

# CERAMIC CHIP CAPACITORS NPO (COG) DIELECTRIC

## APPLICATION

NPO (COG) dielectric properties; suited for precision circuits, requiring stable dielectric characteristics:

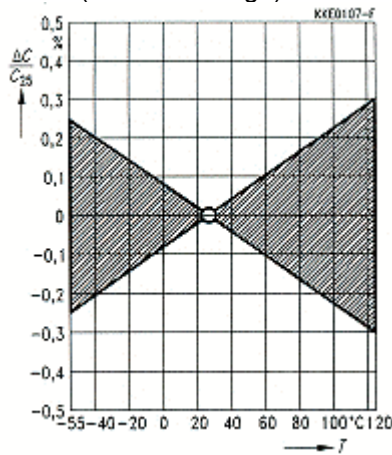
- ◇ Negligible dependence of capacitance and dissipation factor on time, voltage, and frequency
- ◇ Low-loss (High Q)
- ◇ Predictable linear temperature coefficient
- ◇ No piezoelectric behavior

## General Specification

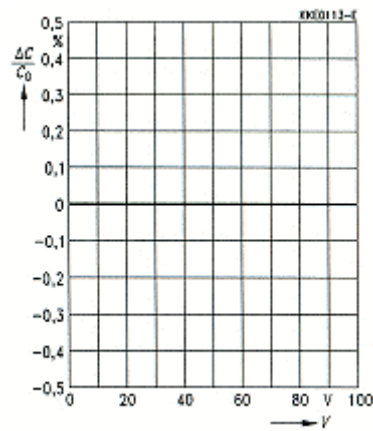
- **Operating temperature range** :  $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$
- **Temperature coefficient**:  $0 \pm 30 \text{ppm}/^{\circ}\text{C}$
- **Capacitance Range**:  $0.5 \text{pF} \sim 0.22 \mu\text{F}$  (Test condition:  $1.0 \pm 0.2 \text{V}_{\text{rms}}$ , 1KHz, for  $\leq 1000 \text{pF}$  use 1 MHz)
- **Capacitance Tolerance**: Preferred  $\pm 1\%$ ,  $\pm 2\%$ ,  $\pm 5\%$ ,  $\pm 10\%$ . ( $10 \text{PF} < : \pm 0.05 \text{pF}, \pm 0.1 \text{pF}, \pm 0.25 \text{pF}, \pm 0.5 \text{pF}$ )
- **Rated Voltage (DC)**: 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1KV, 2KV, 3KV, 4KV
- **Q value** :  $C < 30 \text{pF} : Q \geq 400 + 20C$ ,  $C \geq 30 \text{pF} : Q \geq 1000$  (Test condition: 1MHz, 1KHZ for  $C \geq 1000 \text{pF}$ ,  $1 \text{V}_{\text{rms}}$ ,  $25^{\circ}\text{C}$ )
- **Insulation resistance**:  $10 \text{G}\Omega$  or  $500 \Omega \cdot \text{F}$  min, whichever is less. (rated voltage applied at  $25^{\circ}\text{C}$ )
- **Dielectric strength**:  $> 250\%$  of rated voltage for  $50 \sim 100 \text{V}$ ,  $200\%$  for  $200 \& 250 \text{V}$ ,  $150\%$  for  $500 \text{V}$ ,  $120\%$  for  $\geq 1000 \text{V}$

### Characteristics

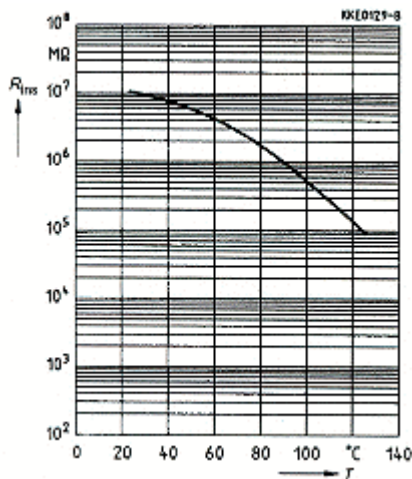
Capacitance change  $\Delta C/C_{25}$  versus temperature T (tolerance range)



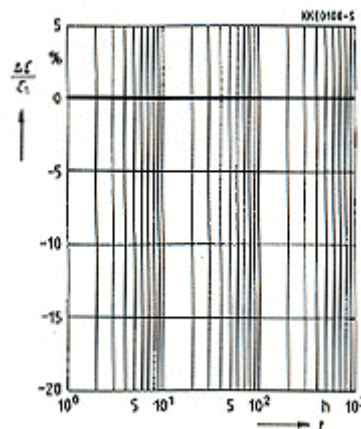
Capacitance change  $\Delta C/C_0$  versus superimposed dc voltage V



