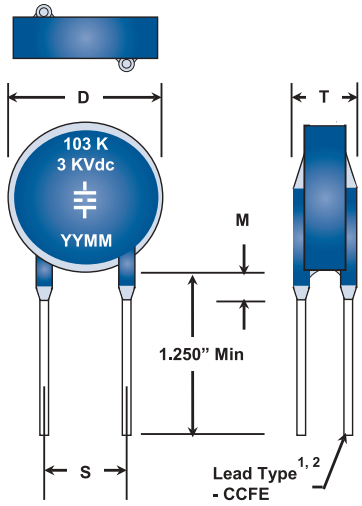
High Voltage Radial Leaded Disc Capacitors

Military & Commercial Level Class 1 & Class 2 Dielectric – 3 kVdc to 20 kVdc



1. Lead Size: D30, D40 @ 0.025" Dia (#22 AWG) [0.64 mm] D50 & larger @ 0.032" Dia (#20 AWG) [0.81mm].
2. Lead Finish: Solder Plate – Standard / RoHS – 100% Tin Plate
3. Order of marking may vary depending on size of capacitor.

CalRamic Technologies LLC manufactures a series of highly reliable, single layer, conformally coated, ceramic disc capacitors, designed with leaded terminals and intended for those applications where the capacitor may be exposed to higher levels of thermal and mechanical shock. These capacitors are manufactured under strict quality control guidelines to ensure unparalleled performance in high voltage applications.

These capacitors, which draw on thirty plus years of proven design and process experience, utilize double action pressing to minimize gradients within the dielectric powder and produce a finished capacitor with a uniform fired ceramic density.

Capacitors are available with ultra stable Class I, NPO dielectrics, essential where low losses and tight capacitance tolerances are critical and stable Class II, X5R, X7R, X5U and Z5U dielectric materials, which are intended for those applications where added dielectric losses and less precision can be tolerated.

These capacitors are ideally suited as snubbers for switching power supplies, coupling and decoupling capacitors, inverter circuitry, lighting ballasts, and other high voltage pulse applications.

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Performance Characteristics

Specification	Dielectric Type (EIA Designation)					
	NPO (COG) (N)	Y5P (P)	X7R (X)	X5R (W)	X5U (Y)	Z5U (Z)
Material Classification	Type I, Ultra Stable, K76	Type II, Stable, K2450	Type II, Stable, K2350	Type II, Stable, K2500	Type II, Stable, K5000	Type II, Stable, K10000
Coef of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C				
Density	72 g / in^3					
Operating Temperature Range	-55 to +125°C	-30 to +85°C	-55 to +125°C	-55 to +85°C		+10 to +85°C
Aging Rate	0	-2% Max per decade hour			-3% Max per decade hour	
Temperature Coefficient	±90 PPM / °C	±10%	±15%		+22 / -56%	
Voltage Coefficient	Negligible	-40% Max @ WVDC			-65% Max @ WVDC	-65% Max @ WVDC
Capacitance Range	1.6 pF to 600 pF	52 pF to 0.020 µF	52 pF to 0.020 µF	52 pF to 0.020 µF	100 pF to 0.037 µF	200 pF to 0.077 µF
Voltage Range	3 kVdc to 20 kVdc					
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less					
Insulation Resistance @ T Max	10,000 MΩ or 100 MΩ - µF, W/E is less					
Dissipation Factor	0.1% Max	2.5% Max				
DWV	1.5 x WVDC					

General Information

1. Custom voltages, package sizes and capacitance values available. Contact factory.
2. Higher voltage parts may require further encapsulation to prevent surface arc over and breakdown. When required, parts should first be cleaned, and oven dried at +85°C. Silicone rubbers or a suitable epoxy may be used and de-airing of encapsulates is recommended.
3. Testing of higher voltage parts before installation and / or supplemental encapsulation, may be done in a suitable, non-contaminating dielectric fluid like FC-40.
4. Large ceramic capacitors, even leaded devices are susceptible to damage when exposed to thermal and / or mechanical shock. Refer to Technical Bulletin AN103/AN112 for handling and installation recommendations.

