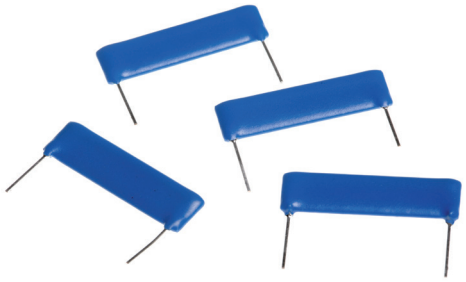
High Voltage Planar Resistors

HVP Series

Features

- Excellent reliability
- Ideally suited for medical applications
- Voltages up to 20kV in air & 40kV in oil
- Resistance values up to 1G0
- Small footprint
- Printed or powder coat protection
- Planar construction gives low inductance and capacitance



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

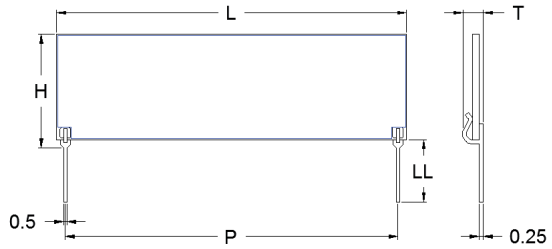
Electrical Data

		HVP04	HVP06	HVP08	HVP10	HVP15	HVP20
Power rating at 70°C in air	watts	0.4	0.6	0.8	1	1.5	2
Power rating at 25°C in oil	watts	0.6	0.9	1.2	1.5	2.25	3
Resistance range	ohms	1K0 to 250M	1K5 to 1G0	2K0 to 1G0	3K0 to 1G0	4K0 to 1G0	5K0 to 1G0
Limiting element voltage in air (dc or ac peak)	kV	2	5	7.5	10	15	20
Limiting element voltage in oil (dc or ac peak)	kV	4	10	15	20	30	40
TCR (20°C to 70°C)	ppm/°C	100	≤500M: 25, 50, 100 >500M: 50, 100		25, 50, 100		
Resistance tolerance	%	0.5, 1, 5	<500M: 0.25, 0.5, 1, 5 ≥500M: 1, 5				
Values		E24 preferred					
Ambient temperature range	°C	-55 to 155					
Insulation resistance at 500V	ohms	>10G					
Dielectric strength of insulation	volts	Screen printed protection: >1000 Powder coated: >2000					

Other resistance, tolerance and TCR values are available on request.

Physical Data

Dimensions (mm)						
Type	L ±0.75	H ±0.5	T ±0.5	P ±0.5	Wt Nom	LL (±0.25)
HVP04	10.16	7.35	2	7.62	0.208g	9.25
HVP06	12.7	7.35	2	10.16	0.251g	
HVP08	19.05	7.35	2	15.24	0.352g	
HVP10	25.4	7.35	2	22.86	0.454g	
HVP15	38.1	7.35	2	35.56	0.654g	
HVP20	50.8	7.35	2	48.26	0.854g	



For powder coat option add 0.25mm to L, H & T.

Construction

Conductor pads are printed to the rear and front faces of a 96% alumina substrate. A specially selected high voltage thick film resistor ink, based on a ruthenium oxide/glass system, is printed between the front face conductors and then covered in an overglaze before being protected either with powder coating or a special screen printed material which gives excellent high voltage and climatic performance.

Marking

Type, resistance value and tolerance are legend marked in black ink on the rear of the component. The resistance value conforms to IEC 62.

Solvent Resistance

The component protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuit boards

Terminations

Solder coated phosphor bronze leadframe terminations are solder dipped in SnAgCu and meet the following IEC requirements:

IEC 68.2.21 – Strength
IEC 115-1, Clause 4.17.3.2 – Solderability

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Performance Data

			Maximum	Typical
Load at rated power: 1000 hours in air at 70°C, or in oil at 25°C		ΔR%	1	0.1
Dry heat: 1000 hours at 155°C		ΔR%	1	0.1
Shelf life: 12 months at room temperature		ΔR%	0.3	<0.1
Derating from power at 70°C in air or 25°C in oil			Zero at 155°C	
Climatic		ΔR%	1	0.1
Climatic category			-55/155/56	
Biased humidity: 1000 hours, 85%RH, 85°C, 10%Pr		ΔR%	0.25	0.1
Temperature rapid change: 5 cycles -55/155°C		ΔR%	0.25	0.1
Resistance to solder heat		ΔR%	0.25	0.02
Moisture resistance: MIL Std. 202, method 106 (powder coat option)		ΔR%	0.25	0.1
Solderability			>95% coverage	
Voltage coefficient of resistance	HVP04, 06, 08	ppm/V	-2.5	-1
	HVP10, 15, 20	ppm/V	-1.5	-0.5

Application Notes

Due to the high voltage which can appear between the resistor body and any adjacent metal part, resistors should be mounted at an adequate distance from other conducting parts.

Due to the possibility of surface condensation it is recommended that high voltages are not applied to resistors in areas of high humidity without the application of suitable moisture resistant lacquer

For some ultra-high voltage applications designers may wish to immerse the components in oil or pot them in void-free silicone compound to reduce corona or surface tracking. The printed protection is recommended for such applications.

Design Flexibility

The experience of Welwyn engineers has been used to design this generation of high voltage planar resistors to be suitable for a majority of applications. However, should an application require particular consideration, Welwyn designers are able to provide advice and where applicable, to recommend a non-standard product. Special sizes, designs etc, can be prototyped at short notice.

Packaging

Packed in foam within a box. See Ordering Procedure for box quantities.

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Ordering Procedure

Example: HVP06C-100MFB016 (HVP06 with screen printed protection, at 50ppm/°C TCR, 100 megohms, and 1% tolerance, Pb-free and packed in a box of 160 pieces)

H	V	P	0	6		C	-	1	0	0	M	F	B	0	1	6
1					2	3		4				5	6			

1 Type	2 Coating (optional)		3 TCR (optional)		4 Value	5 Tolerance		6 Packing		
HVP04		screen printed protection		±100 ppm/°C	3/4 characters	J	±5%	B02	HVP04	200/box
HVP06			C	±50 ppm/°C	K = kilohms M = megohms G = gigohms	F	±1%	B016	HVP06	160/box
HVP08	P	powder coated protection	D	±25 ppm/°C		D	±0.5%	B012	HVP08	120/box
HVP10						C	±0.25%	B008	HVP10	80/box
HVP15								B006	HVP15	60/box
HVP20								B004	HVP20	40/box