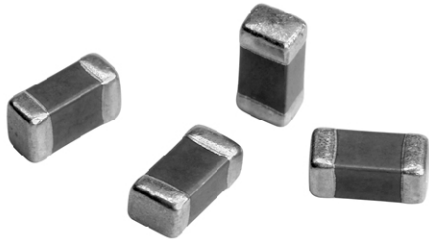


## Surface Mount Multilayer Ceramic Chip Capacitors for Ultra High Q Commodity Applications



### FEATURES

- Ultra stable class 1 dielectric
- Ultra High Q and low ESR at high frequency
- Four standard sizes
- High SRF characteristic
- Ultra low capacitance to 0.1 pF
- High precision capacitance tolerance  $\pm 0.05$  pF
- Supplied in tape on reel
- Ni-barrier with 100 % tin terminations
- Dry sheet manufacturing technology
- Base Metal Electrode system (BME)
- Compliant to RoHS Directive 2011/65/EU
- Halogen-free according to IEC 61249-2-21 definition



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

- Mobile telecommunication
- WLAN
- RF modules
- Tuner

### ELECTRICAL SPECIFICATIONS

#### Note

- Electrical characteristics at 25 °C, 30 % to 70 % related humidity, unless otherwise specified

**Operating Temperature:** - 55 °C to + 125 °C

**Capacitance Range:** 0.1 pF to 100 pF

**Voltage Range:** 10  $V_{DC}$  to 250  $V_{DC}$

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

0 ppm/°C  $\pm$  30 ppm/°C from - 55 °C to + 125 °C  
0201:  $\geq 22$  pF: 0 ppm/°C  $\pm$  60 ppm/°C from - 55 °C to + 125 °C

#### Dissipation Factor:

Cap < 30 pF:  $Q \geq 400 + 20 C$   
Cap  $\geq 30$  pF:  $Q \geq 1000$

#### Test Conditions for Capacitance and DF Measurement:

Cap.  $\leq 1000$  pF 1.0  $V_{RMS} \pm 0.2 V_{RMS}$ , 1 MHz  $\pm 10$  %  
Cap. > 1000 pF 1.0  $V_{RMS} \pm 0.2 V_{RMS}$ , 1 kHz  $\pm 10$  %

**Aging Rate:** 0 % maximum per decade

**Insulation Resistance (IR):** after 120 s at  $U_R$  (DC)  
 $\geq 10 G\Omega$  or  $R \times C \geq 500 \Omega \times F$  whichever is less

#### Dielectric Strength Test:

This is the maximum voltage the capacitors are tested for 1 s to 5 s period and the charge/discharge current does not exceed 50 mA  
 $\leq 100 V_{DC}$ : DWV at 250 % of rated voltage  
 $250 V_{DC}$ : DWV at 200 % of rated voltage

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
Ultra High Q	0201	25	0.1 pF	33 pF
	0402	50	0.1 pF	22 pF
	0603	250	0.3 pF	47 pF
	0805	250	0.3 pF	100 pF

**Note**

- Detail ratings see selection chart

ORDERING INFORMATION							
VJ0402	L	100	F	X	A	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE <sup>(1)</sup>	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0201 0402 0603 0805	L = Ultra High Q	Expressed in pF two significant digits followed by the number of zeros: 0R3 = 0.3 pF 1R0 = 1.0 pF 150 = 15 pF	Cap. value ≤ 5 pF V = ± 0.05 pF B = ± 0.10 pF C = ± 0.25 pF D = ± 0.50 pF 5 pF > Cap. value < 10 pF B = ± 0.10 pF C = ± 0.25 pF D = ± 0.50 pF Cap. value ≥ 10 pF F = ± 1 % G = ± 2 % J = ± 5 %	X = Ni barrier 100 % tin termination	Q = 10 V X = 25 V A = 50 V B = 100 V P = 250 V	C = 7" reel/ paper tape P = 13" reel/ paper tape	

