

# DATASHEET

**Product Name**   **Radial Type Cement Fixed Resistors**

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**Part Name**   **PRM Series**

**File No.**   **DIP-SP-029**

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## 1. Scope

This datasheet is the characteristics of Radial Type Cement Fixed Resistors manufactured by UNI-ROYAL.

1.1 Compliant with RoHS directive.

1.2 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 4<sup>th</sup> digit will be “0”

Example: PRM0=PRM- type

2.2 5<sup>th</sup>~6<sup>th</sup> digits:

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

Example: 5W=5W; AW=10W;

2.2.2 For power rating Between 20 watt to 99 watt, the 5<sup>th</sup> and the 6<sup>th</sup> digits will show the whole numbers of the power rating itself.

Example: 20=20W 75=75W

2.3 The 7<sup>th</sup> 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 8<sup>th</sup> to 11<sup>th</sup> digits is to denote the Resistance Value.

2.4.1 For Cement Fixed Resistors the 8<sup>th</sup> 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 9<sup>th</sup> & 10<sup>th</sup> digits are to denote the significant figures of the resistance and the 11<sup>th</sup> digit is the number of zeros following

Example: W12J=1.2Ω W120=12Ω P273=27KΩ

2.5 The 12<sup>th</sup>, 13<sup>th</sup> & 14<sup>th</sup> digits.

2.5.1 The 12<sup>th</sup> digit is to denote the Packaging Type with the following codes: B=Bulk/Box

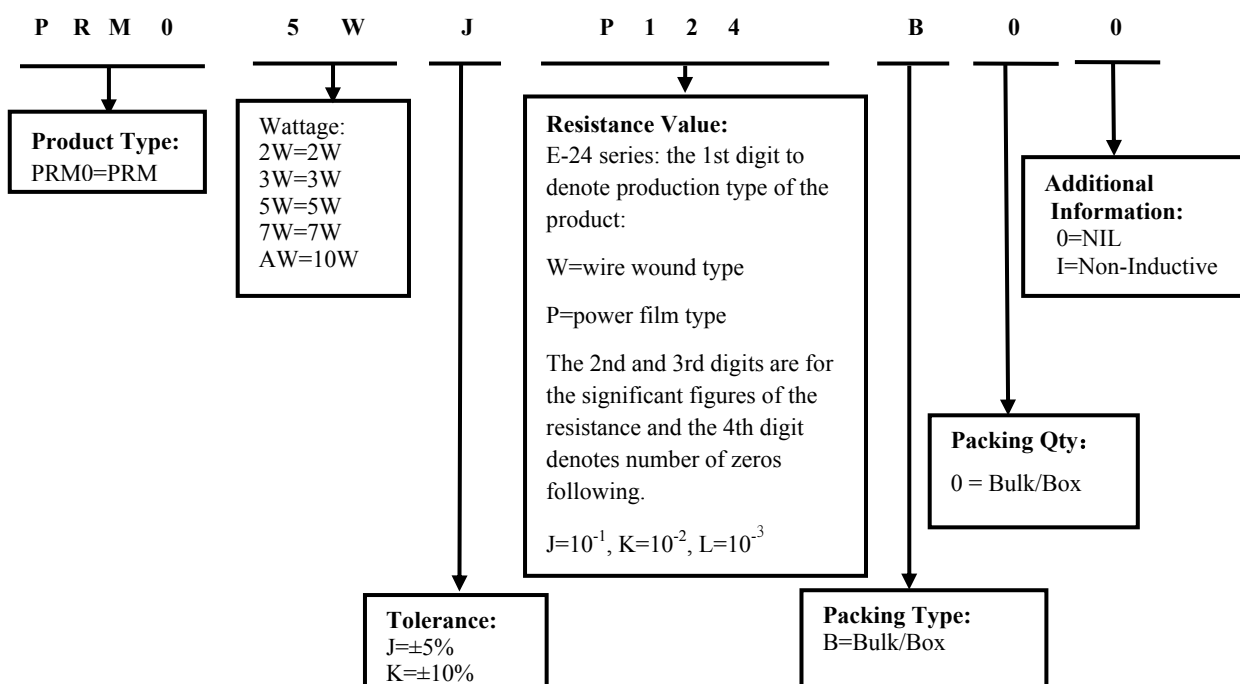
2.5.2 The 13<sup>th</sup> digit is normally to indicate the Packing Quantity, This digit should be filled with “0” for the Cement products with “Bulk/Box” packing requirements.

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

Example: 0= standard product

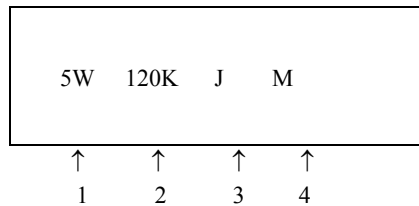
## 3. Ordering Procedure

(Example: PRM 5W ±5% 120KΩ 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:

