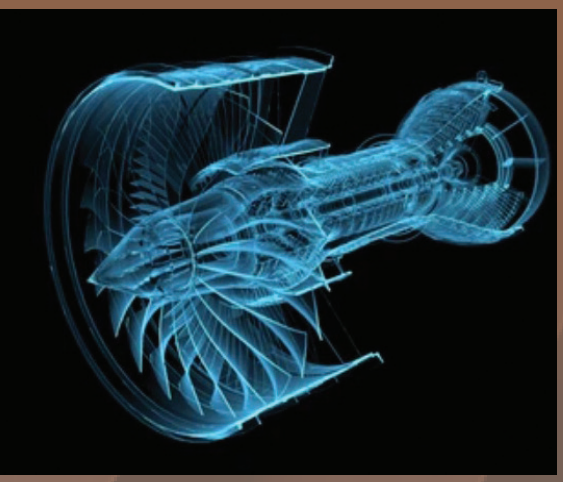
High Voltage Ceramic Capacitors

500 V to 20 KV



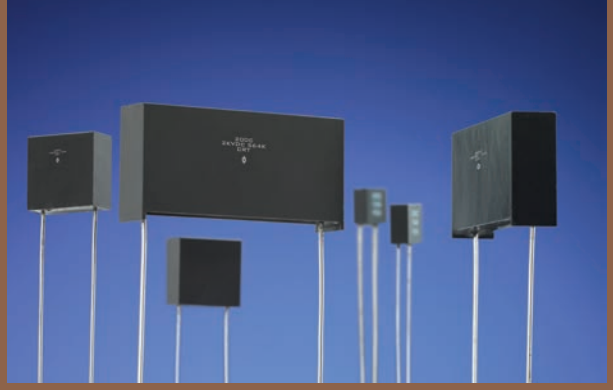
Radial Leaded Disc | Radial Leaded and Surface Mount Multilayer | Multi-Pin SMPS

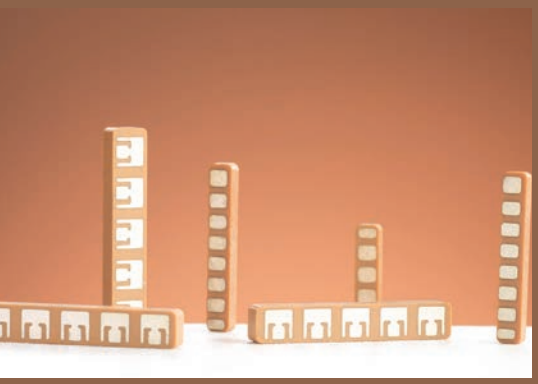
CalRamic Technologies LLC

MADE IN USA

Hi-Rel Space Systems
Military Aerospace and Ground Based Systems
Commercial Aerospace
Switch Mode Power Supply
Commercial and Industrial Applications
Medical
Scientific Instrumentation
Pulse Discharge and High Repetition Rate Applications
Geophysical and Geothermal 200° C High Temp

2310







Partnering with our clients for combined success.

ISO 9001:2015 CERTIFIED QUALITY MANAGEMENT SYSTEMS

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.

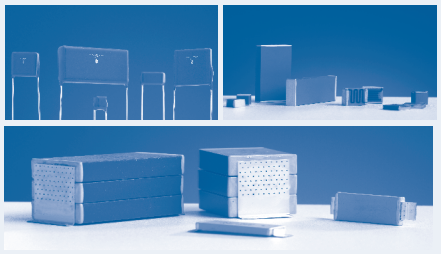
Snubber Capacitors

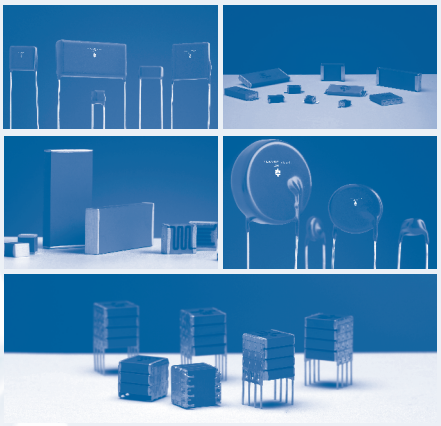
Capacitors can be used to protect sensitive components in a circuit by limiting the energy associated with high voltage transients generated by the opening of relays or silicon controlled rectifiers (SCR) used to drive high inductance loads.

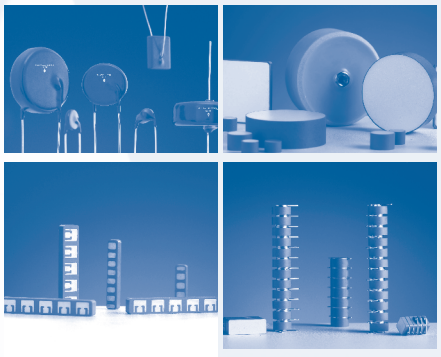
Switch Mode Power Supply

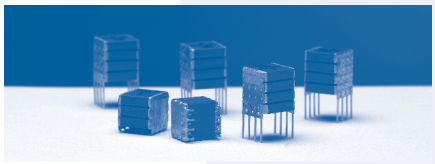
For applications including input and output filters for switch mode power supplies, DC to DC converters, decoupling, snubbers, energy storage and high capacitance discharge circuits.
See pages 27 & 49 for more information.

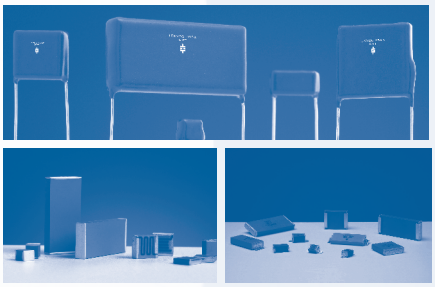
PRODUCTS

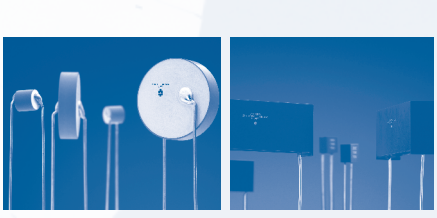








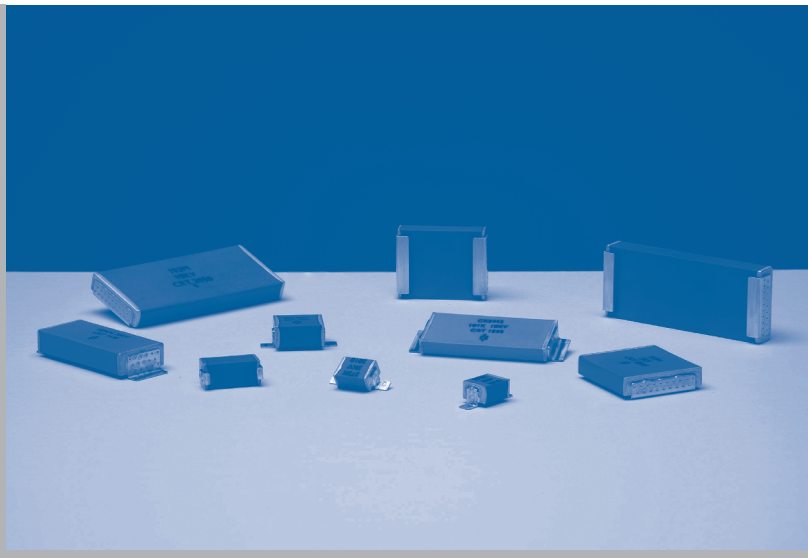


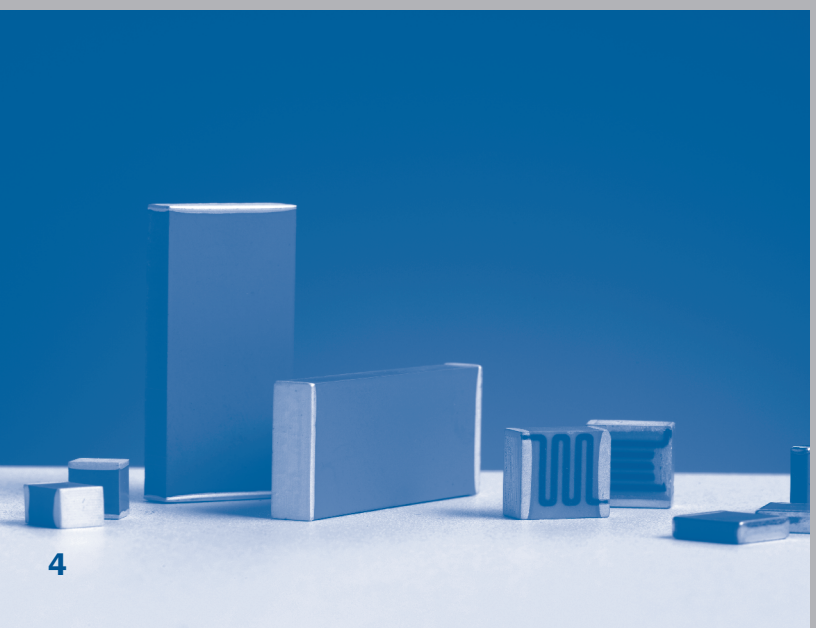


High Voltage Multilayer Ceramic Capacitors
Military and Commercial

CalRamic Technologies LLC

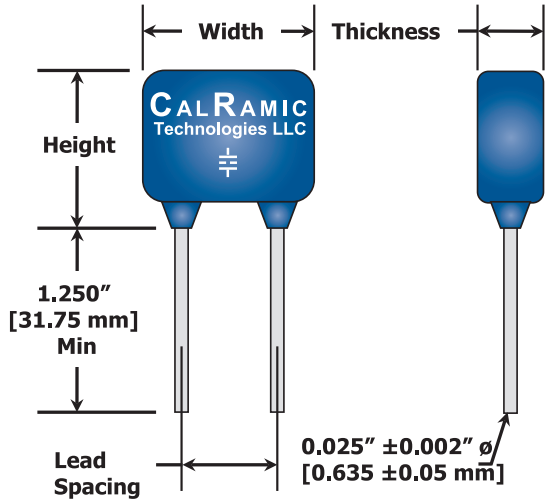
(775) 851-3580 / calramic.com / 5462 Louie Lane / Reno, NV 89511 USA





High Voltage Radial Leaded Capacitors

Military & Commercial Level NPO & X7R – 500 Vdc to 10 kVdc



Lead Type: #22 AWG, CCFE / Solder plate
RoHS Option – 100% Tin plate

CalRamic Technologies LLC manufactures a series of highly reliable, military / commercial grade high voltage, radial leaded ceramic capacitors that are designed specifically for those conditions where the assembly may be exposed to high levels of thermal and / or mechanical shock. In addition, these assemblies are packaged in a high resistance conformal coating that provides enhanced electrical isolation and added environmental protection.

Intended for continuous operation at full rated voltage and across the entire operating temperature range, these capacitors utilize a special internal design specifically intended to reduce electric field stresses, thereby providing a device that exhibits very low ESR characteristics and no reduction in insulation resistance with life.

Available with ultra-stable Class I, NPO and stable Class II, X7R dielectric materials, these capacitors are ideally suited for timing / precision circuitry, energy storage, DC blocking, snubbers, transient suppression, decoupling, resonators and EMI filtering applications.

Performance Characteristics

Specification	Dielectric Type (EIA Designation)	
	NPO (COG)	X7R
Material Classification	Type I, Ultra Stable, K90	Type II, Stable, K2500
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	67 g / in^3	
Operating Temperature Range	-55 to +125°C	
Aging Rate	0	-2% Max per decade hour
Temperature Coefficient	±30 PPM / °C	±15%
Voltage Coefficient	Negligible	Range -35% to -55% Max @ WVDC
Capacitance Range	10 pF to 0.33 µF	150 pF to 5.6 µF
Voltage Range	500 VDC to 10 kVDC	
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less	
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less	
Dissipation Factor	0.1% Max	2.5% Max
DWV	1.5 X WVDC ≤ 1250 Vdc or 1.2 X WVDC > 1250 Vdc	

Mechanical Dimensions

Dimensions inches [mm]	Product Style												
	HV01	HV02	HV03	HV10	HV04	HV11	HV05	HV06	HV07	HV13	HV14	HV15	HV16
Width - Max	0.250 [6.35]	0.320 [8.13]	0.370 [9.40]	0.450 [11.43]	0.470 [11.94]	0.550 [13.97]	0.570 [14.48]	0.670 [17.02]	0.770 [19.56]	0.850 [21.59]	1.050 [26.67]	1.250 [31.75]	1.450 [36.83]
Height - Max	0.220 [5.59]	0.280 [7.11]	0.300 [7.62]	0.220 [5.59]	0.400 [10.16]	0.280 [7.11]	0.500 [12.70]	0.600 [15.24]	0.720 [18.29]	0.400 [10.16]	0.500 [12.70]	0.600 [15.24]	0.720 [18.29]
Thickness - Max	0.200 [5.08]	0.250 [6.35]	0.250 [6.35]	0.200 [5.08]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]
Lead Spacing ±0.030 [0.762]	0.170 [4.32]	0.220 [5.59]	0.275 [6.99]	0.300 [7.62]	0.375 [9.53]	0.400 [10.16]	0.475 [12.07]	0.575 [14.61]	0.675 [17.15]	0.700 [17.78]	0.975 [24.77]	1.175 [29.85]	1.300 [33.02]

High Voltage Radial Leaded Capacitors

Military & Commercial Level NPO & X7R – 500 Vdc to 10 kVdc

Electrical Characteristics

NPO Capacitance Range														
Style		HV01	HV02	HV03	HV04	HV05	HV06	HV07	HV10	HV11	HV13	HV14	HV15	HV16
Min Cap		120	220	270	270	180	270	470	100	100	120	180	330	560
WVDC	500	472	822	103	223	563	823	104	153	273	124	154	224	334
	1000	152	392	682	183	333	473	683	472	103	683	563	104	154
	2000	681	821	122	332	682	103	223	102	222	103	153	223	253
	3000	151	561	681	152	392	682	822	391	821	472	562	153	183
	4000	•	•	•	681	152	222	392	221	561	152	332	562	822
	5000	•	•	•	•	102	222	272	•	391	122	222	392	562
	7000	•	•	•	•	•	•	•	•	•	471	102	182	272
	10000	•	•	•	•	•	•	•	•	•	•	821	122	222

*Voltages >10kVdc available – Contact Factory

X7R Capacitance Range														
Style		HV01	HV02	HV03	HV04	HV05	HV06	HV07	HV10	HV11	HV13	HV14	HV15	HV16
Min Cap		271	561	681	271	471	681	122	151	271	221	471	821	122
WVDC	500	823	184	224	564	125	185	255	224	394	155	225	395	565
	1000	223	683	823	274	474	684	105	563	154	684	*105*	155	225
	2000	392	123	183	333	683	104	184	822	223	823	154	254	334
	3000	•	392	562	153	333	393	823	222	822	273	563	823	124
	4000	•	•	•	682	103	153	273	122	472	123	273	473	683
	5000	•	•	•	•	682	103	153	•	272	822	223	273	393
	7000	•	•	•	•	•	•	•	•	•	332	682	103	183
	10000	•	•	•	•	•	•	•	•	•	•	392	562	103

*Voltages >10kVdc available – Contact Factory

Notes

1. Product designed and manufactured to be drop-in replacements for DSCC HV designs.
2. Group A screening available to MIL-PRF-49467.
3. Special testing including Ultrasound (C-SAM) and Partial Discharge (Corona) is available. See Space Level HS catalog CRT-0009 for more information.
4. Custom voltages, package sizes and capacitance values available. Contact factory.
5. X7R dielectrics are not intended for AC line filtering applications.
6. 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.
7. High voltage products may require additional conformal coating to prevent possible arc over.

Part Number / Ordering Information

20	HV03	B	562	K	M	R

Voltage
05 = 500 Vdc
20 = 2000 Vdc
100 = 10 kVdc

Style
HV03
- Reference table

Dielectric
B = X7R
N = NPO

Capacitance
Value in pF
- Two significant figures, plus number of zeros
562 = 5600 pF
104 = 100,000 pF

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

Screening
M = Group A
- Excludes Partial Discharge (Corona)

RoHS
R = RoHS if Required

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

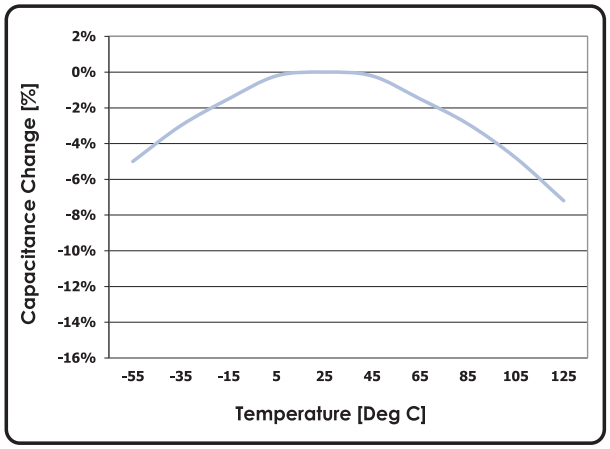
High Voltage Radial Leaded Capacitors

Military & Commercial Level NPO & X7R – 500 Vdc to 10 kVdc

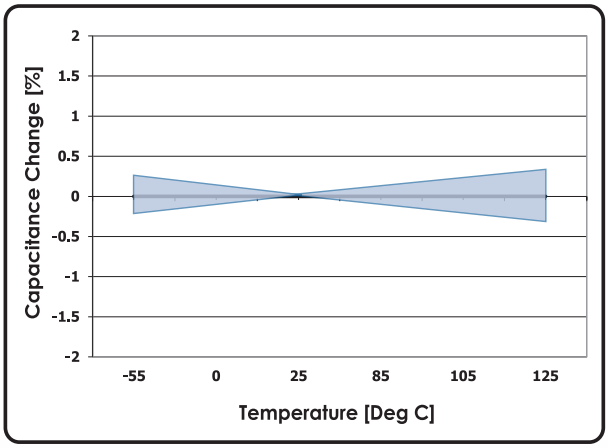
MADE IN USA

A

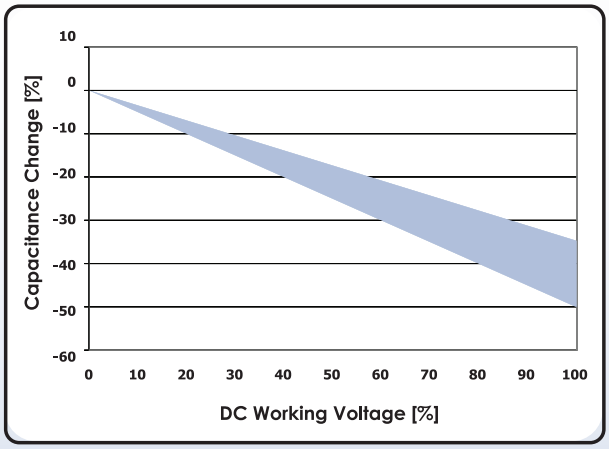
Performance Charts (Typical)



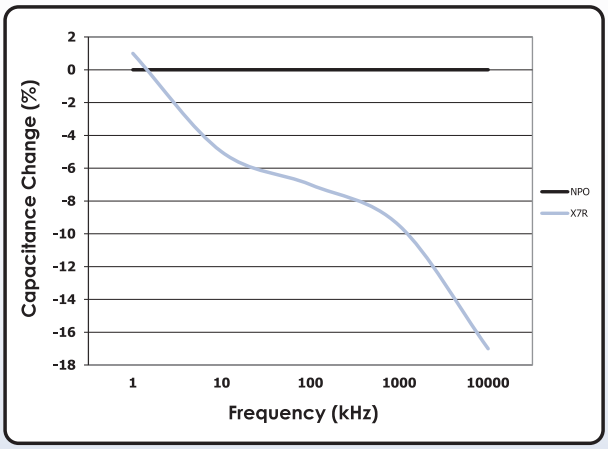
X7R Temperature Coefficient



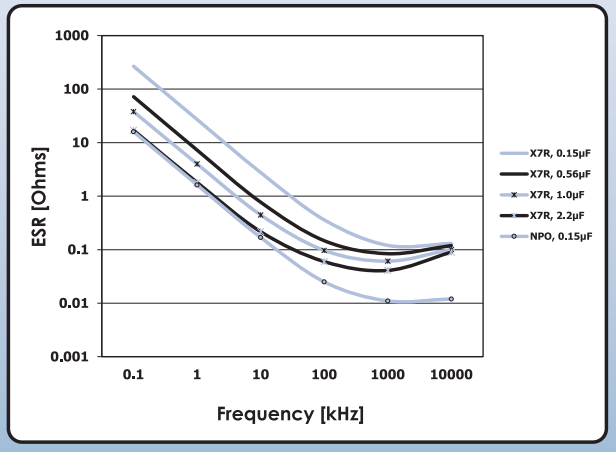
NPO Temperature Coefficient



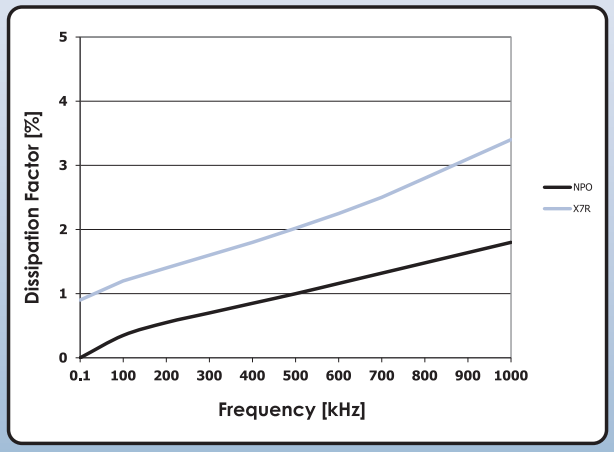
X7R Voltage Coefficient



Capacitance Vs Frequency



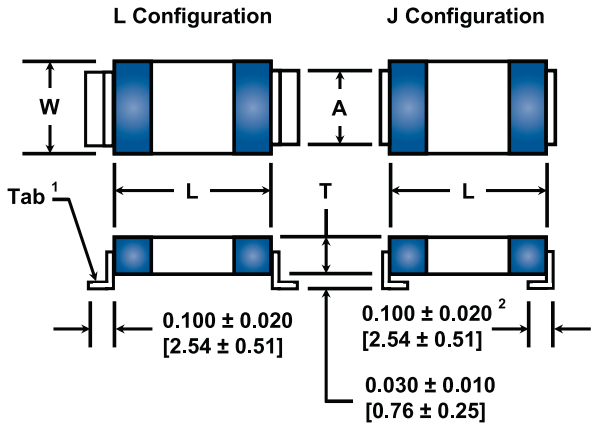
ESR Vs Frequency



DF Vs Frequency

High Voltage Surface Mount Capacitors

Military & Commercial Level NPO & X7R – 500 Vdc to 10 kVdc



1. Tab thickness 0.009 ± 0.001 [0.25 ± 0.025]
2. Tab Length SM01, SM02, SM03 @ 0.040 ± 0.010 [1.02 ± 0.26]

CalRamic Technologies LLC manufactures a series of highly reliable, military / commercial grade high voltage, surface mount, ceramic chip capacitors, that are intended for those applications where the assembly may be exposed to high levels of thermal and / or mechanical shock. Conservatively designed, they are ideal for use in demanding high voltage, high current environments.

Intended for continuous operation at full rated voltage and across the entire operating temperature range, these capacitors utilize a special internal design specifically intended to reduce electric field stresses, thereby providing a device that exhibits very low ESR characteristics and no reduction in insulation resistance with life.

Available with ultra stable Class I, NPO and stable Class II, X7R dielectric materials, these capacitors are ideally suited for timing / precision circuitry, energy storage, DC blocking, snubbers, transient suppression, decoupling, resonators and EMI filtering applications.

Performance Characteristics

Specification	Dielectric Type (EIA Designation)	
	NPO (COG)	X7R
Material Classification	Type I, Ultra Stable, K90	Type II, Stable, K2500
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	67 g / in^3	
Operating Temperature Range	-55 to +125°C	
Aging Rate	0	-2% Max per decade hour
Temperature Coefficient	±30 PPM / °C	±15%
Voltage Coefficient	Negligible	Range -35% to -55% Max @ WVDC
Capacitance Range	10 pF to 0.33 µF	150 pF to 5.6 µF
Voltage Range	500 VDC to 10 kVDC	
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less	
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less	
Dissipation Factor	0.1% Max	2.5% Max
DWV	1.5 X WVDC ≤ 1250 Vdc or 1.2 X WVDC > 1250 Vdc	

Mechanical Dimensions

Dimensions Inches [mm]	Product Style												
	SM01	SM02	SM03	SM10	SM04	SM11	SM05	SM06	SM07	SM13	SM14	SM15	SM16
Length [L]	0.150 ± 0.015 [3.81 ± 0.38]	0.200 ± 0.020 [5.08 ± 0.51]	0.250 ± 0.025 [6.35 ± 0.64]	0.300 ± 0.030 [7.62 ± 0.76]	0.350 ± 0.030 [8.89 ± 0.76]	0.400 ± 0.030 [10.20 ± 0.76]	0.450 ± 0.030 [11.43 ± 0.76]	0.550 ± 0.030 [14.00 ± 0.76]	0.650 ± 0.030 [16.50 ± 0.76]	0.700 ± 0.030 [17.80 ± 0.76]	0.900 ± 0.030 [22.90 ± 0.76]	1.100 ± 0.030 [27.90 ± 0.76]	1.300 ± 0.030 [33.02 ± 0.76]
Width [W]	0.150 ± 0.015 [3.81 ± 0.38]	0.200 ± .020 [5.08 ± 0.51]	0.200 ± 0.020 [5.08 ± 0.51]	0.150 ± 0.015 [3.81 ± 0.38]	0.300 ± 0.030 [7.62 ± 0.76]	0.200 ± 0.020 [5.08 ± 0.51]	0.400 ± 0.030 [10.16 ± 0.76]	0.500 ± 0.030 [12.70 ± 0.76]	0.600 ± 0.030 [10.20 ± 0.76]	0.300 ± 0.030 [7.62 ± 0.76]	0.400 ± 0.030 [10.16 ± 0.76]	0.500 ± 0.030 [12.70 ± 0.76]	0.600 ± 0.030 [10.20 ± 0.76]
Thickness [T] [Max]	0.130 [3.30]	0.180 [4.57]	0.180 [4.57]	0.140 [3.55]	0.220 [5.59]	0.130 [3.30]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	.180 [4.57]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]
Tab [A] [Max]	0.100 [2.54]	0.100 [2.54]	0.100 [2.54]	0.100 [2.54]	0.200 5.08]	0.100 [2.54]	0.300 [7.62]	0.400 [10.2]	0.500 [12.7]	0.200 5.08]	0.300 [7.62]	0.400 [10.2]	0.500 [12.7]

High Voltage Surface Mount Capacitors

Military & Commercial Level NPO & X7R – 500 Vdc to 10 kVdc

MADE IN USA

A

Electrical Characteristics

NPO Capacitance Range														
Style		SM01	SM02	SM03	SM04	SM05	SM06	SM07	SM10	SM11	SM13	SM14	SM15	SM16
Min Cap		120	220	270	270	180	270	470	100	100	120	180	330	560
WVDC	500	472	822	103	223	563	823	104	103	183	823	104	224	334
	1000	152	392	682	183	333	473	683	472	123	393	563	104	154
	2000	271	821	102	222	472	682	103	102	152	562	103	223	253
	3000	151	561	681	152	392	562	822	471	821	472	562	153	183
	4000	•	•	•	681	152	272	392	221	561	152	332	562	822
	5000	•	•	•	•	102	222	272	•	391	122	182	392	562
	7000	•	•	•	•	•	•	•	•	•	471	102	182	272
	10000	•	•	•	•	•	•	•	•	•	•	821	122	222

*Voltages >10kVdc available – Contact Factory

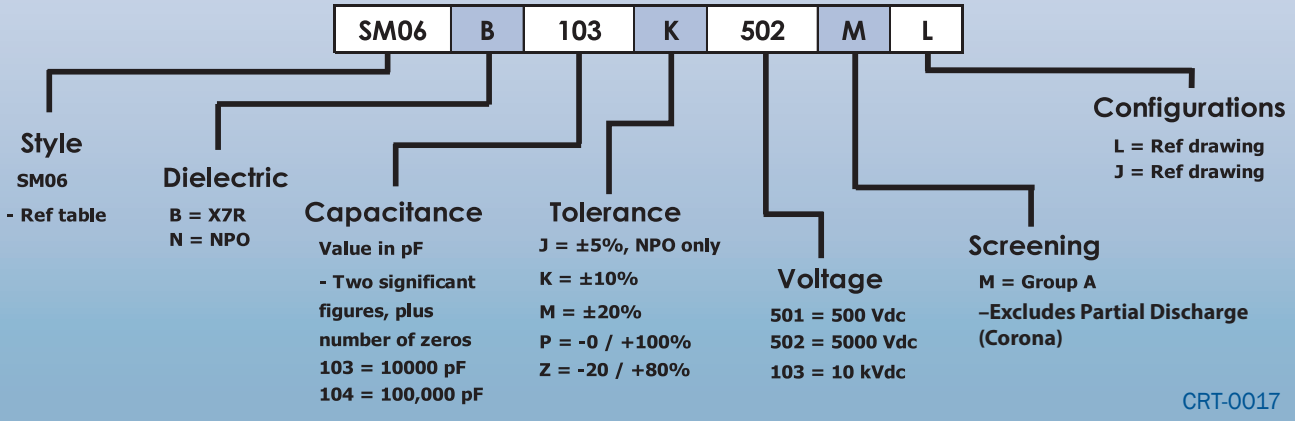
X7R Capacitance Value														
Style		SM01	SM02	SM03	SM04	SM05	SM06	SM07	SM10	SM11	SM13	SM14	SM15	SM16
Min Cap		271	561	681	271	471	681	821	151	271	221	471	821	122
WVDC	500	823	184	224	564	125	185	255	224	394	155	225	395	565
	1000	223	683	823	274	474	684	105	563	154	684	105	155	225
	2000	392	123	183	333	683	104	184	822	223	823	154	254	334
	3000	•	392	562	153	333	393	823	222	822	273	563	823	124
	4000	•	•	•	682	103	153	273	122	472	123	273	473	683
	5000	•	•	•	•	682	103	153	•	272	822	223	273	393
	7000	•	•	•	•	•	•	•	•	•	332	682	103	183
	10000	•	•	•	•	•	•	•	•	•	•	392	562	103

*Voltages >10kVdc available – Contact Factory

Notes

1. Group A screening available to MIL-PRF-49467.
2. Special testing including Ultrasound (C-SAM) and Partial Discharge (Corona) is available. See Space Level Surface Mount catalog page CRT-0022 for more information or contact factory.
3. Custom voltages, package sizes and capacitance values available. Contact factory.
4. X7R dielectrics are not intended for AC line filtering applications.
5. Large ceramic capacitors, even leaded devices are susceptible to damage when exposed to thermal and/or mechanical shock. Refer to Technical Bulletin AN101/AN112 for handling and installation recommendations.
6. High voltage products may require conformal coating to prevent possible arc over.
7. All parts are RoHS compliant.

