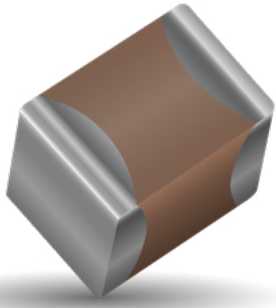


# COG (NP0) Dielectric

## General Specifications



COG (NP0) is the most popular formulation of the “temperature-compensating,” EIA Class I ceramic materials. Modern COG (NP0) formulations contain neodymium, samarium and other rare earth oxides.

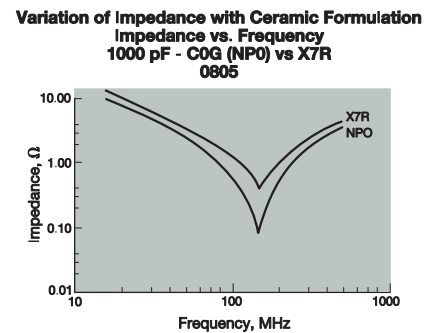
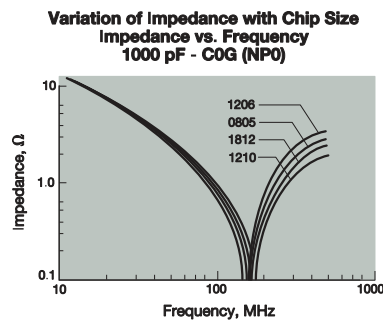
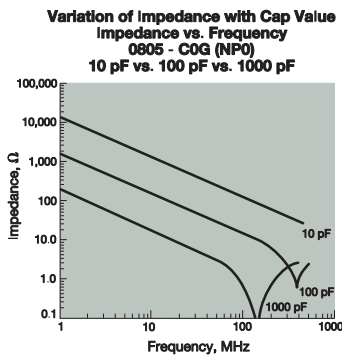
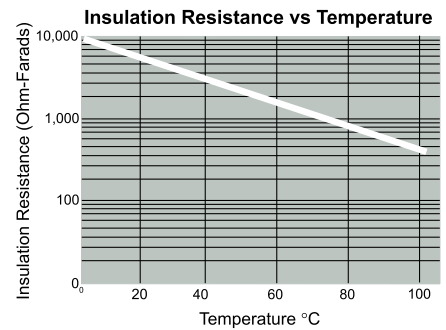
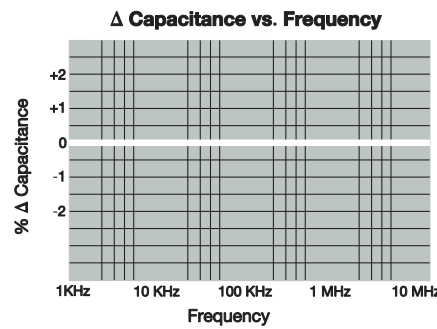
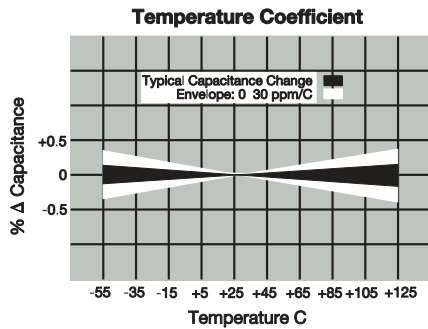
COG (NP0) ceramics offer one of the most stable capacitor dielectrics available. Capacitance change with temperature is  $0 \pm 30\text{ppm}/^\circ\text{C}$  which is less than  $\pm 0.3\%$  C from  $-55^\circ\text{C}$  to  $+125^\circ\text{C}$ . Capacitance drift or hysteresis for COG (NP0) ceramics is negligible at less than  $\pm 0.05\%$  versus up to  $\pm 2\%$  for films. Typical capacitance change with life is less than  $\pm 0.1\%$  for COG (NP0), one-fifth that shown by most other dielectrics. COG (NP0) formulations show no aging characteristics.

