

## Radial Dipped Ceramic Capacitors [Ultra High Capacitor ]

### RDH Series – Ultra High Voltage (2KV-5KV)



Voltage ratings from 2KV to 5KV

#### ◆ Features

- ❑ Technological progress in creating thinner layers of ceramic dielectric offers the ultra high voltage rating and big size
- ❑ Provides good frequency
- ❑ High reliability
- ❑ RoHS compliant

#### ◆ Applications

- ❑ Suitable for Power supplies , Surge protection Industrial control circuits , Voltage multipliers , Data isolation

#### ◆ Summary of Specification

Operation Temperature	-55~+125 °C
Rated Voltage	2KV to 5KV
Temperature Coefficient	NPO : $\leq \pm 30\text{ppm}/^\circ\text{C}$ , -55~+125 °C (EIA Class I )
	X7R : $\leq \pm 15\%$ , -55~+125 °C (EIA Class II )
Capacitance Range	NPO :10pF to 56nF ; X7R :330pF to 470nF
Dissipation Factor :	NPO : $Q \geq 1000$ ; X7R : D.F. $\leq 2.5\%$
Insulation Resistance	10G $\Omega$ or 500/C $\Omega$ whichever is smaller
Aging	NPO:0% ; X7R: 2.5 %
Dielectric Strength	1000 $\leq V$ :120% Rated Voltage

#### ◆ How To Order

RDH	X	102	K	202	5	HK	T
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Product Code	Dielectric	Capacitance Unit : pF	Tolerance	Rated Voltage	Leader Space	Leader Style	Packaging
RDH: Radial Dipped Ultra High Capacitor	Ex.: N: NPO X: X7R	Ex.: 100:10 $\times 10^0$ 471:47 $\times 10^1$ 102:10 $\times 10^2$	Ex.: C: +/-0.25pF D: +/-0.50pF J : +/- 5% K : +/-10% M: +/-20%	Ex.: 102:1000Vdc 202:2000Vdc 502:5000Vdc	EX: 5 : 5.00mm 7 : 7.50mm A : 10.0mm B : 12.5mm C : 15.0mm D : 17.5mm E : 20.0mm	EX: Size GD:6.35x5.95 HD:9.40x7.62 I D:12.0x10.2 GK:6.35x5.95 HK:9.40x7.62 I K:12.0x10.2	T: Taping &Reel B: Bulk





**RDH Series Specification & Test Condition**

Item	Specification	Test Condition		
<b>Operation Temperature</b>	-55 to +125°C			
<b>Visual</b>	No abnormal exterior appearance	Visual Inspection		
<b>Capacitance</b>	Within The Specified Tolerance	Class      Frequency      Voltage		
<b>Quality Factor</b>	ClassI(NPO): More Than 30pF : $Q \geq 1000$ 30pF & Below: $Q \geq 400 + 20C$ (C:Cap., pF)	NPO $C \leq 100pF$ 1MHz±10%    1.0±0.2Vrms $C > 100pF$ 1KHz±10%		
		X7R                    1KHz±10%    1.0±0.2Vrms		
<b>Dissipation Factor</b>	ClassII(X7R): Maximum 0.025	Perform a heat temperature at 150±5°C for 30min. then place room temp. for 24±2hr.		
<b>Insulation Resistance</b>	10,000MΩ or 500/C Ω whichever is smaller. (C in Farad)	V≤500V, Rated Voltage V> 500V, Applied 500Vdc Charge Time : 60sec. Is applied less than 50mA current.		
<b>Withstanding Voltage</b>	No dielectric breakdown or mechanical breakdown	1000±V :120% Rated Voltage for 1~5 sec. Current is limited to less than 50mA. Withstanding voltage testing requires immersion of the element in a isolation fluid prevent arcing on the chip surface, at voltage over 1000Vdc.		
<b>Temperature Capacitance Coefficient</b>	Char.	Temp. Range	Cap. Change	ClassI: [C2-C1/C1(T2-T1)] × 100% ClassII: (C2-C1)/C1 × 100% T1:Standard Temperature(25°C) T2:Test Temperature C1:Capacitance At Standard Temperature C2:Capacitance At Test Temperature
	NPO(N)	-55°C~ +125°C	± 30ppm/°C	
	X7R (X)	-55°C~ +125°C	± 15%	
<b>Lead Strength</b>	Tensile Strength	No mechanical damage such as lead breakage and losing.	With holding the parts, apply pulling force to lead drawing direction gradually. Pulling strength: 5N Holding time: 10±1s	
	Bending Strength	No mechanical damage such as lead breakage and losing.	With holding the capacitors to keep the axis vertical, bend it 90 degrees with weighting and put it back to the original position. This operation shall be done for 2~3s. and repeat the following times. Bending forth: 5N(weight :0.51kg) Testing time : 2 times	
<b>Solderability</b>	Leads shall be covered by new solder more than 75% of its surface	Completely soak both terminations in solder at 235± 5°C for 2±0.5s Solder : H63A Flux :Rosin Dipping :By 1.5~2.0mm form the root of lead		

