

## Surface Mount Multilayer Ceramic Chip Capacitors for Commodity Applications



### FEATURES

- Class 3 dielectric
- 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 technology process
- Base Metal Electrode system (BME)
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



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

### APPLICATIONS

- Consumer electronics
- Telecommunications
- Data processing
- Mobile applications

### ELECTRICAL SPECIFICATION

#### Note

- Electrical characteristics at 20 °C, 30 % to 70 % related humidity, unless otherwise specified

**Operating Temperature:** - 25 °C to + 85 °C

**Capacitance Range:** 10 nF to 100 µF

**Voltage Range:** 6.3 V<sub>DC</sub> to 100 V<sub>DC</sub>

**Temperature Coefficient of Capacitance (TCC):**  
+ 30 %/- 80 % without voltage applied

#### Dissipation Factor (DF):

**6.3 V:** ≤ 20 %

**10 V:** ≤ 12.5 %

≤ 20 % for 0402 ≥ 0.47 µF

**16 V:** for Cap. < 1 µF ≤ 7.0 %

≤ 9 % for 0402 ≥ 0.068 µF; 0603 ≥ 0.68 µF

≤ 12.5 % for 0402 ≥ 0.22 µF

**16 V:** for Cap. ≥ 1 µF ≤ 9 %

≤ 12.5 % for 0805 ≥ 3.3 µF; 1206 ≥ 10 µF; 1210 ≥ 22 µF

**25 V:** ≤ 5 %

≤ 7 % for 0402 ≥ 0.047 pF; 0603 ≥ 0.1 µF; 0805 ≥ 0.33 µF;

1206 ≥ 1 µF; 1210 ≥ 4.7 µF

≤ 9 % for 0402 ≥ 0.068 µF; 0603 ≥ 0.47 µF; 1206 ≥ 4.7 µF

≥ **50 V:** ≤ 5.0 %

≤ 7 % for 0603 ≥ 0.1 µF; 0805 ≥ 0.47 µF

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

For C ≤ 10 µF apply 1.0 V<sub>RMS</sub> ± 0.2 V<sub>RMS</sub>, 1.0 kHz ± 10 %

For C > 10 µF apply 0.5 V<sub>RMS</sub> ± 0.2 V<sub>RMS</sub>, 120 Hz ± 20 %

#### Aging Rate:

6.3 V: 12.5 % maximum per decade

10 V/16 V: 9 % maximum per decade

≥ 25 V: 7 % maximum per decade

#### Insulation Resistance (IR):

≥ 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>: 250 % of rated voltage

# VJ....W1BC Y5V Dielectric



Vishay

Surface Mount Multilayer Ceramic Chip Capacitors  
for Commodity Applications

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
Y5V	0402	50	10 nF	1.0 $\mu$ F
	0603	50	10 nF	2.2 $\mu$ F
	0805	100	10 nF	10 $\mu$ F
	1206	100	10 nF	22 $\mu$ F
	1210	100	10 nF	100 $\mu$ F

**Note**

- Detail ratings see selection chart

ORDERING INFORMATION							
VJ0402	V	101	J	X	Q	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0402 0603 0805 1206 1210	V = Y5V	Two significant digits followed by the number of zeros: 101 = 100 pF 102 = 1000 pF 152 = 1500 pF 103 = 10 000 pF	M = $\pm 20$ % Z = -20 %/ + 80 %	X = Ni Barrier	Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V	C = 7" reel/paper P = 13" reel/paper T = 7" reel/blister R = 13" reel/blister	

