



# Capacitors (RoHS)

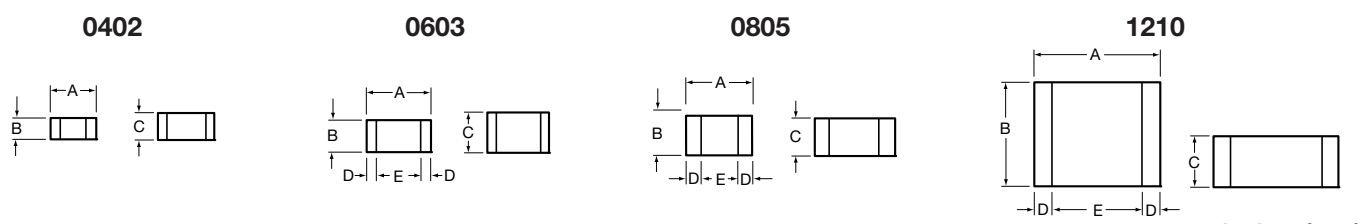
## Ultra Low ESR, "U" Series, C0G (NP0) Chip Capacitors

### 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 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

**0805** | **1** | **U** | **100** | **J** | **A** | **T** | **2** | **A**

**Case Size**  
 0402  
 0603  
 0805  
 1210

**Voltage Code**  
 3 = 25V  
 5 = 50V  
 1 = 100V  
 2 = 200V

**Dielectric = Ultra Low ESR**

**Capacitance**  
 EIA Capacitance Code in pF.  
 First two digits = significant figures or "R" for decimal place.  
 Third digit = number of zeros or after "R" significant figures.

**Capacitance Tolerance Code**  
 B = ±0.1pF  
 C = ±0.25pF  
 D = ±0.5pF  
 F = ±1%  
 G = ±2%  
 J = ±5%  
 K = ±10%  
 M = ±20%

**Failure Rate Code**  
 A = Not Applicable

**Termination**  
 T = Plated Ni and Sn

**Packaging Code**  
 2 = 7" Reel  
 4 = 13" Reel  
 9 = Bulk

**Special Code**  
 A = Standard

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			
		0402	0603	0805	1210
0.2	B,C	50V	N/A	N/A	N/A
0.3	B,C	50V	N/A	N/A	N/A
0.4	B,C	50V	N/A	N/A	N/A
0.5	B,C	50V	N/A	N/A	N/A
0.6	B,C,D	50V	N/A	N/A	N/A
0.7	B,C,D	50V	N/A	N/A	N/A
0.8	B,C,D	50V	N/A	N/A	N/A
0.9	B,C,D	50V	N/A	N/A	N/A

Cap (pF)	Available Tolerance	Size			
		0402	0603	0805	1210
1.0	B,C,D	50V	200V	200V	200V
1.1	B,C,D	50V	200V	200V	200V
1.2	B,C,D	50V	200V	200V	200V
1.3	B,C,D	50V	200V	200V	200V
1.4	B,C,D	50V	200V	200V	200V
1.5	B,C,D	50V	200V	200V	200V
1.6	B,C,D	50V	200V	200V	200V
1.7	B,C,D	50V	200V	200V	200V
1.8	B,C,D	50V	200V	200V	200V
1.9	B,C,D	50V	200V	200V	200V
2.0	B,C,D	50V	200V	200V	200V
2.1	B,C,D	50V	200V	200V	200V
2.2	B,C,D	50V	200V	200V	200V
2.4	B,C,D	50V	200V	200V	200V
2.7	B,C,D	50V	200V	200V	200V
3.0	B,C,D	50V	200V	200V	200V
3.3	B,C,D	50V	200V	200V	200V
3.6	B,C,D	50V	200V	200V	200V
3.9	B,C,D	50V	200V	200V	200V
4.3	B,C,D	50V	200V	200V	200V
4.7	B,C,D	50V	200V	200V	200V
5.1	B,C,D	50V	200V	200V	200V
5.6	B,C,D	50V	200V	200V	200V
6.2	B,C,D	50V	200V	200V	200V
6.8	B,C,D	50V	200V	200V	200V

