

UniRoyal

DATASHEET

Product Name Power Flat Alloy Resistors

Part Name PFAP Series

File No. DIP-SP-034

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1. Scope

- 1.1 This datasheet is the characteristics of Power Flat Alloy Resistors manufactured by UR.
- 1.2 Low inductance
- 1.3 Safety flameroof construction
- 1.4 Thin lightweight body save the PCB space considerably
- 1.5 Compliant with RoHS directive.
- 1.6 Halogen free requirement.

2. Part No. System

The standard Part No. includes 14 digits with the following explanation:

- 2.1 For Cement Fixed Resistors, these 4 digits are to indicate the product type but if the product type has only 3 digits, the 4th digit will be "0"

Example: PFAP=PFAP-type

- 2.2 5th~6th digits:

- 2.2.1 For power of 1 watt to 16 watt, the 5th digit will be a number or a letter code and the 6th digit will be the letters of W.

Example: 2W=2W

- 2.3 The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.

J=±5% K=±10%

- 2.4 The 8th to 11th digits is to denote the Resistance Value.

- 2.4.1 For the standard resistance values of E-24 series, the 8th digit is "0", the 9th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following;

- 2.4.2 The following numbers and the letter codes are to be used to indicate the number of zeros in the 11th digit:

0=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵

6=10⁶ J=10⁻¹ K=10⁻² L=10⁻³ M=10⁻⁴

- 2.5 The 12th, 13th & 14th digits.

- 2.5.1 The 12th digit is to denote the Packaging Type with the following codes:

B=Bulk/Box

- 2.5.2 The 13th digit is normally to indicate the Packing Quantity of Tape/Box & Tape/Reel packaging types. Using "0" to indicate the Bulk packaging types, the following letter codes is to be used for some packing quantities:

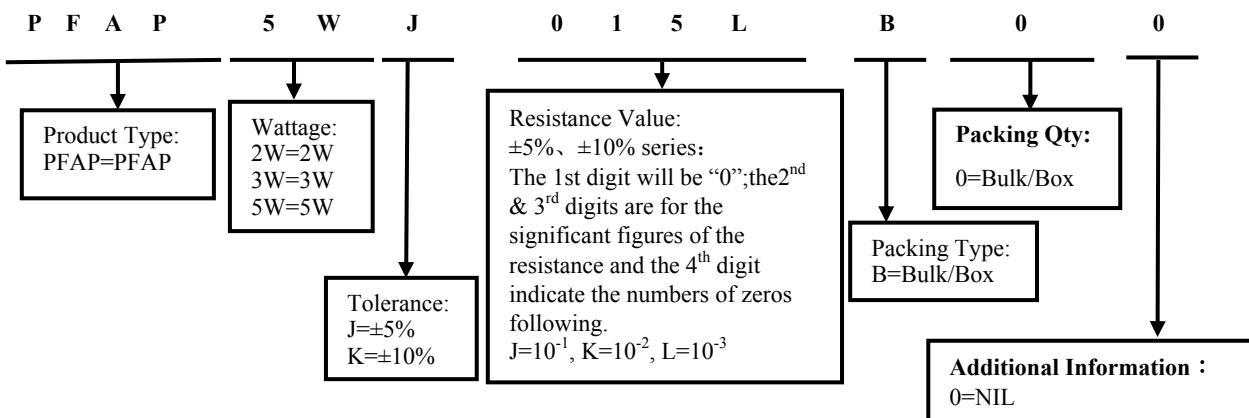
0=Bulk/Box

- 2.5.3 For some items, the 14th digit alone can use to denote special features of additional information with the following codes or standard product

Example: 0= standard product

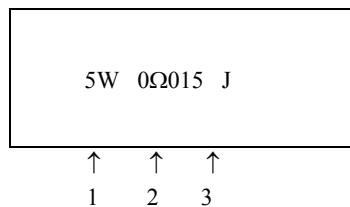
3. Ordering Procedure

(Example: PFAP 5W ±5% 0.015Ω B/B)



4. Marking

Example:



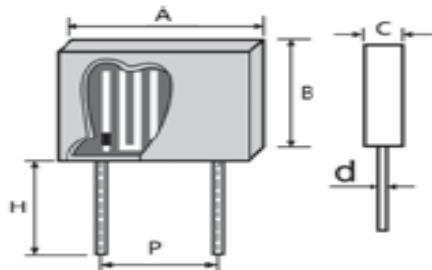
Code description and regulation:

1. Wattage Rate
2. Nominal Resistance Value
3. Resistance Tolerance. J: $\pm 5\%$
K: $\pm 10\%$

Color of marking: Black Ink

Note: The marking code shall be prevailed in kind!

