

# Approval Sheet

for

**High Voltage/High Ohmic Resistors  
Flame-Proof Type**

**HHV series**

**$\pm 1\%$ ,  $\pm 5\%$**

**YAGEO CORPORATION**

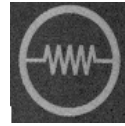
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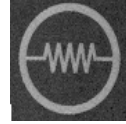
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Rev.	Description	Issue Date	Drawn	Approved
00	issue new spec.	Jul 16, 2007	Sara Lin	Joyce Chung
01	HHV200 and 300 data are included Update description Environmental Characteristics revised	Sep 04, 2007	Lynn Chen	Joyce Chung
02	HHV1WS data is included	Jan 09, 2008	Lynn Chen	Joyce Chung
03	The 5th color band is changed to yellow for tolerance 5% to represent high HHV	Jan 16, 2008	Lynn Chen	Joyce Chung
04	Lead Length 26mm is included	Apr 18, 2008	Lynn Chen	Joyce Chung
05	Series adjustment	Aug 29, 2008	Lynn Chen	Joyce Chung
06	HHV1SS data is included	Feb 25, 2009	Lynn Chen	Ken Hsu
07	Revised the product description	Apr 07, 2009	Lynn Chen	Ken Hsu

<b>Description</b>	High Voltage & High Ohmic Resistors, Flame-Proof Type		
<b>Series</b>	HHV	<b>Rev.</b>	07



## 1. PRODUCT:

A metal glazed film is deposited on a high grade ceramic body, the resistors are coated with a pink lacquer, the 5th color band is yellow for tolerance 5% to represent high voltage resistors.

## 2. PART NUMBER:

Part number of the flame-proof type high voltage resistor is identified by the name, power, tolerance, packing, temperature coefficient, special type and resistance value.

Example :

<b>HHV</b>	<b>-50</b>	<b>J</b>	<b>T</b>	<b>-</b>	<b>52-</b>	<b>100K</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>
Series Name	Power Rating	Resistance Tolerance	Packing Style	Temperature Coefficient of Resistance	Special Type	Resistance Value

(1) Style : HHV SERIES

(2) Power Rating : -25=1/4W 、 -50=1/2W 、 1SS=1W 、 1WS=1W 、 100=1W

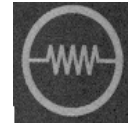
(3) Tolerance : F =  $\pm 1\%$  , J =  $\pm 5\%$

(4) Packaging Type : T= Tape on Box Packing  
B= Bulk Packing

(5) Temperature Coefficient :  $\pm 200\text{ppm}/^\circ\text{C}$

(6) Special Type : 26- = 26mm  
52- = 52.4mm  
73- = 73mm

(7) Resistance Value : 100K-68M $\Omega$  for E24 Series.



### 3. BAND-CODE:

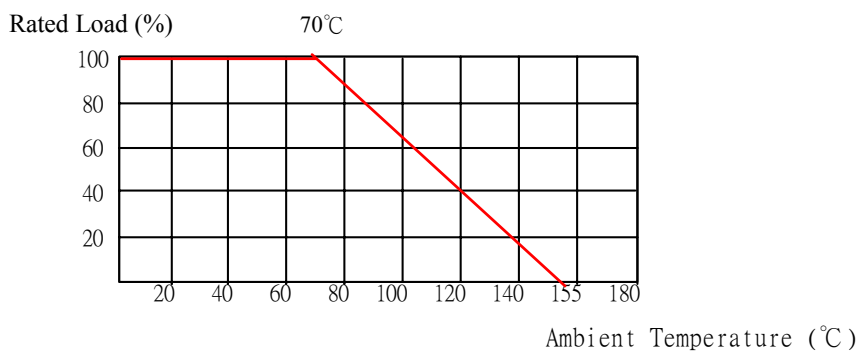
COLOR	1ST BAND	2ND BAND	MULTIPLIER	TOLERANCE
BLACK	0	0	1Ω	
BROWN	1	1	10Ω	± 1 % (F)
RED	2	2	100Ω	
ORANGE	3	3	1KΩ	
YELLOW	4	4	10KΩ	HHV 5%
GREEN	5	5	100KΩ	
BLUE	6	6	1MΩ	
VIOLET	7	7	10MΩ	
Gold	8	8		± 5 % (J)
Silver	9	9		

