



# COG - COMMERCIAL - 16Vdc to 10KVdc



Ultra stable Class I dielectric (EIA COG) or NPO: linear temperature coefficient, low loss, stable electrical properties with time, voltage and frequency. Designed for surface mount application with nickel barrier termination suitable for solder wave, vapor phase or reflow solder board attachment. Also available with silver-palladium terminations for hybrid use with conductive epoxy. COG chips are used in precision circuitry requiring Class I stability.

## CAPACITANCE & VOLTAGE SELECTION FOR POPULAR CHIP SIZES

3 digit code: two significant digits, followed by number of zeros eg: 183 = 18,000 pF. R denotes decimal, eg. 2R7 = 2.7 pF

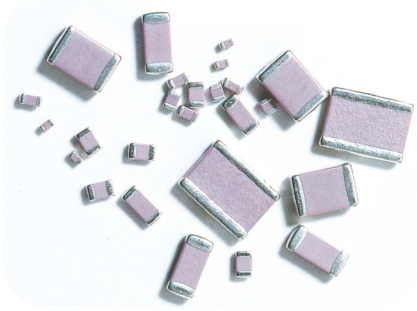
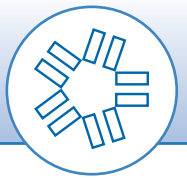
**MAX CAP & VOLTAGE**

SIZE	0402	0504	0603	0805	1005	1206	1210	1515	1808	1812	1825			
Min Cap	0R3	0R5	0R3	0R5	0R5	3R0	5R0	3R0	5R0	5R0	100	100	150	150
Tmax	.024	.044	.035	.054	.054	.064	.065	.130	.065	.080 <sup>x</sup>	.065	.100 <sup>x</sup>	.080	.140 <sup>x</sup>
16V	271	222	152	562	822	153	273	473	393	393	563	563	104	104
25V	221	182	122	472	682	123	273	393	333	333	563	563	104	104
50V	181	152	102	392	562	123	223	333	223	273	393	393	104	104
100V	181	152	102	392	562	103	183	333	153	223	273	393	683	823
200V	101	821	561	182	272	562	103	223	103	153	183	273	473	683
250V	560	561	331	152	222	392	822	223	682	103	153	223	393	563
300V	•	•	•	821	122	272	472	153	472	562	103	153	223	473
400V	•	•	•	821	122	182	472	103	472	472	103	123	223	333
500V	•	•	•	821	122	182	472	822	472	472	103	123	223	273
600V	•	•	•	681	102	152	392	682	392	472	822	103	183	183
800V*	•	•	•	681	102	152	392	682	392	472	822	103	183	183
1000V*	•	•	•	471	391	102	222	562	222	332	472	822	103	153
1500V*	•	•	•	•	•	561	122	392	122	182	272	472	562	103
2000V*	•	•	•	•	•	391	821	272	821	122	182	272	272	562
3000V*	•	•	•	•	•	•	•	122	391	471	821	122	122	222
4000V*	•	•	•	•	•	•	•	681	221	271	471	821	681	122
5000V*	•	•	•	•	•	•	•	•	•	•	•	•	391	821
6000V*	•	•	•	•	•	•	•	•	•	•	•	•	•	•
7000V*	•	•	•	•	•	•	•	•	•	•	•	•	•	•
8000V*	•	•	•	•	•	•	•	•	•	•	•	•	•	•
9000V*	•	•	•	•	•	•	•	•	•	•	•	•	•	•
10000V*	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Note: "x" denotes a special thickness (see Tmax row above). An X is required in the part number. Please refer to page 10 for how to order.

\* Units rated above 800V may require conformal coating in use to preclude arcing over the chip surface

**NOTE: REFER TO PAGES 10 & 11 FOR ORDERING INFORMATION**



See chart for standard EIA case sizes and available capacitance and voltage ratings. Special sizes, thicknesses and other voltage ratings are available, see other NOVACAP product offerings. High reliability testing is available refer to pages 20-21. Please consult the factory with your requirements. NOVACAP has complete testing facilities at your disposal.

