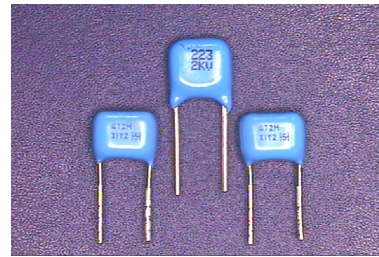


Radial Dipped Ceramic Capacitors [Ultra High Voltage Radial Capacitor – 2KV-5KV]

RDH Series



◆ Features

- ❑ Advanced process technology produces thinner layers of ceramic dielectric and offers higher voltage rating and capacitance values
- ❑ Provides good frequency response
- ❑ High reliability
- ❑ RoHS compliant
- ❑ Halogen free available

◆ Applications

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

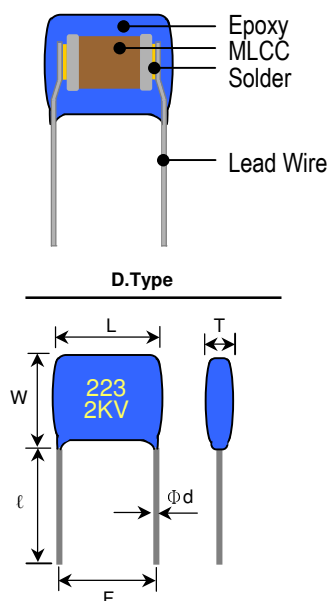
◆ Summary of Specification

Operation Temperature	-55~+125 °C
Rated Voltage	2KV to 5KV
Temperature Coefficient	NPO : $\pm 30\text{ppm}/^\circ\text{C}$, -55~+125 °C (EIA Class I)
	X7R : $\pm 15\%$, -55~+125 °C (EIA Class II)
Capacitance Range	NPO :2pF to 56nF
	X7R :100pF to 390nF
Dissipation Factor :	NPO : $Q \geq 1000$
	X7R : D.F. $\leq 2.5\%$
Insulation Resistance	10G Ω or 500/C Ω 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	HK	T	N
Product Code RDH: Radial Dipped Ultra High Voltage Capacitor	Dielectric Ex.: N: NPO X: X7R	Capacitance Unit : pF Ex.: 100:10 $\times 10^0$ 471:47 $\times 10^1$ 102:10 $\times 10^2$	Tolerance Ex.: C: $\pm 0.25\text{pF}$ D: $\pm 0.50\text{pF}$ J : $\pm 5\%$ K : $\pm 10\%$ M: $\pm 20\%$	Rated Voltage Ex.: 102:1000Vdc 202:2000Vdc 302:3000Vdc 402:4000Vdc 502:5000Vdc	Leader Style EX: Size GD:5.5x4.0 HD:5.5x4.5 I D:5.5x4.0	Packaging T: Taping &Reel B: Bulk	Optional Suffix Ex.: N :Halogen Free Indicator

◆ Structure & Dimension



Unit : mm [inches]

TYPE	L (max)	W (max)	T (max)	F (Max.)	ℓ	Φd
ED	5.5 [0.216]	7.0 [0.275]	4.0 [0.157]	5.0±1 [0.196]	25.0+3/-1 [0.984]	0.6±0.1 [0.196]
FD	7.5 [0.294]	8.0 [0.314]	4.0 [0.157]	5.0±1 [0.196]	25.0+3/-1 [0.984]	0.6±0.1 [0.196]
GD	7.6 [0.299]	9.4 [0.370]	6.9 [0.272]	6.54 [0.257]	25.0+3/-1 [0.984]	0.6±0.1 [0.196]
HD	9.40 [0.370]	7.62 [0.300]	6.86 [0.270]	7.55 [0.296]	25.0+3/-1 [0.984]	0.6±0.1 [0.196]
I D	12.0 [0.470]	10.2 [0.400]	8.13 [0.320]	10.2 [0.400]	25.0+3/-1 [0.984]	0.6±0.1 [0.196]
J D	14.5 [0.570]	12.7 [0.500]	8.13 [0.320]	12.8 [0.503]	25.0+3/-1 [0.984]	0.6±0.1 [0.196]
KD	17.0 [0.670]	15.2 [0.600]	8.13 [0.320]	15.36 [0.603]	25.0+3/-1 [0.984]	0.6±0.1 [0.196]
LD	19.6 [0.770]	18.3 [0.720]	8.13 [0.320]	17.86 [0.701]	25.0+3/-1 [0.984]	0.6±0.1 [0.196]
MD	22.1 [0.870]	19.1 [0.750]	8.13 [0.320]	20.46 [0.804]	25.0+3/-1 [0.984]	0.6±0.1 [0.196]

