



# 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

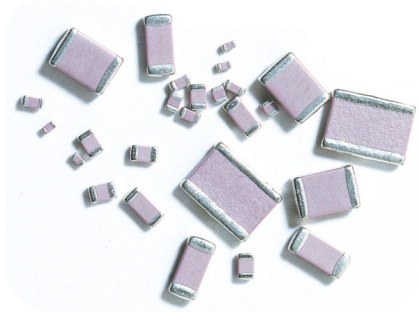
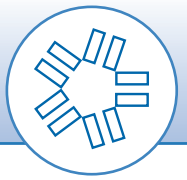
MAX CAP & VOLTAGE

| 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*  | •    | •    | •    | •    | •    | •    | •    | •    | •    | 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. |      |                   |      |                   |
| 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

MAX CAP & VOLTAGE

| 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               | 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  |
| 600V    | 153  | 183  | 273  | 273               | 223                                                                                                                                        | 393  | 393  | 823  | 823  | 104  | 154  | 224  |
| 800V*   | 153  | 183  | 273  | 273               | 183                                                                                                                                        | 333  | 333  | 563  | 683  | 823  | 124  | 184  |
| 1000V*  | 103  | 103  | 153  | 223               | 123                                                                                                                                        | 273  | 273  | 563  | 563  | 683  | 104  | 154  |
| 1500V*  | 822  | 562  | 822  | 153               | 103                                                                                                                                        | 183  | 223  | 393  | 393  | 393  | 563  | 823  |
| 2000V*  | 472  | 272  | 392  | 822               | 562                                                                                                                                        | 153  | 153  | 273  | 333  | 333  | 473  | 683  |
| 3000V*  | 222  | 122  | 182  | 332               | 272                                                                                                                                        | 822  | 103  | 183  | 223  | 223  | 333  | 473  |
| 4000V*  | 122  | 681  | 102  | 182               | 152                                                                                                                                        | 332  | 562  | 123  | 123  | 123  | 183  | 273  |
| 5000V*  | 821  | 391  | 561  | 122               | 102                                                                                                                                        | 222  | 332  | 682  | 822  | 822  | 123  | 183  |
| 6000V*  | .    | .    | .    | .                 | .                                                                                                                                          | 182  | 182  | 392  | 392  | 472  | 562  | 103  |
| 7000V*  | .    | .    | .    | .                 | .                                                                                                                                          | .    | 122  | 272  | 272  | 332  | 472  | 682  |
| 8000V*  | .    | .    | .    | .                 | .                                                                                                                                          | .    | 102  | 222  | 222  | 272  | 332  | 562  |
| 9000V*  | .    | .    | .    | .                 | .                                                                                                                                          | .    | 821  | 152  | 182  | 182  | 272  | 392  |
| 10000V* | .    | .    | .    | .                 | .                                                                                                                                          | .    | 681  | 122  | 152  | 152  | 222  | 332  |

\* 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

**I 206 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  $\mu$ F  
 120 = 12 pF      474 = 0.47  $\mu$ F  
 471 = 470 pF      105 = 1.0  $\mu$ F  
 102 = 1,000 pF

**Capacitance Tolerance**

| Code             |               | COG<br>NPO | X7R | BX | Z5U<br>Y5V | X8R<br>150°C | D/F | E/G | W<br>X5R |
|------------------|---------------|------------|-----|----|------------|--------------|-----|-----|----------|
| Cap Value < 10pF |               |            |     |    |            |              |     |     |          |
| B                | $\pm 0.10$ pF |            |     |    |            |              |     |     |          |
| C                | $\pm 0.25$ pF |            |     |    |            |              |     |     |          |
| D                | $\pm 0.50$ pF |            |     |    |            |              |     |     |          |
| F                | $\pm 1\%$     |            |     |    |            |              |     |     |          |
| G                | $\pm 2\%$     |            |     |    |            |              |     |     |          |
| J                | $\pm 5\%$     |            |     |    |            |              |     |     |          |
| K                | $\pm 10\%$    |            |     |    |            |              |     |     |          |
| M                | $\pm 20\%$    |            |     |    |            |              |     |     |          |
| 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.

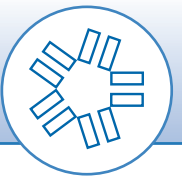
**Termination**

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**

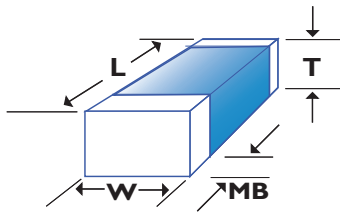
Examples:  
 160 = 16 Volts      102 = 1000 Volts  
 101 = 100 Volts      502 = 5000 Volts  
 501 = 500 Volts      103 = 10,000 Volts