DIMENSIONS in inches (millimeters)					
	SIZE CODE	L	W	T MAX.	MB
	0402 (1005)	0.040 $\pm$ 0.002 (1.00 $\pm$ 0.05)	0.020 $\pm$ 0.002 (0.50 $\pm$ 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 $\pm$ 0.006 (0.40 $\pm$ 0.15)
	0805 (2012)	0.080 $\pm$ 0.008 (2.00 $\pm$ 0.20)	0.050 $\pm$ 0.008 (1.25 $\pm$ 0.20)	0.057 (1.45)	0.020 $\pm$ 0.008 (0.50 $\pm$ 0.20)
	1206 (3216)	0.126 + 0.012/- 0.008 (3.20 + 0.30/- 0.20)	0.063 + 0.012/- 0.008 (1.60 + 0.30/- 0.20)	0.075 (1.90)	0.024 $\pm$ 0.008 (0.60 $\pm$ 0.20)
	1210 (3225)	0.126 $\pm$ 0.016 (3.20 $\pm$ 0.40)	0.098 $\pm$ 0.012 (2.50 $\pm$ 0.30)	0.110 (2.80)	0.060 $\pm$ 0.010 (0.75 $\pm$ 0.25)



# VJ...W1BC Y5V Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors  
for Commodity Applications

Vishay

SELECTION CHART																	
DIELECTRIC		Y5V															
STYLE		VJ0402					VJ0603					VJ0805					
EIA CODE		0402					0603					0805					
VOLTAGE (V <sub>DC</sub> )		6.3 V	10 V	16 V	25 V	50 V	100 V	10 V	16 V	25 V	50 V	100 V	10 V	16 V	25 V	50 V	100 V
VOLTAGE CODE		Y	Q	J	X	A	B	Q	J	X	A	B	Q	J	X	A	B
CAP. CODE	CAP.																
102	1.0 nF																
122	1.2 nF																
152	1.5 nF																
182	1.8 nF																
222	2.2 nF																
272	2.7 nF																
332	3.3 nF																
392	3.9 nF																
472	4.7 nF																
562	5.6 nF																
682	6.8 nF																
822	8.2 nF																
103	10 nF		N	N	N	N		S	S	S	S		A	A	A	A	B
123	12 nF		N	N	N	N		S	S	S	S		A	A	A	A	
153	15 nF		N	N	N	N		S	S	S	S		A	A	A	A	B
183	18 nF		N	N	N	N		S	S	S	S		A	A	A	A	
223	22 nF		N	N	N	N		S	S	S	S		A	A	A	A	B
273	27 nF		N	N	N	N		S	S	S	S		A	A	A	A	
333	33 nF		N	N	N	N		S	S	S	S		A	A	A	A	B
393	39 nF		N	N	N			S	S	S	S		A	A	A	A	
473	47 nF		N	N	N			S	S	S	S		A	A	A	A	B
563	56 nF		N	N	N <sup>(1)</sup>			S	S	S	S		A	A	A	A	
683	68 nF		N	N	N			S	S	S	S		A	A	A	A	B
823	82 nF		N	N				S	S	S	S		A	A	A	A	
104	100 nF		N	N	N			S	S	S	S		A	A	A	A	B
154	150 nF		N					S	S	S	S		A	A	A	A	
224	220 nF	N	N					S	S	S	S		A	A	A	A	
334	330 nF	N	N					S	S	S			B	B	B	B	
474	470 nF	N	N					S	S	X			B	B	B	B	
684	680 nF	N						S	X				B	B	D	D	
105	1.0 μF	N						S	X	X			B	B	D	D	
155	1.5 μF							S					D	D			
225	2.2 μF							S					D	D	I		
335	3.3 μF												D	D			
475	4.7 μF												D	D	I		
685	6.8 μF												I				
106	10 μF												I				
226	22 μF																
336	33 μF																
476	47 μF																
686	68 μF																
107	100 μF																

**Notes**

- Letters indicate product thickness, please see packaging quantities
- <sup>(1)</sup> Not in 20 % (code "M") tolerance

