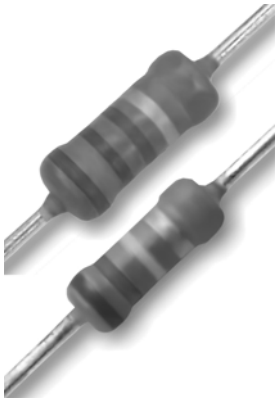
High Ohmic (up to 10 MΩ)/High Voltage (up to 3.5 kV) Metal Film Leaded Resistors



FEATURES

- Technology: metal film
- High pulse loading (up to 10 kV) capability
- Small size (0207/0411)
- Compatible with lead (Pb)-free and lead containing soldering processes
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free RoHS COMPLIANT

APPLICATIONS

- Power supplies
- Electronic ballast
- White goods
- Television

DESIGN SUPPORT TOOLS

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3D Models Available

A homogenous film of metal alloy is deposited on a high grade ceramic body. After a helical groove has been cut in the resistive layer, tinned electrolytic copper wires are welded to the end-caps. The resistors are coated with a blue, non-flammable lacquer, which provides electrical, mechanical, and climatic protection.

TECHNICAL SPECIFICATIONS

DESCRIPTION	HVR25		HVR37	
Resistance range	100 kΩ to 10 MΩ		100 kΩ to 10 MΩ	
Resistance tolerance	± 5 %	± 1 %	± 5 %	± 1 %
E-series	E24 series	E24/E96 series	E24 series	E24/E96 series
Temperature coefficient	± 200 ppm/K			
Climatic category (LCT/UCT/days)	55/155/56			
Rated dissipation, P_{70}	0.25 W		0.5 W	
Maximum permissible voltage $U_{max.}$				
DC	1600 V		3500 V	
RMS	1150 V		2500 V	
Basic specification	IEC 60115-1			
Stability after:				
Load (1000 h, P_{70})	± (5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)
Long term damp heat test (56 days)	± (1.5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)
Soldering (10 s, 260 °C)	± (1 % R + 0.1 Ω)	± (1 % R + 0.1 Ω)	± (1 % R + 0.1 Ω)	± (1 % R + 0.1 Ω)

PART NUMBER AND PRODUCT DESCRIPTION (1)

Part Number: HVR2500001503JA100

H	V	R	2	5	0	0	0	0	1	5	0	3	J	A	1	0	0

MODEL/SIZE	VARIANT	TCR/MATERIAL	VALUE	TOLERANCE	PACKAGING (2)	SPECIAL
HVR2500 **HVR3700**	**0** = neutral	**0** = standard	**3 digit value** **1 digit multiplier** MULTIPLIER **3** = $*10^3$ **4** = $*10^4$ **5** = $*10^5$	**F** = ± 1 % **J** = ± 5 %	**A1** **A5** **R5** **N4**	Up to 2 digits **00** = standard

Product Description: HVR25 5 % A1 150K

HVR25	5 %	A1	150K
Model	TOLERANCE	PACKAGING (2)	RESISTANCE VALUE
HVR25 **HVR37**	**± 1 %** **± 5 %**	**A1** **A5** **R5** **N4**	**150K** = 150 kΩ **4M64** = 4.64 MΩ

Notes

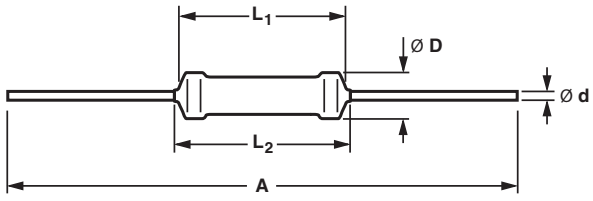
(1) The PART NUMBER is shown to facilitate the introduction of the unified part numbering system