Insulation resistance  $R_{\text{ins}}$  versus Temperature T



Capacitance change  $\Delta C/C_1$  versus time (aging rate)





# CERAMIC CHIP CAPACITORS NPO (COG) DIELECTRIC

SIZE AND VALUES AVAILABLE (NPO) 100V – 630V (Medium Voltage)

Size	0402	0603				0805					1206					1210					1812					
(L)	mm	1.00±0.05	1.60±0.10				2.00±0.20					3.20±0.20					3.20±0.30					4.50±0.30				
(W)	mm	0.50±0.05	0.80±0.10				1.25±0.20					1.60±0.20					2.50±0.20					3.20±0.30				
(T)	mm	0.50±0.05	0.80±0.10				1.25±0.10					1.65±0.20					2.50±0.30					3.00±0.30				
(t)	mm	0.15±0.35	0.27~0.60				0.30~0.70					0.30~0.70					0.30~0.70					0.35~1.00				
Cap./ W.V.		100	100	200	250	100	200	250	500	630	100	200	250	500	630	100	200	250	500	630	100	200	250	500	630	
1 – 8.2	pF	S	P	P	P	A	A	A	A	A	H	H	H	H	H											
10-68	pF	S	P	P	P	A	A	A	A	A	H	H	H	H	H	C	C	C	C	C	C	X	X	X	X	X
82	pF	S	P	P	P	A	A	A	H	H	H	H	H	H	H	C	C	C	C	C	C	X	X	X	X	X
100	pF	S	P	P	P	A	A	H	H	H	H	H	H	H	H	C	C	C	C	C	C	X	X	X	X	X
120	pF	S	P	P	P	A	A	H	X	X	H	H	H	H	H	C	C	C	C	C	C	X	X	X	X	X
150	pF	S	P	P	P	A	H	H	X	X	H	H	H	H	H	C	C	C	C	C	C	X	X	X	X	X
180	pF	S	P	P	P	A	H	X	X	X	H	H	H	H	H	C	C	C	C	C	C	X	X	X	X	X
220	pF	S	P	P	P	A	X	X	X	X	H	H	H	H	H	C	C	C	C	C	C	X	X	X	X	X
270	pF		P	P	P	A	X	X	X	X	H	H	C	C	C	C	C	C	C	C	C	X	X	X	X	X
330	pF		P	P	P	A	X	X	X	X	H	H	C	C	C	C	C	C	C	C	C	X	X	X	X	X
390	pF		P	P	P	H	X	X	X	X	H	H	C	C	C	C	C	C	C	C	C	X	X	X	X	X
470	pF		P	P	P	H	X	X	X	X	H	C	C	C	C	C	C	C	C	C	C	X	X	X	X	X
560	pF		P	P	P	H	X	X	X	X	H	C	X	X	X	C	C	C	C	C	C	X	X	X	X	X
680	pF		P	P	P	H	X	X	X	X	H	C	X	X	X	C	C	C	C	C	C	X	X	X	X	X
820	pF		P	P	P	H	X	X	X	X	H	C	L	L	L	C	C	C	C	C	C	X	X	X	X	X
1000	pF		P			H	X	X	X	X	H	C	L	L	L	C	X	X	X	X	X	X	X	X	X	X
1200	pF		P			H	X	X	X	X	H	C	L	L	L	C	X	X	X	X	X	X	X	X	X	X
1500	pF		P			H	X	X	X	X	H	X	L	L	L	C	X	X	X	X	X	X	X	X	X	X
1800	pF					H	X	X	X	X	H	X	L	L	L	C	X	X	X	X	X	X	X	X	X	X
2200	pF					H	X	X	X	X	H	X	L	L	L	C	X	X	X	X	X	X	X	X	X	X
2700	pF					X					H	X	L	L	L	C	X	X	X	X	X	X	X	X	X	X
3300	pF					X					H	X	L	L	L	C	X	X	X	X	X	X	X	X	X	X
3900	pF					X					H	L	L	L	L	C	X	X	X	X	X	X	X	X	X	X
4700	pF					X					H	L	L	L	L	X	X	X	X	X	X	X	X	X	X	X
5600	pF					X					H	L	L	L	L	X	X	X	X	X	X	X	X	X	X	X
6800	pF					X					C	L	L			L	L	L	L	L	L	X	X	X	X	X
8200	pF										X	L	L			L	L	L	L	L	L	X	X	X	X	X
10	nF										X					L	Z	Z	Z	Z	Z	X	X	X	X	X
12	nF										L					L	Z	Z	Z	Z	Z	X	L	L	L	L
15	nF										L					Z	G	G	G	G	G	X	L	L	L	L
18	nF										L					G	G	G				L	Z	Z	Z	Z
22	nF										L					G	G	G				L	Z	Z	Z	Z
27	nF																					Z	G	G	G	G
33	nF															G						Z	G	G	G	G
39	nF																					G	G	G		
47	nF																					G	G	G		
56	nF																					G				
68	nF																					G				

