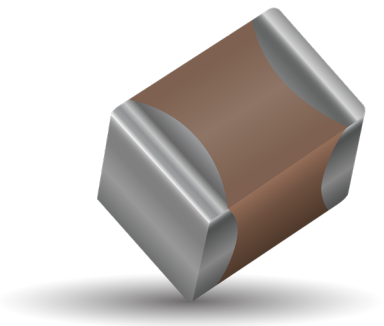
C0G (NP0) Dielectric

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.

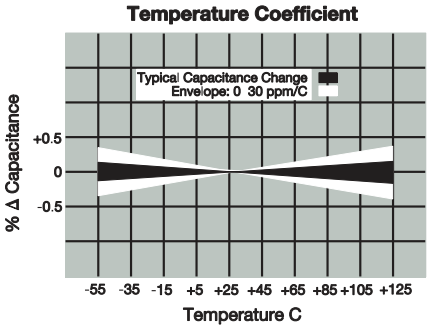
C0G (NP0) ceramics offer one of the most stable capacitor dielectrics available. Capacitance change with temperature is 0 ±30ppm/°C which is less than ±0.3% C from -55°C to +125°C. Capacitance drift or hysteresis for C0G (NP0) ceramics is negligible at less than ±0.05% versus up to ±2% for films. Typical capacitance change with life is less than ±0.1% for C0G (NP0), one-fifth that shown by most other dielectrics.

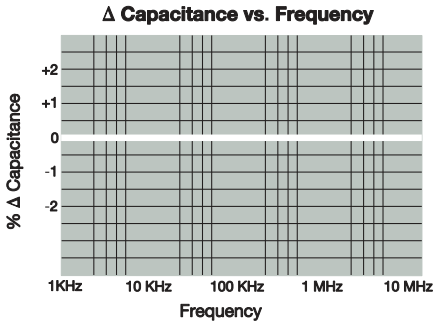
PART NUMBER (SEE PAGE 4 FOR COMPLETE PART NUMBER EXPLANATION)

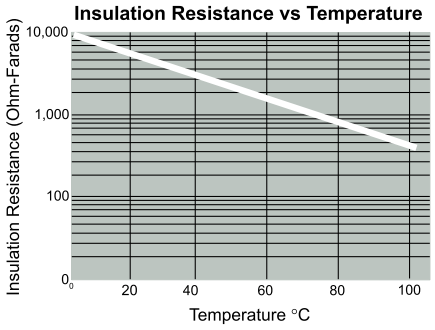
RoHS COMPLIANT

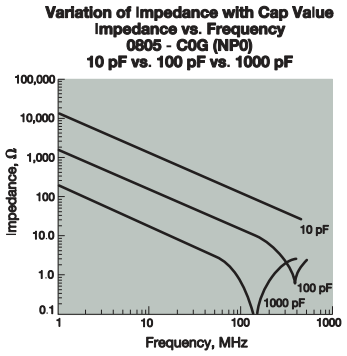
0805	5	A	101	J	A	T	2	A
Size (L" x W")	**Voltage** 4= 4.0V 6= 6.3v Z= 10v Y=16V 3=25V 5= 50V 1=100V 2=200v V=250v 7=500v	**Dielectric** C0G (NP0) = A	**Capacitance Code (In pF)** 2 Sig. Digits + Number of Zeros	**Capacitance Tolerance** B = ±.10 pF (<10pF) C = ±.25 pF (<10pF) D = ±.50 pF (<10pF) F = ±1% (≥ 10 pF) G = ±2% (≥ 10 pF) J = ±5% K = ±10%	**Failure Rate** A = Not Applicable	**Terminations** T = Plated Ni and Sn	**Packaging** 2 = 7" Reel 4 = 13" Reel U = 4mm TR (01005)	**Special Code** A = Std. Product