(2) Please refer to table PACKAGING, see next page

PACKAGING

MODEL	TAPING	AMMO PACK		REEL	
		PIECES	CODE	PIECES	CODE
HVR25	Axial, 52 mm	5000	A5	5000	R5
		1000	A1		
	Radial	4000	N4		
HVR37	Axial, 52 mm	1000	A1	5000	R5

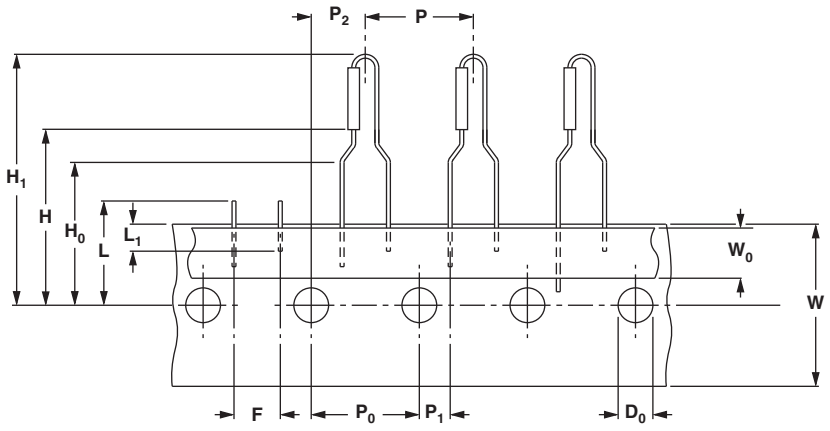
DIMENSIONS



DIMENSIONS - Resistor types, mass and relevant physical dimensions

TYPE	$L_{1\ max.}$ (mm)	$L_{2\ max.}$ (mm)	$D_{max.}$ (mm)	Ø d (mm)	A (mm)	MASS (mg)
HVR25	6.5	7.5	2.5	0.58 ± 0.05	52.5 ± 1.5	220
HVR37	10	12	4	0.70 ± 0.03	52.5 ± 1.5	500

PRODUCTS WITH RADIAL LEADS (HVR25)



DIMENSIONS - Radial taping				
SYMBOL	**PARAMETER**	**VALUE**	**TOLERANCE**	**UNIT**
P	Pitch of components	12.7	± 1.0	mm
P_0	Feed-hole pitch	12.7	± 0.2	mm
P_1	Feed-hole centre to lead at topside at the tape	3.85	± 0.5	mm
P_2	Feed-hole center to body center	6.35	± 1.0	mm
F	Lead-to-lead distance	4.8	+0.7/-0	mm
W	Tape width	18.0	± 0.5	mm
W_0	Minimum hold down tape width	5.5	-	mm
H1	Component height	29	Max.	mm
H_0	Lead wire clinch height	16.5	0.5	mm
H	Height of component from tape center	19.5	± 1	mm
D_0	Feed-hole diameter	4.0	± 0.2	mm
L	Maximum length of snipped lead	11.0	-	mm
L_1	Minimum lead wire (tape portion) shortest lead	2.5	-	mm

Note

- Please refer document number 28721 “Packaging” for more detail

MARKING

The nominal resistance and tolerance are marked on the resistor using four or five colored bands in accordance with IEC 60062, marking codes for resistors and capacitors. Standard values of nominal resistance are taken from the E24 and E24/E96 series for resistors with a tolerance of ± 5 % or ± 1 % respectively. The values of the E24/E96 series are in accordance with IEC 60063. Yellow and grey are used instead of gold and silver because metal particles in the lacquer could affect high-voltage properties.

