



**THE DATASHEET OF  
04025A3R3CAT2A**



# C0G (NP0) Dielectric

## General Specifications



C0G (NP0) is the most popular formulation of the "temperature-compensating," EIA Class I ceramic materials. Modern C0G (NP0) formulations contain neodymium, samarium and other rare earth oxides.

C0G (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 C0G (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 C0G (NP0), one-fifth that shown by most other dielectrics. C0G (NP0) formulations show no aging characteristics.



### PART NUMBER (see page 2 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>                               |
| Size<br>(L" x W") | Voltage<br>6.3V = 6<br>10V = Z<br>16V = Y<br>25V = 3<br>50V = 5<br>100V = 1<br>200V = 2<br>500V = 7 | Dielectric<br>C0G (NP0) = A | Capacitance<br>Code (in pF)<br>2 Sig. Digits +<br>Number of Zeros | Capacitance<br>Tolerance<br>B = $\pm 10 \text{ pF}$ (<10pF)<br>C = $\pm 25 \text{ pF}$ (<10pF)<br>D = $\pm 50 \text{ pF}$ (<10pF)<br>F = $\pm 1\%$ ( $\geq 10 \text{ pF}$ )<br>G = $\pm 2\%$ ( $\geq 10 \text{ pF}$ )<br>J = $\pm 5\%$<br>K = $\pm 10\%$ | Failure<br>Rate<br>A = Not<br>Applicable | Terminations<br>T = Plated Ni<br>and Sn   | Packaging<br>2 = 7" Reel<br>4 = 13" Reel<br>U = 4mm TR<br>(01005) | Special<br>Code<br>A = Std.<br>Product |
|                   |   |                             |   |  |  | <b>Contact<br/>Factory For<br/>1 = Pd/Ag Term<br/>7 = Gold Plated<br/><br/>NOT RoHS<br/>COMPLIANT</b> |   | Contact Factory<br>For Multiples       |

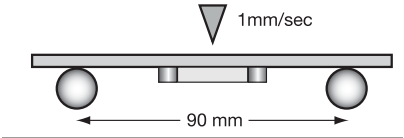
NOTE: Contact factory for availability of Termination and Tolerance Options for Specific Part Numbers. Contact factory for non-specified capacitance values.



# C0G (NP0) Dielectric

## Specifications and Test Methods



| Parameter/Test                 |                       | NP0 Specification Limits  | Measuring Conditions  |                |
|--------------------------------|-----------------------|---|---|----------------|
| Operating Temperature Range    |                       | -55°C to +125°C   | Temperature Cycle Chamber   |                |
| Capacitance                    |                       | Within specified tolerance  | Freq.: 1.0 MHz ± 10% for cap ≤ 1000 pF<br>1.0 kHz ± 10% for cap > 1000 pF<br>Voltage: 1.0Vrms ± .2V   |                |
| Q                              |                       | <30 pF: Q ≥ 400+20 x Cap Value<br>≥30 pF: Q ≥ 1000                        |   |                |
| Insulation Resistance          |                       | 100,000MΩ or 1000MΩ - μF,<br>whichever is less                            | Charge device with rated voltage for<br>60 ± 5 secs @ room temp/humidity  |                |
| Dielectric Strength            |                       | No breakdown or visual defects  | Charge device with 250% of rated voltage for<br>1-5 seconds, w/charge and discharge current<br>limited to 50 mA (max)<br>Note: Charge device with 150% of rated<br>voltage for 500V devices.  |                |
| Resistance to Flexure Stresses | Appearance            | No defects  | Deflection: 2mm<br>Test Time: 30 seconds<br>   |                |
|                                | Capacitance Variation | ±5% or ±.5 pF, whichever is greater                                       |   |                |
|                                | Q                     | Meets Initial Values (As Above)   |   |                |
|                                | Insulation Resistance | ≥ Initial Value x 0.3   |   |                |
| Solderability                  |                       | ≥ 95% of each terminal should be covered<br>with fresh solder             | Dip device in eutectic solder at 230 ± 5°C<br>for 5.0 ± 0.5 seconds   |                |
| Resistance to Solder Heat      | Appearance            | No defects, <25% leaching of either end terminal                          | Dip device in eutectic solder at 260°C for 60sec-<br>onds. Store at room temperature for 24 ± 2hours<br>before measuring electrical properties.   |                |
|                                | Capacitance Variation | ≤ ±2.5% or ±.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)   |   |                |
| Thermal Shock                  | Appearance            | No visual defects   | Step 1: -55°C ± 2°  | 30 ± 3 minutes |
|                                | Capacitance Variation | ≤ ±2.5% or ±.25 pF, whichever is greater                                  | Step 2: Room Temp   | ≤ 3 minutes    |
|                                | Q                     | Meets Initial Values (As Above)   | Step 3: +125°C ± 2°   | 30 ± 3 minutes |
|                                | Insulation Resistance | Meets Initial Values (As Above)   | Step 4: Room Temp   | ≤ 3 minutes    |
|                                | Dielectric Strength   | Meets Initial Values (As Above)   | Repeat for 5 cycles and measure after<br>24 hours at room temperature   |                |
| Load Life                      | Appearance            | No visual defects   | Charge device with twice rated voltage in<br>test chamber set at 125°C ± 2°C<br>for 1000 hours (+48, -0).<br><br>Remove from test chamber and stabilize at<br>room temperature for 24 hours<br>before measuring.                    |                |
|                                | Capacitance Variation | ≤ ±3.0% or ± .3 pF, whichever is greater                                  |   |                |
|                                | Q<br>(C=Nominal Cap)  | ≥ 30 pF: Q ≥ 350<br>≥10 pF, <30 pF: Q ≥ 275 +5C/2<br><10 pF: Q ≥ 200 +10C |   |                |
|                                | Insulation Resistance | ≥ Initial Value x 0.3 (See Above)   |   |                |
|                                | Dielectric Strength   | Meets Initial Values (As Above)   |   |                |
| Load Humidity                  | Appearance            | No visual defects   | Store in a test chamber set at 85°C ± 2°C/<br>85% ± 5% relative humidity for 1000 hours<br>(+48, -0) with rated voltage applied.<br><br>Remove from chamber and stabilize at room<br>temperature for 24 ± 2 hours before measuring. |                |
|                                | Capacitance Variation | ≤ ±5.0% or ± .5 pF, whichever is greater                                  |   |                |
|                                | Q                     | ≥ 30 pF: Q ≥ 350<br>≥10 pF, <30 pF: Q ≥ 275 +5C/2<br><10 pF: Q ≥ 200 +10C |   |                |
|                                | Insulation Resistance | ≥ Initial Value x 0.3 (See Above)   |   |                |
|                                | Dielectric Strength   | Meets Initial Values (As Above)   |   |                |

