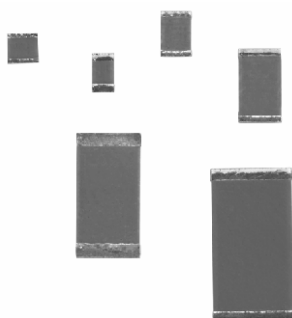


## High Stability Resistor Chips (< 0.25 % at Pn at 70 °C during 1000 h) Thick Film Technology



### FEATURES

- Robust terminations
- Large ohmic value range 0.1  $\Omega$  to 100 M $\Omega$
- Tight tolerance to 0.5 %
- CHP: Standard passivated version for industrial, professional and military applications
- HCHP: For high frequency applications
- ESCC approved see CHPHR
- SMD wraparound chip resistor
- Halogen-free according to IEC 61249-2-21 definition
- Withstand moisture resistance test of AEC-Q200
- Compliant to RoHS directive 2002/95/EC



**RoHS\***  
COMPLIANT  
HALOGEN  
FREE

Vishay Sfernice thick film resistor chips are specially designed to meet very stringent specifications in terms of reliability, stability < 0.25 % at Pn at + 70 °C during 1000 h, homogeneity, reproducibility and quality.

They conform to specifications NFC 83-240 and MIL-R-55342 D.

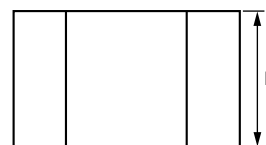
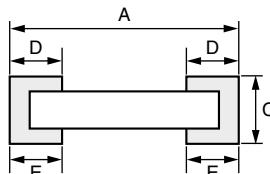
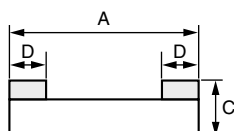
Evaluated to ESCC 4001/026 (see CHPHR datasheet).

Sputtered Thin Film terminations, with nickel barrier, are very convenient for high operating conditions. They can withstand thousands of very severe thermal shocks.

B (W/A), N (W/A) and F (one face) types are for solder reflow assembly.

G (W/A) and W (one face) types are for wire bonding, gluing and even high temperature solder reflow.

### DIMENSIONS in millimeters (inches)



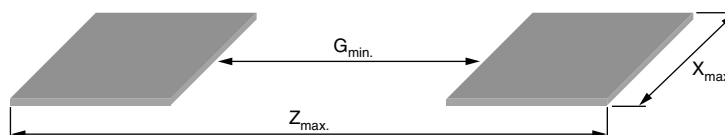
CASE SIZE	A		B		C		D/E	
	VALUE	TOL.	VALUE	TOL.	VALUE	TOL.	VALUE	TOL.
0502	1.27 (0.050)	0.152 (0.006)	0.60 (0.024)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
0505	1.27 (0.050)	0.152 (0.006)	1.27 (0.050)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
0603	1.52 (0.060)	0.152 (0.006)	0.85 (0.033)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
0705/0805	1.91 (0.075)	0.152 (0.006)	1.27 (0.050)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
1005	2.54 (0.100)	0.152 (0.006)	1.27 (0.050)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
1206	3.05 (0.120)	0.152 (0.006)	1.70 (0.067)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
1505	3.81 (0.150)	0.152 (0.006)	1.32 (0.052)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
2010	5.08 (0.200)	0.152 (0.006)	2.54 (0.100)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
1020	2.54 (0.100)	0.152 (0.006)	5.08 (0.200)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
2208	5.58 (0.220)	0.152 (0.006)	2.00 (0.079)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
2512	6.35 (0.250)	0.152 (0.006)	3.30 (0.130)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
1010	2.54 (0.100)	0.152 (0.006)	2.54 (0.100)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)

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

High Stability Resistor Chips  
( $< 0.25\%$  at  $P_n$  at  $70\text{ }^{\circ}\text{C}$  during 1000 h)  
Thick Film Technology