FUNCTIONAL PERFORMANCE

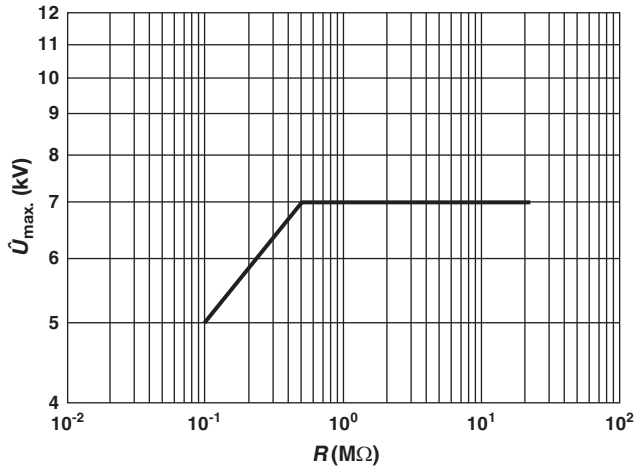
Derating - Standard Operation

Maximum dissipation ($P_{max.}$) in percentage of rated power as a function of ambient temperature (T_{amb})

PULSE LOADING CAPABILITY

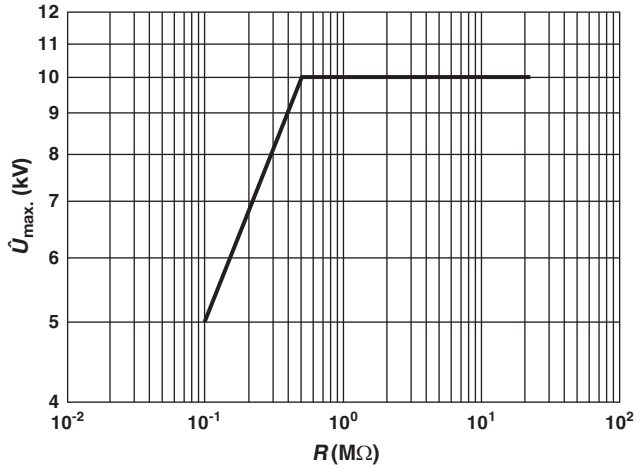
Note

- Maximum allowed peak pulse voltage in accordance with IEC 60065, 14.1.a; 50 discharges from a 1 nF capacitor charged to $U_{max.}$; 12 discharges/min



HVR25

$\Delta R = \pm$ (4.0 % R + 0.1 Ω)



HVR37

For 5 % tolerance $\Delta R = \pm$ (4.0 % R + 0.1 Ω)

For 1 % tolerance $\Delta R = \pm$ (2.0 % R + 0.1 Ω)

TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance with IEC 60115-1, category 55/155/56 (rated temperature range -55 °C to +155 °C; damp heat, long term, 56 days) and along the lines of IEC 60068-2-xx test method. The tests are carried out under standard atmospheric conditions according to IEC 60068-1, 5.3 unless otherwise specified. In some instances deviations from IEC recommendations were necessary for our method of specifying.

