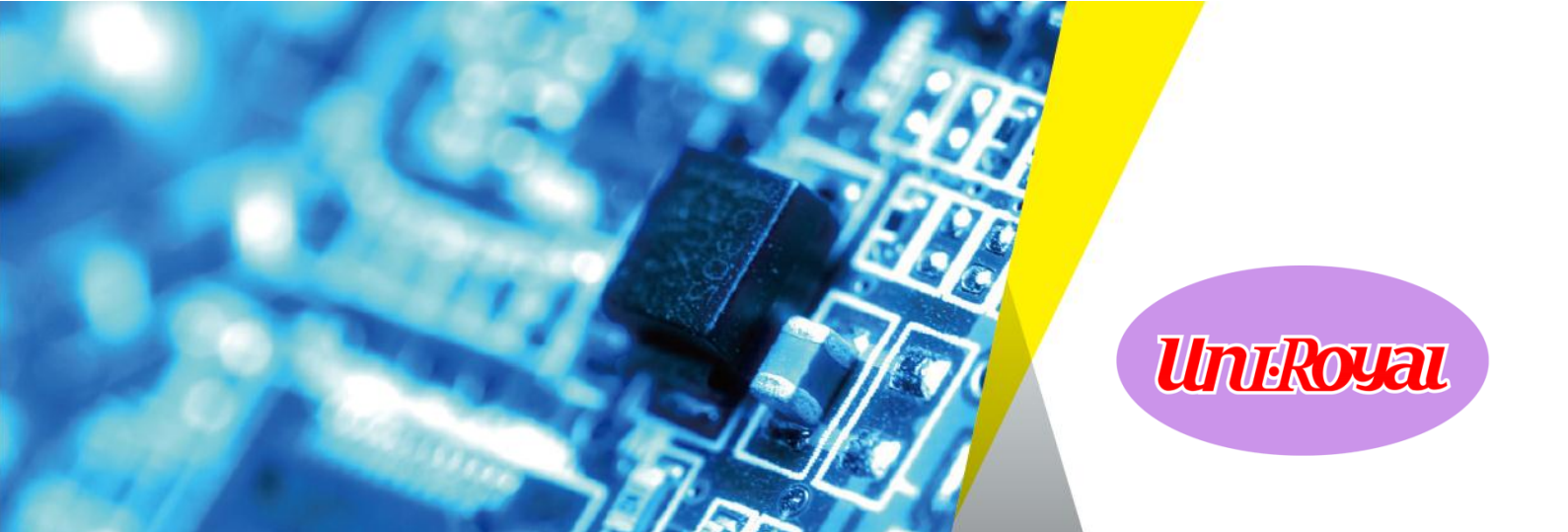




UniRoyal

DATASHEET

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

Part Name **PRT Series**

File No. **DIP-SP-036**

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1. Scope

This datasheet is the characteristics of Power Metal 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 4th digit will be “0”

Example: PRT0=PRT 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: AW=10W FW=15W

2.2.2 For power rating between 20 watt to 99 watt, the 5th and the 6th digits will show the whole numbers of the power rating itself.

Example: 20=20W 30=30W 40=40W

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.

F=±1% G=±2% 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 & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following.

