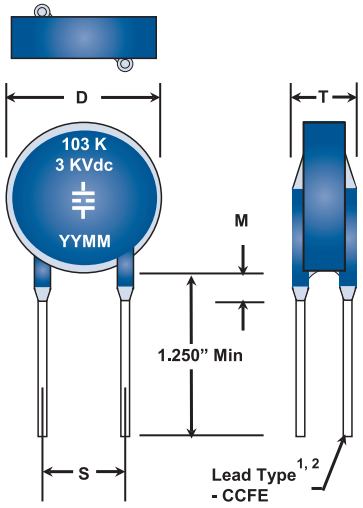
High Voltage Radial Leaded Disc Capacitors

High Rel. Space Level NPO & X7R – 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, mission critical, single layer, conformally coated, leaded ceramic disc capacitors that are designed and manufactured under strict quality control guidelines to ensure unparalleled performance in high voltage space level 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.

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
Coefficient 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	±30 PPM / °C	±10%	±15%		+22 / -56%	
Voltage Coefficient	Negligible	-20% Max @ WVDC			-35% Max @ WVDC	-35% Max @ WVDC
Capacitance Range	1.6 pF to 350 pF	52 pF to 0.012 µF	52 pF to 0.012 µF	52 pF to 0.012 µF	100 pF to 0.022 µF	200 pF to 0.045 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. Capacitors receive 100% Group A Inspection including Partial Discharge (Corona).
2. Ultrasonic examination (C-SAM) is available. Contact factory.
3. Group A testing and Group B Inspection when required, is performed in accordance with applicable requirements of MIL-PRF-49467, DSCC 87125, DSCC 89087 and NASA GSFC S-311-15C.
4. Custom voltages, package sizes and capacitance values available. Contact factory.
5. 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. Care should be taken to select a suitable epoxy that will not apply mechanical stress to the part and de-airing of encapsulates is recommended.
6. Testing of higher voltage parts before installation and / or supplemental encapsulation, may be done in a suitable, non-contaminating dielectric fluid like FC-40.
7. 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.