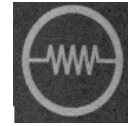
### 4. ELECTRICAL CHARACTERISTICS

STYLE	HHV-25	HHV-50	HHV1SS	HHV1WS	HHV100
Power Rating at 70 °C	1/4W	1/2W	1W	1W	1W
Maximum Working Voltage (DC)	1600V	3500V		5000V	10000V
Maximum Overload Voltage (DC)	3000V	7000V		10000V	20000V
Dielectric Withstanding Voltage	500V	700V			
Resistance Range	100K ~ 68MΩ for E24 series value				
Operating Temp. Range	- 55 °C to + 155 °C				
Temperature Coefficient	± 200 ppm /°C				

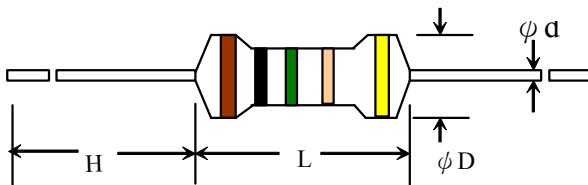
\* Below or over this resistance on request

### 5. DERATING CURVE





## 6. DIMENSIONS



STYLE	DIMENSION			
	L	$\phi D$	H	$\phi d$
HHV-25	6.3±0.5	2.4±0.2	28±2.0	0.55±0.05
HHV-50	9.0±0.5	3.3±0.3	26±2.0	0.55±0.05
HHV1SS				
HHV1WS	11.5±1.0	4.5±0.5	35±2.0	0.80±0.05
HHV100	15.5±1.0	5.0±0.5	33±2.0	0.80±0.05

## 7. ENVIRONMENTAL CHARACTERISTICS

### (1) Short Time Over Load Test

At 2.5 times of the rated voltage applied for 5 seconds, the resistor should be free from defects after the resistor is released from load for about 30 minutes

$$\text{Short Time Overload Voltage} = 2.5 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

The change of the resistance value should be within  $\pm 1 \% + 0.05 \Omega$

### (2) Dielectric Withstanding Voltage

The resistor is placed on the metal V Block. Apply a Table I dielectric withstanding between the terminals connected together with the block for about 60 seconds.

The resistor shall be able to withstand without breakdown or flashover.

### (3) Temperature Coefficient Test

Test of resistors above room temperature  $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$  ( Testing Temperature  $115^{\circ}\text{C}$  to  $130^{\circ}\text{C}$  ) at the constant temperature silicon plate for over 5 minutes. Then measure the resistance value.

The Temperature Coefficient is calculated by the following equation and its value should be within the range of requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

**R** = Resistance value under the testing temperature

**R<sub>0</sub>** = Resistance value at the room temperature

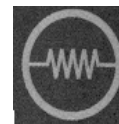
**t** = The testing temperature

**t<sub>0</sub>** = Room temperature

### (4) Insulation Resistance

Apply test terminal on lead and resistor body.

The test resistance should be high than 10,000M ohm.



(5) Solderability

Immerse the specimen into the solder pot at  $230 \pm 5$  °C for  $5 \pm 0.5$  seconds.  
At least 95% solder coverage on the termination.

(6) Resistance to Solvent

The specimen into the appropriate solvent of IPA condition of ultrasonic machine for 1 minutes.  
The specimen is no deterioration of coatings and color code.

(7) Terminal Strength

Direct Load – Resistors shall be held by one terminal and the load shall be gradually applied in the direction of the longitudinal axis of the resistor unit the applied load reached 5 pounds ◦  
The load shall be held for 10 seconds. The load of weight shall be  $\geq 2.5$  kg ( 24.5N ).

(8) Pulse Overload

Apply 4 times of rated voltage to the specimen at the 1 second on and 25 seconds off cycle, subjected to voltage application cycles specified in 10,000 time ◦  
The change of the resistance value shall be within  $\pm 1.0\% + 0.05 \Omega$

(9) Load Life in Humidity

Place the specimen in a test chamber at 40 °C and 93 % relative humidity. Apply the rated voltage to the specimen at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 1,000 hours  
The change of the resistance value shall be within  $\pm 5.0 \% + 0.05 \Omega$

(10) Load Life Test

Placed in the constant temperature chamber of  $70 \pm 3$  °C the resistor shall be connected to the lead wire at the point of 25mm. Length with each terminal, the resistors shall be arranged not much effected mutually by the temperature of the resistors and the excessive ventilation shall not be performed, for 90 minutes on and 30 minutes off under this condition the rated D.C. voltage is applied continuously for 1000+48/-0 hours then left at no-load for 1hour, measured at this time the resistance value ◦  
The change of the resistance value shall be within  $\pm 5.0 \% + 0.05 \Omega$ .  
There shall be no remarkable change in the appearance and the color code shall be legible after the test.

