UniOhm

C O N F I D E N T I A L D O C U M E N T

SPECIFICATION FOR APPROVAL

DACHS

Description : High Voltage Flat Resistors

Customer Part no.:	**Uniohm Part no.:**
289871	HFR05WF1205B0E (HFR 5W +/-1% 12MΩ)
289872	HFR05WF2204B0E (HFR 5W +/-1% 2.2MΩ)
289873	HFR05WF1104B0E (HFR 5W +/-1% 1.1MΩ)
289874	HFR05WF4704B0E (HFR 5W +/-1% 4.7MΩ)
289875	HFR05WF6804B0E (HFR 5W +/-1% 6.8MΩ)
289876	HFR05WF2405B0E (HFR 5W +/-1% 24MΩ)

Approved by

Parts corresponding to RoHS Compliant: 2005-Apr.-1

Approved	**Checked**	**Prepared**
Mr. Jack Lin	Mr. S. Polthanasan	Ms. P. Supatta

Issue Date: 2018/03/22

CHANGE NOTIFICATION HISTORY

Version	Date of Version	History	Remark
1	2018/03/22	Resistance value: 12MΩ, 2.2MΩ, 1.1MΩ, 4.7MΩ, 6.8MΩ, 24MΩ	

Customer: DACHS	Part No.: HFR05WFxxxxB0E

1. Scope:

This specification for approval relates to Lead-Free Resistor HFR Series manufactured by UniOhm 's specifications.

2. Type designation:

The type designation shall be in the following form:

Ex.

Type	Power Rating	Resistance tolerance	Nominal Resistance
HFR	5W	F	12MΩ

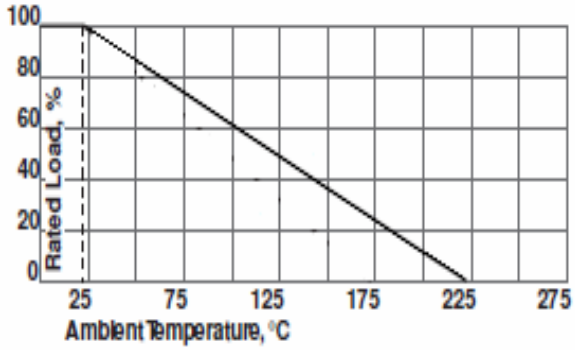
3. Ratings:

Type	HFR
Power Rating	5W
Max. Working Voltage	22KV
Dielectric Withstanding Voltage	500 V
Temperature Range	+21℃～ +225℃
Ambient Temperature	21 ℃
Resistance Value	12MΩ, 2.2MΩ, 1.1MΩ, 4.7MΩ, 6.8MΩ, 24MΩ

3.1 Power rating:

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 21℃. For temperature in excess of 21℃, the load shall be derate as shown in figure 1 s

Figure 1



3.2 Voltage Rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform curresponding to the power rating , as determined from the following formula :

$$RCWV = \sqrt{P \times R}$$

Were : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

R = Nominal Resistance (ohm)