High Voltage Radial Leaded Disc Capacitors

High Rel. Space Level NPO & X7R – 3 kVdc to 20 kVdc

MADE IN USA

B

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	12	270	370	260	350	270	370	500	670	1000	1300
	D40	0.400	0.250	0.210	0.125	12	24	410	780	380	730	410	780	730	1400	1500	2900
	D50	0.500	0.375	0.210	0.125	28	46	920	1500	870	1400	920	1500	1700	2700	3400	5600
	D60	0.600	0.375	0.210	0.125	38	61	1300	2000	1200	1900	1300	2000	2200	3600	6000	7300
	D70	0.700	0.500	0.210	0.125	63	95	2100	3100	2000	2900	2100	3100	3700	5600	7500	11000
	D80	0.800	0.500	0.210	0.125	94	110	3100	3800	2900	3500	3100	3800	5500	6800	11000	13000
	D90	0.900	0.500	0.210	0.125	110	160	3700	5300	3500	5000	3700	5300	6600	9500	13000	19000
	D100	1.000	0.500	0.210	0.125	150	200	5000	6500	4700	6200	5000	6500	9000	12000	18000	13000
	D120	1.200	0.500	0.210	0.125	200	310	6600	10000	6200	9500	6600	10000	12000	18000	24000	36000
	D140	1.400	0.625	0.210	0.125	310	350	10000	12000	9600	12000	10000	12000	19000	22000	37000	45000
5 kVDC	D30	0.300	0.250	0.250	0.125	5.1	6.9	160	220	150	210	160	220	300	400	600	820
	D40	0.400	0.250	0.250	0.125	7.3	15	250	470	230	440	250	470	440	850	900	1700
	D50	0.500	0.375	0.250	0.125	17	28	560	920	520	860	560	920	1000	1600	2100	3300
	D60	0.600	0.375	0.250	0.125	23	37	760	1200	700	1100	760	1200	1400	2200	3600	4300
	D70	0.700	0.500	0.250	0.125	38	57	1300	1800	1200	1800	1300	1800	2300	3400	4500	6700
	D80	0.800	0.500	0.250	0.125	57	69	1900	2300	1800	2100	1900	2300	3400	4000	6800	8200
	D90	0.900	0.500	0.250	0.125	69	97	2200	3100	2100	3000	2200	3100	4000	5700	8100	11000
	D100	1.000	0.500	0.250	0.125	92	120	3000	3900	2900	3700	3000	3900	5500	7100	11000	14000
	D120	1.200	0.500	0.250	0.125	120	180	3900	6100	3800	5700	3900	6100	7200	11000	14000	22000
	D140	1.400	0.625	0.250	0.125	190	230	6200	7500	5800	7000	6200	7500	11000	13000	22000	27000
7.5 kVDC	D30	0.300	0.250	0.310	0.150	3.4	4.6	110	150	100	150	110	150	200	270	400	540
	D40	0.400	0.250	0.310	0.150	5	9.6	170	310	150	300	170	310	300	570	600	1100
	D50	0.500	0.375	0.310	0.150	12	19	370	610	350	580	370	610	670	1100	1400	2200
	D60	0.600	0.375	0.310	0.150	15	25	510	800	470	750	510	800	900	1450	2400	2900
	D70	0.700	0.500	0.310	0.150	25	38	830	1200	780	1200	830	1200	1500	2200	3000	4500
	D80	0.800	0.500	0.310	0.150	37	46	1300	1500	1200	1400	1300	1500	2200	2700	4500	5400
	D90	0.900	0.500	0.310	0.150	45	65	1500	2100	1400	2000	1500	2100	2700	3800	5400	7600
	D100	1.000	0.500	0.310	0.150	60	80	2000	2600	1900	2500	2000	2600	3700	4700	7300	9500
	D120	1.200	0.500	0.310	0.150	80	120	2600	3300	2500	3800	2600	3300	4800	7400	9500	14000
	D140	1.400	0.625	0.310	0.150	120	150	4100	5000	3800	4700	4100	5000	7400	9000	15000	18000
10 kVDC	D30	0.300	0.250	0.440	0.170	2.5	3.5	84	110	78	110	84	110	150	200	300	410
	D40	0.400	0.250	0.440	0.170	3.8	7.2	120	230	110	220	120	230	220	420	450	850
	D50	0.500	0.375	0.440	0.170	8.5	14	280	480	260	430	280	480	500	820	1000	1600
	D60	0.600	0.375	0.440	0.170	12	18	380	600	350	560	380	600	680	1000	1800	2100
	D70	0.700	0.500	0.440	0.170	19	28	620	940	580	880	620	940	1100	1700	2300	3400
	D80	0.800	0.500	0.440	0.170	28	34	930	1100	870	1100	930	1100	1700	2000	3400	4100
	D90	0.900	0.500	0.440	0.170	34	48	1100	1600	1000	1500	1100	1600	2000	2900	4000	5700
	D100	1.000	0.500	0.440	0.170	46	60	1500	2000	1400	1800	1500	2000	2700	3500	5500	7100
	D120	1.200	0.500	0.440	0.170	60	93	2000	3000	1900	2800	2000	3000	3600	5500	7200	11000
	D140	1.400	0.625	0.440	0.170	94	110	3100	3700	2900	3500	3100	3700	5600	6800	11000	13000
15 kVDC	D30	0.300	0.250	0.545	0.175	1.6	2.3	55	76	52	71	55	76	100	130	200	270
	D40	0.400	0.250	0.545	0.175	2.4	4.8	52	160	76	150	52	160	150	280	300	570
	D50	0.500	0.375	0.545	0.175	5.7	9.4	180	300	180	290	180	300	330	550	700	1100
	D60	0.600	0.375	0.545	0.175	7.7	12	250	400	230	370	250	400	450	720	1200	1400
	D70	0.700	0.500	0.545	0.175	12	20	410	620	390	590	410	620	750	1100	1500	2200
	D80	0.800	0.500	0.545	0.175	19	23	620	760	580	710	620	760	1100	1360	2300	2700
	D90	0.900	0.500	0.545	0.175	23	32	740	1000	690	1000	740	1000	1300	1900	2700	3800
	D100	1.000	0.500	0.545	0.175	30	40	1000	1300	950	1200	1000	1300	1800	2400	3700	4700
	D120	1.200	0.500	0.545	0.175	40	60	1300	2000	1300	1900	1300	2000	2400	3600	4800	7300
	D140	1.400	0.625	0.545	0.175	60	77	2100	2500	1900	2300	2100	2500	3700	4500	7500	9000
20 kVDC	D50	0.500	0.375	0.650	0.175	4.6	6.8	150	220	140	210	150	220	270	400	500	830
	D60	0.600	0.375	0.650	0.175	6.2	8.9	200	290	190	270	200	290	360	520	890	1000
	D70	0.700	0.500	0.650	0.175	10	14	330	450	310	430	330	450	600	820	1200	1700
	D80	0.800	0.500	0.650	0.175	15	17	500	550	470	520	500	550	900	1000	1700	2000
	D90	0.900	0.500	0.650	0.175	18	23	600	770	560	720	600	770	1100	1400	2000	2800
	D100	1.000	0.500	0.650	0.175	24	30	800	960	760	900	800	960	1500	1700	2800	3000
	D120	1.200	0.500	0.650	0.175	32	45	1000	1500	1000	1400	1000	1500	1900	2600	3600	5500
	D140	1.400	0.625	0.650	0.175	50	56	1700	1800	1600	1700	1700	1800	3000	3300	5600	6800

