

# 04025A221JAJ2A Datasheet

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DiGi Electronics Part Number	04025A221JAJ2A-DG
Manufacturer	<a href="#">KYOCERA AVX</a>
Manufacturer Product Number	04025A221JAJ2A
Description	CAP CER 220PF 50V NP0 0402
Detailed Description	220 pF ±5% 50V Ceramic Capacitor C0G, NP0 0402 (1005 Metric)

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## Purchase and inquiry

Manufacturer Product Number:

04025A221JAJ2A

Series:

-

Capacitance:

220 pF

Voltage - Rated:

50V

Operating Temperature:

-55°C ~ 125°C

Ratings:

-

Failure Rate:

-

Package / Case:

0402 (1005 Metric)

Height - Seated (Max):

-

Lead Spacing:

-

Manufacturer:

KYOCERA AVX

Product Status:

Active

Tolerance:

±5%

Temperature Coefficient:

COG, NPO

Features:

-

Applications:

General Purpose

Mounting Type:

Surface Mount, MLCC

Size / Dimension:

0.039" L x 0.020" W (1.00mm x 0.50mm)

Thickness (Max):

0.022" (0.56mm)

Lead Style:

-

## Environmental & Export classification

RoHS Status:

RoHS non-compliant

REACH Status:

REACH Affected

HTSUS:

8532.24.0020

Moisture Sensitivity Level (MSL):

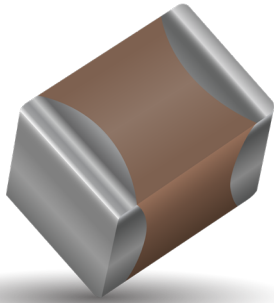
1 (Unlimited)

ECCN:

EAR99

# COG (NP0) Dielectric

## General Specifications



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

COG (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  $\pm 0.3\%$  C from  $-55^\circ\text{C}$  to  $+125^\circ\text{C}$ . Capacitance drift or hysteresis for COG (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 COG (NP0), one-fifth that shown by most other dielectrics.

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



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

**Contact Factory For Multiples**



# COG (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 x Cap Value $\geq$ 30 pF: Q $\geq$ 1000		
Insulation Resistance		10,000M $\Omega$ or 500M $\Omega$ - $\mu$ 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 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 1mm/sec 	
	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	Dip device in eutectic solder at 260°C for 60sec- onds. Store at room temperature for 24 $\pm$ 2 hours before measuring electrical properties.	
	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)		
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)		