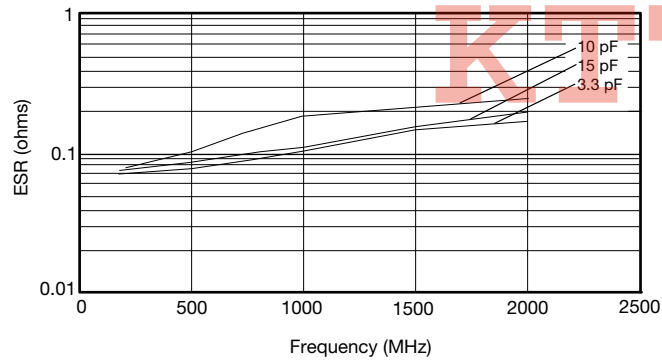
Cap (pF)	Available Tolerance	Size			
		0402	0603	0805	1210
7.5	B,C,J,K,M	50V	200V	200V	200V
8.2	B,C,J,K,M	50V	200V	200V	200V
9.1	B,C,J,K,M	50V	200V	200V	200V
10	F,G,J,K,M	50V	200V	200V	200V
11	F,G,J,K,M	50V	200V	200V	200V
12	F,G,J,K,M	50V	200V	200V	200V
13	F,G,J,K,M	50V	200V	200V	200V
15	F,G,J,K,M	50V	200V	200V	200V
18	F,G,J,K,M	50V	200V	200V	200V
20	F,G,J,K,M	50V	200V	200V	200V
22	F,G,J,K,M	50V	200V	200V	200V
24	F,G,J,K,M	50V	200V	200V	200V
27	F,G,J,K,M	50V	200V	200V	200V
30	F,G,J,K,M	50V	200V	200V	200V
33	F,G,J,K,M	50V	200V	200V	200V
36	F,G,J,K,M	50V	200V	200V	200V
39	F,G,J,K,M	50V	200V	200V	200V
43	F,G,J,K,M	50V	200V	200V	200V
47	F,G,J,K,M	50V	200V	200V	200V
51	F,G,J,K,M	50V	200V	200V	200V
56	F,G,J,K,M	50V	200V	200V	200V
68	F,G,J,K,M	50V	200V	200V	200V
75	F,G,J,K,M	50V	200V	200V	200V
82	F,G,J,K,M	50V	200V	200V	200V
91	F,G,J,K,M	50V	200V	200V	200V

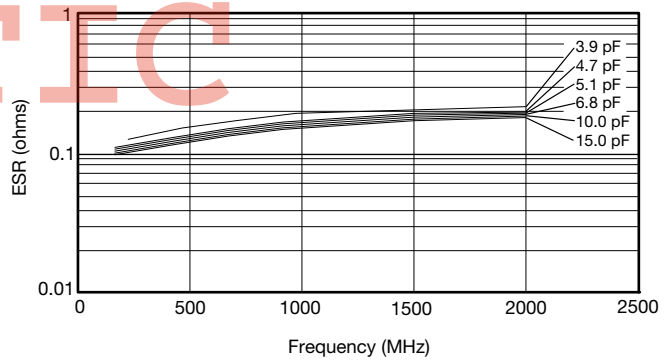
Cap (pF)	Available Tolerance	Size			
		0402	0603	0805	1210
100	F,G,J,K,M	N/A	100V	200V	200V
110	F,G,J,K,M	N/A	50V	200V	200V
120	F,G,J,K,M	N/A	50V	200V	200V
130	F,G,J,K,M	N/A	50V	200V	200V
140	F,G,J,K,M	N/A	50V	200V	200V
150	F,G,J,K,M	N/A	50V	200V	200V
160	F,G,J,K,M	N/A	50V	200V	200V
180	F,G,J,K,M	N/A	50V	200V	200V
200	F,G,J,K,M	N/A	50V	200V	200V
220	F,G,J,K,M	N/A	50V	200V	200V
270	F,G,J,K,M	N/A	50V	200V	200V
300	F,G,J,K,M	N/A	50V	200V	200V
330	F,G,J,K,M	N/A	50V	200V	200V
360	F,G,J,K,M	N/A	50V	200V	200V
390	F,G,J,K,M	N/A	50V	200V	200V
430	F,G,J,K,M	N/A	50V	200V	200V
470	F,G,J,K,M	N/A	50V	200V	200V
510	F,G,J,K,M	N/A	50V	200V	200V
560	F,G,J,K,M	N/A	50V	200V	200V
620	F,G,J,K,M	N/A	50V	200V	200V
680	F,G,J,K,M	N/A	50V	200V	200V
750	F,G,J,K,M	N/A	50V	200V	200V
820	F,G,J,K,M	N/A	50V	200V	200V
910	F,G,J,K,M	N/A	50V	200V	200V
1000	F,G,J,K,M	N/A	50V	200V	200V