◆ Capacitance Range

NPO(N) Series

Type	ED		FD				GD				HD				I D			
WVDC	2KV	3KV	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV
Cap Min.	100	2R0	2R0	2R0	2R0	2R0	100	100	100	2R0	100	100	100	100	100	100	100	100
Cap Max.	391	390	102	102	151	101	681	331	221	151	152	681	331	221	332	152	102	471

Type	JD				KD				LD				MD			
WVDC	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV
Cap Min.	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Cap Max.	682	332	222	102	103	472	393	182	153	682	472	332	563	333	223	682

X7R(R) Series

Type	ED	FD			GD				HD				I D			
WVDC	2KV	2KV	3KV	4KV	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV
Cap Min.	101	101	101	101	151	151	151	151	221	221	221	221	221	221	221	221
Cap Max.	152	472	272	102	103	332	272	102	153	682	222	102	473	333	103	682

Type	JD				KD				LD				MD			
WVDC	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV	2KV	3KV	4KV	5KV
Cap Min.	331	331	331	331	331	331	331	331	331	331	331	331	331	331	331	331
Cap Max.	104	683	223	103	154	683	223	103	224	154	473	333	394	184	563	393

■ Other dimensions, capacitance values and voltages rating are available. Please contact HEC.

RDH Series Specification & Test Condition

Item	Specification		Test Condition		
Operation Temperature	-55 to +125°C				
Visual	No abnormal exterior appearance		Visual Inspection		
Capacitance	Within The Specified Tolerance		Class	Frequency	Voltage
Quality Factor	Class I (NPO): More Than 30pF : $Q \geq 1000$ 30pF & Below: $Q \geq 400+20C$ (C:Cap., pF)		NPO $C \leq 100\text{pF}$ $C > 100\text{pF}$	1MHz $\pm 10\%$ 1KHz $\pm 10\%$	1.0 $\pm 0.2V_{rms}$
			X7R	1KHz $\pm 10\%$	1.0 $\pm 0.2V_{rms}$
Dissipation Factor	Class II (X7R): Maximum 0.025		Perform a heat treatment at 150 $\pm 5^\circ\text{C}$ for 30min. then place room temp. for 24 ± 2 hr.		
Insulation Resistance	10,000M Ω or 500/C Ω whichever is smaller. (C in Farad)		V> 500V, Applied 500Vdc Charge Time : 60sec. Is applied less than 50mA current.		
Withstanding Voltage	No dielectric breakdown or mechanical breakdown		1000 $\leq V$:120% Rated Voltage for 1~5 sec. Current is limited to less than 50mA.		
Temperature Capacitance Coefficient	Char.	Temp. Range	Class I :		
	NPO(N)	-55 $^\circ\text{C}$ ~ +125 $^\circ\text{C}$	[C2-C1/C1(T2-T1)] $\times 100\%$		
	X7R (X)	-55 $^\circ\text{C}$ ~ +125 $^\circ\text{C}$	Class II :		
			(C2-C1)/C1 $\times 100\%$		
			T1:Standard Temperature(25 $^\circ\text{C}$)		
			T2:Test Temperature		
			C1:Capacitance At Standard Temperature		
			C2:Capacitance At Test Temperature		
Lead Strength	Tensile Strength	No mechanical damage such as lead breakage and losing.	Holding the body of the part, apply the pulling force to the lead as indicated below. Pulling strength: 5N Holding time: 10 ± 1 s		
	Bending Strength	No mechanical damage such as lead breakage and losing.	Hold the capacitors to keep the axis vertical, bend it 90 degrees as shown below and bend back to the original position. This operation shall be done for 2~3s. and repeated for the following times. Bending force: 5N(weight :0.51kg) Test time : 2 times		
Solderability	Leads shall be covered by new solder more than 75% of its surface		Completely immerse both terminations in solder at 235 $\pm 5^\circ\text{C}$ for 2 ± 0.5 s Solder : H63A Flux :Rosin Dipping :By 1.5~2.0mm from the root of lead		
Resistance to Soldering Heat	Appearance	No mechanical damage shall occur	Completely immerse both terminations in solder at 250 $\pm 5^\circ\text{C}$ for 5 ± 1 s		
	Capacitance	Class I (NPO): Within 2.5% or $\pm 0.25\text{pF}$ whichever is larger of initial value Class II (X7R): Within $\pm 10\%$ of initial value	Solder : H63A Flux :Rosin Dipping :By 1.5~2.0mm from the root of lead		
	Q / Tan δ	To satisfy the specified initial value			
	Insulation Resistance	To satisfy the specified initial value			

