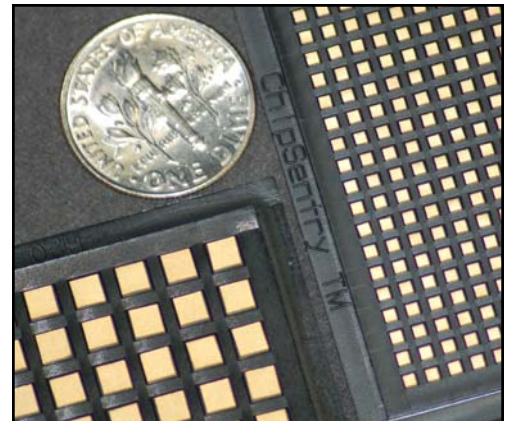


Parallel Plate Ceramic Single Layer Microwave Capacitors (SLCs) are ideally suited for applications such as GaAs integrated circuits, microwave integrated circuits, DC block, bypass, and tuning, and RF/microwave components. The SLC design offers increased capacitance for additional bandwidth, increased stability in capacitance over various temperatures, and more capacitance in smaller case sizes for greater board density.

SLCs are suitable solutions for applications that require:

- Through 40 GHz with minimum insertion loss.
- Specified material from a selection of fourteen standard dielectric options.
- Imperviousness to electrostatic discharge and more ruggedness than MOS/MNS capacitors.
- Gold plated electrode termination, which is compatible with solder, eutectic, epoxy and wire bonding production methods.



General Specifications

MECHANICAL

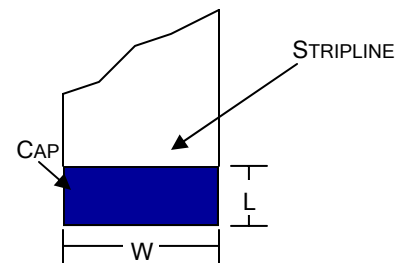
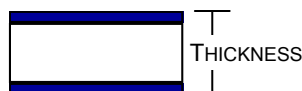
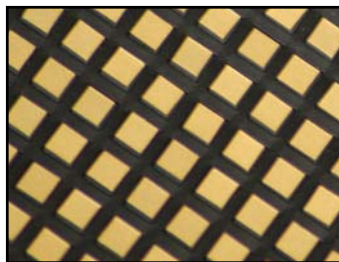
- Bond Strength: Exceeds MIL-STD-883, Method 2011 Destructive Bond Pull Test
- Die Shear Strength: Exceeds applicable MIL-STD-883 requirements.

ENVIRONMENTAL

- Low Voltage Humidity: Paragraph 3.17, MIL-C-49464
- Burn-in/Life Test: MIL-STD-202, Method 108, Condition A/F
- Solderability: MIL-STD-202, Method 208

HIGH RELIABILITY TESTING

- Group A: 100 Hour burn-in, 100% screening.
- Group B: Group A tests, solderability, bond strength, die shear strength, and temperature coefficient.
- Group C: Group B tests, thermal shock, resistance to soldering heat, low voltage humidity, and life test.



CASE DIMENSIONS in Inches (mm)

Case Size	P10	P13	P15	P20	P25	P30	P35	P40	P50	P70	P90	PA0
Width (W)	.010 (.254)	.013 (.330)	.015 (.381)	.020 (.508)	.025 (.635)	.030 (.762)	.035 (.889)	.040 (1.02)	.050 (1.27)	.070 (1.78)	.90 (2.29)	.100 (2.54)
Length (L)	.010 (.254)	.013 (.330)	.015 (.381)	.020 (.508)	.025 (.635)	.030 (.762)	.035 (.889)	.040 (1.02)	.050 (1.27)	.070 (1.78)	.100 (2.54)	.100 (2.54)
Thickness (50V)	.005 (.127)	.005 (.127)	.005 (.127)	.005 (.127)	.005 (.127)	.005 (.127)	.005 (.127)	.005 (.127)	—	—	—	—
Thickness (100V)	.007 (.178)	.007 (.178)	.007 (.178)	.007 (.178)	.007 (.178)	.007 (.178)	.007 (.178)	.007 (.178)	.008 (.203)	.008 (.203)	.009 (.229)	.010 (.254)

** Tolerance: ±.002 (.050) or 10%

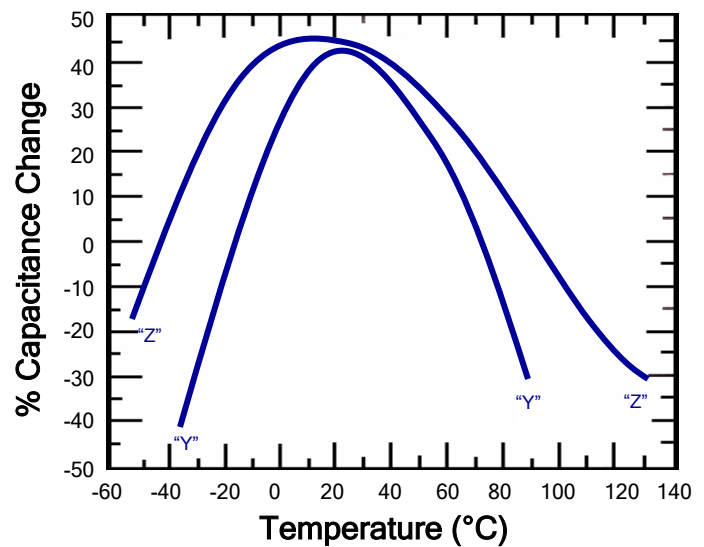
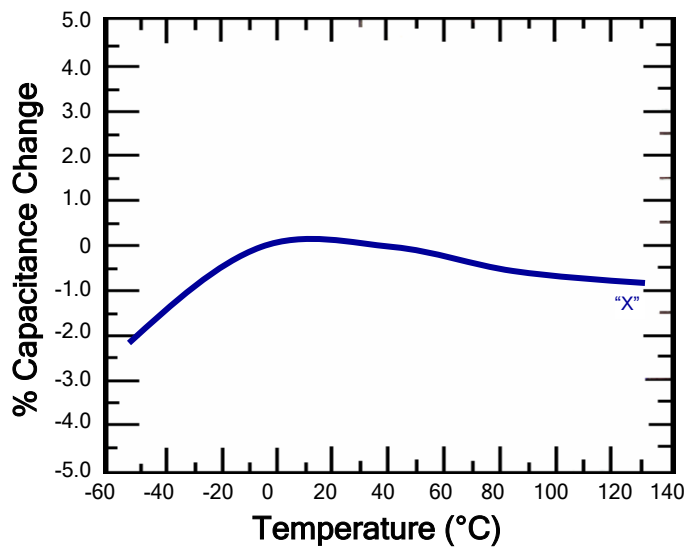
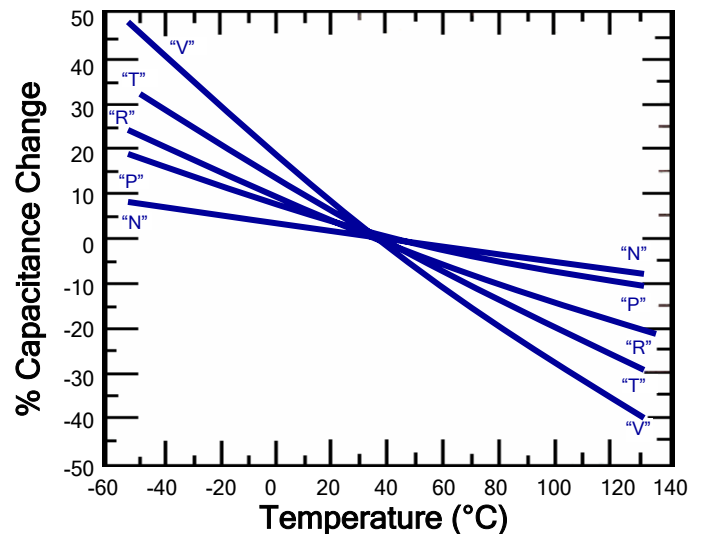
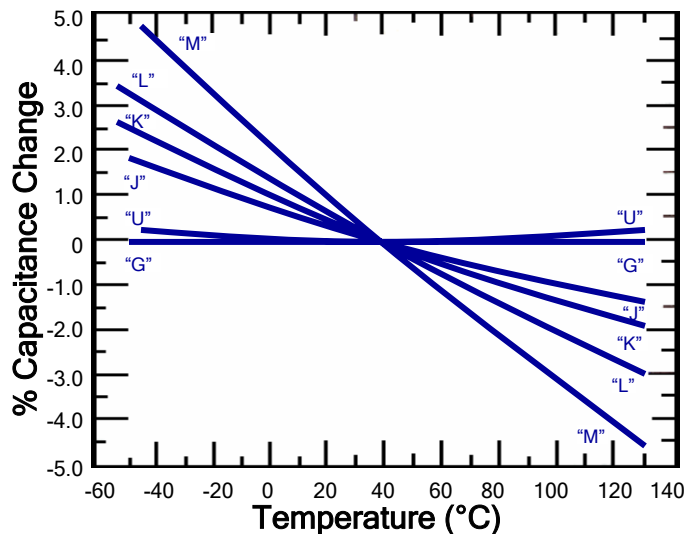
Dielectric Characteristics

DIELECTRIC Code	Constant	Temperature Coefficient	Temperature Range	Dissipation Factor/Frequency	Insulation Resistance
U	23	0 ± 30 ppm	-55°C to +125°C	< 0.15%/1MHz	> 1000 GΩ
G	37/80/110	0 ± 30 ppm	-55°C to +125°C	< 0.15%/1MHz	> 1000 GΩ
N	120	-750 ± 120 ppm	-55°C to +125°C	< 0.25%/1MHz	> 1000 GΩ
P	160	-1500 ± 300 ppm	-55°C to +125°C	< 0.25%/1MHz	> 1000 GΩ
R	270	-2200 ± 500 ppm	-55°C to +125°C	< 0.25%/1MHz	> 1000 GΩ
T	330	-3300 ± 500 ppm	-55°C to +125°C	< 1.50%/1MHz	> 1000 GΩ
V	600	-4700 ± 1000 ppm	-55°C to +125°C	< 2.50%/1KHz	> 100 GΩ
W	1200	-5600 ± 1000 ppm	-55°C to +125°C	< 2.50%/1KHz	> 100 GΩ
X	2000/3000/4000	± 15%	-55°C to +125°C	< 2.50%/1KHz	> 100 GΩ
Y	8000	+22%, -56%	+10°C to +85°C	< 4.00%/1KHz	> 10 GΩ
Z	12000	+22%, -82%	-30°C to +85°C	< 4.00%/1KHz	> 10 GΩ