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Electrical / Mechanical Characteristics

Working Voltage	Disc Style	Dimensions [in]				Actual Capacitance Value Range [pF]											
						NPO (N)		Y5P (P)		X7R (X)		X5R (W)		X5U (Y)		Z5U (Z)	
		D Max	S ± 0.030	T Max	M Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
3 kVDC	D30	0.300	0.250	0.210	0.125	8.4	21	270	630	260	600	270	630	500	1100	1000	2200
	D40	0.400	0.250	0.210	0.125	12	41	410	1300	380	1200	410	1300	730	2400	1500	4900
	D50	0.500	0.375	0.210	0.125	28	79	920	2500	870	2400	920	2500	1700	4600	3400	9600
	D60	0.600	0.375	0.210	0.125	38	100	1300	3400	1200	3200	1300	3400	2200	6100	6000	12000
	D70	0.700	0.500	0.210	0.125	63	160	2100	5300	2000	4900	2100	5300	3700	9600	7500	18000
	D80	0.800	0.500	0.210	0.125	94	180	3100	6500	2900	6000	3100	6500	5500	11000	11000	22000
	D90	0.900	0.500	0.210	0.125	110	270	3700	9100	3500	8600	3700	9100	6600	16000	13000	32000
	D100	1.000	0.500	0.210	0.125	150	340	5000	11000	4700	10000	5000	11000	9000	20000	18000	39000
	D120	1.200	0.500	0.210	0.125	200	530	6600	17000	6200	16000	6600	17000	12000	30000	24000	61000
	D140	1.400	0.625	0.210	0.125	310	600	10000	20000	9600	20000	10000	20000	19000	37000	37000	77000
5 kVDC	D30	0.300	0.250	0.250	0.125	5.1	12	160	370	150	360	160	370	300	680	600	1400
	D40	0.400	0.250	0.250	0.125	7.3	26	250	800	230	750	250	800	440	1400	900	2900
	D50	0.500	0.375	0.250	0.125	17	48	560	1500	520	1400	560	1500	1000	2700	2100	5600
	D60	0.600	0.375	0.250	0.125	23	64	760	2000	700	1800	760	2000	1400	3700	3600	7300
	D70	0.700	0.500	0.250	0.125	38	98	1300	3000	1200	3000	1300	3000	2300	5800	4500	11000
	D80	0.800	0.500	0.250	0.125	57	110	1900	3900	1800	3600	1900	3900	3400	6800	6800	14000
	D90	0.900	0.500	0.250	0.125	69	160	2200	5300	2100	5100	2200	5300	4000	9800	8100	18000
	D100	1.000	0.500	0.250	0.125	92	200	3000	6700	2900	6300	3000	6700	5500	12000	11000	24000
	D120	1.200	0.500	0.250	0.125	120	310	3900	10000	3800	9800	3900	10000	7200	18000	14000	37000
	D140	1.400	0.625	0.250	0.125	190	390	6200	12900	5800	12000	6200	12000	11000	22000	22000	46000
7.5 kVDC	D30	0.300	0.250	0.310	0.150	3.4	8	110	250	100	250	110	250	200	460	400	920
	D40	0.400	0.250	0.310	0.150	5	17	170	530	150	510	170	530	300	980	600	1800
	D50	0.500	0.375	0.310	0.150	12	33	370	1000	350	990	370	1000	670	1800	1400	3700
	D60	0.600	0.375	0.310	0.150	15	43	510	1300	470	1200	510	1300	900	2400	2400	4900
	D70	0.700	0.500	0.310	0.150	25	65	830	2000	780	2000	830	2000	1500	3700	3000	7700
	D80	0.800	0.500	0.310	0.150	37	79	1300	2500	1200	2400	1300	2500	2200	4600	4500	9200
	D90	0.900	0.500	0.310	0.150	45	110	1500	3600	1400	3400	1500	3600	2700	6500	5400	13000
