

# RF/Microwave COG (NP0) Capacitors (RoHS)



## Ultra Low ESR, "U" Series, COG (NP0) Chip Capacitors

### GENERAL INFORMATION

"U" Series capacitors are COG (NP0) chip capacitors specially designed for "Ultra" low ESR for applications in the communications market. Max ESR and effective capacitance

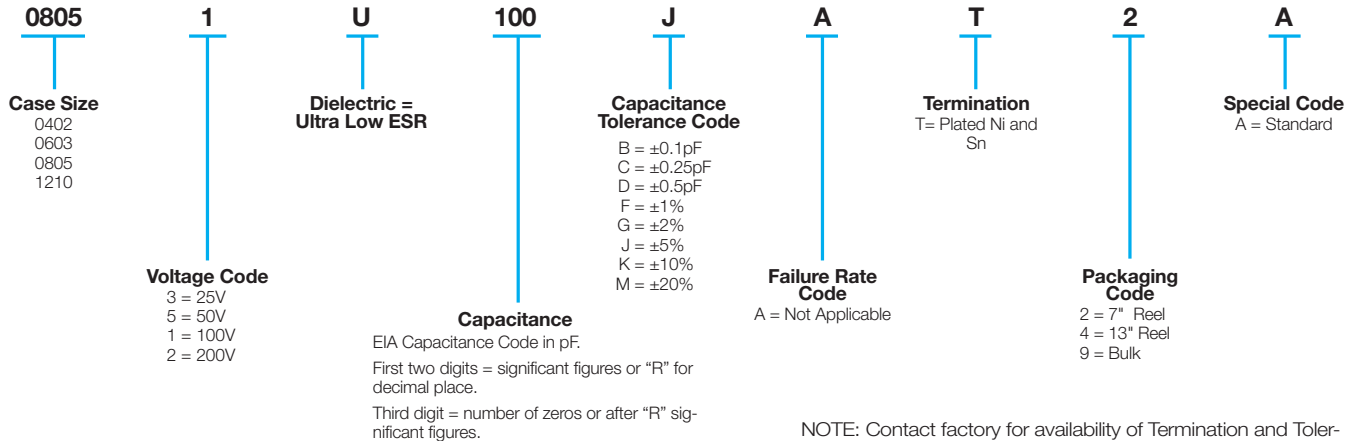
are met on each value producing lot to lot uniformity. Sizes available are EIA chip sizes 0402, 0603, 0805, and 1210.

### DIMENSIONS: inches (millimeters)



| Size | A                       | B                       | C                        | D                         | E                |
|------|-------------------------|-------------------------|--------------------------|---------------------------|------------------|
| 0402 | 0.039±0.004 (1.00±0.1)  | 0.020±0.004 (0.50±0.1)  | 0.024 (0.6) max          | N/A                       | N/A              |
| 0603 | 0.060±0.010 (1.52±0.25) | 0.030±0.010 (0.76±0.25) | 0.036 (0.91) max         | 0.010±0.005 (0.25±0.13)   | 0.030 (0.76) min |
| 0805 | 0.079±0.008 (2.01±0.2)  | 0.049±0.008 (1.25±0.2)  | 0.040±0.005 (1.02±0.127) | 0.020±0.010 (0.51±0.255)  | 0.020 (0.51) min |
| 1210 | 0.126±0.008 (3.2±0.2)   | 0.098±0.008 (2.49±0.2)  | 0.050±0.005 (1.27±0.127) | 0.025±0.015 (0.635±0.381) | 0.040 (1.02) min |

### HOW TO ORDER



NOTE: Contact factory for availability of Termination and Tolerance Options for Specific Part Numbers.

