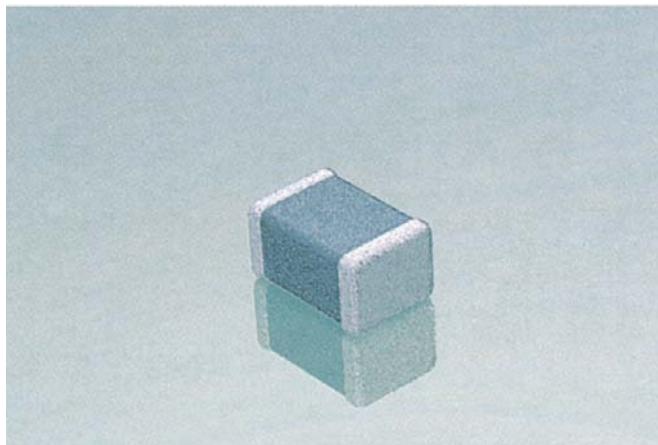


C0G (NP0) Dielectric

General Specifications



C0G (NP0) is the most popular formulation of the "temperature-compensating," EIA Class I ceramic materials. Modern C0G (NP0) formulations contain neodymium, samarium and other rare earth oxides.

C0G (NP0) ceramics offer one of the most stable capacitor dielectrics available. Capacitance change with temperature is $0 \pm 30\text{ppm}/^\circ\text{C}$ which is less than $\pm 0.3\% \Delta C$ from -55°C to $+125^\circ\text{C}$. Capacitance drift or hysteresis for C0G (NP0) ceramics is negligible at less than $\pm 0.05\%$ versus up to $\pm 2\%$ for films. Typical capacitance change with life is less than $\pm 0.1\%$ for C0G (NP0), one-fifth that shown by most other dielectrics. C0G (NP0) formulations show no aging characteristics.

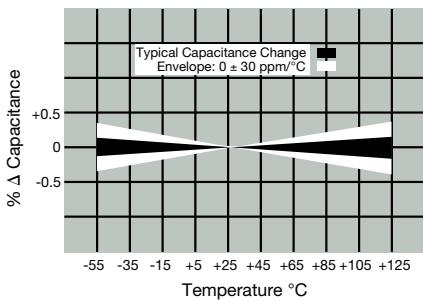
PART NUMBER (see page 2 for complete part number explanation)

0805	5	A	101	J	A	T	2	A
Size (L" x W")	Voltage 6.3V = 6 10V = Z 16V = Y 25V = 3 50V = 5 100V = 1 200V = 2 500V = 7	Dielectric C0G (NP0) = A	Capacitance Code (In pF) 2 Sig. Digits + Number of Zeros	Capacitance Tolerance B = $\pm .10\text{ pF} (<10\text{pF})$ C = $\pm .25\text{ pF} (<10\text{pF})$ D = $\pm .50\text{ pF} (<10\text{pF})$ F = $\pm 1\% (\geq 10\text{ pF})$ G = $\pm 2\% (\geq 10\text{ pF})$ J = $\pm 5\%$ K = $\pm 10\%$	Failure Rate A = Not Applicable	Terminations T = Plated Ni and Sn 7 = Gold Plated	Packaging 2 = 7" Reel 4 = 13" Reel 7 = Bulk Cass. 9 = Bulk	Special Code A = Std. Product
						Contact Factory For 1 = Pd/Ag Term	Contact Factory For Multiples	

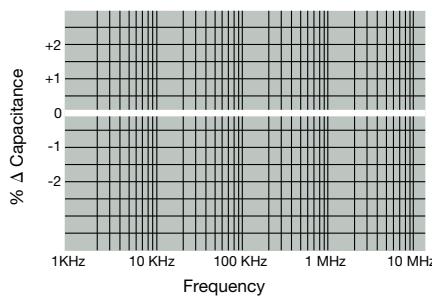
NOTE: Contact factory for availability of Termination and Tolerance Options for Specific Part Numbers.

Contact factory for non-specified capacitance values.