Vishay Sfernice

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



CASE SIZE	DIMENSION in mm (inches)		
	$Z_{max.}$	$G_{min.}$	$X_{max.}$
0502	1.82 (0.072)	0.10 (0.004)	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 (0.038)
0705/0805	2.76 (0.109)	0.74 (0.029)	1.40 (0.055)
1005	3.39 (0.134)	1.37 (0.054)	1.40 (0.055)
1206	3.90 (0.154)	1.88 (0.074)	1.73 (0.068)
1505	4.66 (0.184)	2.64 (0.104)	1.45 (0.057)
2010	5.93 (0.234)	3.91 (0.154)	2.67 (0.105)
1020	3.39 (0.134)	1.37 (0.054)	5.21 (0.205)
2208	6.43 (0.253)	4.41 (0.174)	2.04 (0.080)
2512	7.20 (0.284)	5.18 (0.204)	3.19 (0.125)
1010	3.39 (0.134)	1.37 (0.054)	2.67 (0.105)

ELECTRICAL SPECIFICATIONS					
CASE SIZE	POWER RATING $P_n$ mW	LIMITING ELEMENT VOLTAGE V	MAX. OVERLOAD VOLTAGE V	MAX. RESISTANCE <sup>(1)</sup> M $\Omega$	UNIT WEIGHT mg
0502	50	50	100	25	1
0505	125	50	100	10	3
0603	125	50	100	25	2
0705/0805	200	150	300	25	4
1005	250	150	300	50	5
1206	250	200	400	50	8
1505	500	200	400	75	8
2010	1000 <sup>(2)</sup>	200	400	100	26
1020	1000 <sup>(2)</sup>	200	400	10	25
2208	750	200	400	100	21
2512	2000 <sup>(2)</sup>	250	500	100	42
1010	500	200	400	25	12

**Notes**

<sup>(1)</sup> Shall be read in conjunction with other tables

<sup>(2)</sup> With special assembly care

**ELECTRICAL SPECIFICATIONS**

Resistance range: 0.1R to 100M  
 Resistance tolerance: 0.5 % to 10 %  
 Power dissipation: Pn: 50 mW to 2 W  
 Temperature coefficient: K: 100 ppm/°C  
 L: 200 ppm/°C

**MECHANICAL SPECIFICATIONS**

Substrate: Alumina  
 Technology: Thick film (Ruthenium oxyde)  
 Protection: Epoxy coating  
 Terminations: **B (W/A)**: SnPb over nickel barrier for solder reflow  
**N (W/A)**: SnAg over nickel barrier for solder reflow  
**F (Flip Chip)**: SnAg over nickel barrier for solder reflow  
**W (one face) and G (W/A) type**: gold over nickel barrier for other applications

**Note**

- Refer to Application Note "Guidelines for Vishay Sfernice Resistive and Inductive Components" (document number: 52029) for recommended reflow profile. Profile #3 applies.

**CLIMATIC SPECIFICATIONS**

Operating temp. range: - 55 °C to + 155 °C

**Note**

- For temperature up to 215 °C please consult Vishay Sfernice

**BEST TOL. AND TCR VERSUS OHMIC VALUE <sup>(1)</sup>**

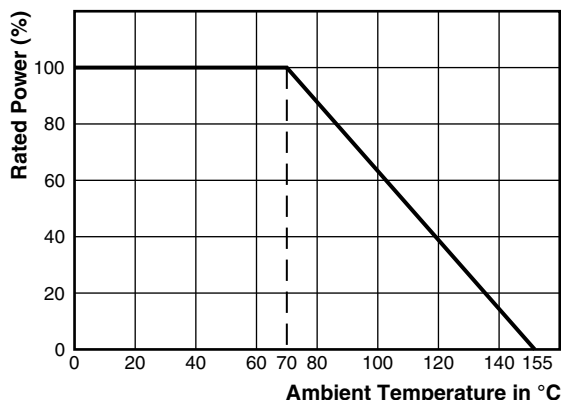
TIGHTEST TOLERANCE	OHMIC VALUES	BEST TCR ppm/°C
0.5 % (D)	10 Ω < R < 5M	100 (K)
1 % (F)	5 Ω < R < 10M	100 (K)
2 % (G)	1 Ω < R < R max.	200 (L)
5 % (J)	0.1 Ω < R < R max.	200 (L)

**Note**

<sup>(1)</sup> Improved performance on request

**CHIPS FOR HIGH FREQUENCY APPLICATIONS**

The HF performance of flip chip and W/A types can be improved on request.  
 Please ask for HCHP

**POWER DERATING CURVE****PACKAGING**

ESD packaging available: Waffle pack and plastic tape and reel (low conductivity). Paper tapes available on request (ESD only).

