



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



### FEATURES

- Ultra stable class 1 dielectric
- High Q and low ESR at high frequency
- Four standard sizes
- High capacitance per unit volume
- Supplied in tape on reel
- For high frequency applications
- Ni-barrier with 100 % tin terminations
- Dry sheet manufacturing technology
- Noble Metal Electrode system (NME)
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### 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:** 0.5 pF to 3300 pF

**Voltage Range:** 16 V<sub>DC</sub> to 100 V<sub>DC</sub>

**Temperature Coefficient of Capacitance (TCC):**  
± 30 ppm/°C from - 55 °C to + 125 °C

**Dissipation Factor:**  
Cap. < 30 pF: Q ≥ 400 + 20 C  
Cap. ≥ 30 pF: Q ≥ 1000

#### Test Conditions for Capacitance and DF Measurement

Cap. ≤ 1000 pF 1.0 V<sub>RMS</sub> ± 0.2 V<sub>RMS</sub>, 1 MHz ± 10 %  
Cap. > 1000 pF 1.0 V<sub>RMS</sub> ± 0.2 V<sub>RMS</sub>, 1 kHz ± 10 %

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

**Insulation Resistance (IR):** after 120 s at U<sub>R</sub> (DC)  
≥ 10 GΩ or R x C ≥ 500 Ω x 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  
≤ 100 V<sub>DC</sub>: DWV at 250 % of rated voltage

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
High Q	0402	50	0.5 pF	470 pF
	0603	100	0.5 pF	3.3 nF

**Note**

- Detail ratings see selection chart

ORDERING INFORMATION							
VJ0402	Q	101	F	X	J	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0402 0603	Q = High Q	Two significant digits followed by the number of zeros: 1R0 = 1.0 pF 101 = 100 pF	Cap. value ≤ 5 pF B = ± 0.10 pF C = ± 0.25 pF 5 pF > Cap. value < 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	J = 16 V X = 25 V A = 50 V B = 100 V	C = 7" reel/ paper P = 13" reel/ paper	

DIMENSIONS in inches (millimeters)					
	SIZE CODE	L	W	T MAX.	MB
	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 + 0.006/- 0.004 (1.60 + 0.15/- 0.10)	0.030 + 0.006/- 0.004 (0.80 + 0.15/- 0.10)	0.038 (0.95)	0.016 ± 0.006 (0.40 ± 0.15)



SELECTION CHART									
DIELECTRIC		HIGH Q							
STYLE		VJ0402				VJ0603			
SIZE CODE		0402				0603			
VOLTAGE (V <sub>DC</sub> )		16 V	25 V	50 V	100 V	16 V	25 V	50 V	100 V
VOLTAGE CODE		J	X	A	B	J	X	A	B
CAP. CODE	CAP.								
0R5	0.5 pF		N	N			S	S	S
1R0	1.0 pF		N	N			S	S	S
1R2	1.2 pF		N	N			S	S	S
1R5	1.5 pF		N	N			S	S	S
1R8	1.8 pF		N	N			S	S	S
2R2	2.2 pF		N	N			S	S	S
2R7	2.7 pF		N	N			S	S	S
3R3	3.3 pF		N	N			S	S	S
3R9	3.9 pF		N	N			S	S	S
4R7	4.7 pF		N	N			S	S	S
5R6	5.6 pF		N	N			S	S	S
6R8	6.8 pF		N	N			S	S	S
8R2	8.2 pF		N	N			S	S	S
100	10 pF		N	N			S	S	S
120	12 pF		N	N			S	S	S
150	15 pF		N	N			S	S	S
180	18 pF		N	N			S	S	S
220	22 pF		N	N			S	S	S
270	27 pF		N	N			S	S	S
330	33 pF		N	N			S	S	S
390	39 pF		N	N			S	S	S
470	47 pF		N	N			S	S	S
560	56 pF		N	N			S	S	S
680	68 pF		N	N			S	S	S
820	82 pF		N	N			S	S	S
101	100 pF		N	N			S	S	S
121	120 pF		N	N			S	S	S
151	150 pF		N	N			S	S	S
181	180 pF		N	N			S	S	S
221	220 pF		N	N			S	S	S
271	270 pF	N	N	N			S	S	S
331	330 pF	N	N	N			S	S	S
391	390 pF	N	N	N			S	S	S
471	470 pF	N	N	N			S	S	S
561	560 pF						S	S	S
681	680 pF						S	S	S
821	820 pF						S	S	S
102	1000 pF						S	S	S
122	1200 pF					X	X	X	
152	1500 pF					X	X	X	
182	1800 pF					X	X	X	
222	2200 pF					X	X	X	
272	2700 pF					X	X	X	
332	3300 pF					X	X	X	
472	4700 pF								
562	5600 pF								
682	6800 pF								
822	8200 pF								
103	10 000 pF								

