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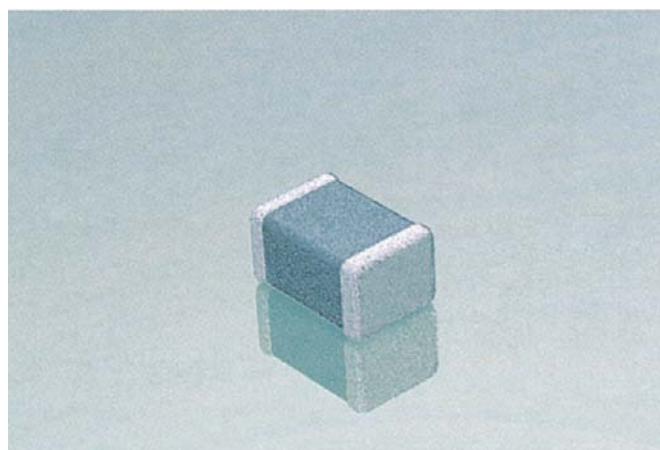
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Jameco Part Number 735923

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.

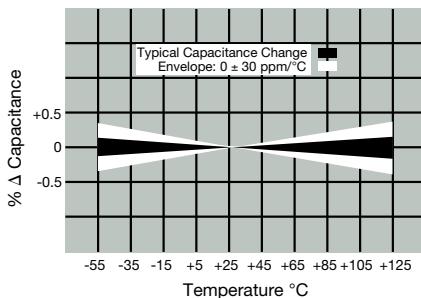
PART NUMBER (see page 2 for complete part number explanation)

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 = $\pm 0.10\text{ pF} (< 10\text{ pF})$ C = $\pm 0.25\text{ pF} (< 10\text{ pF})$ D = $\pm 0.50\text{ pF} (< 10\text{ pF})$ 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	

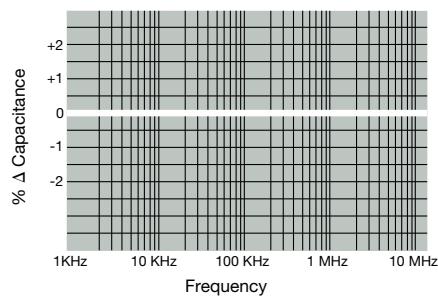
NOTE: Contact factory for availability of Termination and Tolerance Options for Specific Part Numbers.

Contact factory for non-specified capacitance values.