Example: W12J=1.2Ω W120=12Ω P273=27KΩ

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

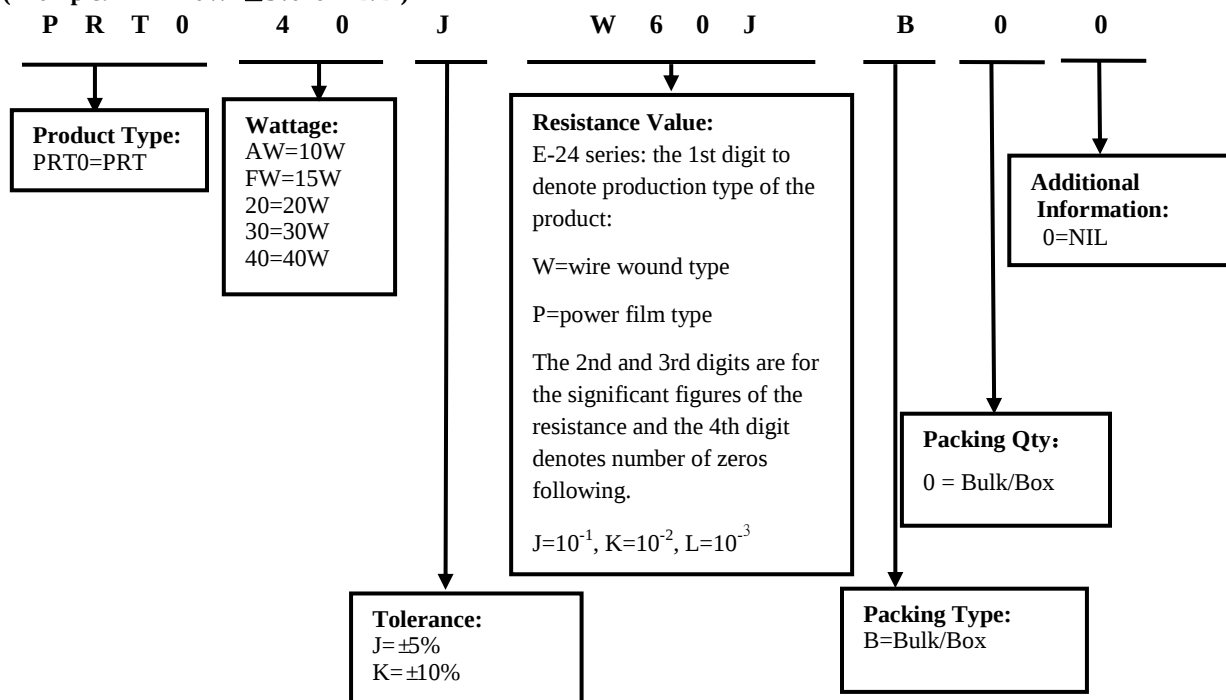
2.5.2 The 13th digit is normally to indicate the Packing Quantity, This digit should be filled with “0” for the Cement products with “Bulk/Box” packing requirements.

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

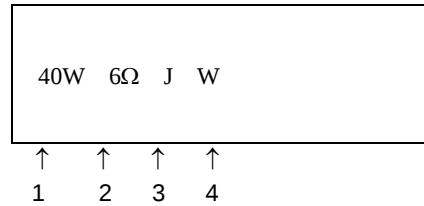
3. Ordering Procedure

(Example: PRT 40W ±5% 6Ω 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:

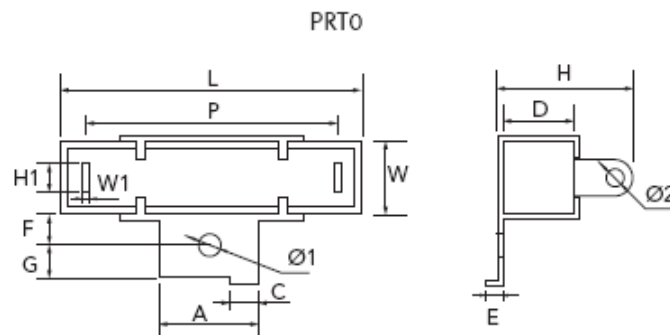
M: Power film

W: Wire wound

Color of marking: Black Ink

Note: The marking code shall be prevailed in kind!

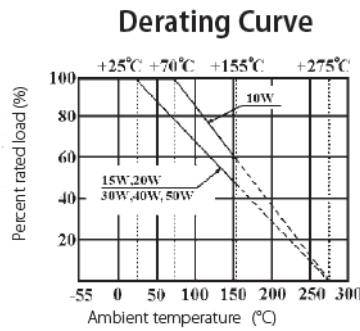
5. Ratings & Dimension



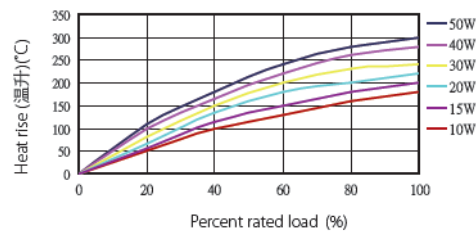
2.1 Dimension (mm):