High Voltage Radial Leaded Disc Capacitors

High Rel. Space Level NPO & X7R – 3 kVdc to 20 kVdc

Part Number / Ordering Information

HS	D150	D80	N	190	J	R

Series
HS = Space level

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

Style
D80
- Reference table

Dielectric
N = NPO
W = X5R
X = X7R
Y = X5U
P = Z5P
Z = Z5U

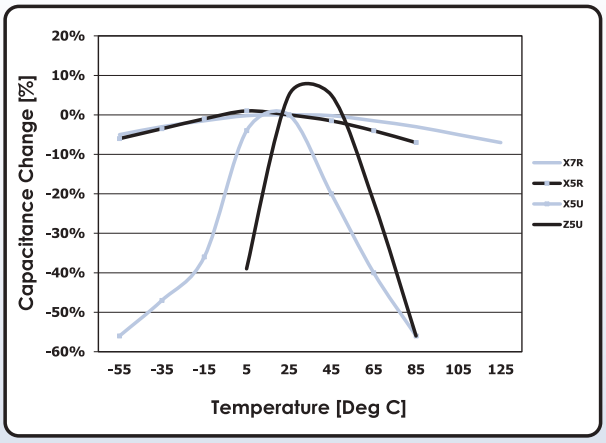
Capacitance
Value in pF
- Two significant figures, plus number of zeros
8R4 = 8.4 pF
190 = 19pF
921 = 920 pF
223 = 22,000 pF

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

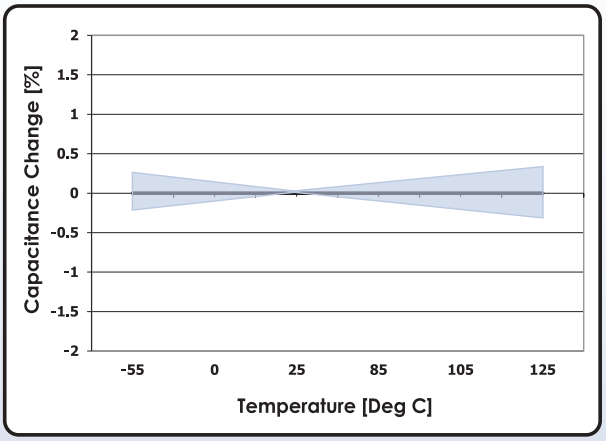
RoHS
Compliant

Note: RoHS compliance is not included unless designated in part number

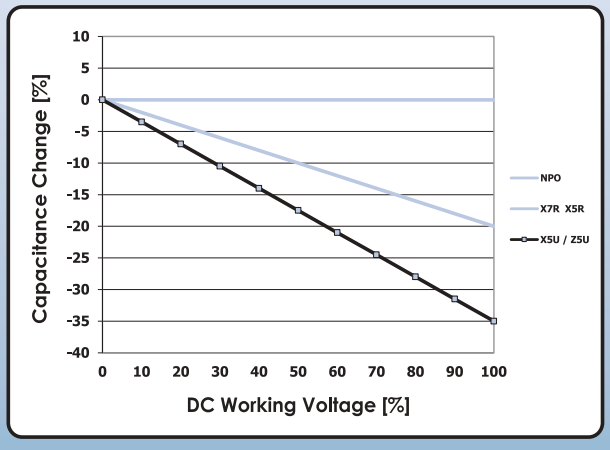
Performance Charts (Typical)



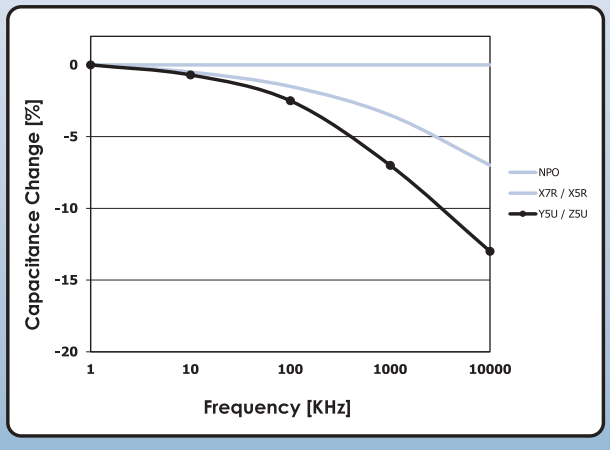
Class II Temperature Coefficient



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.

MADE IN USA

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

5462 Louie Lane, Reno, Nevada 8951 • USA
Tel.: +1 775 851-3580

info@calramic.com
www.calramic.com

Exxelia Headquarters
204 rond-point du Pont de Sèvres
92100 BOULOGNE BILLANCOURT • FRANCE
Tel.: +33 1 49 23 10 00

www.exxelia.com

OTHER SALES OFFICES

AMERICAS

USA, Florida
1221 N. Highway 17-92,
Longwood, FL 32750 • USA
Tel.: +1 407 695-6562

USA, New York
93 Paper Mill Street,
Honeoye Falls, NY 14472 • USA
Tel.: +1 585 624-2610

For all requests
exxelia.com/en/contact

EUROPE

Western Europe
93, rue Oberkampf
75011 PARIS • FRANCE
Tel.: +33 1 49 23 10 00

Northern Europe
Cylindervägen 18
SE-131 52 Nacka Strand • SWEDEN
Tel.: +46 76 16 50 014

APAC

India
Level 7, Mfar Greenheart,
Manyata Tech Park
Outer Ring Road, Hebbal,
BANGALORE - 560045
Tel.: +91 80 67 65 41 14

China
Mayfair Tower NO.83
Fu Min Road - 200040 Shanghai • CHINA
Tel.: +86 21 6132 7197