# COG (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 (0.016 ± 0.0008)	mm 0.60 ± 0.03 (0.024 ± 0.001)	mm 1.00 ± 0.10 (0.040 ± 0.004)	mm 1.60 ± 0.15 (0.063 ± 0.006)	mm 2.01 ± 0.20 (0.079 ± 0.008)	mm 3.20 ± 0.20 (0.126 ± 0.008)
(W) Width	mm 0.20 ± 0.02 (0.008 ± 0.0008)	mm 0.30 ± 0.03 (0.011 ± 0.001)	mm 0.50 ± 0.10 (0.020 ± 0.004)	mm 0.81 ± 0.15 (0.032 ± 0.006)	mm 1.25 ± 0.20 (0.049 ± 0.008)	mm 1.60 ± 0.20 (0.063 ± 0.008)
(t) Terminal	mm 0.10 ± 0.04 (0.004 ± 0.0016)	mm 0.15 ± 0.05 (0.006 ± 0.002)	mm 0.25 ± 0.15 (0.010 ± 0.006)	mm 0.35 ± 0.15 (0.014 ± 0.006)	mm 0.50 ± 0.25 (0.020 ± 0.010)	mm 0.50 ± 0.25 (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 (pF)	0.5	A A	C C C	G G G G	J J J J J	J J J J J J
	1.0	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	1.2	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	1.5	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	1.8	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	2.2	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	2.7	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	3.3	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	3.9	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	4.7	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	5.6	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	6.8	B	A A C C C	G G G G G	J J J J J J	J J J J J J
	8.2	B	A A C C C	G G G G G	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
	12	B	A A C C C	G G G G G	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
	18	B	A A C C C	G G G G G	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
	27	B	A A C C C	G G G G G	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
	39	B	A A C C C	G G G G G	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
	56	B	A A C C C	G G G G G	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
	82	B	A A C C C	G G G G G	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
	120		A A C C C	G G G G G	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
	180		A A C C C	G G G G G	J J J J J J	J J J J J J
	220		A A C C C	G G G G G	J J J J J J	J J J J J J
	270		A A C C C	G G G G G	J J J J J J	J J J J J J
	330			C C C G G G	J J J J J N	J J J J J J
	390			C C C G G G	J J J J J N	J J J J J J
	470			C C C G G G	J J J J J N	J J J J J J
	560			C C C G G G	J J J J J N	J J J J J J
	680			C C C G G G	J J J J J N	J J J J J J
	750			C C C G G G	J J J J J N	J J J J J J
	820			C C C G G G	J J J J J N	J J J J J J
	1000			C C C G G G	J J J J J N	J J J J J J
	1200			G G G G	J J J J J P	J J J J J J
	1500			G G G G	J J J J J P	J J J J J J
	1800			G G G G	J J J J J P	J J J J J J
	2200			G G G G	P P P P P	J J J M P Q P P
	2700			G G G G	P P P P P	J J J M P Q P P
	3300			G G G G	P P P P P	J J J M P Q X P
	3900			G G G G	P P P P P	J J J M P X X X
	4700			G G G G	P P P P P	J 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 X
Cap (µF)	0.010				P P P	P P P P X X
	0.012				P P P	X X X X X
	0.015					X X X X X
	0.018					X X X X X
	0.022					X X X X X
	0.027					X X X X X
	0.033					X X X X X
	0.039					X X X X X
	0.047					X X X X X
	0.068					X X X X X
	0.082					X X X X X
	0.1					X X 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 (0.055)	1.52 (0.060)	1.78 (0.070)	2.29 (0.090)	2.54 (0.100)	2.79 (0.110)
	PAPER						EMBOSSED							



# COG (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	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	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	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										
	12	M	M	M	M	M	P	P	P	P										
	15	M	M	M	M	M	P	P	P	P										
	18	M	M	M	M	M	P	P	P	P										
	22	M	M	M	M	M	P	P	P	P										
	27	M	M	M	M	M	P	P	P	P										
	33	M	M	M	M	M	P	P	P	P										
	39	M	M	M	M	M	P	P	P	P										
	47	P	P	P	P	P	P	P	P	P										
	56	P	P	P	P	P	P	P	P	P										
	68	P	P	P	P	P	P	P	P	P										
	82	P	P	P	P	P	P	P	P	P										
	100	P	P	P	P	P	P	P	P	P										
	120	P	P	P	P	P	P	P	P	P										
	150	P	P	P	P	P	P	P	P	P										
	180	P	P	P	P	P	P	P	P	P										
	220	P	P	P	P	P	P	P	P	P										
	270	P	P	P	P	P	P	P	P	P										
	330	P	P	P	P	P	P	P	P	P										
	390	P	P	P	P	P	P	P	P	P										
	470	P	P	P	P	P	P	P	P	P										
	560	P	P	P	P	P	P	P	P	P										
	680	P	P	P	P	P	P	P	P	P										
	820	P	P	P	P	P	P	P	P	P										
	1000	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	M	M	M					M	M	P
	1500	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	M	M	M					M	M	P
	2200	P	P	P	P	P	P	P	P	P	X	X	M					M	M	P
	2700	P	P	P	P	P	P	P	P	Q	X	X	M					M	M	P
	3300	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	Q	X	X	X				X	M	M	P
	4700	P	P	P	P	P	P	P	P	Y	X	X	X			X	X	M	M	P
	5600	P	P	P	P	P	P	P	P	Y	X	X	X			X	X	M	M	P
	6800	P	P	P	X	X	P	P	Q	Q	Y	X	X	X		X	X	M	M	P
	8200	P	P	P	X	X	P	P	Q	Q	Y	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	M	M	P
	0.012	X	X	X	X	X	P	P	Q	X	Y	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	M	M	Y
	0.018	X	X	Z	Z		P	P	X	X	Y	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						EMBOSSSED							

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