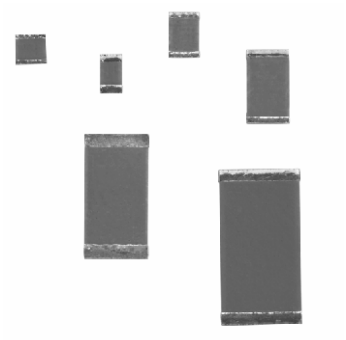
High Stability Resistor Chips (< 0.25 % at Pn at 70 °C during 1000 h) Thick Film Technology



FEATURES

- Robust terminations
- Large ohmic value range 0.1 Ω to 100 MΩ
- 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

Pb-free Available

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.

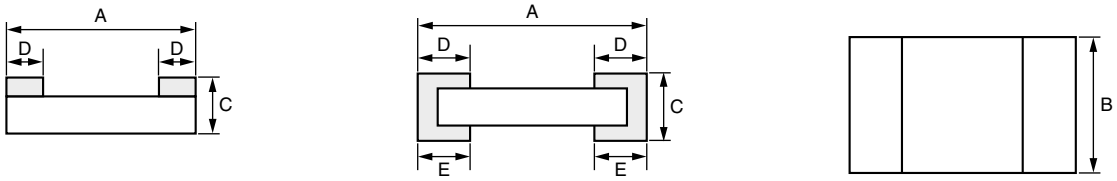
Evaluated to ESCC 4001/026 (see CHPHR datasheet).

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)

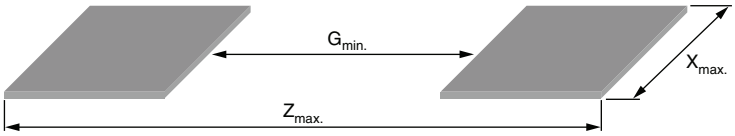


CASE SIZE	A		B		C		D/E	
	VALUE	TOL.	VALUE	TOL.	VALUE	TOL.	VALUE	TOL.
0502	1.27 (0.050)	0.152 (0.006)	0.60 (0.024)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
0505	1.27 (0.050)	0.152 (0.006)	1.27 (0.050)	0.127 (0.005)	0.5 (0.020)	0.127 (0.005)	0.38 (0.015)	0.127 (0.005)
0603	1.52 (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 Pn at 70 °C during 1000 h)
Thick Film Technology

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 Pn mW	LIMITING ELEMENT VOLTAGE V	MAX. OVERLOAD VOLTAGE V	MAX. RESISTANCE (1) MΩ	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 (2)	200	400	100	26
1020	1000 (2)	200	400	10	25
2208	750	200	400	100	21
2512	2000 (2)	250	500	100	42
1010	500	200	400	25	12

Notes
(1) Shall be read in conjunction with other tables
(2) 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 (1)

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)

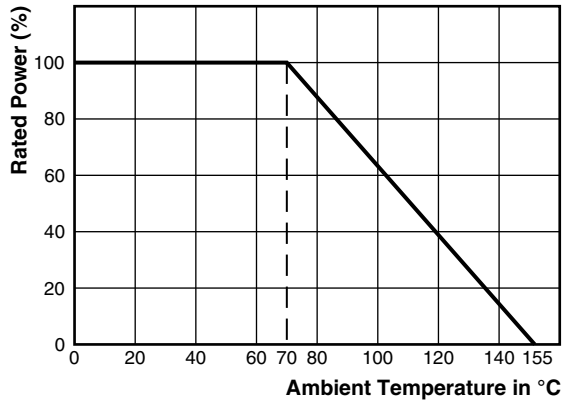
Note

(1) 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			1000	8 mm (2)
1010	100		4000	8 mm (2)
2208	60		1000	8 mm (2)
1020	60			8 mm (2)
2512	45		2000	8 mm (2)

