

# RF/Microwave Capacitors

## RF/Microwave C0G (NP0) Capacitors

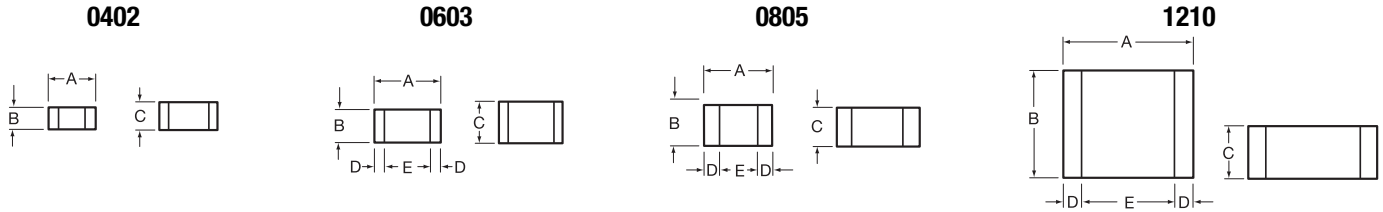
### Ultra Low ESR "U" Series, C0G (NP0) Capacitors (RoHS), KGQ Series



#### 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	0.010 ± 0.006 (0.25 ± 0.15)	0.014 (0.36) min
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)	0.045 (1.15mm) max	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)	0.055 (1.40mm) max	0.025 ± 0.015 (0.635 ± 0.381)	0.040 (1.02) min

#### HOW TO ORDER

<b>KGQ</b>	<b>05</b>	<b>F</b>	<b>CG</b>	<b>1H</b>	<b>9R1</b>	<b>B</b>	<b>N</b>
Series	Size	Thickness	Dielectric	Voltage	Capacitance	Capacitance	Packaging
General Purpose Tin/ Nickel Finish	05 = 0402 15 = 0603 21 = 0805 32 = 1210	See Cap Chart	COG = CG	1H = 50V 2A = 100V 2D = 200V	Code Code (in pF) 2 Significant Digits +Number of zeros eg. 10µF = 106 10nF = 103 47pF = 470	Tolerance B = ± 0.1pF(<10pF) C = ± 0.25pF(<10pF) D = ± 0.5pF(<10pF) G = ±2% F = ±1% J = ±5% K = ±10% M = ±20%	See Table Below



#### PACKAGING CODES

Code	EIA (inch)	IEC(mm)	7" Paper	7" Embossed	13" Paper	13" Embossed
05	0402	1005	H		N	
15	0603	1608	T		M	
21	0805	2012	T		M	
32	1210	3225	T		M	

#### 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 300
- 0603 - See Performance Curve, page 300
- 0805 - See Performance Curve, page 300
- 1210 - See Performance Curve, page 300

##### 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.

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## RF/Microwave C0G (NP0) Capacitors