SIZE	NUMBER OF PIECES PER PACKAGE		TAPE WIDTH		
	WAFFLE PACK	TAPE AND REEL			
		MIN.		MAX.	
0502	100	100	4000	8 mm	
0505					
0603					
0805					
1005	140				
1206					
1505	60				
2010					
1010	100			1000	8 mm <sup>(2)</sup>
2208	60			4000	8 mm <sup>(2)</sup>
1020	60			1000	8 mm <sup>(2)</sup>
2512	45			2000	8 mm <sup>(2)</sup>

**Note**

<sup>(2)</sup> 12 mm on request

**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**

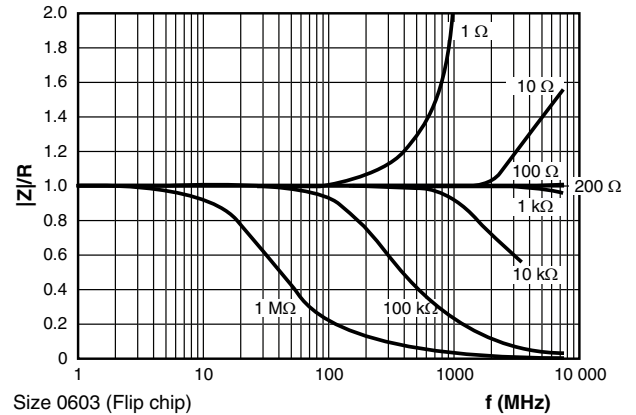
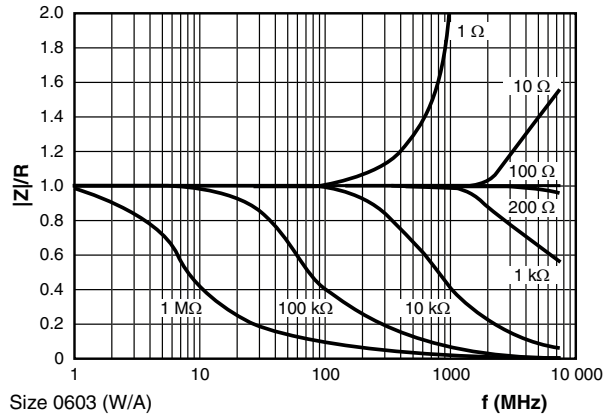
Can be filled up to maximum quantity indicated in the table here above, taking into account the minimum order quantity. When quantity ordered is between the MOQ and the maximum reel capacity, only one reel is provided.

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

## High Stability Resistor Chips ( $< 0.25\%$ at Pn at $70^\circ\text{C}$ during 1000 h) Thick Film Technology

Vishay Sfernice

### TYPICAL HF PERFORMANCE OF HCHP



### POPULAR OPTIONS

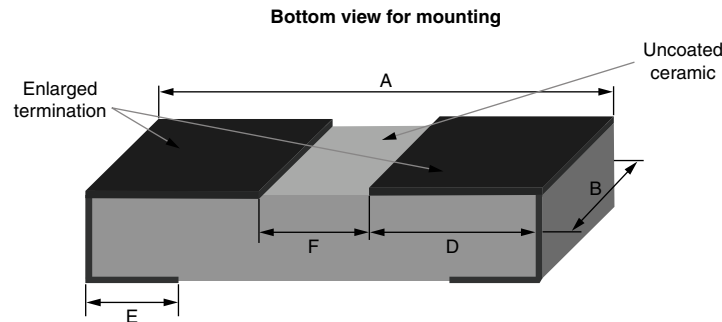
For any option it is recommended to consult Vishay Sfernice for availability first.

#### 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 heat sinks (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 1206/1505/1020/2010/2512).

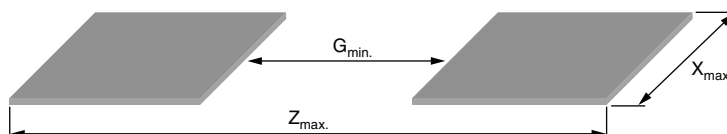
### DIMENSIONS (Option 0063) in millimeters