*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        |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>LENGTH L</b> | .040 (.102) | .050 (.127) | .060 (.152) | .080 (.203) | .090 (.229) | .100 (.254) | .125 (.318) | .125 (.318) | .150 (.381) | .180 (.457) | .180 (.457) | .180 (.457) |
| <b>WIDTH W</b>  | .020 (.508) | .040 (.102) | .030 (.762) | .050 (.127) | .070 (.178) | .050 (.127) | .060 (.152) | .100 (.254) | .150 (.381) | .080 (.203) | .125 (.318) | .250 (.635) |
| <b>T MAX.</b>   | .024 (.610) | .044 (.112) | .035 (.889) | .054 (.137) | .054 (.137) | .054 (.137) | .064 (.163) | .065 (.165) | .130 (.330) | .065 (.165) | .065 (.165) | .080 (.203) |
| <b>MB</b>       | .010 (.254) | .014 (.356) | .014 (.356) | .020 (.508) | .020 (.508) | .020 (.508) | .020 (.508) | .020 (.508) | .030 (.762) | .024 (.610) | .024 (.610) | .024 (.610) |
| <b>LENGTH</b>   | .004 (.102) | .006 (.152) | .006 (.152) | .008 (.203) | .008 (.203) | .008 (.203) | .008 (.203) | .008 (.203) | .015 (.381) | .012 (.305) | .012 (.305) | .012 (.305) |
| <b>WIDTH</b>    | .004 (.102) | .006 (.152) | .006 (.152) | .008 (.203) | .008 (.203) | .008 (.203) | .008 (.203) | .008 (.203) | .015 (.381) | .008 (.203) | .008 (.203) | .015 (.381) |
| <b>MB</b>       | .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        |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>LENGTH L</b> | .200 (.508) | .220 (.559) | .220 (.559) | .250 (.635) | .330 (.838) | .350 (.889) | .400 (10.2) | .450 (11.4) | .540 (13.7) | .550 (14.0) | .650 (16.5) | .750 (19.1) |
| <b>WIDTH W</b>  | .200 (.508) | .210 (.533) | .250 (.635) | .200 (.508) | .330 (.838) | .300 (.762) | .400 (10.2) | .400 (10.2) | .400 (10.2) | .500 (12.7) | .600 (15.2) | .650 (16.5) |
| <b>T MAX.</b>   | .180 (.457) | .080 (2.03) | .080 (2.03) | .180 (.457) | .250 (.635) | .250 (.635) | .300 (.762) | .300 (.762) | .300 (.762) | .300 (.762) | .300 (.762) | .300 (.762) |
| <b>MB</b>       | .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) |
| <b>LENGTH</b>   | .015 (.381) | .015 (.381) | .015 (.381) | .015 (.381) | .017 (.432) | .018 (.457) | .020 (.508) | .023 (.584) | .027 (.686) | .028 (.711) | .033 (.838) | .038 (.965) |
| <b>WIDTH</b>    | .015 (.381) | .015 (.381) | .015 (.381) | .015 (.381) | .017 (.432) | .015 (.381) | .020 (.508) | .020 (.508) | .020 (.508) | .025 (.635) | .030 (.762) | .033 (.838) |
| <b>MB</b>       | .014 (.356) | .015 (.381) | .015 (.381) | .015 (.381) | .015 (.381) | .015 (.381) | .020 (.508) | .020 (.508) | .020 (.508) | .020 (.508) | .020 (.508) | .020 (.508) |

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## Novacap:

[1812B102J202N](#) [1210N223J250NT](#) [1210N273J160NT](#) [1210N183J250NT](#) [0805B102K501Y](#) [1812B471M302NT](#)  
[0402N101J500NXT](#) [0805B104K500NT](#) [3333N822M302N](#) [3333N222F402P](#) [1206N182J500N](#) [5550B473K402N](#)  
[1808B102M202NT](#) [2520B102K502P](#) [1206Z104M201N](#) [1210N302J5001N](#) [0805Z104M101NT](#) [1206B473K500NTM](#)  
[0805B473K500N](#) [1812Z105K500N](#) [0805N360F101NT](#) [1210B472K102NT](#) [1206B823J500N](#) [5550N621K103N](#)  
[1210B224K500NTM](#) [1206N103J500NT](#) [0805F751J500K](#) [2020B103K202NT](#) [1206N202J500N](#) [1206N202G500N](#)  
[1206B471K101NT](#) [1210B152K152N](#) [1206B472K102NT](#) [1206N241J501N](#) [1206N682F500NM](#) [0805B562K501NTM](#)  
[0805N470M501NTM](#) [1812B473K501NT](#) [1812B223K501CT](#) [2225N104J500NT](#) [1812B104K501NT](#) [1812Y475M500CT](#)  
[1812B104K201NT](#) [1210N103F101NT](#) [1812B472K202NT](#) [1812B222K202CT](#) [1812B222K202NT](#) [0805B102K201CT](#)  
[0603B102K201CT](#) [1812B102K202NT](#) [1210B472K152NT](#) [1825B684K251NT](#) [2225B104K102NT](#) [0504N471J101NT](#)  
[2225B474K251NT](#) [0504N101J101NT](#) [0504N100J101NT](#) [1808B103K102NT](#) [1812B824K101CXT](#) [2225B105K101NT](#)  
[1210B223K501NT](#) [1210B473K501NT](#) [1210B473K501CT](#) [1825B105K101NT](#) [1825B105K101CT](#) [1812B334K251CXT](#)  
[1812N103J201NT](#) [1515B102K202NT](#) [1825B154M201NT](#) [1825B104K501CT](#) [1812N102J202NT](#) [2225B474K500NT](#)  
[1206B102K202NT](#) [1808N221K202NT](#) [1812N471K102NT](#) [1825N102K202NT](#) [1206B471K202NT](#) [1808B222M202NT](#)  
[1515B103K102NT](#) [1812B474K101NT](#) [1825B474K201CT](#) [0504N102J500NT](#) [1825B104K201NT](#) [1812B223K102NT](#)  
[1812B273K102NT](#) [1812B473K102NXT](#) [1812N222M202NXT](#) [1825B102K202NT](#) [1825B103K202NT](#)  
[1812B103K102NT](#) [1812B103K102CT](#) [2225N221J302NT](#) [0504B102K101NT](#) [0504B103K101NT](#) [1808B102K202NT](#)  
[1808B152K202NT](#) [2225B103K202NT](#) [1812B224K251CT](#) [1812B224K251NT](#) [2225N151M302NT](#)