

Specification

(Reference)

Title: FIXED HIGH VOLTAGE RESISTORS PRECISION

Style: RH1, 2, 3, 4, 6, 8

RoHS COMPLIANCE ITEM

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Title: FIXED HIGH VOLTAGE RESISTORS: PRECISION
RH1, 2, 3, 4, 6, 8

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1. Scope

1.1 This specification covers the detail requirements for fixed high voltage resistors: precision, style of RH1, 2, 3, 4, 6, 8.

1.2 Applicable documents

JIS C 5201-1994, JIS C 5202-1990

2. Classification

Type designation shall be the following form.

(Example)

RH	1	D	100M	J	□	B
1	2	3	4	5	6	7

Style

1 Fixed high voltage resistors: precision Style

2 Rated dissipation

3 Temperature coefficient of resistance

4 Rated resistance Example: 100M → 100MΩ

5 Tolerance on rated resistance

6 Note	Blank	Standard
	A	Possible to use in Insulated oil.

7 Packaging form

3. Rating

3.1 The ratings shall be in accordance with Table-1.

Table-1

Style	Rated dissipation (W)	Limiting element voltage (kV)	Max. overload voltage (kV)	Pulse voltage (kV)
RH1	1	1.5	4	4
RH2	2	5	12.5	7.5
RH3	3	10	25	15
RH4	4	15	30	20
RH6	6	20	40	30
RH8	8	30	60	40

Style	Temperature coefficient of resistance	Rated resistance range (MΩ)	Tolerance on rated resistance	Working temperature range (°C)
RH1	K($\pm 100 \times 10^{-6}/^{\circ}\text{C}$)	1 ≤ R ≤ 500	F($\pm 1\%$) G($\pm 2\%$) J($\pm 5\%$) K($\pm 10\%$)	-25~+100
RH2				
RH3				
RH4				
RH6	D($\pm 200 \times 10^{-6}/^{\circ}\text{C}$)	500 < R ≤ 5000		
RH8				

*Rated resistance shall be an arbitrary constant within the rated resistance range.

*Use in insulated oil shall be applied to RH 4, RH6 and RH8.

3.2 Derating

The derated values of dissipation at temperature in excess of 40 °C shall be as indicated by the following curve.

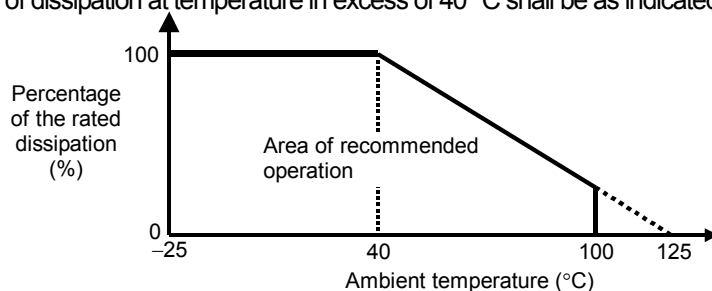


Figure-1 Derating curve

3.3 Rated voltage

d.c.or a.c.r.m.s.voltage calculated from the square root of the product of the rated resistance and the rated dissipation.

$$E = \sqrt{P \cdot R}$$

E: Rated voltage (V)

P: Rated dissipation (W)

R: Resistance (Ω)

Limiting element voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

At high value of resistance, the rated voltage may not be applicable.

4. Packaging form

The standard packaging form shall be in accordance with Table-2.

Table-2

Symbol	Packaging form		Standard packaging Quantity / units	Application
B	Bulk	Loose package	100 pcs.	RH1
			50 pcs.	RH2, 3
			25 pcs.	RH4, 6, 8