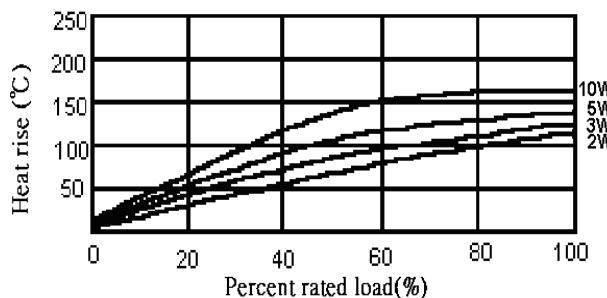
5. Ratings & Dimension



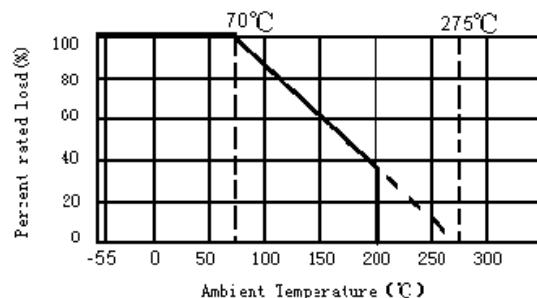
Type	Dimension(mm)						Tolerance	Resistance Range
	A ± 1.0	B ± 1.0	C ± 0.5	d ± 0.05	P ± 1.0	H ± 1.0		
PFAP 2W	13.0	8.5	5.0	0.75	9 & 10	4 & 10	$\pm 5\% \text{ } \pm 10\%$	0.01Ω~1Ω
PFAP 3W	14.0	13.5	5.0	0.75			$\pm 5\% \text{ } \pm 10\%$	0.01Ω~1Ω
PFAP 5W	14.0	18.0	5.0	0.75			$\pm 5\% \text{ } \pm 10\%$	0.01Ω~1Ω
PFAP 10W	26.0	18.0	5.0	0.75			$\pm 5\% \text{ } \pm 10\%$	0.01Ω~3.3Ω

6. Derating Curve

Heat rise chart



Derating curve



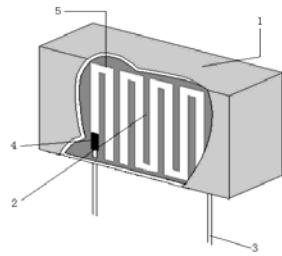
6.1 Voltage rating:

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:

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

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)

7. Structure



No.	Name	Material Generic Name
1	Ceramic case	Stearite
2	Cement	SiO ₂
3	Terminal	Copper wire Platted with tin
4	Weld point	/
5	Alloy ribbon	Ni & Cr

8. Performance Specification

Characteristic	Limits	Test Methods (GB/T5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	0.01Ω~0.1Ω Please contact uniohm ≥0.1Ω: ±350PPM/°C;	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6 \text{ (PPM/°C)}$ R ₁ : Resistance Value at room temperature (t ₁) ; R ₂ : Resistance at test temperature (t ₂) t ₁ : +25°C or specified room temperature t ₂ : Test temperature (-55°C or 125°C)
Short-time overload	Resistance change rate must be in $\Delta R/R \leq \pm(2\% + 0.05\Omega)$, and no mechanical damage.	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV or Max.Overload Voltage whichever less for 5 seconds.
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down.	4.7 Resistors shall be clamped in the trough of a 90°metallic V-block and shall be tested at AC potential respectively specified in the above list for 60-70 seconds. for cement fixed resistors the testing voltage is 1000V.
Terminal strength	No evidence of 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.
Resistance to soldering heat	Resistance change rate must be in $\Delta R/R \leq \pm(1\% + 0.05\Omega)$, and no mechanical damage.	4.18 Permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in 260°C±5°C solder for 10±1 seconds.
Resistance to solvent	No deterioration of protective coating and markings	4.29 Specimens shall be immersed in a bath of sopropanol completely for 3 minutes with ultrasonic.
Solderability	95% coverage Min.	4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. Of solder:245°C±3°C Dwell time in solder: 2~3seconds.
Humidity (Steady state)	Resistance change rate must be in $\Delta R/R \leq \pm(5\% + 0.05\Omega)$, and no mechanical damage.	4.24 Temporary resistance change after a 240 hours exposure in a humidity test chamber controlled at 40°C±2°C and 90 to 95% relative humidity.
Load life in humidity	Resistance change rate must be in $\Delta R/R \leq \pm(5\% + 0.05\Omega)$, and no mechanical damage.	7.9 Resistance change after 1000 hours (1.5hours “ON” , 0.5hours “OFF”) at RCWV or Max. Working Voltage whichever less in a humidity test chamber controlled at 40±2°C and 93%±3% RH.

Load life	Resistance change rate must be in $\Delta R/R \leq \pm(5\% + 0.05\Omega)$, and no mechanical damage.	4.25.1 Permanent Resistance change after 1000 hours operating at RCWV or Max. Working Voltage whichever less with duty cycle of 1.5 hours "ON" , 0.5 hour "OFF" at $70 \pm 2^\circ\text{C}$ ambient.
Low Temperature Storage	Resistance change rate must be in $\Delta R/R \leq \pm(5\% + 0.05\Omega)$, and no mechanical damage.	IEC 60068-2-1 (Aa) Lower limit temperature , for 2H.
High Temperature Exposure	Resistance change rate must be in $\Delta R/R \leq \pm(5\% + 0.05\Omega)$, and no mechanical damage.	MIL-STD-202 108A Upper limit temperature , for 16H.

9. Note

9.1. UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35°C under humidity between 25 to 75%RH.
Even under storage conditions recommended above, solder ability of products will be degraded stored over 1 year old.

9.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.

9.3. Storage conditions as below are inappropriate:

- Stored in high electrostatic environment
- Stored in direct sunshine, rain, snow or condensation.
- Exposed to sea wind or corrosive gases, such as Cl_2 , H_2S , NH_3 , SO_2 , NO_2 , Br etc.

10. Record

Version	Description	Page	Date	Amended by	Checked by
1	First version	1~5	Mar.20, 2018	Haiyan Chen	Nana Chen
2	Modify characteristic	4~5	Feb.26, 2019	Haiyan Chen	Yuhua Xu
3	Modify characteristic	4	Nov.20,2020	Song Nie	Yuhua Xu
4	Modify the temperature coefficient test conditions	4	Nov.07, 2022	Haiyan Chen	Yuhua Xu

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