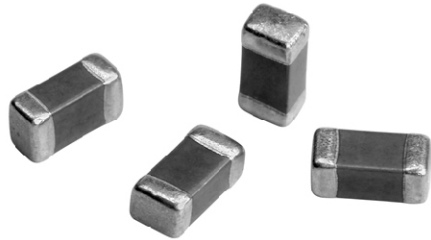




## Surface Mount Multilayer Ceramic Chip Capacitors for Ultra High Q Commodity Applications



### 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)
- 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:** 0.1 pF to 100 pF

**Voltage Range:** 10 V<sub>DC</sub> to 250 V<sub>DC</sub>

#### 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<sub>RMS</sub>  $\pm$  0.2 V<sub>RMS</sub>, 1 MHz  $\pm$  10 %  
 Cap. > 1000 pF 1.0 V<sub>RMS</sub>  $\pm$  0.2 V<sub>RMS</sub>, 1 kHz  $\pm$  10 %

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

**Insulation Resistance (IR):** after 120 s at U<sub>R</sub> (DC)  
 $\geq 10$  G $\Omega$  or R x C  $\geq 500$   $\Omega$  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  
 $\leq 100$  V<sub>DC</sub>: DWV at 250 % of rated voltage  
 $250$  V<sub>DC</sub>: DWV at 200 % of rated voltage

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
Ultra High Q	0201	50	0.1 pF	33 pF
	0402	100	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											
STYLE		VJ0201			VJ0402		VJ0603			VJ0805			TOLERANCE
SIZE CODE		0201			0402		0603			0805			
VOLTAGE V <sub>DC</sub>		10 V	25 V	50 V	50 V	100 V	50 V	100 V	250 V	50 V	100 V	250 V	
VOLTAGE CODE		Q	X	A	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	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	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	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	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	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	L	N	N	S	S	S	T	T	T	B, C, D
8R2	8.2 pF	L	L		N	N	S	S	S	T	T	T	B, C, D
100	10 pF	L	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	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	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	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

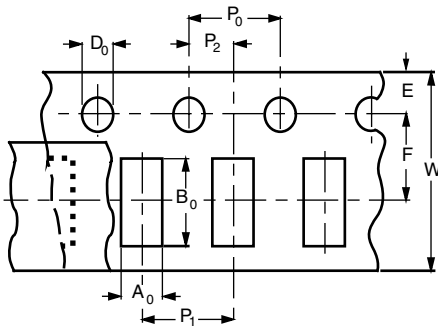
**Note**

- 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

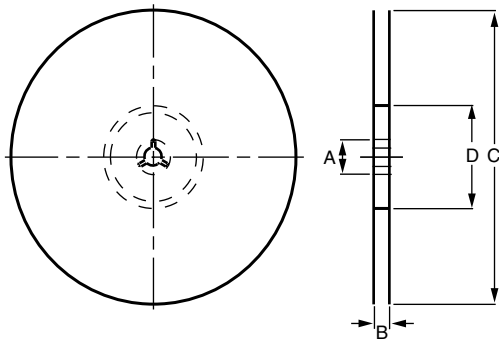
**PAPER TAPE SPECIFICATION**



**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**



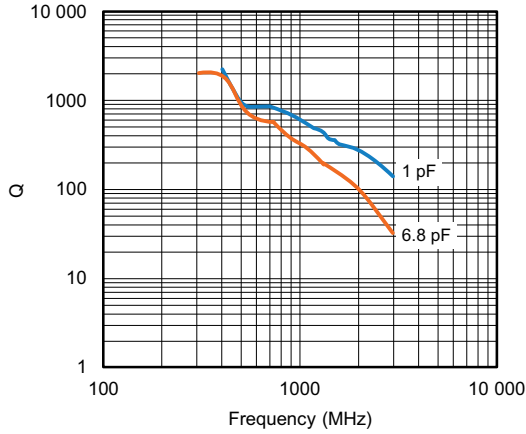
**REEL DIMENSIONS AND TAPE WIDTH**  
in millimeters