5. Dimensions

5.1 The resistor shall be accordance with the design and physical dimensions in Figure-2, Figure-3, Table-3 and Table-4.

5.1.1 Standard

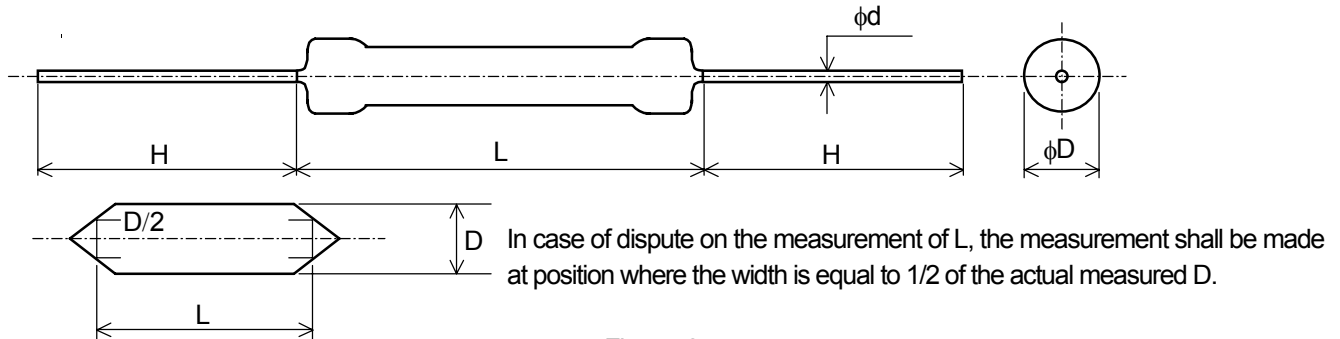


Figure-2

Table-3

Unit: mm

Style	L	ϕD	H	ϕd
RH1	14.5 ± 1.0	4.0 ± 1.0	38 ± 3	0.8
RH2	26.5 ± 1.0	5.0 ± 1.0	38 ± 3	1.0
RH3	39.0 ± 2.0	5.0 ± 1.0	38 ± 3	1.0
RH4	52.0 ± 2.0	9.0 ± 1.0	38 ± 3	1.0
RH6	77.0 ± 2.0	9.0 ± 1.0	38 ± 3	1.0
RH8	97.0 ± 2.0	9.0 ± 1.0	38 ± 3	1.0

5.1.2 Possible to use in Insulated oil.; Symbol: A.

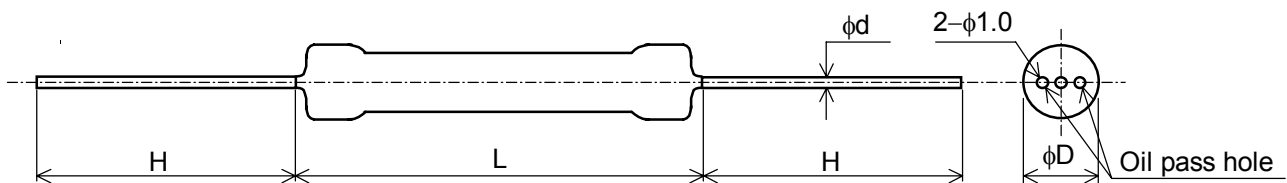


Figure-3

Table-4

Unit: mm

Style	L	ϕD	H	ϕd
RH4	51.5 ± 2.0	8.0 ± 1.0	38 ± 3	1.0
RH6	76.0 ± 2.0	8.0 ± 1.0	38 ± 3	1.0
RH8	96.0 ± 2.0	8.0 ± 1.0	38 ± 3	1.0

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6. Marking

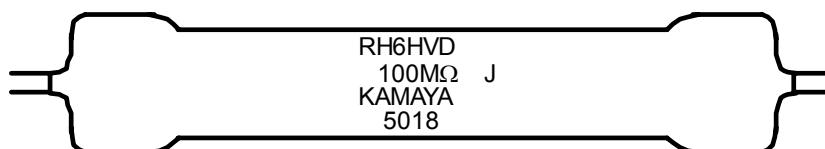
6.1 Marking on products

The following shall be marked on surface of resistor body.

(Example) (1) Style name and Temperature characteristic of resistance	RH6HVD											
(2) Rated resistance	100MΩ											
(3) Tolerance on rated resistance	J											
(4) Manufacturer's name or trade mark	KAMAYA											
(5) Date code	(Example)	<table><tr><td>5</td><td>O</td><td>1 8</td></tr><tr><td>1</td><td>2</td><td>3</td></tr></table>	5	O	1 8	1	2	3	<table><tr><td>1. Day</td></tr><tr><td>2. Month</td></tr><tr><td>3. Last digit of year</td></tr></table>	1. Day	2. Month	3. Last digit of year
5	O	1 8										
1	2	3										
1. Day												
2. Month												
3. Last digit of year												

