

# Data Sheet

Customer: \_\_\_\_\_

Product: Thick Film High Voltage Chip Resistors HVR Series \_\_\_\_\_

Size : 0603/0805/1206/2010/2512 \_\_\_\_\_

Issued Date: 15-Feb.-2023 \_\_\_\_\_

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## Record of change

Date	Ver.	Description	Page
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15-Feb.-2023	15-Feb.-2023	15-Feb.-2023	
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# Thick Film High Voltage Chip Resistors

# HVR SERIES

## ■ Features

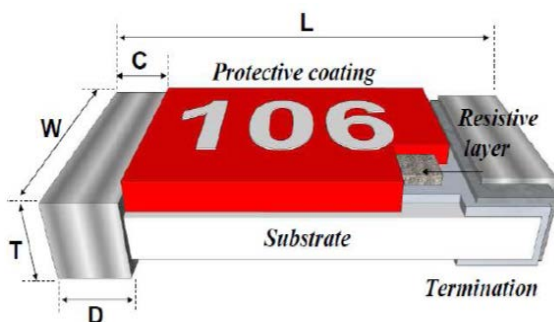
- Special materials and design for higher working voltage required.
- Superior surge ability than general purpose series.
- Compatible with flow and reflow soldering.
- Suitable for lead free soldering.
- Max. Voltage coefficient resistance below 300ppm.
- RoHS compliant & Halogen Free.

## ■ Applications

- Power supply
- Automotive industry
- Medical equipment
- Measurement equipment

## ■ Dimension and Construction

(a) R value  $\geq 100K\Omega$  / Overcoating Color is " Red "



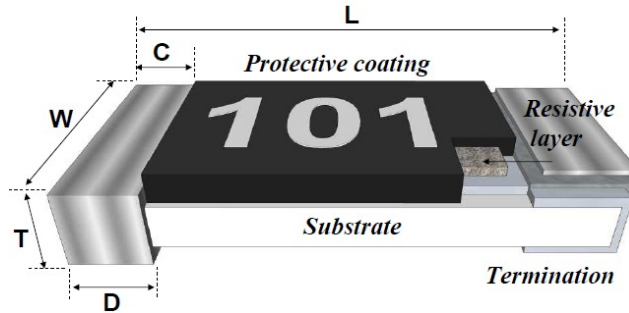
Type	L	W	C	D	T
HVR0603	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10
HVR0805	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
HVR1206	3.10±0.10	1.60±0.10	0.50±0.20	0.50±0.20	0.55±0.10
HVR2010	5.00±0.20	2.50±0.20	0.65±0.25	0.60±0.25	0.60±0.10
HVR2512	6.40±0.20	3.20±0.20	0.65±0.25	0.90±0.25	0.60±0.15

Unit : mm

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# HVR SERIES

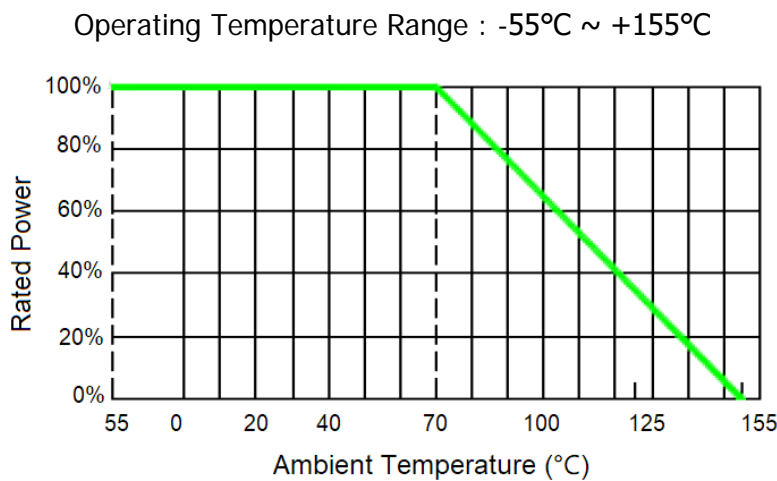
(b) R value < 100KΩ / Overcoating Color is " Black "



Type	L	W	C	D	T
HVR0603	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10
HVR0805	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
HVR1206	3.10±0.10	1.60±0.10	0.50±0.25	0.50±0.25	0.55±0.10
HVR2010	5.00±0.20	2.50±0.20	0.65±0.25	0.60±0.25	0.60±0.10
HVR2512	6.40±0.20	3.10±0.20	0.60±0.25	1.80±0.25	0.60±0.15