Remark: Customized size and specification is available upon request. Please contact us for further details

# CERAMIC CHIP CAPACITORS NPO (COG) DIELECTRIC

SIZE AND VALUES AVAILABLE (NPO) 100V – 630V (Medium Voltage)

Size		1825					2220					2225				
(L)	mm	4.50±0.30					5.70±0.40					5.70±0.40				
(W)	mm	6.30±0.40					5.00±0.40					6.30±0.40				
(T)	mm	2.50±0.30					3.00±0.20					3.00±0.20				
(t)	mm	0.35~1.00					0.35~1.00					0.35~1.00				
Cap.\\W.V		100	200	250	500	630	100	200	250	500	630	100	200	250	500	630
10	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
12	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
15	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
18	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
22	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
27	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
33	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
39	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
47	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
56	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
68	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
82	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
100	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
120	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
150	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
180	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
220	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
270	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
330	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
390	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
470	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
560	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
680	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
820	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
1000	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
1200	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
1500	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
1800	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
2200	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
2700	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
3300	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
3900	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
4700	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
5600	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
6800	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
10000	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
12000	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
15000	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
18000	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
22000	pF	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
27000	pF	L	L	L	Z	Z	L	L	L	Z	Z	L	L	L	L	L
33000	pF	L	L	L	Z	Z	L	Z	Z	Z	Z	L	L	L	L	L
39000	pF	L	Z	Z	G	G	L	Z	Z	G	G	L	Z	Z	Z	Z
47000	pF	L	Z	Z	G	G	L	G	G	G	G	L	Z	Z	Z	Z
56000	pF	Z	G	G	G	G	Z	G	G	G	G	L	G	G	G	G
68000	pF	Z	G	G	G	G	Z	G	G			Z	G	G	G	G
82000	pF	G	G	G			G	G	G			Z	G	G	G	G
100000	pF	G					G					G	G	G		

# CERAMIC CHIP CAPACITORS NPO (COG) DIELECTRIC

SIZE AND VALUES AVAILABLE (NPO) 1000V – 4000V (High Voltage)

Size		0805	1206			1210			1808				1812				1825				2220				2225			
(L)	mm	2.00±0.20	3.20±0.20			3.20±0.30			4.50±0.30				4.50±0.30				4.50±0.30				5.70±0.40				5.70±0.40			
(W)	mm	1.25±0.20	1.60±0.20			2.50±0.20			2.00±0.20				3.20±0.30				6.30±0.40				5.00±0.40				6.30±0.40			
(T)	mm	1.25±0.10	1.65±0.20			2.50±0.30			2.00±0.20				3.00±0.30				2.50±0.30				3.00±0.20				3.00±0.20			
(t)	mm	0.30~0.70	0.30~0.70			0.30~0.70			0.35~1.00				0.35~1.00				0.35~1.00				0.35~1.00				0.35~1.00			
Cap./ W.V.		1K	1K	2K	3K	1K	2K	3K	1K	2K	3K	4K	1K	2K	3K	4K	1K	2K	3K	4K	1K	2K	3K	4K	1K	2K	3K	4K
1.5	pF	X	H	H																								
1.8	pF	X	X	H																								
2.2~8.2	pF	X	X	H					X	X	X	X																
10	pF	X	H	H	L	C	C	L	X	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
12	pF	X	H	H	L	C	C	L	X	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
15	pF	X	H	H	L	C	C	L	X	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
18	pF	X	H	H	L	C	C	L	X	X	X	X	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
22	pF	X	H	H	L	C	C	L	X	X	X	L	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
27	pF	X	H	H	L	C	C	L	X	X	X	L	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
33	pF	X	H	C	L	C	C	L	X	X	X	Z	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
39	pF	X	H	C	L	C	C	L	X	X	X	Z	X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
47	pF	X	C	C	L	C	C	L	X	X	X		X	X	X	L	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
56	pF	X	C	X	L	C	X	L	X	X	X		X	X	X	L	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
68	pF	X	C	X	L	C	X	L	X	X	X		X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
82	pF	X	X	X	L	C	X	L	X	X	X		X	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
100	pF	X	X	X		X	X	L	X	X	Z		X	X	X		Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
120	pF	X	X	L		X	X	L	X	X	Z		X	X	X		Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
150	pF	X	X	L		X	L	L	X	Z	Z		X	X	X		Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
180	pF	X	L	L		X	L	L	X	Z	Z		X	X	Z		Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
220	pF	X	L	L		L	L	L	X	Z	Z		X	X	Z		Z	Z	Z		Z	Z	Z	Z	Z	Z	Z	
270	pF	X	L	L		L	L		Z	Z	Z		X	Z	Z		Z	Z	Z		Z	Z	Z	G	Z	Z	Z	
330	pF	X	L	L		L	L		Z	Z	Z		X	Z	Z		Z	Z	Z		Z	Z	G	G	Z	Z	Z	
390	pF	X	L	L		L	L		Z	Z	Z		X	Z	Z		Z	Z	Z		Z	Z	G		Z	Z	Z	
470	pF		L	L		L	L		Z	Z	Z		Z	Z	Z		Z	Z	Z		Z	Z	G		Z	Z	Z	
560	pF		L			L	L		Z	Z	Z		Z	Z	Z		Z	Z	Z		Z	Z	G		Z	Z	Z	
680	pF		L			L	L		Z	Z			Z	Z	Z		Z	Z	G		Z	Z	G		Z	Z	Z	
820	pF		L			L	L		Z	Z			Z	Z	G		Z	Z	G		Z	Z	G		Z	G	G	
1000	pF		L			L	Z		Z	Z			Z	Z	G		Z	Z	G		Z	Z	G		Z	G	G	
1200	pF		L			L	Z		Z	Z			Z	Z			Z	Z	G		G	G	G		Z	G	G	
1500	pF					Z	G		Z	Z			Z	Z			Z	G	G		G	G	G		Z	G	G	
1800	pF					G	G		Z	Z			Z	Z			Z	G	G		G	G	G		Z	G	G	
2200	pF					G			Z				Z	Z			Z	G	G		G	G	G		Z	G	G	
2700	pF					G			Z				Z	G			Z	G	G		G	G	G		Z	G	G	
3300	pF					G			Z				Z	G			Z	G			G	G			Z	G	G	
3900	pF					G			Z				G				G	G			G	G			Z	G		
4700	pF												G				G	G			G	G			Z	G		
5600	pF												G				G	G			G	G			G	G		
6800	pF																G	G			G	G			G	G		
8200	pF																G	G			G	G			G	G		
10000	pF																G				G				G	G		
12000	pF																G				G				G			

