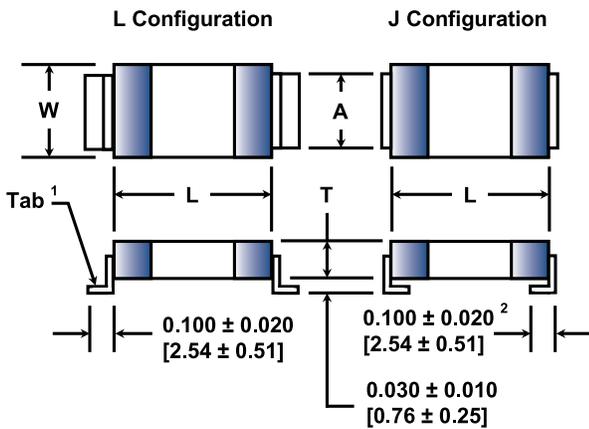


# High Voltage Surface Mount Capacitors

## Military & Commercial Grade – 500 Vdc to 10 KVdc



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	$9 \times 10^{-6} / ^\circ\text{C}$	$11 \times 10^{-6} / ^\circ\text{C}$
Density	67 g / in <sup>3</sup>	
Operating Temperature Range	-55 to +125°C	
Aging Rate	0	-2% Max per decade hour
Temperature Coefficient	$\pm 30$ PPM / °C	$\pm 15\%$
Voltage Coefficient	Negligible	Range -35% to -55% Max @ WVDC
Capacitance Range	10 pF to 0.33 $\mu\text{F}$	150 pF to 5.6 $\mu\text{F}$
Voltage Range	500 Vdc to 10KVdc	
Insulation Resistance @ +25°C	100,000 M $\Omega$ or 1000 M $\Omega$ - $\mu\text{F}$ , W/E is less	
Insulation Resistance @ +125°C	10,000 M $\Omega$ or 100 M $\Omega$ - $\mu\text{F}$ , W/E is less	
Dissipation Factor	0.1% Max	2.5% Max
DWV	1.5 x WVDC @ WVDC = 500 Vdc / 1.2 x WVDC @ WVDC > 500 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]	1.150 ± 0.030 [29.20 ± 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 [15.20 ± 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 [15.20 ± 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]	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]

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## Electrical Characteristics

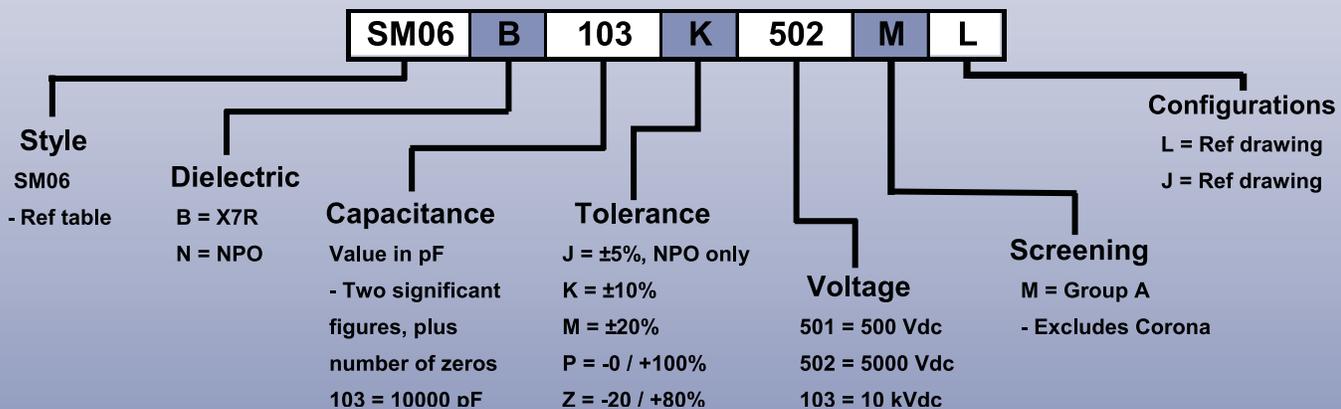
NPO Capacitance Range														
Style	S M01	S M02	S M03	S M04	S M05	S M06	S M07	S M10	S M11	S M13	S M14	S M15	S M16	
Min Cap	120	220	270	270	180	270	470	100	100	120	180	330	560	
WVDC	500	472	822	103	223	563	823	104	103	183	823	104	224	334
	1000	152	392	682	183	333	473	683	472	123	393	563	104	154
	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

X7R Capacitance Value														
Style	S M01	S M02	S M03	S M04	S M05	S M06	S M07	S M10	S M11	S M13	S M14	S M15	S M16	
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

### Notes

1. Group A screening available to MIL-PRF-49467.
2. Special testing including Ultrasound (SLAM / CSAM) 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 for handling and installation recommendations.
6. High voltage products may require conformal coating to prevent possible arc over.