Note

(2) 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
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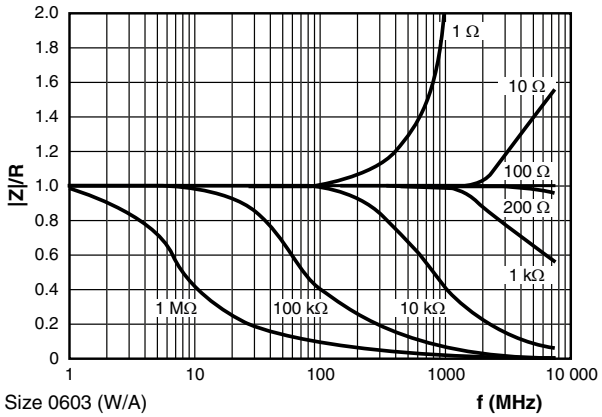
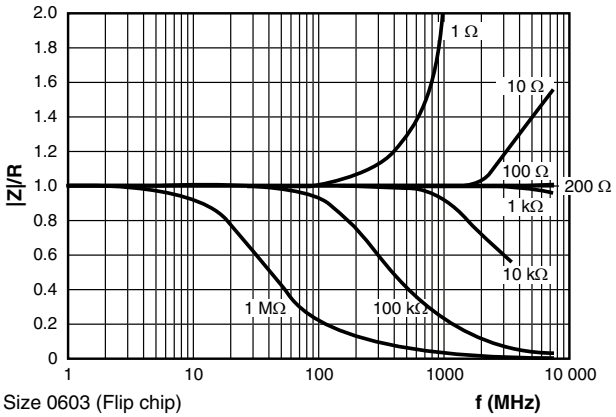
TYPICAL HF PERFORMANCE OF HCHP



Size 0603 (W/A)



Size 0603 (Flip chip)

POPULAR OPTIONS

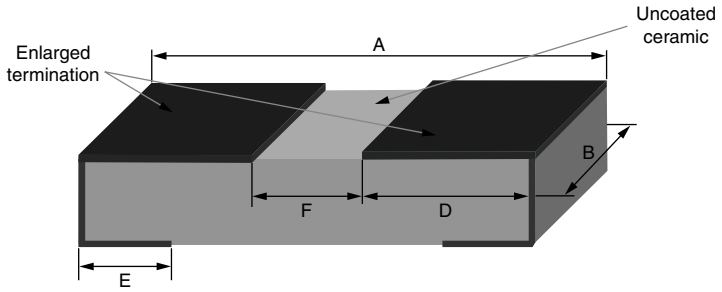
For any option it is recommended to consult Vishay Sfernice for availability first.

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.
Option to order: 0063 (applies to size 1206/1505/1020/2010/2512).

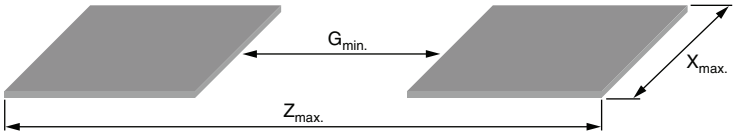
DIMENSIONS (Option 0063) in millimeters

Bottom view for mounting



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)

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 °C; + 215 °C] powered (and up to 230 °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.
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 µm) 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
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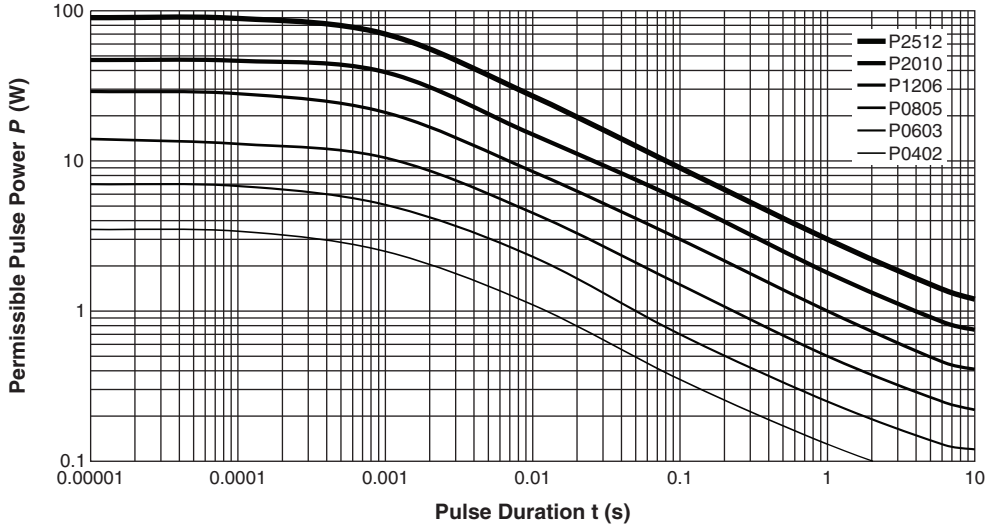
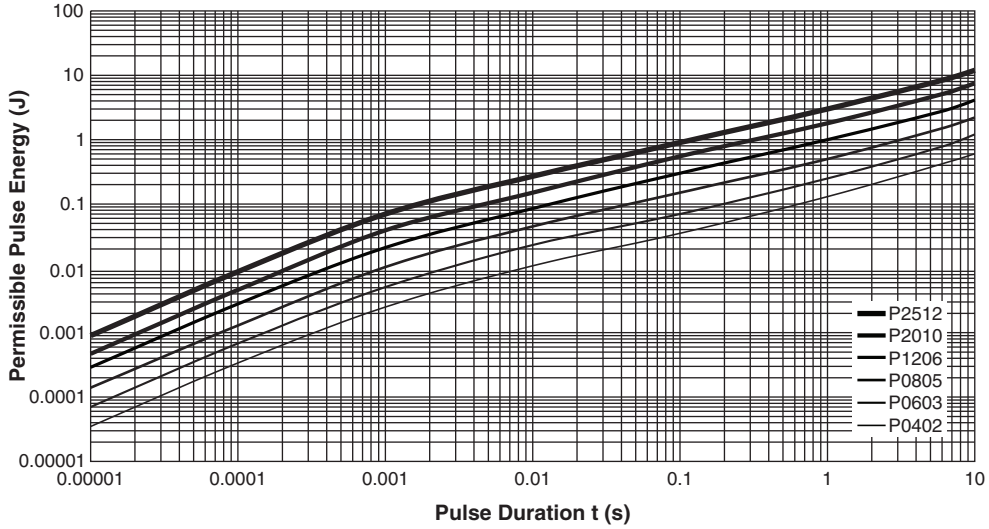
Thick Film Technology