Remark: Customized size and specification is available upon request. Please contact us for further details

# CERAMIC CHIP CAPACITORS NPO (COG) DIELECTRIC

## Thickness Code & Standard Packing Q'ty per reel

Thickness Code	Chip Size	Chip Thickness	Max Tape Thickness	Q'ty of carboard tape in		Q'ty of Embosses tape in	
				7" reel	13" reel	7" reel	13" reel
S	0402	0.50±0.05 mm	0.60 mm	10,000	50,000	--	--
P	0603	0.80±0.10 mm	0.95 mm	4,000	15,000	--	--
A	0805	0.60±0.10 mm	0.75 mm	4,000	15,000	--	--
H		0.85±0.10 mm	0.95 mm	4,000	15,000	--	--
X		1.25±0.10 mm	1.80 mm	--	--	3,000	10,000
H	1206	0.85±0.10 mm	0.90 mm	4,000	15,000	--	--
C		0.95±0.10 mm	1.80 mm			3,000	10,000
X		1.25±0.10 mm	1.80 mm	--	--	3,000	10,000
L		1.65±0.20 mm	1.80 mm	--	--	2,000	--
C	1210	0.95±0.10 mm	1.80 mm			3,000	10,000
X		1.25±0.10 mm	1.80 mm	--	--	2,000	--
L		1.65±0.20 mm	1.80 mm	--	--	2,000	--
Z		2.00±0.20 mm	2.20 mm	--	--	2,000	--
G		2.50±0.20 mm	2.75 mm	--	--	1,000	--
X	1808	1.25±0.10 mm	1.80 mm	--	--	2,000	--
F		1.40±0.20 mm	1.80 mm	--	--	2,000	--
L		1.65±0.20 mm	1.80 mm	--	--	2,000	--
Z		2.00±0.20 mm	2.20 mm	--	--	1,000	--
X	1812	1.25±0.20 mm	1.80 mm	--	--	1,000	--
L		1.65±0.20 mm	1.80 mm			1,000	
Z		2.00±0.20 mm	2.20 mm	--	--	1,000	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--
Z	1825	2.00±0.20 mm	2.20 mm	--	--	1,000	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--
Z	2220	2.00±0.20 mm	2.20 mm	--	--	500	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--
L	2211	1.65±0.20 mm	1.80 mm			1,000	
Z		2.00±0.20 mm	2.20 mm	--	--	1,000	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--
Z	2225	2.00±0.20 mm	2.20 mm	--	--	1,000	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--