# VJ....W1BC Y5V Dielectric



Vishay

Surface Mount Multilayer Ceramic Chip Capacitors  
for Commodity Applications

SELECTION CHART												
DIELECTRIC		Y5V										
STYLE		VJ1206					VJ1210					
EIA CODE		1206					1210					
VOLTAGE (V <sub>DC</sub> )		10 V	16 V	25 V	50 V	100 V	6.3 V	10 V	16 V	25 V	50 V	100 V
VOLTAGE CODE		Q	J	X	A	B	Y	Q	J	X	A	B
CAP. CODE	CAP.											
102	1.0 nF											
122	1.2 nF											
152	1.5 nF											
182	1.8 nF											
222	2.2 nF											
272	2.7 nF											
332	3.3 nF											
392	3.9 nF											
472	4.7 nF											
562	5.6 nF											
682	6.8 nF											
822	8.2 nF											
103	10 nF	B	B	B	B	B						C
123	12 nF	B	B	B	B							
153	15 nF	B	B	B	B	B						C
183	18 nF	B	B	B	B							
223	22 nF	B	B	B	B	B						C
273	27 nF	B	B	B	B							
333	33 nF	B	B	B	B	B						C
393	39 nF	B	B	B	B							
473	47 nF	B	B	B	B	B						C
563	56 nF	B	B	B	B							
683	68 nF	B	B	B	B	B						C
823	82 nF	B	B	B	B							
104	100 nF	B	B	B	B	B		C	C	C	C	C
154	150 nF	B	B	B	B	C		C	C	C	C	C
224	220 nF	B	B	B	B	C		C	C	C	C	C
334	330 nF	B	B	B	B			C	C	C	C	C
474	470 nF	B	B	B	B			C	C	C	C	
684	680 nF	B	B	B	B			C	C	C	C	
105	1.0 μF	C	C	C	C			C	C	C	C	
155	1.5 μF	C	C	C				C	C	C		
225	2.2 μF	C	C	C	J <sup>(1)</sup>			C	C	C	G	
335	3.3 μF	J	J	J				C	C	C		
475	4.7 μF	J	J	J				C	C	D	G	
685	6.8 μF	J	J					C	C	D		
106	10 μF	J	J	P				D	D	G		
226	22 μF	P						K	K			
336	33 μF											
476	47 μF							K	K			
686	68 μF											
107	100 μF						M					

**Notes**

- Letters indicate product thickness, please see packaging quantities
- <sup>(1)</sup> Not in 20 % (code "M") tolerance



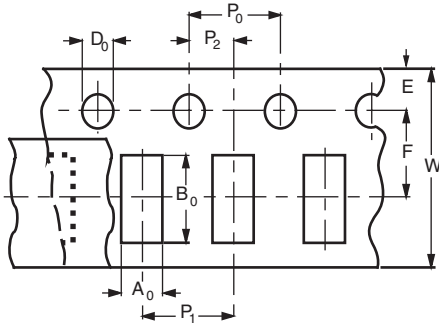
# VJ...W1BC Y5V Dielectric

Surface Mount Multilayer Ceramic Chip Capacitors  
for Commodity Applications

Vishay

PACKAGING QUANTITIES						
SIZE CODE (inch/mm)	MAX. THICKNESS (mm)	THICKNESS SYMBOL	PAPER TAPE		PLASTIC TAPE	
			7" REEL (C)	13" REEL (P)	7" REEL (T)	13" REEL (R)
0402 (1002)	0.55	N	10K	50K		
0603 (1608)	0.90	S	4K	15K		
	0.95	X	4K	15K		
0805 (2012)	0.75	A	4K	15K		
	0.95	B	4K	15K		
	1.40	D			3K	10K
	1.45	I			3K	10K
1206 (3216)	0.95	B	4K	15K		
	1.05	C			3K	10K
	1.30	J			3K	10K
	1.35	D			3K	10K
	1.80	G			2K	
	1.80	H			2K	8K
	1.90	P			2K	
1210 (3225)	1.05	B			2K	10K
	1.05	C			3K	10K
	1.35	D			3K	10K
	1.80	G			2K	
	2.00	U			2K	4K
	2.20	K			1K	
	2.70	J			1K	4K
	2.80	M			1K	
	2.80	V			1K	4K