### PART NUMBER (SEE PAGE 4 FOR COMPLETE PART NUMBER EXPLANATION)



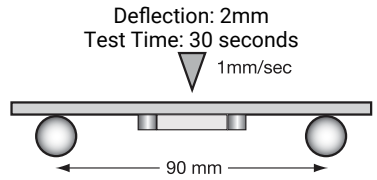
|                          |  |                                    |  |  |   |  |   |   |
|--------------------------|--|------------------------------------|--|--|---|--|---|---|
| <b>0805</b>              | <b>5</b>   | <b>A</b>                           | <b>101</b>   | <b>J</b>   | <b>A</b>                                  | <b>T</b>   | <b>2</b>  | <b>A</b>                                |
| <b>Size</b><br>(L" x W") | <b>Voltage</b><br>6.3V = 6<br>10V = Z<br>16V = Y<br>25V = 3<br>50V = 5<br>100V = 1<br>200V = 2<br>250V = V<br>500V = 7 | <b>Dielectric</b><br>COG (NP0) = A | <b>Capacitance Code (In pF)</b><br>2 Sig. Digits + Number of Zeros | <b>Capacitance Tolerance</b><br>B = $\pm 10$ pF (<10pF)<br>C = $\pm 25$ pF (<10pF)<br>D = $\pm 50$ pF (<10pF)<br>F = $\pm 1\%$ ( $\geq 10$ pF)<br>G = $\pm 2\%$ ( $\geq 10$ pF)<br>J = $\pm 5\%$<br>K = $\pm 10\%$ | <b>Failure Rate</b><br>A = Not Applicable | <b>Terminations</b><br>T = Plated Ni and Sn  | <b>Packaging</b><br>2 = 7" Reel<br>4 = 13" Reel<br>U = 4mm TR (01005) | <b>Special Code</b><br>A = Std. Product |
|                          |  |                                    |  |  |   | <b>Contact Factory For</b><br>1 = Pd/Ag Term<br>7 = Gold Plated<br><b>NOT RoHS COMPLIANT</b> |   | <b>Contact Factory For Multiples</b>    |

NOTE: Contact factory for availability of Termination and Tolerance Options for Specific Part Numbers. Contact factory for non-specified capacitance values.