# C0G (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   | 0.40 ± 0.02<br>(0.016 ± 0.0008) |  |  | 0.60 ± 0.09<br>(0.024 ± 0.004) |  |  | 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    | 0.20 ± 0.02<br>(0.008 ± 0.0008) |  |  | 0.30 ± 0.09<br>(0.011 ± 0.004) |  |  | 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 | 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                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 1.0                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 1.2                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 1.5                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 1.8                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 2.2                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 2.7                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 3.3                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 3.9                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 4.7                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 5.6                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 6.8                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 8.2                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | J J J J J                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 10                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 12                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 15                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 18                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 22                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 27                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 33                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 39                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 47                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 56                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 68                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 82                              |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 100                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 120                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 150                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 180                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 220                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 270                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 330                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 390                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 470                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 560                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 680                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 820                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 1000                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 1200                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 1500                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 1800                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 2200                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 2700                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 3300                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 3900                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 4700                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 5600                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 6800                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 8200                            |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
| Cap (µF)     | 0.010                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.012                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.015                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.018                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.022                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.027                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.033                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.039                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.047                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.068                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.082                           |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
|              | 0.1                             |  |  | A A C C C                      |  |  | G G G G G                      |  |  | J J J J J                      |  |  |  | N N N N N                      |  |  |  |  | J J J J J                      |  |  |  |  |
| 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       |  |  |  |  |



| 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           |                 |                 |                 |                 |                 | EMBOSS          |                 |                 |                 |                 |                 |                 |                 |