## CAPACITANCE & VOLTAGE SELECTION FOR POPULAR CHIP SIZES

3 digit code: two significant digits, followed by number of zeros eg: 183 = 18,000 pF. R denotes decimal, eg. 2R7 = 2.7 pF

SIZE	2020	2221	2225		2520	3333	3530	4040	4540	5440	5550	6560	7565					
Min Cap	270	270	270	270	390	390	390	390	390	390	390	560	101					
Tmax	.180	.080	.080	.150 <sup>x</sup>	.180	.250	.250	.300	.300	.300	.300	.300	.300					
16V	683	104	124	124	Note: "x" denotes a special thickness (see Tmax row above). An X is required in the part number. Please refer to page 10 for how to order.						.	.	.	.				
25V	683	104	124	124							.	.	.	.	.	.	.	.
50V	683	104	124	124							.	.	.	.	.	.	.	.
100V	563	683	823	104							.	.	.	.	.	.	.	.
200V	563	473	563	823	.	.	.	.	.	.	.	.	.					
250V	473	393	473	683	.	.	.	.	.	.	.	.	.					
300V	393	223	273	563	.	.	.	.	.	.	.	.	.					
400V	333	223	273	393	.	.	.	.	.	.	.	.	.					
500V	273	223	273	333	393	473	683	104	124	154	184	274	334					
600V	153	183	273	273	223	393	393	823	823	104	154	224	274					
800V*	153	183	273	273	183	333	333	563	683	823	124	184	224					
1000V*	103	103	153	223	123	273	273	563	563	683	104	154	184					
1500V*	822	562	822	153	103	183	223	393	393	393	563	823	124					
2000V*	472	272	392	822	562	153	153	273	333	333	473	683	104					
3000V*	222	122	182	332	272	822	103	183	223	223	333	473	683					
4000V*	122	681	102	182	152	332	562	123	123	123	183	273	393					
5000V*	821	391	561	122	102	222	332	682	822	822	123	183	223					
6000V*	.	.	.	.	.	182	182	392	392	472	562	103	123					
7000V*	.	.	.	.	.	.	122	272	272	332	472	682	822					
8000V*	.	.	.	.	.	.	102	222	222	272	332	562	682					
9000V*	.	.	.	.	.	.	821	152	182	182	272	392	472					
10000V*	.	.	.	.	.	.	681	122	152	152	222	332	392					

\* Units rated above 800V may require conformal coating in use to preclude arcing over the chip surface

**NOTE: REFER TO PAGES 10 & 11 FOR ORDERING INFORMATION**



# STANDARD SMT CHIP P/N BREAKDOWN

**1206 N 472 J 101 N X050 H T M - HB**

**Case Size**

**Dielectric Code**

Code	EIA	Class
N	COG/NP0	Ultra Stable
B	X7R	Stable
X	BX	MIL
Y	Y5V	General Purpose
Z	Z5U	General Purpose
S	X8R	High Temp up to 150°C
D	COG/NPO	High Temp up to 200°C
E	Class II (Stable)	High Temp up to 200°C
F	160°	High Temp up to 160°C
G	160°	High Temp up to 160°C
W	X5R	Stable
P	85°	Pulse Power
R	200°	Pulse Energy

**Capacitance**

1st two digits are significant, third digit denotes number of zeros, R= decimal

Examples:

1R0 = 1.0 pF      273 = .027 μF  
 120 = 12 pF      474 = 0.47 μF  
 471 = 470 pF      105 = 1.0 μF  
 102 = 1,000 pF

**Capacitance Tolerance**

Code		COG NPO	X7R	BX	Z5U Y5V	X8R 150°C	D/F	E/G	W X5R
Cap Value < 10pF	<b>B</b>	±0.10pF							
	<b>C</b>	±0.25pF							
	<b>D</b>	±0.50pF							
	<b>F</b>	± 1%							
	<b>G</b>	± 2%							
	<b>J</b>	± 5%							
	<b>K</b>	±10%							
	<b>M</b>	±20%							
	<b>Z</b>	+80% -20%							
	<b>P</b>	+100%/-0%							

