

ROYALOHM

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

SPECIFICATION FOR APPROVAL

OZDISAN

Description : Power Flat Alloy Resistors

Royalohm Part no.:

PFAS5WJ020LB00 (PFA (S-TYPE) 5W +/- 5% 0.02Ω B/B)

Approved by

RoHS V3 Compliant (EU) 2015/863

REACH Compliant

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Approved	Checked	Prepared
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Issue Date: 2022/03/08

Power Flat Alloy Resistors

1. Scope:

This specification for approval relates to Power Flat Alloy Resistors manufactured by ROYALOHM 's specifications.

2. Type designation:

The type designation shall be in the following form:

(Ex.)	PFAS	5 W	J	0.02Ω
	Type	Power Rating	Resistance Tolerance	Nominal Resistance

3. Ratings:

Ratings shall be shown in the table 1.

Table 1

Type	PFAS
Rated Power	5W at 70°C
Rated Ambient Temp.	70 °C
Dielectric Withstanding Voltage	2,000 V
Operating Temp. Range	-55°C --- +155°C
Resistance Tolerance	± 5%
Resistance Value	0.02Ω

3.1 Power rating:

Resistors shall have a power rating based on continuous full load operation at an ambient temperature of 70 °C

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 corresponding to the power rating , as determined from the following formula:

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

Note : Max. Working Voltage or $\sqrt{P \times R}$ whichever is lesser

Max. Overload Voltage or $2.5 \sqrt{P \times R}$ whichever is lesser

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

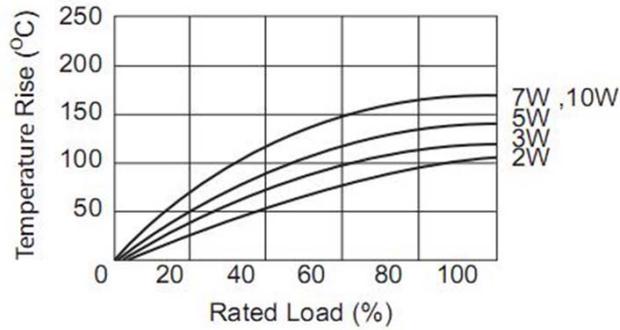
P = Power Rating (watt)

R = Nominal Resistance (ohm)

Power Flat Alloy Resistors

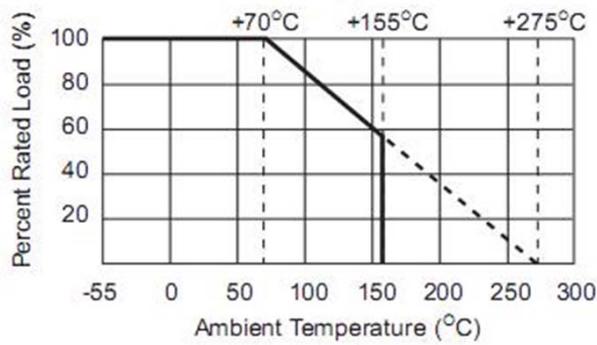
Heat Rise Chart

Heat Rise Chart

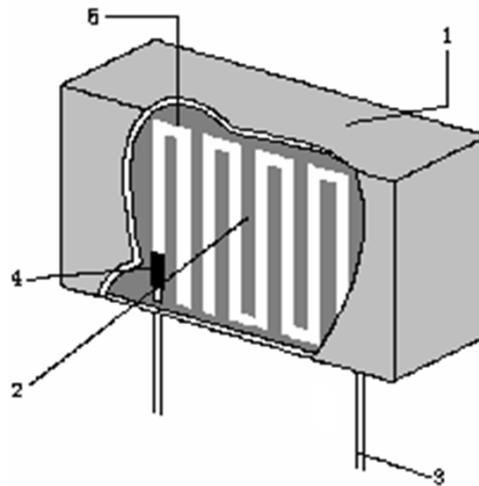


Derating Curve:

Derating Curve



4. Construction:



Confirmation List of Material

No.	Name	Material Generic Name	Remark
1	Ceramic Case	Steatite	MgO SiO ₂
2	Cement	Quartz mixed sand	SiO ₂
3	Terminal Lead	Tin Copper plated steel wire	Steel 79%, Cu 18%, Sn 3%
4	Weld Point	---	---
5	Flat Alloy	Ni-Cr	Ni80%, Cr20%

Power Flat Alloy Resistors		
5. Characteristic :		
Characteristics	Limits	Test Methods (JIS - C - 5201-1)
Temperature coefficient	± 350 PPM/°C Max.	Natural resistance change per temp. degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/°C)}$ R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2) (Sub-clause 4.8)
Dielectric withstanding voltage	No evidence of flashover, mechanical damage, arcing or insulation break down	Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested at AC potential respectively for 60 +10/ -0 secs. (Sub-clause 4.7)
Short time overload	Resistance change rate is ± (2%+ 0.05Ω) Max. with no evidence of mechanical damage	Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds. (Sub-clause 4.13)
Terminal strength	No evidence of mechanical damage	Direct load : Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads (Sub-clause 4.16)
Solderability	95 % coverage Min.	The area covered with a new , smooth clean , shiny and continuous surface free from concentrated pinholes. Test temp. of solder : 245°C ± 5°C Dwell time in solder : 2 ~ 3 seconds (Sub-clause 4.17)
Soldering temp. reference	Electrical characteristics shall be satisfied. Without distinct deformation in appearance. (95 % coverage Min.)	The leads immersed into solder bath to 3.2 to 4.8 mm. from the body. Permanent resistance change shall be checked. <u>Wave soldering condition: (2 cycles Max.)</u> Pre-heat : 100 ~ 120 °C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.) Peak temp.: 260 °C <u>Hand soldering condition:</u> Hand Soldering bit temp. : 380 ± 10 °C Dwell time in solder : 3 +1/-0 sec.
Resistance to soldering heat	Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage	Permanent resistance change when leads immersed to 3.2 to 4.8 mm from the body in 350°C ± 10 °C solder for 3 ± 0.5 secs. (Sub-clause 4.18)