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 (0.120)	1.60 (0.063)	0.40 (0.016)	1.22 (0.048)	0.63 (0.024)	0.50 (0.020)	0.76 (0.030)
1505	3.81 (0.150)	1.32 (0.052)	0.48 (0.019)	1.59 (0.063)	0.63 (0.024)	0.50 (0.020)	0.76 (0.030)
1020	2.54 (0.100)	5.08 (0.200)		0.96 (0.038)	0.63 (0.024)	0.50 (0.020)	0.76 (0.030)
2010	5.08 (0.200)	2.54 (0.100)		2.23 (0.088)	0.63 (0.024)	0.50 (0.020)	0.76 (0.030)
2512	6.35 (0.250)	3.06 (0.120)		2.86 (0.11)	0.63 (0.024)	0.50 (0.020)	0.76 (0.030)

### High Stability Resistor Chips ( $< 0.25\%$ at Pn at $70\text{ }^{\circ}\text{C}$ during 1000 h) Thick Film Technology

#### SUGGESTED LAND PATTERN (Option 0063)



CHIP SIZE	DIMENSIONS (in millimeters)		
	$Z_{max.}$	$G_{min.}$	$X_{max.}$
1206	3.91 (0.154)	0.50 (0.020)	1.73 (0.068)
1505	4.66 (0.183)	0.50 (0.020)	1.45 (0.057)
1020	3.39 (0.133)	0.50 (0.020)	5.21 (0.205)
2010	5.93 (0.233)	0.50 (0.020)	2.67 (0.105)
2512	7.20 (0.283)	0.50 (0.020)	3.19 (0.126)

#### Option: High Temperature (please consult)

For applications such as down hole drilling, high temperature withstanding is required. Vishay Sfernice offers an option for utilization on extended temperature range:  $[- 55\text{ }^{\circ}\text{C}; + 215\text{ }^{\circ}\text{C}]$  powered (and up to  $230\text{ }^{\circ}\text{C}$  unpowered).

For guidance in designs, please refer to application note: 53047 Power Dissipation Considerations in High Precision Vishay Sfernice Thin Film Chip Resistors and Arrays (P, PRA etc.) (High Temperature Application) [www.vishay.com/doc?53047](http://www.vishay.com/doc?53047).

#### Option to order 0151:

Please consult Vishay Sfernice

Parts have double and organic coating above mineral coating (overglaze)

External coating color: Blue

Marking: HT

Terminations: Gold ( $< 1\text{ }\mu\text{m}$ ) for reflow or conductive glue

#### 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.

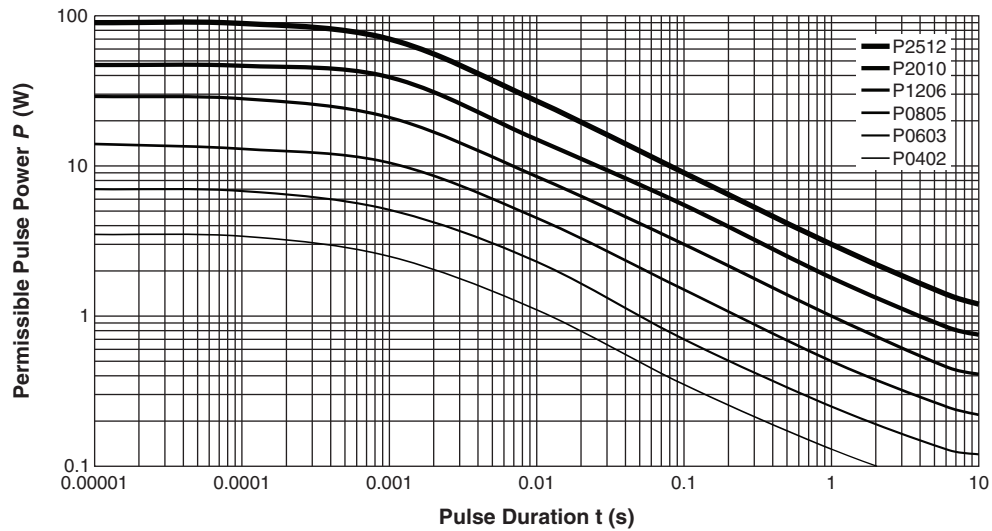
A price adder will apply to the unit price of the parts for options 0013 and 0014.