**Marking**

M = Marked  
 None = Unmarked  
 Marking not available on sizes 0603 and below

**Packaging**

T= Tape and Reel  
 W = Waffle Pack  
 None = Bulk

**High Reliability Testing**

H = High Reliability Testing Required  
 None = Standard SMT, no High-Rel  
 HB = MIL-PRF-55681 Group A  
 HK = MIL-PRF-38534 Class K  
 HS = MIL-PRF-123 Group A

**Special Thickness**

**X** in the part number denotes a special thickness other than standard. Specify in mils if required. (As shown above X=.050")  
 If no **X** in the part number then thickness is standard per Novacap catalog specifications.

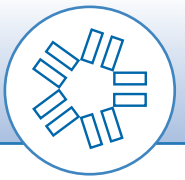
**Termination**

N = Nickel Barrier (100% Tin) (RoHS)  
 P = Palladium Silver  
 PR = Palladium Silver (RoHS)  
 Y = Nickel Barrier (90%Tin/10%Lead)  
 S = Silver  
 C = Polymer with Nickel Barrier (100% Tin) (RoHS)  
 D = Polymer with Nickel Barrier (90%Tin/10%Lead)  
 V = Non-Solderable Silver (RoHS)  
 NG = Nickel Gold

**Voltage**

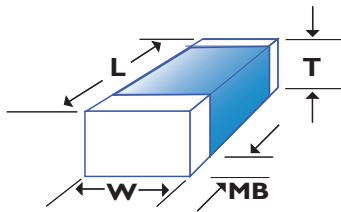
Examples:  
 160 = 16 Volts      102 = 1000 Volts  
 101 = 100 Volts      502 = 5000 Volts  
 501 = 500 Volts      103 = 10,000 Volts

*This ordering information relates to NOVACAP's standard surface mount capacitors. Please refer to the specific catalog pages for ordering information for our application specific products; ie: Stacked, Leaded, Capacitor Arrays, Pulsed Power capacitors and other specialty products.*



## PART NUMBER PREFIX DEFINITIONS

<b>LS</b> = Y3 Certified Safety Capacitor	pg. 38
<b>ES</b> = Y2 Certified Safety Capacitor	pg. 39
<b>AP</b> = Arc Prevention Capacitor	pg. 54
<b>CR</b> = Cap-Rack Capacitor Array	pg. 42 - 43
<b>RC</b> = Bleed Resistor	pg. 34 - 37
<b>RD</b> = Ring Detect Capacitor	pg. 40
<b>ST</b> = Stacked Capacitor Assembly	pg. 54 - 55
<b>SM</b> = Hi-Rel Stacked Capacitor Assembly	pg. 54 - 55



## CODE COMBINATIONS

Dielectric Code	Max. Temp. Rated	Terminations (allowed)
<b>N</b> (COG/NPO)	125°	N, P, Y, S, V, NG, PR
<b>B</b> (X7R)	125°	N, P, Y, C, D, S, V, NG, PR
<b>X</b> (BX)	125°	N, P, Y, C, D, S, V, NG, PR
<b>Y</b> (Y5V)	85°	N, Y, C, D
<b>Z</b> (Z5U)	85°	N, Y, C, D
<b>D</b> (NPO-HIGH TEMP)	200°	P, S, V, PR
<b>E</b> (CLASS II-HIGH TEMP)	200°	P, S, V, PR
<b>F</b> (NPO-HIGH TEMP)	160°	N, P, Y, S, V, C, D, PR
<b>G</b> (CLASS II-HIGH TEMP)	160°	N, P, Y, S, V, C, D, PR
<b>S</b> (X8R)	150°	N, P, Y, S, V, C, D, PR
<b>P</b> (PULSE POWER)	85°	P, PR
<b>R</b> (R2D)	200°	P, PR
<b>W</b> (X5R)	85°	N, Y, NG

