X7R - COMMERCIAL - 16Vdc to 10KVdc

Stable EIA Class II dielectric, with +/-15% temperature coefficient and predictable variation of electrical properties with time, temperature and voltage. These chips are designed for surface mount application with nickel barrier terminations suitable for solder wave, vapor phase or reflow solder board attachment. Also available in silver-palladium terminations for hybrid use with conductive epoxy. Class II X7R chips are used as decoupling, by-pass, filtering and transient voltage suppression elements.

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	121	121	121	121	121	121	121	151	151	151	151	151	471	471
Tmax	.024	.044	.035	.054	.054	.064	.065	.130	.065	.080[X]	.065	.100[X]	.080	.140[X]
16V	562	393	273	124	154	334	474	125	684	824	125	155	185	225
25V	472	333	223	104	124	274	474	105	564	564	105	125	155	225
50V	472	333	223	104	124	274	474	824	394	564	824	125	155	225
100V	472	333	223	683	823	184	334	684	274	394	564	824	125	185
200V	222	153	103	333	473	104	184	564	184	224	334	564	824	155
250V	152	103	682	273	393	683	124	394	124	154	224	394	684	125
300V	•	•	•	153	183	473	823	274	823	104	154	224	474	824
400V	•	•	•	123	123	273	563	224	563	823	104	184	334	564
500V	•	•	•	123	822	223	563	154	563	683	104	154	334	474
600V	•	•	•	822	822	183	393	124	393	563	683	124	224	394
800V*	•	•	•	472	472	103	273	823	273	333	473	683	124	274
1000V*	•	•	•	272	272	682	153	563	153	223	273	473	823	154
1500V*	•	•	•	•	•	222	472	183	472	682	822	153	273	563
2000V*	•	•	•	•	•	102	222	822	272	332	472	682	123	273
3000V*	•	•	•	•	•	•	•	332	821	122	152	272	472	103
4000V*	•	•	•	•	•	•	•	122	331	391	681	122	152	272
5000V*	•	•	•	•	•	•	•	•	•	•	•	•	821	182
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 22-23. 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

MAX CAP & VOLTAGE

SIZE	2020	2221	2225		2520	3333	3530	4040	4540	5440	5550	6560	7565
Min Cap	102	471	471	471	102	102	102	102	102	102	102	222	222
Tmax	.180	.080	.080	.150[X]	.180	.250	.250	.300	.300	.300	.300	.300	.300
16V	185	155	225	275						•	•	•	•
25V	155	125	185	225						•	•	•	•
50V	155	125	185	225						•	•	•	•
100V	155	125	155	225	•					•	•	•	•
200V	125	684	105	185	•	•	•	•	•	•	•	•	•
250V	105	564	824	155	•	•	•	•	•	•	•	•	•
300V	824	394	474	105	•	•	•	•	•	•	•	•	•
400V	564	274	394	684	•	•	•	•	•	•	•	•	•
500V	474	274	334	564	684	105	105	185	185	185	225	335	475
600V	274	224	274	474	394	684	684	155	155	155	225	275	395
800V*	224	124	154	334	274	474	394	684	824	105	155	225	275
1000V*	154	823	104	224	184	334	334	564	684	684	105	155	225
1500V*	473	273	333	683	563	124	124	274	334	334	474	684	824
2000V*	273	123	153	333	273	823	683	154	184	184	274	394	474
3000V*	103	472	562	123	123	333	273	683	683	823	124	184	224
4000V*	272	152	152	332	472	183	153	223	333	393	473	823	104
5000V*	152	821	102	222	272	123	103	123	183	223	333	473	563
6000V*	•	•	•	•	•	682	562	822	123	153	223	333	393
7000V*	•	•	•	•	•	•	472	562	822	103	153	223	273
8000V*	•	•	•	•	•	•	332	472	682	822	123	153	223
9000V*	•	•	•	•	•	•	272	332	472	562	103	123	183
10000V*	•	•	•	•	•	•	182	272	392	472	682	103	123

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

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 150ºC
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 Reliablity 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

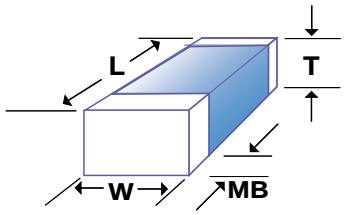
Examples:

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

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



CODE COMBINATIONS

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

TOLERANCE +/- INCHES (MM)

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)

TOLERANCE +/- INCHES (MM)

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)

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