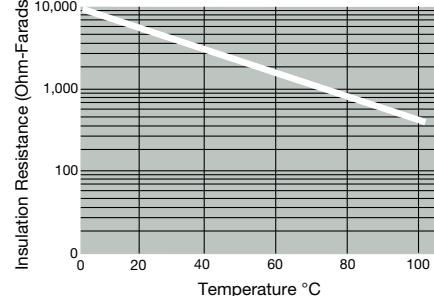
Temperature Coefficient



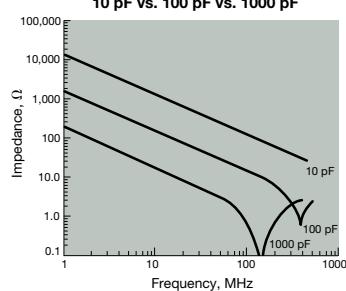
Δ Capacitance vs. Frequency



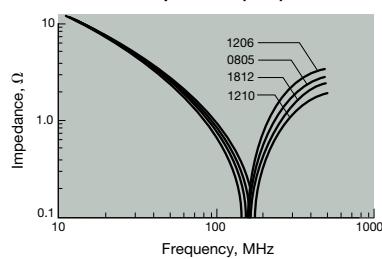
Insulation Resistance vs Temperature



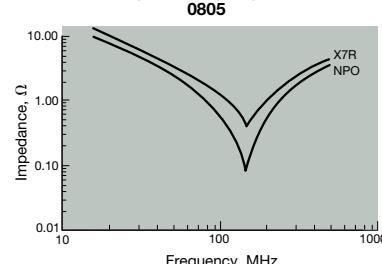
Variation of Impedance with Cap Value



Variation of Impedance with Chip Size



Variation of Impedance with Ceramic Formulation



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	
Q	<30 pF: Q \geq 400 + 20 x Cap Value \geq 30 pF: Q \geq 1000		Voltage: 1.0VRms \pm .2V	
Insulation Resistance	100,000MΩ or 1000MΩ - μF, 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 x 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		
	Capacitance Variation	\leq \pm 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 \pm 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). Remove from test chamber and stabilize at room temperature for 24 hours before measuring.	
	Capacitance Variation	\leq \pm 3.0% or \pm .3 pF, whichever is greater		
	Q (C=Nominal Cap)	\geq 30 pF: Q \geq 350 \geq 10 pF, <30 pF: Q \geq 275 +5C/2 <10 pF: Q \geq 200 +10C		
	Insulation Resistance	\geq Initial Value x 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. Remove from chamber and stabilize at room temperature for 24 \pm 2 hours before measuring.	
	Capacitance Variation	\leq \pm 5.0% or \pm .5 pF, whichever is greater		
	Q	\geq 30 pF: Q \geq 350 \geq 10 pF, <30 pF: Q \geq 275 +5C/2 <10 pF: Q \geq 200 +10C		
	Insulation Resistance	\geq Initial Value x 0.3 (See Above)		
	Dielectric Strength	Meets Initial Values (As Above)		



C0G (NP0) Dielectric



Capacitance Range

PREFERRED SIZES ARE SHADED

SIZE	0201				0402				0603				0805				1206					
Soldering	Reflow Only				Reflow Only				Reflow Only				Reflow/Wave				Reflow/Wave					
Packaging	All Paper				All Paper				All Paper				Paper/Embossed				Paper/Embossed					
(L) Length	MM (in.)	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)	2.40 ± 0.20 (0.094 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)															
(W) Width	MM (in.)	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	MM (in.)	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	25	50	16	25	50	16	25	50	100	16	25	50	100	100	200	16	25	50	100	200	500
Cap (μ F)	0.5			A	C	C	C	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	1.0			A	C	C	C	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	1.2			A	C	C	C	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	1.5	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	1.8	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	2.2	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	2.7	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	3.3	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	3.9	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	4.7	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	5.6	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	6.8	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	8.2	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	10	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	12	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	15	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	18	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	22	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	27	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	33	A	A	C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	39	A		C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	47	A		C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	56	A		C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	68	A		C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	82	A		C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	100	A		C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	120			C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	150			C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	180			C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	
	220			C	C	C	G	G	G	G	J	J	J	J	J	J	J	J	J	J	M	
	270			C	C	C	G	G	G	G	J	J	J	J	M	J	J	J	J	J	M	
	330			C	C	C	G	G	G	G	J	J	J	J	M	J	J	J	J	J	M	
	390			C	C	C	G	G	G	G	J	J	J	J	M	J	J	J	J	J	M	
	470			C	C	C	G	G	G	G	J	J	J	J	M	J	J	J	J	J	M	
	560						G	G	G		J	J	J	J	M	J	J	J	J	J	M	
	680						G	G	G		J	J	J	J		J	J	J	J	J	P	
	820						G	G	G		J	J	J	J		J	J	J	J	J	M	
	1000						G	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	J	Q	
	1800										J	J	J	N			J	J	M	M		
	2200										J	J	J	N			J	J	M	M		
	2700										J	J	J	N			J	J	M	M		
	3300										J	J	J				J	J	M	P		
	3900										J	J	J				J	J	M	P		
	4700										J	J	J				J	J	M	P		
	5600																J	J	M			
	6800																M	M	M			
	8200																M	M	M			
Cap (μ F)	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	100	200	16	25	50	100	200	500
SIZE	0201				0402				0603				0805				1206					



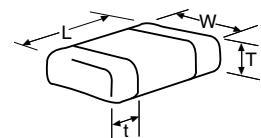
Letter	A	C	E	G	J	K	M	N	P	Q	X	Y	Z
Max. Thickness	0.33 (0.013)	0.56 (0.022)	0.71 (0.028)	0.90 (0.035)	0.94 (0.037)	1.02 (0.040)	1.27 (0.050)	1.40 (0.055)	1.52 (0.060)	1.78 (0.070)	2.29 (0.090)	2.54 (0.100)	2.79 (0.110)
	PAPER												EMBORESSED