Capacitance Selection

CAPACITANCE		P10	P13	P15	P20	P25	P30	P35	P40	P50	P70	P90	PA0	CAPACITANCE		P10	P13	P15	P20	P25	P30	P35	P40	P50	P70	P90	PA0
CODE	VALUE													CODE	VALUE												
0R1	0.1pF	U	U	U										6R8	6.8pF	X	W	W	V	R	P	P	P	G	G	G	G
0R2	0.2pF	G	G	U	U									7R5	7.5pF	X	W	W	V	T	R	P	P	G	G	G	G
0R3	0.3pF	G	G	G	U	U								8R2	8.2pF	X	X	W	V	T	R	P	P	G	G	G	G
0R4	0.4pF	P	G	G	G	U								9R1	9.1pF	X	X	W	V	V	R	R	P	G	G	G	G
0R5	0.5pF	P	G	G	G	U	U							100	10pF	X	X	X	V	V	T	R	P	P	G	G	G
0R6	0.6pF	P	P	G	G	G	U	U						120	12pF	X	X	X	W	V	T	R	R	P	G	G	G
0R7	0.7pF	P	P	P	G	G	U	U						150	15pF	X	X	X	W	V	T	T	R	P	G	G	G
0R8	0.8pF	R	P	P	G	G	U	U						180	18pF	X	X	X	W	V	V	T	R	R	P	G	G
0R9	0.9pF	R	P	P	G	G	U	U	U					200	20pF	X	X	X	W	W	V	V	T	R	P	G	G
1R0	1.0pF	R	P	P	G	G	G	U	U					220	22pF	Z	X	X	W	W	V	V	T	R	P	G	G
1R1	1.1pF	R	R	P	G	G	G	U	U					270	27pF	Z	X	X	X	W	V	V	V	T	P	G	G
1R2	1.2pF	T	R	P	G	G	G	U	U					330	33pF	Y	Z	X	X	W	W	V	V	T	R	G	G
1R3	1.3pF	T	R	R	G	G	G	G	U					390	39pF	Y	Z	Z	X	X	W	W	V	T	R	P	P
1R4	1.4pF	T	R	R	G	G	G	G	U	U				470	47pF	Y	Z	Z	X	X	W	W	V	V	R	P	P
1R5	1.5pF	T	R	R	P	G	G	G	U	U				500	50pF	Y	Y	Z	X	X	W	W	V	V	R	P	P
1R6	1.6pF	V	R	R	P	G	G	G	G	U				510	51pF	Y	Y	Z	X	X	W	W	V	V	R	P	P
1R7	1.7pF	V	R	R	P	G	G	G	G	U				560	56pF	Y	Y	Z	X	X	W	W	W	V	R	R	P
1R8	1.8pF	V	T	R	P	G	G	G	G	U				680	68pF		Y	Y	X	X	X	X	W	V	T	R	P
1R9	1.9pF	V	T	T	P	G	G	G	G	U				820	82pF		Y	Y	Z	X	X	X	W	V	V	R	P
2R0	2.0pF	V	T	T	P	G	G	G	G	U				101	100pF			Y	Z	X	X	X	X	W	V	T	P
2R1	2.1pF	V	T	T	P	G	G	G	G	U	U			121	120pF				Z	X	X	X	X	W	V	V	P
2R2	2.2pF	V	T	T	P	P	G	G	G	U	U			151	150pF				Y	Z	X	X	X	X	W	V	R
2R4	2.4pF	V	T	T	P	P	G	G	G	G	U			181	180pF				Y	Z	X	X	X	X	W	V	R
2R7	2.7pF	V	V	T	P	P	G	G	G	G	U	U		201	200pF				Y	Z	X	X	X	X	W	W	R
3R0	3.0pF	W	V	V	T	P	G	G	G	G	U	U		221	220pF				Y	Y	Z	X	X	X	W	W	V
3R3	3.3pF	W	V	V	T	P	G	G	G	G	U	U		271	270pF					Y	Z	Z	X	X	X	W	V
3R6	3.6pF	W	V	V	T	P	G	G	G	G	U	U	U	331	330pF					Y	Y	Z	Z	X	X	X	W
3R9	3.9pF	W	V	V	T	P	P	G	G	G	U	U	U	391	390pF						Y	Z	Z	X	X	X	W
4R3	4.3pF	W	V	V	T	R	P	G	G	G	U	U	U	471	470pF						Y	Y	Z	X	X	X	X
4R7	4.7pF	W	W	V	T	R	P	G	G	G	G	U	U	561	560pF						Y	Y	Y	Z	X	X	X
5R1	5.1pF	W	W	V	T	R	P	G	G	G	G	U	U	681	680pF							Y	Y	Z	X	X	X
5R6	5.6pF	W	W	W	T	R	P	G	G	G	G	G	U	821	820pF									Y	X	X	X
6R2	6.2pF	X	W	W	V	R	P	P	P	G	G	G	G	102	1000pF									Y	X	X	Z
6R8	6.8pF	X	W	W	V	R	P	P	P	G	G	G	G	122	1200pF									Y	Z	X	Y

Typical Temperature Coefficient



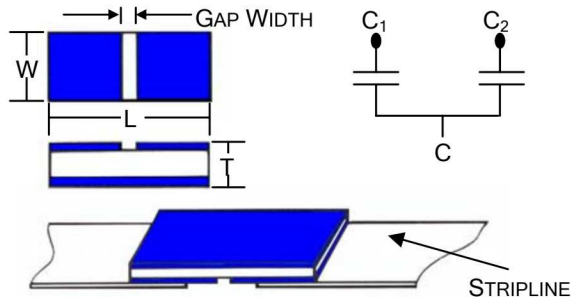
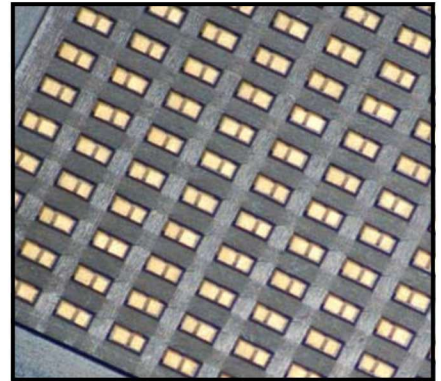
ORDERING INFORMATION

Style	Case Size	Dielectric	Capacitance	Tolerance	Voltage	Termination	High Rel Testing
P	20	X	500	K	101	G	A
P Parallel Plate	10 15 20 25 30 35 40 50 70 90 A0	U G N P R T V W X Z Y	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200pF 2R2 = 2.2pF	A $\pm 0.05\text{pF}$ B $\pm 0.10\text{pF}$ C $\pm 0.25\text{pF}$ F $\pm 1\%$ G $\pm 2\%$ J $\pm 5\%$ K $\pm 10\%$ M $\pm 20\%$ X Special	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200V 151 = 150V 202 = 2000V	G Gold over Nickel Plated (RoHS Compliant)	(Optional) A = Group A B = Groups A & B C = Groups A, B, & C D = Special Testing

The S-Series Single Layer Gap Capacitors (SLCs) are ideally suited for applications such as micro-strip circuits or stripline microwave circuits.

S-Series SLCs are suitable solutions for applications that require:

- Most minimum insertion loss.
- Lowest heat exertion levels.
- Controlled gap in micro-strip.
- Custom sized widths to adhere to stripline gaps.
- Direct mounting onto stripline without wire bonding.
- Various attachment options, including solder, epoxy, and eutectics.



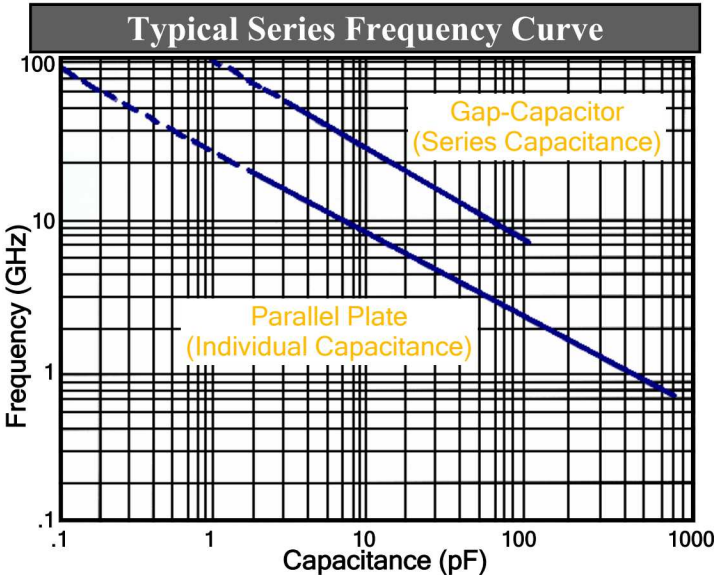
SELECTION GUIDE in Inches (mm)

Case Size	<u>S20</u>	<u>S24</u>	<u>S25</u>	<u>S29</u>	<u>S30</u>	<u>S50</u>		
Width (W)	.020 (.508)	.025 (.635)	.025 (.635)	.030 (.762)	.030 (.762)	.050 (1.27)		
Length (L)	.040 (1.02)	.040 (1.02)	.050 (1.27)	.050 (1.27)	.080 (2.03)	.080 (2.03)		
Thickness (T)	.005 (.127)	.005 (.127)	.005 (.127)	.005 (.127)	.005 (.127)	.006 (.152)		
Max. Gap Width	.005 (.127)	.005 (.127)	.010 (.254)	.010 (.254)	.020 (.508)	.020 (.508)		
Equivalent Series Capacitance (pF)	Temperature Coefficient Code	G	0.5	0.6	0.7	1.1	1.5	2.4
		N	0.7	1.0	1.1	1.8	2.2	3.9
		P	1.0	1.3	1.5	2.4	3.0	4.7
		R	1.8	2.2	2.7	4.3	5.1	8.2
		X	12	18	22	33	39	56
		Z	27	33	47	68	82	150