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



#### CAPACITANCE RANGE

SIZE		0402			0603			0805			1210		
Soldering		All Paper			All Paper			All Embossed			All Embossed		
(L) Length	mm	1.00±0.10			1.60±0.15			2.01±0.20			3.20±0.20		
	(in.)	(0.040±0.004)			(0.063±0.006)			(0.079±0.008)			(0.126±0.008)		
(W) Width	mm	0.50±0.10			0.81±0.15			1.25±0.20			2.50±0.20		
	(in.)	(0.020±0.004)			(0.032±0.006)			(0.049±0.008)			(0.098±0.008)		
(t) Terminal	mm	0.25±0.15			0.35±0.15			0.50±0.25			0.50±0.25		
	(in.)	(0.010±0.006)			(0.014±0.006)			(0.020±0.010)			(0.020±0.010)		
WVDC		50			50 100 200			100 200			100 200		
Cap (pF)	0.2	F	A	A	A	H	H	D	D	D	D	D	
	0.3	F	A	A	A	H	H	D	D	D	D	D	
	0.4	F	A	A	A	H	H	D	D	D	D	D	
	0.5	F	A	A	A	H	H	D	D	D	D	D	
	0.6	F	A	A	A	H	H	D	D	D	D	D	
	0.7	F	A	A	A	H	H	D	D	D	D	D	
	0.8	F	A	A	A	H	H	D	D	D	D	D	
	0.9	F	A	A	A	H	H	D	D	D	D	D	
	1.0	F	A	A	A	H	H	D	D	D	D	D	
	1.1	F	A	A	A	H	H	D	D	D	D	D	
	1.2	F	A	A	A	H	H	D	D	D	D	D	
	1.3	F	A	A	A	H	H	D	D	D	D	D	
	1.4	F	A	A	A	H	H	D	D	D	D	D	
	1.5	F	A	A	A	H	H	D	D	D	D	D	
	1.6	F	A	A	A	H	H	D	D	D	D	D	
	1.7	F	A	A	A	H	H	D	D	D	D	D	
	1.8	F	A	A	A	H	H	D	D	D	D	D	
	1.9	F	A	A	A	H	H	D	D	D	D	D	
	2.0	F	A	A	A	H	H	D	D	D	D	D	
	2.1	F	A	A	A	H	H	D	D	D	D	D	
	2.2	F	A	A	A	H	H	D	D	D	D	D	
	2.4	F	A	A	A	H	H	D	D	D	D	D	
	2.7	F	A	A	A	H	H	D	D	D	D	D	
	3.0	F	A	A	A	H	H	D	D	D	D	D	
	3.3	F	A	A	A	H	H	D	D	D	D	D	
	3.6	F	A	A	A	H	H	D	D	D	D	D	
	3.9	F	A	A	A	H	H	D	D	D	D	D	
	4.3	F	A	A	A	H	H	D	D	D	D	D	
	4.7	F	A	A	A	H	H	D	D	D	D	D	
	5.1	F	A	A	A	H	H	D	D	D	D	D	
	5.6	F	A	A	A	H	H	D	D	D	D	D	
	6.2	F	A	A	A	H	H	D	D	D	D	D	
	6.8	F	A	A	A	H	H	D	D	D	D	D	
	7.5	F	A	A	A	H	H	D	D	D	D	D	
	8.2	F	A	A	A	H	H	D	D	D	D	D	
	9.1	F	A	A	A	H	H	D	D	D	D	D	
	10	F	A	A	A	H	H	D	D	D	D	D	
	11	F	A	A	A	H	H	D	D	D	D	D	
	12	F	A	A	A	H	H	D	D	D	D	D	
	18	F	A	A	A	H	H	D	D	D	D	D	
	20	F	A	A	A	H	H	D	D	D	D	D	
	22	F	A	A	A	H	H	D	D	D	D	D	
WVDC		50			50 100 200			100 200			100 200		
SIZE		0402			0603			0805			1210		

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(L) Length	mm	1.00±0.10			1.60±0.15			2.01±0.20			3.20±0.20		
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(W) Width	mm	0.50±0.10			0.81±0.15			1.25±0.20			2.50±0.20		
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(t) Terminal	mm	0.25±0.15			0.35±0.15			0.50±0.25			0.50±0.25		
	(in.)	(0.010±0.006)			(0.014±0.006)			(0.020±0.010)			(0.020±0.010)		
WVDC		50			50 100 200			100 200			100 200		
	24	F	A	A	A	H	H	D	D	D	D	D	
	27	F	A	A	A	H	H	D	D	D	D	D	
Cap (pF)	30	F	A	A	A	H	H	D	D	D	D	D	
	33	F	A	A	A	H	H	D	D	D	D	D	
	36	F	A	A	A	H	H	D	D	D	D	D	
	39	F	A	A	A	H	H	D	D	D	D	D	
	43		A	A	A	H	H	D	D	D	D	D	
	47		A	A	A	H	H	D	D	D	D	D	
	51		A	A	A	H	H	D	D	D	D	D	
	56		A	A	A	H	H	D	D	D	D	D	
	68		A	A	A	H	H	D	D	D	D	D	
	75		A	A		H	H	D	D	D	D	D	
	82		A	A		H	H	D	D	D	D	D	
	91		A	A		H	H	D	D	D	D	D	
	100		A	A		H	H	D	D	D	D	D	
	110							D	D	D	D	D	
	120							D	D	D	D	D	
	130							D	D	D	D	D	
	140							D	D	D	D	D	
	150							D	D	D	D	D	
	160							D	D	D	D	D	
	180							D	D	D	D	D	
	200							D	D	D	D	D	
	220							D	D	D	D	D	
	270							D	D	D	D	D	
	300							D	D	D	D	D	
	330							D	D	D	D	D	
	360							D	D	D	D	D	
	390							D	D	D	D	D	
	430							D	D	D	D	D	
	470							D	D	D	D	D	
	510							D	D	D	D	D	
	560							D	D	D	D	D	
	620							D	D	D	D	D	
	680							D	D	D	D	D	
	750							D	D	D	D	D	
	820							D	D	D	D	D	
	910							D	D	D	D	D	
	1000							D	D	D	D	D	
WVDC		50			50 100 200			100 200			100 200		
SIZE		0402			0603			0805			1210		