	D100	1.000	0.500	0.310	0.150	60	130	2000	4400	1900	4300	2000	4400	3700	8000	7300	16000
	D120	1.200	0.500	0.310	0.150	80	200	2600	5600	2500	6500	2600	5600	4800	12000	9500	24000
	D140	1.400	0.625	0.310	0.150	120	250	4100	8600	3800	8000	4100	8600	7400	15000	15000	30000
10 kVDC	D30	0.300	0.250	0.440	0.170	2.5	6	84	180	78	180	84	180	150	340	300	700
	D40	0.400	0.250	0.440	0.170	3.8	12	120	390	110	370	120	390	220	720	450	1400
	D50	0.500	0.375	0.440	0.170	8.5	24	280	820	260	740	280	820	500	1400	1000	2700
	D60	0.600	0.375	0.440	0.170	12	31	380	1000	350	960	380	1000	680	1700	1800	3600
	D70	0.700	0.500	0.440	0.170	19	48	620	1600	580	1500	620	1600	1100	2900	2300	5800
	D80	0.800	0.500	0.440	0.170	28	58	930	1800	870	1800	930	1800	1700	3400	3400	7000
	D90	0.900	0.500	0.440	0.170	34	83	1100	2700	1000	2500	1100	2700	2000	4900	4000	9800
	D100	1.000	0.500	0.440	0.170	46	100	1500	3400	1400	3000	1500	3400	2700	6000	5500	12000
	D120	1.200	0.500	0.440	0.170	60	160	2000	5100	1900	4800	2000	5100	3600	9400	7200	18000
	D140	1.400	0.625	0.440	0.170	94	180	3100	6300	2900	6000	3100	6300	5600	11000	11000	22000
15 kVDC	D30	0.300	0.250	0.545	0.175	1.6	4	55	130	52	120	55	130	100	220	200	460
	D40	0.400	0.250	0.545	0.175	2.4	8	52	270	76	250	52	270	150	480	300	980
	D50	0.500	0.375	0.545	0.175	5.7	16	180	510	180	490	180	510	330	940	700	1800
	D60	0.600	0.375	0.545	0.175	7.7	21	250	680	230	630	250	680	450	1200	1200	2400
	D70	0.700	0.500	0.545	0.175	12	34	410	1000	390	1000	410	1000	750	1800	1500	3700
	D80	0.800	0.500	0.545	0.175	19	40	620	1300	580	1200	620	1300	1100	3200	2300	4600
	D90	0.900	0.500	0.545	0.175	23	55	740	1720	690	1700	740	1700	1300	3200	2700	6500
	D100	1.000	0.500	0.545	0.175	30	69	1000	2200	950	2000	1000	2200	1800	4100	3700	8000
	D120	1.200	0.500	0.545	0.175	40	100	1300	3440	1300	3200	1300	3400	2400	6100	4800	12000
	D140	1.400	0.625	0.545	0.175	60	130	2100	4300	1900	3900	2100	4300	3700	7700	7500	15000
20 kVDC	D50	0.500	0.375	0.650	0.175	4.6	12	150	370	140	360	150	370	270	680	500	1400
	D60	0.600	0.375	0.650	0.175	6.2	15	200	490	190	460	200	490	360	890	890	1700
	D70	0.700	0.500	0.650	0.175	10	24	330	770	310	740	330	770	600	1400	1200	2900
	D80	0.800	0.500	0.650	0.175	15	29	500	940	470	890	500	940	900	1700	1700	3400
	D90	0.900	0.500	0.650	0.175	18	40	600	1300	560	1200	600	1300	1100	2400	2000	4800
	D100	1.000	0.500	0.650	0.175	24	52	800	1600	760	1500	800	1600	1500	2900	2800	5100
	D120	1.200	0.500	0.650	0.175	32	77	1000	2500	1000	2400	1000	2500	1900	4400	3600	9400
	D140	1.400	0.625	0.650	0.175	50	96	1700	3100	1600	2900	1700	3000	3000	5600	5600	11000