Tolerance $\pm .002$ (.050) or 10%, whichever is greater

Dielectric Strength: 2.5 x WVDC min @ 25°C, 50 mA max
Test Conditions: All Values @ 1Mhz, 1.0 $\pm$ 0.2Vrms, 25°C

** All capacitors are rated at 50 VDC, for other sizes, voltages, and other configurations, contact the Factory. **



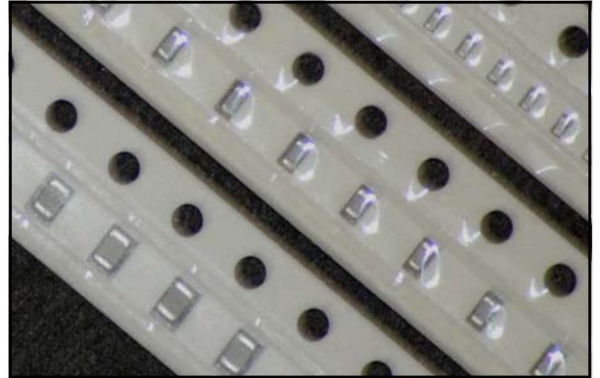
ORDERING INFORMATION

Style	Case Size	Temp. Coefficient	Capacitance	Tolerance	Voltage	Termination	Hi-Reli Testing
S	20	X	120	K	500	G	- A
S Gap Series	20 24 25 29 30 50	G N P R X Z	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200pF 2R2 = 2.2pF	C ± 0.25 pF D ± 0.50 pF J $\pm 5\%$ K $\pm 10\%$ M $\pm 20\%$ Z -20%, +80%	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200V 151 = 150V 202 = 2000V	G Gold Plated (RoHS Compliant)	(Optional) A = Group A B = Groups A & B C = Group C D = Special Testing

The C-Series Ultra-Low ESR Capacitors are ideally suited for applications such as base station products, high Q frequency sources, portable wireless systems, and RF integrated circuits. The unique combination of characteristics, performance, and high working voltage allows C-Series Ultra-Low ESR Capacitors to exceed the dielectric RF performance of any other series capacitor and to meet and exceed EIA-198, MIL-PRF-55681 and MIL-PRF-123 requirements.

These capacitors are suitable solutions for applications that require:

- Extremely Low ESR
- High Self Resonance Frequencies
- High Working Voltage

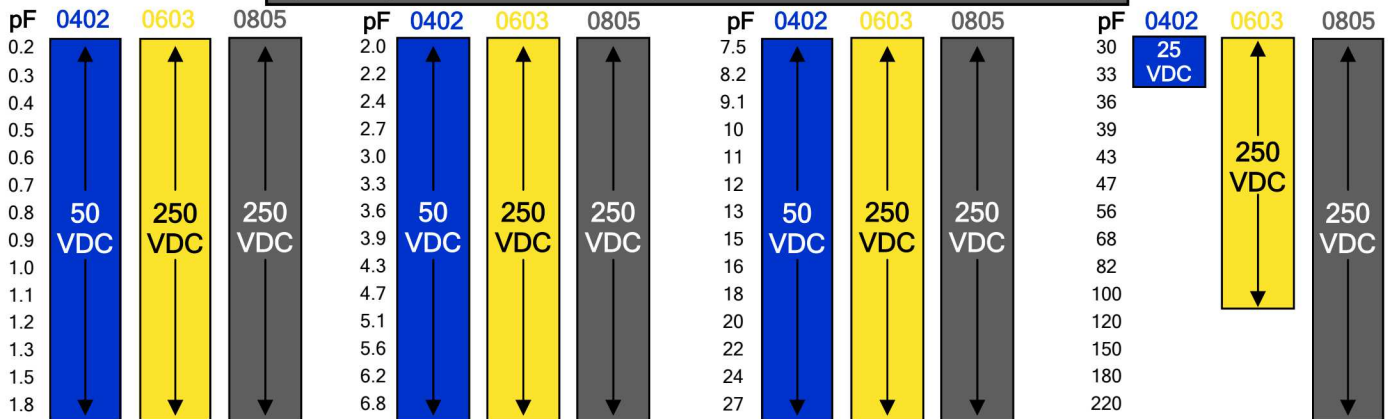


MECHANICAL DIMENSIONS in Inches (mm)

Case Size	Length (L)	Width (W)	Thickness (T)	Bandwidth (bw)
0201	.020±.004 (.51±.10)	.010±.004 (.25±.10)	.010±.003 (.51±.08)	.003±.001 (.076±.03)
0402	.040±.004 (1.02±.10)	.020±.004 (.51±.10)	.020±.004 (.51±.10)	.010±.006 (.25±.15)
0603	.060±.006 (1.50±.15)	.032±.006 (.81±.15)	max: .035 max: (.889)	.014±.006 (.357±.15)
0805	.080±.008 (2.03±.20)	.050±.008 (1.27±.20)	.040±.006 (1.02±.15)	.020±.01 (.51±.25)

Capacitance Selection

(Charts represents basic C/V availability. Please contact us for combinations not shown.)



ORDERING INFORMATION

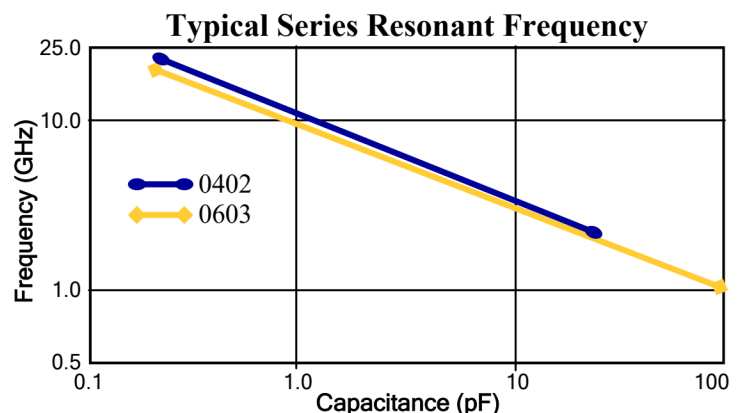
Case Size	Dielectric	Capacitance	Tolerance	Voltage	Termination	Packaging
0402	C	201	J	201	S	T
0201 0402 0603 0805	C = Ultra Hi-Q NPO	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200pF 2R2 = 2.2pF	P ±0.03pF A ±0.05pF B ±0.1pF C ±0.25pF F ±1% G ±2% J ±5% K ±10% M ±20%	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200V 151 = 150V 202 = 2000V	S Solder Plated Over Nickel SN Tin over Nickel Plated (RoHS Compliant) G Gold over Nickel Plated (RoHS Compliant)	T Tape and Reel W Waffle Pack

ENVIRONMENTAL CHARACTERISTICS

	SPECIFICATION	TEST PARAMETERS
SOLDERABILITY:	Solder coverage: 90% of metalized areas No termination degradation	Preheat chip to 120°C-150°C for 60 secs, dip terminals in rosin flux then dip in Sn62 solder @ 240°±5°C for ±1 sec
RESISTANCE TO SOLDERING HEAT:	No mechanical damage. Capacitance change: ±2.5% or 0.25pF Q>500 I.R. >10G Ohms Breakdown Voltage: 2.5 x WVDC	Preheat device to 80°-100°C for 60 secs; followed by 150°-180°C for 60 secs.
TERMINAL ADHESION:	Termination should not pull off. Ceramic should remain undamaged.	Linear pull force exerted on axial leads soldered to each terminal. (2lbs for 0402; 2lbs for 0603)
PCB DEFLECTION:	No mechanical damage. Capacitance change: 2% or 0.5pF Max	Glass epoxy PCB; 0.5 mm deflection.
LIFE TEST:	No mechanical damage. Capacitance change: ±3.0% or 0.3pF Q>500 I.R. >1G Ohms Breakdown Voltage: 2.5 x WVDC	Applied voltage: 200% rated voltage, 50mA max. Temperature: 125°±3°C Test time: 1000 +48 hours, -0 hours.
THERMAL CYCLE:	No mechanical damage. Capacitance change: ±2.5% or 0.25pF Q>2000 I.R. >10G Ohms Breakdown Voltage: 2.5 x WVDC	5 cycles of: 30±3 min. @ -55°+0/-3°C, 2-3 min. @ 25°C, 30±3 min. @ +125°C=3/-0°C, 2-3 mins. @ 25°C Measure after 24±2 hour cooling period.
HUMIDITY, STEADY STATE:	No mechanical damage. Capacitance change: ±5.0% or 0.5pF max. Q>300 I.R. = 1G Ohms Breakdown Voltage: 2.5 x WVDC	Relative humidity: 90-95% Temperature: 40°±2°C Test time: 500 + 12/-0 hours. Measure time after 24±2 hour cooling period.
HUMIDITY, LOW VOLTAGE:	No mechanical damage. Capacitance change: ±5.0% or 0.5pF max Q>300 I.R. = 1G Ohms min. Breakdown Voltage: 2.5 x WVDC	Applied voltage: 1.5 VDC, 50 mA max Relative humidity: 85±2%; Temperature: 40°±2°C Test time: 240 + 12/-0 hours. Measure after 24±2 hour cooling period.
VIBRATION:	No mechanical damage. Capacitance change: ±2.5% or 0.25pF max. Q>1000 I.R. = 10G Ohms Breakdown Voltage: 2.5 x WVDC	Cycle performed for 2 hours in each of three perpendicular directions. Frequency range 10Hz to 55 Hz to 10 Hz traversed in 1 min Harmonic motion amplitude: 1.5mm.