### ELECTRICAL CHARACTERISTICS

#### Capacitance Values and Tolerances:

- Size 0402 - 0.2 pF to 22 pF @ 1 MHz
- Size 0603 - 1.0 pF to 100 pF @ 1 MHz
- Size 0805 - 1.6 pF to 160 pF @ 1 MHz
- Size 1210 - 2.4 pF to 1000 pF @ 1 MHz

#### Temperature Coefficient of Capacitance (TC):

0±30 ppm/°C (-55° to +125°C)

#### Insulation Resistance (IR):

- 10<sup>12</sup> Ω min. @ 25°C and rated WVDC
- 10<sup>11</sup> Ω min. @ 125°C and rated WVDC

#### Working Voltage (WVDC):

- Size Working Voltage
- 0402 - 50, 25 WVDC
- 0603 - 200, 100, 50 WVDC
- 0805 - 200, 100 WVDC
- 1210 - 200, 100 WVDC

#### Dielectric Working Voltage (DWV):

250% of rated WVDC

#### Equivalent Series Resistance Typical (ESR):

- 0402 - See Performance Curve, page 9
- 0603 - See Performance Curve, page 9
- 0805 - See Performance Curve, page 9
- 1210 - See Performance Curve, page 9

#### Marking: Laser marking EIA J marking standard

(except 0603) (capacitance code and tolerance upon request).

#### MILITARY SPECIFICATIONS

Meets or exceeds the requirements of MIL-C-55681



# RF/Microwave C0G (NP0) Capacitors (RoHS)



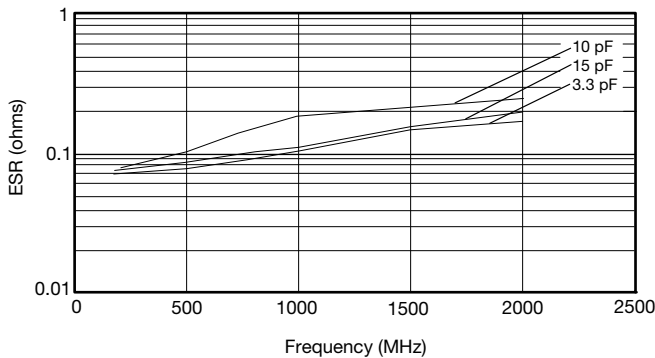
## Ultra Low ESR, "U" Series, C0G (NP0) Chip Capacitors

