

# MLCCs for Non- magnetic applications

**COG/NP0, High Q and X7R  
Copper Barrier MLCCs**

Multilayer ceramic capacitors with silver/palladium (Ag/Pd) terminations have often been used in medical applications where non-magnetic components are required, for example in MRI equipment. The use of conventional nickel barrier terminations is not suitable due to nickel exhibiting magnetic properties.

However, RoHS requirements have dictated the use of lead-free solders, and the composition of these solders has resulted in an increase in soldering temperatures. This has caused solder leaching problems for the Ag/Pd termination, and meant alternative terminations have had to be found.



As copper is non-magnetic, one solution is to use a copper barrier instead of a nickel barrier, with a tin finish on top, and this is the solution Syfer has developed.

This copper barrier termination is offered with selected non-magnetic COG/NP0, High Q and X7R dielectrics, providing a fully non-magnetic component.

To meet high temperature 260°C soldering reflow profiles as detailed in J-STD-020, COG/NP0 dielectrics are supplied with sintered termination and X7R dielectrics are supplied with Syfer's award winning FlexiCap™ termination.



## Specification

### Capacitance Values

#### COG/NP0 & High Q

0.1pF - 15nF

#### X7R

47pF - 6.8μF

See overleaf for full list of values

### Electrical

**COG/NP0    High Q    X7R**

#### Operating Temperature

-55°C to +125°C    -55°C to +125°C    -55°C to +125°C

#### Temperature Coefficient (Typical)

0 ± 30 ppm/°C    0 ± 30 ppm/°C    ±15%

#### Insulation Resistance

Time constant (Ri x Cr) (whichever is the least)

100GΩ or 1000s    100GΩ or 1000s    100GΩ or 1000s

#### Ageing Rate

None    None    Typical 1% per time decade

### Mechanical

#### Termination Material

See ordering information below

#### Solderability

IEC 60068-2-58. Passed 3 times reflow profile defined in J-STD-020

#### Printing

Consult sales office

#### Lead Free Soldering

Termination codes 2 and 3 ranges are fully compliant with the RoHS and WEEE directives and parts are compatible with lead free solders.

#### Climatic Category

55/125/56

#### Reeled Quantities

See Capacitance tables overleaf

## Ordering Information

1210	3	100	0103	J	X	T	---
Chip size	Termination	Voltage	Capacitance in picofarads (pF)	Capacitance tolerance	Dielectric	Packaging	Suffix
0402 0603 0505 0805 1206 1111 1210 1808 1812 2220 2225	<b>2</b> (for COG/NP0 & High Q only) = Sintered silver base with copper barrier (100% matte tin plating). RoHS compliant.  <b>3</b> = FlexiCap™ base with copper barrier (100% matte tin plating). RoHS compliant.	016 = 16V 025 = 25V 050 = 50V 063 = 63V 100 = 100V 150 = 150V 200 = 200V 250 = 250V 500 = 500V 630 = 630V 1K0 = 1000V 1K2 = 1200V 1K5 = 1500V 2K0 = 2000V 3K0 = 3000V	<10pF Insert a P for the decimal point, eg P300 = 0.3pF, 8P20 = 8.2pF.  ≥10pF 1st digit is 0. 2nd and 3rd digits are significant figures of capacitance code. The 4th digit is number of 0's following eg. 0103 = 10000pF  Values <1pF in 0.1pF steps, above this values are E24 series	<4.7pF H = ±0.05pF B = ±0.1pF C = ±0.25pF D = ±0.5pF  ≥4.7pF & <10pF B = ±0.1pF C = ±0.25pF D = ±0.5pF  ≥10pF F = ±1% G = ±2% J = ±5% K = ±10%	<b>C</b> = COG/NP0 (1B)  <b>X</b> = X7R (2R1)  <b>Q</b> = High Q	<b>T</b> = 178mm (7") reel  <b>R</b> = 330mm (13") reel  <b>B</b> = Bulk pack - tubs	Used for specific customer requirements