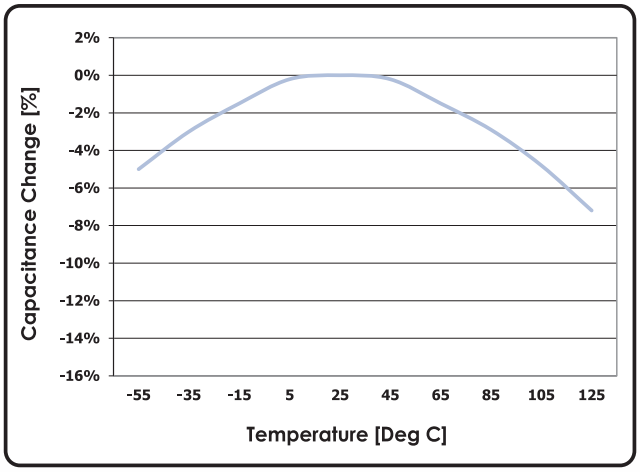
Part Number / Ordering Information



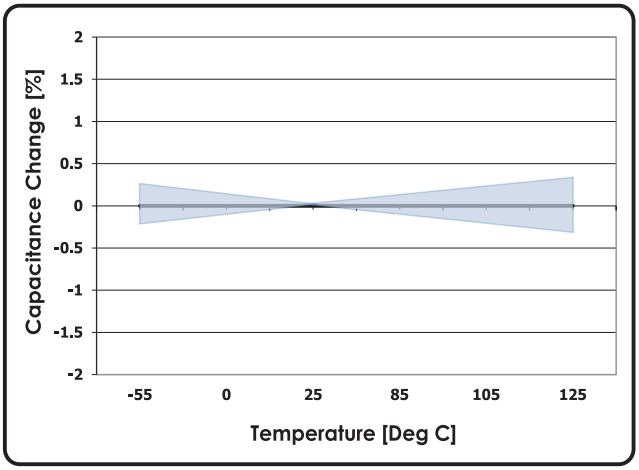
High Voltage Surface Mount Capacitors

Military & Commercial Level NPO & X7R – 500 Vdc to 10 kVdc

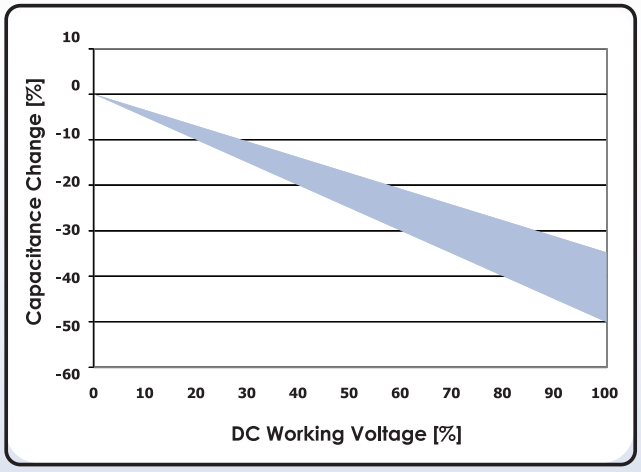
Performance Charts (Typical)



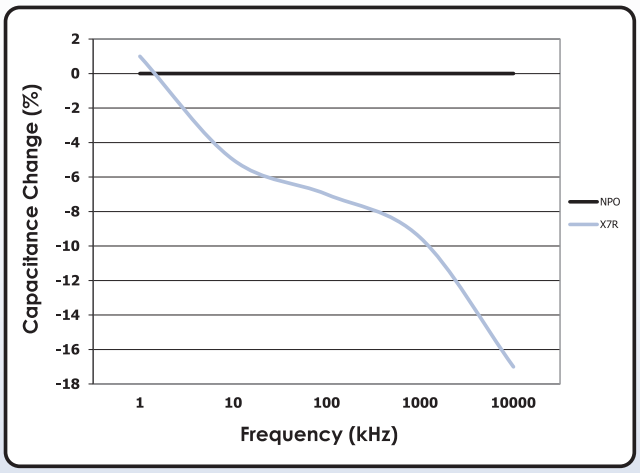
X7R Temperature Coefficient



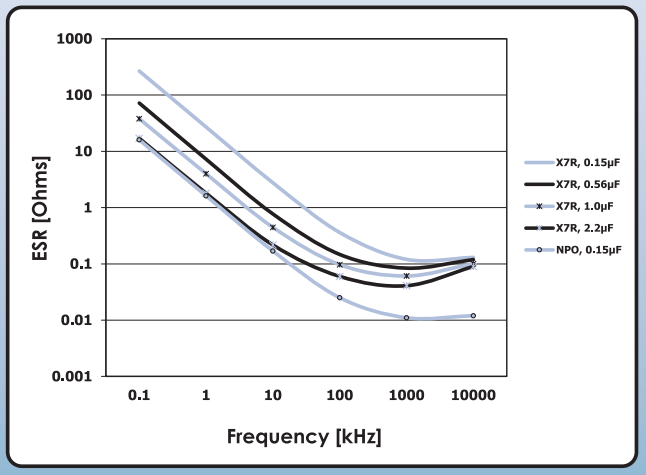
NPO Temperature Coefficient



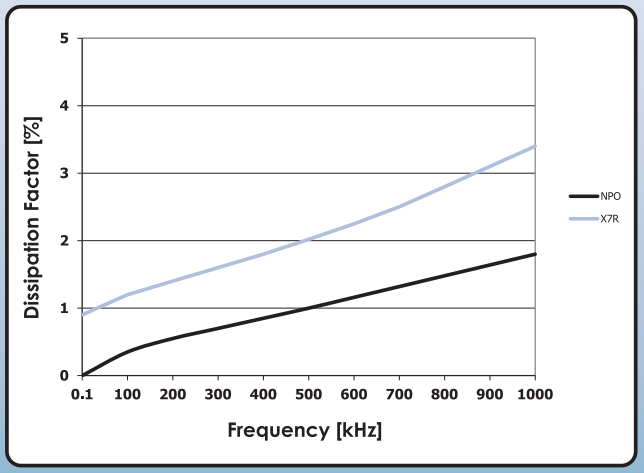
X7R Voltage Coefficient



Capacitance Vs Frequency



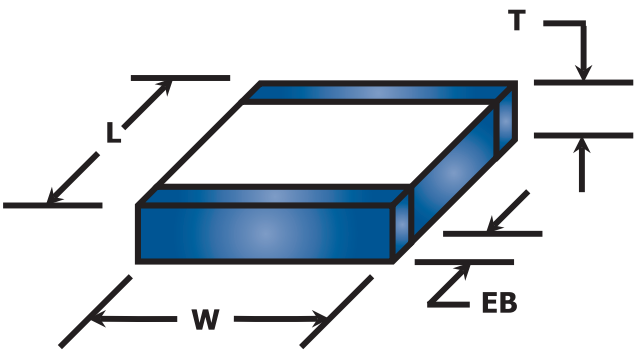
ESR Vs Frequency



DF Vs Frequency

High Voltage Multi-Layer Chip Capacitors

Military & Commercial Level NPO & X7R – 500 Vdc to 10 kVdc



CalRamic Technologies LLC manufactures a series of highly reliable, military / commercial grade high voltage, multi-layer ceramic chip capacitors that are conservatively designed and intended specifically for use in demanding high voltage, high current environments.

Intended for continuous operation at full rated voltage and across the entire operating temperature range, these capacitors utilize a special internal design specifically intended to reduce electric field stresses, thereby providing a device that exhibits very low ESR characteristics and no reduction in insulation resistance with life.

Available with ultra stable Class I, NPO and stable Class II, X7R dielectric materials, these capacitors are ideally suited for timing / precision circuitry, energy storage, DC blocking, snubbers, transient suppression, decoupling, resonators and EMI filtering applications.

A

Performance Characteristics

Specification	Dielectric Type (EIA Designation)	
	NPO (COG)	X7R
Material Classification	Type I, Ultra Stable, K90	Type II, Stable, K2500
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	67 g / in^3	
Operating Temperature Range	-55 to +125°C	
Aging Rate	0	-2% Max per decade hour
Temperature Coefficient	±30 PPM / °C	±15%
Voltage Coefficient	Negligible	Range -35% to -55% Max @ WVDC
Capacitance Range	10 pF to 0.33 µF	150 pF to 5.6 µF
Voltage Range	500 VDC to 10 kVDC	
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less	
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less	
Dissipation Factor	0.1% Max	2.5% Max
DWV	1.5 X WVDC ≤ 1250 Vdc or 1.2 X WVDC > 1250 Vdc	

Mechanical Dimensions

Dimensions in [mm]	Product Style																	
	HV1515	HV1812	HV1825	HV2020	HV2225*	HV2520*	HV3333*	HV3530*	HV4040*	HV4540*	HV5440*	HV5550*	HV6560*	HV7030*	HV9040*	HV11050*	HV13060*
Length [L] Tol ±	0.150 [3.81] 0.015 [0.38]	0.180 [4.57] 0.020 [0.51]	0.180 [4.57] 0.020 [0.51]	0.200 [5.08] 0.020 [0.51]	0.220 [5.59] 0.020 [0.51]	0.250 [6.35] 0.020 [0.51]	0.330 [8.38] 0.030 [0.76]	0.350 [8.89] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.450 [11.43] 0.030 [0.76]	0.540 [13.7] 0.030 [0.76]	0.550 [14.0] 0.030 [0.76]	0.650 [16.5] 0.030 [0.76]	0.700 [17.8] 0.030 [0.76]	0.900 [22.9] 0.030 [0.76]	1.100 [27.9] 0.030 [0.76]	1.300 [33.0] 0.030 [0.76]
Width [W] Tol ±	0.150 [3.81] 0.015 [0.38]	0.120 [4.57] 0.015 [0.38]	0.250 [6.35] 0.020 [0.51]	0.200 [5.08] 0.020 [0.51]	0.250 [6.35] 0.020 [0.51]	0.200 [5.08] 0.020 [0.51]	0.330 [8.38] 0.030 [0.76]	0.300 [7.62] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.500 [12.7] 0.030 [0.76]	0.600 [15.2] 0.030 [0.76]	0.300 [7.62] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.500 [12.7] 0.030 [0.76]	0.600 [15.2] 0.030 [0.76]
Thickness [T] Max	0.140 [3.55]	0.100 [2.54]	0.160 [4.07]	0.180 [4.57]	0.200 [5.08]	0.180 [4.57]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]
EB Min - Max	0.010 - 0.030 [0.254 - 0.762]	0.010 - 0.040 [0.254 - 1.02]	0.010 - 0.040 [0.254 - 1.02]	0.010 - 0.040 [0.254 - 1.02]	0.010 - 0.040 [0.254 - 1.02]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]

*Surface Mount Tabs Recommended - See Page 8

High Voltage Multi-Layer Chip Capacitors

Military & Commercial Level NPO & X7R – 500 Vdc to 10 kVdc

Electrical Characteristics

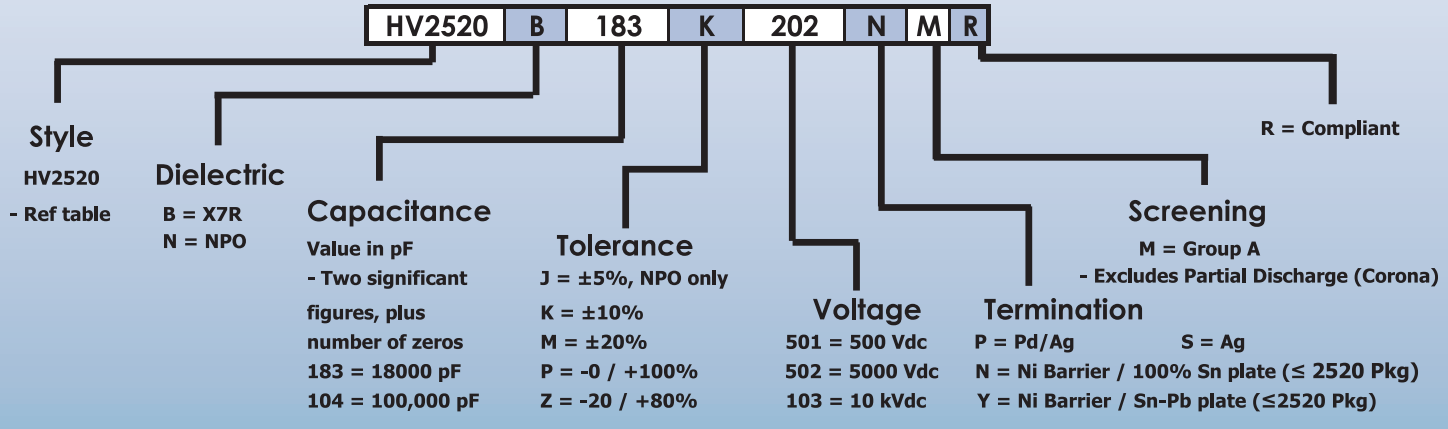
X7R Capacitance Range																		
HV Style		1515	1812	1825	2020	2225	2520	3333	3530	4040	4540	5440	5550	6560	7030	9040	11050	13060
Min Cap		271	271	561	561	681	681	471	271	471	471	681	681	821	221	471	821	122
WVDC	500	823	563	184	184	224	224	474	564	824	125	155	185	255	155	225	395	565
	1000	223	183	473	683	823	823	254	274	394	474	684	684	105	684	105	155	225
	2000	392	252	822	123	153	183	333	333	473	683	563	104	184	823	154	254	334
	3000	•	•	272	392	472	562	123	153	183	333	333	393	823	273	563	823	124
	4000	•	•	•	•	•	•	•	682	•	103	103	153	273	123	273	473	683
	5000	•	•	•	•	•	•	•	•	•	682	•	103	153	822	223	273	393
	7000	•	•	•	•	•	•	•	•	•	•	•	•	•	332	682	103	183
	10000	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	562	103

NPO Capacitance Range																		
HV Style		1515	1812	1825	2020	2225	2520	3333	3530	4040	4540	5440	5550	6560	7030	9040	11050	13060
Min Cap		120	120	220	220	270	270	270	270	180	180	270	270	470	120	180	330	560
WVDC	500	472	272	822	822	123	103	153	223	393	563	823	823	104	823	104	224	334
	1000	152	122	392	392	822	682	123	183	223	333	333	473	683	393	563	104	154
	2000	271	271	821	821	102	102	222	222	392	472	562	682	103	562	103	223	253
	3000	151	121	561	561	681	681	122	152	222	392	472	562	822	472	562	153	183
	4000	•	•	•	•	•	•	681	681	122	152	222	272	392	152	332	562	822
	5000	•	•	•	•	•	•	•	•	•	122	•	222	272	122	182	392	562
	7000	•	•	•	•	•	•	•	•	•	•	•	•	•	471	102	182	272
	10000	•	•	•	•	•	•	•	•	•	•	•	•	•	•	821	122	222

Notes

1. Group A screening available to MIL-PRF-49467.
2. Special testing including Ultrasound (C-SAM) and Partial Discharge (Corona) is available. See Space Level, HV MLCC catalog page CRT-0021 for more information or contact factory.
3. Custom voltages, package sizes and capacitance values available. Contact factory.
4. X7R dielectrics are not intended for AC line filtering applications.
5. Large ceramic capacitors are susceptible to damage when exposed to thermal and/or mechanical shock. Refer to Technical Bulletin AN101/AN112 for handling and installation recommendations.
6. High voltage products may require conformal coating to prevent possible arc over.

Part Number / Ordering Information



Note: Marking, Group A Screening and / or RoHS compliance are not included unless indicated in part number

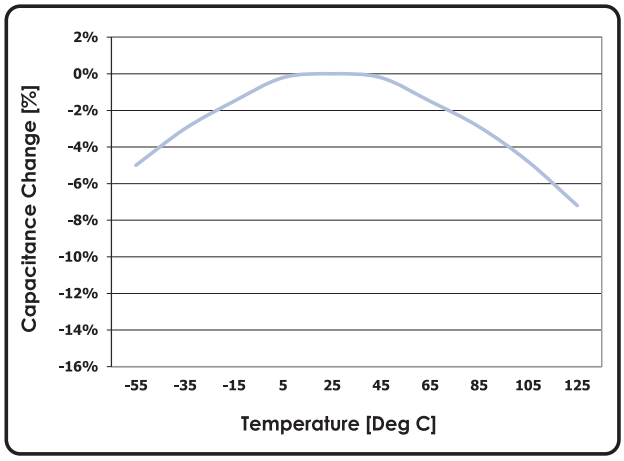
High Voltage Multi-Layer Chip Capacitors

Military & Commercial Level NPO & X7R – 500 Vdc to 10 kVdc

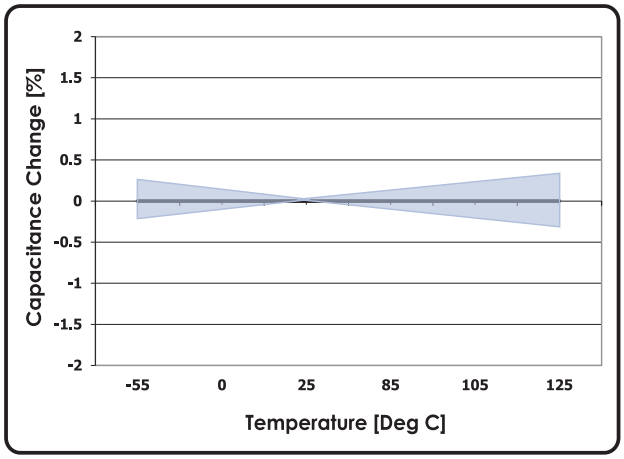
MADE IN USA

A

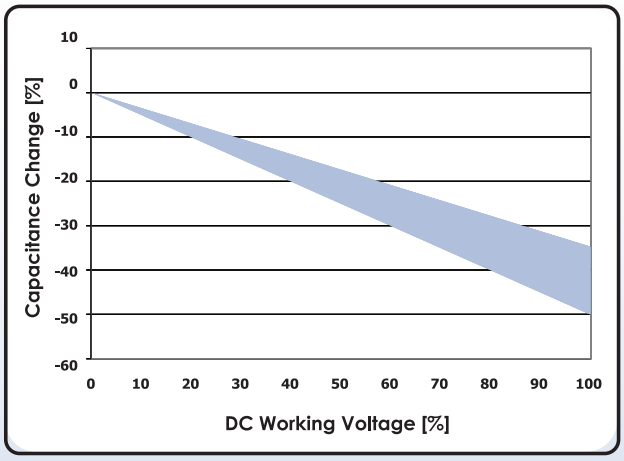
Performance Charts (Typical)



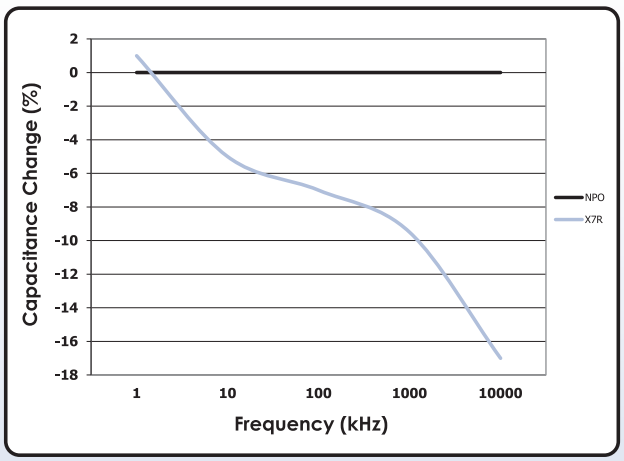
X7R Temperature Coefficient



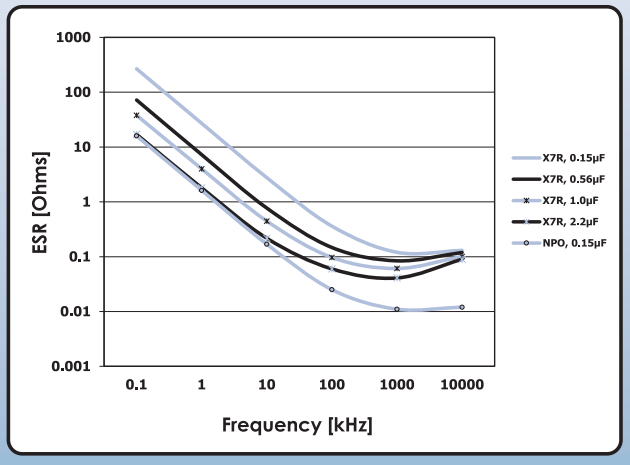
NPO Temperature Coefficient



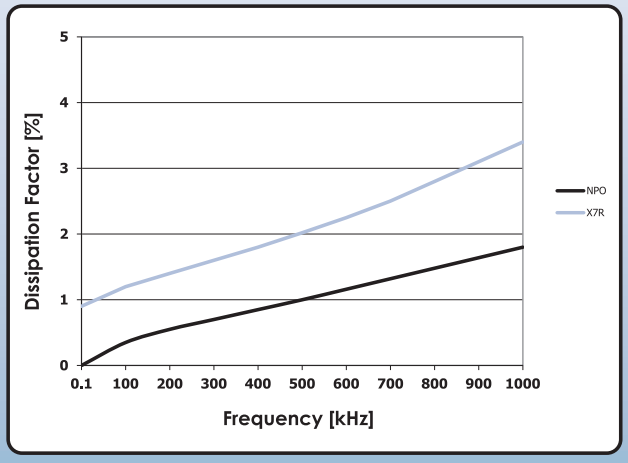
X7R Voltage Coefficient



Capacitance Vs Frequency



ESR Vs Frequency

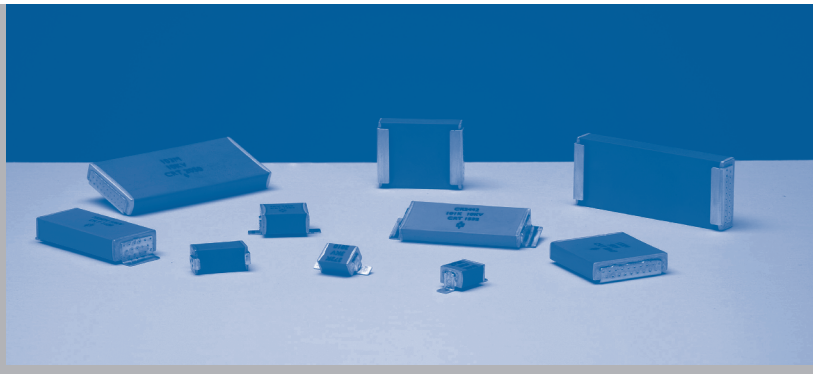


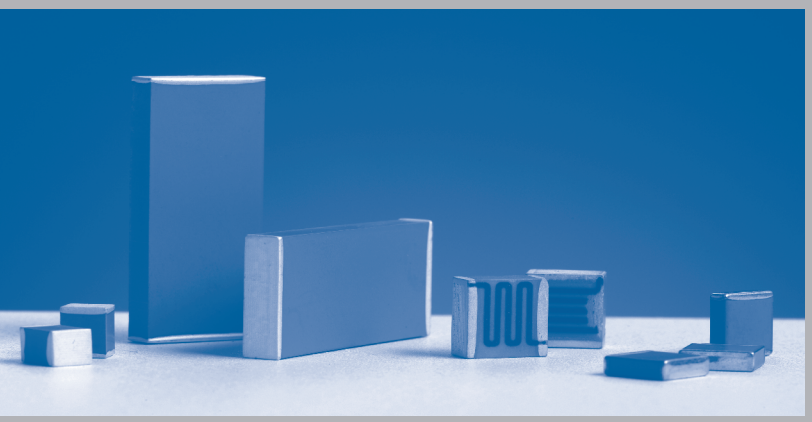
DF Vs Frequency

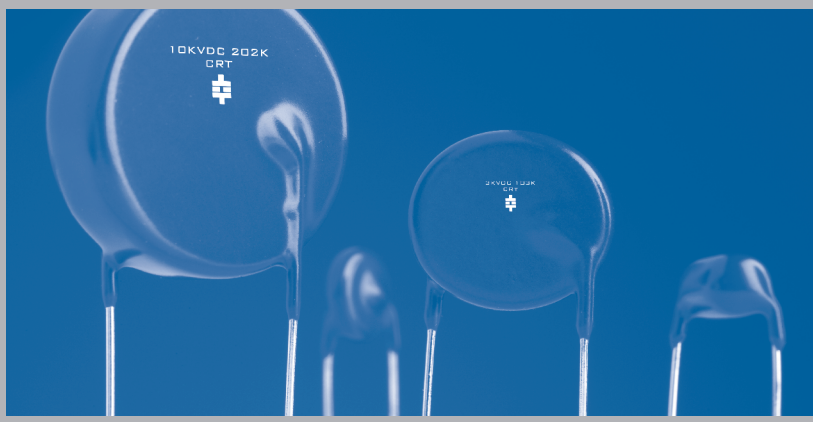
High Voltage Multilayer Ceramic Capacitors
High Rel. Space Level

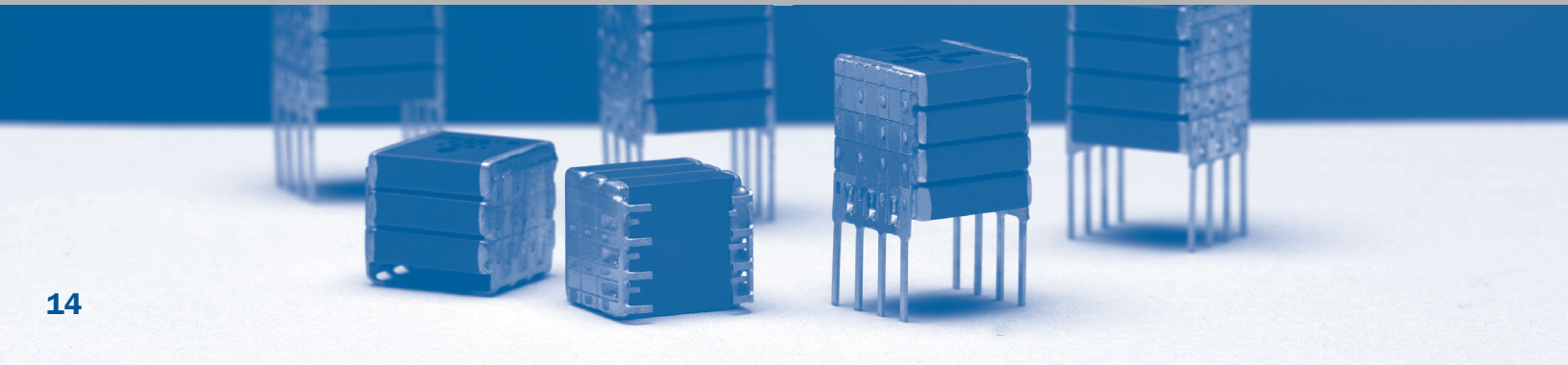
CalRamic Technologies LLC

(775) 851-3580 / calramic.com / 5462 Louie Lane / Reno, NV 89511 USA



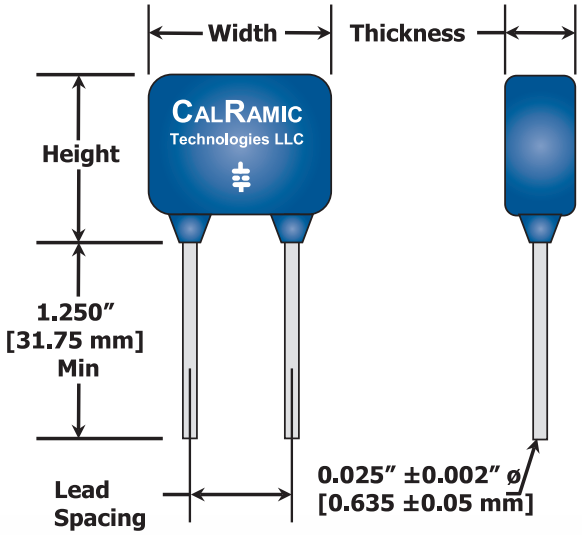






High Voltage Radial Leaded Capacitors

High Rel. Space Level NPO & X7R – 500 Vdc to 10 kVdc



Lead Type: #22 AWG, CCFE / Solder plate
RoHS Option – 100% Tin plate

CalRamic Technologies LLC manufactures a series of highly reliable, mission critical, high voltage, radial leaded ceramic capacitors that are designed specifically for those non-repairable, space applications where the assembly may be exposed to high levels of thermal and / or mechanical shock. In addition, these assemblies are packaged in a high resistance conformal coating that provides enhanced electrical isolation and added environmental protection.

Intended for continuous operation at full rated voltage and across the entire operating temperature range, these capacitors utilize a special internal design specifically intended to reduce electric field stresses, thereby providing a device that exhibits very low ESR characteristics and no reduction in insulation resistance with life.

Available with ultra stable Class I, NPO and stable Class II, X7R / BR dielectric materials, these capacitors are ideally suited for timing / precision circuitry, energy storage, DC blocking, snubbers, transient suppression, decoupling, resonators and EMI filtering applications.

B

Performance Characteristics

Specification	Dielectric Type (EIA Designation)	
	NPO (COG)	X7R [BR]
Material Classification	Type I, Ultra Stable, K90	Type II, Stable, K2500
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	67 g / in^3	
Operating Temperature Range	-55 to +125°C	
Aging Rate	0	-2% Max per decade hour
Temperature Coefficient	±30 PPM / °C	±15%
Voltage Coefficient	Negligible	Range -40% Max @ WVDC
Capacitance Range	12 pF to 0.22 µF	270 pF to 2.2 µF
Voltage Range	500 VDC to 10 kVDC	
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less	
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less	
Dissipation Factor	0.1% Max	2.5% Max
DWV	1.5 X WVDC ≤ 1250 Vdc or 1.2 X WVDC > 1250 Vdc	

Mechanical Dimensions

Dimensions inches [mm]	Product Style												
	HS01	HS02	HS03	HS10	HS04	HS11	HS05	HS06	HS07	HS13	HS14	HS15	HS16
Width - Max	0.250 [6.35]	0.320 [8.13]	0.370 [9.40]	0.450 [11.43]	0.470 [11.94]	0.550 [13.97]	0.570 [14.48]	0.670 [17.02]	0.770 [19.56]	0.850 [21.59]	1.050 [26.67]	1.250 [31.75]	1.450 [36.83]
Height - Max	0.220 [5.59]	0.280 [7.11]	0.300 [7.62]	0.220 [5.59]	0.400 [10.16]	0.280 [7.11]	0.500 [12.70]	0.600 [15.24]	0.720 [18.29]	0.400 [10.16]	0.500 [12.70]	0.600 [15.24]	0.720 [18.29]
Thickness - Max	0.200 [5.08]	0.250 [6.35]	0.250 [6.35]	0.200 [5.08]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]
Lead Spacing ±0.030 [0.762]	0.170 [4.32]	0.220 [5.59]	0.275 [6.99]	0.300 [7.62]	0.375 [9.53]	0.400 [10.16]	0.475 [12.07]	0.575 [14.61]	0.675 [17.15]	0.700 [17.78]	0.975 [24.77]	1.175 [29.85]	1.300 [33.02]

High Voltage Radial Leaded Capacitors

High Rel. Space Level NPO & X7R – 500 Vdc to 10 kVdc

Electrical Characteristics

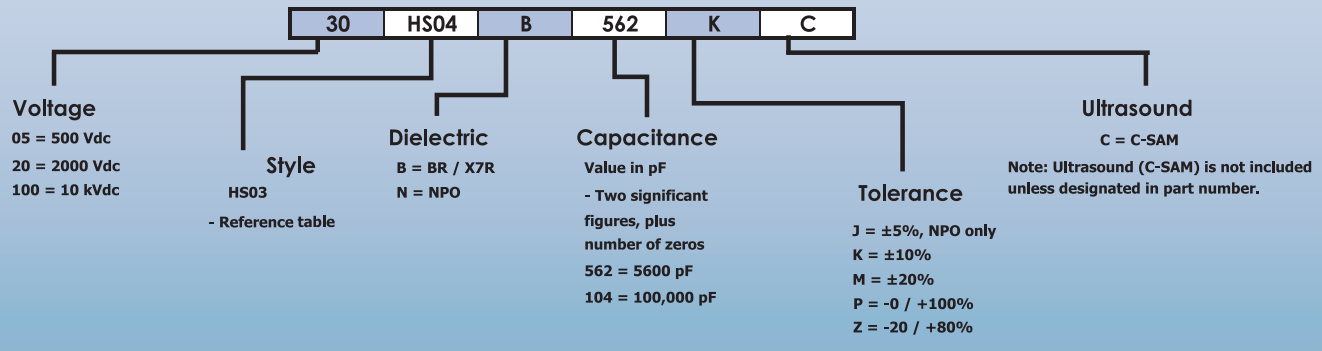
NPO Capacitance Range														
Style		HS01	HS02	HS03	HS04	HS05	HS06	HS07	HS10	HS11	HS13	HS14	HS15	HS16
Min Cap		120	220	270	270	180	270	470	100	100	120	180	330	560
WVDC	500	392	682	822	183	473	683	823	123	223	104	124	184	224
	1000	122	272	472	153	253	393	473	332	682	473	563	823	124
	2000	561	681	821	252	562	822	183	681	182	822	123	183	223
	3000	•	•	471	122	272	472	562	271	681	392	472	123	153
	4000	•	•	•	•	102	182	272	•	561	152	332	472	822
	5000	•	•	•	•	561	152	222	•	251	122	222	392	392
	7000	•	•	•	•	•	•	•	•	•	821	102	122	222
	10000	•	•	•	•	•	•	•	•	•	•	•	102	152

X7R Capacitance Range														
Style		HS01	HS02	HS03	HS04	HS05	HS06	HS07	HS10	HS11	HS13	HS14	HS15	HS16
Min Cap		271	561	681	271	471	681	122	151	271	221	471	821	122
WVDC	500	273	823	104	274	474	684	105	823	154	684	105	155	225
	1000	682	223	273	823	154	224	334	183	473	224	*274*	474	684
	2000	122	472	682	153	273	473	683	332	103	333	683	104	154
	3000	•	•	•	562	123	223	333	122	392	153	273	473	683
	4000	•	•	•	•	472	822	123	•	222	682	153	223	333
	5000	•	•	•	•	392	472	522	•	821	392	822	123	223
	7000	•	•	•	•	•	•	•	•	•	272	472	682	822
	10000	•	•	•	•	•	•	•	•	•	•	•	332	562

Notes

1. Product receives 100% Group A Inspection in accordance with MIL-PRF-49467, including Partial Discharge (Corona).
2. Special testing including 100% Ultrasound (C-SAM) is available upon request.
3. Custom voltages, package sizes and capacitance values available. Contact factory.
4. X7R dielectrics are not intended for AC line filtering applications.
5. Space level products are capable of meeting a minimum of 4000 hours life at full rated conditions with no degradation in insulation resistance.
6. 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.
7. High voltage products may require additional conformal coating to prevent possible arc over.

