

DATASHEET

Product Name **Axial Leaded Type Cement Fixed Resistors**

Part Name **PRWA Series**

File No. **DIP-SP-028**

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1. Scope

- 1.1 This datasheet is the characteristics of Axial Leaded Type Cement Fixed Resistors manufactured by UNI-ROYAL.
- 1.2 Self-extinguishing
- 1.3 Extremely small & sturdy mechanically safe
- 1.4 Non-inductive type available
- 1.5 Excellent flame & moisture resistance
- 1.6 Too low or too high values on Wire-wound& Power –film type can be supplied on a case to case basis
- 1.7 Compliant with RoHS directive.
- 1.8 Halogen free requirement.

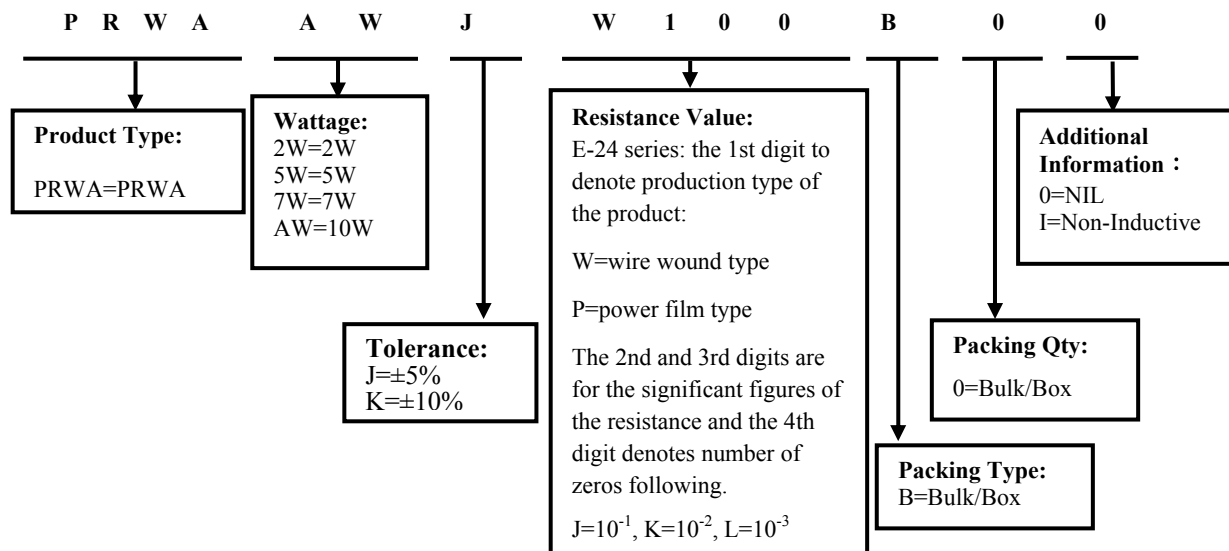
2. Part No. System

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 3digits, the 4th digit will be “0”
Example: PRWA=PRWA 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; AW=10W
 - 2.2.2 For power rating between20 watt to 99 watt, the 5th and the 6th digits will show the whole numbers of the power rating itself.
Example: 20=20W 75=75W
- 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 Cement Fixed Resistors the 8th digits will be coded with “W” or “P” to denote Wire-wound type or Power Film type respectively of the Cement Fixed Resistor product. The 9th to 11th please refer to point a) of item 4.
Example: W12J=1.2Ω W120=12Ω P273=27KΩ
- 2.5 The 12th, 13th & 14th digits.
 - 2.5.1The 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, This digit should be filled with “0”for the Cement products with “Bulk/Box” packing requirements.
 - 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; I=Non-Inductive

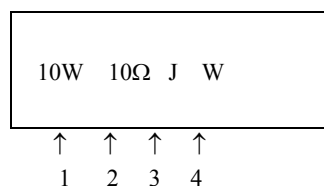
3.0 Ordering Procedure

(Example: PRWA 10W ±5% 10Ω B/B)



4. Marking

Example:



Code description and regulation:

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

4. Pattern:

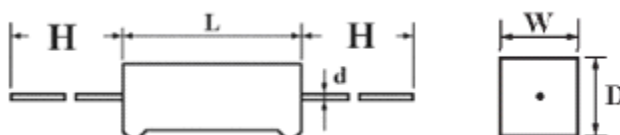
M: Power film

W: Wire wound

Color of marking: Black Ink

Note: The marking code shall be prevailed in kind!