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

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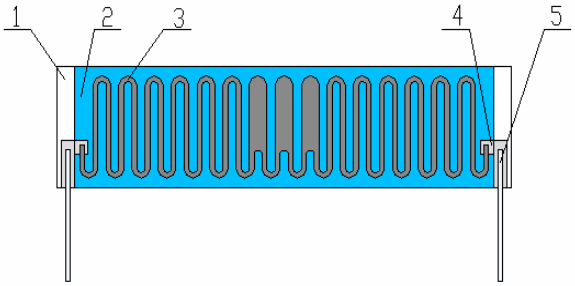
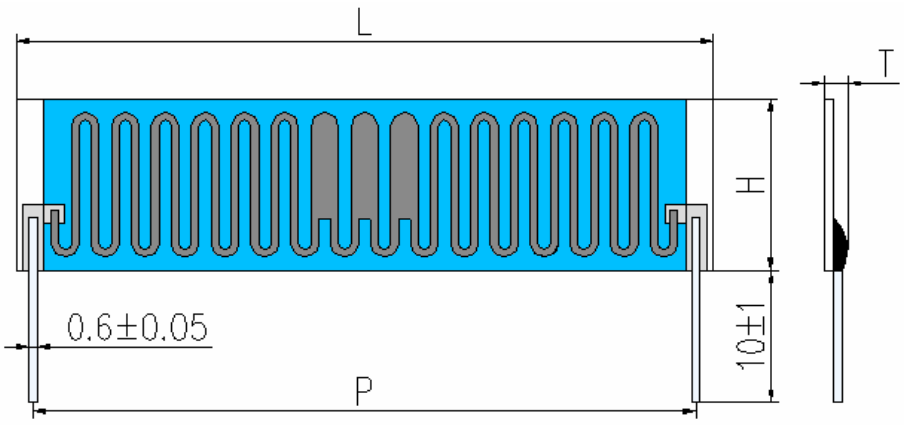
4. Construction :



No.	Name
1	Basic body
2	Protective covering
3	Resistance element
4	Electrode
5	Lead wire

5. Power rating and dimensions



Dimension :

Type	Dimension (mm)			
	L±0.5	P±0.5	H±0.5	T(Max.)
HFR 5W	51	48.2	12.9	3

Power Rating :

Type	Power Rating at 70 ℃	Tolerance %	Resistance Value	Standard Series
HFR 5W	5W	± 1	12MΩ, 2.2MΩ 1.1MΩ, 4.7MΩ 6.8MΩ, 24MΩ	E-96

High Voltage Flat Resistors

6. Performance specification :

Characteristics	Limits	Test Methods (JIS-C-5201&JIS-C-5202)
Temperature Coefficient	± 100 PPM/℃	4.8 Natural resistance change per temp. degree centigrade. $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/℃) R_1: Resistance value at room temperature (t1) R_2: Resistance value at room temp. plus 100 ℃ (t2) Test pattern : Room Temperature(t1), Room temperature +100°C (t2)
Insulation Resistance	10,000 MΩ	4.6 The measuring voltage shall be ,measured with a direct voltage of (100±15)V or a voltage equal to the dielectric withstanding voltage., and apply for 1min
Dielectric withstanding voltage	No evidence of flashover mechanical damage or insulation break down	4.7 Resistors shall be clamped in the trogh of a 90^0 metallic V-block and shall be tested at AC potential respectively specified in the above list for 60-70 seconds.
Terminal strength	Without mechanical damage	4.16 Direct load : Resistance to a 2.5 kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads. Twist test: Terminal leads shall be bent through 90℃at a point of about 6mm from the body of the resistor and shall be rotated through 360℃ about the original axis of the bent terminal in alternating direction for a total of 3 rotations.
Resistance to sodering heat	± (1%+0.1Ω)	4.18 Dip the resistor into a sodler bath having a temperature of 260℃± 5℃and hold it for 10±1 seconds.

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6. Performance specification :