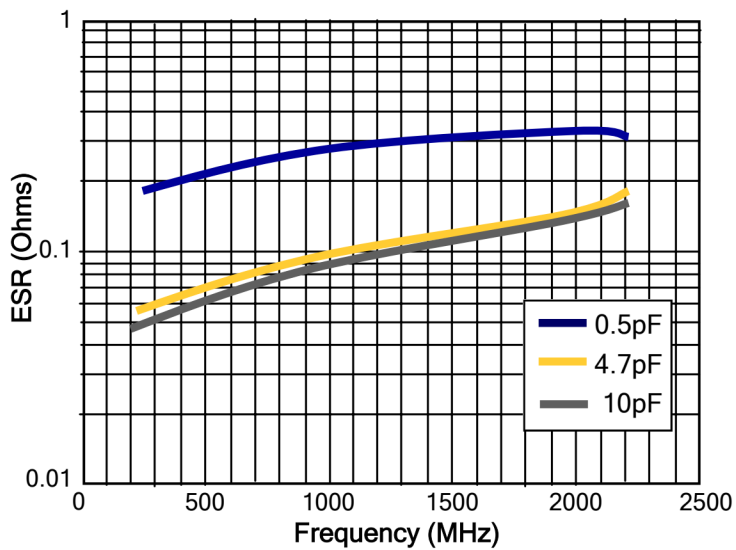
Dielectric Characteristics

TEMPERATURE COEFFICIENT:	0 ± 30ppm /°C, -55 to 125°C
QUALITY FACTOR:	5000 min, 10,000 typical
INSULATION RESISTANCE:	>10 G @ 25°C,WVDC; 125°C IR is 10% of 25 rating
DIELECTRIC STRENGTH:	2.5 x WVDC min, 25°C, 50 mA max
TEST PARAMETERS:	1MHz ±50kHz, 1.0±0.2 VRMS, 25°C
AVAILABLE CAPACITANCE:	0201 Size: 0.2 - 20 pF 0402 Size: 0.2 - 33 pF 0603 Size: 0.2 - 100 pF 0805 Size: 0.3 - 220 pF

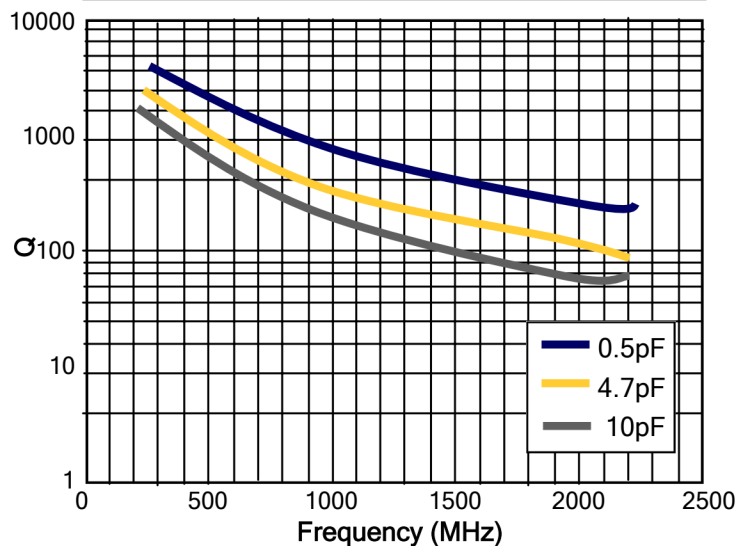


RF Characteristics versus Frequency

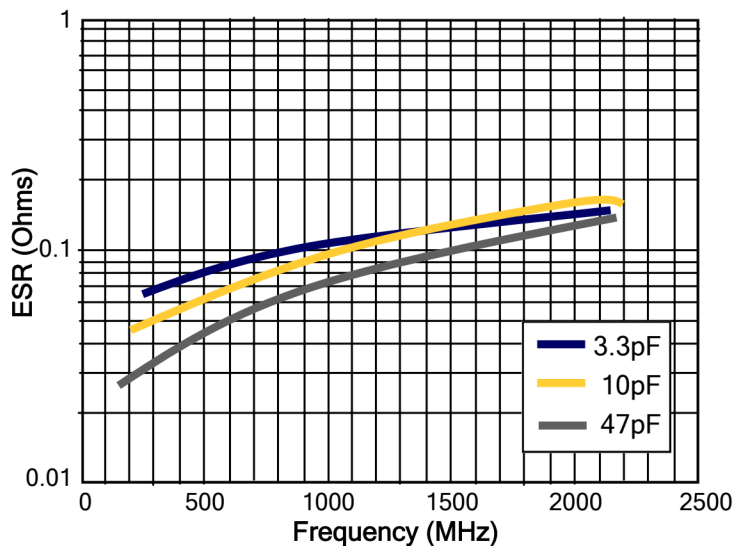
0402: Equivalent Series Resistance



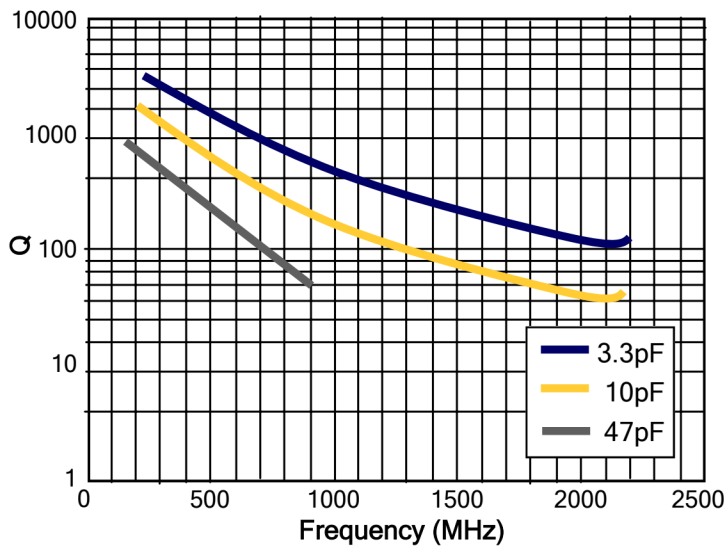
0402: Dissipation Factor (Q)



0603: Equivalent Series Resistance

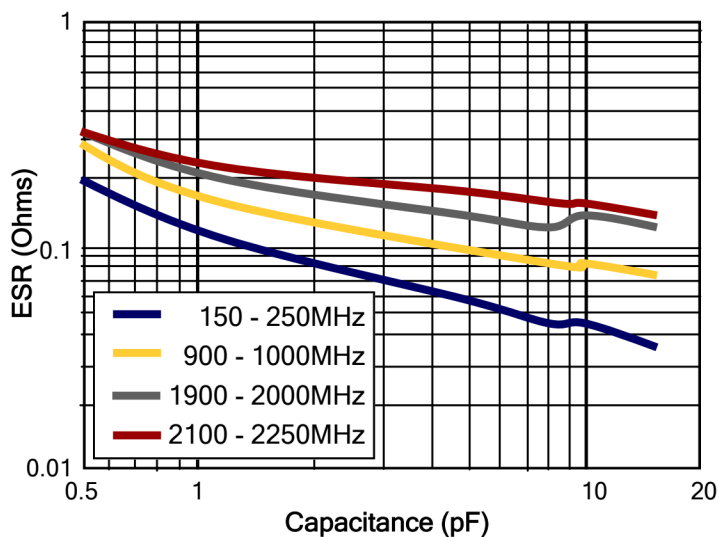


0603: Dissipation Factor (Q)

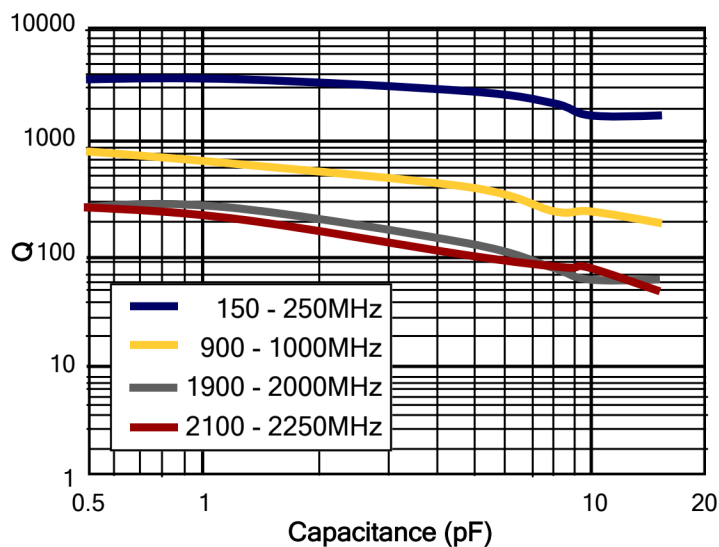


RF Characteristics versus Capacitance

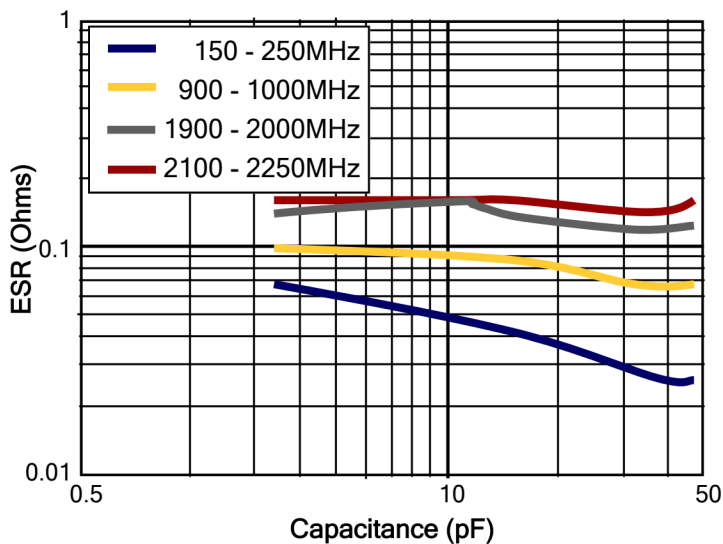
0402: Equivalent Series Resistance



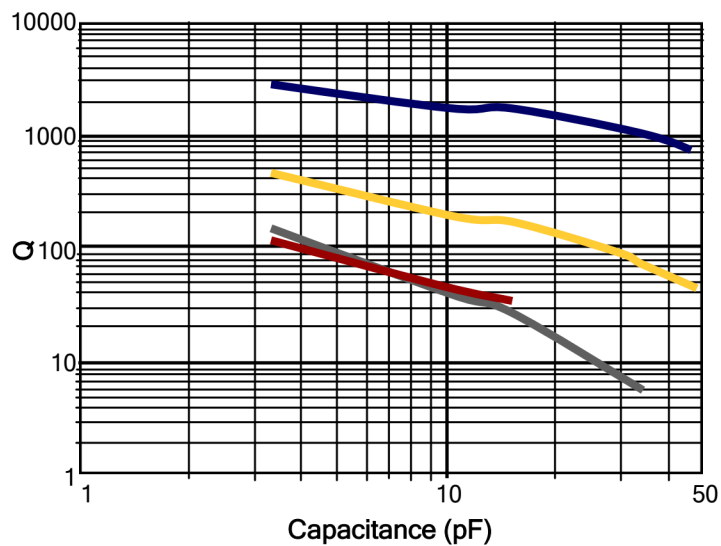
0402: Dissipation Factor (Q)