C0G (NP0) Dielectric



Capacitance Range

PREFERRED SIZES ARE SHADED



SIZE	1210					1812					1825					2220					2225							
	Soldering					Reflow Only					Reflow Only					Reflow Only					Reflow Only							
Soldering		Reflow Only			Reflow Only		All Embossed			All Embossed		All Embossed			All Embossed		All Embossed			All Embossed		All Embossed						
(L) Length (in.)	MM	3.20 ± 0.20 (0.126 ± 0.008)					4.50 ± 0.30 (0.177 ± 0.012)				4.50 ± 0.30 (0.177 ± 0.012)				5.70 ± 0.25 (0.225 ± 0.016)				5.72 ± 0.25 (0.225 ± 0.010)									
(W) Width (in.)	MM	2.50 ± 0.20 (0.098 ± 0.008)					3.20 ± 0.20 (0.126 ± 0.008)				6.40 ± 0.40 (0.252 ± 0.016)				5.00 ± 0.40 (0.197 ± 0.016)				6.35 ± 0.25 (0.250 ± 0.010)									
(t) Terminal (in.)	MM	0.50 ± 0.25 (0.020 ± 0.010)					0.61 ± 0.36 (0.024 ± 0.014)				0.61 ± 0.36 (0.024 ± 0.014)				0.64 ± 0.39 (0.025 ± 0.015)				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																											
	12																											
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	100																											
	120																											
	150																											
	180																											
	220																											
	270																											
	330																											
	390																											
	470																											
	560	J	J	J	J	M	M	M	K	K	K	K	M	M	M	M	M	M	M	M	M	P	P	P				
	680	J	J	J	J	M	M	M	K	K	K	K	P	M	M	M	M	M	M	M	M	M	M	M	P			
	820	J	J	J	J	M	M	M	K	K	K	K	P	Q	M	M	M	M	M	M	M	M	M	M	P			
	1000	J	J	J	J	M	M	M	K	K	K	K	M	M	M	M	M	M	M	M	M	M	M	M	P			
	1200	J	J	J	J	M	M	M	K	K	K	K	P	M	M	M	M	M	M	M	M	M	M	M	P			
	1500	J	J	J	J	M	M	M	K	K	K	K	M	M	M	M	M	M	M	M	M	M	M	M	P			
	1800	J	J	J	M	Q	Q	Q	K	K	K	K	M	M	M	M	M	M	M	M	M	M	M	M	P			
	2200	J	J	J	Q	Q	Q	Q	K	K	K	K	P	Q	M	M	M	M	M	M	M	M	M	M	P			
	2700	J	J	J	Q	Q	Q	Q	K	K	K	K	P	Q	M	M	M	M	M	M	M	M	M	M	P			
	3300	J	J	J	M	M	M	M	K	K	K	K	P	Q	M	M	M	M	M	M	M	M	M	M	P			
	3900	J	J	J	M	M	M	M	K	K	K	K	P	Q	M	M	M	M	M	M	M	M	M	M	P			
	4700	J	J	J	M	M	M	M	K	K	K	K	P	Q	M	M	M	M	M	M	M	M	M	M	P			
	5600	J	J	J	J	M	M	M	K	K	K	K	P	X	M	M	M	M	M	M	M	M	M	M	P			
	6800	J	J	J	J	M	M	M	K	K	K	K	P	X	M	M	M	M	M	M	M	M	M	M	P			
	8200	J	J	J	J	M	M	M	K	K	K	K	P	X	M	M	M	M	M	M	M	M	M	M	P			
	0.010	J	J	J	J	M	M	M	K	K	K	K	M	M	M	M	M	M	M	M	M	M	M	M	P			
	0.012	J	J	J	J	M	M	M	K	K	K	K	M	M	M	M	M	M	M	M	M	M	M	M	P			
	0.015					M	M	M	K	K	K	K	M	M	M	M	M	M	M	M	M	M	M	M	Y			
	0.018					M	M	M	K	K	K	K	P	P	M	M	M	M	M	M	M	M	M	M	P			
	0.022					M	M	M	K	K	K	K	P	P	M	M	M	M	M	M	M	M	M	M	Y			
	0.027					M	M	M	K	K	K	K	P	P	M	M	M	M	M	M	M	M	M	M	Y			
	0.033					M	M	M	K	K	K	K	P	P	M	M	M	M	M	M	M	M	M	M	P			
	0.039					M	M	M	K	K	K	K	P	P	M	M	M	M	M	M	M	M	M	M	P			
	0.047					M	M	M	K	K	K	K	P	P	M	M	M	M	M	M	M	M	M	M	P			
	0.068					M	M	M	K	K	K	K	P	P	M	M	M	M	M	M	M	M	M	M	Q			
	0.082					M	M	M	K	K	K	K	P	P	M	M	M	M	M	M	M	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)														