### CAPACITANCE RANGE

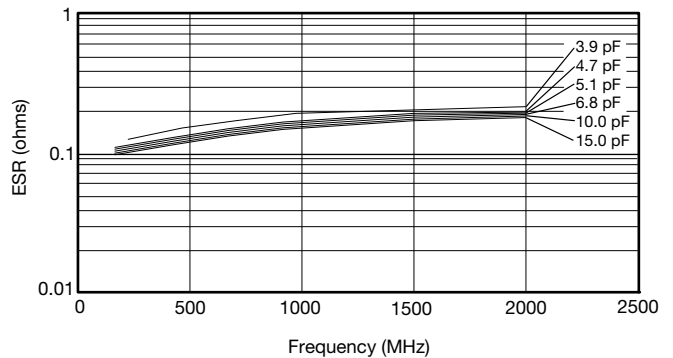
| Cap (pF) | Available Tolerance | Size |      |      |      | Cap (pF) | Available Tolerance | Size |      |      |      | Cap (pF) | Available Tolerance | Size |      |      |      | Cap (pF) | Available Tolerance | Size |      |      |      |   |
|----------|---------------------|------|------|------|------|----------|---------------------|------|------|------|------|----------|---------------------|------|------|------|------|----------|---------------------|------|------|------|------|---|
|          |                     | 0402 | 0603 | 0805 | 1210 |          |                     | 0402 | 0603 | 0805 | 1210 |          |                     | 0402 | 0603 | 0805 | 1210 |          |                     | 0402 | 0603 | 0805 | 1210 |   |
| 0.2      | B,C                 | 50V  | N/A  | N/A  | N/A  | 1.0      | B,C,D               | 50V  | 200V | 200V | 200V | 100      | F,G,J,K,M           | N/A  | 100V | 200V | 200V | 100      | F,G,J,K,M           | N/A  | 100V | 200V | 200V |   |
| 0.3      | B,C                 | ↓    | ↓    | ↓    | ↓    | 1.1      | ↓                   | ↓    | ↓    | ↓    | ↓    | 110      | ↓                   | ↓    | ↓    | ↓    | ↓    | 110      | ↓                   | ↓    | ↓    | ↓    | ↓    |   |
| 0.4      | B,C                 | ↓    | ↓    | ↓    | ↓    | 1.2      | ↓                   | ↓    | ↓    | ↓    | ↓    | 120      | ↓                   | ↓    | ↓    | ↓    | ↓    | 120      | ↓                   | ↓    | ↓    | ↓    | ↓    |   |
| 0.5      | B,C                 | ↓    | ↓    | ↓    | ↓    | 1.3      | ↓                   | ↓    | ↓    | ↓    | ↓    | 130      | ↓                   | ↓    | ↓    | ↓    | ↓    | 130      | ↓                   | ↓    | ↓    | ↓    | ↓    |   |
| 0.6      | B,C,D               | ↓    | ↓    | ↓    | ↓    | 1.4      | ↓                   | ↓    | ↓    | ↓    | ↓    | 140      | ↓                   | ↓    | ↓    | ↓    | ↓    | 140      | ↓                   | ↓    | ↓    | ↓    | ↓    |   |
| 0.7      | B,C,D               | ↓    | ↓    | ↓    | ↓    | 1.5      | ↓                   | ↓    | ↓    | ↓    | ↓    | 150      | ↓                   | ↓    | ↓    | ↓    | ↓    | 150      | ↓                   | ↓    | ↓    | ↓    | ↓    |   |
| 0.8      | B,C,D               | ↓    | ↓    | ↓    | ↓    | 1.6      | ↓                   | ↓    | ↓    | ↓    | ↓    | 160      | ↓                   | ↓    | ↓    | ↓    | ↓    | 160      | ↓                   | ↓    | ↓    | ↓    | ↓    |   |
| 0.9      | B,C,D               | ↓    | ↓    | ↓    | ↓    | 1.7      | ↓                   | ↓    | ↓    | ↓    | ↓    | 180      | ↓                   | ↓    | ↓    | ↓    | ↓    | 180      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 1.8      | ↓                   | ↓    | ↓    | ↓    | ↓    | 200      | ↓                   | ↓    | ↓    | ↓    | ↓    | 200      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 1.9      | ↓                   | ↓    | ↓    | ↓    | ↓    | 220      | ↓                   | ↓    | ↓    | ↓    | ↓    | 220      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 2.0      | ↓                   | ↓    | ↓    | ↓    | ↓    | 270      | ↓                   | ↓    | ↓    | ↓    | ↓    | 270      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 2.1      | ↓                   | ↓    | ↓    | ↓    | ↓    | 300      | ↓                   | ↓    | ↓    | ↓    | ↓    | 300      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 2.2      | ↓                   | ↓    | ↓    | ↓    | ↓    | 330      | ↓                   | ↓    | ↓    | ↓    | ↓    | 330      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 2.4      | ↓                   | ↓    | ↓    | ↓    | ↓    | 360      | ↓                   | ↓    | ↓    | ↓    | ↓    | 360      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 2.7      | ↓                   | ↓    | ↓    | ↓    | ↓    | 390      | ↓                   | ↓    | ↓    | ↓    | ↓    | 390      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 3.0      | ↓                   | ↓    | ↓    | ↓    | ↓    | 430      | ↓                   | ↓    | ↓    | ↓    | ↓    | 430      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 3.3      | ↓                   | ↓    | ↓    | ↓    | ↓    | 470      | ↓                   | ↓    | ↓    | ↓    | ↓    | 470      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 3.6      | ↓                   | ↓    | ↓    | ↓    | ↓    | 510      | ↓                   | ↓    | ↓    | ↓    | ↓    | 510      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 3.9      | ↓                   | ↓    | ↓    | ↓    | ↓    | 560      | ↓                   | ↓    | ↓    | ↓    | ↓    | 560      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 4.3      | ↓                   | ↓    | ↓    | ↓    | ↓    | 620      | ↓                   | ↓    | ↓    | ↓    | ↓    | 620      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 4.7      | ↓                   | ↓    | ↓    | ↓    | ↓    | 680      | ↓                   | ↓    | ↓    | ↓    | ↓    | 680      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 5.1      | ↓                   | ↓    | ↓    | ↓    | ↓    | 750      | ↓                   | ↓    | ↓    | ↓    | ↓    | 750      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 5.6      | ↓                   | ↓    | ↓    | ↓    | ↓    | 820      | ↓                   | ↓    | ↓    | ↓    | ↓    | 820      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 6.2      | B,C,D               | ↓    | ↓    | ↓    | ↓    | 910      | ↓                   | ↓    | ↓    | ↓    | ↓    | 910      | ↓                   | ↓    | ↓    | ↓    | ↓    | ↓ |
|          |                     |      |      |      |      | 6.8      | B,C,J,K,M           | ↓    | ↓    | ↓    | ↓    | 1000     | F,G,J,K,M           | ↓    | ↓    | ↓    | ↓    | 1000     | F,G,J,K,M           | ↓    | ↓    | ↓    | ↓    | ↓ |