0603: Equivalent Series Resistance



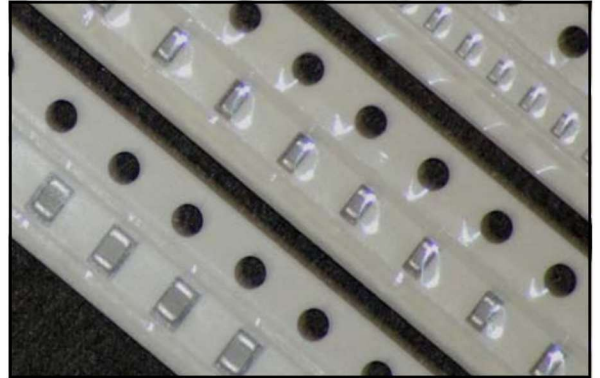
0603: Dissipation Factor (Q)



The C-Series Ultra-Low ESR Capacitors are ideally suited for applications such as base station products, high Q frequency sources, portable wireless systems, and RF integrated circuits. The unique combination of characteristics, performance, and high working voltage allows C-Series Ultra-Low ESR Capacitors to exceed the dielectric RF performance of any other series capacitor and to meet and exceed EIA-198, MIL-PRF-55681 and MIL-PRF-123 requirements.

These capacitors are suitable solutions for applications that require:

- Extremely Low ESR
- High Self Resonance Frequencies
- High Working Voltage

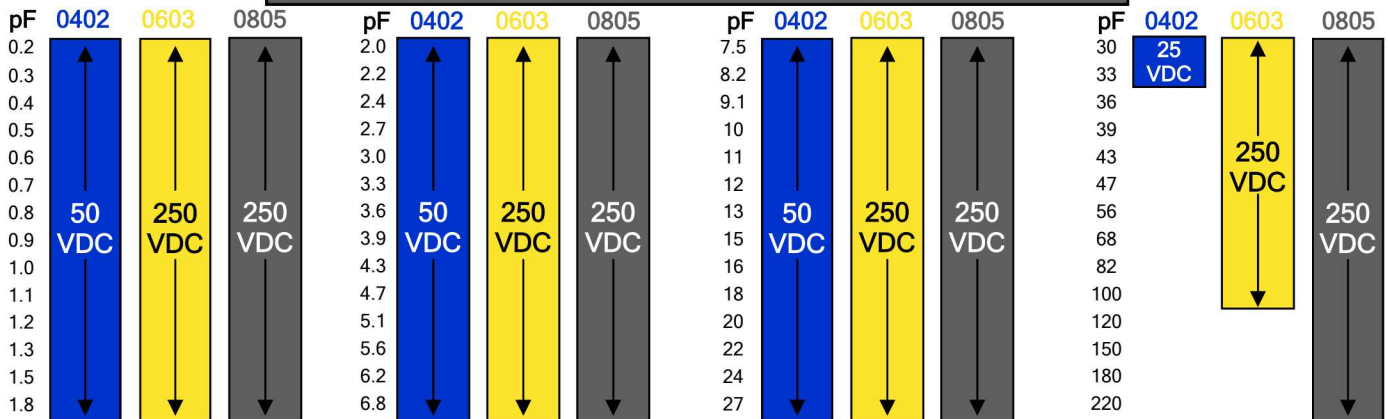


MECHANICAL DIMENSIONS in Inches (mm)

Case Size	Length (L)	Width (W)	Thickness (T)	Bandwidth (bw)
0201	.020±.004 (.51±.10)	.010±.004 (.25±.10)	.010±.003 (.51±.08)	.003±.001 (.076±.03)
0402	.040±.004 (1.02±.10)	.020±.004 (.51±.10)	.020±.004 (.51±.10)	.010±.006 (.25±.15)
0603	.060±.006 (1.50±.15)	.032±.006 (.81±.15)	max: .035 max: (.889)	.014±.006 (.357±.15)
0805	.080±.008 (2.03±.20)	.050±.008 (1.27±.20)	.040±.006 (1.02±.15)	.020±.01 (.51±.25)

Capacitance Selection

(Charts represents basic C/V availability. Please contact us for combinations not shown.)



ORDERING INFORMATION

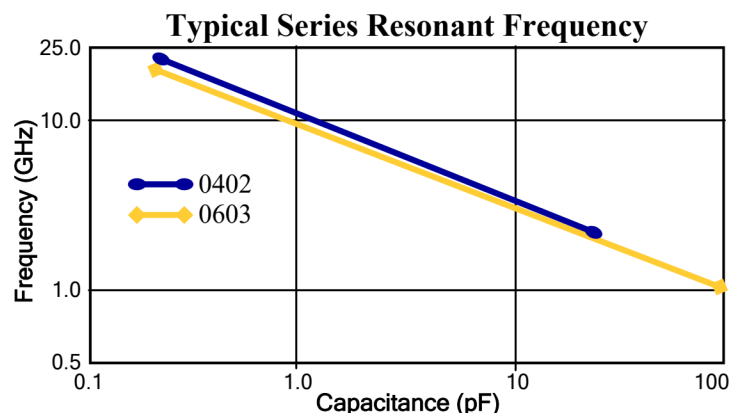
Case Size	Dielectric	Capacitance	Tolerance	Voltage	Termination	Packaging
0402	C	201	J	201	S	T
0201 0402 0603 0805	C = Ultra Hi-Q NPO	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200pF 2R2 = 2.2pF	P ±0.03pF A ±0.05pF B ±0.1pF C ±0.25pF F ±1% G ±2% J ±5% K ±10% M ±20%	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200V 151 = 150V 202 = 2000V	S Solder Plated Over Nickel SN Tin over Nickel Plated (RoHS Compliant) G Gold over Nickel Plated (RoHS Compliant)	T Tape and Reel W Waffle Pack

ENVIRONMENTAL CHARACTERISTICS

	SPECIFICATION	TEST PARAMETERS
SOLDERABILITY:	Solder coverage: 90% of metalized areas No termination degradation	Preheat chip to 120°C-150°C for 60 secs, dip terminals in rosin flux then dip in Sn62 solder @ 240°±5°C for ±1 sec
RESISTANCE TO SOLDERING HEAT:	No mechanical damage. Capacitance change: ±2.5% or 0.25pF Q>500 I.R. >10G Ohms Breakdown Voltage: 2.5 x WVDC	Preheat device to 80°-100°C for 60 secs; followed by 150°-180°C for 60 secs.
TERMINAL ADHESION:	Termination should not pull off. Ceramic should remain undamaged.	Linear pull force exerted on axial leads soldered to each terminal. (2lbs for 0402; 2lbs for 0603)
PCB DEFLECTION:	No mechanical damage. Capacitance change: 2% or 0.5pF Max	Glass epoxy PCB; 0.5 mm deflection.
LIFE TEST:	No mechanical damage. Capacitance change: ±3.0% or 0.3pF Q>500 I.R. >1G Ohms Breakdown Voltage: 2.5 x WVDC	Applied voltage: 200% rated voltage, 50mA max. Temperature: 125°±3°C Test time: 1000 +48 hours, -0 hours.
THERMAL CYCLE:	No mechanical damage. Capacitance change: ±2.5% or 0.25pF Q>2000 I.R. >10G Ohms Breakdown Voltage: 2.5 x WVDC	5 cycles of: 30±3 min. @ -55°+0/-3°C, 2-3 min. @ 25°C, 30±3 min. @ +125°C=3/-0°C, 2-3 mins. @ 25°C Measure after 24±2 hour cooling period.
HUMIDITY, STEADY STATE:	No mechanical damage. Capacitance change: ±5.0% or 0.5pF max. Q>300 I.R. = 1G Ohms Breakdown Voltage: 2.5 x WVDC	Relative humidity: 90-95% Temperature: 40°±2°C Test time: 500 + 12/-0 hours. Measure time after 24±2 hour cooling period.
HUMIDITY, LOW VOLTAGE:	No mechanical damage. Capacitance change: ±5.0% or 0.5pF max Q>300 I.R. = 1G Ohms min. Breakdown Voltage: 2.5 x WVDC	Applied voltage: 1.5 VDC, 50 mA max Relative humidity: 85±2%; Temperature: 40°±2°C Test time: 240 + 12/-0 hours. Measure after 24±2 hour cooling period.
VIBRATION:	No mechanical damage. Capacitance change: ±2.5% or 0.25pF max. Q>1000 I.R. = 10G Ohms Breakdown Voltage: 2.5 x WVDC	Cycle performed for 2 hours in each of three perpendicular directions. Frequency range 10Hz to 55 Hz to 10 Hz traversed in 1 min Harmonic motion amplitude: 1.5mm.