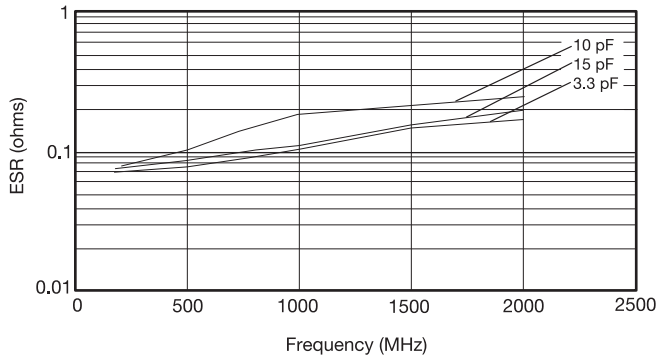
Case Size	0402 (KGQ05)	0603 (KGQ15)	0805 (KGQ21)	1210 (KGQ32)
Thickness Letter	F	A	H	D
Max Thickness(mm)	0.60	0.90	1.15	1.40
Carrier Tape	PAPER	PAPER	PAPER	PAPER
Packaging Code 7"reel	H	T	T	T
Packaging Code 13"reel	N	M	M	M
PAPER				

#### TOLERANCE OPTIONS

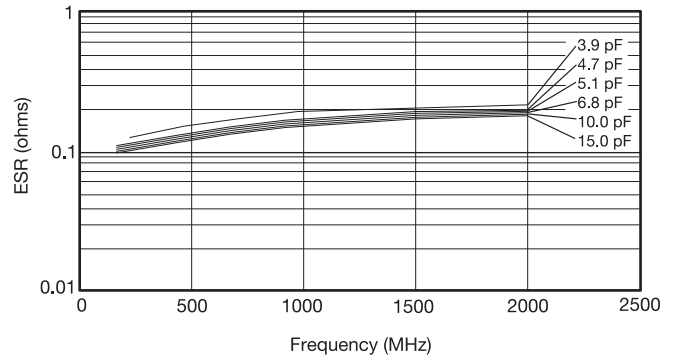
Capacitance Range	Available Tolerances
0.20-0.50 pF	B, C
0.60-6.2 pF	B, C, D
6.8- 9.1 pF	B, C, J, K, M
10-1000 pF	FG, J, K, M

#### ULTRA LOW ESR, "U" SERIES

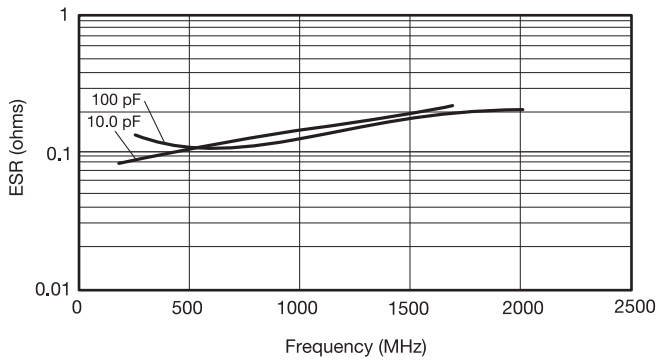
TYPICAL ESR vs. FREQUENCY  
0402 "U" SERIES



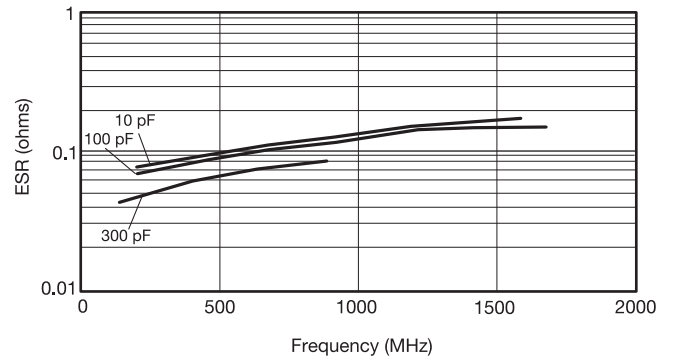
TYPICAL ESR vs. FREQUENCY  
0603 "U" SERIES



TYPICAL ESR vs. FREQUENCY  
0805 "U" SERIES



TYPICAL ESR vs. FREQUENCY  
1210 "U" SERIES



ESR Measured on the Boonton 34A

#### TYPICAL SERIES RESONANT FREQUENCY "U" SERIES CHIP