# COG (NP0) Dielectric

## Specifications and Test Methods

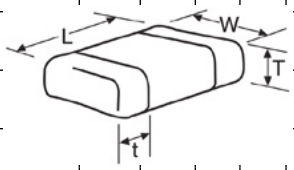
| Parameter/Test                        |                       | NP0 Specification Limits  | Measuring Conditions   |                    |
|---------------------------------------|-----------------------|---|--|--------------------|
| <b>Operating Temperature Range</b>    |                       | -55°C to +125°C   | Temperature Cycle Chamber  |                    |
| <b>Capacitance</b>                    |                       | Within specified tolerance  | Freq.: 1.0 MHz $\pm$ 10% for cap $\leq$ 1000 pF<br>1.0 kHz $\pm$ 10% for cap $>$ 1000 pF<br>Voltage: 1.0Vrms $\pm$ .2V   |                    |
| <b>Q</b>                              |                       | $<$ 30 pF: $Q \geq 400+20 \times \text{Cap Value}$<br>$\geq 30$ pF: $Q \geq 1000$                         |  |                    |
| <b>Insulation Resistance</b>          |                       | 10,000M $\Omega$ or 500M $\Omega$ - $\mu$ F,<br>whichever is less   | Charge device with rated voltage for 60 $\pm$ 5 secs<br>@ room temp/humidity   |                    |
| <b>Dielectric Strength</b>            |                       | No breakdown or visual defects  | Charge device with 250% of rated voltage for 1-5 seconds, w/charge and discharge current limited to 50 mA (max)<br>Note: Charge device with 150% of rated voltage for 500V devices.  |                    |
| <b>Resistance to Flexure Stresses</b> | Appearance            | No defects  |   |                    |
|                                       | Capacitance Variation | $\pm 5\%$ or $\pm 5$ pF, whichever is greater   |  |                    |
|                                       | Q                     | Meets Initial Values (As Above)   |  |                    |
|                                       | Insulation Resistance | $\geq$ Initial Value $\times$ 0.3   |  |                    |
| <b>Solderability</b>                  |                       | $\geq 95\%$ of each terminal should be covered with fresh solder  | Dip device in eutectic solder at 230 $\pm$ 5°C for 5.0 $\pm$ 0.5 seconds   |                    |
| <b>Resistance to Solder Heat</b>      | Appearance            | No defects, $<$ 25% leaching of either end terminal   | Dip device in eutectic solder at 260°C for 60sec- onds. Store at room temperature for 24 $\pm$ 2 hours before measuring electrical properties.   |                    |
|                                       | Capacitance Variation | $\leq \pm 2.5\%$ or $\pm 25$ pF, whichever is greater   |  |                    |
|                                       | Q                     | Meets Initial Values (As Above)   |  |                    |
|                                       | Insulation Resistance | Meets Initial Values (As Above)   |  |                    |
|                                       | Dielectric Strength   | Meets Initial Values (As Above)   |  |                    |
| <b>Thermal Shock</b>                  | Appearance            | No visual defects   | Step 1: -55°C $\pm$ 2°   | 30 $\pm$ 3 minutes |
|                                       | Capacitance Variation | $\leq \pm 2.5\%$ or $\pm 25$ pF, whichever is greater   | Step 2: Room Temp  | $\leq 3$ minutes   |
|                                       | Q                     | Meets Initial Values (As Above)   | Step 3: +125°C $\pm$ 2°  | 30 $\pm$ 3 minutes |
|                                       | Insulation Resistance | Meets Initial Values (As Above)   | Step 4: Room Temp  | $\leq 3$ minutes   |
|                                       | Dielectric Strength   | Meets Initial Values (As Above)   | Repeat for 5 cycles and measure after 24 hours at room temperature   |                    |
| <b>Load Life</b>                      | Appearance            | No visual defects   | Charge device with twice rated voltage in test chamber set at 125°C $\pm$ 2°C for 1000 hours (+48, -0).<br><br>Remove from test chamber and stabilize at room temperature for 24 hours before measuring.                               |                    |
|                                       | Capacitance Variation | $\leq \pm 3.0\%$ or $\pm .3$ pF, whichever is greater   |  |                    |
|                                       | Q<br>(C=Nominal Cap)  | $\geq 30$ pF: $Q \geq 350$<br>$\geq 10$ pF, $<$ 30 pF: $Q \geq 275 +5C/2$<br>$<$ 10 pF: $Q \geq 200 +10C$ |  |                    |
|                                       | Insulation Resistance | $\geq$ Initial Value $\times$ 0.3 (See Above)   |  |                    |
| <b>Load Humidity</b>                  | Appearance            | No visual defects   | Store in a test chamber set at 85°C $\pm$ 2°C/ 85% $\pm$ 5% relative humidity for 1000 hours (+48, -0) with rated voltage applied.<br><br>Remove from chamber and stabilize at room temperature for 24 $\pm$ 2 hours before measuring. |                    |
|                                       | Capacitance Variation | $\leq \pm 5.0\%$ or $\pm .5$ pF, whichever is greater   |  |                    |
|                                       | Q                     | $\geq 30$ pF: $Q \geq 350$<br>$\geq 10$ pF, $<$ 30 pF: $Q \geq 275 +5C/2$<br>$<$ 10 pF: $Q \geq 200 +10C$ |  |                    |
|                                       | Insulation Resistance | $\geq$ Initial Value $\times$ 0.3 (See Above)   |  |                    |
|                                       | Dielectric Strength   | Meets Initial Values (As Above)   |  |                    |