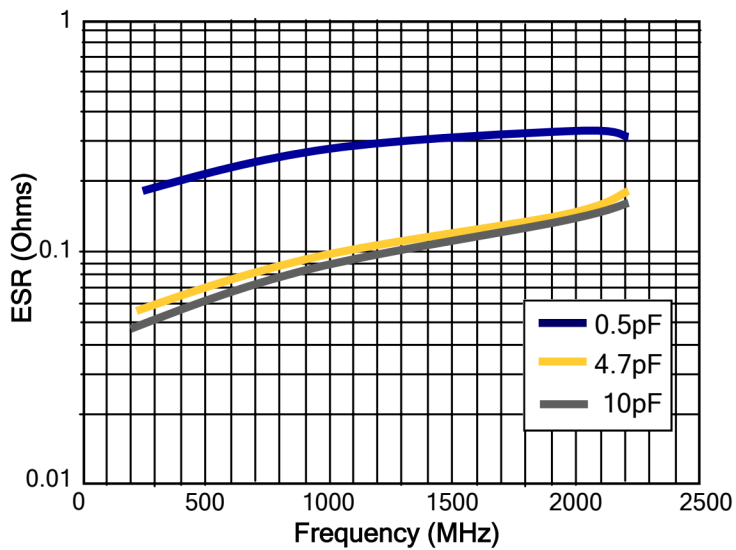
Dielectric Characteristics

TEMPERATURE COEFFICIENT:	0 ± 30ppm /°C, -55 to 125°C
QUALITY FACTOR:	5000 min, 10,000 typical
INSULATION RESISTANCE:	>10 G @ 25°C,WVDC; 125°C IR is 10% of 25 rating
DIELECTRIC STRENGTH:	2.5 x WVDC min, 25°C, 50 mA max
TEST PARAMETERS:	1MHz ±50kHz, 1.0±0.2 VRMS, 25°C
AVAILABLE CAPACITANCE:	0201 Size: 0.2 - 20 pF 0402 Size: 0.2 - 33 pF 0603 Size: 0.2 - 100 pF 0805 Size: 0.3 - 220 pF

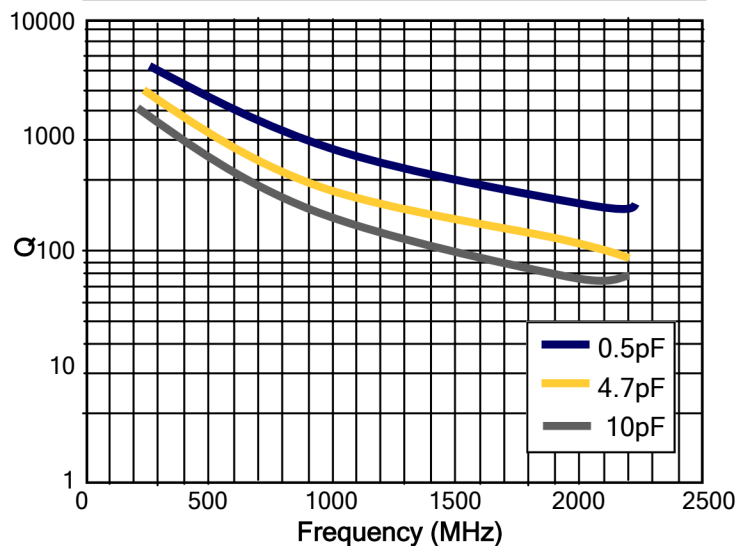


RF Characteristics versus Frequency

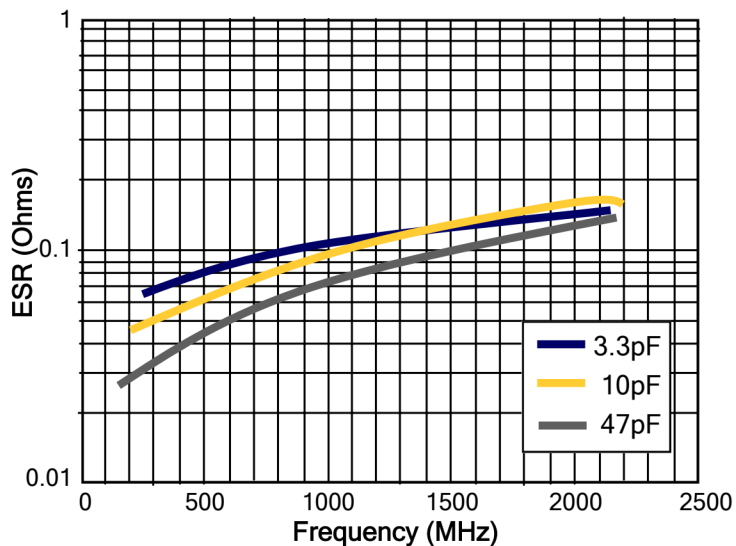
0402: Equivalent Series Resistance



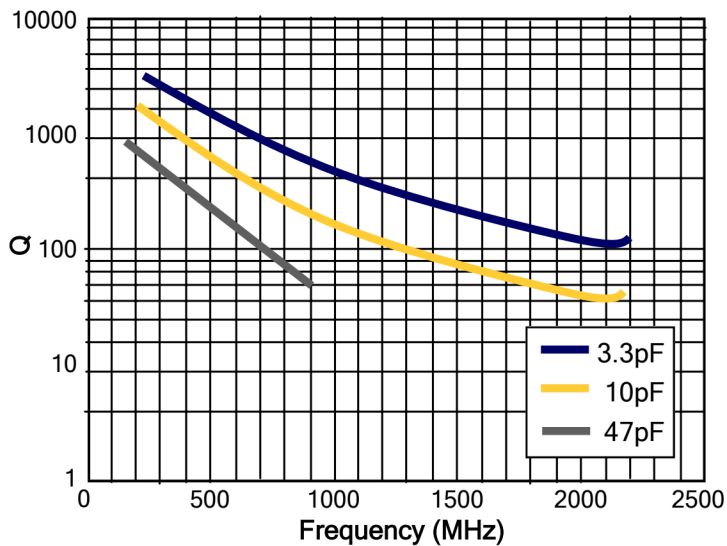
0402: Dissipation Factor (Q)



0603: Equivalent Series Resistance

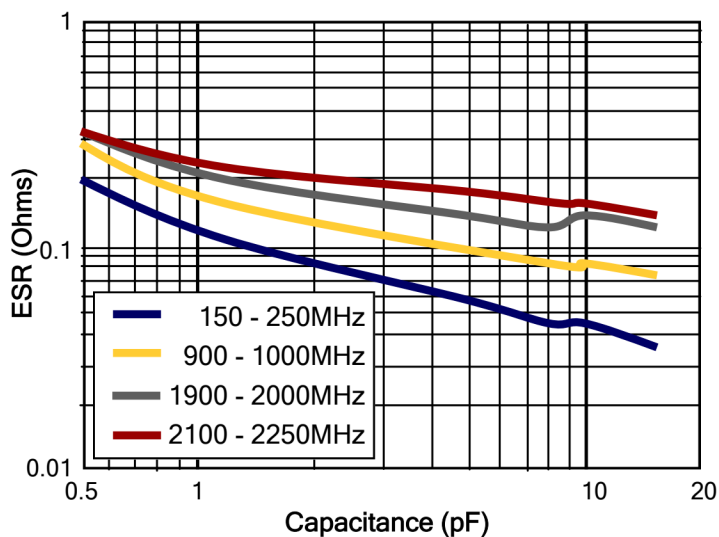


0603: Dissipation Factor (Q)

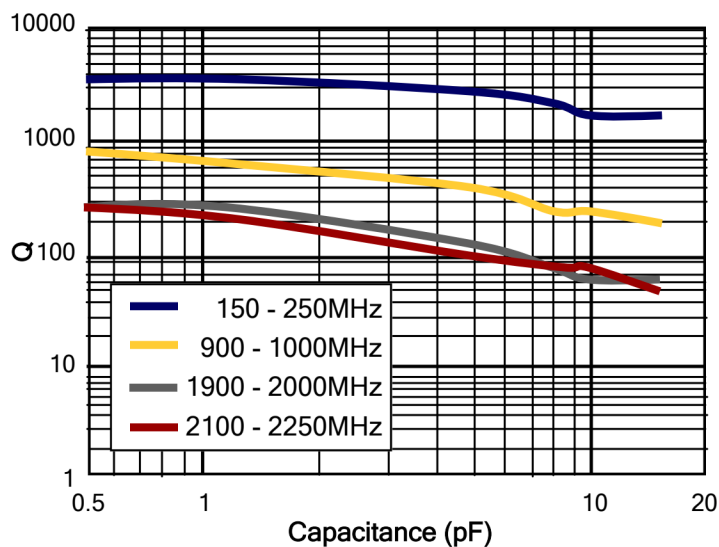


RF Characteristics versus Capacitance

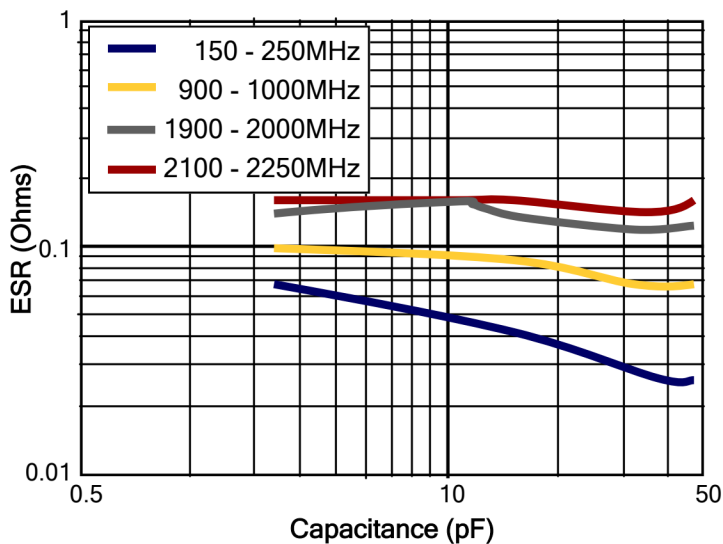
0402: Equivalent Series Resistance



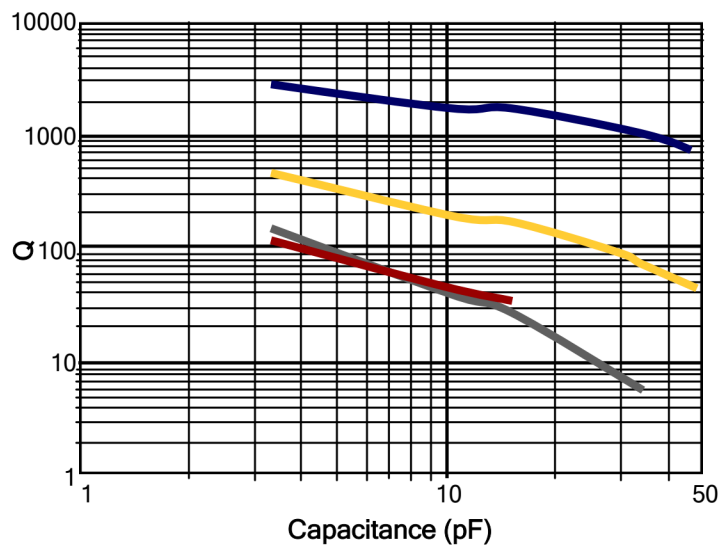
0402: Dissipation Factor (Q)