PERFORMANCE						
TESTS	CONDITIONS	REQUIREMENTS	TYPICAL VALUES AND DRIFTS			
Termination adhesion	5N for 10 s	± (0.25 % + 0.05 Ω)	< ± 0.1 %			
Resistance to solder heat	Immersion 10 s in Sn/Pb 60/40 at + 260 °C	± (0.25 % + 0.05 Ω)	< ± 0.1 %			
Rapid temperature change	5 cycles - 55 °C                      + 155 °C	± (0.25 % + 0.05 Ω)	< ± 0.1 %			
Climatic sequence	Phase A dry heat Phase B damp heat Phase C cold - 55 °C Phase D damp heat 5 cycles	± (1 % + 0.05 Ω)	< ± 0.2 %			
Humidity (steady state)	56 days	± (1 % + 0.05 Ω)	< ± 0.2 %			
Moisture resistance	AEC-Q200 85 °C/85 % RH/Pn/10 1000 h	0.5 % + 0.05 Ω	Max. < 3 % + 0.05 Ω			
Short time overload	6.25 Pn for 2 s	± (0.25 % + 0.05 Ω)	< ± 0.1 %			
Load life	1000 h at rated power 90/30' at + 70 °C	1000 h ± (1 % + 0.05 Ω)	1000 h < 0.25 %	2000 h < 0.5 %	10 000 h < 1 %	

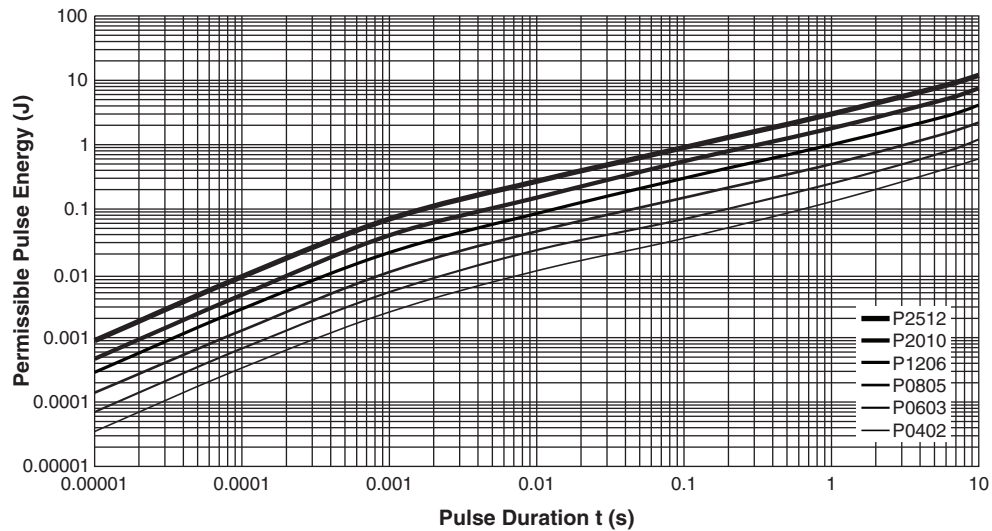
## High Stability Resistor Chips ( $< 0.25\%$ at $P_n$ at $70^\circ\text{C}$ during 1000 h) Thick Film Technology

Vishay Sfernice

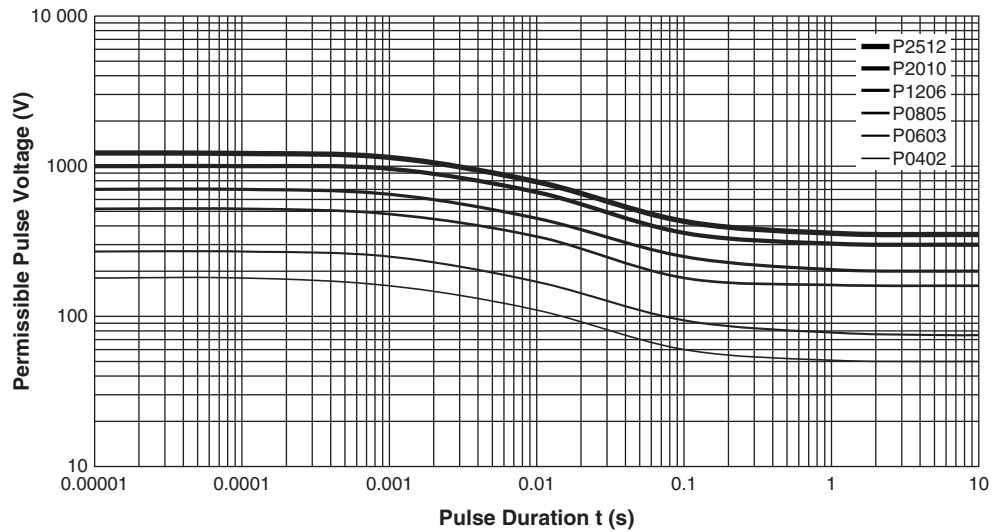
Maximum permissible pulse load  $P_i$  max. for single pulse



