

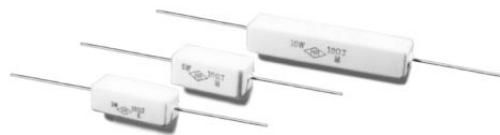


# Cement Power Resistors (RoHS Compliant)

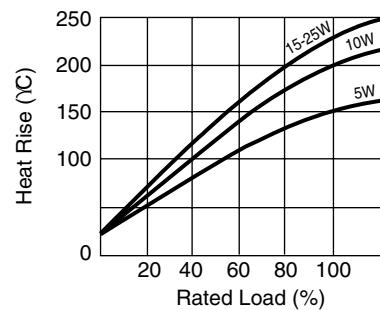
# CR-RC Series

## ■ FEATURES

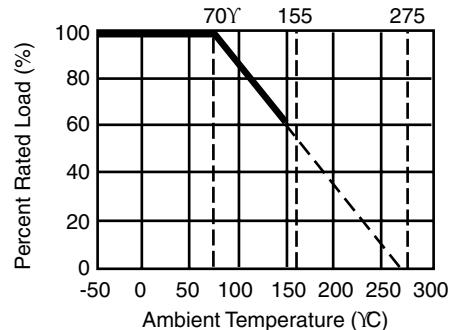
- Temperature Range:  $-55^{\circ}\text{C} \sim +155^{\circ}\text{C}$
- 5% tolerance
- Exceptionally small, sturdy, and reliable
- Sealed with a special cement
- Excellent moisture resistance
- High temperature stability
- Ceramic flame retardant package
- Recommended wash method is alcohol



## ■ HEAT RISE CHART



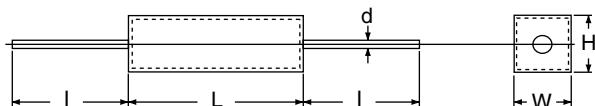
## ■ DERATING CURVE



## ■ PART NUMBERING SYSTEM

2 8 0 - C R 5 - 1 0 K - R C  
 Prefix      Series      Watts      Value      Suffix (RoHS Compliant)

## ■ SERIES, WATTAGE, VALUE-RANGE, AND DIMENSIONS



Series	Watts (W)	Value Ranges ( $\Omega$ )		Dimensions (mm)				
		Wire Wound	Metal Oxide	$L \pm 1$	$W \pm 1$	$H \pm 1$	$L \pm 5$	$d \pm 0.05$
CR	5	0.1 ~ 47	48 ~ 25K	22	10	9	35	0.75
CR	10	0.1 ~ 910	911 ~ 25K	49	10	9	35	0.75
CR	15	1 ~ 1K	-- N/A --	49	12.5	11.5	35	0.75
CR	25	2 ~ 1.0K	-- N/A --	64	14.5	13.5	35	0.75

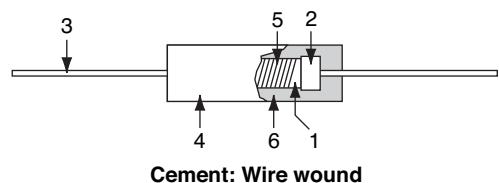
## ■ STANDARD STOCKED VALUES ( $\Omega$ )

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

## ■ CONSTRUCTION

No.	Subpart Name	Material	Material Generic Name
1	Body	Rod Type Ceramics	$\text{Al}_2\text{O}_3$ , $\text{SiO}_2$
2	End Cap	Tin plated iron surface	Tin : 5%, Iron : 95%
3	Lead	Annealed copper wire (Electrosolder plated surface) Pb Free	Tin-Coated Copper wire
4	Ceramic Case	Ceramic	$\text{Al}_2\text{O}_3$ , $\text{SiO}_2$
5	Resistance wire	Ni-Cr Alloy	Ni-Cr Alloy
6	Filling Materials	Quartz mixed sand	$\text{SiO}_2$



## ■ CHARACTERISTICS

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. $R_2 - R_1$ $x 10^6 \text{ (PPM} / ^\circ\text{C)}$ $R_1(t_2 - t_1)$ $R_1$ : Resistance value at room temperature ( $t_1$ ) $R_2$ : Resistance value at room temp. plus $100^\circ\text{C}$ ( $t_2$ )															
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 $90^\circ$ 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"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-55^\circ\text{C} \pm 3^\circ\text{C}</math></td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td><math>10 \sim 15</math> mins</td> </tr> <tr> <td>3</td> <td><math>+155^\circ\text{C} \pm 2^\circ\text{C}</math></td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td><math>10 \sim 15</math> mins</td> </tr> </tbody> </table>	Step	Temperature	Time	1	$-55^\circ\text{C} \pm 3^\circ\text{C}$	30 mins	2	Room temp.	$10 \sim 15$ mins	3	$+155^\circ\text{C} \pm 2^\circ\text{C}$	30 mins	4	Room temp.	$10 \sim 15$ mins
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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	Resistance value	$\Delta R/R$	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															
Load life	Resistance value	$\Delta R/R$	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 $70^\circ\text{C} \pm 2^\circ\text{C}$															
Terminal strength	No evidence of mechanical damage		<p><b>6.1 Direct load :</b> Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads</p> <p><b>Twist test :</b> Terminal leads shall be bent through <math>90^\circ</math> at a point of about 6mm from the body of the resistor and shall be rotated through <math>360^\circ</math> 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 $3 \pm 0.5$ 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 : <math>245^\circ\text{C} \pm 3^\circ\text{C}</math> Dwell time in solder : <math>2 \sim 3</math> seconds</p>															