DIMENSIONS +/- INCHES (MM)

SIZE	0402	0504	0603	0805	0907	1005	1206	1210	1515	1808	1812	1825
LENGTH L	.040 (.102)	.050 (1.27)	.060 (1.52)	.080 (2.03)	.090 (2.29)	.100 (2.54)	.125 (3.18)	.125 (3.18)	.150 (3.81)	.180 (4.57)	.180 (4.57)	.180 (4.57)
WIDTH W	.020 (.508)	.040 (1.02)	.030 (.762)	.050 (1.27)	.070 (1.78)	.050 (1.27)	.060 (1.52)	.100 (2.54)	.150 (3.81)	.080 (2.03)	.125 (3.18)	.250 (6.35)
T MAX.	.024 (.610)	.044 (1.12)	.035 (.889)	.054 (1.37)	.054 (1.37)	.054 (1.37)	.064 (1.63)	.065 (1.65)	.130 (3.30)	.065 (1.65)	.065 (1.65)	.080 (2.03)
MB	.010 (.254)	.014 (.356)	.014 (.356)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.030 (.762)	.024 (.610)	.024 (.610)	.024 (.610)
LENGTH	.004 (.102)	.006 (.152)	.006 (.152)	.008 (.203)	.008 (.203)	.008 (.203)	.008 (.203)	.008 (.203)	.015 (.381)	.012 (.305)	.012 (.305)	.012 (.305)
WIDTH	.004 (.102)	.006 (.152)	.006 (.152)	.008 (.203)	.008 (.203)	.008 (.203)	.008 (.203)	.008 (.203)	.015 (.381)	.008 (.203)	.008 (.203)	.015 (.381)
MB	.006 (.152)	.006 (.152)	.006 (.152)	.010 (.254)	.010 (.254)	.010 (.254)	.010 (.254)	.010 (.254)	.015 (.381)	.014 (.356)	.014 (.356)	.014 (.356)

DIMENSIONS +/- INCHES (MM)

SIZE	2020	2221	2225	2520	3333	3530	4040	4540	5440	5550	6560	7565
LENGTH L	.200 (5.08)	.220 (5.59)	.220 (5.59)	.250 (6.35)	.330 (8.38)	.350 (8.89)	.400 (10.2)	.450 (11.4)	.540 (13.7)	.550 (14.0)	.650 (16.5)	.750 (19.1)
WIDTH W	.200 (5.08)	.210 (5.33)	.250 (6.35)	.200 (5.08)	.330 (8.38)	.300 (7.62)	.400 (10.2)	.400 (10.2)	.400 (10.2)	.500 (12.7)	.600 (15.2)	.650 (16.5)
T MAX.	.180 (4.57)	.080 (2.03)	.080 (2.03)	.180 (4.57)	.250 (6.35)	.250 (6.35)	.300 (7.62)	.300 (7.62)	.300 (7.62)	.300 (7.62)	.300 (7.62)	.300 (7.62)
MB	.024 (.610)	.030 (.762)	.030 (.762)	.030 (.762)	.030 (.762)	.030 (.762)	.040 (1.02)	.040 (1.02)	.040 (1.02)	.040 (1.02)	.040 (1.02)	.040 (1.02)
LENGTH	.015 (.381)	.015 (.381)	.015 (.381)	.015 (.381)	.017 (.432)	.018 (.457)	.020 (.508)	.023 (.584)	.027 (.686)	.028 (.711)	.033 (.838)	.038 (.965)
WIDTH	.015 (.381)	.015 (.381)	.015 (.381)	.015 (.381)	.017 (.432)	.015 (.381)	.020 (.508)	.020 (.508)	.020 (.508)	.025 (.635)	.030 (.762)	.033 (.838)
MB	.014 (.356)	.015 (.381)	.015 (.381)	.015 (.381)	.015 (.381)	.015 (.381)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)