**Note**

- <sup>(1)</sup> Details see selection chart

DIMENSIONS in inches [millimeters]					
	SIZE CODE	L	W	T MAX.	MB
	0201 (0603)	0.024 ± 0.0012 (0.60 ± 0.03)	0.012 ± 0.0012 (0.30 ± 0.03)	0.013 (0.33)	0.006 ± 0.002 (0.15 ± 0.05)
	0402 (1005)	0.040 ± 0.002 (1.00 ± 0.05)	0.020 ± 0.002 (0.50 ± 0.05)	0.022 (0.55)	0.010 + 0.002/- 0.004 (0.25 + 0.05/- 0.10)
	0603 (1608)	0.063 ± 0.004 (1.60 ± 0.10)	0.030 ± 0.004 (0.80 ± 0.10)	0.035 (0.87)	0.015 ± 0.006 (0.40 ± 0.15)
	0805 (2012)	0.080 ± 0.008 (2.00 ± 0.20)	0.050 ± 0.008 (1.25 ± 0.20)	0.038 (0.95)	0.020 ± 0.008 (0.50 ± 0.20)



SELECTION CHART												
DIELECTRIC		ULTRA HIGH Q										TOLERANCE
STYLE		VJ0201		VJ0402		VJ0603			VJ0805			
SIZE CODE		0201		0402		0603			0805			
VOLTAGE V <sub>DC</sub>		10 V	25 V	50 V	100 V	50 V	100 V	250 V	50 V	100 V	250 V	
VOLTAGE CODE		Q	X	A	B	A	B	P	A	B	P	
CAP. CODE	CAP.											
0R1	0.1 pF	L	L	N	N							B
0R2	0.2 pF	L	L	N	N							V, B
0R3	0.3 pF	L	L	N	N	S	S	S	T	T	T	V, B
0R4	0.4 pF	L	L	N	N	S	S	S	T	T	T	V, B
0R5	0.5 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
0R6	0.6 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
0R7	0.7 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
0R8	0.8 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
0R9	0.9 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
1R0	1.0 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
1R2	1.2 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
1R5	1.5 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
1R8	1.8 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
2R2	2.2 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
2R4	2.4 pF							S				V, B, C
2R7	2.7 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
3R3	3.3 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
3R9	3.9 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
4R7	4.7 pF	L	L	N	N	S	S	S	T	T	T	V, B, C
5R6	5.6 pF	L	L	N	N	S	S	S	T	T	T	B, C, D
6R8	6.8 pF	L	L	N	N	S	S	S	T	T	T	B, C, D
8R2	8.2pF	L	L	N	N	S	S	S	T	T	T	B, C, D
100	10 pF	L	L	N	N	S	S	S	T	T	T	F, G, J
110	11 pF	L	L	N		S	S	S	T	T	T	F, G, J
120	12 pF	L	L	N		S	S	S	T	T	T	F, G, J
130	13 pF	L	L	N		S	S	S	T	T	T	F, G, J
150	15 pF	L	L	N		S	S	S	T	T	T	F, G, J
160	16 pF	L	L	N		S	S	S	T	T	T	F, G, J
180	18 pF	L	L	N		S	S	S	T	T	T	F, G, J
200	20 pF	L		N		S	S	S	T	T	T	F, G, J
220	22 pF	L		N		S	S	S	T	T	T	F, G, J
240	24 pF	L				S	S	S	T	T	T	F, G, J
270	27 pF	L				S	S	S	T	T	T	F, G, J
300	30 pF	L				S	S	S	T	T	T	F, G, J
330	33 pF	L				S	S	S	T	T	T	F, G, J
360	36 pF					S	S	S	T	T	T	F, G, J
390	39 pF					S	S	S	T	T	T	F, G, J
430	43 pF					S	S	S	T	T	T	F, G, J
470	47 pF					S	S	S	T	T	T	F, G, J
560	56 pF								T	T	T	F, G, J
680	68 pF								T	T	T	F, G, J
820	82 pF								T	T	T	F, G, J
101	100 pF								T	T	T	F, G, J