### ULTRA LOW ESR, "U" SERIES

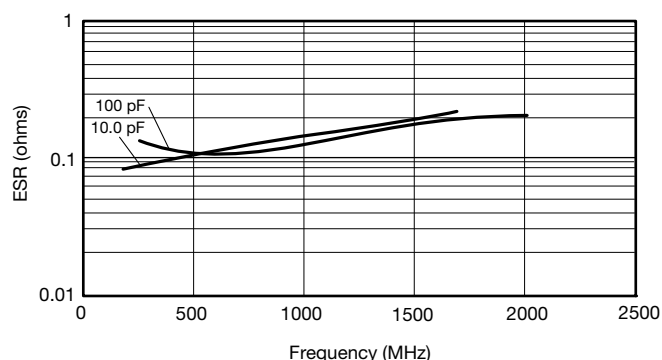
TYPICAL ESR vs. FREQUENCY  
0402 "U" SERIES



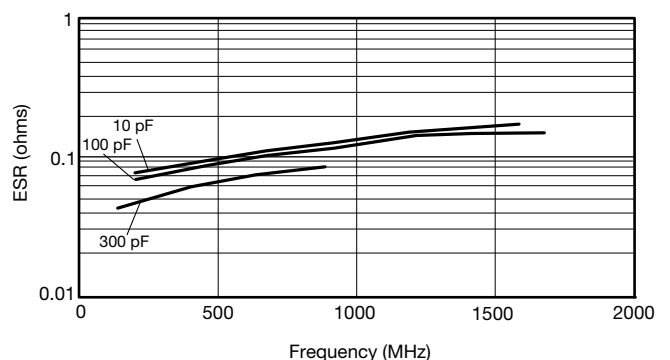
TYPICAL ESR vs. FREQUENCY  
0603 "U" SERIES