Symbol of month: January to September..... 1 to 9
 October O
 November N
 December D

(Example of marking)



6.2 Marking on package

The label of a minimum package shall be legibly marked with follow;

- (1) Style name (2) Rated dissipation (3) Temperature characteristic of resistance
- (4) Rated resistance (5) Tolerance on rated resistance (6) Lot number
- (7) Quantity (8) Manufacturer's name or trade mark (9) Others

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7. Performance

7.1 The standard condition for tests shall be in accordance with Sub-clause 3, JIS C 5202-1990.

7.2 The performance shall be satisfied in Table-5.

7.3 The following three performance (*3) shall not be applied to the use in insulation oil.

- No.4 Insulation resistance, No.5 Dielectric withstanding voltage, No.11 Humidity (Steady state)

Table-5(1)

No.	Test items	Condition of test (JIS C 5202)	Performance requirements
1	DC resistance	Paragraph 5.1 Measurement voltage: 100Vdc Period: Within 5s	Within the specified tolerance of nominal resistance.
2	Temperature characteristic of resistance	Paragraph 5.2 The resistance shall be measured at the room temp. and temp. about 80°C higher than the room temp.	See Table-1
3	Short time overload	Paragraph 5.5 Test potential: 2.5 times rated voltage. Test period: 5s. Test potential should not exceed max. overload voltage as shown in Table-1.	Within $\pm(1\%+0.05\Omega)$ No evidence of appearance damage.
4	Insulation resistance *3	Paragraph 5.6 Test condition: A Test potential: 500Vdc. Test period: 1min.	1000M Ω min.
5	Dielectric withstanding voltage *3	Paragraph 5.7 Test condition: A Test pressure: Normal pressure Test potential: 500Vac Test period: 60^{+10}_0 s	No flashover, fire and breakdown.
6	Pulse test	Test condition: Pulse wave: $(1.2 \times 50)\mu\text{s}$ Interval: 10s Test times: 10,000 times Test potential should not exceed pulse voltage as shown in Table-1.	Within $\pm(1\%+0.05\Omega)$ No evidence of appearance damage.
7	Terminal strength Pulling test	Paragraph 6.1.2(1) Pull force: 25N Duration: 10s.	No evidence of mechanical damage.
8	Terminal strength Bending test	Paragraph 6.1.2(4) Test condition: Angle of 90degrees for 5 times.	
9	Resistance to soldering heat	Paragraph 6.4 Depth of immersion: A point within $4 \pm 0.8\text{mm}$ from the resistor body. Temp. of solder bath: $350 \pm 10^\circ\text{C}$ Immersion time: $3.5 \pm 0.5\text{s}$ After immerse into solder, leaving at the room temp. for 1h, and then measure the resistance.	Within $\pm(1\%+0.05\Omega)$ No evidence of appearance damage.

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Table-5(2)

No.	Test items	Condition of test (JIS C 5202)	Performance requirements		
9	Solderability	Paragraph 6.5 Flux: Rosin Methanol(25wt%) Test condition: Temp. solder bath and Immersion time: 260 °C ± 5 °C, 5 s±0.5 s Depth of immersion: A point within about 4 mm from the resistor body.	The surface of terminal immersed shall be min. of 3/4 covered with a new coating of solder.		
10	Temperature cycling	Paragraph 7.4 Test cycle: 5 cycles for duty cycle as specified below.	Within ±(1%+0.05Ω) No evidence of appearance damage.		
		Step		Temperature(°C)	Time(min.)
		1		Room Temp.	2~3
		2		-25±3	30
		3		Room Temp.	2~3
		4		+85±2	30
11	Humidity (Steady state) *3	Paragraph 7.5 Test temp. & relative humidity: 40±2°C & 90~95% RH. Test period: 1,000 ⁺⁴⁸ ₀ h After drying at 40±2°C for 60±15 min., leaving at the room temp. for about 30 min, and then measure the resistance.	Within ±(5%+0.1Ω) No evidence of appearance damage.		
12	Load life	Paragraph 7.10 Mounting space: 25 mm min. Test temp.: 40±2°C Test voltage: Cycle of 1h 30min. “ON” and 30min. “OFF” at dc rated voltage. Test period:1,000 ⁺⁴⁸ ₀ h	Within ±(5%+0.1Ω) No evidence of appearance damage.		