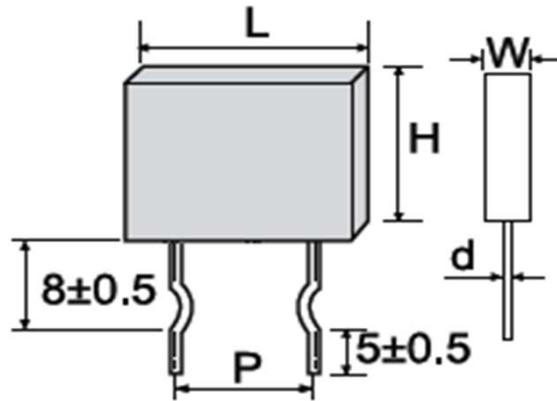
Power Flat Alloy Resistors																	
Characteristics	Limits	Test Methods (JIS - C - 5201-1)															
Temperature cycling	Resistance change rate is $\pm (5\% + 0.05\Omega)$ Max. with no evidence of mechanical damage	Resistance change after continuous 100 cycles for duty shown below:															
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Step</th> <th style="text-align: center;">Temperature</th> <th style="text-align: center;">Time</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">$-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$</td> <td style="text-align: center;">30 mins</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Room temp.</td> <td style="text-align: center;">10~15 mins</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">$+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$</td> <td style="text-align: center;">30 mins</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Room temp.</td> <td style="text-align: center;">10~15 mins</td> </tr> </tbody> </table>	Step	Temperature	Time	1	$-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$	30 mins	2	Room temp.	10~15 mins	3	$+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$	30 mins	4	Room temp.	10~15 mins
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(Sub-clause 4.19)																	
Temporary resistance change after a 240 hours exposure in a humidity test chamber controlled at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 90 to 95% relative humidity.																	
(Sub-clause 4.24)																	
Load life in humidity	Resistance change rate is $\pm (5\% + 0.05\Omega)$ Max. with no evidence	Resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") in a humidity test chamber controlled at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 90 to 95 % relative humidity. (Sub-clause 4.24.2.1)															
Load life	Resistance change rate is $\pm (5\% + 0.05\Omega)$ Max. with no evidence	Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ambient. (Sub-clause 4.25.1)															
Resistance to solvent	Resistance change rate is $\pm (1\% + 0.05\Omega)$ Max.	Specimens shall be immersed in a bath of Isopropyl alcohol completely for 3 minutes with ultrasonic. (Sub-clause 4.30)															

Power Flat Alloy Resistors

6. Dimension :

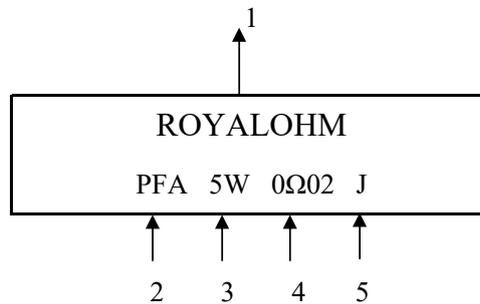
Unit : mm

Single Type



Type	Power Rating	$L \pm 1$	$H \pm 1$	$W + 0$ -0.5	$d \pm 0.05$	$P \pm 1$
PFAS	5 W	14.0	18.0	5.5	0.75	10.0

7. Marking :



Code description and regulation:

1. Company mark or customer designated mark. Company mark : ROYALOHM
2. Product description.
3. Wattage rating.
4. Nominal resistance value.
5. Resistance tolerance.

J : ± 5 %

K : ± 10 %

Color of marking: Black ink

Part Number System

**Explanation of Part Number System
(Power Flat Alloy Resistors)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14
P	F	A	S	5	W	J	0	2	0	L	B	0	0

Resistor Type:
 PFAS = PFA Single Type
 PFAT = PFA Twin Type

Tolerance:
 J ~ ± 5%
 K ~ ± 10%

Wattage:
 2W = 2W
 3W = 3W
 5W = 5W
 7W = 7W
 AW = 10W

Resistance Value:
 E-24 series: the 1st digit will be "0" the 2nd and 3rd digits are for resistance and the 4th digit denote number of zeros following
Decimal point is expressed by:
 "J" ~ 0.1, "K" ~ 0.01
 Ex.: 4.7Ω ~ 47J, 4.7KΩ ~ 472

Packing Quantity:
 0 = for Bulk/Box packing

Packing Type:
 B = Bulk / Box

Special Feature:
 0 = Standard product

Sample: PFA (S-Type) 5W +/- 5% 0.02Ω B/B → PFAS5WJ020LB00

Power Flat Alloy 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 (MSL1)

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 $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and a relative humidity of $60\%\text{RH} \pm 10\%\text{RH}$, 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