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

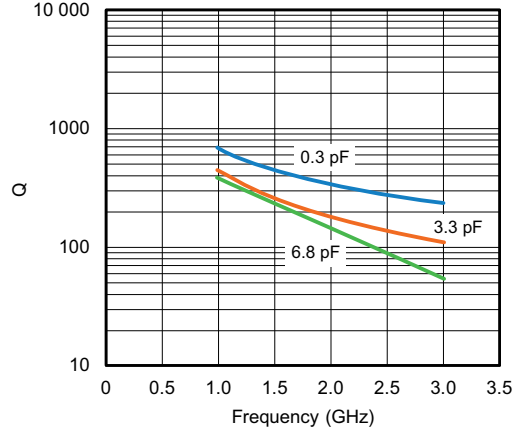


## ELECTRICAL CHARACTERISTICS

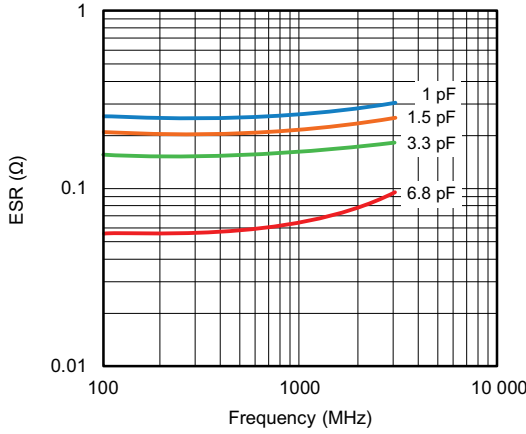
Typical Q Value vs. Frequency (Size 0402)



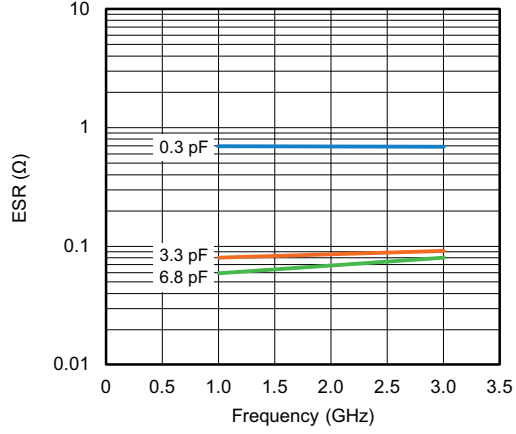
Typical Q Value vs. Frequency (Size 0603, 250 V)



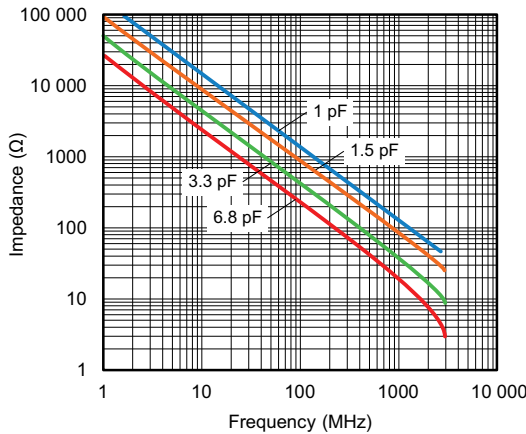
Typical ESR vs. Frequency (Size 0402)



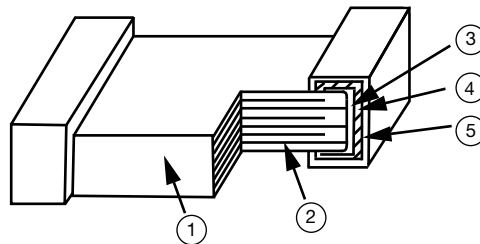
Typical ESR vs. Frequency (Size 0603, 250 V)



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.



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.