### ULTRA LOW ESR, "U" SERIES

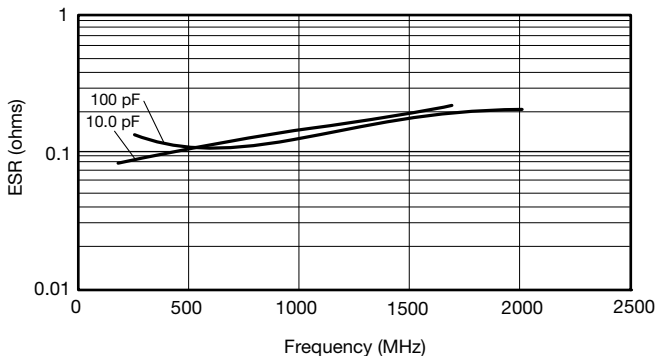
TYPICAL ESR vs. FREQUENCY  
0402 "U" SERIES



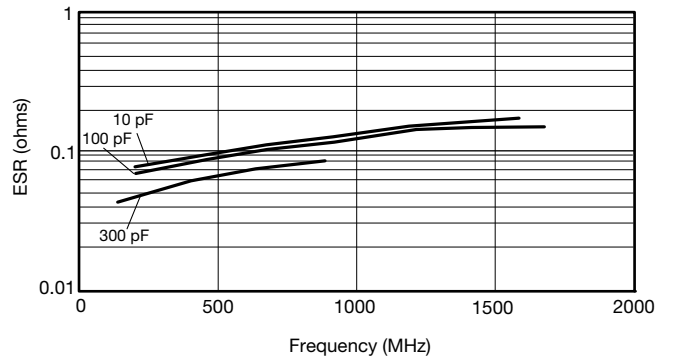
TYPICAL ESR vs. FREQUENCY  
0603 "U" SERIES