Part Number / Ordering Information



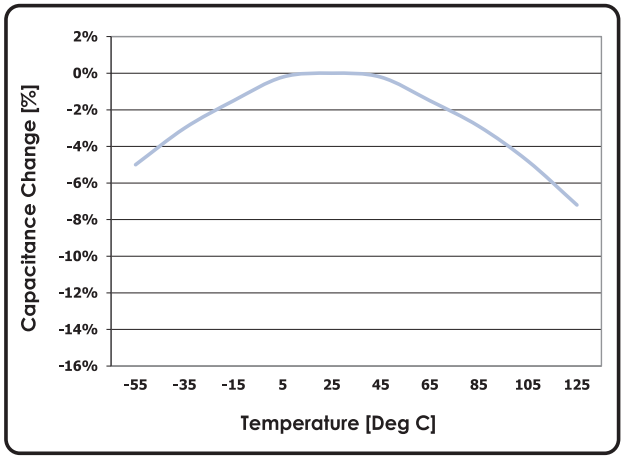
High Voltage Radial Leaded Capacitors

High Rel. Space Level NPO & X7R – 500 Vdc to 10 kVdc

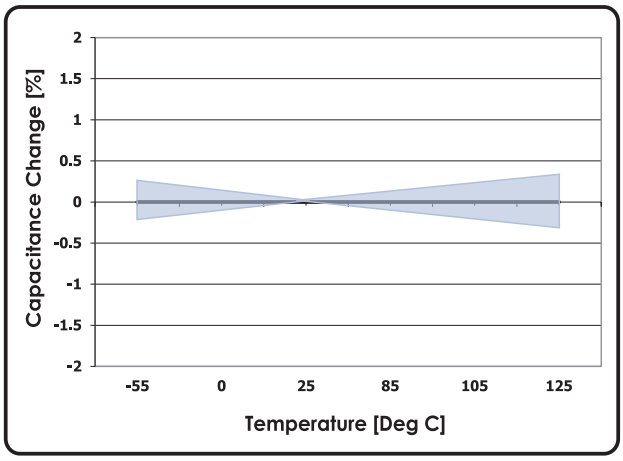
MADE IN USA

B

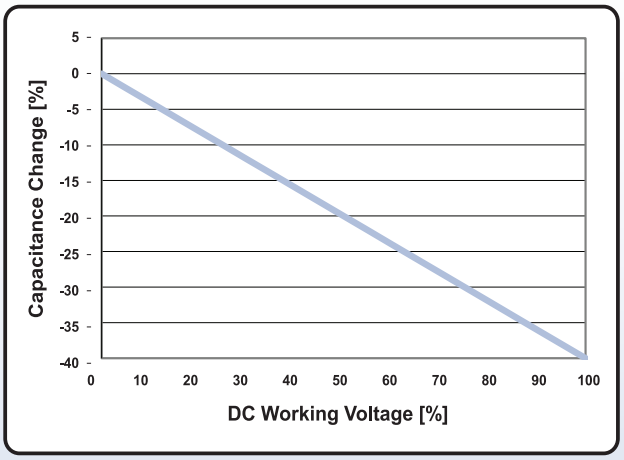
Performance Charts (Typical)



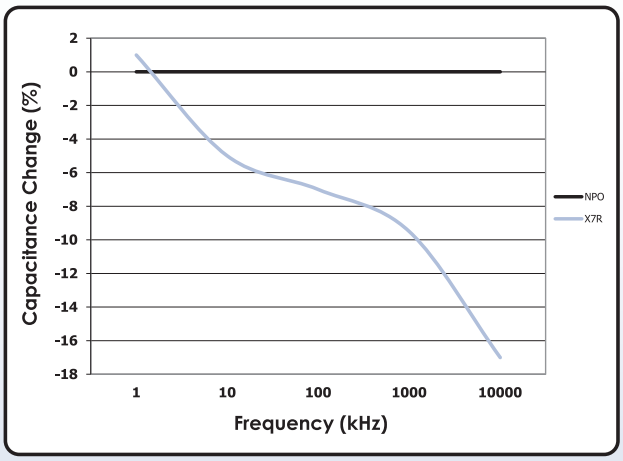
X7R Temperature Coefficient



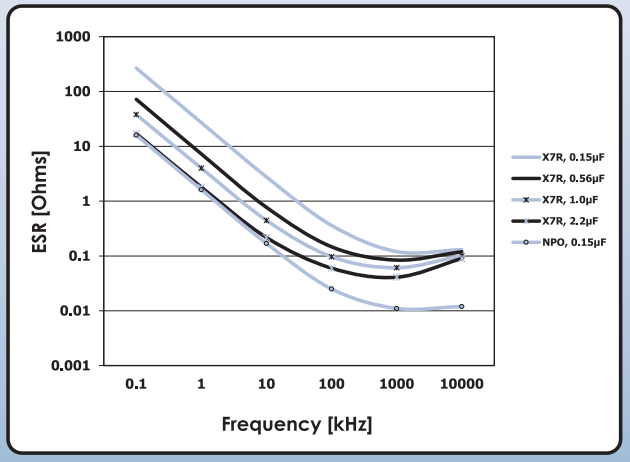
NPO Temperature Coefficient



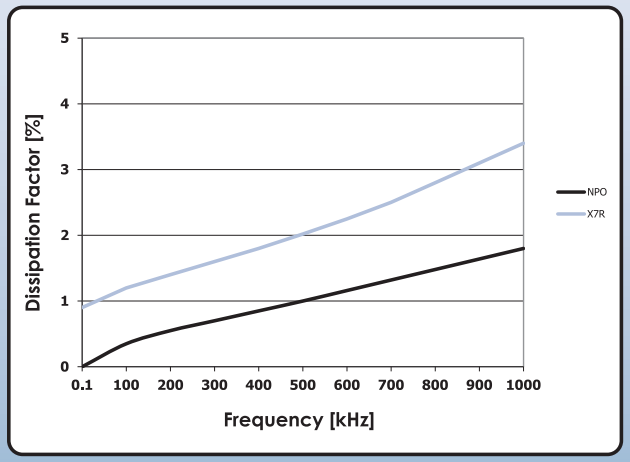
Voltage Coefficient [BR]



Capacitance Vs Frequency



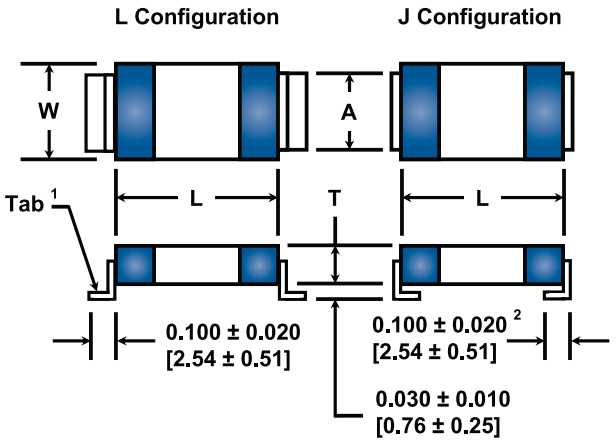
ESR Vs Frequency



DF Vs Frequency

High Voltage Surface Mount Capacitors

High Rel. Space Level NPO & X7R – 500 Vdc to 10 kVdc



1. Tab thickness 0.009 ± 0.001 [0.25 ± 0.025]
2. Tab Length SM01, SM02, SM03 @ 0.040 ± 0.010 [1.02 ± 0.26]

CalRamic Technologies LLC manufactures a series of highly reliable, mission critical, high voltage, surface mount tab leaded ceramic capacitors that are designed specifically for those non-repairable, space applications, where the assembly may be exposed to high levels of thermal and /or mechanical shock. Conservatively designed, they are ideal for use in demanding high voltage, high current environments

Intended for continuous operation at full rated voltage and across the entire operating temperature range, these capacitors utilize a special internal design specifically intended to reduce electric field stresses, thereby providing a device that exhibits very low ESR characteristics and no reduction in insulation resistance with life.

Available with ultra-stable Class I, NPO and stable Class II, X7R / BR dielectric materials, these capacitors are ideally suited for timing / precision circuitry, energy storage, DC blocking, snubbers, transient suppression, decoupling, resonators and EMI filtering applications.

Performance Characteristics

Specification	Dielectric Type (EIA Designation)	
	NPO (COG)	X7R [BR]
Material Classification	Type I, Ultra Stable, K90	Type II, Stable, K2500
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	67 g / in^3	
Operating Temperature Range	-55 to +125°C	
Aging Rate	0	-2% Max per decade hour
Temperature Coefficient	±30 PPM / °C	±15%
Voltage Coefficient	Negligible	Range -40% Max @ WVDC
Capacitance Range	12 pF to 0.22 µF	270 pF to 2.2 µF
Voltage Range	500 VDC to 10 kVDC	
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less	
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less	
Dissipation Factor	0.1% Max	2.5% Max
DWV	1.5 X WVDC ≤ 1250 Vdc or 1.2 X WVDC > 1250 Vdc	

Mechanical Dimensions

Dimensions Inches [mm]	Product Style												
	SM01	SM02	SM03	SM10	SM04	SM11	SM05	SM06	SM07	SM13	SM14	SM15	SM16
Length [L]	0.150 ± 0.015 [3.81 ± 0.38]	0.200 ± 0.020 [5.08 ± 0.51]	0.250 ± 0.025 [6.35 ± 0.64]	0.300 ± 0.030 [7.62 ± 0.76]	0.350 ± 0.030 [8.89 ± 0.76]	0.400 ± 0.030 [10.20 ± 0.76]	0.450 ± 0.030 [11.43 ± 0.76]	0.550 ± 0.030 [14.00 ± 0.76]	0.650 ± 0.030 [16.50 ± 0.76]	0.700 ± 0.030 [17.80 ± 0.76]	0.900 ± 0.030 [22.90 ± 0.76]	1.100 ± 0.030 [27.90 ± 0.76]	1.300 ± 0.030 [33.02 ± 0.76]
Width [W]	0.150 ± 0.015 [3.81 ± 0.38]	0.200 ± .020 [5.08 ± 0.51]	0.200 ± 0.020 [5.08 ± 0.51]	0.150 ± 0.015 [3.81 ± 0.38]	0.300 ± 0.030 [7.62 ± 0.76]	0.200 ± 0.020 [5.08 ± 0.51]	0.400 ± 0.030 [10.16 ± 0.76]	0.500 ± 0.030 [12.70 ± 0.76]	0.600 ± 0.030 [10.20 ± 0.76]	0.300 ± 0.030 [7.62 ± 0.76]	0.400 ± 0.030 [10.16 ± 0.76]	0.500 ± 0.030 [12.70 ± 0.76]	0.600 ± 0.030 [10.20 ± 0.76]
Thickness [T] [Max]	0.130 [3.30]	0.180 [4.57]	0.180 [4.57]	0.140 [3.55]	0.220 [5.59]	0.130 [3.30]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	.180 [4.57]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]
Tab [A] [Max]	0.100 [2.54]	0.100 [2.54]	0.100 [2.54]	0.100 [2.54]	0.200 5.08]	0.100 [2.54]	0.300 [7.62]	0.400 [10.2]	0.500 [12.7]	0.200 5.08]	0.300 [7.62]	0.400 [10.2]	0.500 [12.7]

High Voltage Surface Mount Capacitors

High Rel. Space Level NPO & X7R – 500 Vdc to 10 kVdc

MADE IN USA

B

Electrical Characteristics

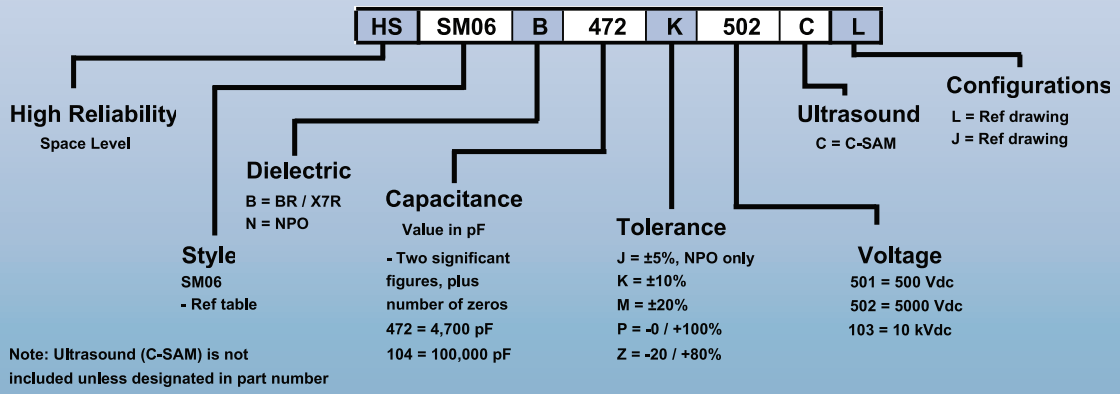
NPO Capacitance Range														
Style		HS01	HS02	HS03	HS04	HS05	HS06	HS07	HS10	HS11	HS13	HS14	HS15	HS16
Min Cap		120	220	270	270	180	270	470	100	100	120	180	330	560
WVDC	500	392	682	822	183	473	683	823	123	223	104	124	184	224
	1000	122	272	472	153	253	393	473	332	682	473	563	823	124
	2000	561	681	821	252	562	822	183	681	182	822	123	183	223
	3000	•	•	471	122	272	472	562	271	681	392	472	123	153
	4000	•	•	•	•	102	182	272	•	561	152	332	472	822
	5000	•	•	•	•	561	152	222	•	251	122	222	392	392
	7000	•	•	•	•	•	•	•	•	•	821	102	122	222
	10000	•	•	•	•	•	•	•	•	•	•	•	102	152

X7R Capacitance Range														
Style		HS01	HS02	HS03	HS04	HS05	HS06	HS07	HS10	HS11	HS13	HS14	HS15	HS16
Min Cap		271	561	681	271	471	681	122	151	271	221	471	821	122
WVDC	500	273	823	104	274	474	684	105	823	154	684	105	155	225
	1000	682	223	273	823	154	224	334	183	473	224	*274*	474	684
	2000	122	472	682	153	273	473	683	332	103	333	683	104	154
	3000	•	•	•	562	123	223	333	122	392	153	273	473	683
	4000	•	•	•	•	472	822	123	•	222	682	153	223	333
	5000	•	•	•	•	392	472	522	•	821	392	822	123	223
	7000	•	•	•	•	•	•	•	•	•	272	472	682	822
	10000	•	•	•	•	•	•	•	•	•	•	•	332	562

Notes

1. Product receives 100% Group A Inspection in accordance with MIL-PRF-49467, including Partial Discharge (Corona).
2. Special testing including 100% Ultrasound (C-SAM) is available upon request.
3. Custom voltages, package sizes and capacitance values available. Contact factory.
4. X7R dielectrics are not intended for AC line filtering applications.
5. Space level products are capable of meeting a minimum of 4000 hours life at full rated conditions.
6. Large ceramic capacitors, even leaded devices are susceptible to damage when exposed to thermal and / or mechanical shock. Refer to Technical Bulletin AN101/AN112 for handling and installation recommendations.
7. High voltage products may require additional conformal coating to prevent possible arc over.

Part Number / Ordering Information

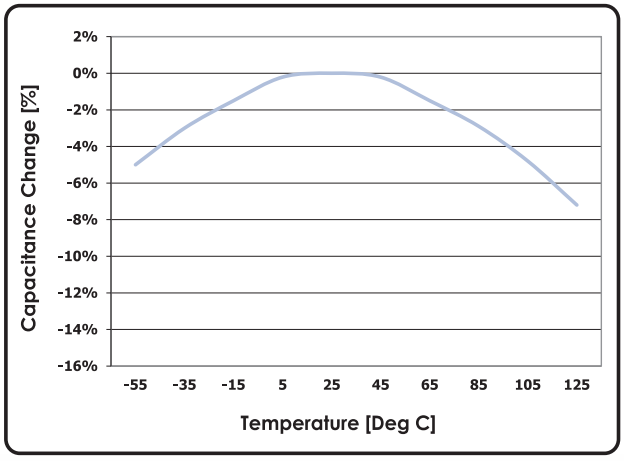


Note: Ultrasound (C-SAM) is not included unless designated in part number

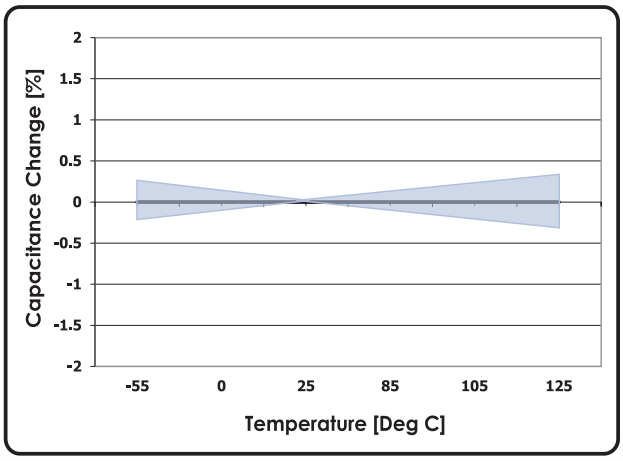
High Voltage Surface Mount Capacitors

High Rel. Space Level NPO & X7R – 500 Vdc to 10 kVdc

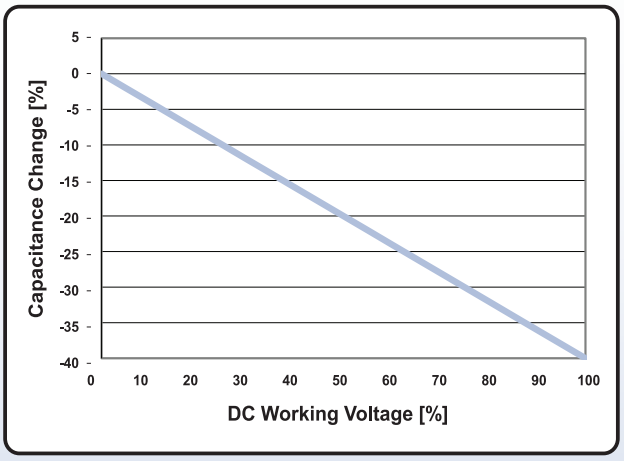
Performance Charts (Typical)



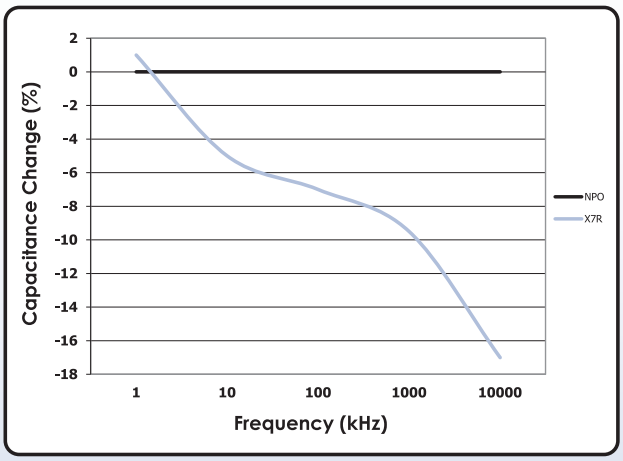
X7R Temperature Coefficient



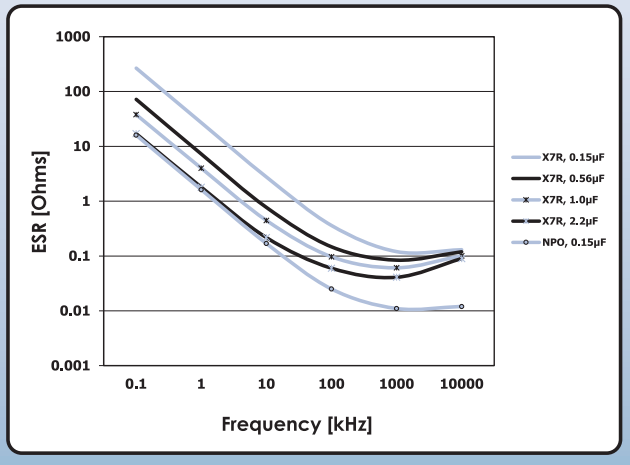
NPO Temperature Coefficient



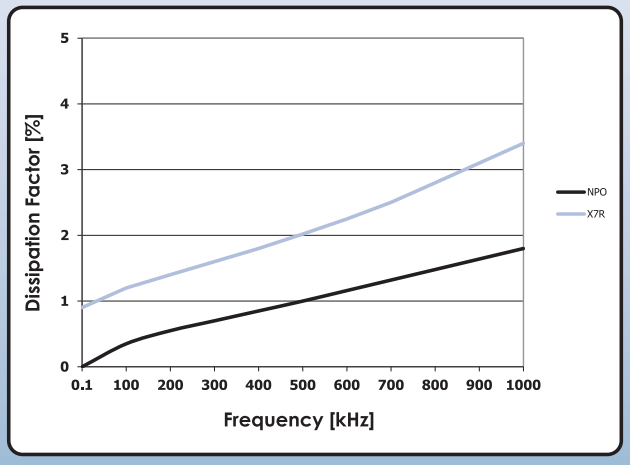
Voltage Coefficient [BR]



Capacitance Vs Frequency



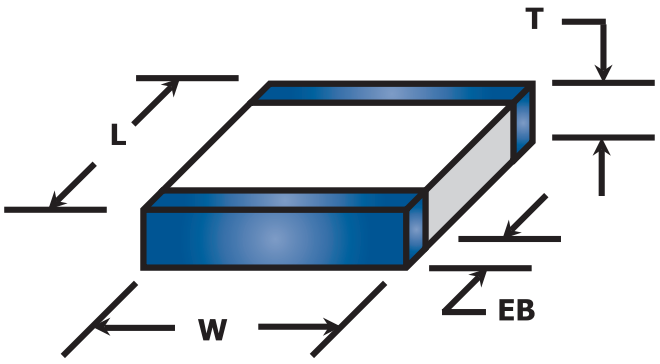
ESR Vs Frequency



DF Vs Frequency

High Voltage Multi-Layer Chip Capacitors

High Rel. Space Level NPO & X7R – 500 Vdc to 10 kVdc



CalRamic Technologies LLC manufactures a series of highly reliable, mission critical, highmanufactures a series of highly reliable, mission critical, high voltage, multi-layer ceramic chip capacitors that are intended specifically for non-repairable, space applications. Conservatively designed they are ideal for use in demanding high voltage, high current environments.

Intended for continuous operation at full rated voltage and across the entire operating temperature range, these capacitors utilize a special internal design specifically intended to reduce electric field stresses, thereby providing a device that exhibits very low ESR characteristics and no reduction in insulation resistance with life.

Available with ultra stable Class I, NPO and stable Class II, X7R dielectric materials, these capacitors are ideally suited for timing / precision circuitry, energy storage, DC blocking, snubbers, transient suppression, decoupling, resonators and EMI filtering applications.

B

Performance Characteristics

Specification	Dielectric Type (EIA Designation)	
	NPO (COG)	X7R [BR]
Material Classification	Type I, Ultra Stable, K90	Type II, Stable, K2500
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	67 g / in^3	
Operating Temperature Range	-55 to +125°C	
Aging Rate	0	-2% Max per decade hour
Temperature Coefficient	±30 PPM / °C	±15%
Voltage Coefficient	Negligible	Range -40% Max @ WVDC
Capacitance Range	12 pF to 0.22 µF	270 pF to 2.2 µF
Voltage Range	500 VDC to 10 kVDC	
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less	
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less	
Dissipation Factor	0.1% Max	2.5% Max
DWV	1.5 X WVDC ≤ 1250 Vdc or 1.2 X WVDC > 1250 Vdc	

Mechanical Dimensions

Dimensions in [mm]	Product Style											
	HS1515	HV2020	HV2520*	HS3530*	HS4040*	HS4540*	HS5550*	HS6560*	HS7030*	HS9040*	HS11050*	HS13060*
Length [L] Tol ±	0.150 [3.81] 0.015 [0.38]	0.200 [5.08] 0.020 [0.51]	0.250 [6.35] 0.020 [0.51]	0.350 [8.89] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.450 [11.43] 0.030 [0.76]	0.550 [14.0] 0.030 [0.76]	0.650 [16.5] 0.030 [0.76]	0.700 [17.8] 0.030 [0.76]	0.900 [22.9] 0.030 [0.76]	1.100 [27.9] 0.030 [0.76]	1.300 [33.0] 0.030 [0.76]
Width [W] Tol ±	0.150 [3.81] 0.015 [0.38]	0.200 [5.08] 0.020 [0.51]	0.200 [5.08] 0.020 [0.51]	0.300 [7.62] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.500 [12.7] 0.030 [0.76]	0.600 [15.2] 0.030 [0.76]	0.300 [7.62] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.500 [12.7] 0.030 [0.76]	0.600 [15.2] 0.030 [0.76]
Thickness [T] Max	0.140 [3.55]	0.180 [4.57]	0.180 [4.57]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]
EB Min - Max	0.010 - 0.030 [0.254 - 0.762]	0.010 - 0.040 [0.254 - 1.02]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]

* Surface Mount Tabs Recommended - See Page 18

High Voltage Multi-Layer Chip Capacitors

High Rel. Space Level NPO & X7R – 500 Vdc to 10 kVdc

Electrical Characteristics

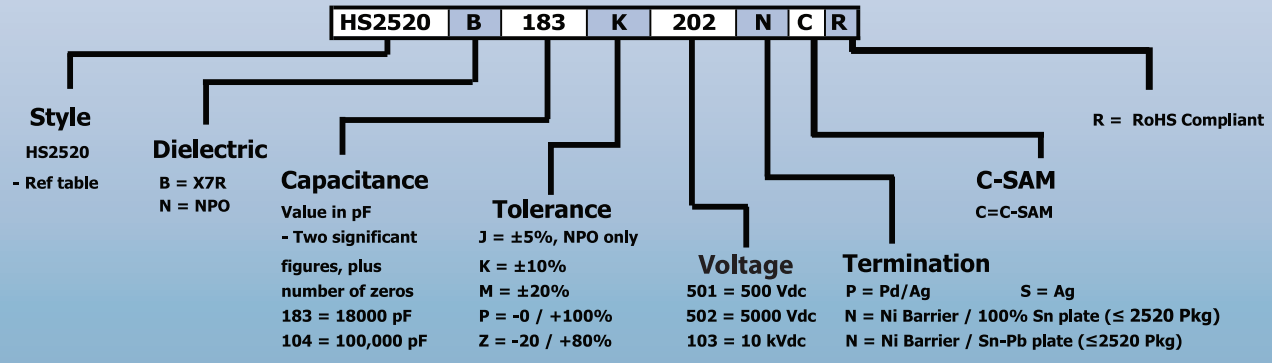
NPO Capacitance Range												
HS Style		1515	2020	2520	3530	4540	5550	6560	4040	7030	9040	11050	13060
Min Cap		120	220	270	270	180	270	470	100	120	180	330	560
WVDC	500	392	682	822	183	473	683	823	223	104	124	184	224
	1000	122	272	472	153	253	393	473	682	473	563	823	124
	2000	561	681	821	252	562	822	183	182	822	123	183	223
	3000	•	•	471	122	272	472	562	681	392	472	123	153
	4000	•	•	•	•	102	182	272	561	152	332	472	822
	5000	•	•	•	•	561	152	222	251	122	222	392	392
	7000	•	•	•	•	•	•	•	•	821	102	122	222
	10000	•	•	•	•	•	•	•	•	•	•	102	152

NPO Capacitance Range												
HS Style		1515	2020	2520	3530	4540	5550	6560	4040	7030	9040	11050	13060
Min Cap		271	561	681	271	471	681	122	271	221	471	821	122
WVDC	500	273	823	104	274	474	684	105	154	684	105	155	225
	1000	682	223	273	823	154	224	334	473	224	*274*	474	684
	2000	122	472	682	153	273	473	683	103	333	683	104	154
	3000	•	•	•	562	123	223	333	392	153	273	473	683
	4000	•	•	•	•	472	822	123	222	682	154	223	333
	5000	•	•	•	•	392	472	522	152	392	822	123	223
	7000	•	•	•	•	•	•	•	•	272	472	682	822
	10000	•	•	•	•	•	•	•	•	•	•	332	562

Notes

1. Product receives 100% Group A Inspection in accordance with MIL-PRF-49467, including Partial Discharge (Corona).
2. Special testing including 100% Ultrasound (C-SAM) is available upon request.
3. Custom voltages, package sizes and capacitance values available. Contact factory.
4. X7R dielectrics are not intended for AC line filtering applications.
5. Space level products are capable of meeting a minimum of 4000 hours life at full rated conditions with no degradation in insulation resistance.
6. Large ceramic capacitors are susceptible to damage when exposed to thermal and / or mechanical shock. Refer to Technical Bulletin AN101/AN112 for handling and installation recommendations or consider selecting radial leaded or surface mount alternatives as detailed in CRT-0009 and CRT-0022.
7. High voltage products may require conformal coating to prevent possible arc over.

Part Number / Ordering Information



Note: Ultrasonic (C-SAM) is not included unless designated in part number.