# COG (NP0) Dielectric Capacitance Range



## PREFERRED SIZES ARE SHADED

| SIZE         | 0101*       | 0201                            |      |                                | 0402        |                                |    | 0603                           |      |    |     | 0805                           |      |    |    |     | 1206                           |      |    |    |    |     |     |     |     |
|--------------|-------------|---------------------------------|------|--------------------------------|-------------|--------------------------------|----|--------------------------------|------|----|-----|--------------------------------|------|----|----|-----|--------------------------------|------|----|----|----|-----|-----|-----|-----|
| Soldering    | Reflow Only | Reflow Only                     |      |                                | Reflow/Wave |                                |    | Reflow/Wave                    |      |    |     | Reflow/Wave                    |      |    |    |     | Reflow/Wave                    |      |    |    |    |     |     |     |     |
| Packaging    | All Paper   | All Paper                       |      |                                | All Paper   |                                |    | All Paper                      |      |    |     | Paper/Embossed                 |      |    |    |     | Paper/Embossed                 |      |    |    |    |     |     |     |     |
| (L) Length   | mm<br>(in.) | 0.40 ± 0.02<br>(0.016 ± 0.0008) |      | 0.60 ± 0.03<br>(0.024 ± 0.001) |             | 1.00 ± 0.10<br>(0.040 ± 0.004) |    | 1.60 ± 0.15<br>(0.063 ± 0.006) |      |    |     | 2.01 ± 0.20<br>(0.079 ± 0.008) |      |    |    |     | 3.20 ± 0.20<br>(0.126 ± 0.008) |      |    |    |    |     |     |     |     |
| (W) Width    | mm<br>(in.) | 0.20 ± 0.02<br>(0.008 ± 0.0008) |      | 0.30 ± 0.03<br>(0.011 ± 0.001) |             | 0.50 ± 0.10<br>(0.020 ± 0.004) |    | 0.81 ± 0.15<br>(0.032 ± 0.006) |      |    |     | 1.25 ± 0.20<br>(0.049 ± 0.008) |      |    |    |     | 1.60 ± 0.20<br>(0.063 ± 0.008) |      |    |    |    |     |     |     |     |
| (t) Terminal | mm<br>(in.) | 0.10 ± 0.04<br>(0.004 ± 0.0016) |      | 0.15 ± 0.05<br>(0.006 ± 0.002) |             | 0.25 ± 0.15<br>(0.010 ± 0.006) |    | 0.35 ± 0.15<br>(0.014 ± 0.006) |      |    |     | 0.50 ± 0.25<br>(0.020 ± 0.010) |      |    |    |     | 0.50 ± 0.25<br>(0.020 ± 0.010) |      |    |    |    |     |     |     |     |
| WVDC         |             | 16                              | 25   | 50                             | 16          | 25                             | 50 | 16                             | 25   | 50 | 100 | 200                            | 16   | 25 | 50 | 100 | 200                            | 250  | 16 | 25 | 50 | 100 | 200 | 250 | 500 |
| Cap (pF)     | 0.5         | A                               | A    | C                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 1.0         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 1.2         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 1.5         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 1.8         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 2.2         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 2.7         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 3.3         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 3.9         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 4.7         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 5.6         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 6.8         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 8.2         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   |                                | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 10          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 12          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 15          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 18          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 22          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 27          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 33          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 39          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 47          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 56          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 68          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 82          | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 100         | B                               | A    | A                              | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 120         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 150         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 180         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 220         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 270         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 330         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 390         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 470         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 560         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 680         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 750         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 820         |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 1000        |                                 |      |                                | C           | C                              | C  | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 1200        |                                 |      |                                |             |                                |    | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 1500        |                                 |      |                                |             |                                |    | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 1800        |                                 |      |                                |             |                                |    | G                              | G    | G  | G   | G                              | J    | J  | J  | J   | J                              | J    | J  | J  | J  | J   | J   | J   | J   |
