

# COG - HIGH RELIABILITY - 16Vdc to 10KVdc



NOVACAP manufactures and tests COG chips in accordance with MIL-PRF-55681, MIL-PRF-123, MIL-PRF-49467, or customer SCD. Product is designed for optimum reliability, burned in at elevated voltage and temperature, and 100% physically and electrically inspected to ascertain conformance to strict performance criteria. Voltage ratings from 16VDC to 10,000VDC are available on standard EIA case sizes. Applications for High Reliability products include medical implanted devices, aerospace, airborne and various military applications, and consumer uses requiring safety margins not attainable with conventional product.

## 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

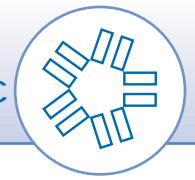
MAX CAP & VOLTAGE

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	181	152	102	392	562	103	223	393	223	273	473	473	104	104
25V	181	152	102	392	562	123	223	393	223	273	473	473	104	104
50V	181	152	102	392	562	123	223	333	183	223	393	393	104	104
100V	101	821	561	222	332	682	123	273	123	183	273	273	683	823
200V	101	561	331	152	222	392	822	223	822	103	153	273	473	683
250V	390	391	271	102	152	272	562	183	562	682	123	183	273	473
300V	•	•	•	681	681	182	392	123	392	472	822	123	223	273
400V	•	•	•	681	561	152	392	822	392	472	822	103	183	183
500V	•	•	•	681	561	152	392	682	392	392	822	103	183	183
600V	•	•	•	•	•	122	392	682	392	392	822	103	183	183
800V*	•	•	•	•	•	102	222	472	222	222	472	682	123	153
1000V*	•	•	•	•	•	681	152	392	152	152	332	562	822	123
1500V*	•	•	•	•	•	271	681	222	681	102	152	222	392	682
2000V*	•	•	•	•	•	151	391	122	391	391	821	122	222	392
3000V*	•	•	•	•	•	•	•	561	181	181	391	561	102	182
4000V*	•	•	•	•	•	•	•	•	•	•	•	•	391	681
5000V*	•	•	•	•	•	•	•	•	•	•	•	•	221	471
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**



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

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	560	101	
Tmax	.180	.080	.080	.150 <sup>x</sup>	.180	.250	.250	.300	.300	.300	.300	.300	
16V	683	104	124	124						•	•	•	
25V	683	104	124	124						•	•	•	
50V	683	104	124	124						•	•	•	
100V	563	683	823	104						•	•	•	
200V	473	393	473	823	•	•	•	•	•	•	•	•	
250V	393	223	273	563	•	•	•	•	•	•	•	•	
300V	333	183	273	473	•	•	•	•	•	•	•	•	
400V	223	183	273	273	•	•	•	•	•	•	•	•	
500V	153	183	273	273	183	684	473	823	823	104	124	224	274
600V	153	183	273	273	183	474	393	683	823	823	124	184	274
800V*	103	103	153	223	123	334	333	563	683	683	104	154	184
1000V*	103	822	123	183	123	184	273	473	563	563	823	124	184
1500V*	682	392	562	103	822	223	183	333	393	393	563	823	124
2000V*	392	182	272	562	472	473	153	223	273	333	473	683	823
3000V*	182	821	122	272	222	223	682	153	183	183	273	393	473
4000V*	681	331	471	102	102	123	272	562	682	822	103	153	223
5000V*	391	221	331	681	561	682	182	392	472	472	682	103	123
6000V*	•	•	•	•	•	472	152	272	332	332	472	822	822
7000V*	•	•	•	•	•	•	821	152	182	182	272	392	472
8000V*	•	•	•	•	•	•	•	102	122	122	182	272	392
9000V*	•	•	•	•	•	•	•	•	821	102	122	222	272
10000V*	•	•	•	•	•	•	•	•	681	821	122	182	222

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.

MAX CAP & VOLTAGE

\* 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

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

Capacitance

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

Examples:

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

Capacitance Tolerance

Code		COG NPO	X7R	BX	Z5U Y5V	X8R 150°C	D 200°C	E 200°C
Cap Value < 10pF	B ±0.10pF	█						
	C ±0.25pF	█						
	D ±0.50pF	█						
	F ± 1%pF		█				█	
	G ± 2%pF		█	█			█	
	J ± 5%pF		█	█		█	█	█
	K ±10%pF				█			
	M ±20%pF				█			
	Z +80% -20%							
	P +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
- Consult catalog to determine MIL SPEC required.

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

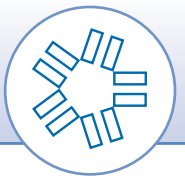
- N = Nickel Barrier (100% Tin)
- P = Palladium Silver
- Y = Nickel Barrier (90%Tin/10%Lead)
- S = Silver
- C = Polymer with Nickel Barrier (100% Tin)
- D = Polymer with Nickel Barrier (90%Tin/10%Lead)
- V = Non-Solderable Silver

Voltage

Examples:

- 160 = 16 Volts      202 = 2000 Volts
- 250 = 25 Volts      302 = 3000 Volts
- 500 = 50 Volts      402 = 4000 Volts
- 101 = 100 Volts      502 = 5000 Volts
- 251 = 250 Volts      602 = 6000 Volts
- 501 = 500 Volts      802 = 8000 Volts
- 102 = 1000 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.*

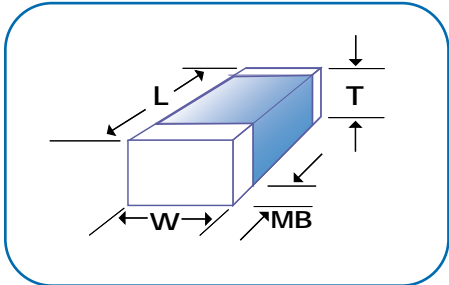


## PART NUMBER PREFIX DEFINITIONS

<b>LS</b> = Y3 Certified Safety Capacitor	pg. 36
<b>ES</b> = Y2 Certified Safety Capacitor	pg. 37
<b>AP</b> = Arc Prevention Capacitor	pg. 50
<b>CR</b> = Cap-Rack Capacitor Array	pg. 40 - 41
<b>RD</b> = Ring Detect Capacitor	pg. 38
<b>ST</b> = Stacked Capacitor Assembly	pg. 48 - 49
<b>SM</b> = Hi-Rel Stacked Capacitor Assembly	pg. 48 - 49

## CODE COMBINATIONS

Dielectric Code	Max. Temp. Rated	Terminations (allowed)
<b>N</b> (COG/NPO)	125°	N, P, Y, S, V
<b>B</b> (X7R)	125°	N, P, Y, C, D, S, V
<b>X</b> (BX)	125°	N, P, Y, C, D, S, V
<b>Y</b> (Y5V)	125°	N, Y, C, D
<b>Z</b> (Z5U)	125°	N, Y, C, D
<b>D</b> (NPO-HIGH TEMP)	200°	P, S, V
<b>E</b> (CLASS 11-HIGH TEMP)	200°	P, S, V
<b>F</b> (NPO-HIGH TEMP)	160°	N, P, Y, S, V
<b>G</b> (CLASS 11-HIGH TEMP)	160°	N, P, Y, S, V
<b>S</b> (X8R)	150°	N, P, Y, S, V
<b>P</b> (PULSE POWER)	125°	P
<b>R</b> (R2D)	200°	P



DIMENSIONS  
INCHES (MM)

SIZE	0402	0504	0603	0805	0907	1005	1206	1210	1515	1808	1812	1825
LENGTH L	.040 (1.02)	.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)	.040 (1.02)	.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)