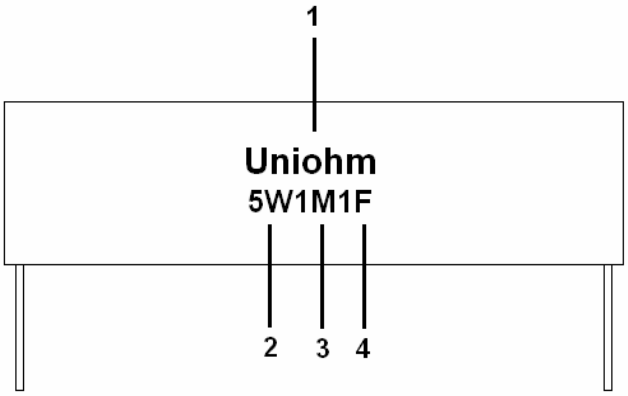
<table>
<tr><th>Characteristics</th><th>Limits</th><th>Test Methods
(JIS C 5201-1)</th></tr>
<tr><td>Solderability</td><td>95% coverage Min.</td><td>Wave Solder: Test temperature of solder: 245℃± 3℃,
Dipping time in solder: 2-3 seconds</td></tr>
<tr><td>Temperature cycling</td><td>Resistance change rate is:
± (1%+0.1Ω) Max.With no evidence of mechanical damage.</td><td>4.19 Resistance change after continuous five cycles for duty cycle specified:
<table>
<tr><th>Step</th><th>Temperature</th><th>Time</th></tr>
<tr><td>1</td><td>-55℃ ± 3℃</td><td>30Mins</td></tr>
<tr><td>2</td><td>Room temp.</td><td>10 - 15Mins</td></tr>
<tr><td>3</td><td>-155℃ ± 2℃</td><td>30Mins</td></tr>
<tr><td>4</td><td>Room temp.</td><td>10 - 15Mins</td></tr>
</table></td></tr>
<tr><td>Thermal Shock</td><td>± (1%+0.1Ω)</td><td>4.21 Load V, Room temp., 30Mins.
Unliad,-55℃, 15 Mins.
Over 2 houre in room temp. before measuring</td></tr>
<tr><td>Load life in humidity</td><td>± (3%+0.05Ω)</td><td>7.9 Resistanec change after 1,000 hours (1.5 hours "ON",0.5 hours "OFF") at RCWV in a humidity test chamber controlled at 40℃± 2℃ and 90% to 95% rerative humidity.</td></tr>
<tr><td>Load life</td><td>± (3%+0.05Ω)</td><td>4.25.1 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours "ON", 0.5 hour "OFF"at 70℃±2℃ ambient.</td></tr>
</table>

High Voltage Flat Resistors

7. Marking

Resistors shall be marked with color coding

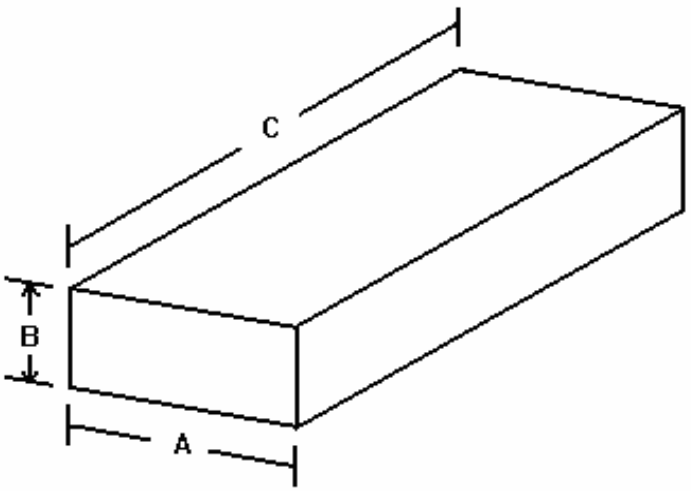
Color Codes shall be in accordance with JIS C 0802



1）Product company name：UNIOHM
2）Wattage rating.
3）Nominal resistance value.
4）Resistance tolerance. ：F=±1%