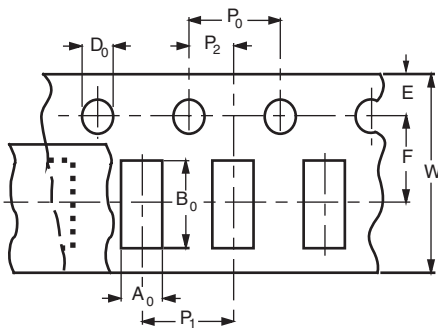
**Note**

- Letters indicate product thickness, see packaging quantities



PACKAGING QUANTITIES				
SIZE CODE (inch/mm)	THICKNESS (mm)	THICKNESS SYMBOL	PAPER TAPE	
			7" REEL (C)	13" REEL (P)
0201 (0603)	0.30 ± 0.03	L	15K	-
0402 (1002)	0.50 ± 0.05	N	10K	50K
0603 (1608)	0.80 ± 0.07	S	4K	15K
0805 (2012)	0.85 ± 0.10	T	4K	15K

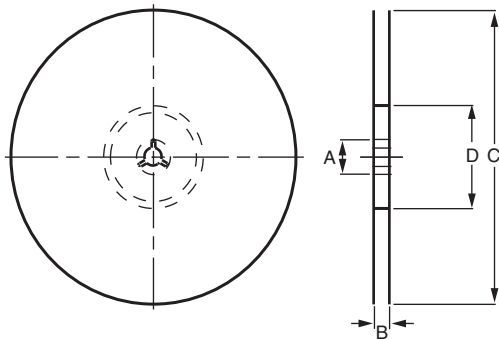
**PAPER TAPE SPECIFICATION**



**DIMENSIONS OF PAPER TAPE**  
in millimeters

SYM.	PRODUCT SIZE CODE			
	0201	0402	0603	0805
$A_0$	0.37 ± 0.03	0.62 ± 0.05	1.02 ± 0.05	1.50 ± 0.10
$B_0$	0.67 ± 0.03	1.12 ± 0.05	1.82 ± 0.05	2.30 ± 0.10
$W$	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
$E$	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.05	1.75 ± 0.05
$F$	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
$D_0$	1.55 ± 0.05	1.55 ± 0.05	1.55 ± 0.05	1.55 ± 0.05
$P_0$	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
$P_1$	2.00 ± 0.05	2.00 ± 0.05	4.00 ± 0.10	4.00 ± 0.10
$P_2$	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05	2.00 ± 0.05

**REEL SPECIFICATIONS**



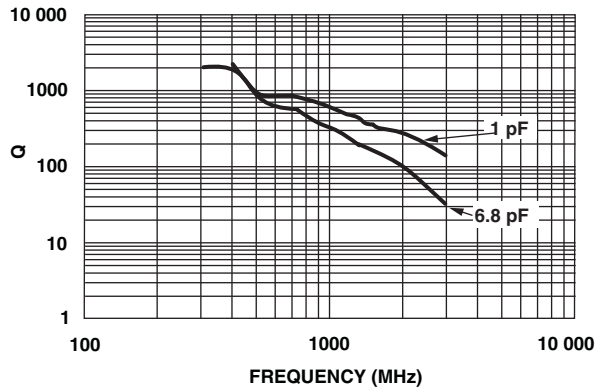
**REEL DIMENSIONS AND TAPE WIDTH**  
in millimeters

SYM.	Ø 180 mm; 7"	Ø 330 mm; 13"
A	13.0 ± 0.5	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.0 ± 1.0	100.0 ± 1.0

