



# Cement Power Resistors (RoHS Compliant)

# PW-RC Series

## FEATURES

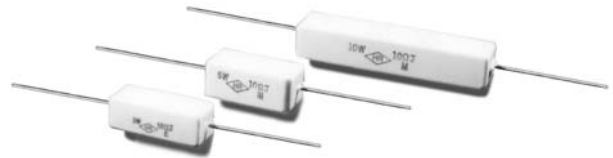
- Temperature Range: -55°C ~ +155°C
- 5% tolerance
- Exceptionally small, sturdy, and reliable
- Sealed with a special cement
- Excellent moisture resistance
- High temperature stability
- Ceramic flame retardant package
- Recommended wash method is alcohol



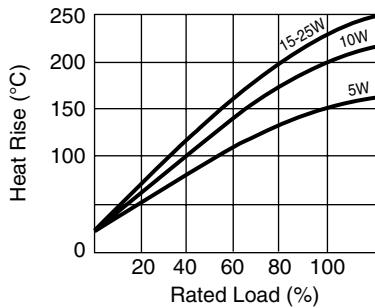
LEAD-FREE



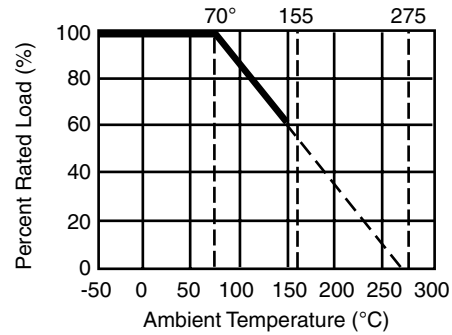
Environmental Commitment



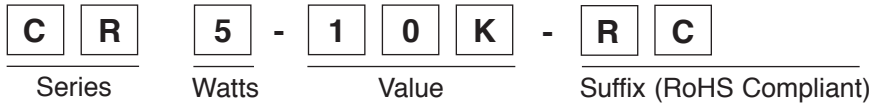
## HEAT RISE CHART



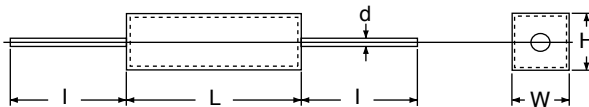
## DERATING CURVE



## PART NUMBERING SYSTEM



## POWER RATING, RANGE OF VALUES, AND DIMENSIONS



| Watts (W) | Range of Values |             | Dimensions (mm) |      |      |      |         |
|-----------|-----------------|-------------|-----------------|------|------|------|---------|
|           | Wire Wound      | Metal Oxide | L ±1            | W ±1 | H ±1 | l ±5 | d ±0.05 |
| 5         | 0.1 ~ 47        | 48 ~ 25K    | 22              | 10   | 9    | 35   | 0.75    |
| 10        | 0.1 ~ 910       | 911 ~ 25K   | 49              | 10   | 9    | 35   | 0.75    |
| 15        | 1 ~ 1K          | -- N/A --   | 49              | 12.5 | 11.5 | 35   | 0.75    |
| 25        | 2 ~ 1.0K        | -- N/A --   | 64              | 14.5 | 13.5 | 35   | 0.75    |

## STANDARD STOCKED VALUES (Ω)

|      |      |      |     |     |     |     |     |    |    |    |    |    |     |     |     |     |     |      |      |      |      |
|------|------|------|-----|-----|-----|-----|-----|----|----|----|----|----|-----|-----|-----|-----|-----|------|------|------|------|
| 0.1  | 0.33 | 0.56 | 1.0 | 1.8 | 3.3 | 4.7 | 6.8 | 11 | 18 | 27 | 43 | 62 | 100 | 160 | 250 | 390 | 560 | 910  | 1.5K | 2.4K | 4.7K |
| 0.15 | 0.39 | 0.62 | 1.1 | 2.0 | 3.6 | 5.0 | 7.5 | 12 | 20 | 30 | 47 | 68 | 110 | 180 | 270 | 430 | 620 | 1.0K | 1.6K | 2.7K | 5.0K |
| 0.2  | 0.43 | 0.68 | 1.2 | 2.2 | 3.9 | 5.1 | 8.2 | 13 | 22 | 33 | 50 | 75 | 120 | 200 | 300 | 470 | 680 | 1.1K | 1.8K | 3.0K | 10K  |
| 0.22 | 0.47 | 0.75 | 1.3 | 2.4 | 4.0 | 5.6 | 9.1 | 15 | 24 | 36 | 51 | 82 | 130 | 220 | 330 | 500 | 750 | 1.2K | 2.0K | 3.3K | 20K  |
| 0.27 | 0.5  | 0.82 | 1.5 | 2.7 | 4.3 | 6.2 | 10  | 16 | 25 | 39 | 56 | 91 | 150 | 240 | 360 | 510 | 820 | 1.3K | 2.2K | 3.9K | 25K  |
| 0.3  | 0.51 | 0.91 | 1.6 | 3.0 |     |     |     |    |    |    |    |    |     |     |     |     |     |      |      |      |      |

