

BX characteristics are identical to X7R dielectric, with the added restriction that the Temperature-Voltage Coefficient (TVC) is not to exceed  $-25\% \Delta C$  at rated voltage, over the operating temperature range ( $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ ). NOVACAP manufactures chips using dielectrics with minimal voltage coefficient and layer thickness designed to meet BX requirements.

## COMMERCIAL & HIGH RELIABILITY CAPACITANCE & VOLTAGE SELECTION

3 digit code: two significant digits, followed by number of zeros eg: 473 = 47,000 pF

SIZE	0402	0504	0603	0805	1005	1206	1210	1808	1812	1825	2221	2225
Min Cap	121	121	121	121	121	121	121	151	151	471	471	471
Tmax	.024	.044	.035	.054	.054	.064	.065	.065	.065	.080	.080	.080
16V	562	393	273	104	124	274	474	564	105	185	155	225
25V	472	333	223	104	124	274	474	564	105	155	125	185
50V	182	183	123	473	683	124	274	274	564	125	125	155
100V	681	682	472	183	183	473	104	104	184	394	334	474
200V	221	182	122	562	822	153	273	333	563	104	823	124
250V	•	681	391	182	272	472	103	103	223	563	473	683
300V	•	•	•	122	122	332	562	682	123	393	333	473
400V	•	•	•	681	681	182	332	392	562	183	183	223
500V	•	•	•	391	471	102	222	222	392	123	103	153

MAX CAP & VOLTAGE

## HOW TO ORDER

2225	X	124	K	302	N	X	H	T	M	-HB
<b>SIZE</b> See Chart	<b>DIELECTRIC</b> X = BX	<b>CAPACITANCE</b> Value in Picofarads Two significant figures, followed by number of zeros: 103=10,000 pF	<b>TOLERANCE</b> J= +/- 5% K= +/- 10% M= +/- 20%	<b>VOLTAGE-VDCW</b> Two significant figures, followed by number of zeros: 302=3000V	<b>TERMINATION</b> N=Nickel Barrier (100% Tin) P=Palladium Silver Y=Nickel Barrier (90 Tin/10 Lead)	<b>THICKNESS OPTION</b> X = Non-standard thickness. Specify in Mils if non-standard is required. Standard items are any thickness to Max. shown in charts.	<b>HIGH REL TESTING (Optional)</b> Specify test criteria if required	<b>PACKING OPTION</b> T=Reeled	<b>MARKING OPTION</b> M = Marked See Marking Specification	<b>TESTING OPTION</b> HB = MILPRF-55681 GROUP A HK = MIL-PRF-38534 CLASS K HS = MIL-PRF-123 GROUP A



# 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	±0.10pF							
	C	±0.25pF							
	D	±0.50pF							
	F	± 1%							
	G	± 2%							
	J	± 5%							
	K	±10%							
	M	±20%							
	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  
 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.

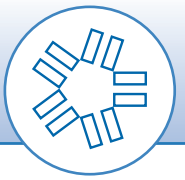
**Termination**

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**

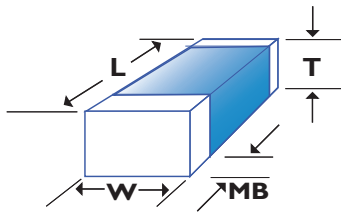
Examples:  
 160 = 16 Volts      102 = 1000 Volts  
 101 = 100 Volts      502 = 5000 Volts  
 501 = 500 Volts      103 = 10,000 Volts

*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)