TYPICAL ESR vs. FREQUENCY  
0805 "U" SERIES



TYPICAL ESR vs. FREQUENCY  
1210 "U" SERIES



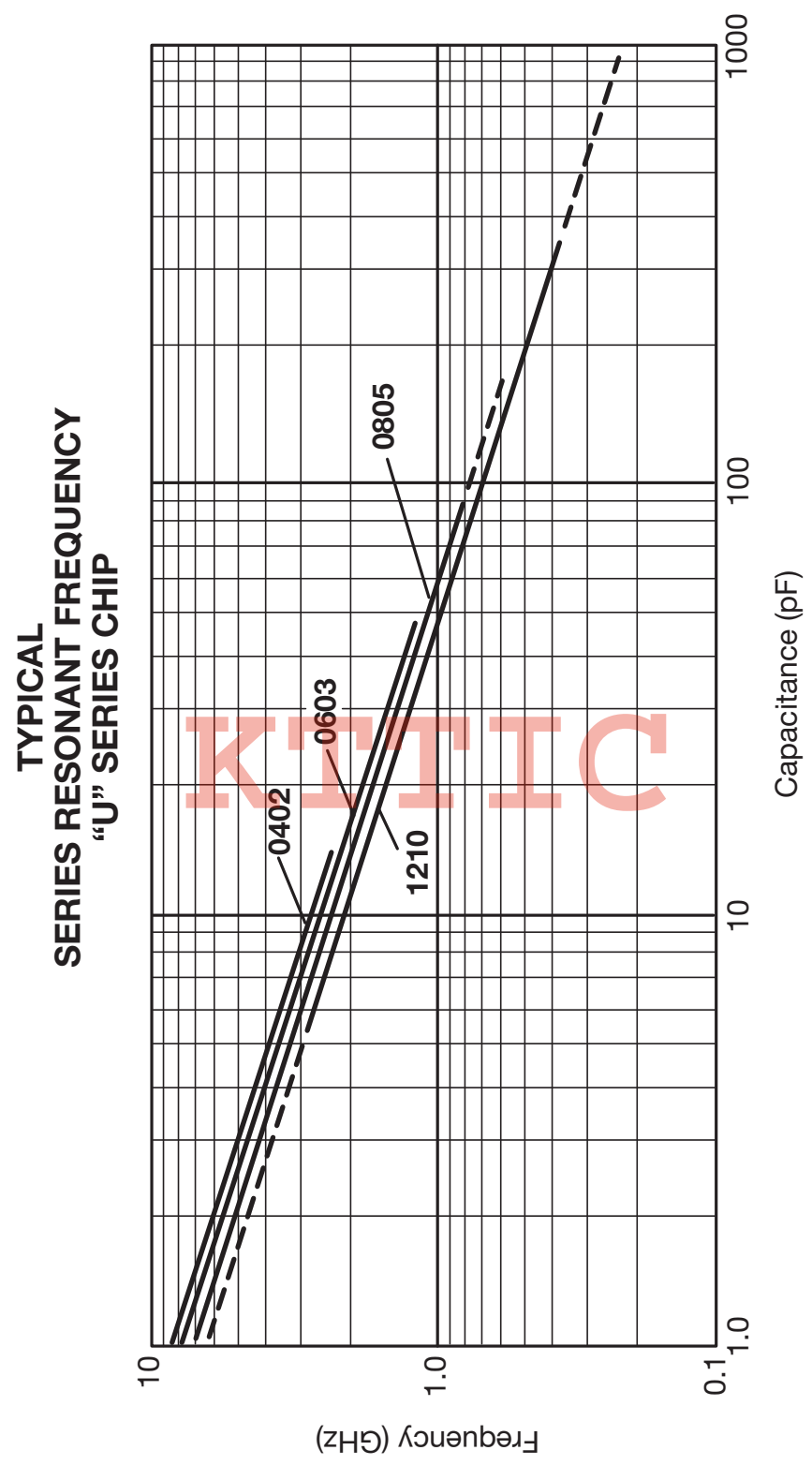
ESR Measured on the Boonton 34A



# RF/Microwave C0G (NP0) Capacitors



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



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

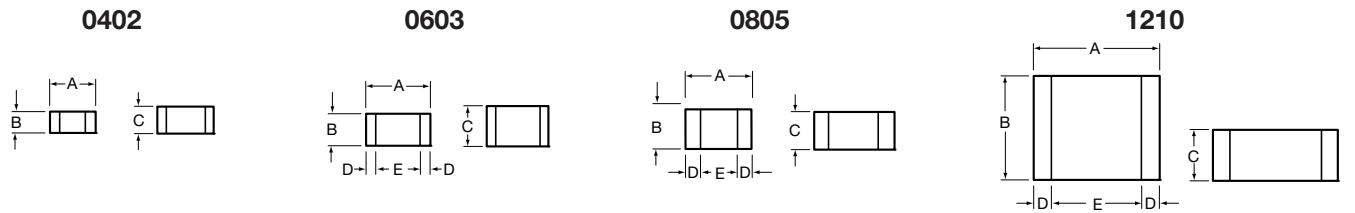
## Ultra Low ESR, "U" Series, COG (NP0) Chip Capacitors

### 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 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

**LD05** | **1** | **U** | **100** | **J** | **A** | **B** | **2** | **A**

- Case Size**  
LD02 = 0402  
LD03 = 0603  
LD05 = 0805  
LD10 = 1210
- Voltage Code**  
3 = 25V  
5 = 50V  
1 = 100V  
2 = 200V
- Dielectric = Ultra Low ESR**
- Capacitance**  
EIA Capacitance Code in pF.  
First two digits = significant figures or "R" for decimal place.  
Third digit = number of zeros or after "R" significant figures.
- Capacitance Tolerance Code**  
B = ±0.1pF  
C = ±0.25pF  
D = ±0.5pF  
F = ±1%  
G = ±2%  
J = ±5%  
K = ±10%  
M = ±20%
- Failure Rate Code**  
A = Not Applicable
- Termination**  
B = 5% min lead
- Packaging Code**  
2 = 7" Reel  
4 = 13" Reel  
9 = Bulk
- Special Code**  
A = Standard

### 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

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

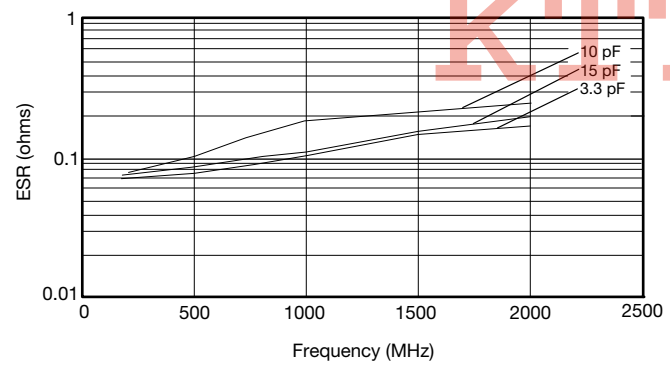
## Ultra Low ESR, "U" Series, COG (NP0) Chip Capacitors