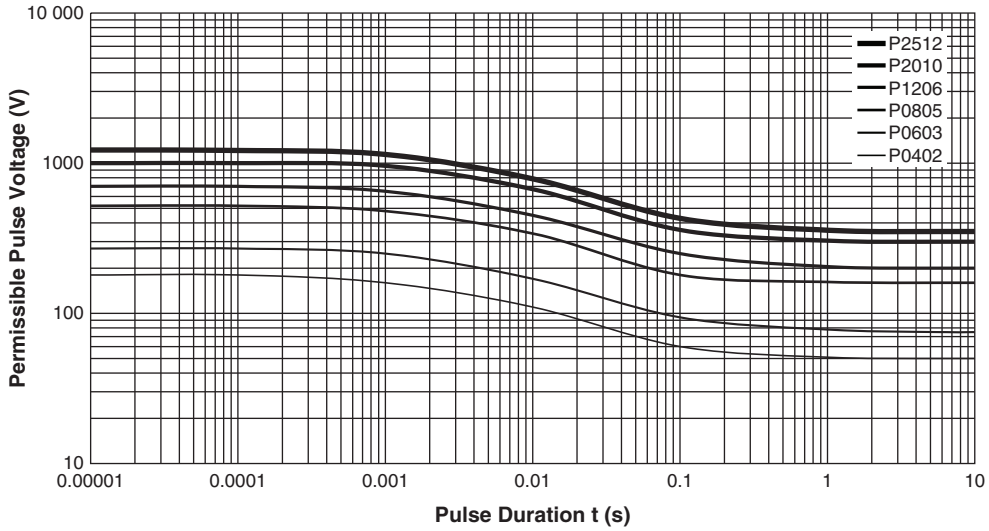
Maximum permissible pulse load P_i max. for single pulse