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MADE IN USA

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Part Number / Ordering Information

D30	D50	X	152	K	M	C	R	/LS250	/025

Voltage
D30 = 3 kVDC
D100 = 10 kVDC
D150 = 15 kVDC
D200 = 20 kVDC

Style
D50
- Reference table

Dielectric
N = NPO
W = X5R
X = X7R
Y = X5U
P = Y5P
Z = Z5U

Capacitance
Value in pF
- Two significant figures, plus number of zeros
5R5 = 5.5 pF
152 = 1000 pF
103 = 10,000 pF

Tolerance
J = ±5%
K = ±10%
M = ±20%
P = -0 / +100%
Z = -20 / +80%

Screening
- Excludes Partial Discharge (Corona)

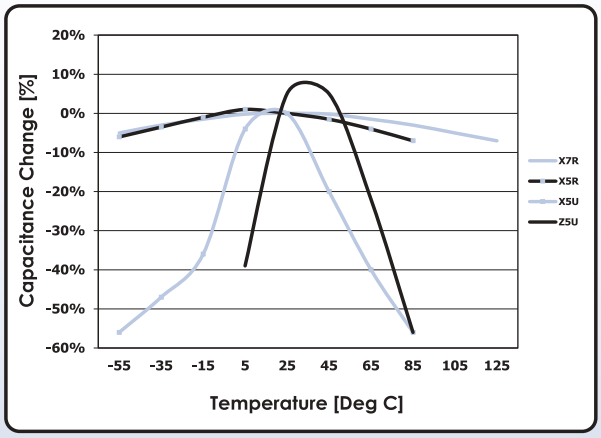
Partial Discharge (Corona)
C - Partial Discharge (Corona)

RoHS
R = RoHS

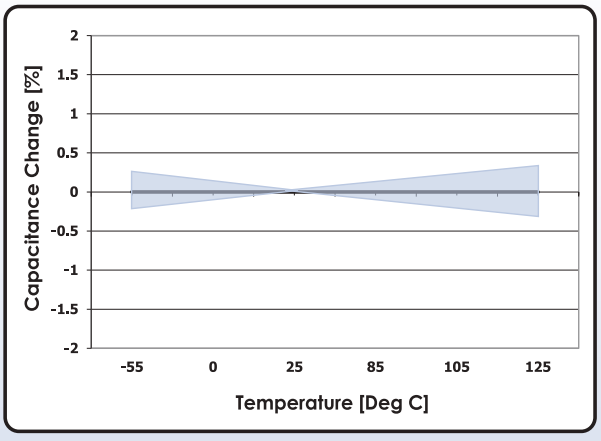
Alternative Lead Spacing
/LS250 = 0.250"
/LS375 = 0.375"
/LSXXX = X.XXX"

Alternative Lead Diameter
/025 = 0.025"
/032 = 0.032"

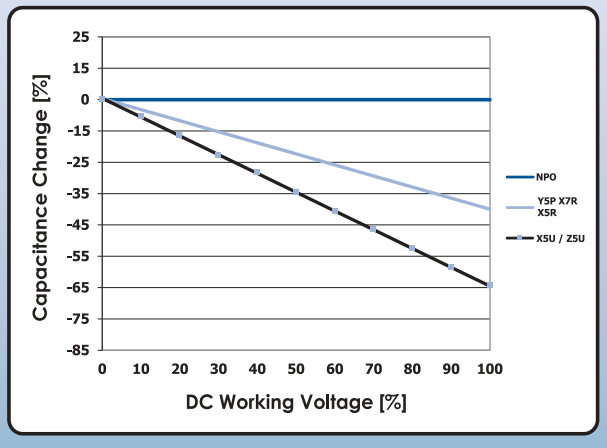
Performance Charts (Typical)



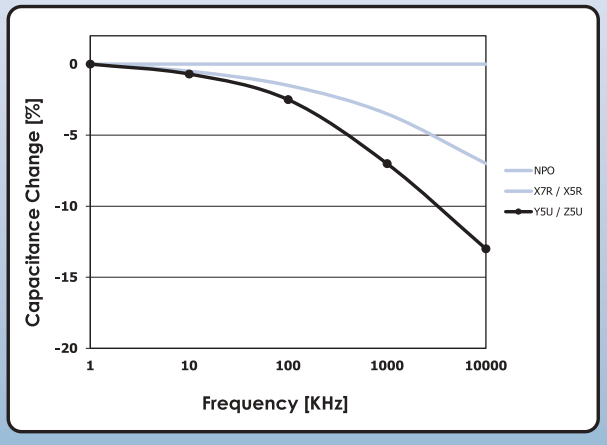
Class II Temperature Coefficient



NPO Temperature Coefficient



Voltage Coefficient



Capacitance Vs Frequency

Partnering with our clients for combined success.

ISO 9001:2015 CERTIFIED QUALITY MANAGEMENT SYSTEM

MADE IN USA

CalRamic Technologies LLC manufactures High Voltage Ceramic Capacitors. All of our products are manufactured in the United States. Applications of our products are Space Level, Military Aircraft and Ground Based Systems, Commercial Aerospace, SMPS, Medical Imaging, High Temperature (Geophysical and Geothermal), Pulse Discharge and High Repetition Rate, and a variety of commercial and industrial applications.