TYPICAL ESR vs. FREQUENCY  
0805 "U" SERIES



TYPICAL ESR vs. FREQUENCY  
1210 "U" SERIES



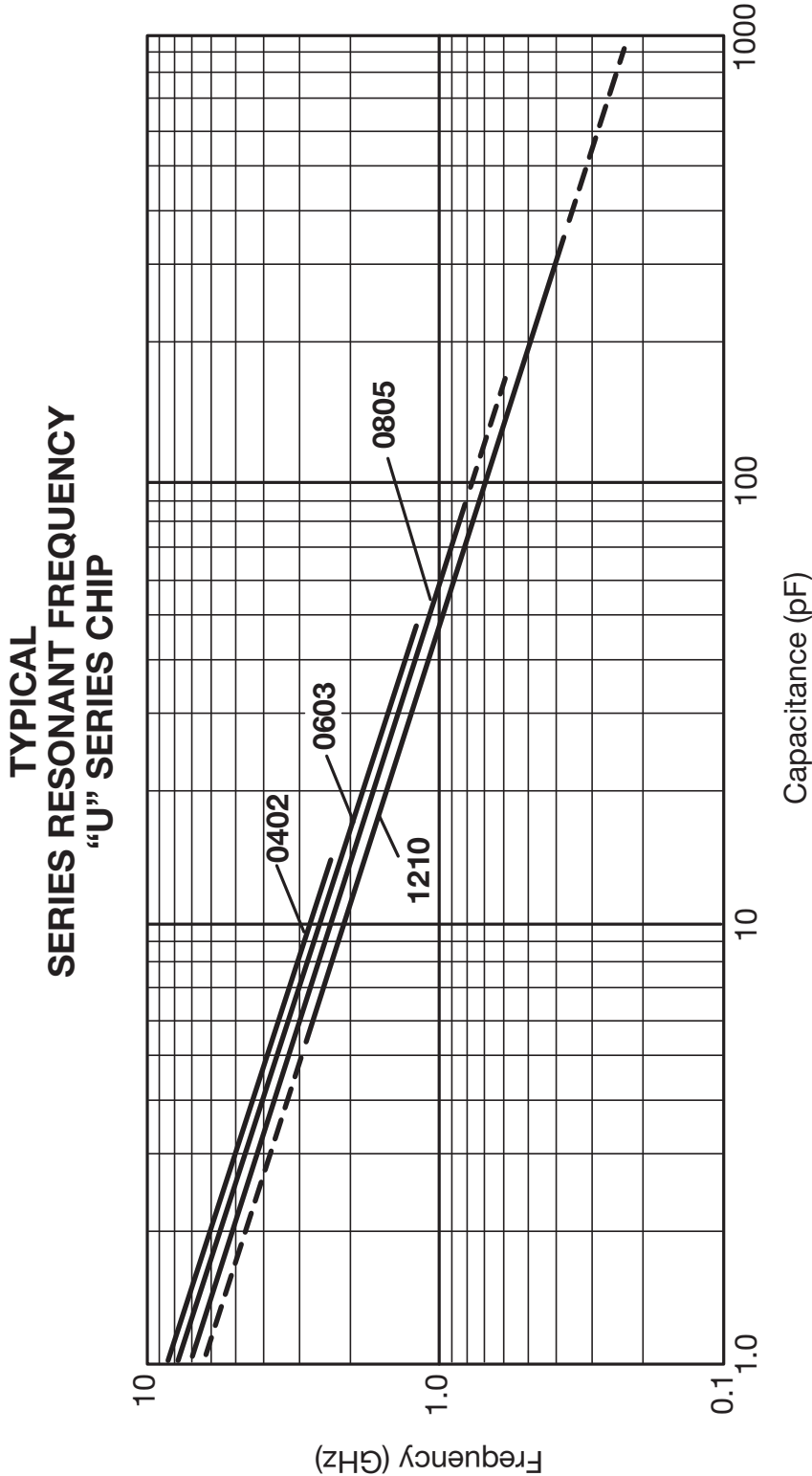
ESR Measured on the Boonton 34A



# RF/Microwave C0G (NP0) Capacitors



Ultra Low ESR, "U" Series, C0G (NP0) Chip Capacitors



# RF/Microwave C0G (NP0) Capacitors (Sn/Pb)

## Ultra Low ESR, "U" Series, C0G (NP0) Chip Capacitors

### GENERAL INFORMATION

"U" Series capacitors are C0G (NP0) chip capacitors specially designed for "Ultra" low ESR for applications in the communications market. Max ESR and effective capacitance