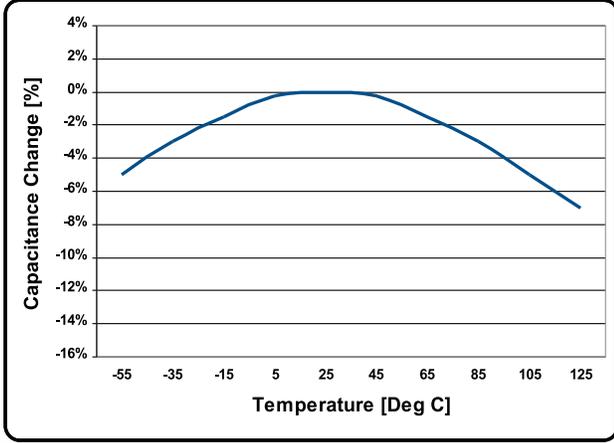
### Part Number / Ordering Information



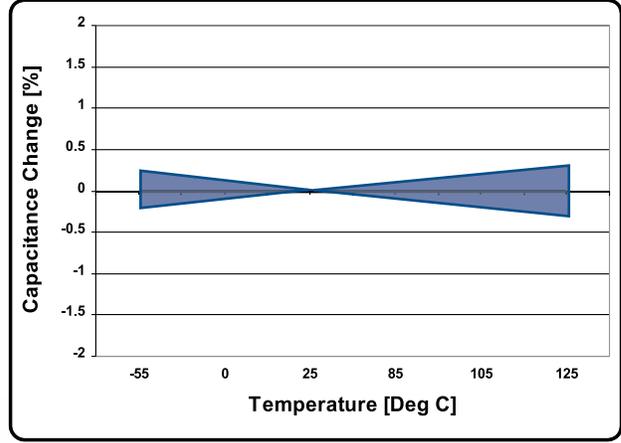
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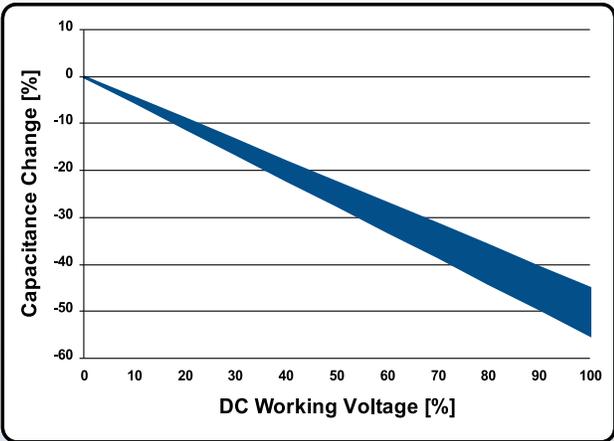
## Performance Charts (Typical)



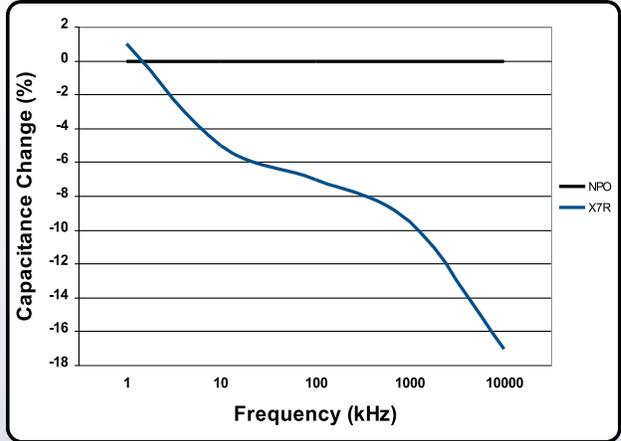
X7R Temperature Coefficient



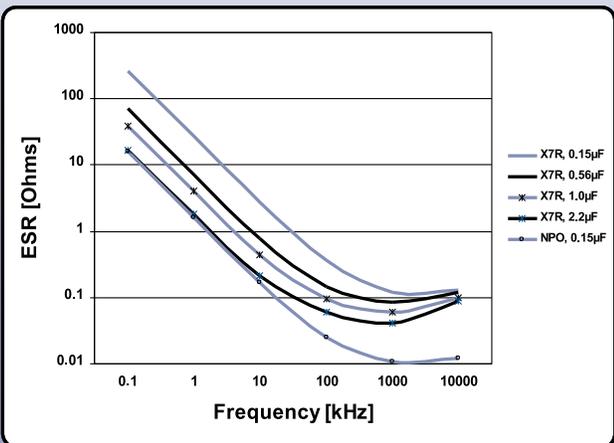
NPO Temperature Coefficient



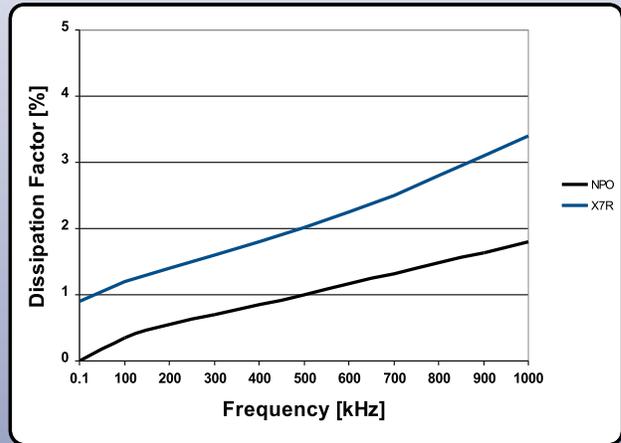
Voltage Coefficient [BR]



Capacitance Vs Frequency



ESR Vs Frequency



DF Vs Frequency