|              | 2200        |                                 |      |                                |             |                                |    | G                              | G    | G  | G   | G                              | P    | P  | P  | P   | P                              | P    | J  | J  | M  | P   | Q   | P   | P   |
|              | 2700        |                                 |      |                                |             |                                |    | G                              | G    | G  | G   | G                              | P    | P  | P  | P   | P                              | P    | J  | J  | M  | P   | Q   | P   | P   |
|              | 3300        |                                 |      |                                |             |                                |    | G                              | G    | G  | G   | G                              | P    | P  | P  | P   | P                              | P    | J  | J  | M  | P   | Q   | X   | P   |
|              | 3900        |                                 |      |                                |             |                                |    | G                              | G    | G  | G   | G                              | P    | P  | P  | P   | P                              | P    | J  | J  | M  | P   | X   | X   | X   |
|              | 4700        |                                 |      |                                |             |                                |    | G                              | G    | G  | G   | G                              | P    | P  | P  | P   | P                              | P    | J  | J  | M  | P   | X   | X   | X   |
|              | 5600        |                                 |      |                                |             |                                |    |                                |      |    |     |                                | P    | P  | P  |     |                                |      | J  | J  | M  | P   | X   | X   | X   |
|              | 6800        |                                 |      |                                |             |                                |    |                                |      |    |     |                                | P    | P  | P  |     |                                |      | M  | M  | M  | P   | X   | X   | X   |
|              | 8200        |                                 |      |                                |             |                                |    |                                |      |    |     |                                | P    | P  | P  |     |                                |      | P  | P  | P  | P   | X   | X   |     |
| Cap (µF)     | 0.010       |                                 |      |                                |             |                                |    |                                |      |    |     |                                | P    | P  | P  |     |                                |      | P  | P  | P  | P   | X   | X   |     |
|              | 0.012       |                                 |      |                                |             |                                |    |                                |      |    |     |                                | P    | P  | P  |     |                                |      | X  | X  | X  | X   |     |     |     |
|              | 0.015       |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  | X   |     |     |     |
|              | 0.018       |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  | X   |     |     |     |
|              | 0.022       |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  | X   |     |     |     |
|              | 0.027       |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  |     |     |     |     |
|              | 0.033       |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  |     |     |     |     |
|              | 0.039       |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  |     |     |     |     |
|              | 0.047       |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  |     |     |     |     |
|              | 0.068       |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  |     |     |     |     |
|              | 0.082       |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  |     |     |     |     |
|              | 0.1         |                                 |      |                                |             |                                |    |                                |      |    |     |                                |      |    |    |     |                                |      | X  | X  | X  |     |     |     |     |
| WVDC         |             | 16                              | 25   | 50                             | 16          | 25                             | 50 | 16                             | 25   | 50 | 100 | 200                            | 16   | 25 | 50 | 100 | 200                            | 250  | 16 | 25 | 50 | 100 | 200 | 250 | 500 |
| SIZE         |             | 0101*                           | 0201 |                                |             | 0402                           |    |                                | 0603 |    |     |                                | 0805 |    |    |     |                                | 1206 |    |    |    |     |     |     |     |