PERFORMANCE					
IEC 60115-1 CLAUSE	IEC 60068-2-xx TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR) HVR25	HVR37
4.8	-	Temperature coefficient	Between -55 °C and +155 °C	± 200 ppm/K	
4.25.1	-	Endurance at 70 °C	1000 h; loaded with P_{70} or $U_{max.}$; 1.5 h on; 0.5 h off for 5 % tolerance for 1 % tolerance	 ± (5 % R + 0.1 Ω) ± (1.5 % R + 0.1 Ω)	
4.24	78 (Cab)	Damp heat, steady state	56 days; 40 °C; 90 % to 95 % RH loaded with 0.01 P_{70} for 5 % tolerance for 1 % tolerance	 ± (5 % R + 0.1 Ω) ± (1.5 % R + 0.1 Ω)	
4.23		Climatic sequence			
4.23.2	2 (Ba)	Dry heat	16 h, 155 °C	± (1.5 % R + 0.1 Ω)	
4.23.3	30 (Db)	Damp heat, cyclic	24 h; 25 °C to 55 °C 90 % to 100 % RH; 1 cycle		
4.23.4	1 (Aa)	Cold	2 h, -55 °C		
4.23.6	30 (Db)	Damp heat, (accelerated) remaining cycles	5 days; 25 °C to 55 °C 90 to 100 % RH		
4.19	14 (Na)	Rapid change of temperature	30 min at LCT; 30 min at UCT; LCT = -55 °C; UCT = 155 °C; 5 cycles	No visual damage ± (1 % R + 0.1 Ω)	
4.13	-	Short time overload	Room temperature; dissipation 6.25 x P_{70} (voltage not more than 2 x limiting voltage, 10 000 $V_{max.}$); 10 cycles 5 s on and 45 s off for 5 % tolerance for 1 % tolerance	 ± (2 % R + 0.1 Ω) ± (1 % R + 0.1 Ω)	
4.12	-	Noise	IEC 60195	Max. 5 µV/V	Max. 2.5 µV/V
4.16		Robustness of terminations:		No damage ± (1 % R + 0.1 Ω)	
4.16.2	21 (Ua1)	Tensile all samples	Load 10 N; 10 s		
4.16.3	21 (Ub)	Bending half number of samples	Load 5 N; 4 x 90°		
4.16.4	21 (Uc)	Torsion other half of samples	3 x 360° in opposite direction		
4.22	6 (Fc)	Vibration	Frequency 10 Hz to 500 Hz; displacement 1.5 mm or acceleration 10 g; 3 directions; total 6 h (3 x 2 h)	± (1.0 % R+ 0.1 Ω)	

PERFORMANCE					
IEC 60115-1 CLAUSE	IEC 60068-2-xx TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR) HVR25	HVR37
4.17	20 (Ta)	Solderability (after aging)	2 s; 235 °C: Solder bath method; SnPb40 3 s; 245 °C: Solder bath method; SnAg3Cu0.5	Good tinning (≥ 95 % covered); no visible damage	
4.18	20 (Tb)	Resistance to soldering heat	Thermal shock: 10 s; 260 °C; 3 mm from body	± (1 % R + 0.1 Ω)	
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol	No visible damage	
4.6.11	-	Insulation resistance	U = 500 V_{DC} during 1 min, V-block method	R_{ins} min. 104 MΩ	
4.7	-	Voltage proof on insulation	U_{RMS} = 700 V during 1 min, V-block method	No flashover or breakdown	

12NC INFORMATION FOR HISTORICAL CODING REFERENCE ONLY

- The resistors have a 12 digit ordering code starting with 2306
- The next 4 or 5 digits indicate the resistor type and packaging
- For 5 % tolerance the last 3 digits indicate the resistance value:
  - The first 2 digits indicate the resistance value
  - The last digit indicates the resistance decade in accordance with table
- For 1 % tolerance the last 4 digits indicate the resistance value:
  - The first 3 digits indicate the resistance value
  - The last digit indicates the resistance decade in accordance with table

Last Digit of 12NC Indicating Resistance Decade

RESISTANCE DECADE (5 %)	RESISTANCE DECADE (1 %)	LAST DIGIT
100 kΩ to 910 kΩ	100 kΩ to 976 kΩ	4
1 MΩ to 9.1 MΩ	1 MΩ to 9.76 MΩ	5
= 10 MΩ	= 10 MΩ	6

12NC Example

HVR25, 150 kΩ, ± 5 %, ammopack 1000 pieces is **2306 241 13154**

12NC - resistor type and packaging						
DESCRIPTION			2306			
			BANDOLIER IN AMMOPACK			BANDOLIER ON REEL
TYPE	TAPE WIDTH	TOLERANCE	RADIAL TAPED 4000 UNITS	1000 UNITS	5000 UNITS	5000 UNITS
HVR25	52.5	± 5 %	241 36...	241 13...	241 53...	241 23....
		± 1 %	241 0....	241 8....	241 7....	241 6....
HVR37	52.5	± 5 %	-	242 13...	-	242 23...
		± 1 %	-	242 8....	-	242 6....

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