## C0G/NP0 & High Q Maximum Capacitance Values

Chip Size	0402	0603	0505	0805	1206	1111 1210	1808	1812	2220	2225
Min Cap	0.1pF	0.1pF	0.2pF	0.2pF	0.5pF	0.3pF	1.0pF	1.0pF	2.0pF	2.0pF
Min Cap Tolerance	Minimum tolerance $\pm 0.05\text{pF}$ ( $<4.7\text{pF}$ ), $0.1\text{pF}$ ( $\geq 4.7\text{pF}$ & $<10\text{pF}$ ) and $\pm 1\%$ ( $\geq 10\text{pF}$ )									
50V 63V	22pF	100pF	220pF	470pF	1.5nF	-	-	-	-	-
100V	15pF	68pF	150pF	330pF	1.0nF	2.2nF	2.2nF	4.7nF	10nF	15nF
150V	10pF	47pF	100pF	220pF	680pF	1.5nF	1.5nF	3.3nF	6.8nF	10nF
200V 250V	6.8pF	33pF	56pF	150pF	470pF	1.0nF	1.0nF	2.2nF	4.7nF	6.8nF
300V	-	27pF	47pF	120pF	390pF	820pF	820pF	1.8nF	3.9nF	5.6nF
500V	-	-	-	68pF	270pF	680pF	680pF	1.5nF	3.3nF	4.7nF
630V	-	-	-	-	150pF	390pF	390pF	1.0nF	2.2nF	3.3nF
1000V	-	-	-	-	82pF	220pF	220pF	680pF	1.5nF	2.2nF
2000V	-	-	-	-	18pF	68pF	68pF	150pF	470pF	560pF
3000V	-	-	-	-	-	-	-	68pF	150pF	220pF
Reeled Quantities										
7" Reel	5000	4000	2500	3000	2500	1000 2000	2000	500	500	500
13" Reel	13" reel quantities available on request						8000	2000	2000	2000

**NOTE:** Other capacitance values may become available, please contact our Sales Office if you need values other than those shown in the above tables. For dimensions and soldering information, please go to our website ([www.syfer.com](http://www.syfer.com)) or see our MLC Catalogue.

## X7R Maximum Capacitance Values

Chip Size	0402	0603	0805	1206	1210	1808	1812	2220	2225
Min Cap	47pF	100pF	330pF	680pF	1.5nF	2.2nF	3.3nF	6.8nF	10nF
Min Cap Tolerance	Minimum tolerance $\pm 5\%$								
16V	10nF	100nF	330nF	1.0 $\mu\text{F}$	1.5 $\mu\text{F}$	1.5 $\mu\text{F}$	3.3 $\mu\text{F}$	5.6 $\mu\text{F}$	6.8 $\mu\text{F}$
25V	6.8nF	68nF	220nF	820nF	1.2 $\mu\text{F}$	1.2 $\mu\text{F}$	2.2 $\mu\text{F}$	4.7 $\mu\text{F}$	5.6 $\mu\text{F}$
50V 63V	4.7nF	47nF	150nF	470nF	1.0 $\mu\text{F}$	680nF	1.5 $\mu\text{F}$	3.3 $\mu\text{F}$	3.3 $\mu\text{F}$
100V	1.5nF	10nF	47nF	150nF	470nF	330nF	1.0 $\mu\text{F}$	1.5 $\mu\text{F}$	1.5 $\mu\text{F}$
200V 250V	680pF	5.6nF	27nF	100nF	220nF	180nF	470nF	1.0 $\mu\text{F}$	1.0 $\mu\text{F}$
500V	-	1.5nF	8.2nF	33nF	100nF	100nF	270nF	560nF	680nF
630V	-	-	4.7nF	10nF	27nF	33nF	150nF	330nF	390nF
1000V	-	-	3.3nF	4.7nF	15nF	18nF	56nF	120nF	150nF
1200V	-	-	-	3.3nF	10nF	10nF	33nF	82nF	100nF
1500V	-	-	-	2.7nF	6.8nF	6.8nF	22nF	47nF	68nF
2000V	-	-	-	2.2nF	4.7nF	4.7nF	10nF	27nF	33nF
Reeled Quantities									
7" Reel	5000	4000	3000	2500	2000	2000	500	500	500
13" Reel	13" reel quantities available on request					8000	2000	2000	2000

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