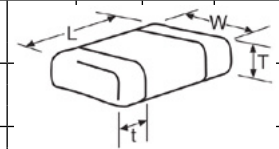
| Letter         | A               | B               | C               | E               | G               | J               | K               | M               | N               | P               | Q               | X               | Y               | Z               |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Max. Thickness | 0.33<br>(0.013) | 0.22<br>(0.009) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.90<br>(0.035) | 0.94<br>(0.037) | 1.02<br>(0.040) | 1.27<br>(0.050) | 1.40<br>(0.055) | 1.52<br>(0.060) | 1.78<br>(0.070) | 2.29<br>(0.090) | 2.54<br>(0.100) | 2.79<br>(0.110) |
|                | PAPER           |                 |                 |                 |                 |                 | EMBOSSED        |                 |                 |                 |                 |                 |                 |                 |

# C0G (NP0) Dielectric Capacitance Range



## PREFERRED SIZES ARE SHADED

| SIZE         | 1210                           |    |     |     |     | 1812                           |    |     |     |     | 1825                           |     |     | 2220                           |     |     | 2225                           |     |     |   |  |
|--------------|--------------------------------|----|-----|-----|-----|--------------------------------|----|-----|-----|-----|--------------------------------|-----|-----|--------------------------------|-----|-----|--------------------------------|-----|-----|---|--|
| Soldering    | Reflow Only                    |    |     |     |     | Reflow Only                    |    |     |     |     | Reflow Only                    |     |     | Reflow Only                    |     |     | Reflow Only                    |     |     |   |  |
| Packaging    | Paper/Embossed                 |    |     |     |     | All Embossed                   |    |     |     |     | All Embossed                   |     |     | All Embossed                   |     |     | All Embossed                   |     |     |   |  |
| (L) Length   | 3.20 ± 0.20<br>(0.126 ± 0.008) |    |     |     |     | 4.50 ± 0.30<br>(0.177 ± 0.012) |    |     |     |     | 4.50 ± 0.30<br>(0.177 ± 0.012) |     |     | 5.70 ± 0.40<br>(0.225 ± 0.016) |     |     | 5.72 ± 0.25<br>(0.225 ± 0.010) |     |     |   |  |
| (W) Width    | 2.50 ± 0.20<br>(0.098 ± 0.008) |    |     |     |     | 3.20 ± 0.20<br>(0.126 ± 0.008) |    |     |     |     | 6.40 ± 0.40<br>(0.252 ± 0.016) |     |     | 5.00 ± 0.40<br>(0.197 ± 0.016) |     |     | 6.35 ± 0.25<br>(0.250 ± 0.010) |     |     |   |  |
| (t) Terminal | 0.50 ± 0.25<br>(0.020 ± 0.010) |    |     |     |     | 0.61 ± 0.36<br>(0.024 ± 0.014) |    |     |     |     | 0.61 ± 0.36<br>(0.024 ± 0.014) |     |     | 0.64 ± 0.39<br>(0.025 ± 0.015) |     |     | 0.64 ± 0.39<br>(0.025 ± 0.015) |     |     |   |  |
| Cap (pF)     | 25                             | 50 | 100 | 200 | 500 | 25                             | 50 | 100 | 200 | 500 | 50                             | 100 | 200 | 50                             | 100 | 200 | 50                             | 100 | 200 |   |  |
| 3.9          |                                |    |     |     |     |                                |    |     |     |     |                                |     |     |                                |     |     |                                |     |     |   |  |
| 4.7          |                                |    |     |     |     |                                |    |     |     |     |                                |     |     |                                |     |     |                                |     |     |   |  |
| 5.6          |                                |    |     |     |     |                                |    |     |     |     |                                |     |     |                                |     |     |                                |     |     |   |  |
| 6.8          |                                |    |     |     |     |                                |    |     |     |     |                                |     |     |                                |     |     |                                |     |     |   |  |
| 8.2          |                                |    |     |     |     |                                |    |     |     |     |                                |     |     |                                |     |     |                                |     |     |   |  |
| 10           | M                              | M  | M   | M   | M   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 12           | M                              | M  | M   | M   | M   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 15           | M                              | M  | M   | M   | M   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 18           | M                              | M  | M   | M   | M   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 22           | M                              | M  | M   | M   | M   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 27           | M                              | M  | M   | M   | M   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 33           | M                              | M  | M   | M   | M   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 39           | M                              | M  | M   | M   | M   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 47           | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 56           | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 68           | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 82           | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 100          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 120          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 150          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 180          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 220          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 270          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 330          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 390          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 470          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 560          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 680          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 820          | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   |                                |     |     |                                |     |     |                                |     |     |   |  |
| 1000         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   | M                              | M   | M   |                                |     |     |                                | M   | M   | P |  |
| 1200         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   | M                              | M   | M   |                                |     |     |                                | M   | M   | P |  |