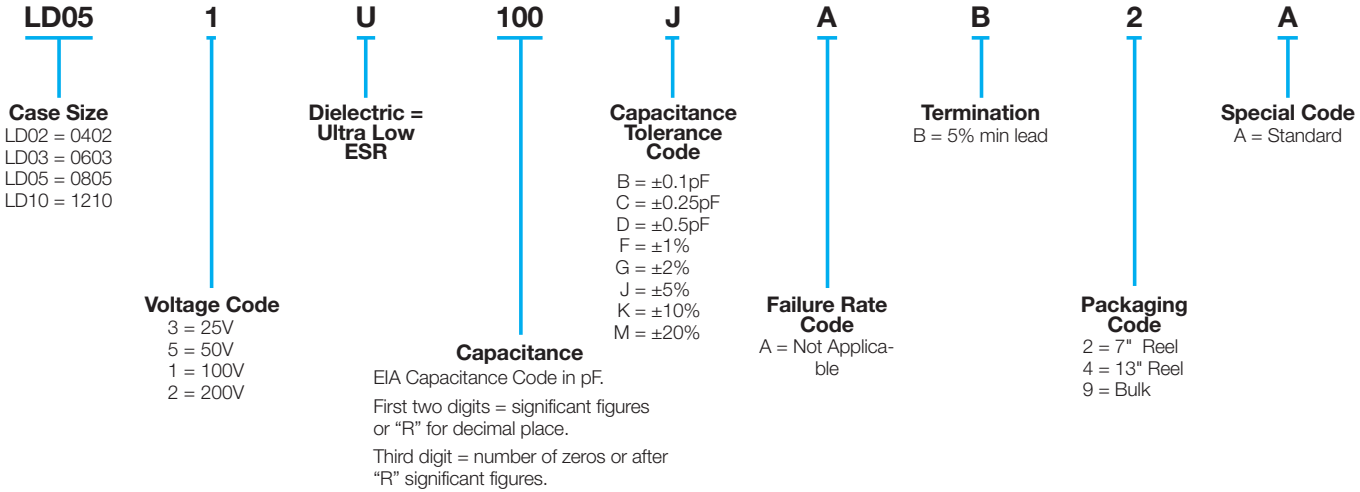
are met on each value producing lot to lot uniformity. Sizes available are EIA chip sizes 0402, 0603, 0805, and 1210.

### DIMENSIONS: inches (millimeters)



| Size | A                       | B                       | C                        | D                         | E                |
|------|-------------------------|-------------------------|--------------------------|---------------------------|------------------|
| 0402 | 0.039±0.004 (1.00±0.1)  | 0.020±0.004 (0.50±0.1)  | 0.024 (0.6) max          | N/A                       | N/A              |
| 0603 | 0.060±0.010 (1.52±0.25) | 0.030±0.010 (0.76±0.25) | 0.036 (0.91) max         | 0.010±0.005 (0.25±0.13)   | 0.030 (0.76) min |
| 0805 | 0.079±0.008 (2.01±0.2)  | 0.049±0.008 (1.25±0.2)  | 0.040±0.005 (1.02±0.127) | 0.020±0.010 (0.51±0.254)  | 0.020 (0.51) min |
| 1210 | 0.126±0.008 (3.2±0.2)   | 0.098±0.008 (2.49±0.2)  | 0.050±0.005 (1.27±0.127) | 0.025±0.015 (0.635±0.381) | 0.040 (1.02) min |

### HOW TO ORDER



### ELECTRICAL CHARACTERISTICS

#### Capacitance Values and Tolerances:

- Size 0402 - 0.2 pF to 22 pF @ 1 MHz
- Size 0603 - 1.0 pF to 100 pF @ 1 MHz
- Size 0805 - 1.6 pF to 160 pF @ 1 MHz
- Size 1210 - 2.4 pF to 1000 pF @ 1 MHz

#### Temperature Coefficient of Capacitance (TC):

0±30 ppm/°C (-55° to +125°C)

#### Insulation Resistance (IR):

- 10<sup>12</sup> Ω min. @ 25°C and rated WVDC
- 10<sup>11</sup> Ω min. @ 125°C and rated WVDC

#### Working Voltage (WVDC):

- Size Working Voltage
- 0402 - 50, 25 WVDC
- 0603 - 200, 100, 50 WVDC
- 0805 - 200, 100 WVDC
- 1210 - 200, 100 WVDC

#### Dielectric Working Voltage (DWV):

250% of rated WVDC

#### Equivalent Series Resistance Typical (ESR):

- 0402 - See Performance Curve, page 12
- 0603 - See Performance Curve, page 12
- 0805 - See Performance Curve, page 12
- 1210 - See Performance Curve, page 12

**Marking:** Laser marking EIA J marking standard (except 0603) (capacitance code and tolerance upon request).

#### MILITARY SPECIFICATIONS

Meets or exceeds the requirements of MIL-C-55681

**Not RoHS Compliant**



### “U” SERIES KITS

#### 0402

| Kit 5000 UZ   |                          |               |                          |
|---------------|--------------------------|---------------|--------------------------|
| Cap. Value pF | Tolerance                | Cap. Value pF | Tolerance                |
| 0.5           | B ( $\pm 0.1\text{pF}$ ) | 4.7           | B ( $\pm 0.1\text{pF}$ ) |
| 1.0           |                          | 5.6           |                          |
| 1.5           |                          | 6.8           |                          |
| 1.8           |                          | 8.2           |                          |
| 2.2           |                          | 10.0          |                          |
| 2.4           | J ( $\pm 5\%$ )          | 12.0          | J ( $\pm 5\%$ )          |
| 3.0           |                          | 15.0          |                          |
| 3.6           |                          |               |                          |
|               |                          |               |                          |