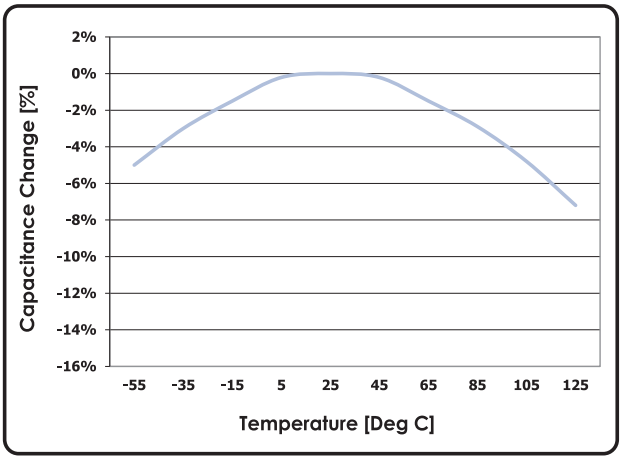
High Voltage Multi-Layer Chip Capacitors

High Rel. Space Level NPO & X7R – 500 Vdc to 10 kVdc

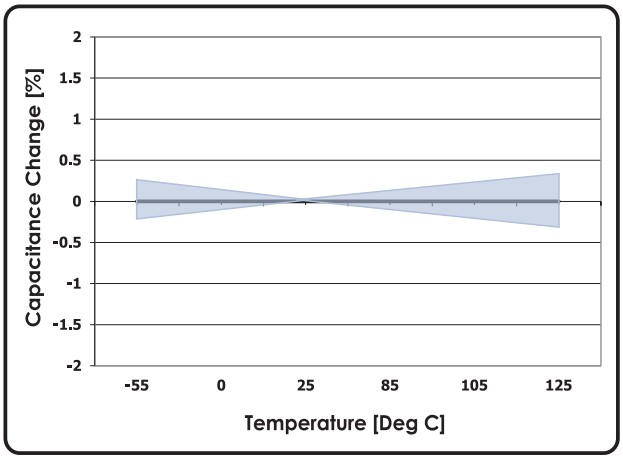
MADE IN USA

B

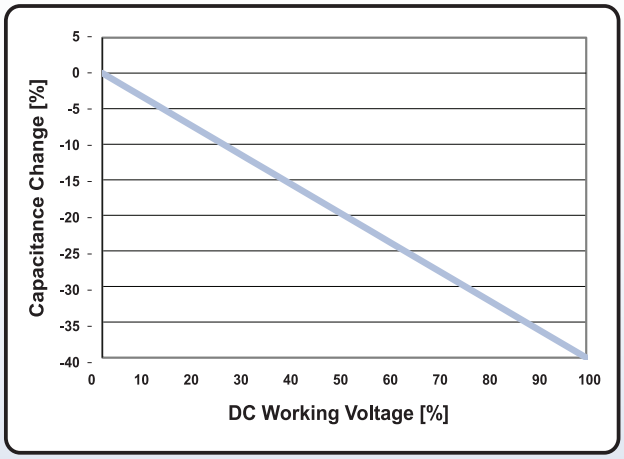
Performance Charts (Typical)



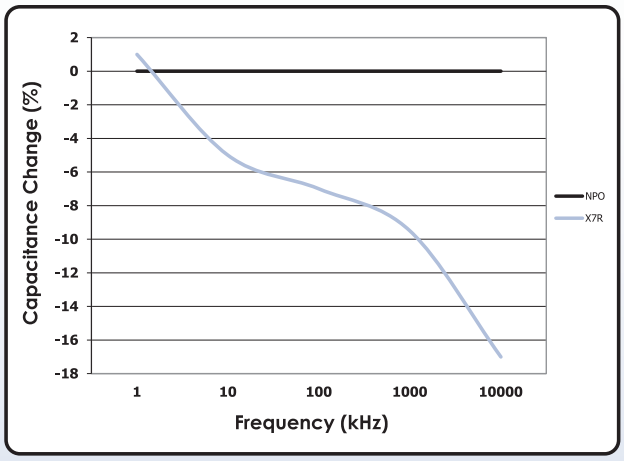
X7R Temperature Coefficient



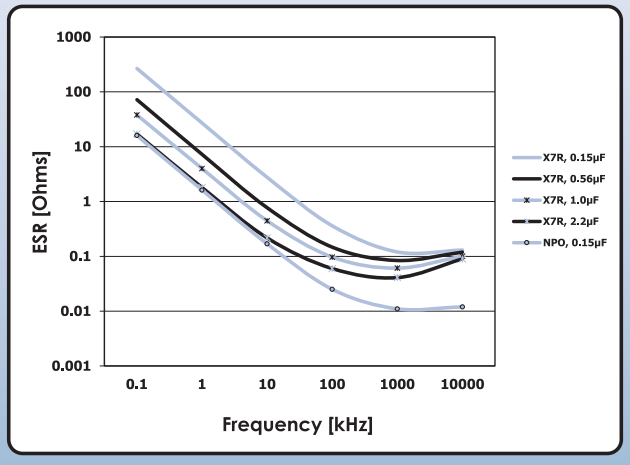
NPO Temperature Coefficient



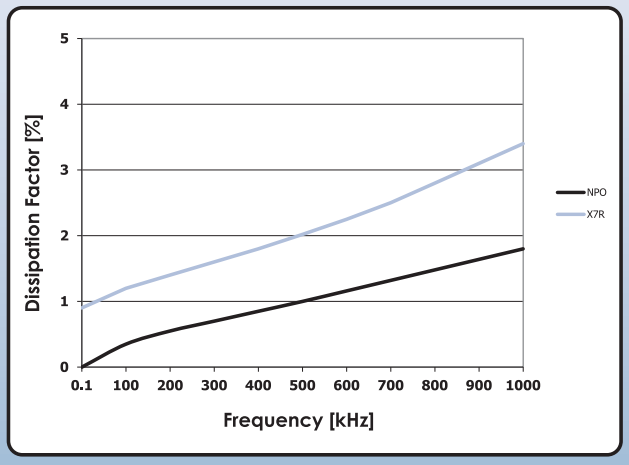
Voltage Coefficient [BR]



Capacitance Vs Frequency



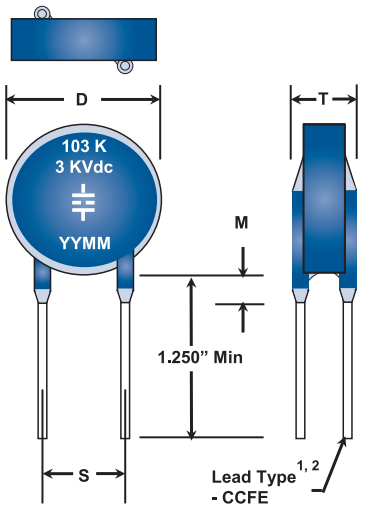
ESR Vs Frequency



DF Vs Frequency

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

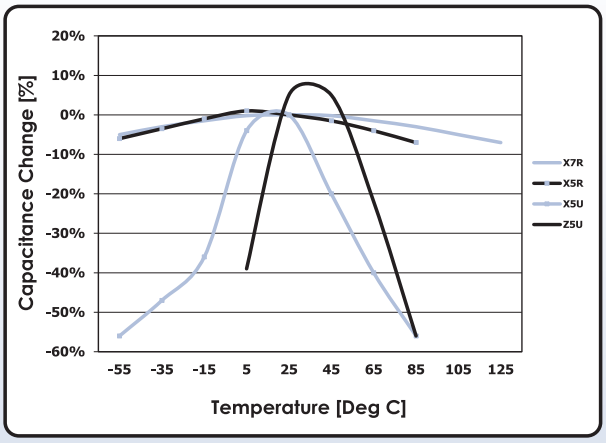
Capacitance
Value in pF
- Two significant figures, plus number of zeros
8R4 = 8.4 pF
190 = 19pF
921 = 920 pF
223 = 22,000 pF

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

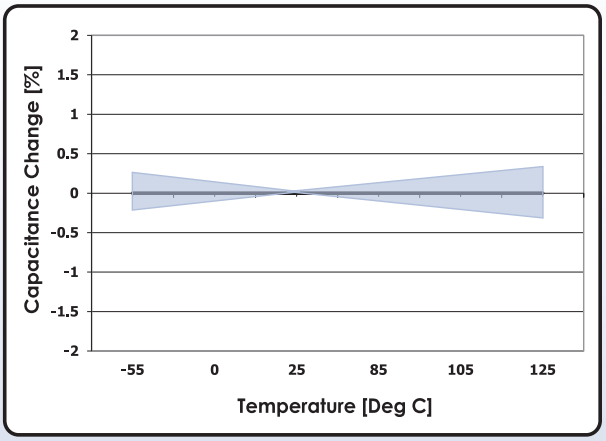
RoHS
Compliant

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

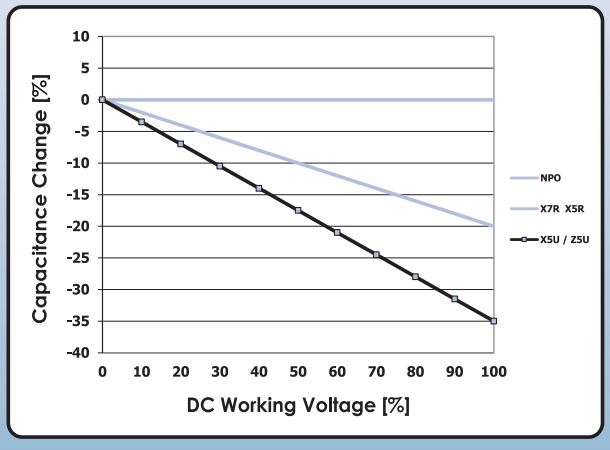
Performance Charts (Typical)



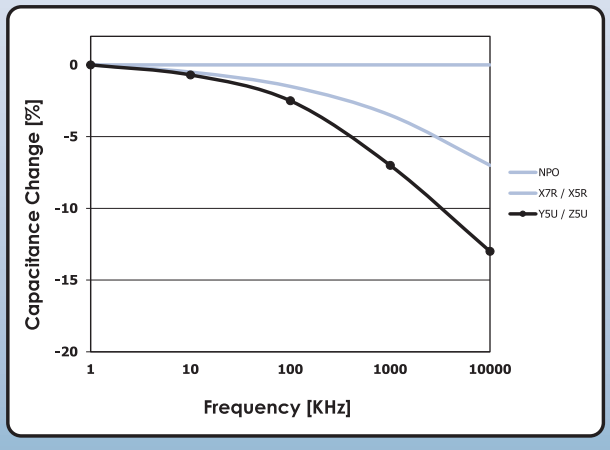
Class II Temperature Coefficient



NPO Temperature Coefficient



Voltage Coefficient



Capacitance Vs Frequency

Switch Mode Power Supply Multi-Layer Capacitors

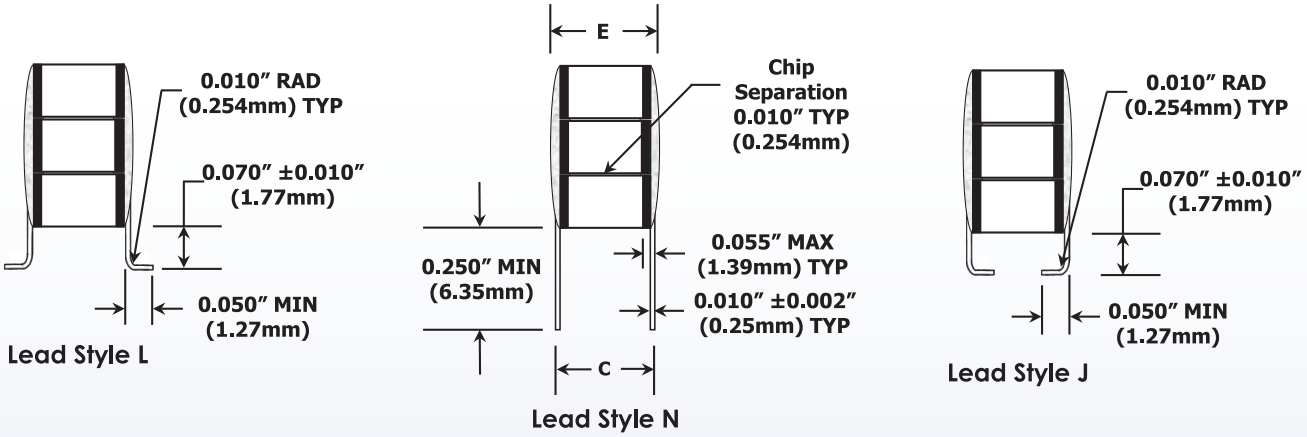
High Rel. Space Level NPO(BP) & X7R (BQ, BR & BX) – 50 Vdc to 500 Vdc

CalRamic Technologies LLC manufactures a series of highly reliable, military / commercial grade, leaded SMPS ceramic capacitors in accordance with MIL-PRF-49470 and 87106 equivalents that feature large capacitance values and are designed for use in a variety of applications including input and output filters for switch mode power supplies, DC to DC converters, decoupling, snubbers, energy storage and high capacitance discharge circuits.

Available with ultra-stable Class I, NPO and stable Class II, X7R (BQ, BR & BX) dielectric materials, these designs exhibit inherently low Equivalent Series Resistance (ESR) and Equivalent Series Inductance (ESL) characteristics, making them the preferred choice versus higher loss Aluminum and Tantalum electrolytic capacitors at operational frequencies up to 1MHz.

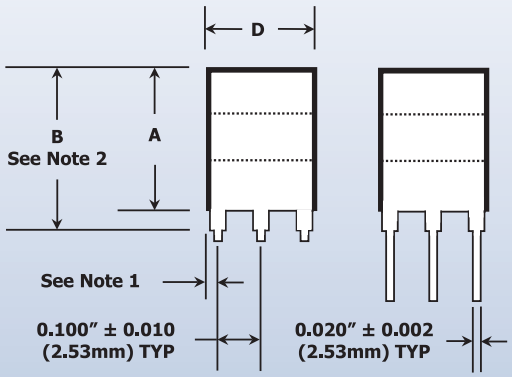
B

Lead Configurations



Mechanical Dimensions

Case Code	A Max	B Max	C ± 0.025 (0.63mm)	D Min / Max	E Max	Number of Leads Per Side
3	Ref. Table 1	0.715" (18.16mm)	0.450" (11.43mm)	0.950" - 1.075" (24.13mm - 27.3mm)	0.500" (12.7mm)	10
4	Ref. Table 1	0.545" (13.14mm)	0.400" (10.16mm)	0.350" - 0.425" (8.89mm - 10.79mm)	0.440" (11.17mm)	4
5	Ref. Table 1	0.545" (13.14mm)	0.250" (6.35mm)	0.224" - 0.275" (5.68mm - 6.98mm)	0.300" (7.62mm)	3



Notes

1. Case Code 3 & 4 @ 0.025" – 0.100" (0.63 – 2.54mm) Case Code 5 @ 0.012" – 0.100" (0.30 – 0.100mm).
2. Dimension B MAX = Dimension A + 0.065" (1.65mm).
   - Reference Electrical Characteristics
   - Table 1 for actual "A" height dimension.
   - Tin – Lead plating utilized for all lead configurations.
   - Vertical stack available upon request – Contact Factory.

Switch Mode Power Supply Multi-Layer Capacitors

High Rel. Space Level NPO(BP) & X7R (BQ, BR & BX) – 50 Vdc to 500 Vdc

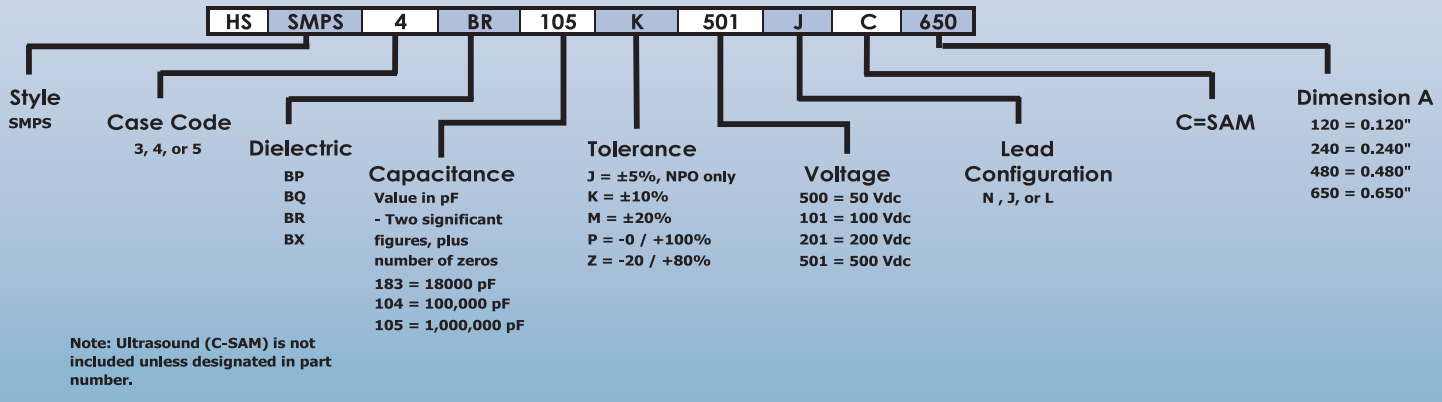
Performance Characteristics

Specification	Dielectric Type (EIA Designation)			
	NPO (BP)	X7R [BQ]	X7R [BR]	X7R [BX]
Material Classification	Type I, Ultra Stable	Type II, Stable		
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C		
Density	67 g / in^3			
Operating Temperature Range	-55 to +125°C			
Aging Rate	0	-2% Max per decade hour		
Temperature Coefficient	0 ±30 PPM / °C	±15%		
Voltage - Temperature Coefficient	0 PPM / °C ±30 PPM / °C	+15 / -50%	+15 / -40%	+15 / -25%
Capacitance Range	0.010 to 2.2 µF	0.150 to 5.6 µF	0.470 to 12 µF	0.680 to 47 µF
Voltage Range	50 VDC to 500 VDC			
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less			
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less			
Dissipation Factor	0.15% Max @ 1 kHz & 1 VRMS Max	2.5% Max @ 1 kHz & 1 VRMS Max		
DWV	2.5 X WVDC@ 50, 100 & 200 VDC / 1.5 X WVDC @ 500 VDC			

Notes

1. Group A screening available to MIL-PRF-49470. [Voltage conditioning performed at 2.0 x WVDC for product rated at > 500 VDC & 1.2 x WVDC for product rated at ≤ 500 VDC].
2. Voltage – Temperature Coefficient limits define the allowable capacitance change as a percentage of the +25°C measured value, across the temperature range of -55 to +125°C, while under bias.
3. Special testing including Ultrasound (C-SAM). Contact factory for more information.
4. Custom voltages, package sizes and capacitance values are available. Contact factory for more information.
5. X7R dielectrics are not intended for AC line filtering applications.
6. Large ceramic capacitors, even leaded devices are susceptible to damage when exposed to thermal and / or mechanical shock. Refer to Technical Bulletin AN112 for handling and installation recommendations.
7. Calramic Technologies recommends the use of a lower profile capacitor design for those applications where high vibration or mechanical shock may be a concern.
8. The use of a Tin – Lead alloy with a minimum of 3% lead content per mass, has proven to be an effective means of inhibiting reliability concerns related to tin whisker growth.

Part Number / Ordering Information



Note: Ultrasound (C-SAM) is not included unless designated in part number.

Switch Mode Power Supply Multi-Layer Capacitors

High Rel. Space Level NPO(BP) & X7R (BQ, BR & BX) – 50 Vdc to 500 Vdc

MADE IN USA

B

Electrical / Mechanical Characteristics

NPO (BP) Dielectric

Capacitance (µF)	50V (BP)		100V (BP)		200V (BP)		500V (BP)	
	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)
0.010							5	0.120
0.012							5	0.240
0.015							5	0.240
0.018							5	0.240
0.022					5	0.120	5	0.360
0.027					5	0.240	5	0.360
0.033					5	0.240	4 / 5	0.240 / 0.480
0.039					5	0.240	4 / 5	0.240 / 0.480
0.047			5	0.240	5	0.360	4 / 5	0.240 / 0.650
0.056	5	0.120	5	0.240	5	0.360	4	0.360
0.068	5	0.240	5	0.240	4 / 5	0.120 / 0.480	4	0.360
0.082	5	0.240	5	0.240	4 / 5	0.240 / 0.480	4	0.480
0.10	5	0.240	5	0.360	4 / 5	0.240 / 0.650	4	0.480
0.12	5	0.360	5	0.360	4	0.360	3 / 4	0.240 / 0.650
0.15	5	0.360	4 / 5	0.240 / 0.480	4	0.360	3	0.240
0.18	4 / 5	0.240 / 0.480	4 / 5	0.240 / 0.650	4	0.480	3	0.240
0.22	4 / 5	0.240 / 0.480	4 / 5	0.240 / 0.650	4	0.480	3	0.360
0.27	4 / 5	0.240 / 0.650	4	0.360	3 / 4	0.240 / 0.650	3	0.360
0.33	4	0.360	4	0.480	3	0.240	3	0.480
0.39	4	0.480	4	0.480	3	0.240	3	0.650
0.47	4	0.480	3 / 4	0.240 / 0.650	3	0.360		
0.56	3 / 4	0.240 / 0.650	3 / 4	0.240 / 0.650	3	0.360		
0.68	3	0.240	3	0.240	3	0.480		
0.82	3	0.240	3	0.120	3	0.360		
1.0	3	0.360	3	0.360	3	0.650		
1.2	3	0.360	3	0.480				
1.5	3	0.480	3	0.480				
1.8	3	0.480	3	0.650				
2.2	3	0.650						
2.7								
3.3								
3.9								
4.7								

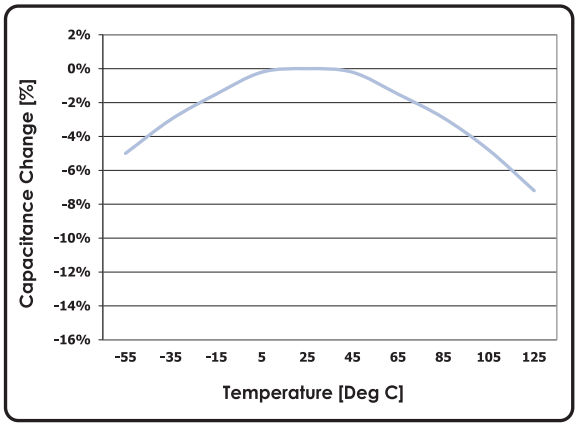
X7R Dielectric (BQ, BR, BX)

Capacitance (µF)	50V (BX)		100V (BX)		200V (BR)		500V (BQ)	
	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)
0.10								
0.12								
0.15							5	0.120
0.18							5	0.240
0.22							5	0.240
0.27							5	0.240
0.33							5	0.360
0.39							5	0.360
0.47					5	0.240	5	0.360
0.56					5	0.240	4 / 5	0.240 / 0.480
0.68			5	0.120	5	0.360	4 / 5	0.240 / 0.650
0.82			5	0.240	5	0.360	4	0.360
1.0	5	0.120	5	0.240	4 / 5	0.120 / 0.480	4	0.360
1.2	5	0.120	5	0.240	4 / 5	0.240 / 0.480	4	0.360
1.5	5	0.240	5	0.360	4 / 5	0.240 / 0.650	4	0.480
1.8	5	0.240	5	0.360	4	0.360	3 / 4	0.240 / 0.650
2.2	5	0.240	5	0.480	4	0.360	3	0.240
2.7	5	0.360	5	0.480	4	0.480	3	0.360
3.3	5	0.360	4 / 5	0.240 / 0.650	4	0.480	3	0.360
3.9	5	0.480	4	0.360	3 / 4	0.240 / 0.650	3	0.360
4.7	4 / 5	0.240 / 0.480	4	0.360	3	0.240	3	0.480
5.6	4 / 5	0.240 / 0.650	4	0.480	3	0.240	3	0.650
6.8	4	0.360	4	0.480	3	0.360		
8.2	4	0.360	4	0.650	3	0.360		
10.0	4	0.480	3	0.240	3	0.480		
12.0	4	0.480	3	0.240	3	0.650		
15.0	3 / 4	0.240 / 0.650	3	0.360				
18.0	3	0.240	3	0.360				
22.0	3	0.360	3	0.480				
27.0	3	0.360	3	0.650				
33.0	3	0.360						
39.0	3	0.480						
47.0	3	0.650						

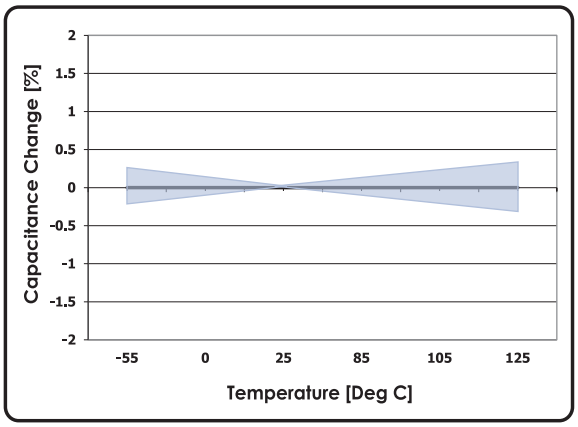
Switch Mode Power Supply Multi-Layer Capacitors

High Rel. Space Level NPO(BP) & X7R (BQ, BR & BX) – 50 Vdc to 500 Vdc

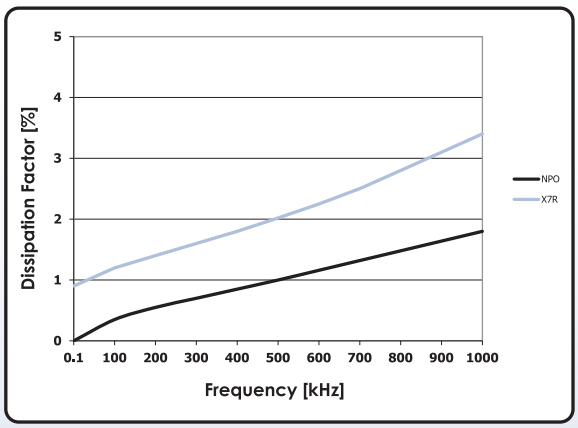
Performance Charts (Typical)



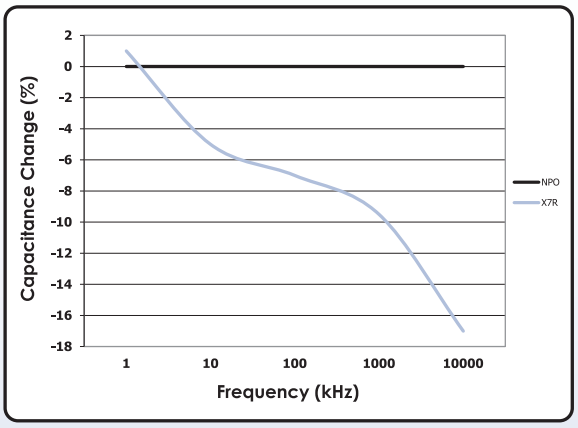
X7R Temperature Coefficient



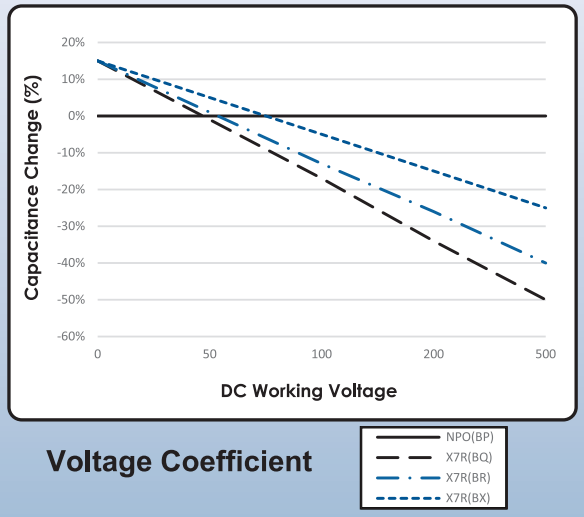
NPO Temperature Coefficient



DF Vs Frequency



Capacitance Vs Frequency



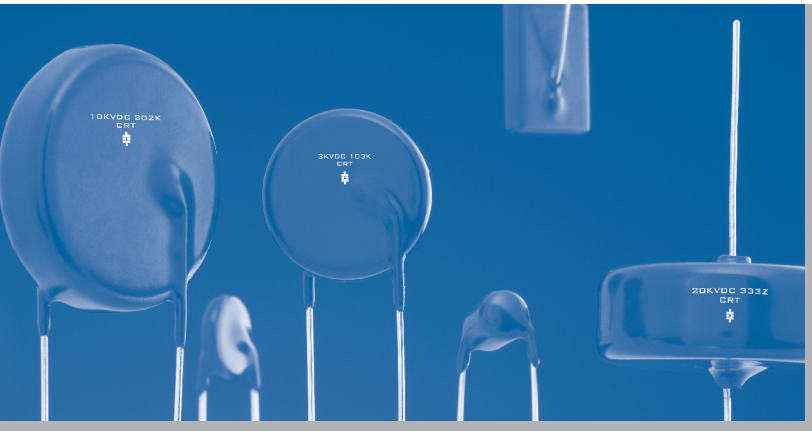
Voltage Coefficient

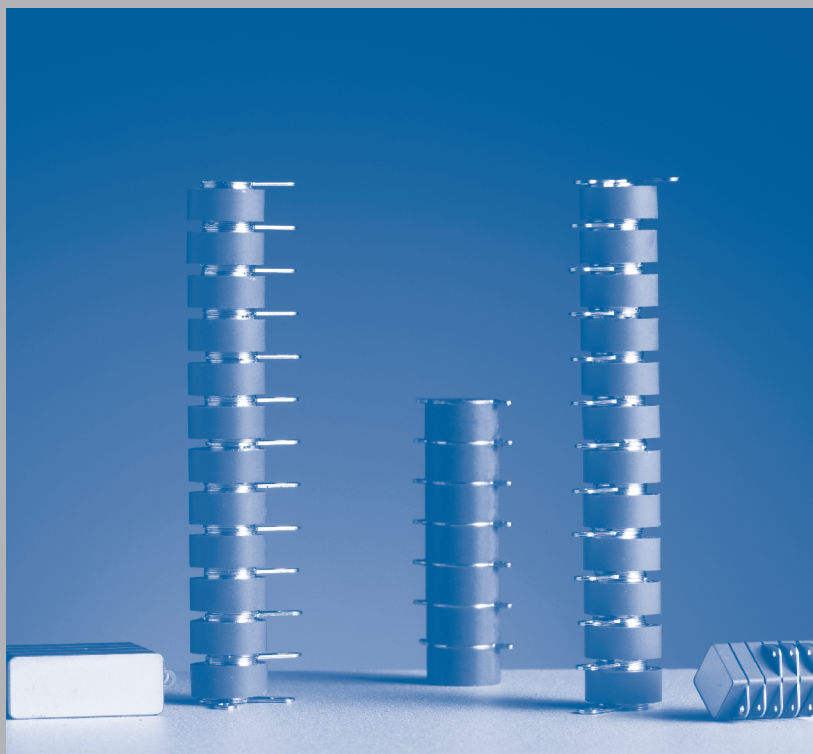
Notes

High Voltage Ceramic Disc Capacitors
Military and Commercial

CalRamic Technologies LLC

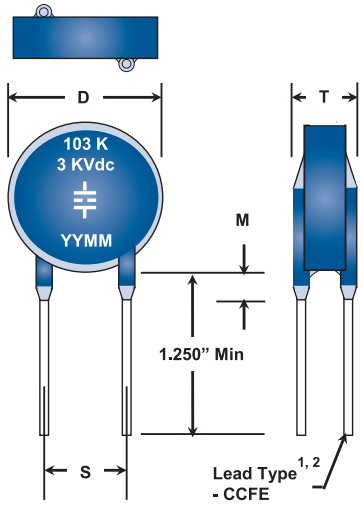
(775) 851-3580 / calramic.com / 5462 Louie Lane / Reno, NV 89511 USA





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.

C

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.

High Voltage Radial Leaded Disc Capacitors

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

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

High Voltage Radial Leaded Disc Capacitors

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

MADE IN USA

C

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)

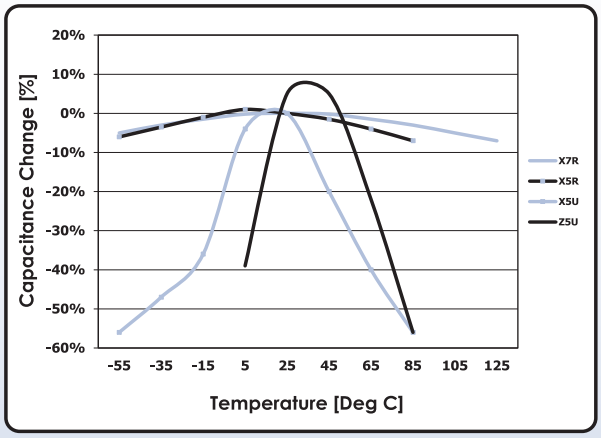
Partial Discharge (Corona)
C - Partial Discharge (Corona)

RoHS
R = RoHS

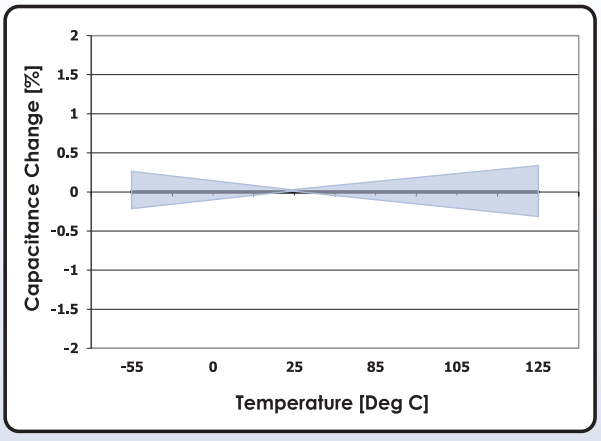
Alternative Lead Spacing
/LS250 = 0.250"
/LS375 = 0.375"
/LSXXX = X.XXX"

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

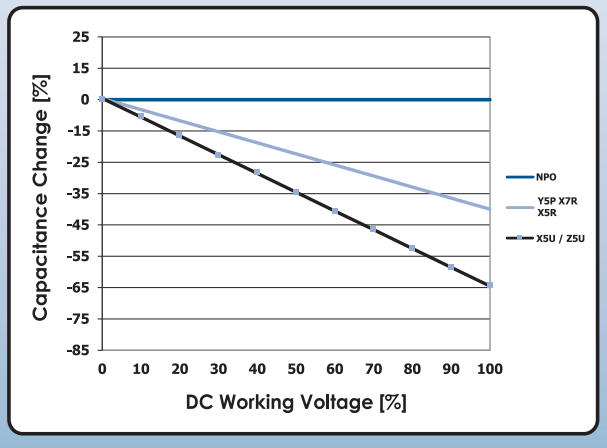
Performance Charts (Typical)



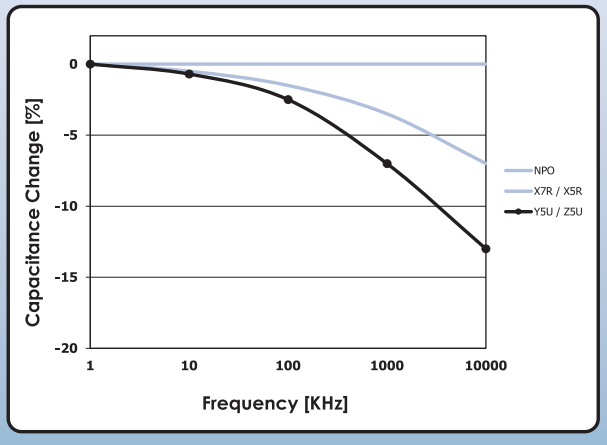
Class II Temperature Coefficient



NPO Temperature Coefficient



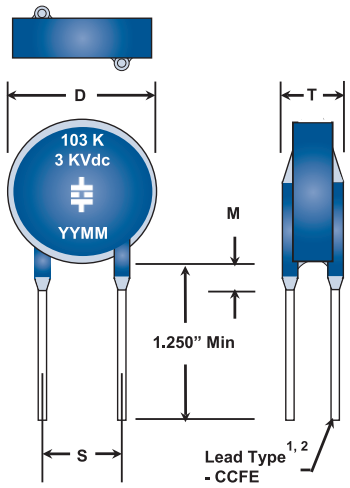
Voltage Coefficient



Capacitance Vs Frequency

High Voltage Radial Leaded Disc Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 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: Sn60 / Pb40 Solder
3. Order of marking may vary depending on size of capacitor.

CalRamic Technologies LLC manufactures a series of highly reliable, single layer, conformally coated, negative temperature compensating, leaded ceramic disc capacitors that deliver both very stable and predictable performance characteristics typically associated with low loss dielectrics.

These capacitors, which draw on thirty plus years of proven design and process experience, are manufactured under strict quality control guidelines and utilize a double action press to minimize gradients within the dielectric powder, producing a finished capacitor with a uniform fired ceramic density and unparalleled performance in high voltage applications. Leaded construction limits risk for damage due to exposure to mechanical and thermal stress.

Essential where low losses and tight capacitance tolerances are critical, 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			
	CR01	CR03	CR17	CR22
Material Classification	N750 (U2J)	N1500 (P3K)	N4700 (T3M)	N5600 (U3N)
Coefficient of Thermal Expansion	11 x 10^{-6} / °C	11 x 10^{-6} / °C	11 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	72 g / in^3			
Operating Temperature Range	-55 to +125°C			
Aging Rate	0			
Temperature Coefficient	-750 PPM / °C ±10% Max	-1500 PPM / °C ±17% Max	-4700 PPM / °C ±52% Max	-5600 PPM / °C ±59% Max
Voltage Coefficient	-8% Max @ WVDC		-14% Max @ WVDC	
Capacitance Range	2.0 pF to 1000 pF	5.5 pF to 2700pF	29 pF to 0.014uF	34 pF to 0.017 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 @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less			
Dissipation Factor	0.2% Max			
DWV	1.5 x WVDC			

General Information

1. Standard inspection and Group A testing, when required, is performed in accordance with applicable requirements of MIL-PRF-49467, DSCC 87125, DSCC 89087 and NASA GSFC S-311-15C.
2. Group B Inspection is available upon request.
3. Special testing including 100% Partial Discharge (Corona) is available upon request. Contact factory.
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. Silicone rubbers or a suitable epoxy may be used 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 for handling and installation recommendations.