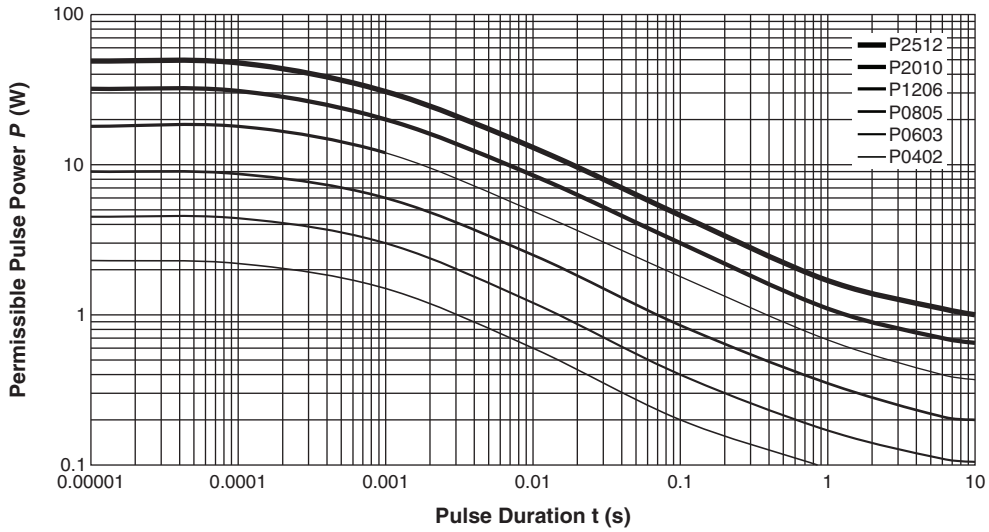
Energy for single pulse



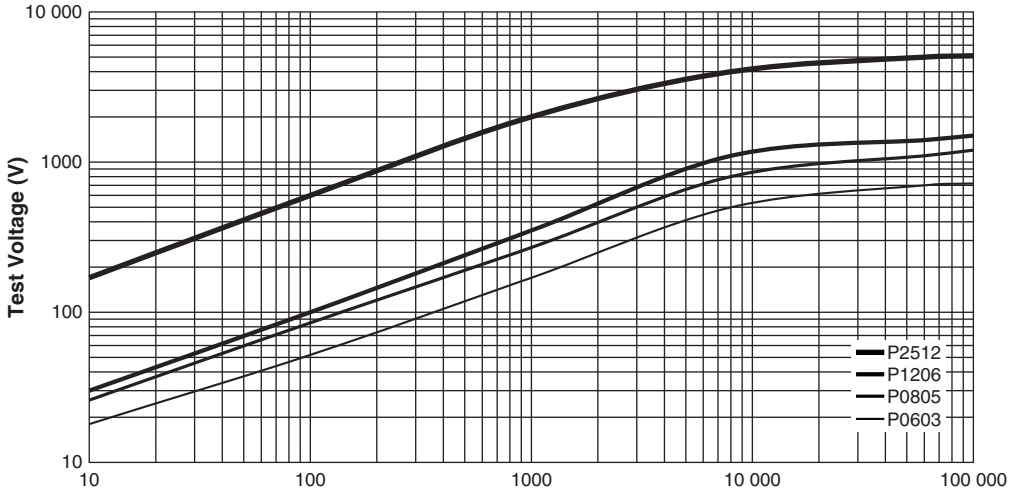
Maximum permissible pulse voltage U_i max.



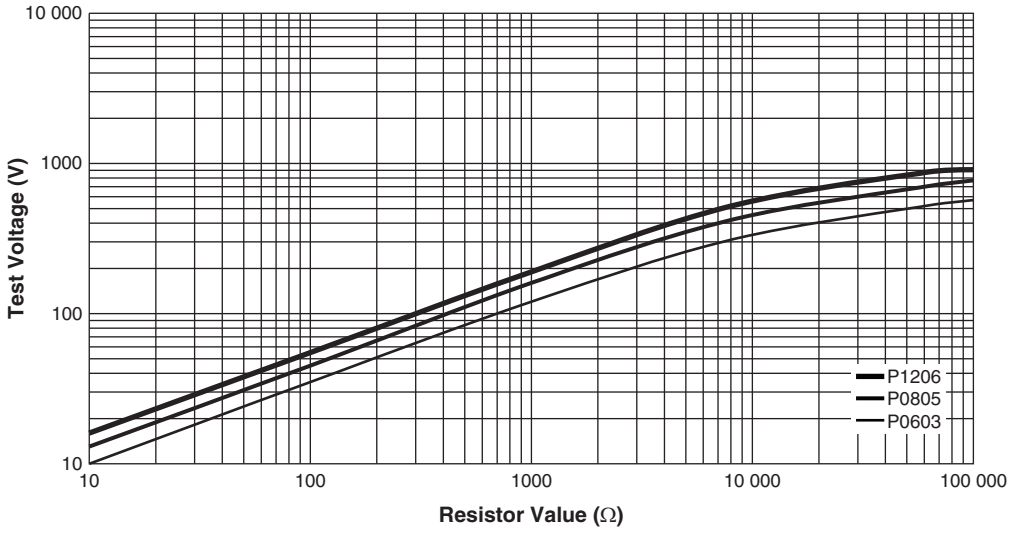
Maximum permissible pulse load P_i max.



1.2/50 µs lightning surge



10/70 µs lightning surge



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

GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: CHP0805K1001FBT131 (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 (1)	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 (2)	Leave blank if no option

Historical Part Number example: CHP 0805 100 ppm 1K 1 % B TR R0131 (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
CHP **HCHP** (3 or 4 digits)	**0502** **0505** **0603** **0805** **0705** **1005** **1206** **1505** **2010** **1020** **1010** **2208** **2512**	In clear	In clear	In clear	**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		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

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