High Ohmic (upto 33 MΩ), High Voltage (upto 10 kV) Metal Film Leaded Resistors

A homogenous film of metal alloy is depositded 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.
The encapsulation is resistant to all cleaning solvents in accordance with “MIL-STD 202E, method 215” and “IEC 60068-2-45“.

FEATURES

- Metal film technology
- High pulse loading (upto 10 kV) capability
- Small size (0207/0411/0617)
- HVR37, HVR68 meets safety requirements of “IEC 60065”, “EN 60065”, “VDE 0860”, “BS 60065”
- Compatible with lead (Pb)-free and lead containing soldering processes
- Lead (Pb)-free and RoHS compliant

APPLICATIONS

- Power supplies
- Electronic ballast
- White goods
- Television

TECHNICAL SPECIFICATIONS

DESCRIPTION	HVR25		HVR37		HVR68	
Resistance Range	100 kΩ to 22 MΩ	100 kΩ to 10 MΩ	100 kΩ to 33 MΩ	100 kΩ to 10 MΩ	100 kΩ to 10 MΩ	
Resistance Tolerance	± 5 % E24 series	± 1 % E24/E96 series	± 5 % E24 series	± 1 % E24/E96 series	± 5 % E24 series	± 1 % 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		1 W	
Maximum Permissible Voltage:						
DC	1600 V		3500 V		10 000 V	
RMS	1150 V		2500 V		7000 V	
Basic Specification	IEC 60115-1 and IEC 60115-2					
Maximum Resistance Change at P_{70} for Resistance Range, ΔR max., after:						
Load (1000 h)	± (5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)
Climatic Tests	± (1.5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)	± (1.5 % R + 0.1 Ω)
Resistance to Soldering Heat	± (1 % R + 0.1 Ω)	± (1 % R + 0.1 Ω)	± (1 % R + 0.1 Ω)	± (1 % R + 0.1 Ω)	± (1 % R + 0.1 Ω)	± (1 % R + 0.1 Ω)

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			ORDERING CODE 2306			
			BANDOLIER IN AMMOPACK			BANDOLIER ON REEL
TYPE	TAPE WIDTH	TOLERANCE	500 UNITS	1000 UNITS	5000 UNITS	5000 UNITS
HVR25	52.5	± 5 %	-	241 13...	241 53...	241 23....
		± 1 %	-	241 8....	241 7....	241 6....
HVR37	52.5	± 5 %	-	242 13...	-	242 23...
		± 1 %	-	242 8....	-	242 6....
HVR68	63.0	± 5 %	244 13...	-	-	-
		± 1 %	244 8....	-	-	-

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	SPECIAL CHARACTER	TCR/MATERIAL	VALUE	TOLERANCE	PACKAGING (2)	SPECIAL
HVR2500 **HVR3700** **HVR6800**	**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** **AC**	up to 2 digits 00 = standard

PRODUCT DESCRIPTION: HVR25 5 % A1 150K

HVR25	5 %	A1	150K
MODEL	TOLERANCE	PACKAGING (2)	RESISTANCE VALUE
HVR25 **HVR37** **HVR68**	**± 1 %** **± 5 %**	**A1** **A5** **R5** **AC**	**150K** = 150 kΩ **4M64** = 4.64 MΩ

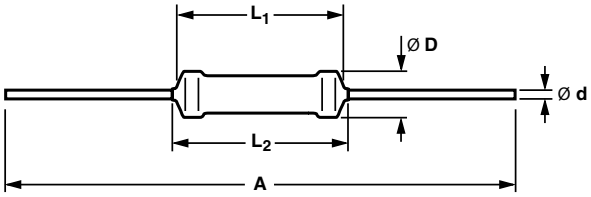
Notes

(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	REEL		BOX	
	PIECES	CODE	PIECES	CODE
HVR25	5000	R5	1000 5000	A1 A5
HVR37	5000	R5	1000	A1
HVR68	-	-	500	AC

DIMENSIONS



DIMENSIONS - resistor types, mass and relevant physical dimensions						
TYPE	$L_{1\ min.}$ (mm)	$L_{2\ min.}$ (mm)	$D_{max.}$ (mm)	Ø d (mm)	A (mm)	MASS (g)/ 100 pieces
HVR25	6.5	7.5	2.5	0.58 ± 0.05	52.5 ± 1.5	22
HVR37	10	12	4	0.80 ± 0.03	52.5 ± 1.5	50
HVR68	16.7	19.5	5.2	0.80 ± 0.03	63.0 ± 1.5	110

MARKING

The nominal resistance and tolerance are marked on the resistor using four or five colored bands in accordance with IEC 60062 “Color code for fixed resistors”. 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