High Voltage Radial Leaded Disc Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 3 kVdc to 20 kVdc

MADE IN USA

C

Electrical / Mechanical Characteristics

Working Voltage	Disc Style	Dimensions [in]				Actual Capacitance Value Range [pF]							
						CR01		CR03		CR17		CR22	
		D Max	S ± 0.030	T Max	M Max	Min	Max	Min	Max	Min	Max	Min	Max
3 kVDC	D30	0.300	0.250	0.210	0.125	14	30	37	86	190	430	230	510
	D40	0.400	0.250	0.210	0.125	20	63	55	170	280	910	330	1000
	D50	0.500	0.375	0.210	0.125	45	120	130	340	640	1700	750	2000
	D60	0.600	0.375	0.210	0.125	80	160	220	440	1200	2200	1400	2700
	D70	0.700	0.500	0.210	0.125	100	250	280	700	1500	3600	1700	4300
	D80	0.800	0.500	0.210	0.125	150	300	420	860	2200	4300	2500	5100
	D90	0.900	0.500	0.210	0.125	180	430	500	1200	2600	6100	3000	7200
	D100	1.000	0.500	0.210	0.125	250	530	670	1400	3500	7500	4100	8900
	D120	1.200	0.500	0.210	0.125	320	820	880	2200	4500	11000	5300	13000
	D140	1.400	0.625	0.210	0.125	500	1000	1400	2700	7100	14000	8300	17000
5 kVDC	D30	0.300	0.250	0.250	0.125	8	17	22	51	120	250	140	300
	D40	0.400	0.250	0.250	0.125	12	37	33	100	170	550	200	630
	D50	0.500	0.375	0.250	0.125	27	75	74	200	390	1000	450	1200
	D60	0.600	0.375	0.250	0.125	48	98	140	250	680	1400	800	1600
	D70	0.700	0.500	0.250	0.125	60	150	170	410	850	2000	1000	2500
	D80	0.800	0.500	0.250	0.125	90	170	250	510	1300	2500	1500	3000
	D90	0.900	0.500	0.250	0.125	110	250	300	720	1600	3600	1800	4300
	D100	1.000	0.500	0.250	0.125	150	320	410	890	2100	4400	2500	5300
	D120	1.200	0.500	0.250	0.125	190	490	530	1300	2700	7000	3200	8200
	D140	1.400	0.625	0.250	0.125	300	610	820	1700	4300	8700	5000	10000
7.5 kVDC	D30	0.300	0.250	0.310	0.150	5.5	12	15	34	76	170	89	200
	D40	0.400	0.250	0.310	0.150	8	25	22	70	120	360	140	430
	D50	0.500	0.375	0.310	0.150	18	49	50	130	260	700	300	840
	D60	0.600	0.375	0.310	0.150	32	65	87	170	450	920	530	1100
	D70	0.700	0.500	0.310	0.150	40	100	110	270	570	1400	670	1700
	D80	0.800	0.500	0.310	0.150	60	120	170	340	850	1700	1000	2000
	D90	0.900	0.500	0.310	0.150	72	170	200	480	1100	240	1200	2900
	D100	1.000	0.500	0.310	0.150	98	200	270	580	1400	2900	1700	3600
	D120	1.200	0.500	0.310	0.150	130	320	350	910	1800	4600	2200	5500
	D140	1.400	0.625	0.310	0.150	200	410	550	1100	2900	5800	3300	6800
10 kVDC	D30	0.300	0.250	0.440	0.170	4	8	11	25	57	130	67	150
	D40	0.400	0.250	0.440	0.170	6	18	17	53	84	270	99	300
	D50	0.500	0.375	0.440	0.170	14	37	37	100	200	530	230	610
	D60	0.600	0.375	0.440	0.170	24	48	66	130	340	700	400	820
	D70	0.700	0.500	0.440	0.170	30	77	83	200	430	1100	500	1200
	D80	0.800	0.500	0.440	0.170	45	82	130	250	640	1300	750	1500
	D90	0.900	0.500	0.440	0.170	54	130	150	360	760	1700	900	2000
	D100	1.000	0.500	0.440	0.170	73	160	210	440	1100	2200	1300	2500
	D120	1.200	0.500	0.440	0.170	95	240	270	680	1400	3400	1600	4100
	D140	1.400	0.625	0.440	0.170	150	300	410	840	2200	4300	2500	5100
15 kVDC	D30	0.300	0.250	0.545	0.175	3	6	7.5	17	38	87	45	100
	D40	0.400	0.250	0.545	0.175	4	12	11	34	56	170	66	200
	D50	0.500	0.375	0.545	0.175	9	24	25	68	130	340	150	410
	D60	0.600	0.375	0.545	0.175	16	32	44	91	230	460	270	550
	D70	0.700	0.500	0.545	0.175	20	51	55	140	290	720	340	860
	D80	0.800	0.500	0.545	0.175	30	61	83	170	430	870	500	1000
	D90	0.900	0.500	0.545	0.175	36	87	99	240	510	1200	600	1400
	D100	1.000	0.500	0.545	0.175	49	100	140	290	690	1500	810	1700
	D120	1.200	0.500	0.545	0.175	64	160	180	440	900	2200	1100	2700
	D140	1.400	0.625	0.545	0.175	99	200	280	560	1500	2900	1700	3400
20 kVDC	D50	0.500	0.375	0.650	0.175	7	18	19	51	96	250	120	300
	D60	0.600	0.375	0.650	0.175	12	24	33	67	170	340	200	410
	D70	0.700	0.500	0.650	0.175	15	37	42	100	220	550	250	630
	D80	0.800	0.500	0.650	0.175	23	46	62	120	320	650	380	770
	D90	0.900	0.500	0.650	0.175	27	65	74	170	380	920	450	1000
	D100	1.000	0.500	0.650	0.175	37	80	110	220	520	1100	610	1300
	D120	1.200	0.500	0.650	0.175	48	120	140	340	680	1700	800	2000
	D140	1.400	0.625	0.650	0.175	75	150	210	410	1100	2000	1300	2500

High Voltage Radial Leaded Disc Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 3 kVdc to 20 kVdc

Part Number / Ordering Information

D30	D50	CR17	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
CR01 = N750
CR03 = N1500
CR17 = N4700
CR22 = N5600

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)

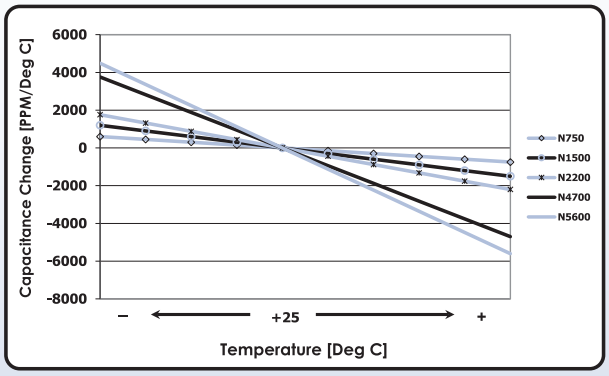
Partial Discharge (Corona)
C - Partial Discharge (Corona)

RoHS
R = RoHS

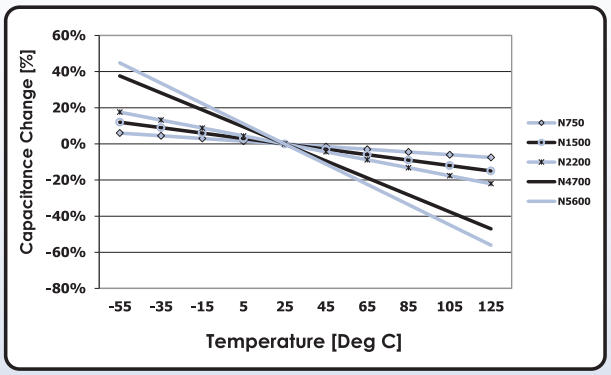
Alternative Lead Spacing
/LS250 = 0.250"
/LS375 = 0.375"
/LSXXX = X.XXX"

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

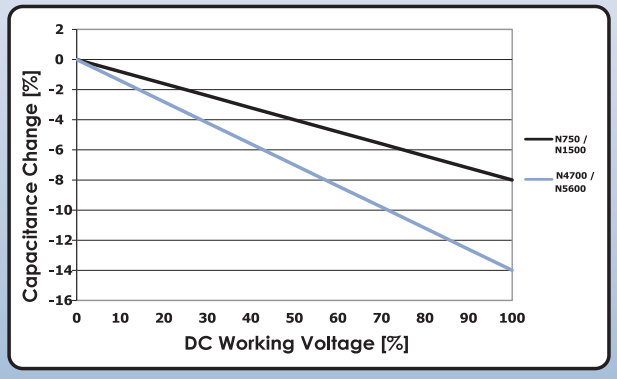
Performance Charts (Typical)



Temperature Coefficient [PPM / °C]



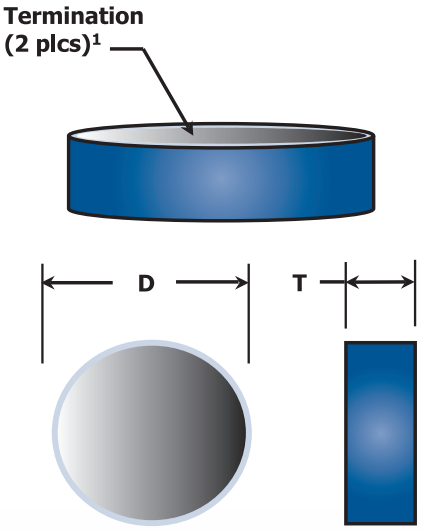
Temperature Coefficient [% Vs Temp]



Voltage Coefficient

High Voltage Single Layer Bare Disc Capacitors

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



1. **Termination Type: 100% fired-on silver**

CalRamic Technologies LLC manufactures a series of highly reliable, single layer, ceramic disc capacitors that are designed and 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 and X5U 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.

C

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. Standard inspection and Group A testing, when required, is performed in accordance with applicable requirements of MIL-PRF-49467, DSCC 87125, DSCC 89087 and NASA GSFC S-311-15C.
2. Special testing including 100% Partial Discharge (Corona) is available upon request.
3. Custom voltages, package sizes and capacitance values available. Contact factory.
4. Higher voltage parts may require 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.
5. Testing of higher voltage parts before installation and / or application of supplemental encapsulation, may be done in a suitable, non-contaminating dielectric fluid like FC-40.
6. Large ceramic capacitors are susceptible to damage when exposed to thermal and / or mechanical shock. Ensure care is taken while handling and during installation or consider selecting leaded alternatives as detailed in catalog page CRT-0006.
7. All parts are RoHS compliant.

High Voltage Single Layer Bare Disc Capacitors

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

Electrical / Mechanical Characteristics

Working Voltage	Disc Style	Dimensions [in]			Capacitance Range [pF]							
					NPO		X5R		X7R		X5U	
		D Max	T Nom	T Max	Min	Max	Min	Max	Min	Max	Min	Max
3 kVDC	D0606	0.220	0.060	0.075	8.4	10	270	340	260	320	500	600
	D0706	0.245	0.060	0.075	9.7	12	320	370	300	350	570	670
	D0806	0.275	0.060	0.075	12	15	410	500	380	470	730	900
	D1006	0.330	0.060	0.075	20	24	640	780	600	730	1200	1400
	D1206	0.400	0.060	0.075	28	34	920	1100	870	1100	1700	2000
	D1406	0.460	0.060	0.075	38	46	1300	1500	1200	1400	2200	2700
	D1606	0.525	0.060	0.075	50	61	1600	2000	1500	1900	3000	3600
	D1806	0.590	0.060	0.075	63	77	2100	2500	2000	2400	3700	4600
	D2006	0.650	0.060	0.075	78	95	2600	3100	2400	2900	4600	5600
	D2206	0.710	0.060	0.075	94	110	3100	3800	2900	3500	5600	6800
	D2406	0.775	0.060	0.075	110	140	3700	4500	3500	4200	6600	8100
	D2606	0.840	0.060	0.075	130	160	4300	5300	4100	5000	7800	9500
	D2906	0.930	0.060	0.075	150	200	5000	6500	4700	6200	9000	12000
	D3206	1.030	0.060	0.075	200	240	6600	8000	6200	7500	12000	14000
	D3606	1.150	0.060	0.075	230	310	7400	10000	7000	9500	13000	18000
5 kVDC	D0610	0.220	0.125	0.100	5.1	6.2	160	200	150	190	300	370
	D0710	0.245	0.125	0.100	5.8	6.9	190	220	180	210	350	400
	D0810	0.275	0.125	0.100	7.3	9.2	250	300	230	280	410	540
	D1010	0.330	0.125	0.100	12	15	390	473	370	440	700	850
	D1210	0.400	0.125	0.100	17	21	560	680	520	640	1000	1200
	D1410	0.460	0.125	0.100	23	28	760	920	700	860	1400	1600
	D1610	0.525	0.125	0.100	30	37	990	1200	930	1100	1800	2200
	D1810	0.590	0.125	0.100	38	47	1300	1500	1200	1400	2300	2800
	D2010	0.650	0.125	0.100	47	57	1500	1800	1500	1800	2800	3400
	D2210	0.710	0.125	0.100	57	69	1900	2300	1800	2100	3400	4000
	D2410	0.775	0.125	0.100	69	83	2200	2700	2100	2600	4000	4900
	D2610	0.840	0.125	0.100	79	97	2600	3100	2500	3000	4700	5700
	D2910	0.930	0.125	0.100	92	120	3000	3900	2900	3700	5500	7100
	D3210	1.030	0.125	0.100	120	150	3900	4800	3800	4500	7200	8700
	D3610	1.150	0.125	0.100	140	180	4500	6100	4200	5700	8000	11000
	D4010	1.280	0.125	0.100	190	230	6200	7500	5800	7000	11000	13000
7.5 kVDC	D0615	0.220	0.180	0.150	3.4	4.1	110	140	110	130	200	240
	D0715	0.245	0.180	0.150	3.9	4.6	130	150	120	150	230	270
	D0815	0.275	0.180	0.150	5	6.1	170	200	150	190	300	360
	D1015	0.330	0.180	0.150	7.8	9.6	260	310	240	300	460	570
	D1215	0.400	0.180	0.150	12	14	370	460	350	430	670	820
	D1415	0.460	0.180	0.150	15	19	510	610	470	580	900	1100
	D1615	0.525	0.180	0.150	20	25	660	800	620	750	1200	1450
	D1815	0.590	0.180	0.150	25	31	830	1000	780	960	1500	1800
	D2015	0.650	0.180	0.150	31	38	1000	1200	970	1200	1900	2200
	D2215	0.710	0.180	0.150	37	46	1300	1500	1200	1400	2200	2700
	D2415	0.775	0.180	0.150	45	55	1500	1800	1400	1700	2700	3300
	D2615	0.840	0.180	0.150	53	65	1700	2100	1600	2000	3100	3800
	D2915	0.930	0.180	0.150	60	80	2000	2600	1900	2500	3700	4700
	D3215	1.030	0.180	0.150	80	98	2600	3200	2500	3000	4800	5800
	D3615	1.150	0.180	0.150	90	120	3000	4000	2800	3800	5300	7400
	D4015	1.280	0.180	0.150	120	150	4100	5000	3800	4700	7400	9000
10 kVDC	D0620	0.220	0.235	0.200	2.5	3.1	84	100	78	95	150	180
	D0720	0.245	0.235	0.200	2.9	3.5	96	110	90	110	170	200
	D0820	0.275	0.235	0.200	3.8	4.6	120	150	110	140	220	270
	D1020	0.330	0.235	0.200	5.9	7.2	190	230	180	220	350	420
	D1220	0.400	0.235	0.200	8.5	10	280	340	260	320	500	610
	D1420	0.460	0.235	0.200	12	14	380	480	350	430	680	820
	D1620	0.525	0.235	0.200	15	18	500	600	470	560	890	1000
	D1820	0.590	0.235	0.200	19	23	620	770	580	720	1100	1400
	D2020	0.650	0.235	0.200	24	28	770	940	730	880	1400	1700
	D2220	0.710	0.235	0.200	28	34	930	1100	870	1100	1700	2000
	D2420	0.775	0.235	0.200	34	41	1100	1400	1000	1300	2000	2400
	D2620	0.840	0.235	0.200	40	48	1300	1600	1200	1500	2400	2900
	D2920	0.930	0.235	0.200	46	60	1500	2000	1400	1800	2700	3500
	D3220	1.030	0.235	0.200	60	73	2000	2400	1900	2300	3600	4300
	D3620	1.150	0.235	0.200	68	93	2200	3000	2100	2800	4000	5500
	D4020	1.280	0.235	0.200	94	110	3100	3700	2900	3500	5600	6800
15 kVDC	D0630	0.220	0.350	0.300	1.6	2.1	55	68	52	64	100	120
	D0730	0.245	0.350	0.300	1.9	2.3	64	76	60	71	120	130
	D0830	0.275	0.350	0.300	2.4	3.1	52	100	76	94	150	180
	D1030	0.330	0.350	0.300	3.9	4.8	130	160	120	150	230	280
	D1230	0.400	0.350	0.300	5.7	6.9	180	230	180	210	340	410
	D1430	0.460	0.350	0.300	7.7	9.4	250	300	230	290	450	550
	D1630	0.525	0.350	0.300	10	12	330	400	310	370	600	720
	D1830	0.590	0.350	0.300	12	16	410	510	390	480	750	920
	D2030	0.650	0.350	0.300	16	20	520	620	490	590	930	1100
	D2230	0.710	0.350	0.300	19	23	620	760	580	710	1100	1360
	D2430	0.775	0.350	0.300	23	28	740	910	690	850	1300	1600
	D2630	0.840	0.350	0.300	26	32	870	1000	820	1000	1600	1900
	D2930	0.930	0.350	0.300	30	40	1000	1300	950	1200	1800	2400
	D3230	1.030	0.350	0.300	40	49	1300	1600	1300	1500	2400	2900
	D3630	1.150	0.350	0.300	45	60	1500	2000	1400	1900	2700	3600
	D4030	1.280	0.350	0.300	60	77	2100	2500	1900	2300	3700	4500
20 kVDC	D1040	0.330	0.460	0.400	3.2	3.5	100	110	98	100	190	200
	D1240	0.400	0.460	0.400	4.6	5	150	170	140	160	270	300
	D1440	0.460	0.460	0.400	6.2	6.8	200	220	190	210	360	400
	D1640	0.525	0.460	0.400	8.1	8.9	270	290	250	270	480	520
	D1840	0.245	0.460	0.400	10	11	330	370	310	350	600	670
	D2040	0.650	0.460	0.400	13	14	410	450	390	430	750	820
	D2240	0.710	0.460	0.400	15	17	500	550	470	520	900	1000
	D2440	0.775	0.460	0.400	18	20	600	660	560	620	1100	1200
	D2640	0.812	0.460	0.400	21	23	700	770	660	720	1300	1400
	D2940	0.930	0.460	0.400	24	30	810	960	760	900	1500	1700
	D3240	1.030	0.460	0.400	32	36	1000	1200	1000	1100	1900	2100
	D3640	0.840	0.460	0.400	36	45	1200	1500	1100	1400	2200	2600
	D4040	1.280	0.460	0.400	50	56	1700	1800	1600	1700	3000	3300

High Voltage Single Layer Bare Disc Capacitors

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

MADE IN USA

C

Part Number / Ordering Information

D	1030	W	122	K	752	M	C

Disc
D = Bare Disc

Style
7050
- Reference table

Dielectric
N = NPO
W = X5R
X = X7R
Y = X5U

Capacitance
Value in pF
- Two significant figures, plus number of zeros
6R8 = 6.8 pF
122 = 1200 pF
203 = 20,000 pF

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

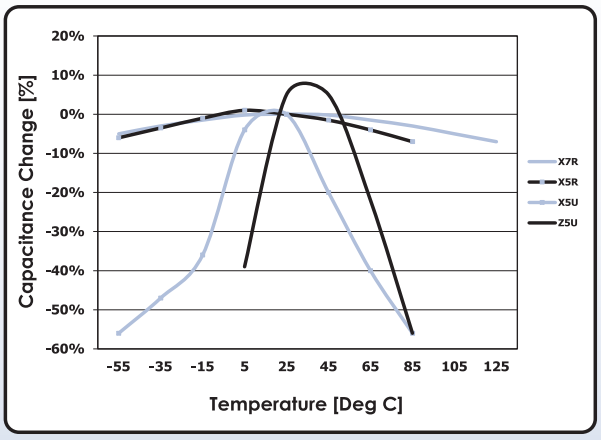
Voltage
752 = 7.5 kVDC
103 = 10 kVDC
153 = 15 kVDC

Screening
M = Group A
- Excluding Partial Discharge (Corona)

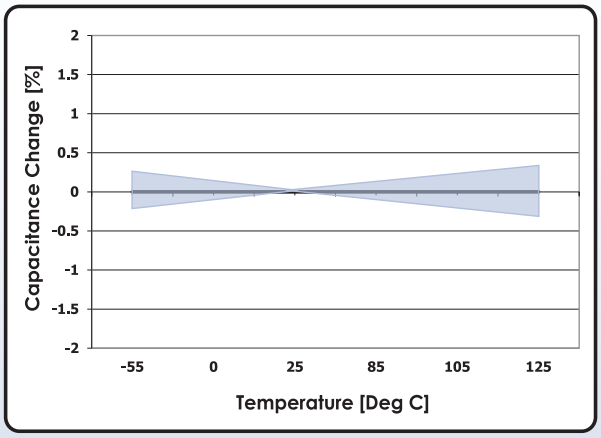
Partial Discharge (Corona)
C = Partial Discharge (Corona)

Note: Group A is not included unless designated in part number

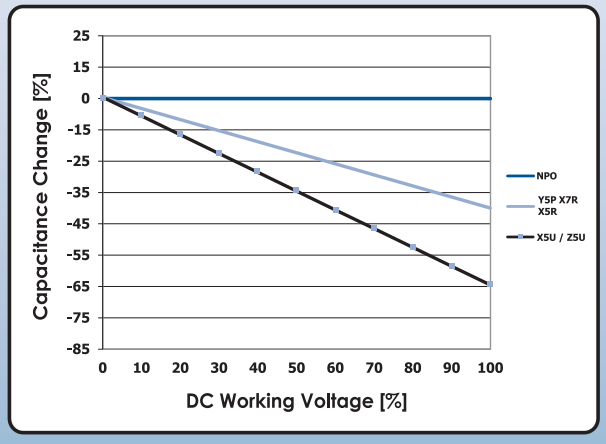
Performance Charts (Typical)



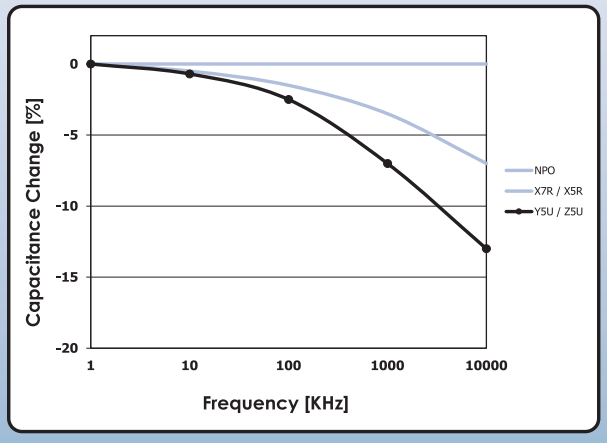
Class II Temperature Coefficient



NPO Temperature Coefficient



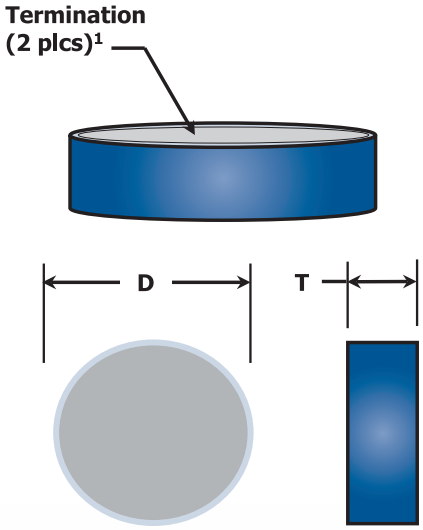
Voltage Coefficient



Capacitance Vs Frequency

High Voltage Single Layer Bare Disc Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 3 kVdc to 20 kVdc



1. **Termination Type: 100% fired-on silver**

CalRamic Technologies LLC manufactures a series of highly reliable, single layer, bare disc, negative temperature compensating, ceramic disc capacitors that deliver both very stable and predictable performance characteristics typically associated with low loss dielectrics.

These capacitors, which draw on thirty plus years of proven design and process experience, are manufactured under strict quality control guidelines and utilize a double action press to minimize gradients within the dielectric powder, producing a finished capacitor with a uniform fired ceramic density and unparalleled performance in high voltage applications. Leaded construction limits risk for damage due to exposure to mechanical and thermal stress.

Essential where low losses and tight capacitance tolerances are critical, 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			
	CR01	CR03	CR17	CR22
Material Classification	N750 (U2J)	N1500 (P3K)	N4700 (T3M)	N5600 (U3N)
Coefficient of Thermal Expansion	11 x 10^{-6} / °C	11 x 10^{-6} / °C	11 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	72 g / in^3			
Operating Temperature Range	-55 to +125°C			
Aging Rate	0			
Temperature Coefficient	-750 PPM / °C ±10% Max	-1500 PPM / °C ±17% Max	-4700 PPM / °C ±52% Max	-5600 PPM / °C ±59% Max
Voltage Coefficient	-8% Max @ WVDC		-14% Max @ WVDC	
Capacitance Range	2.0 pF to 1000 pF	5.5 pF to 2700pF	29 pF to 0.014uF	34 pF to 0.017 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 @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less			
Dissipation Factor	0.2% Max			
DWV	1.5 x WVDC			

General Information

1. Standard inspection and Group A testing, when required, is performed in accordance with applicable requirements of MIL-PRF-49467, DSCC 87125, DSCC 89087 and NASA GSFC S-311-15C.
2. Special testing including 100% Partial Discharge (Corona) is available upon request.
3. Custom voltages, package sizes and capacitance values available. Contact factory.
4. Higher voltage parts may require 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.
5. Testing of higher voltage parts before installation and / or application of supplemental encapsulation, may be done in a suitable, non-contaminating dielectric fluid like FC-40.
6. Large ceramic capacitors are susceptible to damage when exposed to thermal and / or mechanical shock. Ensure care is taken while handling and during installation or consider selecting leaded alternatives as detailed in catalog page CRT-0006.
7. All parts are RoHS compliant.

High Voltage Single Layer Bare Disc Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 3 kVdc to 20 kVdc

MADE IN USA

C

Electrical / Mechanical Characteristics

Working Voltage	Disc Style	Dimensions [in]			Capacitance Range [pF]							
					CR01		CR03		CR17		CR22	
		D Max	T Nom	T Max	Min	Max	Min	Max	Min	Max	Min	Max
3 kVDC	D0606	0.220	0.060	0.075	14	30	37	86	190	430	230	510
	D0706	0.245	0.060	0.075	17.0	46	46	120	230	670	280	750
	D0806	0.275	0.060	0.075	20	63	55	170	280	910	330	1000
	D1006	0.330	0.060	0.075	32	91	92	250	460	1300	540	1500
	D1206	0.400	0.060	0.075	45	120	130	340	640	1700	750	2000
	D1406	0.460	0.060	0.075	80	160	220	440	1200	2200	1400	2700
	D1606	0.525	0.060	0.075	90	200	250	570	1300	2900	1500	3500
	D1806	0.590	0.060	0.075	100	250	280	700	1500	3600	1700	4300
	D2006	0.650	0.060	0.075	120	270	350	780	1800	3900	2100	4700
	D2206	0.710	0.060	0.075	150	300	420	860	2200	4300	2500	5100
	D2406	0.775	0.060	0.075	180	430	500	1200	2600	6100	3000	7200
	D2606	0.840	0.060	0.075	210	480	580	1300	3000	6800	3500	8000
	D2906	0.930	0.060	0.075	250	530	670	1400	3500	7500	4100	8900
	D3206	1.030	0.060	0.075	320	820	880	2200	4500	11000	5300	13000
	D3606	1.150	0.060	0.075	480	1200	1300	3300	6700	16000	7900	19000
5 kVDC	D0610	0.220	0.125	0.100	8	17	22	51	120	250	140	300
	D0710	0.245	0.125	0.100	10	25	29	75	140	400	170	460
	D0810	0.275	0.125	0.100	12	33	37	100	170	550	200	630
	D1010	0.330	0.125	0.100	19	53	56	150	280	770	320	910
	D1210	0.400	0.125	0.100	27	74	75	200	390	1000	450	1200
	D1410	0.460	0.125	0.100	48	98	140	250	680	1400	800	1600
	D1610	0.525	0.125	0.100	54	120	150	330	760	1700	900	2000
	D1810	0.590	0.125	0.100	60	150	170	410	850	2000	1000	2500
	D2010	0.650	0.125	0.100	75	160	210	460	1000	2200	1200	2700
	D2210	0.710	0.125	0.100	90	170	250	510	1300	2500	1500	3000
	D2410	0.775	0.125	0.100	110	250	300	720	1600	3600	1800	4300
	D2610	0.840	0.125	0.100	130	280	350	800	1800	4000	2100	4800
	D2910	0.930	0.125	0.100	150	320	410	890	2100	4400	2500	5300
	D3210	1.030	0.125	0.100	190	490	530	1300	2700	7000	3200	8200
	D3610	1.150	0.125	0.100	240	550	670	1500	3500	7800	4100	9100
	D4010	1.280	0.125	0.100	300	610	820	1700	4300	8700	5000	10000
7.5 kVDC	D0615	0.220	0.180	0.150	5.5	12	15	34	76	170	89	200
	D0715	0.245	0.180	0.150	6.7	17.0	20	52	98	260	110	310
	D0815	0.275	0.180	0.150	8	22	25	70	120	360	140	430
	D1015	0.330	0.180	0.150	13.0	35.0	37	100	190	530	220	630
	D1215	0.400	0.180	0.150	18	49	50	130	260	700	300	840
	D1415	0.460	0.180	0.150	32	65	87	170	450	920	530	1100
	D1615	0.525	0.180	0.150	36	82	98	220	510	1100	600	1400
	D1815	0.590	0.180	0.150	40	100	110	270	570	1400	670	1700
	D2015	0.650	0.180	0.150	50	110	140	300	710	1500	830	1800
	D2215	0.710	0.180	0.150	60	120	170	340	850	1700	1000	2000
	D2415	0.775	0.180	0.150	72	170	200	480	1100	2400	1200	2900
	D2615	0.840	0.180	0.150	85	180	230	530	1200	2600	1400	3200
	D2915	0.930	0.180	0.150	98	200	270	580	1400	2900	1700	3600
	D3215	1.030	0.180	0.150	130	320	350	910	1800	4600	2200	5500
	D3615	1.150	0.180	0.150	160	360	450	1000	2300	5200	2700	6100
	D4015	1.280	0.180	0.150	200	410	550	1100	2900	5800	3300	6800
10 kVDC	D0620	0.220	0.235	0.200	4	8	11	25	57	130	67	150
	D0720	0.245	0.235	0.200	5.0	13	14	39	70	200	83	220
	D0820	0.275	0.235	0.200	6	18	17	53	84	270	99	300
	D1020	0.330	0.235	0.200	10	27	27	76	140	400	160	450
	D1220	0.400	0.235	0.200	14	37	37	100	200	530	230	610
	D1420	0.460	0.235	0.200	24	48	66	130	340	700	400	820
	D1620	0.525	0.235	0.200	27	62	74	160	380	900	450	1000
	D1820	0.590	0.235	0.200	30	77	83	200	430	1100	500	1200
	D2020	0.650	0.235	0.200	37	79	106	220	530	1200	620	1300
	D2220	0.710	0.235	0.200	45	82	130	250	640	1300	750	1500
	D2420	0.775	0.235	0.200	54	130	150	360	760	1700	900	2000
	D2620	0.840	0.235	0.200	63	140	180	400	930	1900	1100	2200
	D2920	0.930	0.235	0.200	73	160	210	440	1100	2200	1300	2500
	D3220	1.030	0.235	0.200	95	240	270	680	1400	3400	1600	4100
	D3620	1.150	0.235	0.200	120	270	340	760	1800	3800	2000	4600
	D4020	1.280	0.235	0.200	150	300	410	840	2200	4300	2500	5100
15 kVDC	D0630	0.220	0.350	0.300	3	6	7.5	17	38	87	45	100
	D0730	0.245	0.350	0.300	3.5	8.5	9.7	25	47	120	55	150
	D0830	0.275	0.350	0.300	4	11	12	34	56	170	66	200
	D1030	0.330	0.350	0.300	6.5	17.0	18	51	90	250	100	300
	D1230	0.400	0.350	0.300	9	24	25	68	130	340	150	410
	D1430	0.460	0.350	0.300	16	32	44	91	230	460	270	550
	D1630	0.525	0.350	0.300	18	41	49	110	260	590	300	700
	D1830	0.590	0.350	0.300	20	51	55	140	290	720	340	860
	D2030	0.650	0.350	0.300	25	56	69	150	360	790	420	930
	D2230	0.710	0.350	0.300	30	61	83	170	430	870	500	1000
	D2430	0.775	0.350	0.300	36	87	99	240	510	1200	600	1400
	D2630	0.840	0.350	0.300	42	93	110	260	600	1300	700	1500
	D2930	0.930	0.350	0.300	49	100	140	290	690	1500	810	1700
	D3230	1.030	0.350	0.300	64	160	180	440	900	2200	1100	2700
	D3630	1.150	0.350	0.300	81	180	230	500	1200	2500	1400	3000
	D4030	1.280	0.350	0.300	99	200	280	560	1500	2900	1700	3400
20 kVDC	D1040	0.330	0.460	0.400	5.8	15	16	42	79	200	99	240
	D1240	0.400	0.460	0.400	7	18	19	51	96	250	120	300
	D1440	0.460	0.460	0.400	12	24	33	67	170	340	200	410
	D1640	0.525	0.460	0.400	13.0	30.0	37	83	190	440	220	520
	D1840	0.245	0.460	0.400	15	37	42	100	220	550	250	630
	D2040	0.650	0.460	0.400	19	41	52	110	270	600	310	700
	D2240	0.710	0.460	0.400	23	46	62	120	320	650	380	770
	D2440	0.775	0.460	0.400	27	65	74	170	380	920	450	1000
	D2640	0.812	0.460	0.400	32	72	92	190	450	1000	530	1100
	D2940	0.930	0.460	0.400	37	80	110	220	520	1100	610	1300
	D3240	1.030	0.460	0.400	48	120	140	340	680	1700	800	2000
	D3640	0.840	0.460	0.400	61	130	170	370	890	1800	1000	2200
	D4040	1.280	0.460	0.400	75	150	210	410	1100	2000	1300	2500

