

ROYALOHM

SPECIFICATION FOR APPROVAL

TRELIK

Description : Cement Fixed Resistors

Royalohm Part no.: PRW0AWJxxxxB00 (PRW 10W +/-5%)

Approved by

Parts corresponding to RoHS Compliant: 2005-Apr.-1

Royal Electronic Factory (Thailand) Co., Ltd.
20/1-2 Moo 2 Klong-Na, Muang
Chachoengsao 24000, Thailand
Tel: +66-38-822404-8
Fax: +66 38-981190 / 823765
E-mail Address: Export sales: Export@royalohm.com
Local sales: Local@royalohm.com
<http://www.royalohm.com>
P.O. Box 251 Klongchan, Bangkok 10240, Thailand

Approved	Checked	Prepared
Mr. Jack Lin	Ms S. Sakultala	Ms. I. Supakhinee

Issued Date: 2007/09/26

1. Scope:

This specification for approval relates to Cement Fixed Resistors manufactured by ROYALOHM 's specifications.

2. Type designation:

The type designation shall be in the following form:

(Ex.)	<u>PRW</u>	<u>10W</u>	<u>J</u>	<u>15Ω</u>
	Type	Power Rating	Resistance Tolerance	Nominal Resistance

3. Ratings:

Ratings shall be shown in the table 1.

Table 1

Type	PRW
Rated Power	10W at 70°C
Rated Ambient Temp.	70 °C
Operating Temp. Range	-55°C --- +155°C
Resistance Tolerance	± 5%
Wire-wound Resistance Range	0.1 Ω ----910Ω
Power Film Resistance Range	911Ω----200KΩ

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:

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

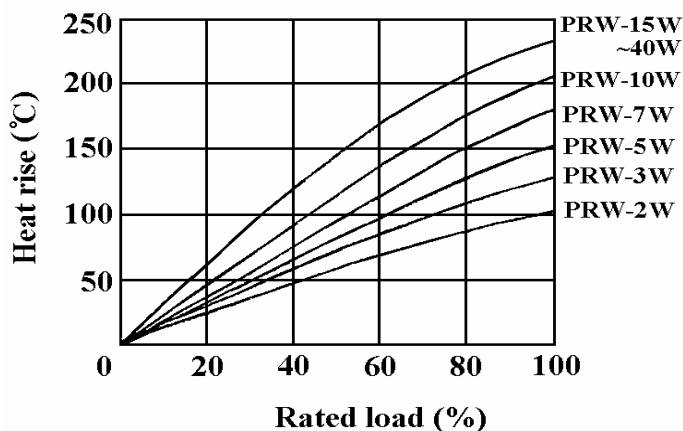
Were : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

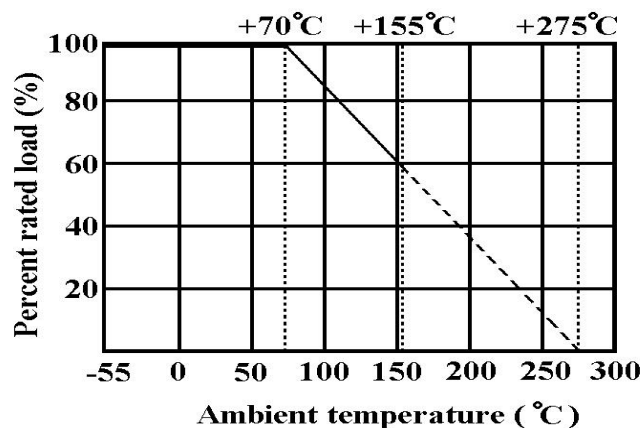
R = Nominal Resistance (ohm)

Cement Fixed Resistors

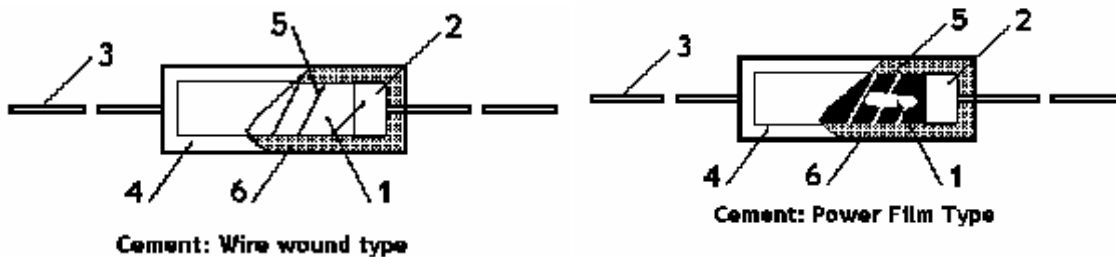
Heat Rise Chart



Derating Curve



4. Construction:



Confirmation List of Material

No.	Subpart Name	Material	Material Generic Name	Remark
1.	Body	Rod Type Ceramics	Al ₂ O ₃ , SiO ₂	
2	End Cap	Tin plated iron surface	Tin : 5%, Iron : 95%	
3	Lead	Annealed copper wire	Tin-Plated Copper wire	
4	Ceramic Case	Ceramic	Al ₂ O ₃ , SiO ₂	
5.	Resistance wire	Cu-Ni Alloy / Ni-Cr Alloy	Cu-Ni Alloy / Ni-Cr Alloy	
	Resistance film	Metal Oxide Film	Metal Oxide Film	
6	Filling Materials	Quartz mixed sand	SiO ₂	