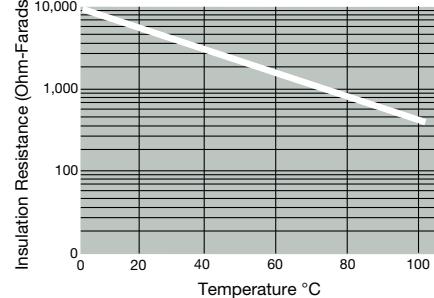
Temperature Coefficient



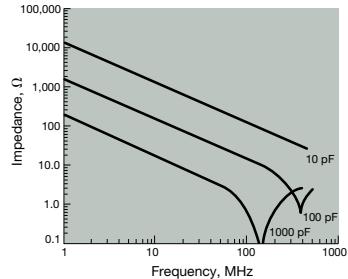
Δ Capacitance vs. Frequency



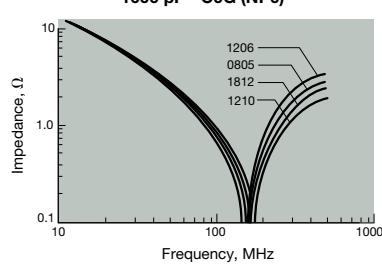
Insulation Resistance vs Temperature



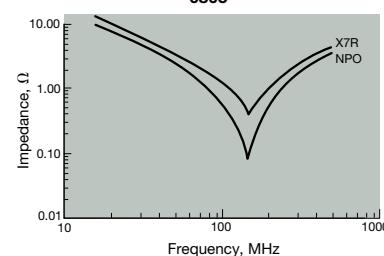
Variation of Impedance with Cap Value Impedance vs. Frequency 0805 - C0G (NP0) 10 pF vs. 100 pF vs. 1000 pF



Variation of Impedance with Chip Size Impedance vs. Frequency 1000 pF - C0G (NP0)



Variation of Impedance with Ceramic Formulation Impedance vs. Frequency 1000 pF - C0G (NP0) vs X7R 0805



C0G (NP0) Dielectric

Specifications and Test Methods



Parameter/Test	NP0 Specification Limits		Measuring Conditions		
Operating Temperature Range	-55°C to +125°C		Temperature Cycle Chamber		
Capacitance	Within specified tolerance		Freq.: 1.0 MHz \pm 10% for cap \leq 1000 pF 1.0 kHz \pm 10% for cap $>$ 1000 pF Voltage: 1.0VRms \pm .2V		
Q	<30 pF: $Q \geq 400 + 20 \times \text{Cap Value}$ ≥ 30 pF: $Q \geq 1000$				
Insulation Resistance	100,000MΩ or 1000MΩ - μ F, whichever is less		Charge device with rated voltage for 60 \pm 5 secs @ room temp/humidity		
Dielectric Strength	No breakdown or visual defects		Charge device with 300% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max) Note: Charge device with 150% of rated voltage for 500V devices.		
Resistance to Flexure Stresses	Appearance	No defects			
	Capacitance Variation	$\pm 5\%$ or $\pm .5$ pF, whichever is greater			
	Q	Meets Initial Values (As Above)			
	Insulation Resistance	\geq Initial Value $\times 0.3$			
Solderability	$\geq 95\%$ of each terminal should be covered with fresh solder		Dip device in eutectic solder at 230 \pm 5°C for 5.0 \pm 0.5 seconds		
Resistance to Solder Heat	Appearance	No defects, $<25\%$ leaching of either end terminal		Dip device in eutectic solder at 260°C for 60 seconds. Store at room temperature for 24 \pm 2 hours before measuring electrical properties.	
	Capacitance Variation	$\leq 2.5\%$ or $\pm .25$ pF, whichever is greater			
	Q	Meets Initial Values (As Above)			
	Insulation Resistance	Meets Initial Values (As Above)			
	Dielectric Strength	Meets Initial Values (As Above)			
Thermal Shock	Appearance	No visual defects		Step 1: -55°C \pm 2° 30 \pm 3 minutes	
	Capacitance Variation	$\leq 2.5\%$ or $\pm .25$ pF, whichever is greater		Step 2: Room Temp \leq 3 minutes	
	Q	Meets Initial Values (As Above)		Step 3: +125°C \pm 2° 30 \pm 3 minutes	
	Insulation Resistance	Meets Initial Values (As Above)		Step 4: Room Temp \leq 3 minutes	
	Dielectric Strength	Meets Initial Values (As Above)		Repeat for 5 cycles and measure after 24 hours at room temperature	
Load Life	Appearance	No visual defects		Charge device with twice rated voltage in test chamber set at 125°C \pm 2°C for 1000 hours (+48, -0).	
	Capacitance Variation	$\leq 3.0\%$ or $\pm .3$ pF, whichever is greater			
	Q (C=Nominal Cap)	≥ 30 pF: $Q \geq 350$ ≥ 10 pF, <30 pF: $Q \geq 275 + 5C/2$ <10 pF: $Q \geq 200 + 10C$			
	Insulation Resistance	\geq Initial Value $\times 0.3$ (See Above)			
	Dielectric Strength	Meets Initial Values (As Above)			
Load Humidity	Appearance	No visual defects		Store in a test chamber set at 85°C \pm 2°C/ 85% \pm 5% relative humidity for 1000 hours (+48, -0) with rated voltage applied.	
	Capacitance Variation	$\leq 5.0\%$ or $\pm .5$ pF, whichever is greater			
	Q	≥ 30 pF: $Q \geq 350$ ≥ 10 pF, <30 pF: $Q \geq 275 + 5C/2$ <10 pF: $Q \geq 200 + 10C$			
	Insulation Resistance	\geq Initial Value $\times 0.3$ (See Above)			
	Dielectric Strength	Meets Initial Values (As Above)			