Our products range from Radial Leaded Multilayer and Disc to Surface Mount Chip capacitors in a variety of dielectrics to suit your application. We can produce large or small production quantities. Our lean manufacturing process and discipline offer the shortest lead times in the industry with out-of-stock same day delivery.

We also offer our “Fast Track” delivery for those special delivery needs. Custom designs and variations are welcome.

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BASIC APPLICATIONS

It is the basic ability of a capacitor to store energy for controlled release that makes it an extremely valuable tool for use in a wide range of applications in the electronics industry. Typical applications would include:

Energy / Pulse Discharge

The energy stored in the capacitor can be discharged for use in an ignition, firing or triggering circuit or as a power source.

Direct Current Blockage

A fully charged capacitor acts as a high impedance device and can block the passage of DC current while still allowing AC current to pass to a specified portion of the circuit.

Coupling of Circuit Components

With the ability to pass AC signals, a capacitor is able to couple one section of an AC circuit to another circuit.

Decoupling of Circuit Components

Capacitors are often used in integrated circuits (IC's) to minimize noise in the logic signal by providing an additional current source.

Filter Capacitors

The reactance of a capacitor is inversely proportional to the frequency thereby offering decreased resistance to current flow at higher frequency levels. This ability to decrease or increase the impedance of the circuit allows the capacitor to discriminate and filter out undesired frequencies.

By-Pass Capacitor

The ability to block DC current and allow the passage of AC current permits the capacitor to be placed in parallel with other components to by-pass the AC at a certain frequency without allowing the DC component of the signal to pass.

Snubber Capacitors

Capacitors can be used to protect sensitive components in a circuit by limiting the energy associated with high voltage transients generated by the opening of relays or silicon controlled rectifiers (SCR) used to drive high inductance loads.

Switch Mode Power Supply

For applications including input and output filters for switch mode power supplies, DC to DC converters, decoupling, snubbers, energy storage and high capacitance discharge circuits.
See pages 27 & 49 for more information.

CalRamic Technologies LLC is an ISO9001-2015 Certified facility. Our commitment to Quality is our primary objective and we pride ourselves on our satisfaction to our client base. Our Goal is to provide the upmost Quality from the initial contact in introducing our company, to quoting the same day if possible, followed by offering short deliveries coupled with “on time deliveries” of our products. And of course, what we consider the most important element, the reliability of the components in the application once delivered. In addition, we remain dynamic and open to our customer’s inputs so we may continue to improve in all aspects related to our chosen field. We continue to grow at a substantial rate and believe that is in direct response to maintaining the Quality Objectives stated above.

42 °C
NEW ELEMENTS 10/9

MORE ABOUT US

CalRamic Technologies LLC is a U.S.-based High Voltage Ceramic Capacitor manufacturer with over 20 years' experience. Our team focuses on producing exceptional quality capacitors by using superior quality materials with a highly trained team.

CalRamic produces a variety of components in a multitude of configurations ranging from 500VDC to 80KVDC. Our Lean Manufacturing principles provide shorter lead times, rapid prototype turnaround deliveries, multiple design derivations for your custom application, and a variety of dielectric types depending on your specific application.

Our quality control system conforms to and exceeds ISO 9001-2015 requirements. We manufacture capacitors suitable for a wide range of applications like: Geothermal, Commercial/Industrial, Medical, Commercial Aerospace, Ground Based Military, Military Aerospace and even Hi-Reliability Space Satellite Systems. Our manufacturing design guidelines, material choices, and precision controls result in performance-based High Voltage Capacitors for your specific application.

The CalRamic Technologies Leadership has created a culture that encourages personal growth and success for each team member, while building a We Succeed as a Team environment. In addition, we look for opportunities to support our local community through non-profit involvement and CalRamic Team events throughout the year.

We are committed to the best approaches and practices that limit environmental impact, and an extensive safety and awareness training program that limits hazardous exposures to our Team Members.

CalRamic Technologies LLC is fully committed to our clients' success. On our website we offer a full ceramic capacitor educational library with Application Notes and Product Training Modules that help our clients understand the technical nature of High Voltage Ceramic Capacitors.

We are fully committed to your application's success.

Jeff Day

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