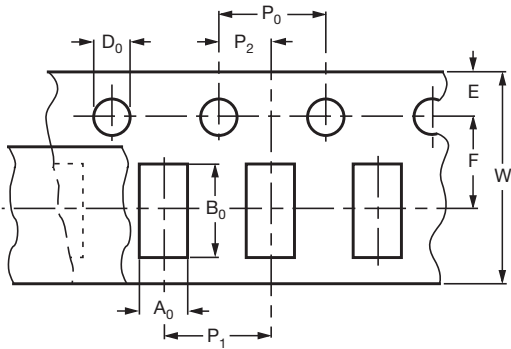
**Note**

- Letters indicate product thickness, see packaging quantities



PACKAGING QUANTITIES				
SIZE CODE (inch/mm)	MAX. THICKNESS (mm)	THICKNESS SYMBOL	PAPER TAPE	
			7" REEL (C)	13" REEL (P)
0402 (1002)	0.55	N	10K	20K
0603 (1608)	0.95	S, X	4K	15K

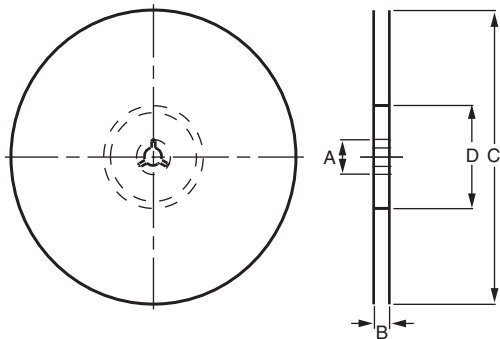
**PAPER TAPE SPECIFICATION**



**DIMENSIONS OF PAPER TAPE**  
in millimeters

SYM.	PRODUCT SIZE CODE	
	0402	0603
A <sub>0</sub>	0.62 ± 0.05	1.02 ± 0.05
B <sub>0</sub>	1.12 ± 0.05	1.80 ± 0.05
W	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.05	1.75 ± 0.05
F	3.50 ± 0.05	3.50 ± 0.05
D <sub>0</sub>	1.55 ± 0.05	1.55 ± 0.05
P <sub>0</sub>	4.00 ± 0.10	4.00 ± 0.10
P <sub>1</sub>	2.00 ± 0.05	4.00 ± 0.10
P <sub>2</sub>	2.00 ± 0.05	2.00 ± 0.05

**REEL SPECIFICATIONS**



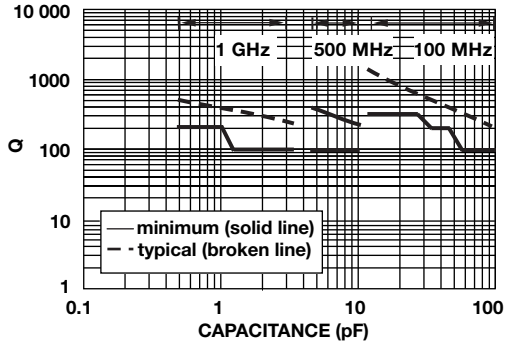
**REEL DIMENSIONS AND TAPE WIDTH**  
in millimeters