0603: Equivalent Series Resistance



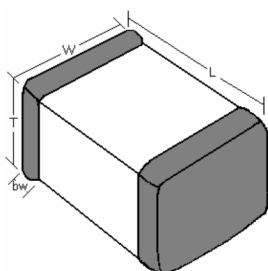
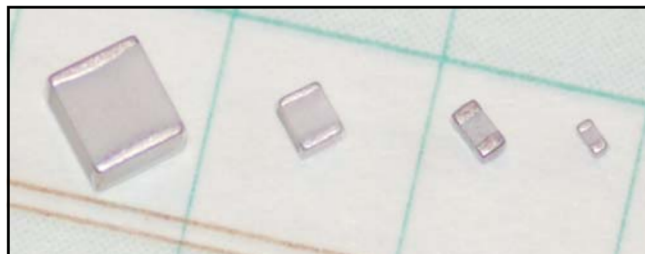
0603: Dissipation Factor (Q)



The Q-Max/Ultra Q-Max series of porcelain and ceramic dielectric capacitors are ideally suited for RF/Microwave frequency application from 10MHz to 4.2 GHz. The combination of high density, high purity dielectric material impervious to moisture, heavy pure palladium internal electrodes and strict statistical process controls allows Q-Max/Ultra Q-Max MLCs to meet or exceed applicable performance characteristics of MIL-PRF-55681/4.

These capacitors are suitable solutions for applications that require:

- Extremely High Quality Factors
- Very Low Equivalent Series Resistance
- Very High Series Resonance
- High Current Carrying Capabilities
- Greatest Stability Under Changing Factors



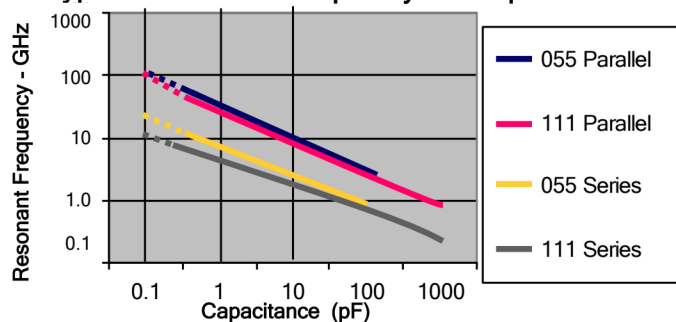
MECHANICAL DIMENSIONS in Inches (mm)				
Case Size	Length (L)	Width (W)	Thickness (T)	Bandwidth (bw)
0402	.040±.010 (1.02±.250)	.020±.005 (.510±.120)	.020±.006 (.510±.152)	.010±.005 (.250±.120)
0603	.063±.006 (1.60±.152)	.032±.006 (.813±.152)	Max: .035 Max: (.889)	.014±.006 (.357±.152)
055	.055±.015 (1.40±.381)	.055±.015 (1.40±.381)	.035±.010 (.889±.25)	.015±.005 (.381±.120)
111	.110±.020 (2.79±.508)	.110±.020 (2.79±.508)	.100±.020 (2.54±.508)	.015±.010 (.381±.254)

ORDERING INFORMATION

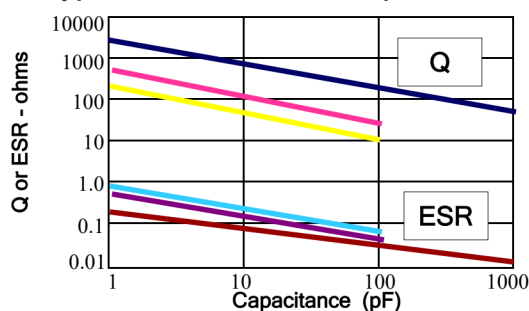
Case Size	Dielectric	Capacitance	Tolerance	Voltage	Termination	Packaging	Marking	Hi-Reli Testing
111	Q	201	J	201	S	T	M	- A
Example: 0402 0603 055 111	Q High Q (Porcelain Dielectric) U Hi-Q (Porcelain NPO Dielectric)	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200pF 2R2 = 2.2pF	A ±0.05pF B ±0.10pF C ±0.25pF F ±1% G ±2% J ±5% K ±10% M ±20%	First 2 digits are Significant; Third digit indicates number of Zeros Examples: 201 = 200V 151 = 150V 202 = 2000V	P Pd/Ag Plated (RoHS Compliant) S Solder Plated Over Nickel SN Tin over Nickel Plated (RoHS Compliant) G Gold over Nickel Plated (RoHS Compliant)	T Tape and Reel W Waffle Pack	(Optional) M = Marking	(Optional) A = Group A B = Group B C = Group C Tested and Screened

Performance

Typical Resonant Frequency vs. Capacitance



Typical Q and ESR vs. Capacitance



Electrical Specifications

for Case Sizes: 0402, 0603, 055, 111
and Dielectric Materials: "Q" and "U"

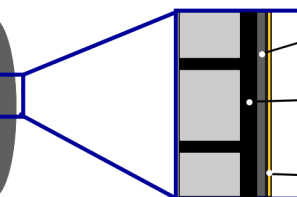
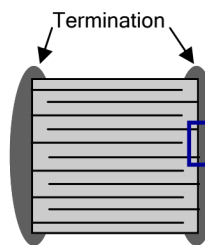
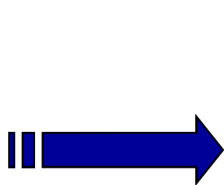
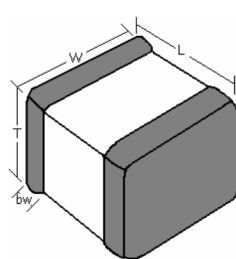
Environmental Characteristics

will meet/exceed performance characteristics
per MIL-PRF-55681/4

Temperature Coefficient	(Q)+90 $\pm$ 20PPM/ $^{\circ}$ C (U) 0 $\pm$ 30PPM/ $^{\circ}$ C
Capacitance Range	0.1pF to 1000pF
Capacitance Tolerance	$\pm$ 0.1pF to $\pm$ 20%
Operating Temperature	-55 $^{\circ}$ C + 125 $^{\circ}$ C
Quality Factor or Dissipation Factor	Per MIL-PRF-55681/4
Insulation Resistance	Per MIL-PRF-55681 10 ⁶ megohm to 470pF @ +25 $^{\circ}$ C 10 ⁵ megohm to 470pF @ +125 $^{\circ}$ C 10 ⁵ megohm over 470pF @ +25 $^{\circ}$ C 10 ⁴ megohm over 470pF @ +125 $^{\circ}$ C
Aging	None
Piezoelectric Effects	None
Dielectric Withstanding Voltage	2.5 x rated voltage (for 500V rated 1.5 x rated voltage)

Requirement	MIL-STD-202 METHOD
Life	108, Condition F
Shock	213, Condition J
Vibration	204, Condition B
Immersion	104, Condition B
Salt Spray	101, Condition B
Solderability	208
Thermal Shock	107, Condition B
Terminal Strength	211
Temperature Cycling	102, Condition C
Moisture Resistance	106
Barometric Pressure	105, Condition B
Resistance to Soldering Heat	210, Condition C

Mechanical Dimensions



- Electroplated Nickel Barrier
- Precious Metal Base
- Electroplated Tin/Solder or Gold

Quality Factor vs. Frequency (Typical)

Capacitance	@ 30 MHz	@ 150 MHz	@ 500 MHz	@ 1000 MHz
1 pF	30000	4000	800	350
10 pF	9000	2000	400	150
30 pF	5000	800	200	60
100 pF	2800	400	70	25
200 pF	1500	250	40	12

Capacitance Selection

**** Please contact the Factory for additional capacitances and voltages. ****

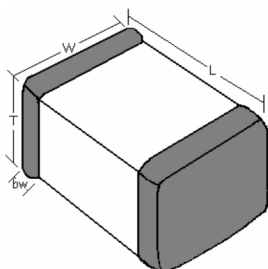
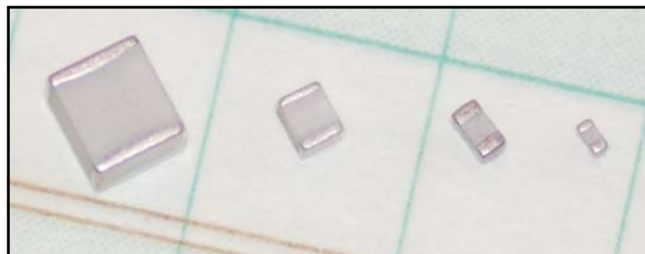
CAPACITANCE		0402 (Q, U)	0603 (Q, U)	055 (Q, U)	111 (Q, U)
CODE	VALUE				
0R1	0.1pF	↑	↑	↑	↑
0R2	0.2pF				
0R3	0.3pF				
0R4	0.4pF				
0R5	0.5pF				
0R6	0.6pF				
0R7	0.7pF				
0R8	0.8pF				
0R9	0.9pF				
1R0	1.0pF				
1R1	1.1pF	100 VDC	100 VDC	250 VDC	2500 VDC
1R2	1.2pF				
1R3	1.3pF				
1R4	1.4pF				
1R5	1.5pF				
1R6	1.6pF				
1R7	1.7pF				
1R8	1.8pF				
1R9	1.9pF				
2R0	2.0pF				
2R1	2.1pF				
2R2	2.2pF				
2R4	2.4pF				
2R7	2.7pF				
3R0	3.0pF				
3R3	3.3pF				
3R6	3.6pF				
3R9	3.9pF				
4R3	4.3pF	100 VDC	100 VDC	250 VDC	2500 VDC
4R7	4.7pF				
5R1	5.1pF				
5R6	5.6pF				
6R2	6.2pF				
6R8	6.8pF				
7R5	7.5pF				
8R2	8.2pF				
9R1	9.1pF				
100	10pF				
110	11pF				
120	12pF				
130	13pF				
150	15pF				
160	16pF				