Cement Fixed Resistors

5. Characteristic :

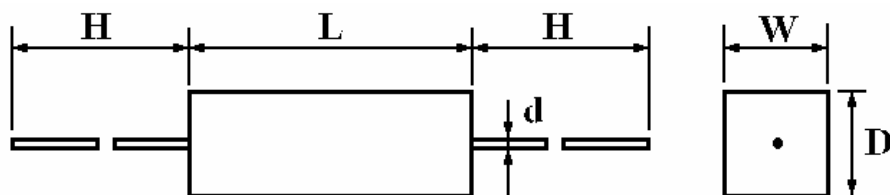
Characteristics	Limits	Test Methods (JIS C 5201-1)															
Temperature coefficient	$\pm 350 \text{ PPM}/^\circ\text{C}$ Max. $< 20 \Omega \pm 400 \text{ PPM}/^\circ\text{C}$	5.2 Natural resistance change per temp. degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \quad (\text{PPM}/^\circ\text{C})$ R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2)															
Dielectric withstanding voltage	No evidence of flashover, mechanical damage, arcing or insulation break down	5.7 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.															
Temperature cycling	Resistance change rate is $\pm (2\% + 0.05\Omega)$ Max. with no evidence of mechanical damage	7.4 Resistance change after continuous 5 cycles for duty shown below: <table border="1" style="margin-left: auto; margin-right: auto;"> <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
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															
Short time overload	Resistance change rate is $\pm (5\% + 0.05\Omega)$ Max. with no evidence of mechanical damage	5.5 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds															
Load life in humidity	<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Resistance value</th> <th style="text-align: center;">$\Delta R/R$</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Wire-wound</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;">Power film : $< 100\text{K}\Omega$</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;">$\geq 100\text{K}\Omega$</td> <td style="text-align: center;">$\pm 10\%$</td> </tr> </tbody> </table>	Resistance value	$\Delta R/R$	Wire-wound	$\pm 5\%$	Power film : $< 100\text{K}\Omega$	$\pm 5\%$	$\geq 100\text{K}\Omega$	$\pm 10\%$	7.9 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							
Resistance value	$\Delta R/R$																
Wire-wound	$\pm 5\%$																
Power film : $< 100\text{K}\Omega$	$\pm 5\%$																
$\geq 100\text{K}\Omega$	$\pm 10\%$																
Load life	<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Resistance value</th> <th style="text-align: center;">$\Delta R/R$</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Wire-wound</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;">Power film : $< 100\text{K}\Omega$</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;">$\geq 100\text{K}\Omega$</td> <td style="text-align: center;">$\pm 10\%$</td> </tr> </tbody> </table>	Resistance value	$\Delta R/R$	Wire-wound	$\pm 5\%$	Power film : $< 100\text{K}\Omega$	$\pm 5\%$	$\geq 100\text{K}\Omega$	$\pm 10\%$	7.10 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							
Resistance value	$\Delta R/R$																
Wire-wound	$\pm 5\%$																
Power film : $< 100\text{K}\Omega$	$\pm 5\%$																
$\geq 100\text{K}\Omega$	$\pm 10\%$																

Cement Fixed Resistors		
Characteristics	Limits	Test Methods (JIS C 5201-1)
Terminal strength	No evidence of mechanical damage	<p>6.1 Direct load : Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads</p> <p>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</p>
Resistance to soldering heat	Resistance change rate is $\pm (1\% + 0.05\Omega)$ Max. with no evidence of mechanical damage	6.4 Permanent resistance change when leads immersed to 3.2 to 4.8 mm from the body in $350^{\circ}\text{C} \pm 10^{\circ}\text{C}$ solder for 3 ± 0.5 secs.
Solderability	95 % coverage Min.	<p>6.5 The area covered with a new , smooth clean , shiny and continuous surface free from concentrated pinholes.</p> <p>Test temp. of solder : $245^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Dwell time in solder : 2 ~ 3 seconds</p>

Cement Fixed Resistors

6. Dimension :

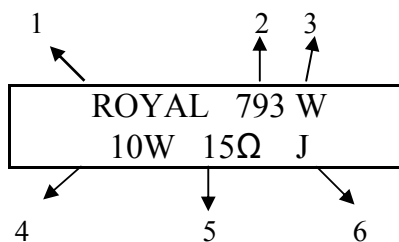
Unit : mm



Type	Rating Wattage	W±1	D±1	L±1	d ± 0.05	H± 5
PRW	10W	10	9	49	0.75	35

7. Marking :

Ex.



