

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



DESIGN SUPPORT TOOLS

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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.

FEATURES

- Technology: metal film
- · High pulse loading (up to 10 kV) capability
- Small size (0207/0411)



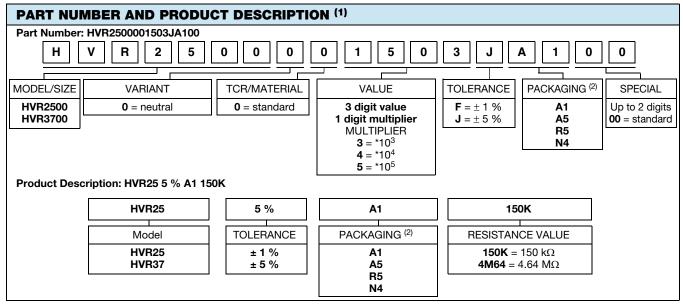
- Compatible with lead (Pb)-free and lead containing soldering processes
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

APPLICATIONS

- Power supplies
- Electronic ballast
- · White goods
- Television

TECHNICAL SPECIFICATIONS							
DESCRIPTION	HV	R25	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	0 ppm/K				
Climatic category (LCT/UCT/days)	55/155/56						
Rated dissipation, P_{70}	0.25 W 0.5 W			5 W			
Maximum permissible voltage $U_{\rm max.}$							
DC	1600 V		3500 V				
RMS	1150 V		2500 V				
Basic specification		IEC 60)115-1				
Stability after:							
Load (1000 h, P ₇₀)	± (5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (5 % R + 0.1 Ω)	$\pm (1.5 \% R + 0.1 \Omega)$			
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)	$\pm (1.5 \% R + 0.1 \Omega)$			
Soldering (10 s, 260 °C)	± (1 % R + 0.1 Ω)						

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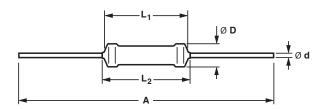


Notes

- (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	TARING	AMMO PACK		REEL	
MODEL	TAPING	PIECES	CODE	PIECES	CODE
HVR25	Avial 50 mm	5000	A5	5000	R5
	Axial, 52 mm	1000	A1		
	Radial	4000	N4		
HVR37	Axial, 52 mm	1000	A1	5000	R5

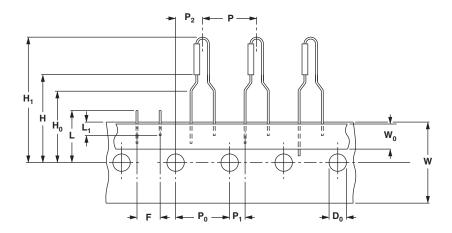
DIMENSIONS



DIMENSIONS - Resistor types, mass and relevant physical dimensions							
TYPE	YPE 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			
Р	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			
Н	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			

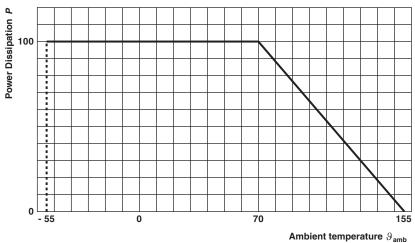
Note

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 \pm 5 % or \pm 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.

[•] Please refer document number 28721 "Packaging" for more detail

FUNCTIONAL PERFORMANCE



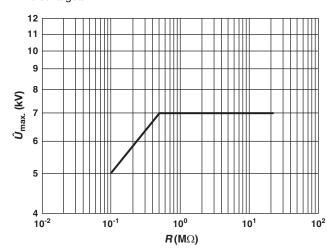
Derating - Standard Operation

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

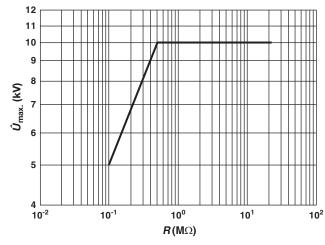
PULSE LOADING CAPABILITY

Note

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







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.

PERFOR	RMANCE				
IEC 60115-1 CLAUSE	IEC 60068-2-xx TEST METHOD	TEST	PROCEDURE		REMENTS E CHANGE (△R) 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	,	$R + 0.1 \Omega$) $R + 0.1 \Omega$)
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 % <i>F</i>	$R + 0.1 \Omega$ $R + 0.1 \Omega$
4.23		Climatic sequence		,	,
4.23.2	2 (Ba)	Dry heat	16 h, 155 °C		
4.23.3	30 (Db)	Damp heat, cyclic	24 h; 25 °C to 55 °C 90 % to 100 % RH; 1 cycle	± (1.5 % <i>R</i> + 0.1 Ω)	
4.23.4	1 (Aa)	Cold	2 h, -55 °C	± (1.5 70	71 + 0.1 52)
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 \pm (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	± (1 % <i>F</i>	? + 0.1 Ω) ? + 0.1 Ω)
4.12	-	Noise	IEC 60195	Max. 5 μV/V	Max. 2.5 μV/V
4.16		Robustness of terminations:			
4.16.2	21 (Ua1)	Tensile all samples	Load 10 N; 10 s	No d	amage
4.16.3	21 (Ub)	Bending half number of samples	Load 5 N; 4 x 90°		R + 0.1 Ω)
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)	



PERFOR	PERFORMANCE							
IEC 60115-1	60115-1 60068-2-xx	-2-xx TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)				
CLAUSE	TEST METHOD			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	(≥ 95 % (tinning covered); e 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 k Ω to 976 k Ω	4
1 M Ω to 9.1 M Ω	1 M Ω to 9.76 M Ω	5
= 10 MΩ	= 10 MΩ	6

12NC Example

HVR25, 150 k Ω , \pm 5 %, ammopack 1000 pieces is 2306 241 13154

12NC - resistor type and packaging							
			2306				
DESCRIPTION			BANDOLIER IN AMMOPACK			BANDOLIER ON REEL	
TVDE	TAPE WIDTH	TOLERANCE	RADIAL TAPED	1000 UNITS	5000 UNITS	5000 UNITS	
TYPE		TOLERANCE	4000 UNITS				
LIVEOF	E0 E	± 5 %	241 36	241 13	241 53	241 23	
HVR25 52.5	±1 %	241 0	241 8	241 7	241 6		
HVR37 52.5	± 5 %	-	242 13	-	242 23		
IIVNJ <i>I</i>	52.5	±1 %	-	242 8	-	242 6	



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