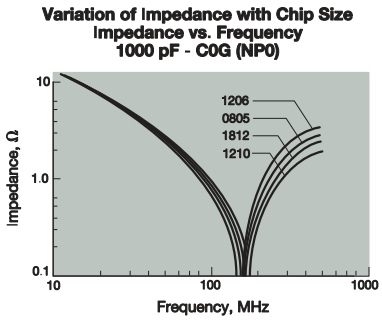
Contact Factory For Multiples

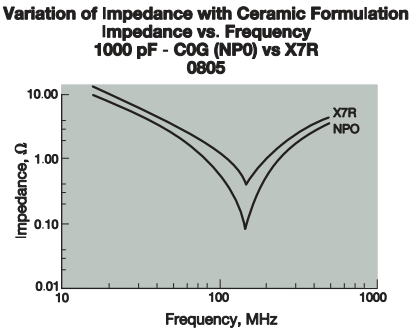






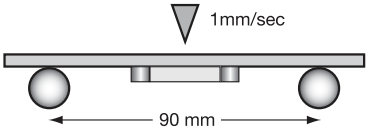






C0G (NP0) Dielectric

Specifications and Test Methods

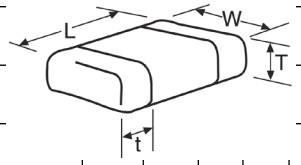
Parameter/Test		NP0 Specification Limits	Measuring Conditions	
Operating Temperature Range		-55ºC to +125ºC	Temperature Cycle Chamber	
Capacitance		Within specified tolerance <30 pF: Q≥ 400+20 x Cap Value ≥30 pF: Q≥ 1000	Freq.: 1.0 MHz ± 10% for cap ≤ 1000 pF 1.0 kHz ± 10% for cap > 1000 pF Voltage: 1.0Vrms ± .2V	
Q				
Insulation Resistance		10,000MΩ or 500MΩ - µF, whichever is less	Charge device with rated voltage for 60 ± 5 secs @ room temp/humidity	
Dielectric Strength		No breakdown or visual defects	Charge device with 250% 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	Deflection: 2mm Test Time: 30 seconds 	
	Capacitance Variation	±5% or ±.5 pF, whichever is greater		
	Q	Meets Initial Values (As Above)		
	Insulation Resistance	≥ Initial Value x 0.3		
Solderability		≥ 95% of each terminal should be covered with fresh solder	Dip device in eutectic solder at 230 ± 5ºC for 5.0 ± 0.5 seconds	
Resistance to Solder Heat	Appearance	No defects, <25% leaching of either end terminal	Dip device in eutectic solder at 260ºC for 60sec- onds. Store at room temperature for 24 ± 2hours before measuring electrical properties.	
	Capacitance Variation	≤ ±2.5% or ±.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: -55ºC ± 2º	30 ± 3 minutes
	Capacitance Variation	≤ ±2.5% or ±.25 pF, whichever is greater	Step 2: Room Temp	≤ 3 minutes
	Q	Meets Initial Values (As Above)	Step 3: +125ºC ± 2º	30 ± 3 minutes
	Insulation Resistance	Meets Initial Values (As Above)	Step 4: Room Temp	≤ 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 125ºC ± 2ºC for 1000 hours (+48, -0). Remove from test chamber and stabilize at room temperature for 24 hours before measuring.	
	Capacitance Variation	≤ ±3.0% or ± .3 pF, whichever is greater		
	Q (C=Nominal Cap)	≥ 30 pF: Q≥ 350 ≥10 pF, <30 pF: Q≥ 275 +5C/2 <10 pF: Q≥ 200 +10C		
	Insulation Resistance	≥ 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 85ºC ± 2ºC/ 85% ± 5% relative humidity for 1000 hours (+48, -0) with rated voltage applied. Remove from chamber and stabilize at room temperature for 24 ± 2 hours before measuring.	
	Capacitance Variation	≤ ±5.0% or ± .5 pF, whichever is greater		
	Q	≥ 30 pF: Q≥ 350 ≥10 pF, <30 pF: Q≥ 275 +5C/2 <10 pF: Q≥ 200 +10C		
	Insulation Resistance	≥ Initial Value x 0.3 (See Above)		
	Dielectric Strength	Meets Initial Values (As Above)		