Code description and regulation

1. Company mark or customer designated mark. Company mark : ROYAL.

2. Date manufactured. First code: 5 : The year 2005 8 : The year 2008
 6 : The year 2006 9 : The year 2009
 7 : The year 2007

Second code: 1 : January 5 : May 9 : September
 2 : February 6 : June O : October
 3 : March 7 : July N : November
 4 : April 8 : August D : December

Third code: 1 : First 10 days of a month
 2 : Second 10 days of a month
 3 : Third 10 days of month

3. W marking for Wire wound type

 P marking for Power film type

4. Wattage rating.

5. Nominal resistance value.

6. Resistance tolerance.

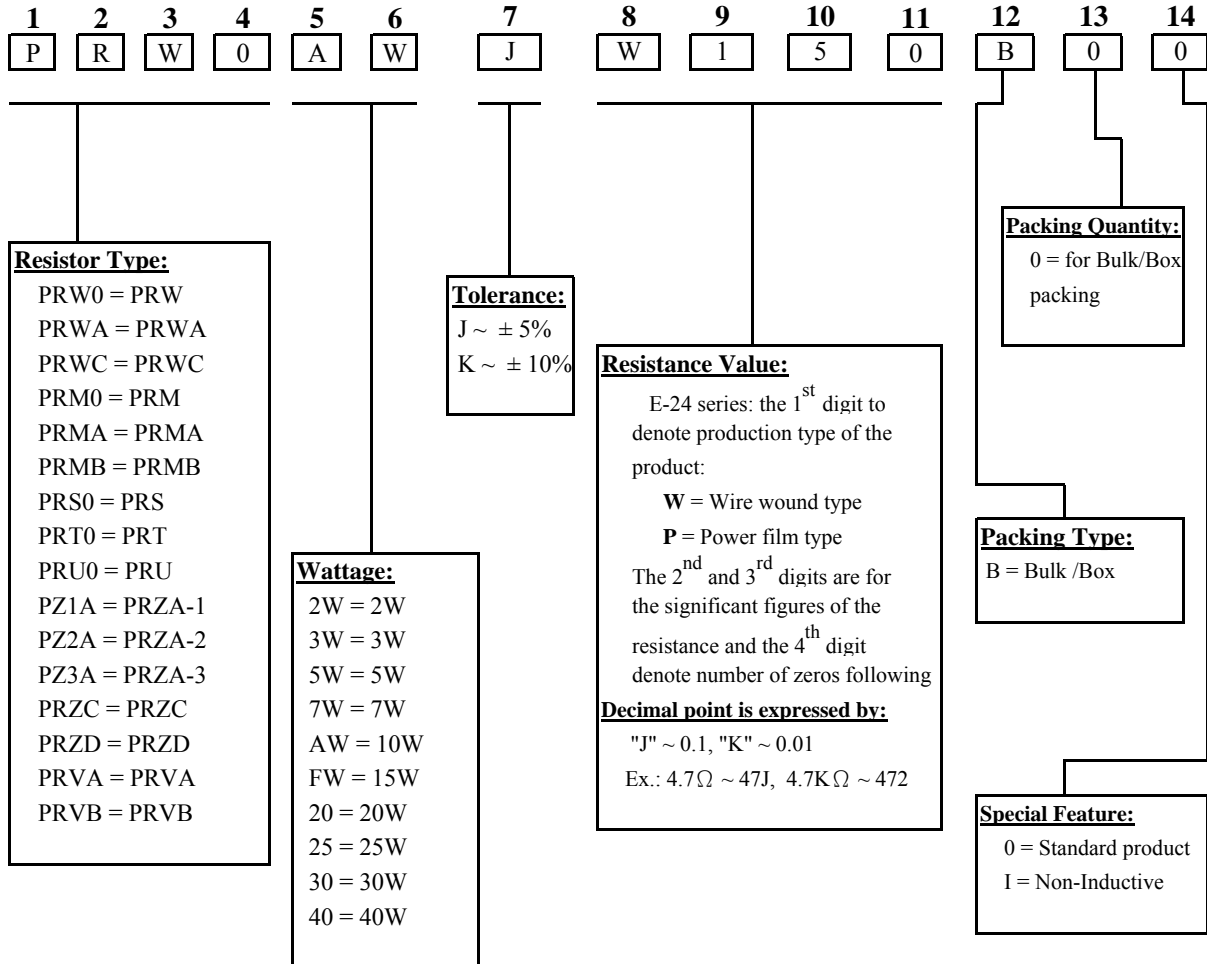
 J : ± 5 %

 K : ± 10 %

Color of marking: Black ink

Part Number System

Explanation of Part Number System (Cement Fixed Resistors)



Sample: PRW 10W +/- 5% Wire wound type 15Ω B/B → PRW0AWJW150B00