Type Dimension	PRT 10W	PRT 15W	PRT 20W	PRT 30W	PRT 40W	PRT 50W
W $\pm 1.0\text{mm}$	10	12.5	12.5	19	19	19
D $\pm 1.0\text{mm}$	9	11.5	13.5	19	19	19
L $\pm 1.5\text{mm}$	48	48	63	75	90	90
P $\pm 1.0\text{mm}$	32	32	44	54	70	70
H $\pm 1.0\text{mm}$	18	21	21	32	32	32
A $\pm 0.5\text{mm}$	12	12	12	18	18	18
H1 $\pm 0.4\text{mm}$	5.5	6.2	6.2	7.6	7.6	7.6
C $\pm 0.5\text{mm}$	3	3	3	3	3	3
F $\pm 0.5\text{mm}$	8.7	8.0	10	9.5	9.5	9.5
G $\pm 0.5\text{mm}$	5	6	6	7.5	7.5	7.5
E $\pm 1.0\text{mm}$	3	3	3	4	4	4
Ø1 $\pm 0.2\text{mm}$	4.1	4.1	4.1	4.1	4.1	4.1
Ø2 $\pm 0.2\text{mm}$	2.5	2.5	2.5	3.2	3.2	3.2
W1 $\pm 0.08\text{mm}$	0.5	0.5	0.5	0.5	0.5	0.5

6. Derating Curve



Heat Rise Chart



6.1 Voltage rating:

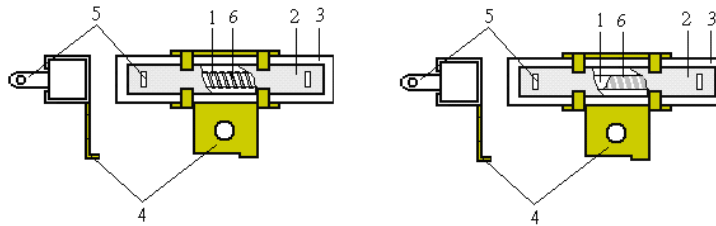
Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

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

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	Filling materials	SiO ₂
3	Ceramic case	Al ₂ O ₃ CaO
4	Bracket	Iron
5	Terminal lug	Steel(tin plated iron surface)
6	Resistance element	Power Film: Metal Oxide Film
		Wire-Wound: Alloy Wire

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 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 is: $\pm(5\%+0.05\Omega)\text{Max.}$ With no evidence of 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 is: $\pm (1\%+0.05\Omega)$ Max. With no evidence of mechanical damage	4.18 Permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in 260°C $\pm 5^{\circ}\text{C}$ solder for 10 ± 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 $\pm 3^{\circ}\text{C}$ Dwell time in solder: 2~3seconds.
Humidity (Steady state)	Resistance change rate is: $\pm (5\%+0.05\Omega)$ Max. With no evidence of mechanical damage.	4.24 Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at 40 $\pm 2^{\circ}\text{C}$ and 90~95%RH relative humidity
Load life in humidity	For Wire-wound: $\Delta R/R: \pm 5\%$ For Power film range: $< 100\text{K}\Omega \Delta R/R: \pm 5\%$ $\geq 100\text{K}\Omega \Delta R/R: \pm 10\%$	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 $\pm 2^{\circ}\text{C}$ and 93% $\pm 3\%$ RH.
Load life	For Wire-wound: $\Delta R/R: \pm 5\%$ For Power film range: $< 100\text{K}\Omega \Delta R/R: \pm 5\%$ $\geq 100\text{K}\Omega \Delta R/R: \pm 10\%$	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 25 $\pm 2^{\circ}\text{C}$ or 70 $\pm 2^{\circ}\text{C}$ ambient.
Low Temperature Storage	For Wire-wound: $\Delta R/R: \pm 5\%$ For Power film range: $< 100\text{K}\Omega \Delta R/R: \pm 5\%$ $\geq 100\text{K}\Omega \Delta R/R: \pm 10\%$	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: $< 100\text{K}\Omega \Delta R/R: \pm 5\%$ $\geq 100\text{K}\Omega \Delta R/R: \pm 10\%$	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℃ 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 Cl₂, H₂S, NH₃, SO₂, NO₂, Br etc.

10. Record

Version	Description	Page	Date	Amended by	Checked by
1	First version	1~6	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 the load life test conditions	5	Sep.26, 2024	Haiyan Chen	Yuhua Xu

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