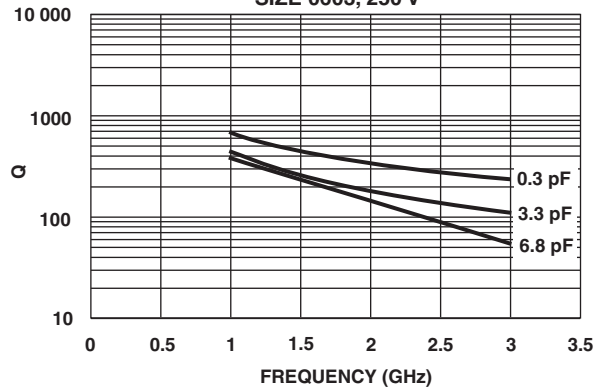


## ELECTRICAL CHARACTERISTICS

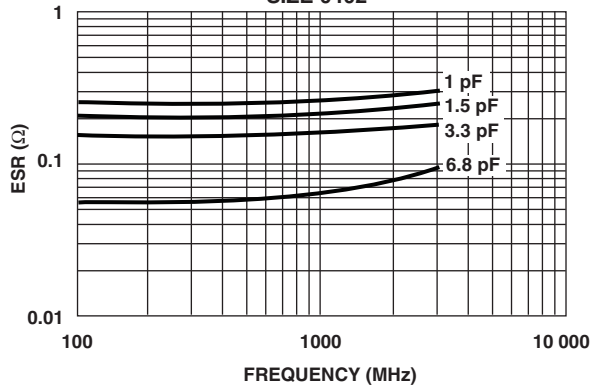
TYPICAL Q VALUE VS.FREQUENCY  
SIZE 0402



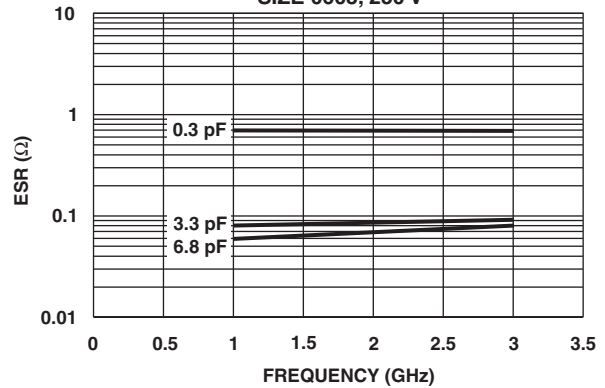
TYPICAL Q VALUE VS. FREQUENCY  
SIZE 0603, 250 V



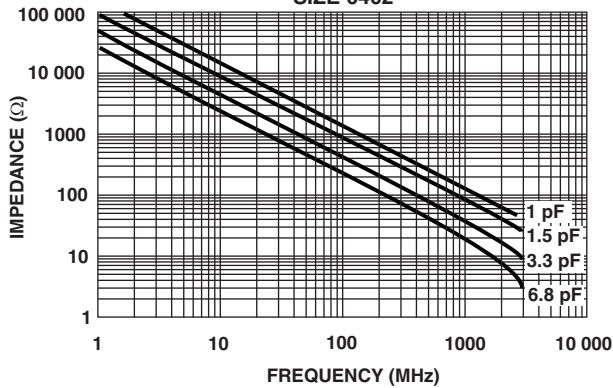
TYPICAL ESR VS. FREQUENCY  
SIZE 0402



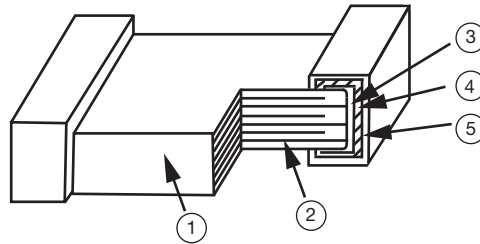
TYPICAL ESR VS. FREQUENCY  
SIZE 0603, 250 V



TYPICAL IMPEDANCE VS. FREQUENCY  
SIZE 0402



CONSTRUCTION		
NO.	NAME	ULTRA HIGH Q
1	Ceramic material	BaTiO <sub>3</sub> based
2	Inner electrode	Cu
3	Termination	Inner layer
4		Middle layer
5		Outer layer
		Sn (matt)



## STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

### Cautions:

- a. Do not store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.
- b. To store products on the shelf and avoid exposure to moisture.
- c. Do not expose products to excessive shock, vibration, direct sunlight and so on.



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