\*\*\*25 each of 15 values

#### 0603

| Kit 4000 UZ   |                          |               |                          |
|---------------|--------------------------|---------------|--------------------------|
| Cap. Value pF | Tolerance                | Cap. Value pF | Tolerance                |
| 1.0           | B ( $\pm 0.1\text{pF}$ ) | 6.8           | B ( $\pm 0.1\text{pF}$ ) |
| 1.2           |                          | 7.5           |                          |
| 1.5           |                          | 8.2           |                          |
| 1.8           |                          | 10.0          | J ( $\pm 5\%$ )          |
| 2.0           |                          | 12.0          |                          |
| 2.4           |                          | 15.0          |                          |
| 2.7           |                          | 18.0          |                          |
| 3.0           |                          | 22.0          |                          |
| 3.3           |                          | 27.0          |                          |
| 3.9           |                          | 33.0          |                          |
| 4.7           | 39.0                     |               |                          |
| 5.6           | 47.0                     |               |                          |

\*\*\*25 each of 24 values

#### 0805

| Kit 3000 UZ   |                          |                 |                 |       |                 |
|---------------|--------------------------|-----------------|-----------------|-------|-----------------|
| Cap. Value pF | Tolerance                | Cap. Value pF   | Tolerance       |       |                 |
| 1.0           | B ( $\pm 0.1\text{pF}$ ) | 15.0            | J ( $\pm 5\%$ ) |       |                 |
| 1.5           |                          | 18.0            |                 |       |                 |
| 2.2           |                          | 22.0            |                 |       |                 |
| 2.4           |                          | 24.0            |                 |       |                 |
| 2.7           |                          | 27.0            |                 |       |                 |
| 3.0           |                          | 33.0            |                 |       |                 |
| 3.3           |                          | 36.0            |                 |       |                 |
| 3.9           |                          | 39.0            |                 |       |                 |
| 4.7           |                          | 47.0            |                 |       |                 |
| 5.6           |                          | 56.0            |                 |       |                 |
| 7.5           |                          | 68.0            |                 |       |                 |
| 8.2           |                          | 82.0            |                 |       |                 |
| 9.1           |                          | 100.0           |                 |       |                 |
| 10.0          |                          | J ( $\pm 5\%$ ) |                 | 130.0 | J ( $\pm 5\%$ ) |
| 12.0          |                          |                 |                 | 160.0 |                 |

\*\*\*25 each of 30 values

#### 1210

| Kit 3500 UZ   |                          |                 |                 |       |
|---------------|--------------------------|-----------------|-----------------|-------|
| Cap. Value pF | Tolerance                | Cap. Value pF   | Tolerance       |       |
| 2.2           | B ( $\pm 0.1\text{pF}$ ) | 36.0            | J ( $\pm 5\%$ ) |       |
| 2.7           |                          | 39.0            |                 |       |
| 4.7           |                          | 47.0            |                 |       |
| 5.1           |                          | 51.0            |                 |       |
| 6.8           |                          | 56.0            |                 |       |
| 8.2           |                          | 68.0            |                 |       |
| 9.1           |                          | 82.0            |                 |       |
| 10.0          |                          | J ( $\pm 5\%$ ) |                 | 100.0 |
| 13.0          | 120.0                    |                 |                 |       |
| 15.0          | 130.0                    |                 |                 |       |
| 18.0          | 240.0                    |                 |                 |       |
| 20.0          | 300.0                    |                 |                 |       |
| 24.0          | 390.0                    |                 |                 |       |
| 27.0          | 470.0                    |                 |                 |       |
| 30.0          | 680.0                    |                 |                 |       |

\*\*\*25 each of 30 values