High Voltage Single Layer Bare Disc Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 3 kVdc to 20 kVdc

Part Number / Ordering Information

D	1030	CR17	122	K	752	M	C

Disc
D = Bare Disc

Style
7050
- Reference table

Dielectric
CR01 = N750
CR03 = N1500
CR17 = N4700
CR22 = N5600

Capacitance
Value in pF
- Two significant figures, plus number of zeros
6R8 = 6.8 pF
122 = 1200 pF
203 = 20,000 pF

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

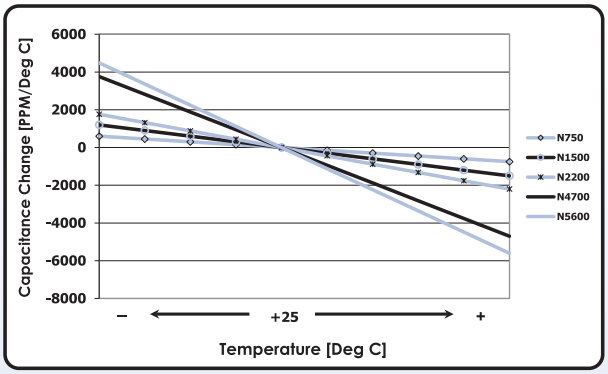
Voltage
752 = 7.5 kVDC
103 = 10 kVDC
153 = 15 kVDC

Screening
M = Group A
- Excluding Partial Discharge (Corona)

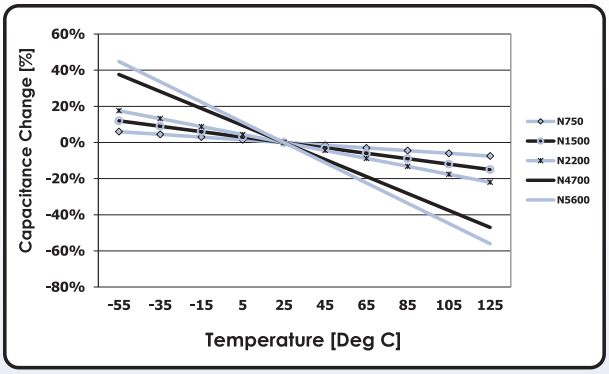
Partial Discharge (Corona)
C = Partial Discharge (Corona)

Note: Group A is not included unless designated in part number

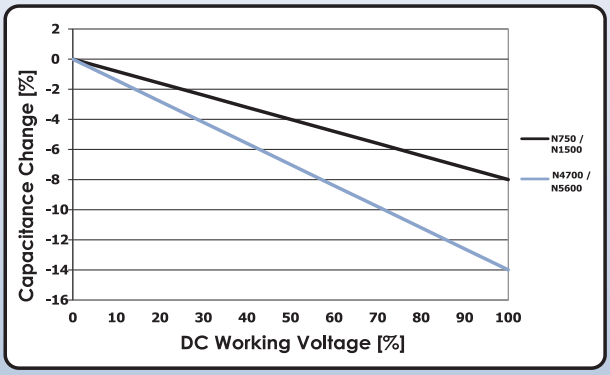
Performance Charts (Typical)



Temperature Coefficient [PPM / °C]



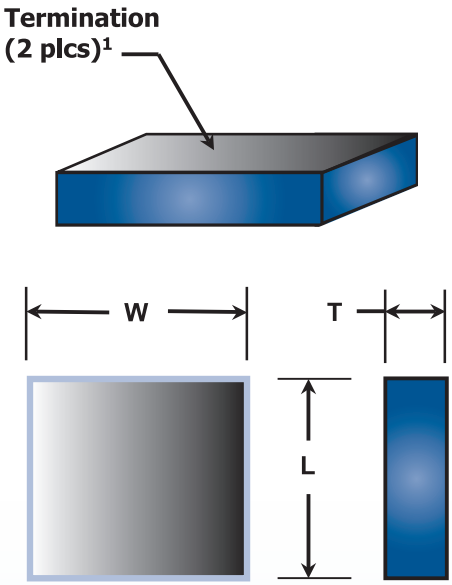
Temperature Coefficient [% Vs Temp]



Voltage Coefficient

High Voltage Single Layer Bare Rectangular Capacitors

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



CalRamic Technologies LLC manufactures a series of highly reliable, single layer, rectangular ceramic capacitors that are designed and 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 and X5U dielectric materials, which are intended for those applications where higher 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.

1. Termination Type: 100% fired-on silver

Performance Characteristics

Specification	Dielectric Type (EIA Designation)			
	NPO (COG) (N)	X7R (X)	X5R (W)	X5U (Y)
Material Classification	Type I, Ultra Stable, K76	Type II, Stable, K2350	Type II, Stable, K2500	Type II, Stable, K5000
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C	11 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	72 g / in^3			
Operating Temperature Range	-55 to +125°C		-55 to +85°C	
Aging Rate	0	-2% Max per decade hour		-3% Max per decade hour
Temperature Coefficient	±90 PPM / °C	±15%		+22 / -56%
Voltage Coefficient	Negligible	-20% Max @ WVDC		-35% Max @ WVDC
Capacitance Range	4.0 pF to 300 pF	120 pF to 9000 pF	140 pF to 10,200 pF	270 pF to 0.020 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. Standard inspection and Group A testing, when required, is performed in accordance with applicable requirements of MIL-PRF-49467, DSCC 87125, DSCC 89087 and NASA GSFC S-311-15C.
2. Special testing including 100% Partial Discharge (Corona) is available upon request.
3. Custom voltages, package sizes and capacitance values available. Contact factory.
4. Higher voltage parts may require 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.
5. Testing of higher voltage parts before installation and / or application of supplemental encapsulation, may be done in a suitable, non-contaminating dielectric fluid like FC-40.
6. Large ceramic capacitors are susceptible to damage when exposed to thermal and / or mechanical shock. Ensure care is taken while handling and during installation, or consider selecting a leaded alternative.

High Voltage Single Layer Bare Rectangular Capacitors

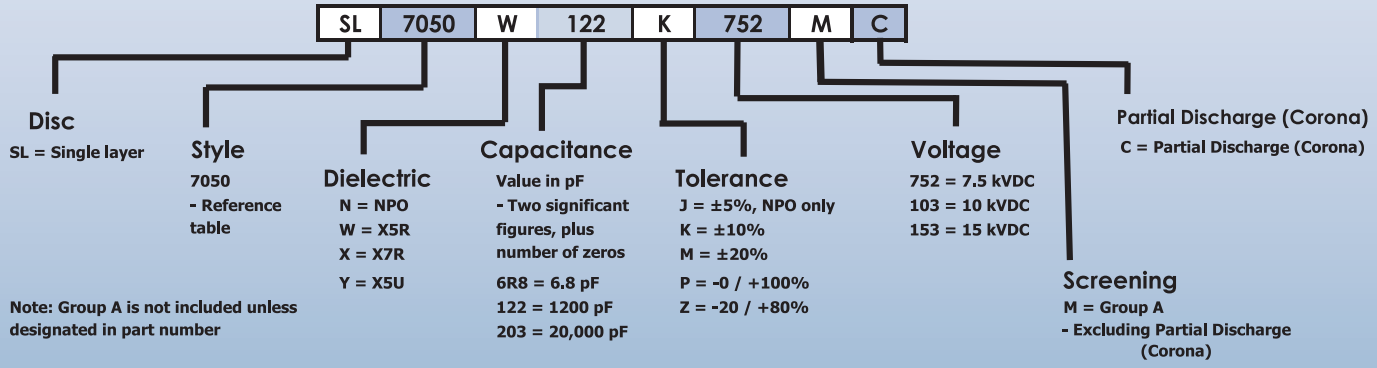
Military & Commercial Level Class 1 & Class 2 Dielectric – 3 kVdc to 20 kVdc

Electrical / Mechanical Characteristics

Working Voltage	Style	Dimensions [in]				Capacitance Range [pF]							
		L ± 0.010	W ± 0.010	T Max	T Nom	NPO (N)		X7R (X)		X5R (W)		X5U (Y)	
						Min	Max	Min	Max	Min	Max	Min	Max
3 kVDC	3408	0.340	0.080	0.075	0.060	6.8	8.1	200	240	230	275	460	550
	5625	0.560	0.250	0.075	0.060	35	42	1000	1200	1200	1400	2400	2900
	5439	0.540	0.390	0.075	0.060	53	64	1600	1900	1800	2200	3600	4300
	7050	0.700	0.500	0.075	0.060	88	106	2600	3100	3000	3600	6000	7100
	100100	1.000	1.000	0.075	0.060	250	300	7500	9000	8500	10200	17000	20000
5 kVDC	3408	0.340	0.080	0.125	0.100	4	5	120	150	140	170	270	340
	5625	0.560	0.250	0.125	0.100	21	26	620	7700	700	870	1400	1700
	5439	0.540	0.390	0.125	0.100	32	39	940	1200	1100	1300	2100	2600
	7050	0.700	0.500	0.125	0.100	52	65	1500	1900	1800	2200	3500	4400
	100100	1.000	1.000	0.125	0.100	150	184	4400	5500	5000	6200	10000	12400
7.5 kVDC	3408	0.340	0.080	0.180	0.150	•	•	•	•	•	•	•	•
	5625	0.560	0.250	0.180	0.180	14	17	410	500	470	580	940	1200
	5439	0.540	0.390	0.180	0.180	21	26	620	760	700	870	1400	1700
	7050	0.700	0.500	0.180	0.180	35	43	100	1300	1200	1400	2300	2900
	100100	1.000	1.000	0.180	0.180	100	120	2900	3600	3400	4100	6700	8200
10 kVDC	3408	0.340	0.080	0.235	0.200	•	•	•	•	•	•	•	•
	5625	0.560	0.250	0.235	0.200	11	13	310	380	350	430	710	870
	5439	0.540	0.390	0.235	0.200	16	19	470	570	530	650	1100	1300
	7050	0.700	0.500	0.235	0.200	26	32	780	950	880	1100	1800	2200
	100100	1.000	1.000	0.235	0.200	75	92	2200	2700	2500	3100	5000	6200
15 kVDC	3408	0.340	0.080	0.350	0.300	•	•	•	•	•	•	•	•
	5625	0.560	0.250	0.350	0.300	7	8.5	210	250	240	290	470	580
	5439	0.540	0.390	0.350	0.300	11	13	310	380	350	430	710	870
	7050	0.700	0.500	0.350	0.300	17	21	520	630	590	720	1200	1400
	100100	1.000	1.000	0.350	0.300	50	60	1500	1800	1700	2100	3400	4100
20 kVDC	3408	0.340	0.080	0.460	0.400	•	•	•	•	•	•	•	•
	5625	0.560	0.250	0.460	0.400	5.2	6.4	160	190	180	220	350	430
	5439	0.540	0.390	0.460	0.400	7.9	9.6	230	290	270	330	530	650
	7050	0.700	0.500	0.460	0.400	13	16	390	470	440	540	880	1100
	100100	1.000	1.000	0.460	0.400	37	46	1100	1400	1300	1500	2500	3100

- **Other sizes & voltages available upon request**

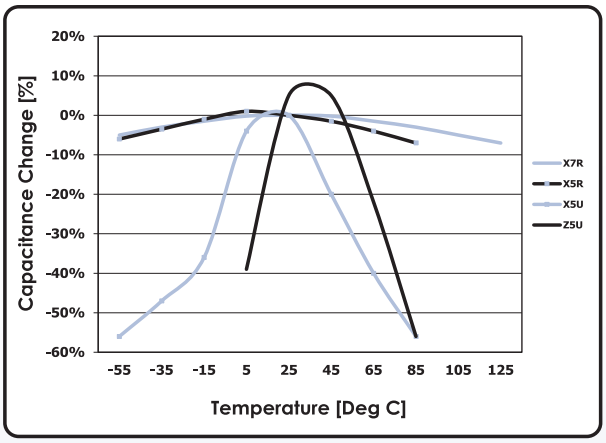
Part Number / Ordering Information



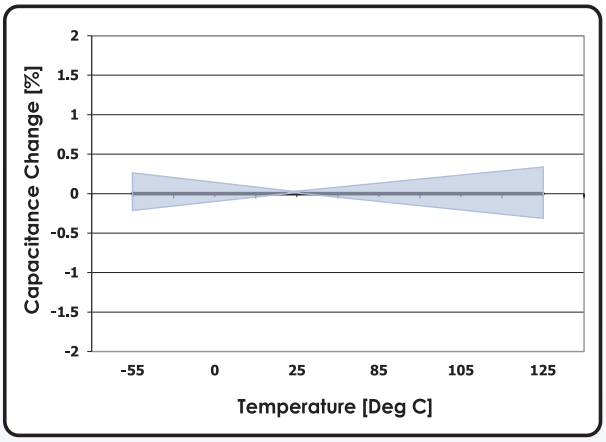
High Voltage Single Layer Bare Rectangular Capacitors

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

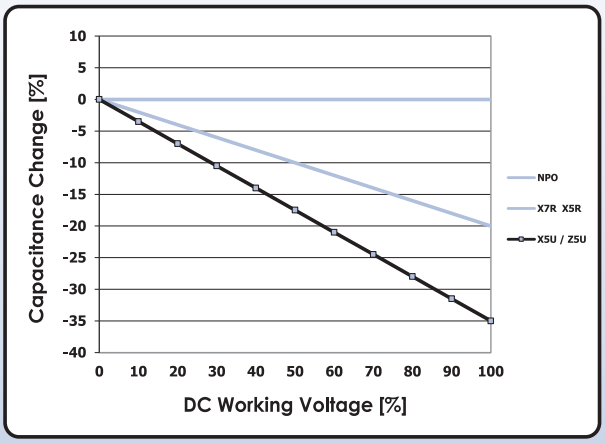
Performance Charts (Typical)



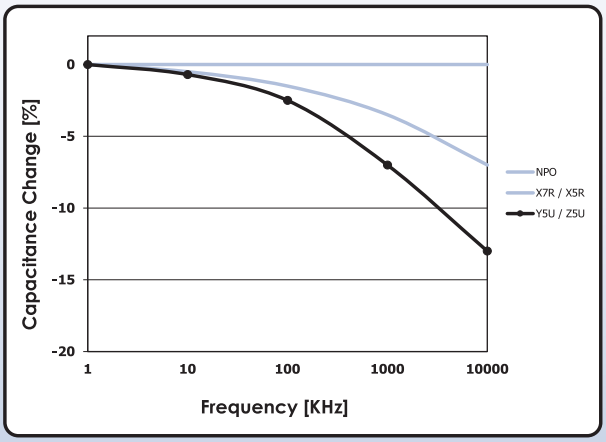
Class II Temperature Coefficient



NPO Temperature Coefficient



Voltage Coefficient

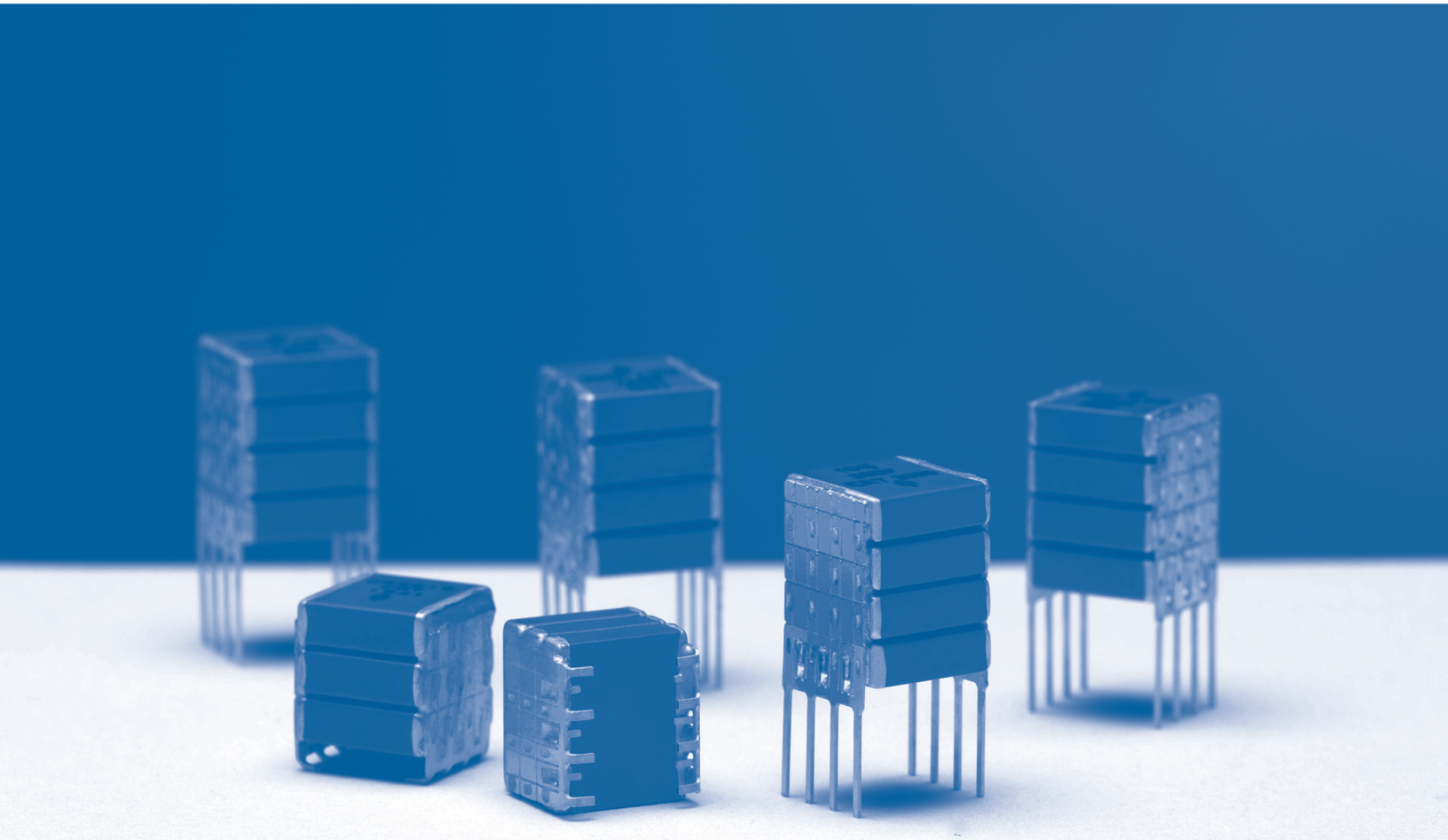


Capacitance Vs Frequency

Switch Mode Power Supply
50 Volt to 500 Volt

CalRamic Technologies LLC

(775) 851-3580 / calramic.com / 5462 Louie Lane / Reno, NV 89511 USA



Switch Mode Power Supply Multi-Layer Capacitors

Military & Commercial Level NPO(BP) & X7R (BQ, BR & BX) – 50 Vdc to 500 Vdc

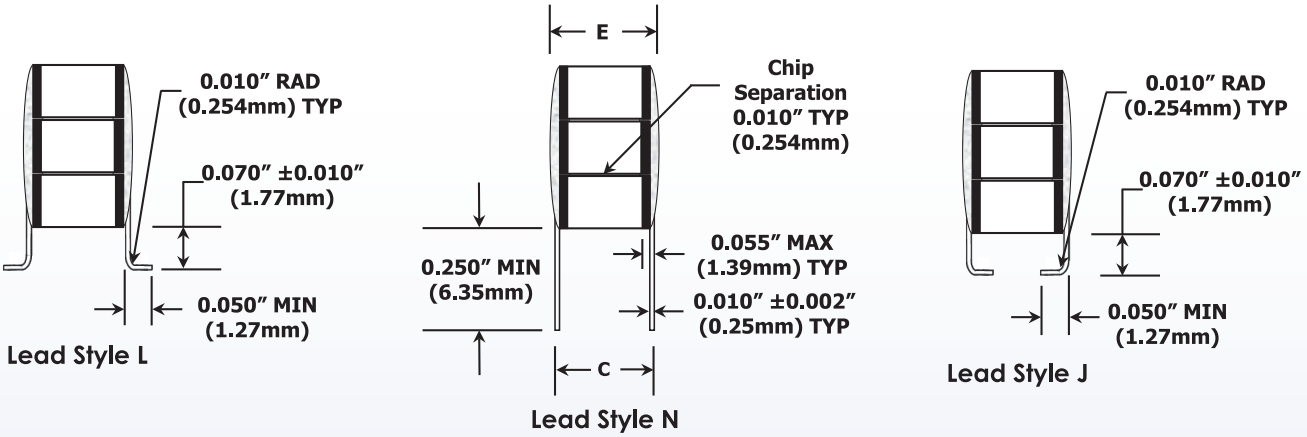
MADE IN USA

CalRamic Technologies LLC manufactures a series of highly reliable, military / commercial grade, leaded SMPS ceramic capacitors in accordance with MIL-PRF-49470 and 87106 equivalents that feature large capacitance values and are designed for use in a variety of applications including input and output filters for switch mode power supplies, DC to DC converters, decoupling, snubbers, energy storage and high capacitance discharge circuits.

Available with ultra-stable Class I, NPO and stable Class II, X7R (BQ, BR & BX) dielectric materials, these designs exhibit inherently low Equivalent Series Resistance (ESR) and Equivalent Series Inductance (ESL) characteristics, making them the preferred choice versus higher loss Aluminum and Tantalum electrolytic capacitors at operational frequencies up to 1MHz.

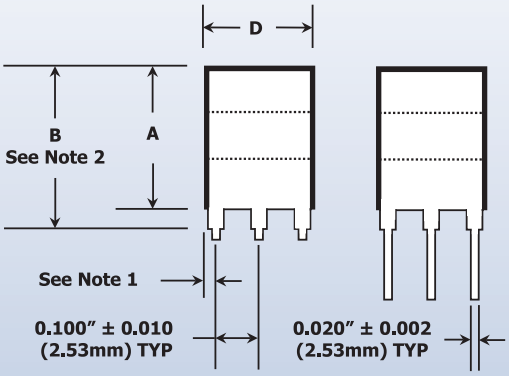
D

Lead Configurations



Mechanical Dimensions

Case Code	A Max	B Max	C ± 0.025 (0.63mm)	D Min / Max	E Max	Number of Leads Per Side
3	Ref. Table 1	0.715" (18.16mm)	0.450" (11.43mm)	0.950" - 1.075" (24.13mm - 27.3mm)	0.500" (12.7mm)	10
4	Ref. Table 1	0.545" (13.14mm)	0.400" (10.16mm)	0.350" - 0.425" (8.89mm - 10.79mm)	0.440" (11.17mm)	4
5	Ref. Table 1	0.545" (13.14mm)	0.250" (6.35mm)	0.224" - 0.275" (5.68mm - 6.98mm)	0.300" (7.62mm)	3



Notes

1. Case Code 3 & 4 @ 0.025" – 0.100" (0.63 – 2.54mm) Case Code 5 @ 0.012" – 0.100" (0.30 – 0.100mm).
2. Dimension B MAX = Dimension A + 0.065" (1.65mm).
   - Reference Electrical Characteristics
   - Table 1 for actual "A" height dimension.
   - Tin – Lead plating utilized for all lead configurations.
   - Vertical stack available upon request – Contact Factory.

Switch Mode Power Supply Multi-Layer Capacitors

Military & Commercial Level NPO(BP) & X7R (BQ, BR & BX) – 50 Vdc to 500

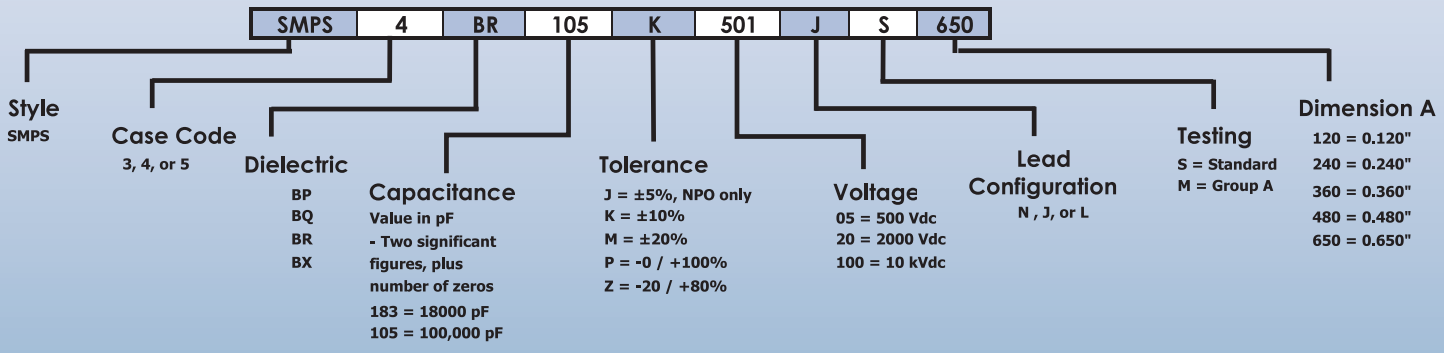
Performance Characteristics

Specification	Dielectric Type (EIA Designation)			
	NPO (BP)	X7R [BQ]	X7R [BR]	X7R [BX]
Material Classification	Type I, Ultra Stable	Type II, Stable		
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C		
Density	67 g / in^3			
Operating Temperature Range	-55 to +125°C			
Aging Rate	0	-2% Max per decade hour		
Temperature Coefficient	0 ±30 PPM / °C	±15%		
Voltage - Temperature Coefficient	0 PPM / °C ±30 PPM / °C	+15 / -50%	+15 / -40%	+15 / -25%
Capacitance Range	0.010 to 2.2 µF	0.150 to 5.6 µF	0.470 to 12 µF	0.680 to 47 µF
Voltage Range	50 VDC to 500 VDC			
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less			
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less			
Dissipation Factor	0.15% Max @ 1 kHz & 1 VRMS Max	2.5% Max @ 1 kHz & 1 VRMS Max		
DWV	2.5 X WVDC@ 50, 100 & 200 VDC / 1.5 X WVDC @ 500 VDC			

Notes

1. Group A screening available to MIL-PRF-49470. [Voltage conditioning performed at 2.0 x WVDC for product rated at > 500 VDC & 1.2 x WVDC for product rated at ≤ 500 VDC].
2. Voltage – Temperature Coefficient limits define the allowable capacitance change as a percentage of the +25°C measured value, across the temperature range of -55 to +125°C, while under bias.
3. Custom voltages, package sizes and capacitance values are available. Contact factory for more information.
4. X7R dielectrics are not intended for AC line filtering applications.
5. Large ceramic capacitors, even leaded devices are susceptible to damage when exposed to thermal and / or mechanical shock. Refer to Technical Bulletin AN112 for handling and installation recommendations.
6. Calramic Technologies recommends the use of a lower profile capacitor design for those applications where high vibration or mechanical shock may be a concern.
7. The use of a Tin – Lead alloy with a minimum of 3% lead content per mass, has proven to be an effective means of inhibiting reliability concerns related to tin whisker growth.