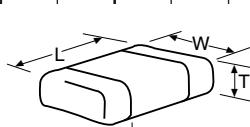
C0G (NP0) Dielectric



Capacitance Range

PREFERRED SIZES ARE SHADED

SIZE	01005	0201	0402			0603					0805					1206				
Soldering	Reflow Only	Reflow Only	Reflow/Wave			Reflow/Wave					Reflow/Wave					Reflow/Wave				
Packaging	All Paper	All Paper	All Paper			All Paper					Paper/Embossed					Paper/Embossed				
(L) Length (in.)	0.40 ± 0.02 (0.016 ± 0.0008)	0.60 ± 0.03 (0.024 ± 0.001)	1.00 ± 0.10 (0.040 ± 0.004)	1.60 ± 0.15 (0.063 ± 0.006)	2.01 ± 0.20 (0.079 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)														
(W) Width (in.)	0.20 ± 0.02 (0.008 ± 0.0008)	0.30 ± 0.03 (0.011 ± 0.001)	0.50 ± 0.10 (0.020 ± 0.004)	0.81 ± 0.15 (0.032 ± 0.006)	1.25 ± 0.20 (0.049 ± 0.008)	1.60 ± 0.20 (0.063 ± 0.008)														
(t) Terminal (in.)	0.10 ± 0.04 (0.004 ± 0.016)	0.15 ± 0.05 (0.006 ± 0.002)	0.25 ± 0.15 (0.010 ± 0.006)	0.35 ± 0.15 (0.014 ± 0.006)	0.50 ± 0.25 (0.020 ± 0.010)	0.50 ± 0.25 (0.020 ± 0.010)														
WVDC	16	25	50	16	25	50	100	16	25	50	100	200	16	25	50	100	200	500		
Cap (pF)	0.5	A	C	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	1.0	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	1.2	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	1.5	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	1.8	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	2.2	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	2.7	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	3.3	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	3.9	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	4.7	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	5.6	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	6.8	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	8.2	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	10	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	12	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	15	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	18	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	22	B	A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	27		A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	33		A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	39		A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	47		A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	56		A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	68		A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	82		A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	100		A	C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	120			C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	150			C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	180			C	C	G	G	J	J	J	J	J	J	J	J	J	J	J		
	220			C	C	G	G	J	J	J	J	J	J	J	J	J	J	M		
	270			C	C	G	G	J	J	J	J	J	M	J	J	J	J	M		
	330			C	C	G	G	J	J	J	J	M	J	J	J	J	J	M		
	390			C	C	G	G	J	J	J	J	M	J	J	J	J	J	M		
	470			C	C	G	G	J	J	J	J	M	J	J	J	J	J	M		
	560					G	G	J	J	J	J	M	J	J	J	J	J	P		
	680					G	G	J	J	J	J	J	J	J	J	J	J			
	820					G	G	J	J	J	J	J	J	J	J	J	M			
	1000					G	G	J	J	J	J	J	J	J	J	J	Q			
	1200							J	J	J	J	J	J	J	J	J	Q			
	1500							J	J	J	J	J	J	J	J	M	Q			
	1800							J	J	J	N			J	J	M	M			
	2200							J	J	J	N			J	J	M	P			
	2700							J	J	J	N			J	J	M	P			
	3300							J	J					J	J	M	P			
	3900							J	J					J	J	M	P			
	4700							J	J					J	J	M	P			
	5600													J	J	M				
	6800													M	M					
	8200													M	M					
Cap (pF)	0.010																			
	0.012																			
	0.015																			
	0.018																			
	0.022																			
	0.027																			
	0.033																			
	0.039																			
	0.047																			
	0.068																			
	0.082																			
	0.1																			
WVDC	25	50	16	25	50	16	25	50	100	16	25	50	100	200	16	25	50	100	200	500
SIZE	01005	0201		0402		0603				0805					1206					



