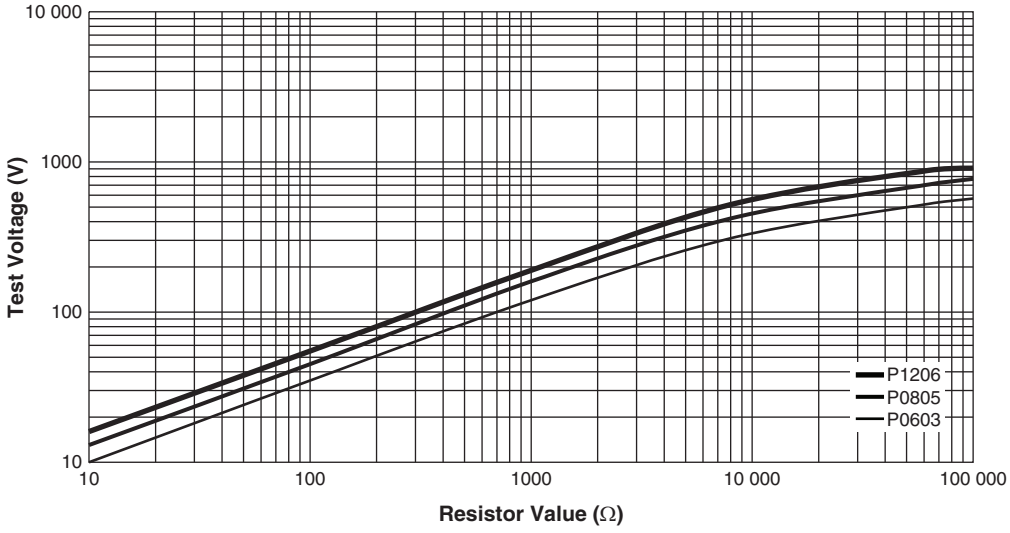
Maximum permissible pulse load P_i max.



1.2/50 µs lightning surge



10/700 µs 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**	**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 [1] **PT** = Paper tape [2]	Leave blank if no option

Historical Part Number example: P 0505 Y 1003 B B TR R0999 e2

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**	**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 [1]	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.

P_{TRIM}

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

Notes

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

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