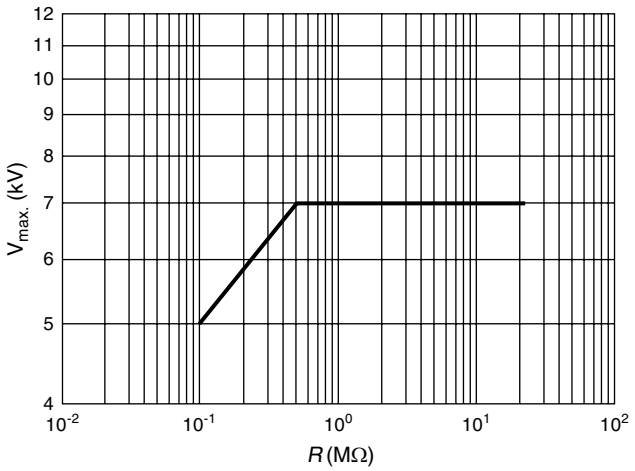
Derating - Standard Operation

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

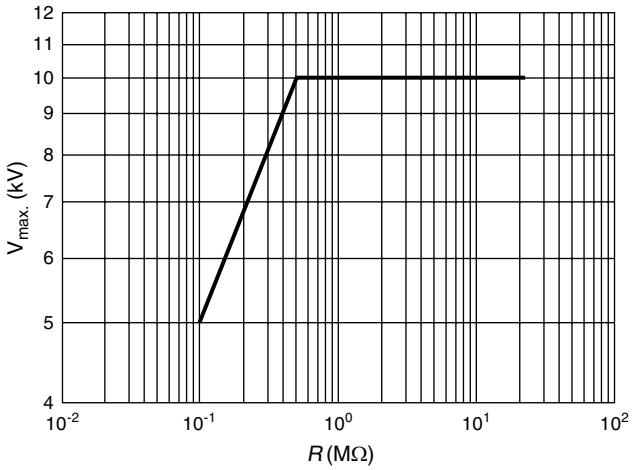
PULSE LOADING CAPABILITY

Note

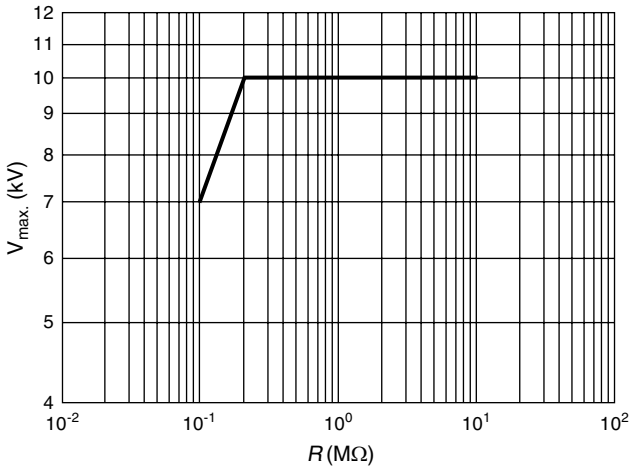
- Maximum allowed peak pulse voltage in accordance with “IEC 60065 chapter 14.1”; 50 discharges from a 1 nF capacitor charged to $V_{max.}$; 12 discharges/min



HVR25
$\Delta R \pm (4.0\ \%\ R + 0.1\ \Omega)$



HVR37
For 5 % tolerance $\Delta R \pm (4.0\ \%\ R + 0.1\ \Omega)$
For 1 % tolerance $\Delta R \pm (2.0\ \%\ R + 0.1\ \Omega)$



HVR68
$\Delta R \pm (2.0\ \%\ R + 0.1\ \Omega)$

TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance with the schedule of IEC 60115-1, category 55/155/56 (rated temperature range - 55 to + 155 °C; damp heat, long term, 56 days) and along the lines of IEC 60068-2; "Recommended basic climatic and mechanical robustness testing procedure for electronic components" and under standard atmosphere conditions according to IEC 60068-1 subclause 5.3, unless otherwise specified. In some instances deviations from IEC recommendations were necessary for our specified method.

PERFORMANCE

IEC 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (∆*R*)		
				HVR25	HVR37	HVR68
4.8	-	Temperature coefficient	Between - 55 °C and + 155 °C	± 200 ppm/K		
4.25.1	-	Endurance at 70 °C	1000 h; loaded with Pn or $V_{max.}$; 1.5 h ON; 0.5 h OFF			
			for 5 % tolerance	± (5 % *R* + 0.1 Ω)		
			for 1 % tolerance	± (1.5 % *R* + 0.1 Ω)		
4.24	3 (Ca)	Damp heat, steady state	56 days; 40 °C; 90 % to 95 % RH loaded with 0.01 Pn			
			for 5 % tolerance	± (5 % *R* + 0.1 Ω)		
			for 1 % tolerance	± (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 Pn (voltage not more than 2 x limiting voltage, 10 000 $V_{max.}$); 10 cycles 5 s ON and 45 s OFF			
			for 5 % tolerance	± (2 % *R* + 0.1 Ω)		
			for 1 % tolerance	± (1 % *R* + 0.1 Ω)		
4.12	-	Noise	"IEC 60195"	Max. 5 µV/V	Max. 2.5 µV/V	
4.16	21 (U)	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			

PERFORMANCE						
IEC 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)		
				HVR25	HVR37	HVR68
4.22	6 (Fc)	Vibration	Endurance by sweeping; 10 Hz to 500 Hz; displacement 1.5 mm or acceleration 10 g; 6 h (3 x 2 h)	± (1.0 % R + 0.1 Ω)		
4.17	20 (Ta)	Solderability (after ageing)	16 h at 155 °C; immersed in flux 600, leads immersed 2 mm in solder bath at (235 ± 5) °C for (2 ± 0.5) s	Good tinning (≥ 95 % covered); no visible damage		
4.18	20 (Tb)	Resistance to soldering heat	Solder bath method; (350 ± 10) °C; 6 mm from body 3 s	± (1 % R + 0.1 Ω)		
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; MIL STD 202E	No visible damage		
4.6.11	-	Insulation resistance	500 V_{DC} during 1 min, V-block method	R_{ins} min. 10^4 MΩ		
4.7	-	Voltage proof on insulation	700 V_{RMS} during 1 min, V-block method	No flashover or breakdown		

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