### CAPACITANCE RANGE

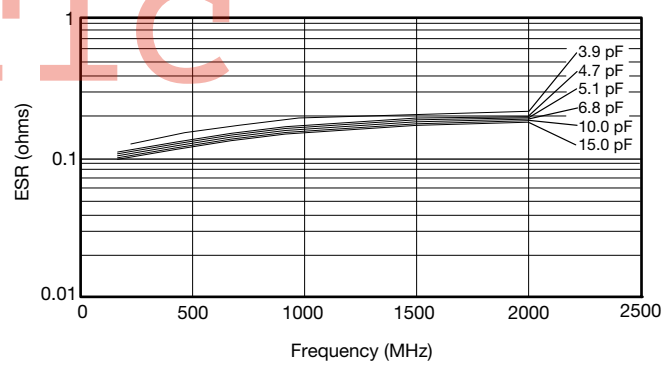
Cap (pF)	Available Tolerance	Size				Cap (pF)	Available Tolerance	Size				Cap (pF)	Available Tolerance	Size				Cap (pF)	Available Tolerance	Size			
		LD02	LD03	LD05	LD10			LD02	LD03	LD05	LD10			LD02	LD03	LD05	LD10			LD02	LD03	LD05	LD10
0.2	B,C	50V	N/A	N/A	N/A	1.0	B,C,D	50V	200V	200V	200V	7.5	B,C,J,K,M	50V	200V	200V	200V	100	F,G,J,K,M	N/A	100V	200V	200V
0.3						1.1						8.2						110			50V	200V	200V
0.4						1.2						9.1	B,C,J,K,M					120			50V	200V	200V
0.5	B,C					1.3						10	F,G,J,K,M					130			N/A	200V	200V
0.6	B,C,D					1.4						11						140				100V	200V
0.7						1.5						12						150				100V	200V
0.8						1.6						13						160				100V	200V
0.9	B,C,D					1.7						15						180				N/A	200V
						1.8						18						200					200V
						1.9						20						220					
						2.0						22						270					
						2.1						24						300					
						2.2						27						330					
						2.4						30		50V				360					
						2.7						33		N/A				390					
						3.0						36						430					200V
						3.3						39						470					100V
						3.6						43						510					
						3.9						47						560					
						4.3						51						620					
						4.7						56						680					
						5.1						68						750					
						5.6						75						820					
						6.2	B,C,D					82						910					
						6.8	B,C,J,K,M					91						1000	F,G,J,K,M				

### ULTRA LOW ESR, "U" SERIES

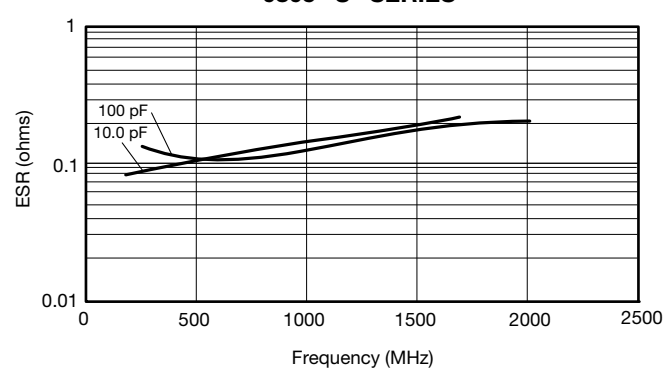
TYPICAL ESR vs. FREQUENCY  
0402 "U" SERIES



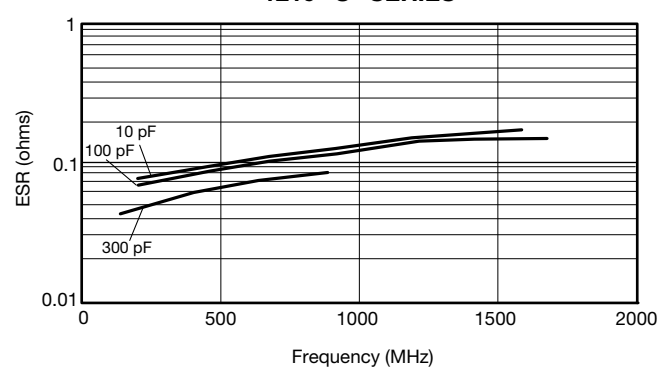
TYPICAL ESR vs. FREQUENCY  
0603 "U" SERIES



TYPICAL ESR vs. FREQUENCY  
0805 "U" SERIES



TYPICAL ESR vs. FREQUENCY  
1210 "U" SERIES



ESR Measured on the Boonton 34A

# Designer Kits

## Communication Kits "U" Series

### "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	
2.0		12.0	
2.4		15.0	
2.7		18.0	
3.0		22.0	
3.3	J ( $\pm 5\%$ )	27.0	J ( $\pm 5\%$ )
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 ( $\pm 5\%$ )	
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 ( $\pm 5\%$ )	
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