Unit : mm

## ■ Power Derating Curve



# Thick Film High Voltage Chip Resistors

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## ■ Rating

Type	Size	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance	Temperature Coefficient (ppm/°C)	Resistance Range		Standar Resistance Values
							Min.	Max.	
HVR0603	0603	1/10W	200V	400V	±1%(F)	±100	47Ω	10MΩ	E96/E24
					±5%(J)	±200	100KΩ	22MΩ	E24
HVR0805	0805	1/8W	400V	800V	±1%(F)	±100	47Ω	10MΩ	E96/E24
					±5%(J)	±200	100KΩ	22MΩ	E24
HVR1206	1206	1/4W	800V	1600V	±1%(F)	±100	47Ω	10MΩ	E96/E24
					±1%(F)	±200	11MΩ	22MΩ	E24
					±5%(J)	±200	47Ω	100MΩ	E24
HVR2010	2010	1/2W	2000V	3000V	±1%(F)	±100	47Ω	10MΩ	E96/E24
					±1%(F)	±200	11MΩ	22MΩ	E24
					±5%(J)	±200	47Ω	100MΩ	E24
HVR2512	2512	1W	3000V	4000V	±1%(F)	±100	47Ω	10MΩ	E96/E24
					±1%(F)	±200	11MΩ	22MΩ	E24
					±5%(J)	±200	47Ω	100MΩ	E24

Note : RCWV= (P×R)<sup>1/2</sup> or Max. RCWV listed above, whichever is lower.

RCWV : Working Voltage (V) , P : Rated Power (W) , R : Resistance Value (Ω)

## ■ Part Number

HVR	0805	J	R	-	100KR
Type	Size	Tolerance	Packing		Resistance
	0603	F: ± 1%	R : Paper tape- 5Kpcs		100KR=100KΩ
	0805	J : ± 5%	K : Plastic tape- 4Kpcs		10MR=10MΩ
	1206				
	2010				
	2512				

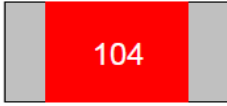
# Thick Film High Voltage Chip Resistors

# HVR SERIES

## ■ Resistance Marking

E24 ±5% : 3 Digits marking to identify the resistance value

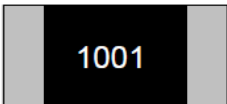
0603/0805/1206/2010/2512



$$104 \rightarrow 10 \times 10^4 = 100 \text{ K}\Omega$$

E24/E96 ±1% : 4 Digits marking to identify the resistance value

0805/1206/2010/2512



$$1001 \rightarrow 100 \times 10^1 = 1 \text{ K}\Omega$$

E24 ±1% : 3 Digits marking to identify the resistance value

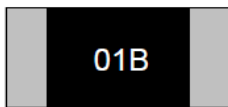
0603



$$106 \rightarrow 10 \times 10^6 = 10 \text{ M}\Omega$$

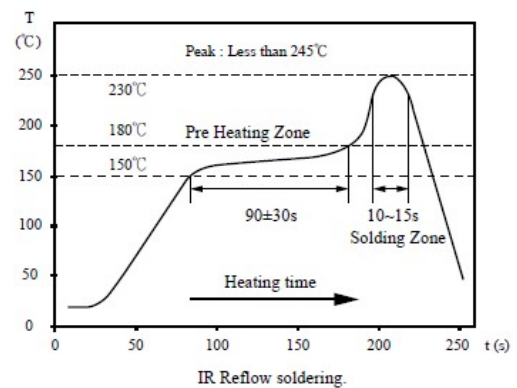
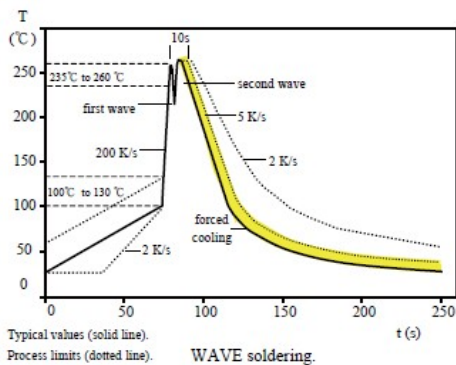
E96 ±1% : 3 Digits marking to identify the resistance value

0603



$$01B \rightarrow \text{Refer 0603 marking table} = 1 \text{ K}\Omega$$

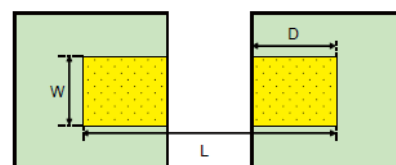
## ■ Soldering Reference



## ■ Recommend Solder Pad Dimensions

Unit : mm

Type	W	D	L
HVR0603	0.90	1.00	3.00
HVR0805	1.30	1.15	3.50
HVR1206	1.80	1.30	4.70
HVR2010	3.00	1.50	6.80
HVR2512	3.70	1.60	7.60
HVR2512 <100KΩ	3.70	2.45	7.60