CAPACITANCE		0402 (Q, U)	0603 (Q, U)	055 (Q, U)	111 (Q, U)
CODE	VALUE				
180	18pF	50 VDC	↑	↑	↑
200	20pF				
220	22pF				
240	24pF				
270	27pF				
300	30pF				
330	33pF				
360	36pF				
390	39pF				
430	43pF				
470	47pF	100 VDC	250 VDC	2000 VDC	
510	51pF				
560	56pF				
620	62pF				
680	68pF				
750	75pF				
820	82pF				
910	91pF				
101	100pF				
111	110pF				200 VDC
121	120pF				
131	130pF				
151	150pF				
161	160pF				
181	180pF				
201	200pF				
221	220pF				
241	240pF				
271	270pF				
301	300pF	200 VDC	2000 VDC	2000 VDC	
331	330pF				
361	360pF				
391	390pF				
431	430pF				
471	470pF				
511	510pF				
561	560pF				
621	620pF				
681	680pF				
751	750pF	100 VDC	2000 VDC	2000 VDC	
821	820pF				
911	910pF				
102	1000pF				

The Q-Max/Ultra Q-Max series of porcelain and ceramic dielectric capacitors are ideally suited for RF/Microwave frequency application from 10MHz to 4.2 GHz. The combination of high density, high purity dielectric material impervious to moisture, heavy pure palladium internal electrodes and strict statistical process controls allows Q-Max/Ultra Q-Max MLCs to meet or exceed applicable performance characteristics of MIL-PRF-55681/4.

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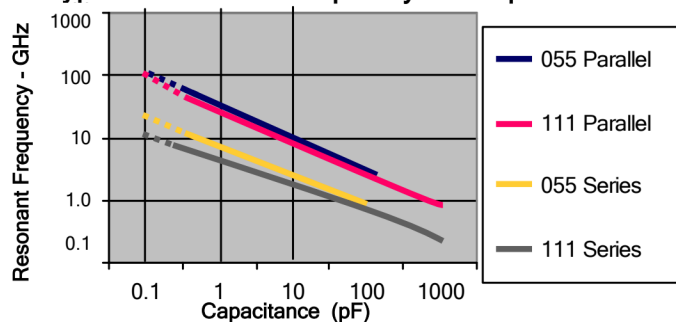
MECHANICAL DIMENSIONS in Inches (mm)				
Case Size	Length (L)	Width (W)	Thickness (T)	Bandwidth (bw)
0402	.040±.010 (1.02±.250)	.020±.005 (.510±.120)	.020±.006 (.510±.152)	.010±.005 (.250±.120)
0603	.063±.006 (1.60±.152)	.032±.006 (.813±.152)	Max: .035 Max: (.889)	.014±.006 (.357±.152)
055	.055±.015 (1.40±.381)	.055±.015 (1.40±.381)	.035±.010 (.889±.25)	.015±.005 (.381±.120)
111	.110±.020 (2.79±.508)	.110±.020 (2.79±.508)	.100±.020 (2.54±.508)	.015±.010 (.381±.254)

ORDERING INFORMATION

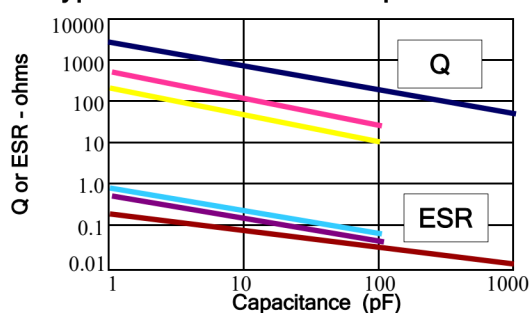
Case Size	Dielectric	Capacitance	Tolerance	Voltage	Termination	Packaging	Marking	Hi-Reli Testing
111	Q	201	J	201	S	T	M	- A
Example:	Q High Q (Porcelain Dielectric)	First 2 digits are Significant; Third digit indicates number of Zeros	A ±0.05pF B ±0.10pF C ±0.25pF F ±1% G ±2% J ±5% K ±10% M ±20%	First 2 digits are Significant; Third digit indicates number of Zeros	P Pd/Ag Plated (RoHS Compliant) S Solder Plated Over Nickel SN Tin over Nickel Plated (RoHS Compliant) G Gold over Nickel Plated (RoHS Compliant)	T Tape and Reel W Waffle Pack	(Optional) M = Marking	(Optional) A = Group A B = Group B C = Group C Tested and Screened
0402 0603 055 111	U Hi-Q (Porcelain NPO Dielectric)	Examples: 201 = 200pF 2R2 = 2.2pF		Examples: 201 = 200V 151 = 150V 202 = 2000V				

Performance

Typical Resonant Frequency vs. Capacitance



Typical Q and ESR vs. Capacitance



Electrical Specifications

for Case Sizes: 0402, 0603, 055, 111
and Dielectric Materials: "Q" and "U"

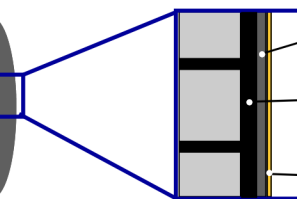
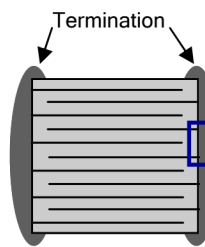
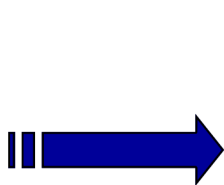
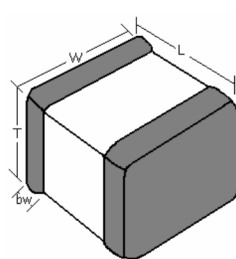
Environmental Characteristics

will meet/exceed performance characteristics
per MIL-PRF-55681/4

Temperature Coefficient	(Q)+90 $\pm$ 20PPM/ $^{\circ}$ C (U) 0 $\pm$ 30PPM/ $^{\circ}$ C
Capacitance Range	0.1pF to 1000pF
Capacitance Tolerance	$\pm$ 0.1pF to $\pm$ 20%
Operating Temperature	-55 $^{\circ}$ C + 125 $^{\circ}$ C
Quality Factor or Dissipation Factor	Per MIL-PRF-55681/4
Insulation Resistance	Per MIL-PRF-55681 10 ⁶ megohm to 470pF @ +25 $^{\circ}$ C 10 ⁵ megohm to 470pF @ +125 $^{\circ}$ C 10 ⁵ megohm over 470pF @ +25 $^{\circ}$ C 10 ⁴ megohm over 470pF @ +125 $^{\circ}$ C
Aging	None
Piezoelectric Effects	None
Dielectric Withstanding Voltage	2.5 x rated voltage (for 500V rated 1.5 x rated voltage)

Requirement	MIL-STD-202 METHOD
Life	108, Condition F
Shock	213, Condition J
Vibration	204, Condition B
Immersion	104, Condition B
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Temperature Cycling	102, Condition C
Moisture Resistance	106
Barometric Pressure	105, Condition B
Resistance to Soldering Heat	210, Condition C

Mechanical Dimensions



- Electroplated Nickel Barrier
- Precious Metal Base
- Electroplated Tin/Solder or Gold

Quality Factor vs. Frequency (Typical)

Capacitance	@ 30 MHz	@ 150 MHz	@ 500 MHz	@ 1000 MHz
1 pF	30000	4000	800	350
10 pF	9000	2000	400	150
30 pF	5000	800	200	60
100 pF	2800	400	70	25
200 pF	1500	250	40	12

Capacitance Selection

**** Please contact the Factory for additional capacitances and voltages. ****

CAPACITANCE		0402 (Q, U)	0603 (Q, U)	055 (Q, U)	111 (Q, U)
CODE	VALUE				
0R1	0.1pF	↑	↑	↑	↑
0R2	0.2pF				
0R3	0.3pF				
0R4	0.4pF				
0R5	0.5pF				
0R6	0.6pF				
0R7	0.7pF				
0R8	0.8pF				
0R9	0.9pF				
1R0	1.0pF				
1R1	1.1pF	100 VDC	100 VDC	250 VDC	2500 VDC
1R2	1.2pF				
1R3	1.3pF				
1R4	1.4pF				
1R5	1.5pF				
1R6	1.6pF				
1R7	1.7pF				
1R8	1.8pF				
1R9	1.9pF				
2R0	2.0pF				
2R1	2.1pF				
2R2	2.2pF				
2R4	2.4pF				
2R7	2.7pF				
3R0	3.0pF				
3R3	3.3pF				
3R6	3.6pF				
3R9	3.9pF				
4R3	4.3pF	100 VDC	100 VDC	250 VDC	2500 VDC
4R7	4.7pF				
5R1	5.1pF				
5R6	5.6pF				
6R2	6.2pF				
6R8	6.8pF				
7R5	7.5pF				
8R2	8.2pF				
9R1	9.1pF				
100	10pF				
110	11pF				
120	12pF				
130	13pF				
150	15pF				
160	16pF				

CAPACITANCE		0402 (Q, U)	0603 (Q, U)	055 (Q, U)	111 (Q, U)
CODE	VALUE				
180	18pF	50 VDC	↑	↑	↑
200	20pF				
220	22pF				
240	24pF				
270	27pF				
300	30pF				
330	33pF				
360	36pF				
390	39pF				
430	43pF				
470	47pF	100 VDC	250 VDC	2000 VDC	
510	51pF				
560	56pF				
620	62pF				
680	68pF				
750	75pF				
820	82pF				
910	91pF				
101	100pF				
111	110pF				200 VDC
121	120pF				
131	130pF				
151	150pF				
161	160pF				
181	180pF				
201	200pF				
221	220pF				
241	240pF				
271	270pF				
301	300pF	200 VDC	2000 VDC	2000 VDC	
331	330pF				
361	360pF				
391	390pF				
431	430pF				
471	470pF				
511	510pF				
561	560pF				
621	620pF				
681	680pF				
751	750pF	200 VDC	2000 VDC	2000 VDC	
821	820pF				
911	910pF				
102	1000pF				