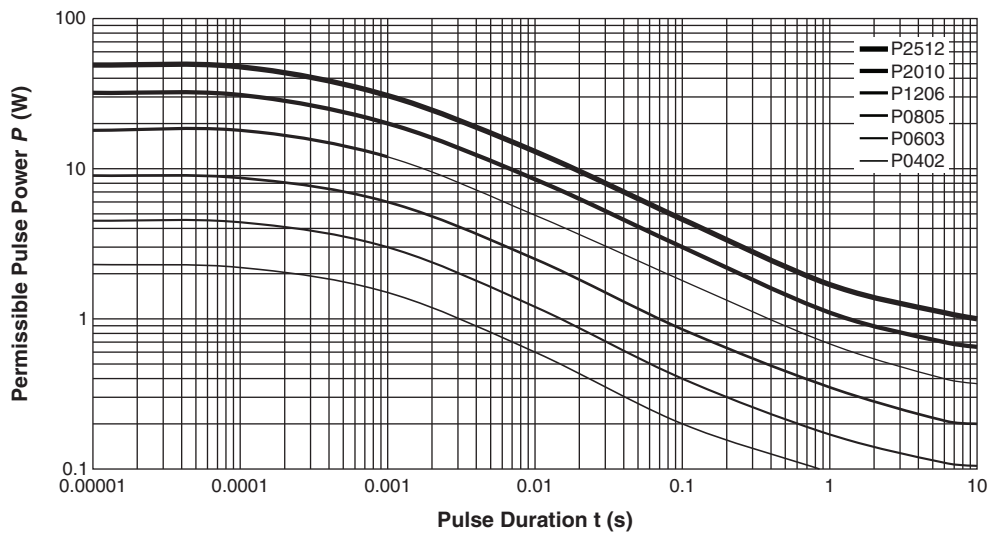
Energy for single pulse



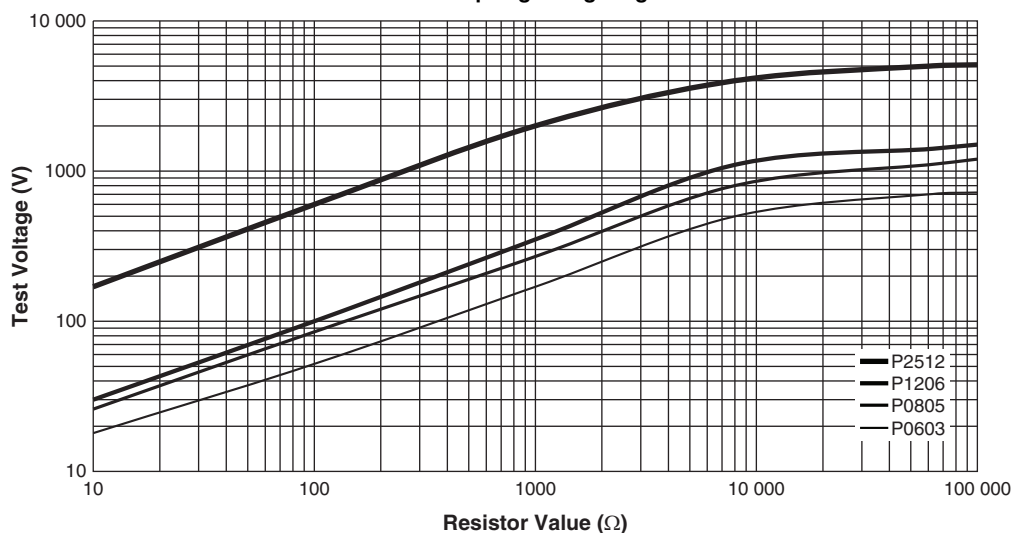
Maximum permissible pulse voltage  $U_i$  max.