# Thick Film High Voltage Chip Resistors

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## ■ Reliability Performance

Test Item	Specification	Test Method
DC Resistance	F : $\pm 1\%$ J : $\pm 5\%$	IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance Value.
Temperature Cycling	$\Delta R \leq \pm(1\% + 0.1\Omega)$ No mechanical damage.	1000 Cycles (-55°C to +125°C). Measurement at 24 $\pm$ 4 hours after test conclusion.
Resistance to Solder Heat	$\Delta R \leq \pm(1\% + 0.1\Omega)$ No mechanical damage.	Solder dipping @ 270°C $\pm$ 5°C for 10sec. $\pm$ 1sec.
Solderability	Over 95% of termination must be covered with solder.	a)Baking 155°C 4H, dipping 235°C 5s b)Steam 1H, dipping 215°C 5s c)Steam 1H, dipping 260°C 7s
Board Flex	J : $\Delta R \leq \pm(1\% + 0.1\Omega)$ F : $\Delta R \leq \pm(0.5\% + 0.05\Omega)$ No mechanical damage.	Bending 2mm 2512.2010.1210.1206, 3mm 0805.0603.
Short Time Overload	J : $\Delta R \leq \pm(2\% + 0.1\Omega)$ F : $\Delta R \leq \pm(1\% + 0.1\Omega)$	IEC 60115-1, Clause 4.13 5 $\times$ Rated power for 5 seconds
Load Life Humidity	J : $\Delta R \leq \pm(3\% + 0.1\Omega)$ F : $\Delta R \leq \pm(1\% + 0.1\Omega)$	IEC 60115-1, Clause 4.24 40 $\pm$ 2°C with relative humidity 90% ~ 95% D.C. rated voltage for 1.5 hours ON 30 minutes OFF. Cycle repeated 1000 hours.

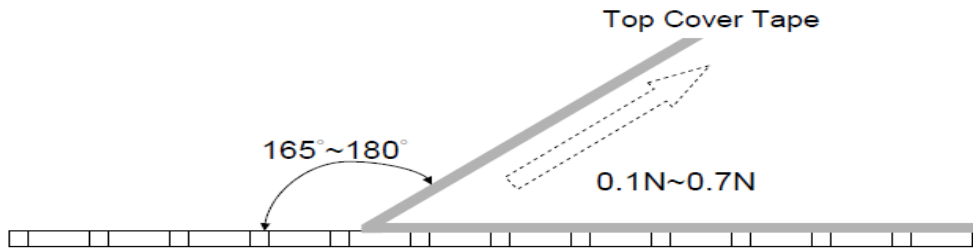
# Thick Film High Voltage Chip Resistors

# HVR SERIES

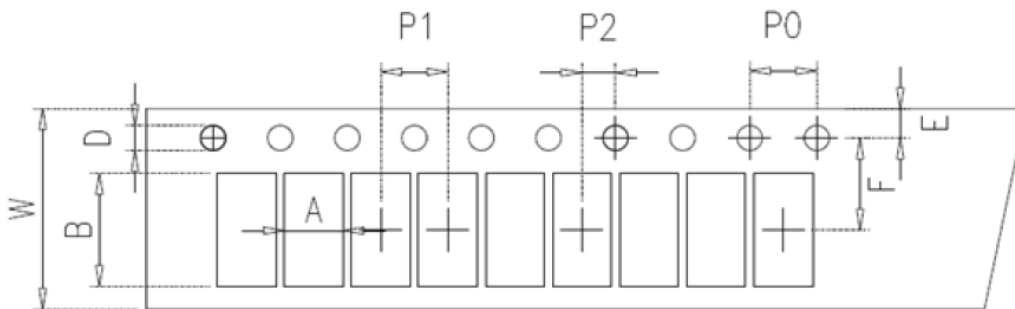
## ■ Packaging

### (a) Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min  
The peel force of top cover tape shall be between 0.1 to 0.7N