8. Bulk in Box Packing

Unit : mm

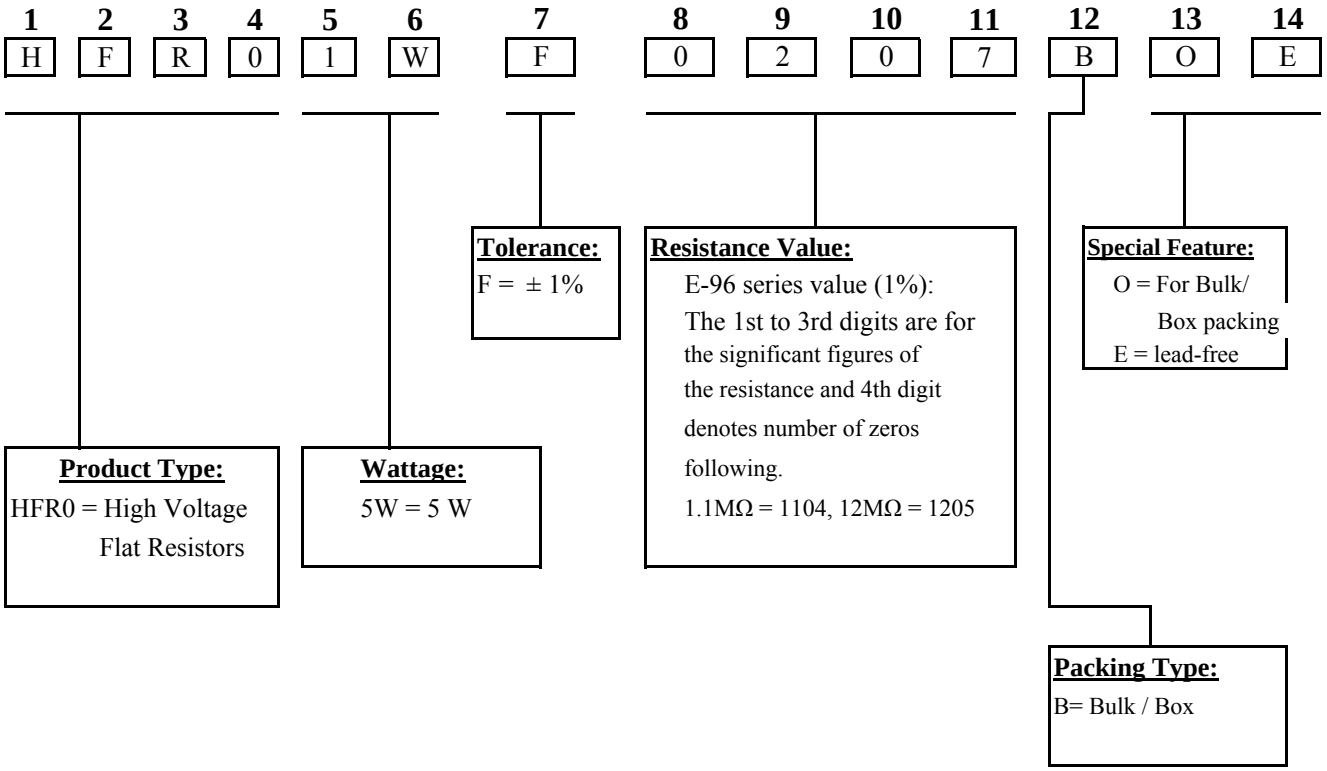


TYPE	Quantity Per Bag (pcs)	Quantity Per Box (pcs)	Quantity Per Carton (pcs)
HFR-100	50	500	15,000

Part Number Syster

Explanation of Part Number System

High Voltage Flat Resistors



Sample :
HFR 5W +/- 1% 12MΩ B/B → HFR05WF1205B0E
HFR 5W +/- 1% 2.2MΩ B/B → HFR05WF2204B0E
HFR 5W +/- 1% 1.1MΩ B/B → HFR05WF1104B0E
HFR 5W +/- 1% 4.7MΩ B/B → HFR05WF4704B0E
HFR 5W +/- 1% 6.8MΩ B/B → HFR05WF6804B0E
HFR 5W +/- 1% 24MΩ B/B → HFR05WF2405B0E

High Voltage Flat Resistors

Environment Related Substance

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

Ozone layer depleting substances.

Ozone depleting substances are not used in our manufacturing process of this product.
This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

Storage Condition

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of 25°C ± 10°C and a relative humidity of 60%RH ± 10%RH, chemical and dust free atmosphere

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as Cl_2, H_2S, NH_3, SO_2, or NO_2
2. In direct sunlight