# 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     | mm    | 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      | mm    | 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   | mm    | 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) |    |     |     |
| WVDC           |       | 25                             | 50              | 100             | 200             | 500             | 25                             | 50              | 100             | 200             | 500             | 50                             | 100             | 200             | 50              | 100                            | 200 | 50 | 100 | 200                            | 50 | 100 | 200 |
| Cap (pF)       | 0.5   |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 1.0            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 1.2            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 1.5            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 1.8            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 2.2            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 2.7            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 3.3            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 3.9            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 4.7            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 5.6            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 6.8            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 8.2            |       |                                |                 |                 |                 |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 10             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 12             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 15             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 18             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 22             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 27             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 33             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 39             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 47             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 56             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 68             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 82             |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 100            |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 120            |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 150            |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 180            |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 220            |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 270            |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 330            |       |                                |                 |                 |                 | J               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 390            |       |                                |                 |                 |                 | M               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 470            |       |                                |                 |                 |                 | M               |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 560            | J     | J                              | J               | J               | M               |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 680            | J     | J                              | J               | K               | P               |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 820            | J     | J                              | J               | K               | P               |                 |                                |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |
| 1000           | J     | J                              | P               | P               | P               | K               | K                              | N               | N               | M               | M               | M                              | M               |                 |                 |                                |     |    |     | M                              | M  | P   |     |
| 1200           | P     | P                              | P               | P               | P               | K               | K                              | N               | N               | M               | M               | M                              | M               |                 |                 |                                |     |    |     | M                              | M  | P   |     |
| 1500           | P     | P                              | P               | P               | P               | K               | K                              | N               | N               | M               | M               | M                              | M               |                 |                 |                                |     |    |     | M                              | M  | P   |     |
| 1800           | P     | P                              | P               | P               | P               | K               | K                              | N               | N               | M               | M               | M                              | M               |                 |                 |                                |     |    |     | M                              | M  | P   |     |
| 2200           | P     | P                              | P               | P               | N               | K               | K                              | N               | N               | P               | X               | X                              | M               |                 |                 |                                |     |    |     | M                              | M  | P   |     |
| 2700           | P     | P                              | P               | P               |                 | K               | K                              | N               | P               | Q               | X               | X                              | M               |                 |                 |                                |     |    |     | M                              | M  | P   |     |
| 3300           | P     | P                              | P               | P               |                 | K               | K                              | N               | P               | Q               | X               | X                              | X               |                 |                 |                                |     |    | X   | M                              | M  | P   |     |
| 3900           | P     | P                              | P               |                 |                 | K               | K                              | N               | P               | Q               | X               | X                              | X               |                 |                 |                                |     |    | X   | M                              | M  | P   |     |
| 4700           | P     | P                              | P               |                 |                 | K               | K                              | N               | P               | Y               | X               | X                              | X               | X               | X               | X                              |     |    | X   | M                              | M  | P   |     |
| 5600           | P     | P                              | P               |                 |                 | K               | K                              | P               | P               | Y               | X               | X                              | X               | X               | X               | X                              |     |    | X   | M                              | M  | P   |     |
| 6800           | P     | P                              | P               |                 |                 | K               | K                              | Q               | Q               |                 | X               | X                              | X               | X               | X               | X                              |     |    | X   | M                              | M  | P   |     |
| 8200           | P     | P                              |                 |                 |                 | K               | M                              | Q               | Q               |                 | X               | X                              | X               | X               | X               | X                              |     |    | X   | M                              | M  | P   |     |
| Cap (µF)       | 0.010 | N                              | N               |                 |                 | K               | M                              | Q               | Q               |                 | X               | X                              | X               | X               | X               | X                              |     |    | X   | M                              | M  | P   |     |
| 0.012          | N     | N                              |                 |                 | K               | M               | Q                              |                 |                 | X               | X               | X                              | X               | X               | X               |                                |     | X  | M   | M                              | P  |     |     |
| 0.015          |       |                                |                 |                 | P               | P               | Q                              |                 |                 | X               | X               | X                              | X               | X               | X               |                                |     | X  | M   | M                              | Y  |     |     |
| 0.018          |       |                                |                 |                 | P               | P               | Q                              |                 |                 | X               | X               | X                              | X               | X               | X               |                                |     | X  | M   | M                              | Y  |     |     |
| 0.022          |       |                                |                 |                 | P               | P               | Q                              |                 |                 | X               | X               | X                              | X               | X               | X               |                                |     |    | M   | Y                              | Y  |     |     |
| 0.027          |       |                                |                 |                 | Q               | Q               | X                              |                 |                 | X               | X               | Y                              | X               | X               |                 |                                |     |    | P   | Y                              | Y  |     |     |
| 0.033          |       |                                |                 |                 | Q               | Q               | X                              |                 |                 | X               | X               |                                | X               | X               |                 |                                |     |    | X   | Y                              | Y  |     |     |
| 0.039          |       |                                |                 |                 | X               | X               | X                              |                 |                 | X               |                 |                                | Y               |                 |                 |                                |     |    | X   | Y                              | Y  |     |     |
| 0.047          |       |                                |                 |                 | X               | X               | X                              |                 |                 | X               |                 |                                | Y               |                 |                 |                                |     |    | X   | Z                              |    |     |     |
| 0.068          |       |                                |                 |                 | Z               | Z               | Y                              |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    | X   | Z                              |    |     |     |
| 0.082          |       |                                |                 |                 | Z               | Z               | Y                              |                 |                 |                 |                 |                                |                 |                 |                 |                                |     |    | X   | Z                              |    |     |     |
| 0.1            |       |                                |                 |                 | 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                            | 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                          |                 |                 |                 |                 |                                | EMBOSS          |                 |                 |                 |                                |                 |                 |                 |                                |     |    |     |                                |    |     |     |



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