(11) Temperature Cycling Test

The temperature cycle shown in the following table shall be repeated 5 times consecutively. The measurement of the resistance value is done before the first cycle and after ending the fifth cycle, leaving in the room temperature for about 1 hour ◦

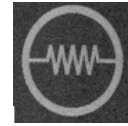
Temperature Cycling Conditions:

Step	Temperature(°C)	Time (minute)
1	$-55 \pm 3$	30
2	$25 \pm 3$	2 ~3
3	$155 \pm 3$	30
4	$25 \pm 3$	2 ~3

The change of the resistance value shall be within  $\pm 1.0 \% + 0.05 \Omega$   
After the test the resistor shall be free from the electrical or mechanical damage.

(12) Resistance to Soldering Heat

The terminal lead shall be dipped into the solder pot at 260 °C for 10 seconds.  
The change of the resistance value shall be within  $\pm 1.0 \% + 0.05 \Omega$



(13) Overload Flame Retardant

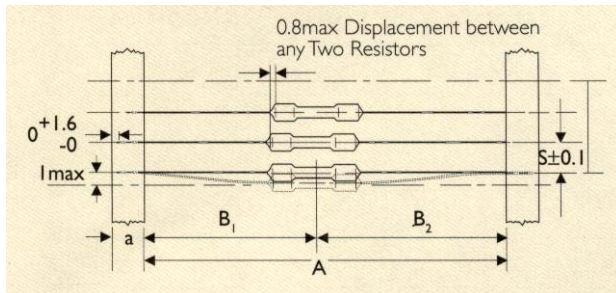
At 4 times of the rated voltage ( If the voltage exceeds the maximum load voltage, the maximum load voltage will be used as the rated voltage ) applied for 1 minute

$$\text{Overload Test Voltage} = 4 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

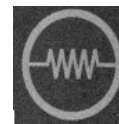
The resistor shall be able to no evidence of flaming arcing.

**6. PACKING METHODS**

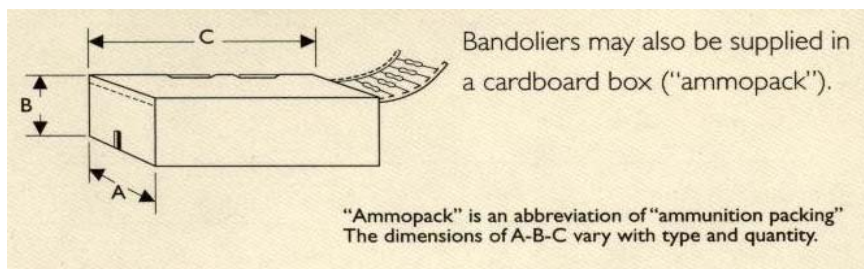
Bandolier for Axial leads



STYLE	DIMENSIONS				Unit: : mm	
	a	A	B <sub>1</sub> -B <sub>2</sub>	S (spacing)	T (max. deviation of spacing)	
HHV-25	6 ± 0.5	52.4 ± 1.0	1.2	5	1 mm per 10 spacing 0.5 mm per 5 spacing	
		26.0 ± 1.0	1.0			
HHV-50	6 ± 0.5	52.4 ± 1.0	1.2	5		
		26.0 ± 1.0	1.0			
HHV1SS		73.0 ± 1.5	1.5	5		
HHV1WS	6 ± 0.5	52.4 ± 1.0	1.2	5		
		73.0 ± 1.5	1.5			
HHV100	6 ± 0.5	73.0 ± 1.5	1.5	5		



## 7. TAPE ON BOX PACKING



Unit: mm

STYLE	Standard Lead Length			Qty per box
	W ( A )	H ( B )	L ( C )	
HHV-25	75	55	255	2,000
HHV-50	75	55	255	2,000
HHV1SS				
HHV1WS	103	78	260	1,000
HHV100	90	74	260	500

## 8. Plant Address

- A. Taiwan Xindian Plant  
3F, No.5, Lane 560, Chung Cheng Road,  
Xindian, Taipei, Taiwan, ROC  
(台北縣新店市中正路 560 巷 5 號 3 樓)  
Tel. 886-2-2218-2139  
Fax. 886-2-6629-8898
- B. China Dongguan Plant  
7-1, Gaoli Road, Gaoli Industrial Zone  
Tangxia Zhen, Dongguan, Guangdong, China  
(廣東省東莞市塘廈鎮高麗工業區高麗路 7-1 號)  
Tel. 86-769-8772 0275  
Fax. 86-769-8772 0275 #4333
- C. China Mudu Plant  
No.158, Jinchang Road, No.1 Building of NanBangIND.Zone,  
Mu Du New District, Suzhou, China  
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