Part Number / Ordering Information



Switch Mode Power Supply Multi-Layer Capacitors

Military & Commercial Level NPO(BP) & X7R (BQ, BR & BX) – 50 Vdc to 500

D

Electrical / Mechanical Characteristics

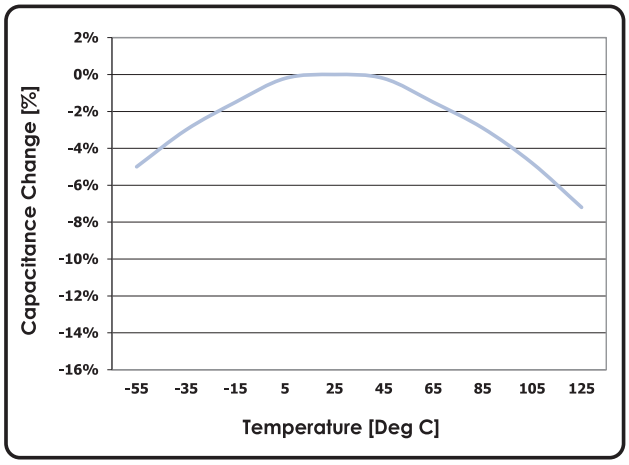
NPO (BP) Dielectric								
Capacitance (µF)	50V (BP)		100V (BP)		200V (BP)		500V (BP)	
	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)
0.010							5	0.120
0.012							5	0.240
0.015							5	0.240
0.018							5	0.240
0.022					5	0.120	5	0.360
0.027					5	0.240	5	0.360
0.033					5	0.240	4 / 5	0.240 / 0.480
0.039					5	0.240	4 / 5	0.240 / 0.480
0.047			5	0.240	5	0.360	4 / 5	0.240 / 0.650
0.056	5	0.120	5	0.240	5	0.360	4	0.360
0.068	5	0.240	5	0.240	4 / 5	0.120 / 0.480	4	0.360
0.082	5	0.240	5	0.240	4 / 5	0.240 / 0.480	4	0.480
0.10	5	0.240	5	0.360	4 / 5	0.240 / 0.650	4	0.480
0.12	5	0.360	5	0.360	4	0.360	3 / 4	0.240 / 0.650
0.15	5	0.360	4 / 5	0.240 / 0.480	4	0.360	3	0.240
0.18	4 / 5	0.240 / 0.480	4 / 5	0.240 / 0.650	4	0.480	3	0.240
0.22	4 / 5	0.240 / 0.480	4 / 5	0.240 / 0.650	4	0.480	3	0.360
0.27	4 / 5	0.240 / 0.650	4	0.360	3 / 4	0.240 / 0.650	3	0.360
0.33	4	0.360	4	0.480	3	0.240	3	0.480
0.39	4	0.480	4	0.480	3	0.240	3	0.650
0.47	4	0.480	3 / 4	0.240 / 0.650	3	0.360		
0.56	3 / 4	0.240 / 0.650	3 / 4	0.240 / 0.650	3	0.360		
0.68	3	0.240	3	0.240	3	0.480		
0.82	3	0.240	3	0.120	3	0.360		
1.0	3	0.360	3	0.360	3	0.650		
1.2	3	0.360	3	0.480				
1.5	3	0.480	3	0.480				
1.8	3	0.480	3	0.650				
2.2	3	0.650						
2.7								
3.3								
3.9								
4.7								

X7R Dielectric (BQ, BR, BX)								
Capacitance (µF)	50V (BX)		100V (BX)		200V (BR)		500V (BQ)	
	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)	Case Code (in)	Max "A" Dim (in)
0.10								
0.12								
0.15							5	0.120
0.18							5	0.240
0.22							5	0.240
0.27							5	0.240
0.33							5	0.360
0.39							5	0.360
0.47					5	0.240	5	0.360
0.56					5	0.240	4 / 5	0.240 / 0.480
0.68			5	0.120	5	0.360	4 / 5	0.240 / 0.650
0.82			5	0.240	5	0.360	4	0.360
1.0	5	0.120	5	0.240	4 / 5	0.120 / 0.480	4	0.360
1.2	5	0.120	5	0.240	4 / 5	0.240 / 0.480	4	0.360
1.5	5	0.240	5	0.360	4 / 5	0.240 / 0.650	4	0.480
1.8	5	0.240	5	0.360	4	0.360	3 / 4	0.240 / 0.650
2.2	5	0.240	5	0.480	4	0.360	3	0.240
2.7	5	0.360	5	0.480	4	0.480	3	0.360
3.3	5	0.360	4 / 5	0.240 / 0.650	4	0.480	3	0.360
3.9	5	0.480	4	0.360	3 / 4	0.240 / 0.650	3	0.360
4.7	4 / 5	0.240 / 0.480	4	0.360	3	0.240	3	0.480
5.6	4 / 5	0.240 / 0.650	4	0.480	3	0.240	3	0.650
6.8	4	0.360	4	0.480	3	0.360		
8.2	4	0.360	4	0.650	3	0.360		
10.0	4	0.480	3	0.240	3	0.480		
12.0	4	0.480	3	0.240	3	0.650		
15.0	3 / 4	0.240 / 0.650	3	0.360				
18.0	3	0.240	3	0.360				
22.0	3	0.360	3	0.480				
27.0	3	0.360	3	0.650				
33.0	3	0.360						
39.0	3	0.480						
47.0	3	0.650						

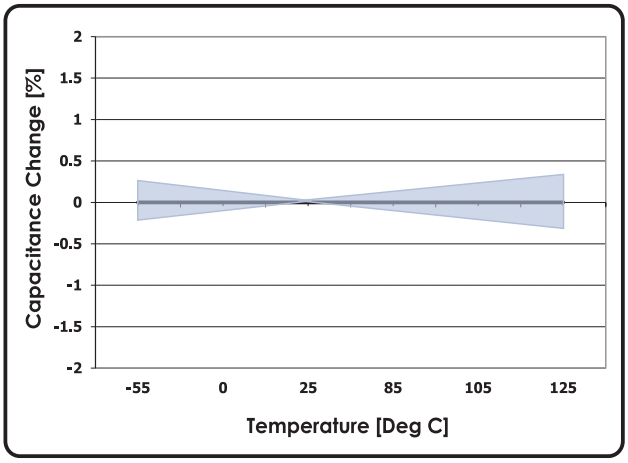
Switch Mode Power Supply Multi-Layer Capacitors

Military & Commercial Level NPO(BP) & X7R (BQ, BR & BX) – 50 Vdc to 500

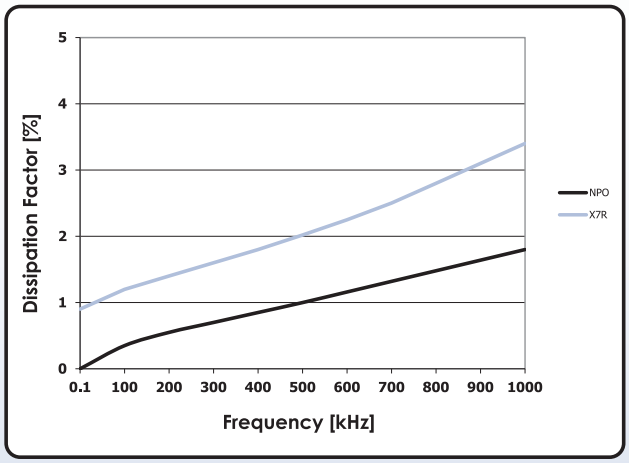
Performance Charts (Typical)



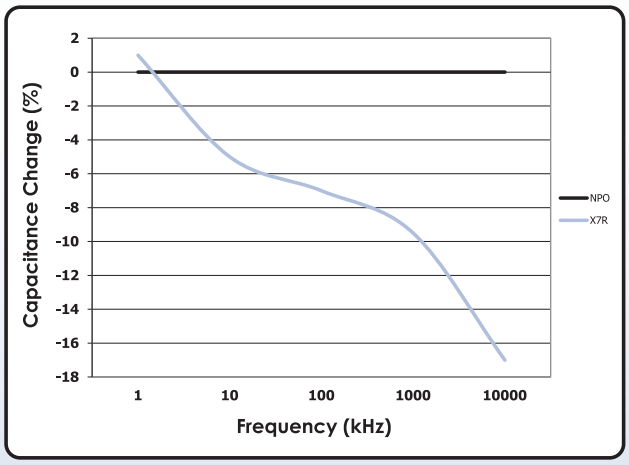
X7R Temperature Coefficient



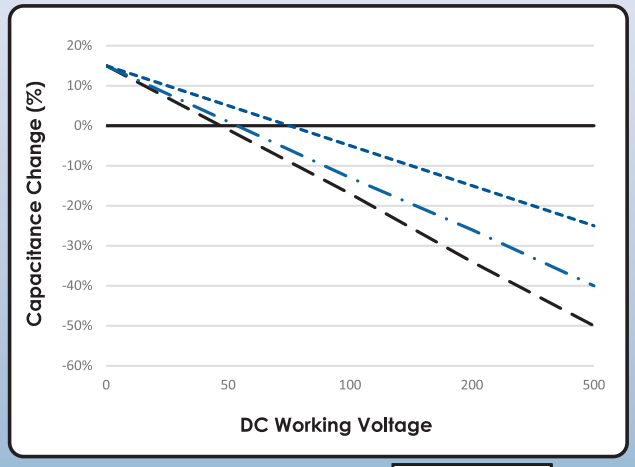
NPO Temperature Coefficient



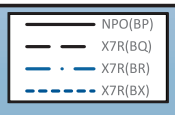
DF Vs Frequency



Capacitance Vs Frequency



Voltage Coefficient

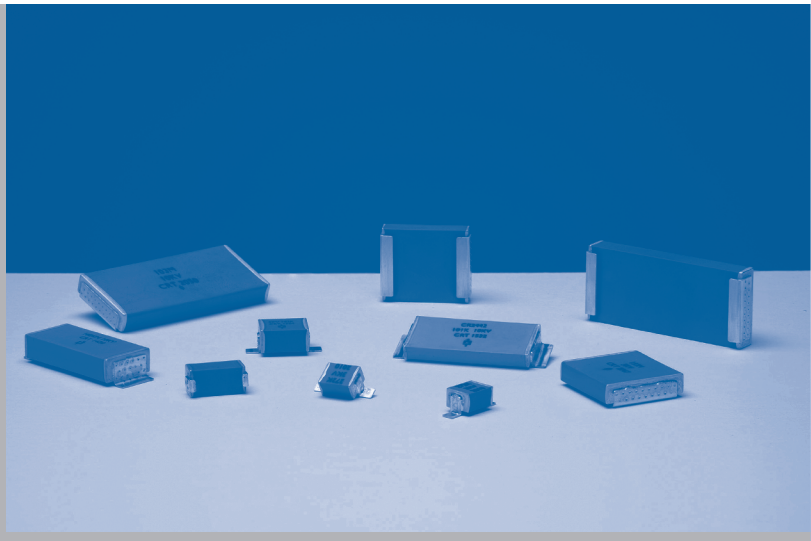


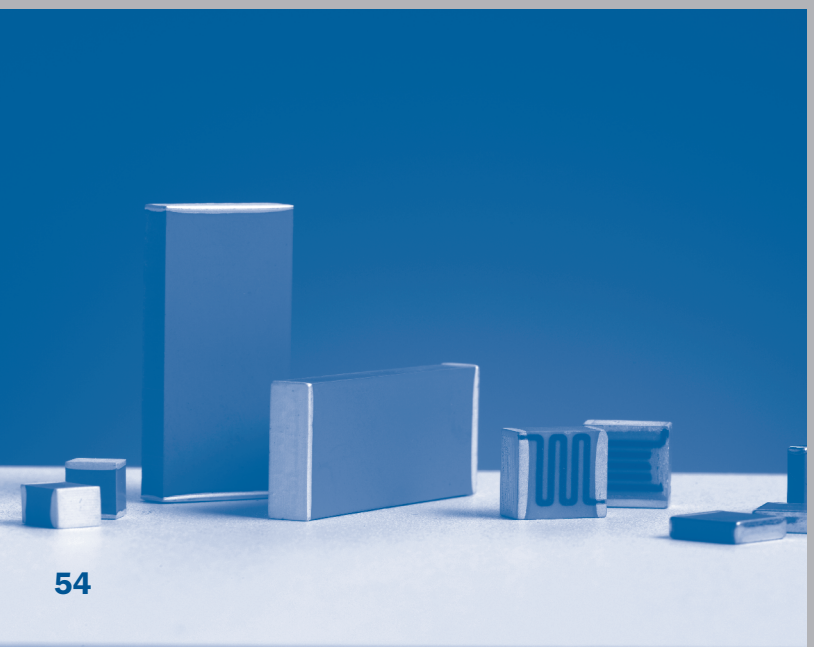
Notes

High Voltage Multilayer Pulse Ceramic Capacitors
Military and Commercial

CalRamic Technologies LLC

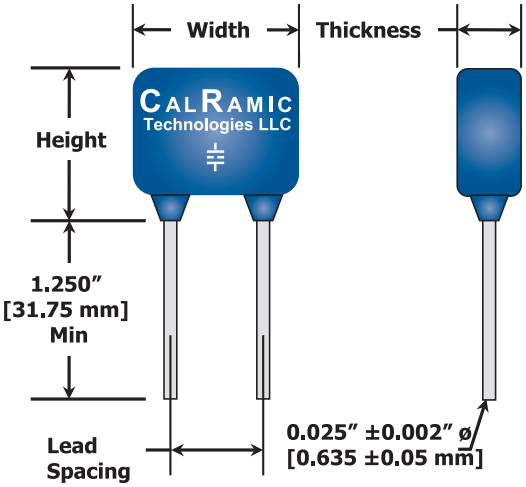
(775) 851-3580 / calramic.com / 5462 Louie Lane / Reno, NV 89511 USA





High Voltage Radial Leaded Pulse Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 500 Vdc to 10 kVdc



Lead Type: #22 AWG, CCFE / Solder plate
RoHS Option – 100% Tin plate

CalRamic Technologies LLC manufactures a series of highly reliable, military / commercial level, high voltage, radial leaded, ceramic capacitors that are designed specifically for those environments where the assembly may be exposed to high levels of thermal and / or mechanical stress. In addition, these assemblies are packaged in a high resistance conformal coating that provides enhanced electrical isolation and added environmental protection.

Intended for continuous operation at full rated voltage and across the entire operating temperature range, these capacitors utilize an inherently low loss dielectric material and a special internal design specifically intended to provide a device that exhibits very low ESR / ESL characteristics, especially at higher frequencies.

Available with stable CR09 dielectric material, these capacitors are ideally suited for high current, pulse discharge applications.

E

Performance Characteristics

Specification	Dielectric Type
	CR09
Material Classification	N2200 (R3L)
Coefficient of Thermal Expansion	11 x 10^{-6} / °C
Density	72 g / in^3
Operating Temperature Range	-55 to +125°C
Aging Rate	0
Temperature Coefficient	-2200 PPM / °C ±24% Max
Voltage Coefficient	-7% Max @ WVDC
Capacitance Range	120 pF to 1.0uF
Voltage Range	3 kVDC to 20 kVDC
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less
Dissipation Factor	0.2% Max
DWV	1.5 X WVDC ≤ 1250 Vdc or 1.2 X WVDC > 1250 Vdc

Mechanical Dimensions

Dimensions inches [mm]	Product Style												
	PDHV01	PDHV02	PDHV03	PDHV10	PDHV04	PDHV11	PDHV05	PDHV06	PDHV07	PDHV13	PDHV14	PDHV15	PDHV16
Width Max	0.250 [6.35]	0.320 [8.13]	0.370 [9.40]	0.450 [11.43]	0.470 [11.94]	0.550 [13.97]	0.570 [14.48]	0.670 [17.02]	0.770 [19.56]	0.850 [21.59]	1.050 [26.67]	1.250 [31.75]	1.450 [36.83]
Height Max	0.220 [5.59]	0.280 [7.11]	0.300 [7.62]	0.220 [5.59]	0.400 [10.16]	0.280 [7.11]	0.500 [12.70]	0.600 [15.24]	0.720 [18.29]	0.400 [10.16]	0.500 [12.70]	0.600 [15.24]	0.720 [18.29]
Thickness Max	0.200 [5.08]	0.250 [6.35]	0.250 [6.35]	0.200 [5.08]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]	0.270 [6.86]
Lead Spacing ±0.030 [0.762]	0.170 [4.32]	0.220 [5.59]	0.275 [6.99]	0.300 [7.62]	0.375 [9.53]	0.400 [10.16]	0.475 [12.07]	0.575 [14.61]	0.675 [17.15]	0.700 [17.78]	0.975 [24.77]	1.175 [29.85]	1.300 [33.02]

High Voltage Radial Leaded Pulse Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 500 Vdc to 10 kVdc

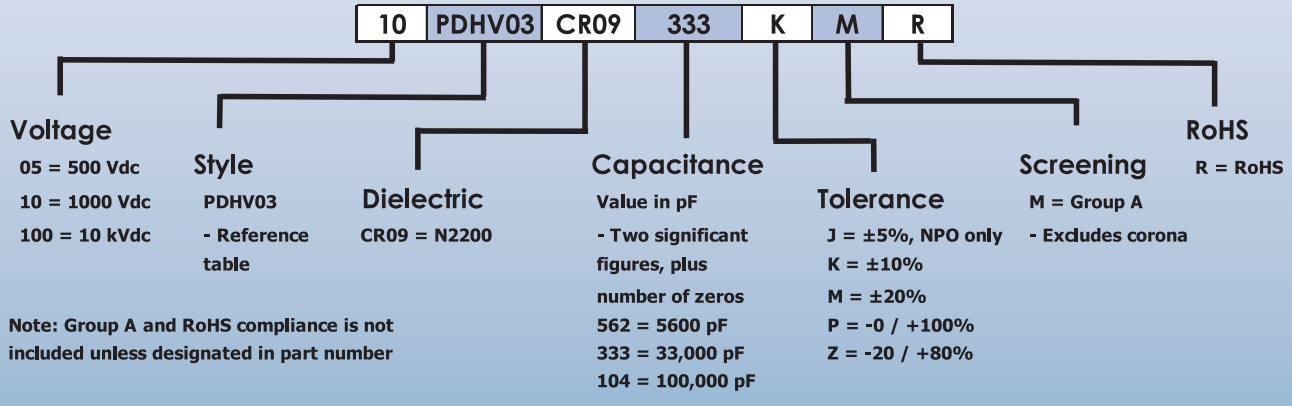
Electrical Characteristics

(CR09) Capacitance Range														
Style		PDHV01	PDHV02	PDHV03	PDHV10	PDHV04	PDHV11	PDHV05	PDHV06	PDHV07	PDHV13	PDHV14	PDHV15	PDHV16
Min Cap		121	181	221	181	271	281	271	471	471	471	471	471	471
WVDC	500	223	473	683	563	154	124	274	474	824	334	474	684	105
	1,000	153	333	393	333	104	683	184	274	684	224	394	564	824
	2,000	222	562	822	682	223	153	333	683	474	473	823	124	184
	3,000	•	332	472	332	123	103	223	393	104	273	563	823	124
	4,000	•	•	•	721	332	222	562	123	563	822	183	273	393
	5,000	•	•	•	•	•	152	472	103	183	562	123	183	273
	7,000	•	•	•	•	•	•	•	•	153	•	392	822	123
	10,000	•	•	•	•	•	•	•	•	•	•	272	472	822

Notes

1. Standard inspection and Group A testing when required, is performed in accordance with applicable requirements of MIL-PRF-49467.
2. Special testing including Ultrasound (C-SAM) and Partial Discharge (Corona) is available. Contact factory for more details.
3. Custom package sizes / aspect ratios, voltages and capacitance values available. Contact factory for more details.
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.
5. High voltage products may require additional conformal coating to prevent possible arc over,
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.

Part Number / Ordering Information

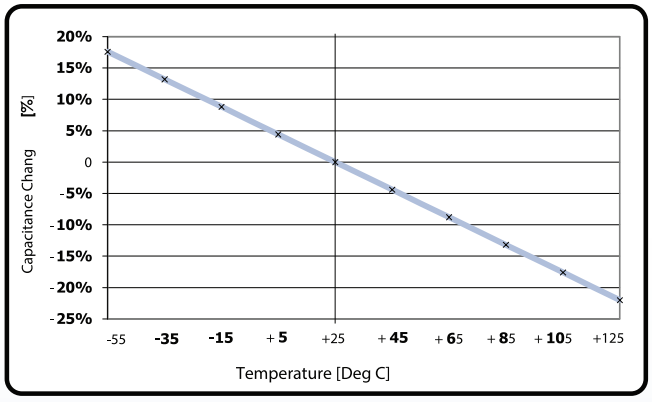


Note: Group A and RoHS compliance is not included unless designated in part number

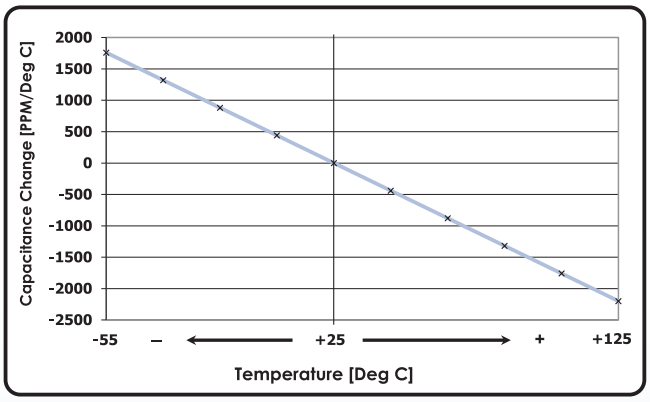
High Voltage Radial Leaded Pulse Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 500 Vdc to 10 kVdc

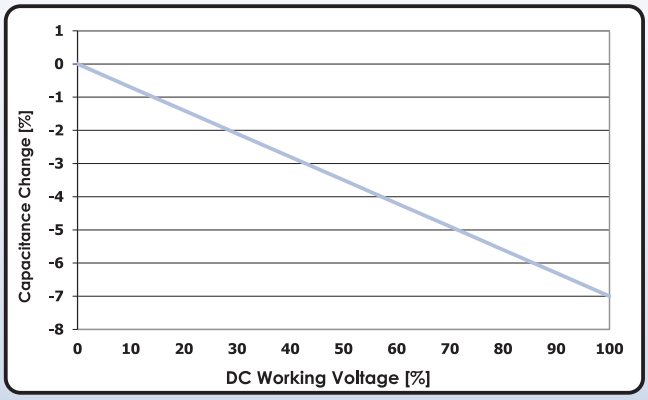
Performance Charts (Typical)



CR09 (N2200) Temperature Coefficient
% Cap Chance Vs Temp



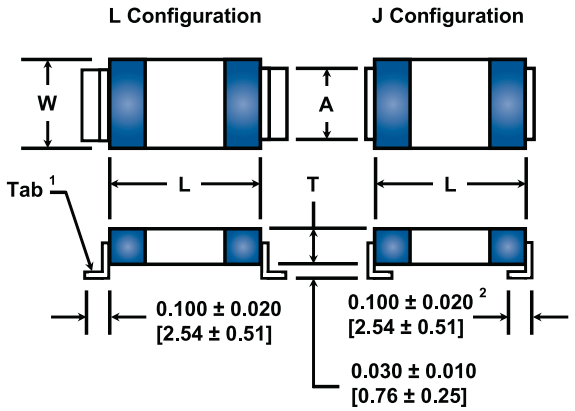
CR09 (N2200) Temperature Coefficient
PPM Cap Change Vs Temp



CR09 (N2200) Voltage Coefficient

High Voltage Surface Mount Pulse Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 500 Vdc to 10 kVdc



1. Tab thickness 0.009 ± 0.001 [0.25 ± 0.025]
2. Tab Length SM01, SM02, SM03 @ 0.040 ± 0.010 [1.02 ± 0.26]

CalRamic Technologies LLC manufactures a series of highly reliable, military / commercial level high voltage, leaded surface mount, ceramic chip capacitors that are intended for those environments where the assembly may be exposed to high levels of thermal and / or mechanical shock. Conservatively designed they are ideal for use in demanding high voltage, high current applications.

Intended for continuous operation at full rated voltage and across the entire operating temperature range, these capacitors utilize an inherently low loss dielectric material and a special internal design specifically intended to provide a device that exhibits very low ESR / ESL characteristics, especially at higher frequencies.

Available with stable CR09 dielectric material, these capacitors are ideally suited for high current, pulse discharge applications.

Performance Characteristics

Specification	Dielectric Type
	CR09
Material Classification	N2200 (R3L)
Coefficient of Thermal Expansion	11 x 10^{-6} / °C
Density	72 g / in^3
Operating Temperature Range	-55 to +125°C
Aging Rate	0
Temperature Coefficient	-2200 PPM / °C ±24% Max
Voltage Coefficient	-7% Max @ WVDC
Capacitance Range	120 pF to 1.0uF
Voltage Range	3 kVDC to 20 kVDC
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less
Dissipation Factor	0.2% Max
DWV	1.5 X WVDC ≤ 1250 Vdc or 1.2 X WVDC > 1250 Vdc

Mechanical Dimensions

Dimensions Inches [mm]	Product Style												
	PDSM01	PDSM02	PDSM03	PDSM10	PDSM04	PDSM11	PDSM05	PDSM06	PDSM07	PDSM13	PDSM14	PDSM15	PDSM16
Length [L]	0.150 ±0.015 [3.81 ±0.38]	0.200 ±0.020 [5.08 ±0.51]	0.250 ±0.025 [6.35 ±0.64]	0.300 ±0.030 [7.62 ±0.76]	0.350 ±0.030 [8.89 ±0.76]	0.400 ±0.030 [10.20 ±0.76]	0.450 ±0.030 [11.43 ±0.76]	0.550 ±0.030 [14.00 ±0.76]	0.650 ±0.030 [16.50 ±0.76]	0.700 ±0.030 [17.80 ±0.76]	0.900 ±0.030 [22.90 ±0.76]	1.100 ±0.030 [27.90 ±0.76]	1.300 ±0.030 [33.02 ±0.76]
Width [W]	0.150 ±0.015 [3.81 ±0.38]	0.200 ±.020 [5.08 ±0.51]	0.200 ±0.020 [5.08 ±0.51]	0.150 ±0.015 [3.81 ±0.38]	0.300 ±0.030 [7.62 ±0.76]	0.200 ±0.020 [5.08 ±0.51]	0.400 ±0.030 [10.16 ±0.76]	0.500 ±0.030 [12.70 ±0.76]	0.600 ±0.030 [10.20 ±0.76]	0.300 ±0.030 [7.62 ±0.76]	0.400 ±0.030 [10.16 ±0.76]	0.500 ±0.030 [12.70 ±0.76]	0.600 ±0.030 [10.20 ±0.76]
Thickness [T] [Max]	0.140 [3.55]	0.180 [4.57]	0.180 [4.57]	0.140 [3.55]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]
Tab [A] [Max]	0.100 [2.54]	0.100 [2.54]	0.100 [2.54]	0.100 [2.54]	0.200 5.08]	0.100 [2.54]	0.300 [7.62]	0.400 [10.2]	0.500 [12.7]	0.200 5.08]	0.300 [7.62]	0.400 [10.2]	0.500 [12.7]

High Voltage Surface Mount Pulse Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 500 Vdc to 10 kVdc

MADE IN USA

E

Electrical Characteristics

(CR09) Capacitance Range														
Style		PDSM01	PDSM02	PDSM03	PDSM10	PDSM04	PDSM11	PDSM05	PDSM06	PDSM07	PDSM13	PDSM14	PDSM15	PDSM16
Min Cap		121	181	221	181	271	281	271	471	471	471	471	471	471
WVDC	500	223	473	683	563	154	124	274	474	824	334	474	684	105
	1,000	153	333	393	333	104	683	184	274	684	224	394	564	824
	2,000	222	562	822	682	223	153	333	683	474	473	823	124	184
	3,000	•	332	472	332	123	103	223	393	104	273	563	823	124
	4,000	•	•	•	721	332	222	562	123	563	822	183	273	393
	5,000	•	•	•	•	•	152	472	103	183	562	123	183	273
	7,000	•	•	•	•	•	•	•	•	153	•	392	822	123
	10,000	•	•	•	•	•	•	•	•	•	•	272	472	822

Notes

1. Standard inspection and Group A testing when required, is performed in accordance with applicable requirements of MIL-PRF-49467.
2. Special testing including Ultrasound (C-SAM) and Partial Discharge (Corona) is available. For more information contact factory.
3. Custom package sizes / aspect ratios, voltages and capacitance values available. Contact factory for more details.
4. Large ceramic capacitors, even leaded devices, are susceptible to damage when exposed to thermal and/or mechanical shock. Refer to Technical Bulletin AN101/AN112 for handling and installation recommendations.
5. High voltage products may require conformal coating to prevent possible arc over.
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.

Part Number / Ordering Information

10	PDSM03	CR09	333	K	M	R

Voltage
05 = 500 Vdc
10 = 1000 Vdc
100 = 10 kVdc

Style
PDSM03
- Reference table

Dielectric
CR09 = N2200

Capacitance
Value in pF
- Two significant figures, plus number of zeros
562 = 5600 pF
333 = 33,000 pF
104 = 100,000 pF

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

Screening
M = Group A
- Excludes corona

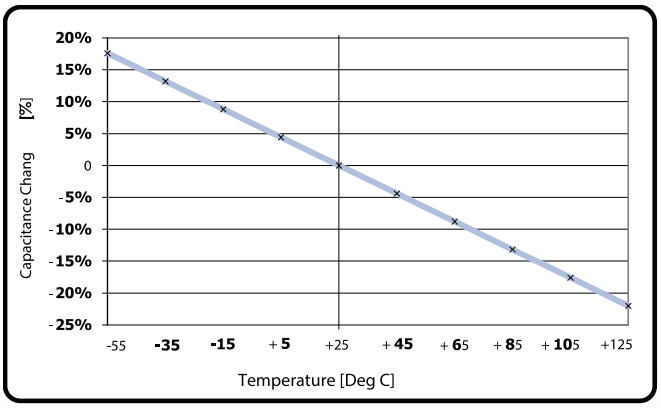
RoHS
R = RoHS

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

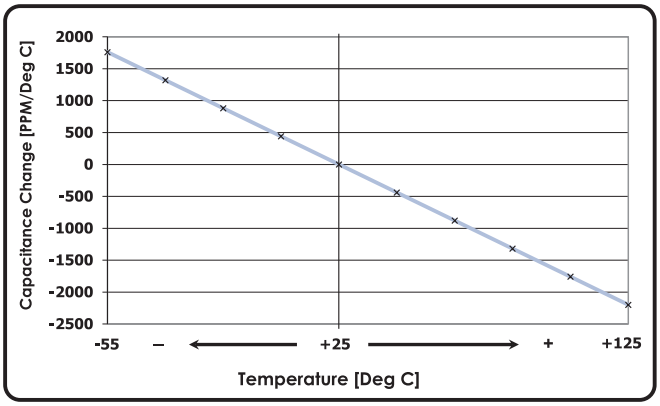
High Voltage Surface Mount Pulse Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 500 Vdc to 10 kVdc

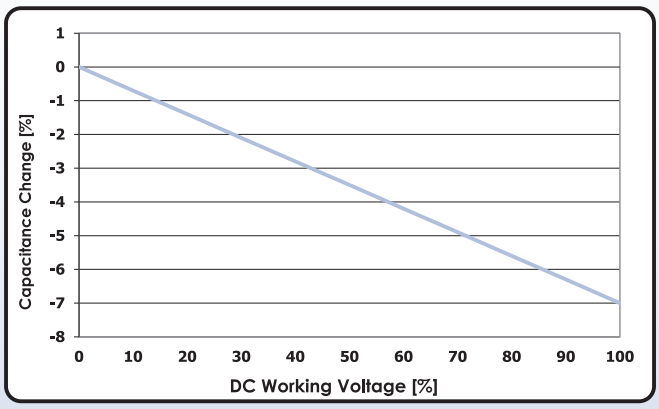
Performance Charts (Typical)



CR09 (N2200) Temperature Coefficient
% Cap Chance Vs Temp



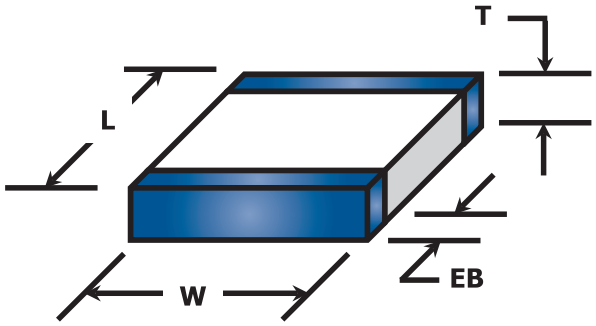
CR09 (N2200) Temperature Coefficient
PPM Cap Change Vs Temp



CR09 (N2200) Voltage Coefficient

High Voltage Multi-Layer Pulse Chip Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 500 Vdc to 10 kVdc



CalRamic Technologies LLC manufactures a series of highly reliable, military / commercial level high voltage, multi-layer ceramic chip capacitors that are conservatively designed and intended specifically for use in demanding high current, high voltage applications.

Intended for continuous operation at full rated voltage and across the entire operating temperature range, these capacitors utilize an inherently low loss dielectric material and a special internal design specifically intended to provide a device that exhibits very low ESR / ESL characteristics, especially at higher frequencies.

Available with stable CR09 dielectric material, these capacitors are ideally suited for high current pulse discharge applications.

E

Performance Characteristics

Specification	Dielectric Type
	CR09
Material Classification	N2200 (R3L)
Coefficient of Thermal Expansion	11 x 10^{-6} / °C
Density	72 g / in^3
Operating Temperature Range	-55 to +125°C
Aging Rate	Negligible
Temperature Coefficient	-2200 PPM / °C ±24% Max
Voltage Coefficient	-7% Max @ WVDC
Capacitance Range	120 pF to 1.0 µF
Voltage Range	500 VDC to 10 kVDC
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less
Insulation Resistance @ +125°C	10,000 MΩ or 100 MΩ - µF, W/E is less
Dissipation Factor	0.2% Max
DWV	1.5 X WVDC ≤ 1250 Vdc / 1.2 X WVDC > 1250 Vdc

Mechanical Dimensions

Dimensions in [mm]	Product Style																
	HV1515	HV1812	HV1825	HV2020	HV2225*	HV2520*	HV3333*	HV3530*	HV4040*	HV4540*	HV5440*	HV5550*	HV6560*	HV7030*	HV9040*	HV11050*	HV13060*
Length [L] Tol ±	0.150 [3.81] 0.015 [0.38]	0.180 [4.57] 0.020 [0.51]	0.180 [4.57] 0.020 [0.51]	0.200 [5.08] 0.020 [0.51]	0.220 [5.59] 0.020 [0.51]	0.250 [6.35] 0.020 [0.51]	0.330 [8.38] 0.030 [0.76]	0.350 [8.89] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.450 [11.43] 0.030 [0.76]	0.540 [13.7] 0.030 [0.76]	0.550 [14.0] 0.030 [0.76]	0.650 [16.5] 0.030 [0.76]	0.700 [17.8] 0.030 [0.76]	0.900 [22.9] 0.030 [0.76]	1.100 [27.9] 0.030 [0.76]	1.300 [33.0] 0.030 [0.76]
Width [W] Tol ±	0.150 [3.81] 0.015 [0.38]	0.120 [4.57] 0.015 [0.38]	0.250 [6.35] 0.020 [0.51]	0.200 [5.08] 0.020 [0.51]	0.250 [6.35] 0.020 [0.51]	0.200 [5.08] 0.020 [0.51]	0.330 [8.38] 0.030 [0.76]	0.300 [7.62] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.500 [12.7] 0.030 [0.76]	0.600 [15.2] 0.030 [0.76]	0.300 [7.62] 0.030 [0.76]	0.400 [10.2] 0.030 [0.76]	0.500 [12.7] 0.030 [0.76]	0.600 [15.2] 0.030 [0.76]
Thickness [T] Max	0.140 [3.55]	0.100 [2.54]	0.160 [4.07]	0.180 [4.57]	0.200 [5.08]	0.180 [4.57]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]	0.220 [5.59]
EB Min - Max	0.010 - 0.030 [0.254 - 0.762]	0.010 - 0.040 [0.254 - 1.02]	0.010 - 0.040 [0.254 - 1.02]	0.010 - 0.040 [0.254 - 1.02]	0.010 - 0.040 [0.254 - 1.02]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]	0.020 - 0.060 [0.51 - 1.52]

* Surface Mount Tabs Recommended - See Page 58

High Voltage Multi-Layer Pulse Chip Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 500 Vdc to 10 kV

Electrical Characteristics

(CR09) Capacitance Range																	
Style		1515	1812	1825	2020	2225	2520	3015	3530	4020	4040	4540	5550	6560	7030	9040	11050	13060
Min Cap		121	121	121	181	181	221	181	271	281	271	271	471	471	471	471	471	471
WVDC	500	223	223	563	473	104	683	563	154	124	274	274	474	824	334	474	684	105
	1000	153	123	393	333	683	393	333	104	683	154	184	274	684	224	394	564	824
	2000	222	202	682	562	822	822	682	223	153	333	333	683	474	473	823	124	184
	3000	•	•	332	332	562	472	332	123	103	223	223	393	104	273	563	823	124
	4000	•	•	•	•	•	•	721	332	222	562	562	123	563	822	183	273	393
	5000	•	•	•	•	•	•	•	•	152	472	472	103	183	562	123	183	273
	7000	•	•	•	•	•	•	•	•	•	•	•	•	153	•	392	822	123
	10000	•	•	•	•	•	•	•	•	•	•	•	•	•	•	272	472	822

Notes

1. Standard inspection and Group A testing when required, is performed in accordance with applicable requirements of MIL-PRF-49467.
2. Special testing including Ultrasound (C-SAM) and Partial Discharge (Corona) is available. Contact factory for more information.
3. Custom package sizes / aspect ratios, voltages and capacitance values available. Contact factory for more details.
4. Large ceramic capacitors are susceptible to damage when exposed to thermal and/or mechanical shock. Refer to Technical Bulletin AN101/AN112 for handling and installation recommendations.
5. High voltage products may require conformal coating to prevent possible arc over.
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.