C0G (NP0) Dielectric

Capacitance Range

PREFERRED SIZES ARE SHADED

SIZE		0101*	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	mm	0.40 ± 0.02	0.60 ± 0.03		1.00 ± 0.10			1.60 ± 0.15					2.01 ± 0.20						3.20 ± 0.20						
	(in.)	(0.016 ± 0.0008)	(0.024 ± 0.001)		(0.040 ± 0.004)			(0.063 ± 0.006)					(0.079 ± 0.008)						(0.126 ± 0.008)						
W) Width	mm	0.20 ± 0.02	0.30 ± 0.03		0.50 ± 0.10			0.81 ± 0.15					1.25 ± 0.20						1.60 ± 0.20						
	(in.)	(0.008 ± 0.0008)	(0.011 ± 0.001)		(0.020 ± 0.004)			(0.032 ± 0.006)					(0.049 ± 0.008)						(0.063 ± 0.008)						
(t) Terminal	mm	0.10 ± 0.04	0.15 ± 0.05		0.25 ± 0.15			0.35 ± 0.15					0.50 ± 0.25						0.50 ± 0.25						
	(in.)	(0.004 ± 0.0016)	(0.006 ± 0.002)		(0.010 ± 0.006)			(0.014 ± 0.006)					(0.020 ± 0.010)						(0.020 ± 0.010)						
	WVDC	16	25	50	16	25	50	16	25	50	100	200	16	25	50	100	200	250	16	25	50	100	200	250	500
Cap	0.5		A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
(pF)	1.0	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	1.2	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	1.5	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	1.8	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	2.2	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	2.7	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	3.3	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	3.9	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	4.7	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	5.6	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	6.8	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	8.2	B	A	A	C	C	C	G	G	G	G		J	J	J	J	J	J	J	J	J	J	J	J	J
	10	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	12	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	15	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	18	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	22	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	27	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	33	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	39	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	47	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	56	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	68	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	82	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	100	B	A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	120		A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	150		A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	J	J	J	J	J	J	J	J
	180		A	A	C	C	C	G	G	G	G	G	J	J	J	J	J	N	J	J	J	J	J	J	J
	220		A	A	C	C	C	G	G	G	G	G	J	J	J	J	N	N	J	J	J	J	J	J	J
	270				C	C	C	G	G	G	G		J	J	J	J	N	N	J	J	J	J	J	J	J
	330				C	C	C	G	G	G	G		J	J	J	J	N	N	J	J	J	J	J	J	J
	390				C	C	C	G	G	G	G		J	J	J	J	N	N	J	J	J	J	J	J	J
	470				C	C	C	G	G	G	G		J	J	J	J	N	N	J	J	J	J	J	J	J
	560				C	C	C	G	G	G	G		J	J	J	J	N	N	J	J	J	J	J	J	J
	680				C	C	C	G	G	G	G		J	J	J	J	N	N	J	J	J	J	J	J	J
	750				C	C	C	G	G	G	G		J	J	J	J	N	N	J	J	J	J	J	J	J
	820				C	C	C	G	G	G	G		J	J	J	J	N	N	J	J	J	J	J	J	J
	1000				C	C	C	G	G	G	G		J	J	J	J	N	N	J	J	J	J	J	J	J
	1200							G	G	G			J	J	J	J	P	P	J	J	J	J	J	J	J
	1500							G	G	G			J	J	J	J	P	P	J	J	J	M	Q	P	P
	1800							G	G	G			J	J	J	J	P	P	J	J	M	P	Q	P	P
	2200							G	G	G			P	P	P	P	P	P	J	J	M	P	Q	P	P
	2700							G	G	G			P	P	P	P	P	P	J	J	M	P	Q	P	P
	3300							G	G	G			P	P	P	P	P	P	J	J	M	P	Q	X	P
	3900							G	G	G			P	P	P	P	P	P	J	J	M	P	X	X	X
	4700							G	G	G			P	P	P	P	P	P	J	J	M	P	X	X	X
	5600												P	P	P				J	J	M	P	X	X	X
	6800												P	P	P				M	M	M	P	X	X	X
	8200												P	P	P				P	P	P	P	X	X	
Cap	0.010												P	P	P				P	P	P	P	X	X	
(µF)	0.012												P	P	P				X	X	X	X			
	0.015																		X	X	X	X			
	0.018																		X	X	X	X			
	0.022																		X	X	X	X			
	0.027																		X	X	X				
	0.033																		X	X	X	X			
	0.039																		X	X	X				
	0.047																		X	X	X				
	0.068																		X	X	X				
	0.082																								
	0.1																		X	X	X				
WVDC		16	25	50	16	25	50	16	25	50	100	200	16	25	50	100	200	250	16	25	50	100	200	250	500
SIZE		0101*	0201		0402			0603					0805						1206						



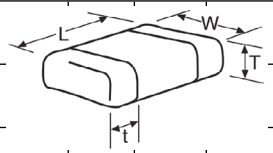
Letter	A	B	C	E	G	J	K	M	N	P	Q	X	Y	Z
Max. Thickness	0.33 (0.013)	0.22 (0.009)	0.56 (0.022)	0.71 (0.028)	0.90 (0.035)	0.94 (0.037)	1.02 (0.040)	1.27 (0.050)	1.40 (0.05 5)	1.52 (0.060)	1.78 (0.070)	2.29 (0.090)	2.54 (0.100)	2.79 (0.110)
	PAPER						EMBOSSED							