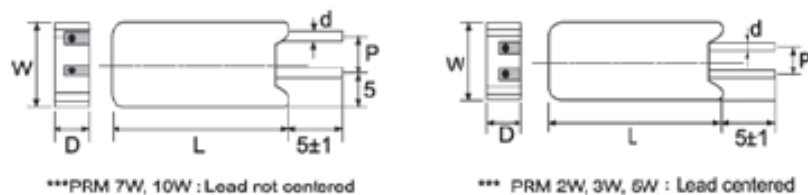
M: Power film

W: Wire wound

Color of marking: Black Ink

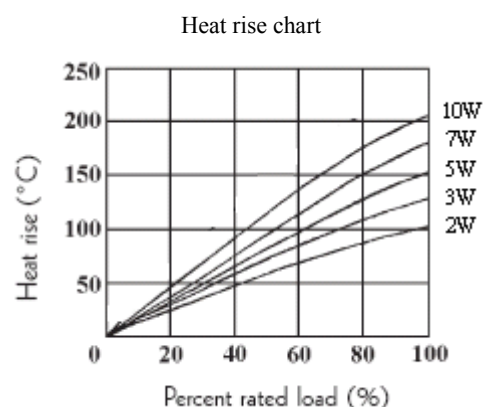
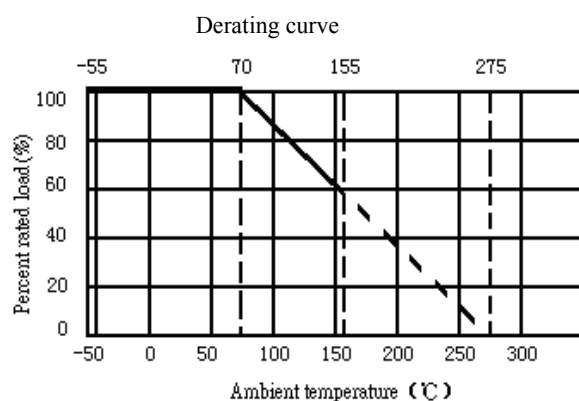
**Note:** The marking code shall be prevailed in kind!

## 5. Ratings & Dimension



Type	Dimension(mm)					Max Working Voltage	Max Overload Voltage	Resistance Range	
	W $\pm 1$	D $\pm 1$	L $\pm 1$	P $\pm 1$	d $\pm 0.05$			Wire Wound	Power Film
PRM 2W	11.5	7.5	20	5	0.70	250V	500V	0.1 $\Omega$ -27 $\Omega$	28 $\Omega$ -120K $\Omega$
PRM 3W	12.5	8.5	25	5	0.70	300V	600V	0.1 $\Omega$ -39 $\Omega$	40 $\Omega$ -150K $\Omega$
PRM 5W	13	9	25	5	0.75	350V	700V	0.1 $\Omega$ -47 $\Omega$	48 $\Omega$ -150K $\Omega$
PRM 7W	13	9	38	5	0.75	500V	1000V	0.1 $\Omega$ -680 $\Omega$	681 $\Omega$ -200K $\Omega$
PRM10W	13	9	50	5	0.75	700V	1400V	0.1 $\Omega$ -910 $\Omega$	911 $\Omega$ -200K $\Omega$

## 6. 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:

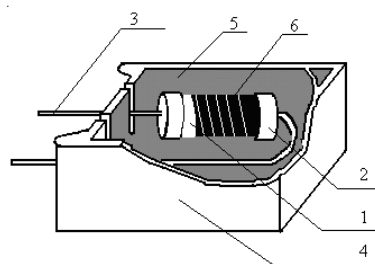
$$RCWV = \sqrt{P \times R}$$

Where: RCWV = rated dc or RMS ac continuous working voltage at commercial-line frequency and waveform (VOLT.)

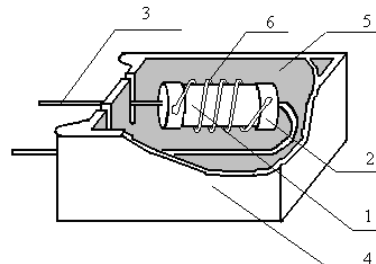
P = power rating (WATT.)

R = nominal resistance (OHM)

## 7. Structure



(POWER FILM)



(WIRE WOUND)

No.	Name	Material Generic Name
1	Body	Al <sub>2</sub> O <sub>3</sub>
2	Cap	Tin plated iron
3	Lead	Copper wire
4	Ceramic case	Al <sub>2</sub> O <sub>3</sub> CaO
5	Filling materials	SiO <sub>2</sub>
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	$\geq 20\Omega$ : $\pm 350\text{PPM}/^\circ\text{C}$ $< 20\Omega$ : $\pm 400\text{PPM}/^\circ\text{C}$	4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM}/^\circ\text{C})$ R <sub>1</sub> : Resistance Value at room temperature (t <sub>1</sub> ) ; R <sub>2</sub> : Resistance at test temperature (t <sub>2</sub> ) t <sub>1</sub> : +25°C or specified room temperature t <sub>2</sub> : 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 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.
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 ± 3°C Dwell time in solder: 2~3 seconds.
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.
Humidity (Steady state)	Resistance change rate must be in ±(5%+0.05Ω), and no mechanical damage.	4.24 Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at 40±2°C and 90~95%RH relative humidity
Load life in humidity	For Wire-wound: ΔR/R: ±5% For Power film range: < 100KΩ ΔR/R: ±5% ≥ 100KΩ ΔR/R: ±10%	7.9 Resistance change after 1000 hours (1.5 hours "ON" , 0.5 hours "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	For Wire-wound: ΔR/R: ±5% For Power film range: < 100KΩ ΔR/R: ±5% ≥ 100KΩ ΔR/R: ±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±2°C ambient.
Low Temperature Storage	For Wire-wound: ΔR/R: ±5% For Power film range: < 100KΩ ΔR/R: ±5% ≥ 100KΩ ΔR/R: ±10%	IEC 60068-2-1 (Aa) Lower limit temperature , for 2H.
High Temperature Exposure	For Wire-wound: ΔR/R: ±5% For Power film range: < 100KΩ ΔR/R: ±5% ≥ 100KΩ ΔR/R: ±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<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>, 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	Mar.20, 2024	Haiyan Chen	Yuhua Xu

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