Part Number / Ordering Information

PD2520	CR09	472	K	302	N	M

Style
PD2520
- Ref table

Dielectric
CR09 = N2200

Capacitance
Value in pF
- Two significant figures, plus number of zeros
221 = 220 pF
472 = 4,700 pF

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

Voltage
501 = 500 Vdc
302 = 3000 Vdc
103 = 10 kVdc

Termination
P = Pd/Ag S = Ag
N = Ni barrier / 100% Sn plate (≤ 2520 Pkg)
Y = Ni barrier / Sn-Pb plate (≤2520 Pkg)

Screening
M = Group A
- Excludes Partial Discharge (Corona)

Note: Group A Screening is not included unless indicated in part number
Capacitors terminated with P, S or N terminations are classified as RoHS compliant

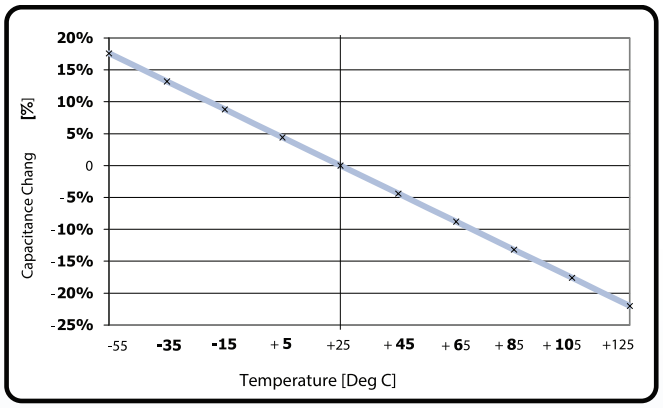
High Voltage Multi-Layer Pulse Chip Capacitors

Military & Commercial Level Class 1 Negative TC Low Loss – 500 Vdc to 10 kV

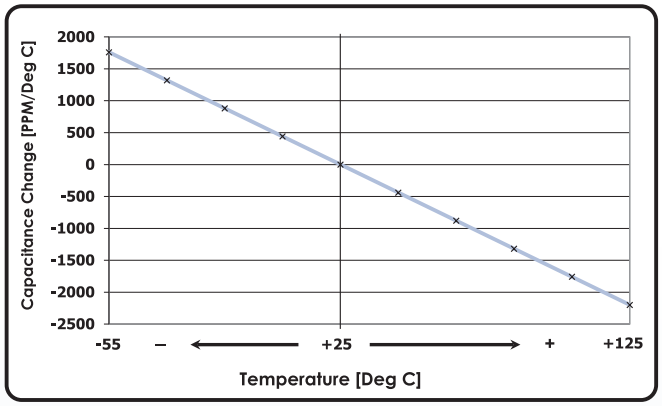
MADE IN USA

E

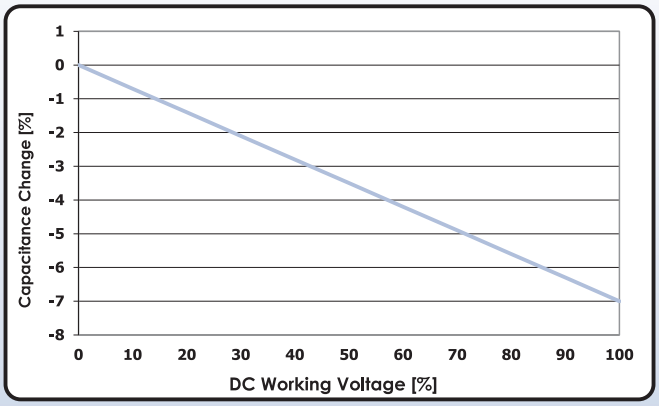
Performance Charts (Typical)



CR09 (N2200) Temperature Coefficient
% Cap Chance Vs Temp



CR09 (N2200) Temperature Coefficient
PPM Cap Change Vs Temp

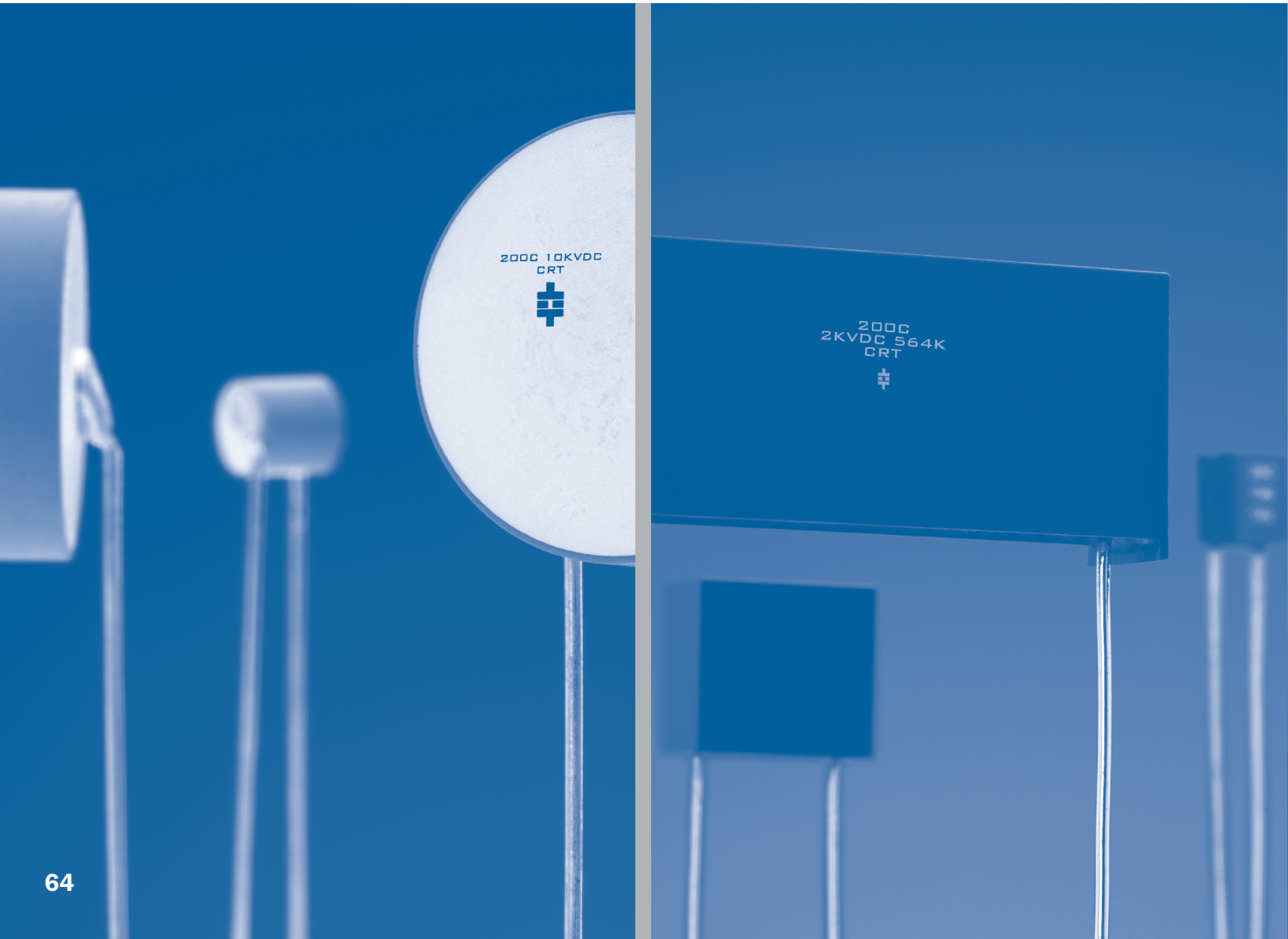


CR09 (N2200) Voltage Coefficient

High Temperature
50 Volt to 20,000 Volt 200° Rated

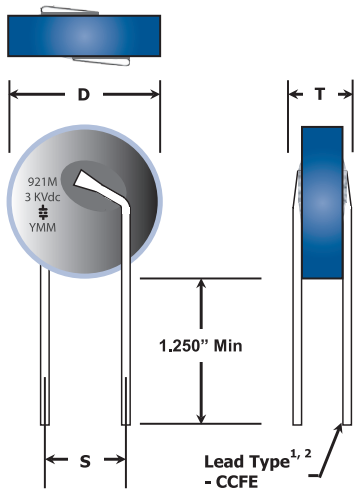
CalRamic Technologies LLC

(775) 851-3580 / calramic.com / 5462 Louie Lane / Reno, NV 89511 USA



High Voltage Radial Leaded Disc Capacitors

200ºC Rated NPO & HTX7R – 3 kVdc to 20kVdc



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
3. Order of marking may vary depending on size of capacitor.

CalRamic Technologies LLC manufactures a series of highly reliable, single layer, leaded ceramic disc capacitors that are designed and manufactured under strict quality control guidelines to ensure unparalleled performance in high temperature, 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, X7R type dielectric materials, which are intended for those applications where higher 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 intended for the high temperature down-hole, automotive and industrial markets.

Performance Characteristics

Specification	Dielectric Type (EIA Designation)	
	HTNPO (COG)	HTX7R
Material Classification	Type I, Ultra Stable, K76	Type II, Stable, K2350
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C
Density	76 g / in^3	
Operating Temperature Range	-55 to +200°C	
Aging Rate	0	-2% Max per decade hour
Temperature Coefficient	±30 PPM / °C	+15 / -70%
Capacitance Range	1.4 pF to 350 pF	42 pF to 0.012 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 @ +200°C	1000 MΩ or 10 MΩ - µF, W/E is less	
Dissipation Factor	0.1% Max	2.5% Max
DWV	1.5 x WVDC	

General Information

1. Standard inspection and Group A testing, when required, is performed in accordance with applicable requirements of MIL-PRF-49467, DSCC 87125, DSCC 89087 and NASA GSFC S-311-15C.
2. Special testing including 100% Partial Discharge (Corona) is available upon request.
3. Custom voltages, package sizes, lead configurations and capacitance values available. Contact factory.
4. Higher voltage parts may require encapsulation to prevent surface arc over and breakdown. When required, parts should first be cleaned and oven dried at +85ºC. A suitable encapsulant, capable of withstanding the extreme conditions associated with these applications, may be used and de-airing of coatings is recommended.
5. Testing of higher voltage parts before installation and / or supplemental encapsulation, may be done in a suitable, non-contaminating dielectric fluid like FC-40.
6. 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

200ºC Rated NPO & HTX7R – 3 kVdc to 20kVdc

Electrical / Mechanical Characteristics

Working Voltage	Disc Style	Dimensions [in]			Capacitance Range [pF]			
		D Max	S ± 0.030	T Max	HTNPO (N)		HTX7R (X)	
					Min	Max	Min	Max
3 kVDC	D30	0.300	0.250	0.210	8.4	12	260	350
	D40	0.400	0.250	0.210	12	24	380	730
	D50	0.500	0.375	0.210	28	46	870	1400
	D60	0.600	0.375	0.210	38	61	1200	1900
	D70	0.700	0.500	0.210	63	95	2000	2900
	D80	0.800	0.500	0.210	94	110	2900	3500
	D90	0.900	0.500	0.210	110	160	3500	5000
	D100	1.000	0.500	0.210	150	200	4700	6200
	D120	1.200	0.500	0.210	200	310	6200	9500
	D140	1.400	0.625	0.210	310	350	9600	12000
5 kVDC	D30	0.300	0.250	0.250	5.1	6.9	150	210
	D40	0.400	0.250	0.250	7.3	15	230	440
	D50	0.500	0.375	0.250	17	28	520	860
	D60	0.600	0.375	0.250	23	37	700	1100
	D70	0.700	0.500	0.250	38	57	1200	1800
	D80	0.800	0.500	0.250	57	69	1800	2100
	D90	0.900	0.500	0.250	69	97	2100	3000
	D100	1.000	0.500	0.250	92	120	2900	3700
	D120	1.200	0.500	0.250	120	180	3800	5700
	D140	1.400	0.625	0.250	190	230	5800	7000
7.5 kVDC	D30	0.300	0.250	0.310	3.4	4.6	100	150
	D40	0.400	0.250	0.310	5	9.6	150	300
	D50	0.500	0.375	0.310	12	19	350	580
	D60	0.600	0.375	0.310	15	25	470	750
	D70	0.700	0.500	0.310	25	38	780	1200
	D80	0.800	0.500	0.310	37	46	1200	1400
	D90	0.900	0.500	0.310	45	65	1400	2000
	D100	1.000	0.500	0.310	60	80	1900	2500
	D120	1.200	0.500	0.310	80	120	2500	3800
	D140	1.400	0.625	0.310	120	150	3800	4700
10 kVDC	D30	0.300	0.250	0.365	2.5	3.5	78	110
	D40	0.400	0.250	0.365	3.8	7.2	110	220
	D50	0.500	0.375	0.365	8.5	14	260	430
	D60	0.600	0.375	0.365	12	18	350	560
	D70	0.700	0.500	0.365	19	28	580	880
	D80	0.800	0.500	0.365	28	34	870	1100
	D90	0.900	0.500	0.365	34	48	1000	1500
	D100	1.000	0.500	0.365	46	60	1400	1800
	D120	1.200	0.500	0.365	60	93	1900	2800
	D140	1.400	0.625	0.365	94	110	2900	3500
15 kVDC	D30	0.300	0.250	0.474	1.6	2.3	52	71
	D40	0.400	0.250	0.475	2.4	4.8	76	150
	D50	0.500	0.375	0.475	5.7	9.4	180	290
	D60	0.600	0.375	0.475	7.7	12	230	370
	D70	0.700	0.500	0.475	12	20	390	590
	D80	0.800	0.500	0.475	19	23	580	710
	D90	0.900	0.500	0.475	23	32	690	1000
	D100	1.000	0.500	0.475	30	40	950	1200
	D120	1.200	0.500	0.475	40	60	1300	1900
	D140	1.400	0.625	0.475	60	77	1900	2300
20 kVDC	D50	0.500	0.375	0.575	4.6	6.8	140	210
	D60	0.600	0.375	0.575	6.2	8.9	190	270
	D70	0.700	0.500	0.575	10	14	310	430
	D80	0.800	0.500	0.575	15	17	470	520
	D90	0.900	0.500	0.575	18	23	560	720
	D100	1.000	0.500	0.575	24	30	760	900
	D120	1.200	0.500	0.575	32	45	1000	1400
	D140	1.400	0.625	0.575	50	56	1600	1700

High Voltage Radial Leaded Disc Capacitors

200ºC Rated NPO & HTX7R – 3 kVdc to 20kVdc

MADE IN USA

F

Part Number / Ordering Information

HT	D100	D50	X	331	K

Series
HT = High Temp +200 ºC

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

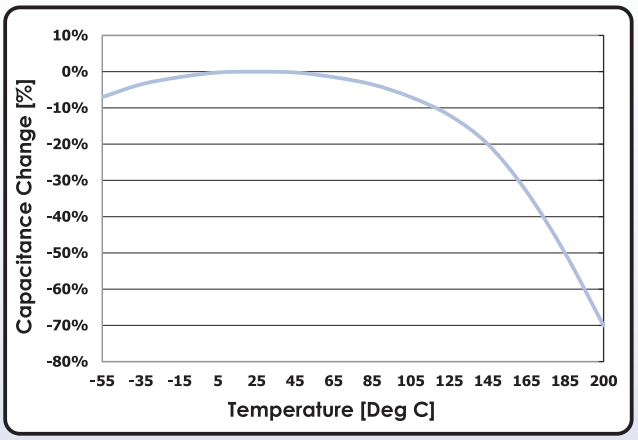
Style
D50
- Reference table

Dielectric
N = HTNPO
X = HTX7R

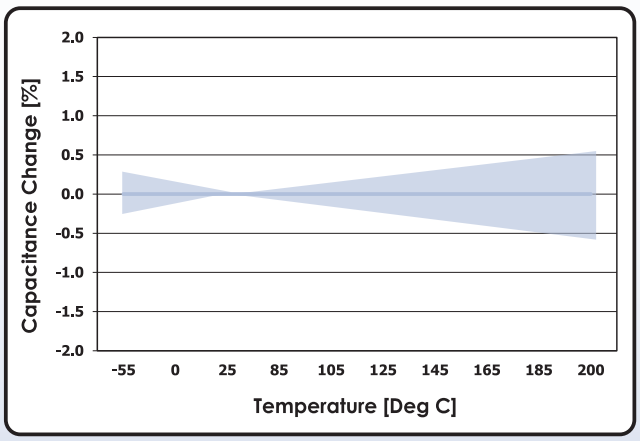
Capacitance
Value in pF
- Two significant figures, plus number of zeros
1R4 = 1.4 pF
120 = 12 pF
331 = 330pF
192 = 1900 pF

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

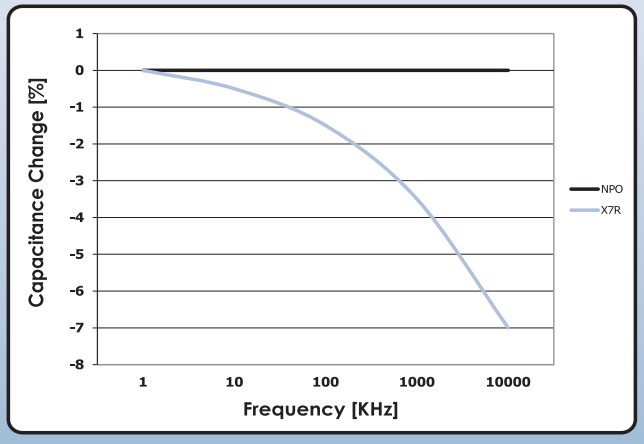
Performance Charts (Typical)



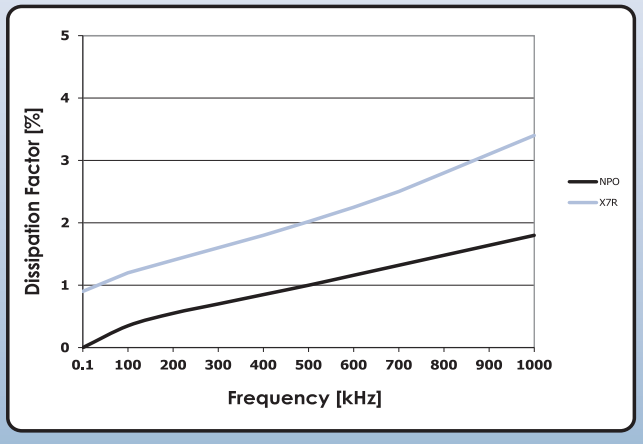
HTX7R Temperature Coefficient



HTNPO Temperature Coefficient



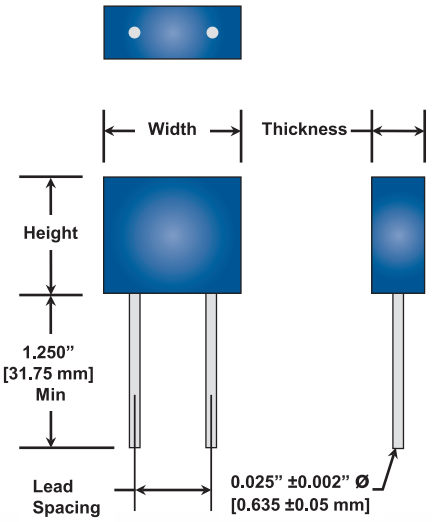
Capacitance Vs Frequency



Dissipation Factor Vs Frequency

High Temperature – High Voltage Leaded Capacitors

200°C Rated NPO & HTX7R – 50 Vdc to 10kVdc



1. Lead Type: #22 AWG, CCFE silver plated or solid nickel.

CalRamic Technologies LLC manufactures a series of highly reliable, encapsulated radial / axial leaded ceramic capacitors that are designed specifically for those severe conditions where the capacitor may be exposed to elevated levels of mechanical stress and high temperature conditions. These assemblies are packaged in a high resistance, high temperature rated case and backfilled with a high temperature epoxy that provides enhanced electrical isolation and added environmental protection.

Intended for continuous operation at full rated voltage and across the entire operating temperature range of -55 to +200°C, these capacitors utilize a special internal design specifically intended to reduce electric field stresses, thereby providing a device that exhibits very low ESR characteristics and no reduction in insulation resistance with life.

Available with ultra stable Class I, NPO and stable Class II, X7R dielectric materials, these capacitors are ideally suited for a variety of extreme applications associated with the high temperature aerospace, down-hole mining and automotive industries.

Performance Characteristics

Specification	Dielectric Type (EIA Designation)		
	NPO (COG)	HTX7R	HTX7R [Extended Range]
Material Classification	Type I, Ultra Stable, K90	Type II, Stable, K2100	Type II, Stable, K2500
Coefficient of Thermal Expansion	9 x 10^{-6} / °C	11 x 10^{-6} / °C	
Density	72 g / in^3		
Operating Temperature Range	-55 to +200°C		
Aging Rate	0	-2% Max per decade hour	
Temperature Coefficient	±60 PPM / °C	+15 / -40%	+15 / -60%
Voltage Coefficient	Negligible	-20% Max @ WVDC	-35% Max @ WVDC
Maximum Capacitance	0.10 µF HTR / 0.010 µF HTA	1.8 µF HTR / 0.68 µF HTA	2.7 µF HTR / 1.0 µF HTA
Voltage Range	50 VDC to 10 kVDC		
Insulation Resistance @ +25°C	100,000 MΩ or 1000 MΩ - µF, W/E is less		
Insulation Resistance @ +200°C	100 MΩ or 1 MΩ - µF, W/E is less		
Dissipation Factor	0.1% Max	2.0% Max	
DWV	2 x WVDC @ WVDC ≤ 200 VDC / 1.5 x WVDC @ ≤ 1 kVDC / 1.2 x WVDC @ WVDC > 1 kVDC		

Mechanical Dimensions

Dimensions inches [mm]	Product Style						
	HTR01	HTR02	HTR03	HTR04	HTR05	HTR06	HTR07
Width Max	0.200 [5.08]	0.200 [5.08]	0.200 [5.08]	0.300 [7.60]	0.500 [12.70]	0.700 [17.80]	1.500 [38.10]
Height Max	0.200 [5.08]	0.200 [5.08]	0.200 [5.08]	0.300 [7.60]	0.500 [12.70]	0.400 [10.16]	0.750 [19.05]
Thickness Max	0.100 [2.54]	0.100 [2.54]	0.150 [3.81]	0.150 [3.81]	0.250 [6.35]	0.250 [6.35]	0.300 [7.62]
Lead Spacing ±0.030 [0.762]	0.100 [2.54]	0.200 [5.08]	0.100 [2.54]	0.200 [5.08]	0.400 [10.16]	0.500 [12.70]	1.375 [34.93]

High Temperature – High Voltage Leaded Capacitors

200°C Rated NPO & HTX7R – 50 Vdc to 10kVdc

MADE IN USA

F

Electrical Characteristics

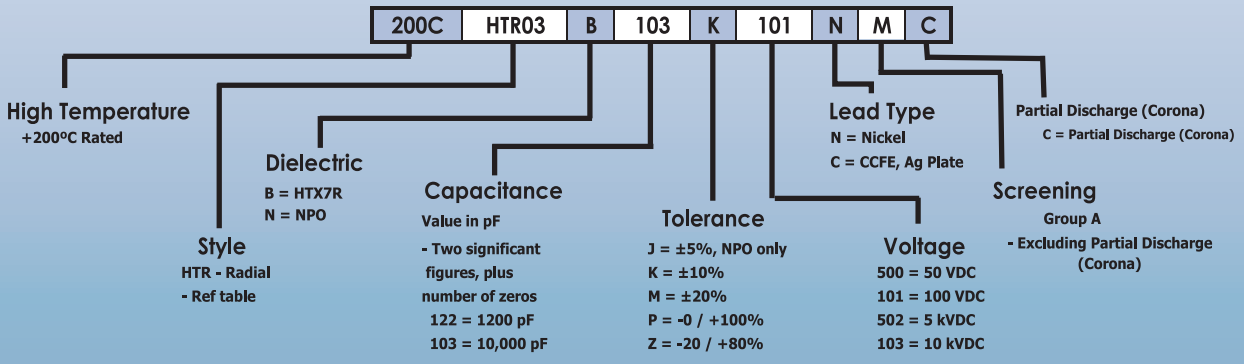
HTNPO Capacitance Range [Max]								
Style		HTR01	HTR02	HTR03	HTR04	HTR05	HTR06	HTR07
WVDC	50	562	562	562	253	683	104	•
	100	472	472	472	223	563	823	•
	200	392	392	392	183	473	683	•
	500	182	182	272	103	333	473	•
	1000	561	561	102	332	183	273	104
	2000	•	•	•	561	392	562	223
	3000	•	•	•	•	272	392	153
	4000	•	•	•	•	681	222	472
	5000	•	•	•	•	•	102	372
	10000	•	•	•	•	•	•	122

HTX7R Capacitance Range														
Style		HTR01		HTR02		HTR03		HTR04		HTR05		HTR06		HTR07	
Cap Range		STD	EXT	STD	EXT	STD	EXT	STD	EXT	STD	EXT	STD	EXT	STD	EXT
WVDC	50	823	124	823	124	823	124	474	824	125	185	185	275	•	•
	100	683	104	683	104	683	104	394	684	105	155	155	225	•	•
	200	273	393	273	393	393	563	154	224	564	824	824	125	•	•
	500	392	562	392	562	682	103	223	333	224	334	334	474	•	•
	1000	102	152	102	152	182	272	562	822	563	823	823	124	394	564
	2000	•	•	•	•	•	•	102	152	153	223	183	273	863	124
	3000	•	•	•	•	•	•	•	•	562	822	822	103	333	473
	4000	•	•	•	•	•	•	•	•	252	392	392	562	153	183
	5000	•	•	•	•	•	•	•	•	•	•	222	332	103	123
	10000	•	•	•	•	•	•	•	•	•	•	•	•	222	332

Notes

1. Group A screening available to MIL-PRF-49467 at +200°C. [Voltage conditioning performed at 1.5 x WVDC for product rated at ≤ 200 VDC].
2. Special testing including Partial Discharge (Corona) is available for product rated at ≥500 VDC. Contact factory for more information.
3. Custom voltages, package sizes and capacitance values available. Contact factory.
4. X7R dielectrics are not intended for AC line filtering applications.
5. 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.

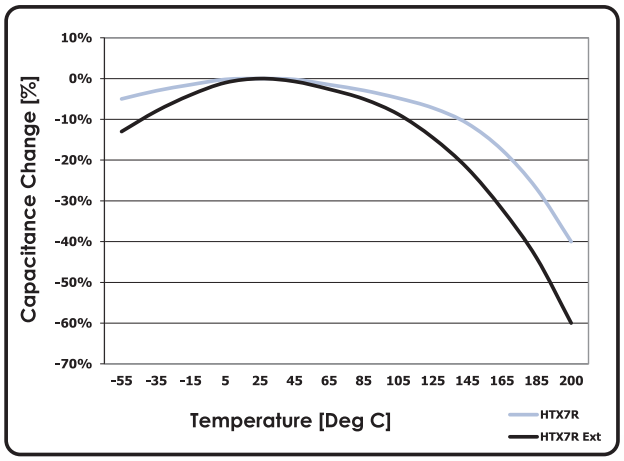
Part Number / Ordering Information



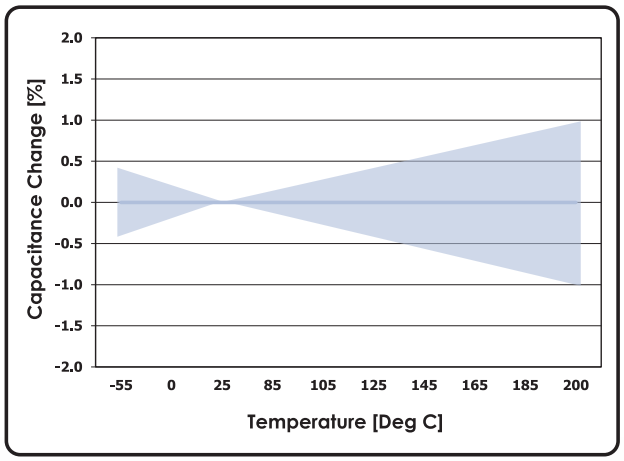
High Temperature – High Voltage Leaded Capacitors

200ºC Rated NPO & HTX7R – 50 Vdc to 10kVdc

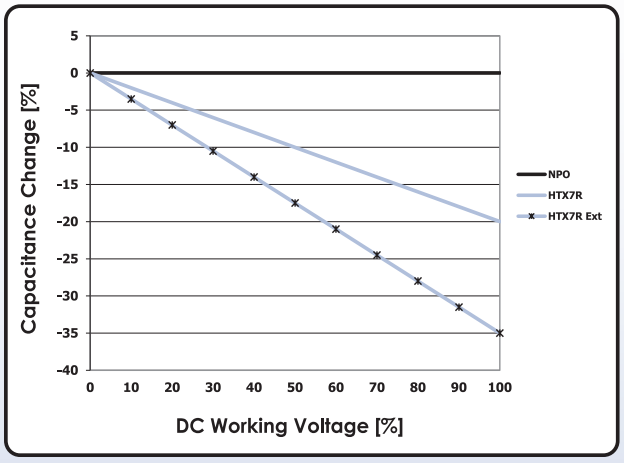
Performance Charts (Typical)



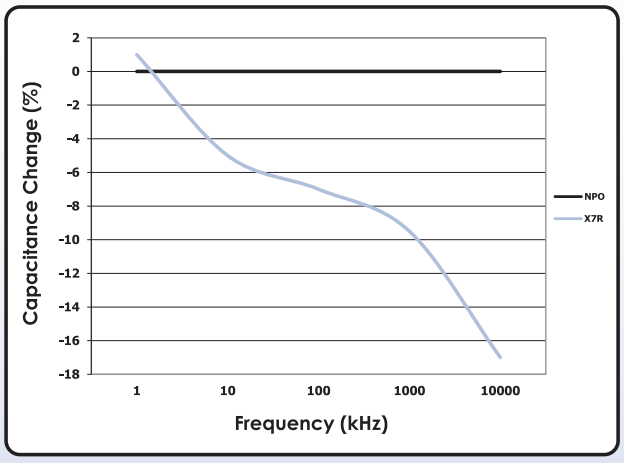
HTX7R Temperature Coefficient



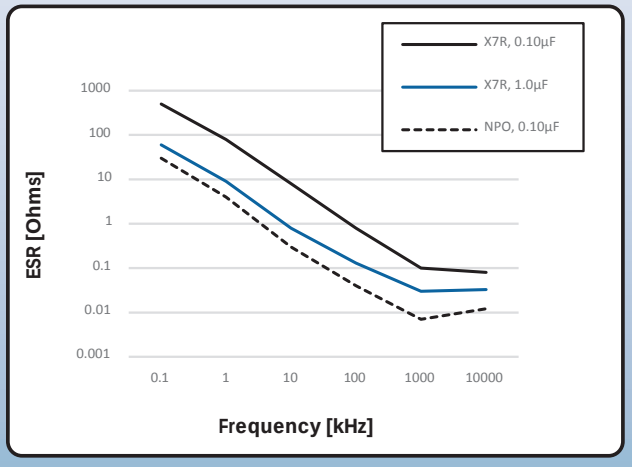
HTNPO Temperature Coefficient



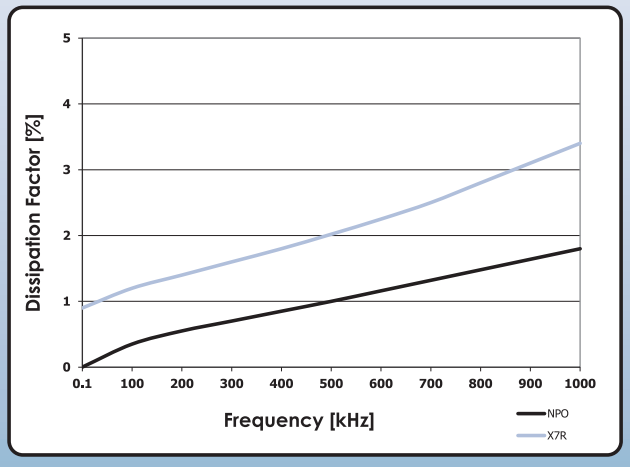
Voltage Coefficient



Capacitance Vs Frequency



ESR Vs Frequency



DF Vs Frequency

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
Program Controller C310
NEW ELEMENTS 1/09
Nabertherm
15
1
400 VOLTS

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 guide-lines, 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

www.CalRamic.com

CalRamic
Technologies LLC

Phone (775) 851-3580 / Fax (775) 851-3582
5462 Louie Lane, Reno, Nevada 89511

CERTIFIED QUALITY MANAGEMENT SYSTEM
ISO 9001:2015

MADE IN USA