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	mm (in.)	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 ± 0.40 (0.225 ± 0.016)			5.72 ± 0.25 (0.225 ± 0.010)		
W) Width	mm (in.)	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	mm (in.)	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
Cap (pF)	3.9																			
	4.7																			
	5.6																			
	6.8																			
	8.2																			
	10	M	M	M	M	M	P	P	P	P	P									
	12	M	M	M	M	M	P	P	P	P	P									
	15	M	M	M	M	M	P	P	P	P	P									
	18	M	M	M	M	M	P	P	P	P	P									
	22	M	M	M	M	M	P	P	P	P	P									
	27	M	M	M	M	M	P	P	P	P	P									
	33	M	M	M	M	M	P	P	P	P	P									
	39	M	M	M	M	M	P	P	P	P	P									
	47	P	P	P	P	P	P	P	P	P	P									
	56	P	P	P	P	P	P	P	P	P	P									
	68	P	P	P	P	P	P	P	P	P	P									
	82	P	P	P	P	P	P	P	P	P	P									
	100	P	P	P	P	P	P	P	P	P	P									
	120	P	P	P	P	P	P	P	P	P	P									
	150	P	P	P	P	P	P	P	P	P	P									
	180	P	P	P	P	P	P	P	P	P	P									
	220	P	P	P	P	P	P	P	P	P	P									
	270	P	P	P	P	P	P	P	P	P	P									
	330	P	P	P	P	P	P	P	P	P	P									
	390	P	P	P	P	P	P	P	P	P	P									
	470	P	P	P	P	P	P	P	P	P	P									
	560	P	P	P	P	P	P	P	P	P	P									
	680	P	P	P	P	P	P	P	P	P	P									
	820	P	P	P	P	P	P	P	P	P	P									
	1000	P	P	P	P	P	P	P	P	P	P	M	M	M				M	M	P
	1200	P	P	P	P	P	P	P	P	P	P	M	M	M				M	M	P
	1500	P	P	P	P	P	P	P	P	P	P	M	M	M				M	M	P
	1800	P	P	P	P	P	P	P	P	P	P	M	M	M				M	M	P
	2200	P	P	P	P	P	P	P	P	P	P	X	X	M				M	M	P
	2700	P	P	P	P	P	P	P	P	P	Q	X	X	M				M	M	P
	3300	P	P	P	P	P	P	P	P	P	Q	X	X	X			X	M	M	P
	3900	P	P	P	P	P	P	P	P	P	Q	X	X	X			X	M	M	P
	4700	P	P	P	P	P	P	P	P	P	Y	X	X	X	X	X	X	M	M	P
	5600	P	P	P	P	P	P	P	P	P	Y	X	X	X	X	X	X	M	M	P
	6800	P	P	P	X	X	P	P	Q	Q	Y	X	X	X	X	X	X	M	M	P
	8200	P	P	P	X	X	P	P	Q	Q	Y	X	X	X	X	X	X	M	M	P
Cap (µF)	0.010	P	P	X	X	X	P	P	Q	Q	Y	X	X	X	X	X	X	M	M	P
	0.012	X	X	X	X	X	P	P	Q	X	Y	X	X	X	X	X	X	M	M	P
	0.015	X	X	X	Z	Z	P	P	Q	X	Y	X	X	X	X	X	X	M	M	Y
	0.018	X	X	Z	Z		P	P	X	X	Y	X	X	X	X	X	X	M	M	Y
	0.022	X	X	Z	Z		P	P	X	X		X	X	X	X	X		M	Y	Y
	0.027	X	Z	Z	Z		Q	X	X	Z		X	X	Y	X	X		P	Y	Y
	0.033	X	Z	Z	Z		Q	X	X	Z		X	X		X	X		X	Y	Y
	0.039	Z	Z	Z			X	X	Z	Z		X			Y			X	Y	Y
	0.047	Z	Z	Z			X	X	Z	Z		X			Y			X	Z	
	0.068						Z	Z	Z						Z			X	Z	
	0.082						Z	Z	Z						Z			X	Z	
	0.1						Z	Z	Z						Z			Z	Z	
	WVDC	25	50	100	200	500	25	50	100	200	500	50	100	200	50	100	200	50	100	200
	SIZE	1210					1812					1825			2220			2225		



Letter	A	B	C	E	G	J	K	M	N	P	Q	X	Y	Z
Max. Thickness	0.33 (0.013)	0.22 (0.009)	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						EMBOSSED							