

# High Voltage Chip Resistors

## HVC Series



### Features:

- Continuous voltages up to 3kV
- Overload voltages up to 4kV
- Values up to 1GΩ
- Precision to  $\pm 0.5\%$  &  $\pm 50\text{ppm}/^\circ\text{C}$
- 100% screened by automated optical inspection
- 100% screened by high voltage overload
- Anti-sulphur options available
- AEC-Q200 grade available



All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

## Electrical Data

		1206	2010	2512
Power rating @70°C	W	0.3	0.5	1
Limiting element voltage	V <sub>(dc or ac.pk)</sub>	1000	2000	3000
Maximum 2s overload voltage <sup>1</sup>	V <sub>(dc or ac.pk)</sub>	1500	3000	4000
Resistance range <sup>2</sup>	ohms	10K to 1GΩ		
Resistance tolerance	%	0.5, 1, 2, 5, 10 (see Value Ranges table)		
TCR	ppm/°C	50, 100, 500 (see Value Ranges table)		
Ambient temperature range	°C	-55 to 155		
Standard values <sup>2</sup>		E24 & E96 preferred		
Thermal impedance	°C/W	200	80	70

Note 1: 100% high voltage screening is applied to all parts in the range 300K to 40M.

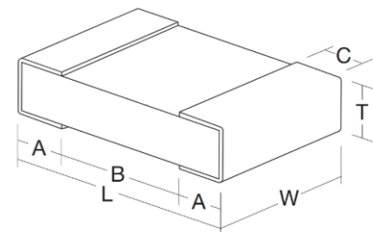
Note 2: Non-standard or out-of-range values may be requested.

## Value Ranges

Size	TCR (ppm/°C)	Tolerance (%)		
		0.5	1 & 2	5 & 10
1206	50	-	10K to 10M	10K – 100M
	100	10K to 2M		
	500	-	>100M	
2010 & 2512	50	-	10K to 100M	
	100	10K to 10M		
	500	-	>100M	

## Physical Data

Dimensions in mm and weight in mg							
	L	W	T <sub>max</sub>	A	B <sub>min</sub>	C	Wt. <sub>nom</sub>
1206	3.2 ± 0.2	1.6 ± 0.2	0.7	0.35 ± 0.2	1.95	0.35 ± 0.2	10.1
2010	5.1 ± 0.3	2.5 ± 0.2	0.8	0.45 ± 0.2	3.7	0.4 ± 0.25	32.7
2512	6.5 ± 0.3	3.2 ± 0.2			5	0.4 ± 0.2	50.3



### Construction

Resistive thick film material, overglaze and organic protection are screen printed on a 96% alumina substrate. The design and laser adjustment of the resistive element optimises the limiting element voltage of the resistor.

### Terminations

The chips are supplied with wrap-around terminations suitable for soldering. Consult factory for alternative termination options.

### Solderability

The terminations have an electroplated nickel barrier and tin finish. This ensures excellent 'leach' resistance properties and solderability.

#### General Note

TT Electronics reserves the right to make changes in product specification without notice or liability. All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

### Marking

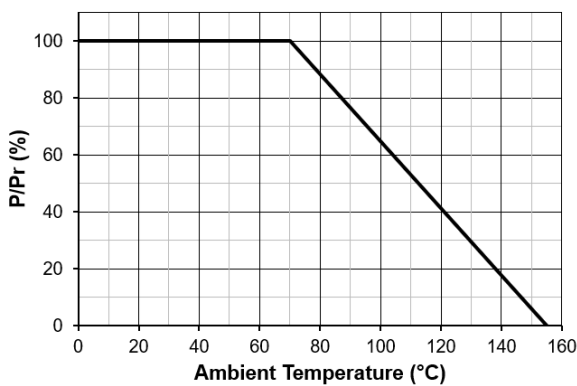
The body protection is resistant to all normal cleaning solvents suitable for printed circuits. The chips are not marked and the relevant information on type, value, tolerance, date code and quantity are recorded on the reel.