	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

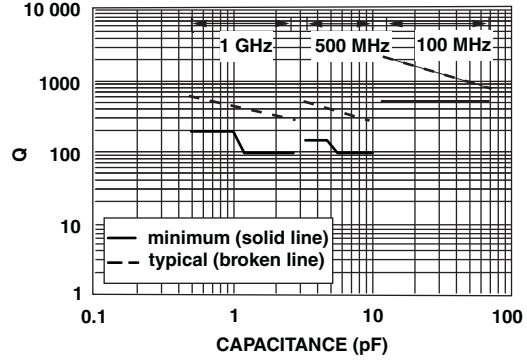


## TYPICAL ELECTRICAL CHARACTERISTICS

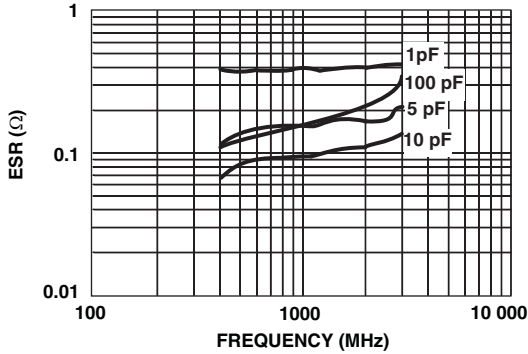
### Q VALUE CRITERIA VS. SPECIFIC FREQUENCY SIZE 0402



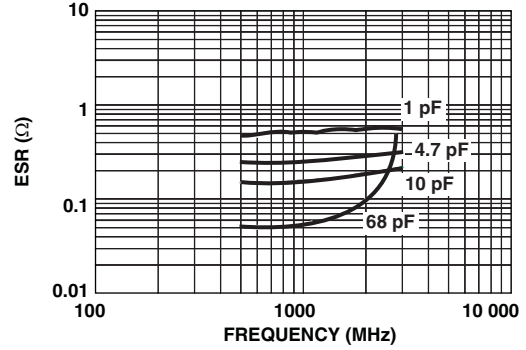
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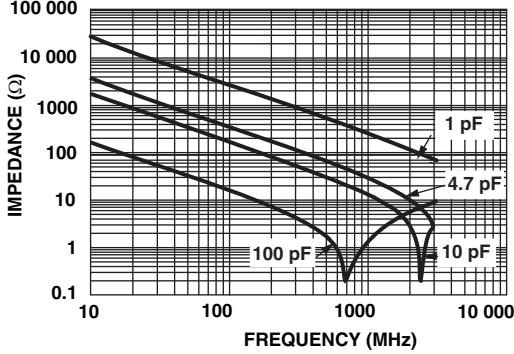
### TYPICAL ESR VS. FREQUENCY SIZE 0402



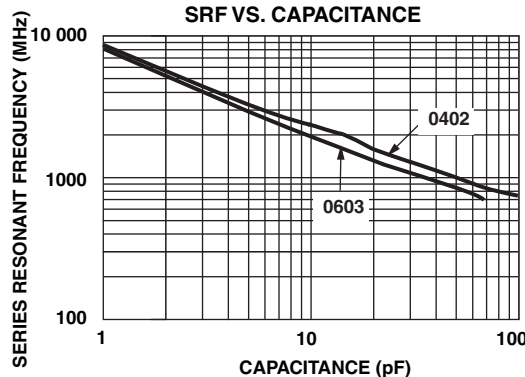
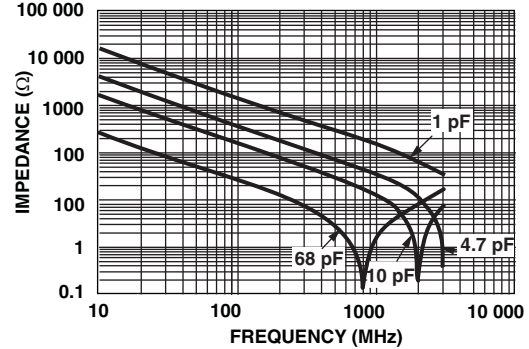
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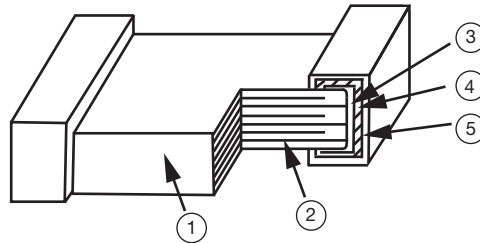
### TYPICAL IMPEDANCE VS. FREQUENCY SIZE 0402



### TYPICAL IMPEDANCE VS. FREQUENCY SIZE 0603



CONSTRUCTION		
NO.	NAME	HIGH Q
1	Ceramic material	BaTiO <sub>3</sub> based
2	Inner electrode	AgPd alloy
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 % relative 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 oxidation 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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