C0G (NP0) Dielectric



Capacitance Range

PREFERRED SIZES ARE SHADED

SIZE	1210					1812					1825					2220					2225									
Soldering	Reflow Only					Reflow Only					Reflow Only					Reflow Only					Reflow Only									
Packaging	Paper/Embossed					All Embossed					All Embossed					All Embossed					All Embossed									
(L) Length (in.)	mm	3.20 ± 0.20 (0.126 ± 0.008)				mm	4.50 ± 0.30 (0.177 ± 0.012)				mm	4.50 ± 0.30 (0.177 ± 0.012)				mm	5.70 ± 0.40 (0.225 ± 0.016)				mm	5.72 ± 0.25 (0.225 ± 0.010)								
(W) Width (in.)	mm	2.50 ± 0.20 (0.098 ± 0.008)				mm	3.20 ± 0.20 (0.126 ± 0.008)				mm	6.40 ± 0.40 (0.252 ± 0.016)				mm	5.00 ± 0.40 (0.197 ± 0.016)				mm	6.35 ± 0.25 (0.250 ± 0.010)								
(t) Terminal (in.)	mm	0.50 ± 0.25 (0.020 ± 0.010)				mm	0.61 ± 0.36 (0.024 ± 0.014)				mm	0.61 ± 0.36 (0.024 ± 0.014)				mm	0.64 ± 0.39 (0.025 ± 0.015)				mm	0.64 ± 0.39 (0.025 ± 0.015)								
	WVDC	25	50	100	200	500	25	50	100	200	500	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200				
Cap (pF)	0.5																													
	1.0																													
	1.2																													
	1.5																													
	1.8																													
	2.2																													
	2.7																													
	3.3																													
	3.9																													
	4.7																													
	5.6																													
	6.8																													
	8.2																													
	10						J																							
	12						J																							
	15						J																							
	18						J																							
	22						J																							
	27						J																							
	33						J																							
	39						J																							
	47						J																							
	56						J																							
	68						J																							
	82						J																							
	100						J																							
	120						J																							
	150						J																							
	180						J																							
	220						J																							
	270						J																							
	330						J																							
	390						M																							
	470						M																							
	560	J	J	J	J	M																								
	680	J	J	J	J	M																								
	820	J	J	J	J	M																								
	Cap (μ F)	0.010	J	J			K	M	M																M	P				
	0.012	J	J				K	M	M															M	M	P				
	0.015						M	M	M															M	M	P	Y			
	0.018						M	M	M								P	M						M	M	P	Y			
	0.022						M	M	M								P	P						X	X	M	Y			
	0.027						M	M	M								P	P						X	X	M	Y			
	0.033						M	M	M								P	P						P	P					
	0.039						M	M	M								P	P						Y	Y					
	0.047						M	M	M								P	P						P	P					
	0.068						M	M	M															P	Q					
	0.082						M	M	M															Q						
	0.1																													
	WVDC	25	50	100	200	500	25	50	100	200	500	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200				
	SIZE	1210					1812					1825					2220					2225								

Letter	A	C	E	G	J	K	M	N	P	Q	X	Y	Z
Max. Thickness	0.33 (0.013)	0.56 (0.022)	0.71 (0.028)	0.90 (0.035)	0.94 (0.037)	1.02 (0.040)	1.27 (0.050)	1.40 (0.055)	1.52 (0.060)	1.78 (0.070)	2.29 (0.090)	2.54 (0.100)	2.79 (0.110)
	PAPER												EMBORESSED