RDH Series Specification & Test Condition

Item	Specification		Test Condition															
Temperature Cycle	Appearance	No mechanical damage shall occur	Class II capacitor shall be set for 48±4 hours at room temperature after one hour heat treatment at 150 +0/-10 °C before initial measurement. Capacitor shall be subjected to five cycles of the temperature cycle as following: <table><tr><th>Step</th><th>Temp.(°C)</th><th>Time(min)</th></tr><tr><td>1</td><td>Min Rated Temp.+0/-3 (-55)</td><td>30</td></tr><tr><td>2</td><td>25</td><td>3</td></tr><tr><td>3</td><td>Max Rated Temp.+3/-0 (125)</td><td>30</td></tr><tr><td>4</td><td>25</td><td>3</td></tr></table> Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours	Step	Temp.(°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
	Step	Temp.(°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																
Capacitance	Class I (NPO): Within 2.5% or ±0.25pF whichever is larger of initial value Class II (X7R): Within ±7.5% of initial value																	
Q / Tanδ	To satisfy the specified initial value																	
Insulation Resistance	To satisfy the specified initial value																	
Humidity	Appearance	No mechanical damage shall occur	Class II capacitor shall be set for 48±4 hours at room temperature after one hour heat treatment at 150 +0/-10 °C before initial measurement. Temperature : 40 ± 2 °C Relative Humidity : 90 ~95%RH Test Time : 500 +12/-0 hr Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours															
	Capacitance	Class I (NPO): Within 5% or ±0.5pF whichever is larger of initial value Class II (X7R): Within ±15% of initial value																
	Q / Tanδ	Class I (NPO): More Than 30pF : Q ≥350 30pF & Below: Q ≥275+2.5C Class II (X7R): Maximum ±5.0%																
	Insulation Resistance	1,000MΩ or 50/C Ω whichever is smaller. (C in Farad)																
	High Temperature Load (Life Test)	Appearance		No mechanical damage shall occur	Solder the capacitor on P.C. board shown in Fig 2. before testing. Apply the voltage below at 125±2°C for 1000 +48/-0h Applied Voltage : <table><tr><th>Rated Voltage</th><th>Applied Voltage</th></tr><tr><td>V≤250Vdc</td><td>150%Rated Voltage</td></tr><tr><td>250Vdc < V< 1KVdc</td><td>120%Rated Voltage</td></tr><tr><td>More Than 1KVdc(include 1KV)</td><td>100%Rated Voltage</td></tr></table> Temperature : max. operating temperature Test Time : 1000 +12/-0Hr Current Applied : 50 mA Max. Measure at room temperature after cooling for Class I : 24 ± 2 Hours Class II : 48 ± 4 Hours	Rated Voltage	Applied Voltage	V≤250Vdc	150%Rated Voltage	250Vdc < V< 1KVdc	120%Rated Voltage	More Than 1KVdc(include 1KV)	100%Rated Voltage					
Rated Voltage		Applied Voltage																
V≤250Vdc		150%Rated Voltage																
250Vdc < V< 1KVdc		120%Rated Voltage																
More Than 1KVdc(include 1KV)		100%Rated Voltage																
Capacitance	Class I (NPO): Within 3% or ±0.3pF whichever is larger of initial value Class II (X7R): Within ±15% of initial value																	
Q / Tanδ	Class I (NPO): More Than 30pF : Q ≥350 30pF & Below: Q ≥275+2.5C Class II (X7R): Maximum ±5%																	
Insulation Resistance	1,000MΩ or 50/C Ω whichever is smaller. (C in Farad)																	
Vibration	Appearance	No mechanical damage shall occur	Solder the capacitor on P.C. Board shown in Fig 2. before testing. 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. Repeat this for 2 hours each in 3perpendicular directions.															
	Capacitance	Within the specified tolerance																
	Q / Tanδ	To satisfy the specified initial value																