## RDH Series Specification & Test Condition

Item	Specification	Test Condition
<b>Resistance to Soldering Heat</b>	Appearance	No mechanical damage shall occur
	Capacitance	ClassI(NPO): Within 2.5% or $\pm 0.25\text{pF}$ whichever is larger of initial value ClassII(X7R): Within $\pm 10\%$ of initial value
	Q / Tan $\delta$	To satisfy the specified initial value
	Insulation Resistance	To satisfy the specified initial value
<b>Temperature Cycle</b>	Appearance	No mechanical damage shall occur
	Capacitance	ClassI(NPO): Within 2.5% or $\pm 0.25\text{pF}$ whichever is larger of initial value ClassII(X7R): Within $\pm 7.5\%$ of initial value
	Q / Tan $\delta$	To satisfy the specified initial value
	Insulation Resistance	To satisfy the specified initial value
<b>Humidity</b>	Appearance	No mechanical damage shall occur
	Capacitance	ClassI(NPO): Within 5% or $\pm 0.5\text{pF}$ whichever is larger of initial value ClassII(X7R): Within $\pm 15\%$ of initial value
	Q / Tan $\delta$	ClassI(NPO): More Than 30pF : $Q \geq 350$ 30pF & Below: $Q \geq 275 + 2.5C$ ClassII(X7R): Maximum $\pm 5.0\%$
	Insulation Resistance	1,000M $\Omega$ or 50/C $\Omega$ whichever is smaller. (C in Farad)

Completely soak both terminations in solder at 250 $\pm$  5 $^{\circ}$ C for 5 $\pm$ 1s

Solder : H63A  
Flux : Rosin  
Dipping : By 1.5~2.0mm from the root of lead

ClassII capacitor shall be set for 48 $\pm$ 4 hours at room temperature after one hour heat treatment at 150 +0/-10  $^{\circ}$ C before initial measure.

Capacitor shall be subjected to five cycles of the temperature cycle as following:

Step	Temp.( $^{\circ}$ C)	Time(min)
1	Min Rated Temp.+0/-3 (-55)	30
2	25	3
3	Max Rated Temp.+3/-0 (125)	30
4	25	3

Measure at room temperature after cooling for  
ClassI: 24  $\pm$  2 Hours  
ClassII: 48  $\pm$  4 Hours

ClassII capacitor shall be set for 48 $\pm$ 4 hours at room temperature after one hour heat treatment at 150 +0/-10 before initial measure.

Temperature : 40 $\pm$  2  $^{\circ}$ C  
Relative Humidity : 90 ~95%RH  
Test Time : 500 +12/-0 hr

Measure at room temperature after cooling for  
ClassI: 24  $\pm$  2 Hours  
ClassII: 48  $\pm$  4 Hours

**RDH Series Specification & Test Condition**

Item	Specification	Test Condition								
<b>High Temperature Load (Life Test)</b>	Appearance	No mechanical damage shall occur								
	Capacitance	ClassI(NPO): Within 3% or $\pm 0.3\text{pF}$ whichever is larger of initial value ClassII(X7R): Within $\pm 15\%$ of initial value								
	Q / Tan $\delta$	ClassI(NPO): More Than 30pF : $Q \geq 350$ 30pF & Below: $Q \geq 275 + 2.5C$ ClassII(X7R): Maximum $\pm 5\%$								
	Insulation Resistance	1,000M $\Omega$ or 50/C $\Omega$ whichever is smaller. (C in Farad)								
		<p>Solder the capacitor on P.C. board shown in Fig 2. before testing.</p> <p>Below the voltage shall e applied at <math>125 \pm 2^\circ\text{C}</math> for 1,000 +48,0h</p> <p>Applied Voltage :</p> <table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>Applied Voltage</th> </tr> </thead> <tbody> <tr> <td><math>V \leq 250\text{Vdc}</math></td> <td>150%Rated Voltage</td> </tr> <tr> <td><math>250\text{Vdc} &lt; V &lt; 1\text{KVdc}</math></td> <td>120%Rated Voltage</td> </tr> <tr> <td>More Than 1KVdc(include 1KV)</td> <td>100%Rated Voltage</td> </tr> </tbody> </table> <p>Temperature : max. operation temperature Test Time : 1000 +12/-0Hr Current Applied : 50 mA Max. Measure at room temperature after cooling for ClassI: <math>24 \pm 2</math> Hours ClassII: <math>48 \pm 4</math> Hours</p>	Rated Voltage	Applied Voltage	$V \leq 250\text{Vdc}$	150%Rated Voltage	$250\text{Vdc} < V < 1\text{KVdc}$	120%Rated Voltage	More Than 1KVdc(include 1KV)	100%Rated Voltage
Rated Voltage	Applied Voltage									
$V \leq 250\text{Vdc}$	150%Rated Voltage									
$250\text{Vdc} < V < 1\text{KVdc}$	120%Rated Voltage									
More Than 1KVdc(include 1KV)	100%Rated Voltage									
<b>Vibration</b>	Appearance	No mechanical damage shall occur								
	Capacitance	Within the specified tolerance								
	Q / Tan $\delta$	To satisfy the specified initial value								
		<p>Solder the capacitor on P.C. Board shown in Fig 2. before testing.</p> <p>Vibrate the capacitor with amplitude of 1.5mm P-P changing the frequencies from 10Hz to 55Hz and back to 10Hz in about 1 min.</p> <p>Repeat this for 2 hours each in 3perpendicular directions.</p>								