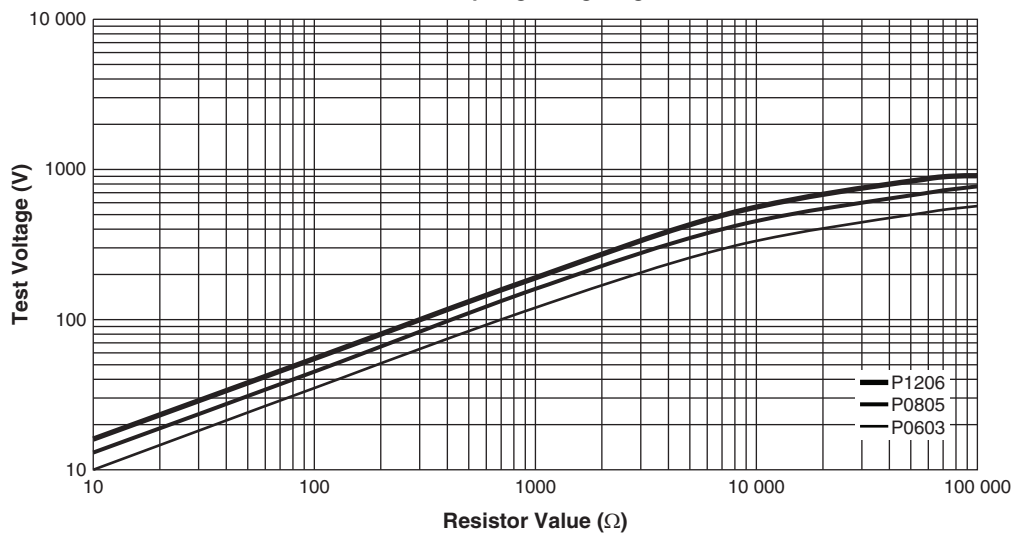
Maximum permissible pulse load  $P_i$  max.



1.2/50  $\mu\text{s}$  lightning surge



10/70  $\mu\text{s}$  lightning surge





High Stability Resistor Chips  
( $< 0.25\%$  at Pn at 70 °C during 1000 h)  
Thick Film Technology

Vishay Sfernice

**GLOBAL PART NUMBER INFORMATION**

New Global Part Numbering: CHP0805K1001FBT151 (preferred part number format)

C	H	P		0	8	0	5	K	1	0	0	1	F	B	T	1	5	1			
GLOBAL MODEL				SIZE				TCR		VALUE				TOLERANCE		TERMINATION		PACKAGING <sup>(1)</sup>		OPTION	
CHP HCHP (3 or 4 digits)				0502 0505 0603 0805 0705 1005 1206 1505 2010 1020 1010 2208 2512				K = 100 ppm L = 200 ppm		The first 3 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				D = ± 0.5 % F = ± 1 % G = ± 2 % J = ± 5 %		B: SnPb over nickel barrier N: SnAg over nickel barrier F: SnAg over nickel barrier (one face) G: Gold over nickel barrier W: Gold over nickel barrier (one face)  B: Lead bearing version N and G: Lead (Pb)-free/ RoHS version		Blank = Waffle pack T = Tape and reel PT = Paper tape <sup>(2)</sup>		Leave blank if no option	

Historical Part Number example: CHP 0805 100 ppm 1K 1 % B TR R0151 (will continue to be accepted)

CHP	0805	100 ppm	1K	1 %	B	TR	R0151	e2
HISTORICAL MODEL	SIZE	TCR	VALUE	TOLERANCE	TERMINATION	TAPE	OPTION	RoHS
<b>CHP</b> <b>HCHP</b> (3 or 4 digits)	<b>0502</b> <b>0505</b> <b>0603</b> <b>0805</b> <b>0705</b> <b>1005</b> <b>1206</b> <b>1505</b> <b>2010</b> <b>1020</b> <b>1010</b> <b>2208</b> <b>2512</b>	In clear	In clear	In clear	<b>B</b> : SnPb over nickel barrier <b>N</b> : SnAg over nickel barrier <b>F</b> : SnAg over nickel barrier (one face) <b>G</b> : Gold over nickel barrier <b>W</b> : Gold over nickel barrier (one face)  <b>B</b> : Lead bearing version <b>N and G</b> : Lead (Pb)-free/ RoHS version		Leave blank if no option	<b>e2</b> : Tin/silver <b>e4</b> : Gold <b>Blank</b> : SnPb

**Notes**<sup>(1)</sup> For specific quantity of parts per packaging please consult Vishay Sfernice<sup>(2)</sup> For paper tape please consult Vishay Sfernice





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