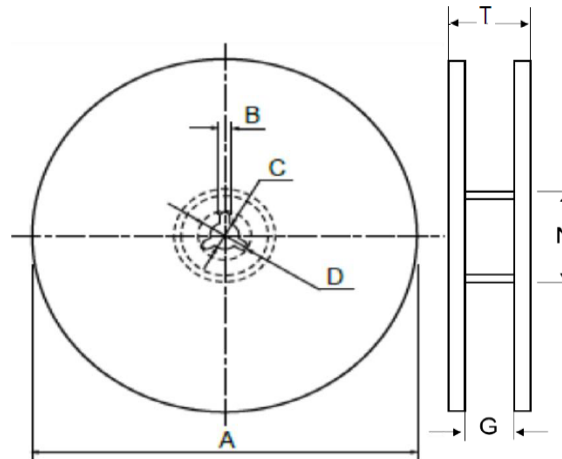
### (b) Tape Packaging Dimensions



Size	A	B	W	F	E	P1	P2	P0	D
0603	$1.10 \pm 0.2$	$1.90 \pm 0.2$	$8.00 \pm 0.3$	$3.50 \pm 0.05$	$1.75 \pm 0.1$	$4.00 \pm 0.1$	$2.00 \pm 0.05$	$4.00 \pm 0.1$	$1.50 + 0.10 / - 0$
0805	$1.65 \pm 0.2$	$2.40 \pm 0.2$	$8.00 \pm 0.3$	$3.50 \pm 0.05$	$1.75 \pm 0.1$	$4.00 \pm 0.1$	$2.00 \pm 0.05$	$4.00 \pm 0.1$	$1.50 + 0.10 / - 0$
1206	$2.00 \pm 0.2$	$3.60 \pm 0.2$	$8.00 \pm 0.3$	$3.50 \pm 0.05$	$1.75 \pm 0.1$	$4.00 \pm 0.1$	$2.00 \pm 0.05$	$4.00 \pm 0.1$	$1.50 + 0.10 / - 0$
2010	$2.80 \pm 0.2$	$5.50 \pm 0.2$	$12.00 \pm 0.3$	$5.50 \pm 0.05$	$1.75 \pm 0.1$	$4.00 \pm 0.1$	$2.00 \pm 0.05$	$4.00 \pm 0.1$	$1.50 + 0.10 / - 0$
2512	$3.50 \pm 0.2$	$6.70 \pm 0.2$	$12.00 \pm 0.3$	$5.50 \pm 0.05$	$1.75 \pm 0.1$	$4.00 \pm 0.1$	$2.00 \pm 0.05$	$4.00 \pm 0.1$	$1.50 + 0.10 / - 0$

Unit : mm

© Tape Packaging Dimensions



Size	Packaging Q'ty	A	N	C	D	B	G	T
0603 0805 1206	5kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
	10kpcs/Reel	254.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
	20kpcs/Reel	330.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
2010 2512	4kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	16.7max.
	8kpcs/Reel	254.0±2.0	100.0±0.5	13.5±0.5	20(Min.)	2.0±0.5	13.8±1.5	20.0max.
	16kpcs/Reel	330.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	13.8±1.5	20.0max.

Unit : mm

■ **Storage & Handling**

- ... Products are recommended to be used up within one year as ensured shelf life.  
Check solder ability in case shelf life extension is needed.
- ... To store products with following condition:  
Temperature:5 to 40°C ; Humidity: 20 to 70% relative humidity.

# Thick Film High Voltage Chip Resistors

# HVR SERIES

■ **0603 1% Marking Table (Table 1)**

Code	E48	E96	Code	E48	E96	Code	E48	E96	Code	E48	E96
01	100	100	25	178	178	49	316	316	73	562	562
02		102	26		182	50		324	74		576
03	105	105	27	187	187	51	332	332	75	590	590
04		107	28		191	52		340	76		604
05	110	110	29	196	196	53	348	348	77	619	619
06		113	30		200	54		357	78		634
07	115	115	31	205	205	55	365	365	79	649	649
08		118	32		210	56		374	80		665
09	121	121	33	215	215	57	383	383	81	681	681
10		124	34		221	58		392	82		698
11	127	127	35	226	226	59	402	402	83	715	715
12		130	36		232	60		412	84		732
13	133	133	37	237	237	61	422	422	85	750	750
14		137	38		243	62		432	86		768
15	140	140	39	249	249	63	442	442	87	787	787
16		143	40		255	64		453	88		806
17	147	147	41	261	261	65	464	464	89	825	825
18		150	42		267	66		475	90		845
19	154	154	43	274	274	67	487	487	91	866	866
20		158	44		280	68		499	92		887
21	162	162	45	287	287	69	511	511	93	909	909
22		165	46		294	70		523	94		931
23	169	169	47	301	301	71	536	536	95	953	953
24		174	48		309	72		549	96		976