| 1500         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   | M                              | M   | M   |                                |     |     |                                | M   | M   | P |  |
| 1800         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   | M                              | M   | M   |                                |     |     |                                | M   | M   | P |  |
| 2200         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | P   | X                              | X   | M   |                                |     |     |                                | M   | M   | P |  |
| 2700         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | Q   | X                              | X   | M   |                                |     |     |                                | M   | M   | P |  |
| 3300         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | Q   | X                              | X   | X   |                                |     |     | X                              | M   | M   | P |  |
| 3900         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | Q   | X                              | X   | X   |                                |     |     | X                              | M   | M   | P |  |
| 4700         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | Y   | X                              | X   | X   |                                |     | X   | X                              | M   | M   | P |  |
| 5600         | P                              | P  | P   | P   | P   | P                              | P  | P   | P   | Y   | X                              | X   | X   |                                |     | X   | X                              | M   | M   | P |  |
| 6800         | P                              | P  | P   | X   | X   | P                              | P  | Q   | Q   | Y   | X                              | X   | X   |                                |     | X   | X                              | M   | M   | P |  |
| 8200         | P                              | P  | P   | X   | X   | P                              | P  | Q   | Q   | Y   | X                              | X   | X   |                                |     | X   | X                              | M   | M   | P |  |
| Cap (pF)     | 0.010                          | P  | P   | X   | X   | P                              | P  | Q   | Q   | Y   | X                              | X   | X   | X                              | X   | X   | X                              | M   | M   | P |  |
| 0.012        | X                              | X  | X   | X   | X   | P                              | P  | Q   | X   | Y   | X                              | X   | X   | X                              | X   | X   | X                              | M   | M   | P |  |
| 0.015        | X                              | X  | X   | Z   | Z   | P                              | P  | Q   | X   | Y   | X                              | X   | X   | X                              | X   | X   | X                              | M   | M   | Y |  |
| 0.018        | X                              | X  | Z   | Z   |     | P                              | P  | X   | X   | Y   | X                              | X   | X   | X                              | X   | X   | X                              | M   | M   | Y |  |
| 0.022        | X                              | X  | Z   | Z   |     | P                              | P  | X   | X   |     | X                              | X   | X   | X                              | X   | X   | X                              | M   | Y   | Y |  |
| 0.027        | X                              | Z  | Z   | Z   |     | Q                              | X  | X   | Z   |     | X                              | X   | Y   | X                              | X   |     |                                | P   | Y   | Y |  |
| 0.033        | X                              | Z  | Z   | Z   |     | Q                              | X  | X   | Z   |     | X                              | X   |     | X                              | X   |     |                                | X   | Y   | Y |  |
| 0.039        | Z                              | Z  | Z   |     |     | X                              | X  | Z   | Z   |     | X                              |     |     | Y                              |     |     |                                | X   | Y   | Y |  |
| 0.047        | Z                              | Z  | Z   |     |     | X                              | X  | Z   | Z   |     | X                              |     |     | Y                              |     |     |                                | X   | Z   |   |  |
| 0.068        |                                |    |     |     |     | Z                              | Z  | Z   |     |     |                                |     |     | Z                              |     |     |                                | X   | Z   |   |  |
| 0.082        |                                |    |     |     |     | Z                              | Z  | Z   |     |     |                                |     |     | Z                              |     |     |                                | X   | Z   |   |  |
| 0.1          |                                |    |     |     |     | Z                              | Z  | Z   |     |     |                                |     |     | Z                              |     |     |                                | Z   | Z   |   |  |
| WVDC         | 25                             | 50 | 100 | 200 | 500 | 25                             | 50 | 100 | 200 | 500 | 50                             | 100 | 200 | 50                             | 100 | 200 | 50                             | 100 | 200 |   |  |
| SIZE         | 1210                           |    |     |     |     | 1812                           |    |     |     |     | 1825                           |     |     | 2220                           |     |     | 2225                           |     |     |   |  |



| Letter         | A               | B               | C               | E               | G               | J               | K               | M               | N               | P               | Q               | X               | Y               | Z               |
|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Max. Thickness | 0.33<br>(0.013) | 0.22<br>(0.009) | 0.56<br>(0.022) | 0.71<br>(0.028) | 0.90<br>(0.035) | 0.94<br>(0.037) | 1.02<br>(0.040) | 1.27<br>(0.050) | 1.40<br>(0.055) | 1.52<br>(0.060) | 1.78<br>(0.070) | 2.29<br>(0.090) | 2.54<br>(0.100) | 2.79<br>(0.110) |
|                | PAPER           |                 |                 |                 |                 |                 | EMBOSSSED       |                 |                 |                 |                 |                 |                 |                 |