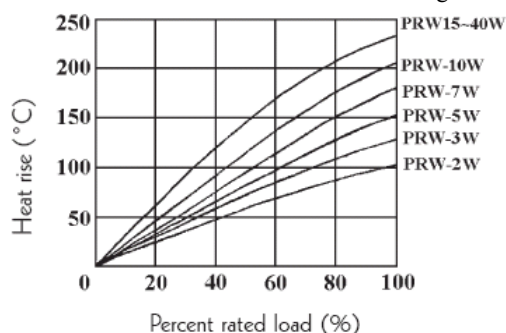
5. Ratings & Dimension



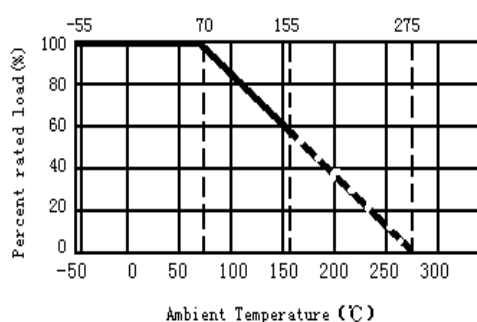
Type	Dimension(mm)					Resistance Range	
	W ± 1	D ± 1	L ± 1	H ± 5	d ± 0.05	Wire Wound	Power Film
PRWA 2W	7	7	18	28	0.70	0.1 Ω ~27 Ω	28 Ω ~120 K Ω
PRWA 5W	10	9	22	35	0.75	0.1 Ω ~47 Ω	48 Ω ~150K Ω
PRWA 7W	10	9	35	35	0.75	0.1 Ω ~680 Ω	681 Ω ~200K Ω
PRWA 10W	10	9	49	35	0.75	0.1 Ω ~910 Ω	911 Ω ~200K Ω

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:

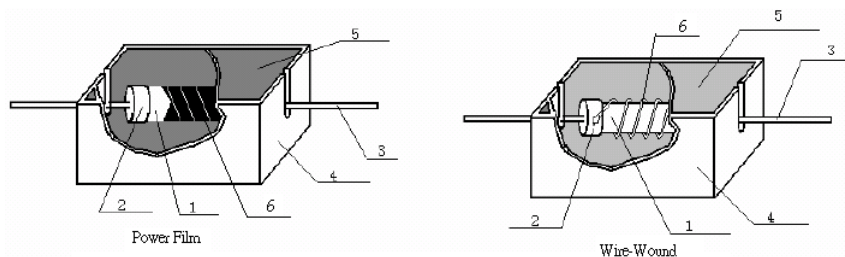
$$RCWV = \sqrt{P \times R}$$

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	Body	Al ₂ O ₃
2	Cap	Tin plated iron
3	Lead	Copper Wire
4	Ceramic Case	Al ₂ O ₃ CaO
5	Filling Materials	SiO ₂
6	Resistance element	Power film: Metal Oxide Film
		Wire-wound: Alloys

8. Performance Specification

Characteristic	Limits	Test Methods (GB/T5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	$\geq 20\Omega$: $\pm 350\text{PPM}/^{\circ}\text{C}$ max.. $< 20\Omega$: $\pm 400\text{PPM}/^{\circ}\text{C}$ max..	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM}/^{\circ}\text{C})$ 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 $\pm(5\%+0.05\Omega)$, and no mechanical damage.	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV or Max.Overload Votage 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. 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 soldering heat	Resistance change rate must be in $\pm(1\%+0.05\Omega)$, 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 \pm 5°C solder for 10 \pm 1 seconds.
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 \pm 3°C Dwell time in solder: 2~3seconds.
Humidity (Steady state)	Resistance change rate must be in $\pm(5\%+0.05\Omega)$, and no mechanical damage.	4.24 Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at 40 \pm 2°C and 90~95%RH relative humidity

Load life in humidity	For Wire-wound: $\Delta R/R: \pm 5\%$ For Power film range: $< 100K\Omega \Delta R/R: \pm 5\%$ $\geq 100K\Omega \Delta R/R: \pm 10\%$	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 $40\pm 2^{\circ}\text{C}$ and $93\%\pm 3\%$ RH.
Load life	For Wire-wound: $\Delta R/R: \pm 5\%$ For Power film range: $< 100K\Omega \Delta R/R: \pm 5\%$ $\geq 100K\Omega \Delta R/R: \pm 10\%$	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	For Wire-wound: $\Delta R/R: \pm 5\%$ For Power film range: $< 100K\Omega \Delta R/R: \pm 5\%$ $\geq 100K\Omega \Delta R/R: \pm 10\%$	IEC 60068-2-1 (Aa) Lower limit temperature , for 2H.
High Temperature Exposure	For Wire-wound: $\Delta R/R: \pm 5\%$ For Power film range: $< 100K\Omega \Delta R/R: \pm 5\%$ $\geq 100K\Omega \Delta R/R: \pm 10\%$	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:
 - a. Stored in high electrostatic environment
 - b. Stored in direct sunshine, rain, snow or condensation.
 - c. 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	5	Nov.20,2020	Song Nie	Yuhua Xu
4	Modify the temperature coefficient test conditions	4	Nov.07, 2022	Haiyan Chen	Yuhua Xu
5	Modify Ordering Procedure	2	Nov.13, 2024	Junying Ye	Haiyan Chen

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