\*Other values available by special request



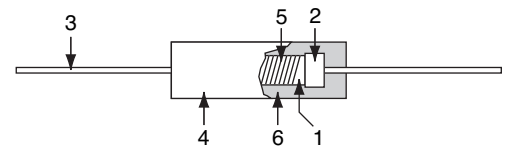


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# PW-RC Series

## CONSTRUCTION

| No. | Subpart Name      | Material   | Material Generic Name                             |
|-----|-------------------|--|---|
| 1   | Body              | Rod Type Ceramics  | Al <sub>2</sub> O <sub>3</sub> , SiO <sub>2</sub> |
| 2   | End Cap           | Tin plated iron surface  | Tin : 5%, Iron : 95%                              |
| 3   | Lead              | Annealed copper wire<br>(Electrosolder plated surface) Pb Free | Tin-Coated Copper wire                            |
| 4   | Ceramic Case      | Ceramic  | Al <sub>2</sub> O <sub>3</sub> , SiO <sub>2</sub> |
| 5   | Resistance wire   | Ni-Cr Alloy  | Ni-Cr Alloy                                       |
| 6   | Filling Materials | Quartz mixed sand  | SiO <sub>2</sub>                                  |



**Cement: Wire wound**

## CHARACTERISTICS

| Characteristics                 | Limits  |                      | Test Methods ( JIS C 5201-1 )   |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
|---------------------------------|---|----------------------|---|------|-------------|------|---|---------------|---------|---|------------|--------------|---|----------------|---------|---|------------|--------------|
| Temperature coefficient         | ± 350 PPM / °C Max.<br><20Ω ± 400 PPM / °C  |                      | 5.2 Natural resistance change per temp. degree centigrade.<br>R <sub>2</sub> -R <sub>1</sub><br>————— x10 <sup>6</sup> (PPM / °C)<br>R <sub>1</sub> (t <sub>2</sub> -t <sub>1</sub> )<br>R <sub>1</sub> : Resistance value at room temperature (t <sub>1</sub> )<br>R <sub>2</sub> : Resistance value at room temp. plus 100 °C (t <sub>2</sub> )   |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
| 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 ± (2% + 0.05Ω) Max. with no evidence of mechanical damage |                      | 7.4 Resistance change after continuous 5 cycles for duty shown below:<br><table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55 °C ± 3 °C</td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10 ~ 15 mins</td> </tr> <tr> <td>3</td> <td>+155 °C ± 2 °C</td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10 ~ 15 mins</td> </tr> </tbody> </table> | Step | Temperature | Time | 1 | -55 °C ± 3 °C | 30 mins | 2 | Room temp. | 10 ~ 15 mins | 3 | +155 °C ± 2 °C | 30 mins | 4 | Room temp. | 10 ~ 15 mins |
| Step                            | Temperature   | Time                 |   |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
| 1                               | -55 °C ± 3 °C   | 30 mins              |   |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
| 2                               | Room temp.  | 10 ~ 15 mins         |   |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
| 3                               | +155 °C ± 2 °C  | 30 mins              |   |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
| 4                               | Room temp.  | 10 ~ 15 mins         |   |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
| Short time overload             | Resistance change rate is ± (5% + 0.05Ω) 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           | <b>Resistance value</b><br>Wire-wound   | <b>Δ R/R</b><br>± 5% | 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 °C ± 2 °C and 90 to 95 % relative humidity  |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
| Load life                       | <b>Resistance value</b><br>Wire-wound   | <b>Δ R/R</b><br>± 5% | 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 °C ± 2 °C  |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
| Terminal strength               | No evidence of mechanical damage  |                      | <b>6.1 Direct load :</b><br>Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads<br><b>Twist test :</b><br>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 ± (1% + 0.05Ω) 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 °C ± 10 °C solder for 3 ± 0.5 secs.   |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |
| Solderability                   | 95 % coverage Min.  |                      | 6.5 The area covered with a new , smooth clean , shiny and continuous surface free from concentrated pinholes.<br>Test temp. of solder : 245 °C ± 3 °C<br>Dwell time in solder : 2 ~ 3 seconds  |      |             |      |   |               |         |   |            |              |   |                |         |   |            |              |