### Performance Data

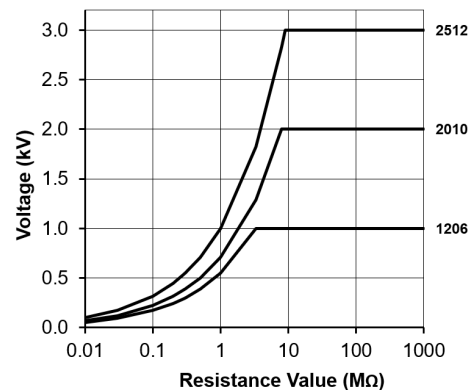
		Maximum	Typical
Load at rated power: 1000 hours at 70°C	±ΔR%	1206: 2, 2010 & 2512: 1	1206: 1, 2010 & 2512: 0.25
Shelf-life test: 12 months at room temperature	±ΔR%	0.1	0.02
Short-term overload: lesser of 6.25 x rated power and maximum overload voltage	±ΔR%	2	0.2
Lightning strike: 1.2/50μs & 10/700μs, see Lightning Strike Performance graph for peak voltage	±ΔR%	0.5	0.2
Dry heat: 1000 hours at 155°C	±ΔR%	0.5	0.1
Long term damp heat	±ΔR%	1	0.25
Temperature rapid change	±ΔR%	0.25	0.05
Resistance to solder heat	±ΔR%	0.25	0.05
Anti-sulphur grade (AS)	ASTM-B-809: 1000 hours, 50°C, 91-93%RH	±ΔR%	0.25
Sulphur-resistant grade (SR)	EIA-977: 750 hours, 105°C	±ΔR%	0.25
	ASTM-B-809: 1000 hours, 50°C, 91-93%RH	±ΔR%	0.25
	Modified ASTM-B-809: 1000 hours, 105°C, 85%RH	±ΔR%	1
Voltage proof	V	500	
Voltage coefficient of resistance	ppm/V	1206: -25 2010: -15 2512 ≤100M: -5 2512 >100M: -15	1206: -15 2010: -5 2512 ≤100M: -1.5 2512 >100M: -8

### Thermal, Continuous Voltage and Surge Data

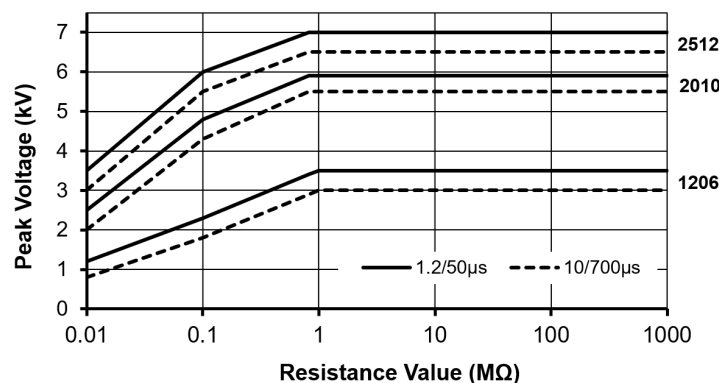
Temperature Derating



Maximum Continuous Voltage



Lightning Strike Performance



### Application Notes

HVC resistors are ideally suited for handling by automatic methods due to their rectangular shape and the small dimensional tolerances. Electrical connection to a ceramic substrate or to a printed circuit board can be made by reflow or wave soldering of wrap-around terminations.

Wrap-around terminations provide good leach properties and ensure reliable contact. Due to the robust construction, the HVC can be immersed in the solder bath for 30 seconds at 260°C. This enables the resistor to be mounted on one side of a printed circuit board and wire-leaded components applied on the other side.

HVC resistors themselves can operate at a maximum temperature of 155°C (see performance above). For soldered resistors, the joint temperature should not exceed 110°C. This condition is met when the stated power levels at 70°C are used.

The PCB layout should avoid tracks running between the HVC mounting pads, as this would compromise the LEV.

The LEV stated applies to operation at sea-level pressure, in a non-condensing atmosphere and non-contaminating environment. Voltage derating should be applied if low pressure, high humidity or contamination may be encountered. The termination clearance dimension (B) should be used in conjunction with the creepage limit applicable to the circuit application in order to determine the derated LEV.

### Packaging

HVC resistors are supplied taped and reeled as per IEC 286-3. For full details of tape and reel dimensions see:

<https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Application-Note/PS003-Packing-of-Specialist-Chip-Resistors.pdf>

### Ordering Procedure

**Example: HVC2512-4M7FT18** (2512, 4.7 megohms ±1%, with a ±100ppm/°C TCR and standard grade and terminations, Pb-free)



1	2	3	4	5	6	7
Type	Size	TCR	Sulphur Grade <sup>2</sup>	Value	Tolerance	Grade, Termination & Packing
HVC	1206	Omit for	Omit for standard	E24 = 3/4 characters	D = ±0.5%	Standard grade, Pb-free finish
	2010	±100/500ppm/°C	AS = Anti-sulphur	E96 = 3/4 characters	F = ±1%	T3 1206, 2010 3000/reel
	2512	C = ±50ppm/°C	SR = Sulphur Resistant	K = kilohms M = megohms G = gigohms	G = ±2%	T18 2512 1800/reel
					J = ±5%	Standard grade, SnPb finish
					K = ±10%	PB Quantities as for Pb-free
						AEC-Q200 grade, Pb-free finish
						A3 1206, 2010 3000/reel
						A18 2512 1800/reel
						AEC-Q200 grade, SnPb finish
						PBA Quantities as for Pb-free

Note 1: The hyphen is omitted if necessary to keep the total character count below 19.

Note 2: For new designs requiring resistance to sulphur-bearing gas, SR grade is preferred.