## PAPER TAPE SPECIFICATION

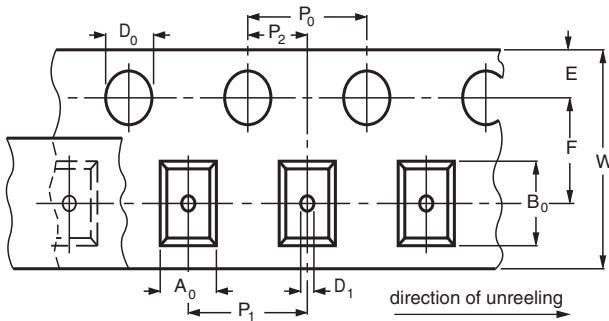


### DIMENSIONS OF PAPER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE			
	0402	0603	0805	1206
$A_0$	$0.62 \pm 0.05$	$1.02 \pm 0.05$	$1.50 \pm 0.10$	$2.00 \pm 0.10$
$B_0$	$1.12 \pm 0.05$	$1.80 \pm 0.05$	$2.30 \pm 0.10$	$3.50 \pm 0.10$
$W$	$8.00 \pm 0.10$	$8.00 \pm 0.10$	$8.00 \pm 0.10$	$8.00 \pm 0.10$
$E$	$1.75 \pm 0.05$	$1.75 \pm 0.05$	$1.75 \pm 0.05$	$1.75 \pm 0.10$
$F$	$3.50 \pm 0.05$	$3.50 \pm 0.05$	$3.50 \pm 0.05$	$3.50 \pm 0.05$
$D_0$	$1.55 \pm 0.05$	$1.55 \pm 0.05$	$1.55 \pm 0.05$	$1.50 \pm 0.05$
$P_0$	$4.00 \pm 0.10$	$4.00 \pm 0.10$	$4.00 \pm 0.10$	$4.00 \pm 0.10$
$P_1$	$2.00 \pm 0.05$	$4.00 \pm 0.10$	$4.00 \pm 0.10$	$4.00 \pm 0.10$
$P_2$	$2.00 \pm 0.05$	$2.00 \pm 0.05$	$2.00 \pm 0.05$	$2.00 \pm 0.05$

## BLISTER TAPE SPECIFICATION

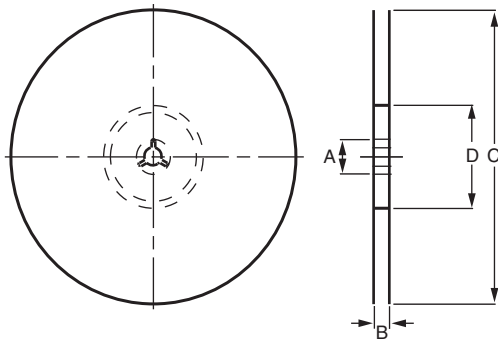


### DIMENSIONS OF BLISTER TAPE

in millimeters

SYM.	PRODUCT SIZE CODE		
	0805	1206	1210
$A_0$	$< 1.57$	$< 2.00$	$< 2.97$
$B_0$	$< 2.45$	$< 3.70$	$< 3.73$
$W$	$8.00 \pm 0.10$	$8.00 \pm 0.10$	$8.00 \pm 0.10$
$E$	$1.75 \pm 0.10$	$1.75 \pm 0.10$	$1.75 \pm 0.10$
$F$	$3.50 \pm 0.05$	$3.50 \pm 0.05$	$3.50 \pm 0.05$
$D_0$	$1.50 \pm 0.05$	$1.50 \pm 0.05$	$1.50 \pm 0.05$
$D_1$	$1.00 \pm 0.10$	$1.00 \pm 0.10$	$1.00 \pm 0.10$
$P_0$	$4.00 \pm 0.10$	$4.00 \pm 0.10$	$4.00 \pm 0.10$
$P_1$	$4.00 \pm 0.10$	$4.00 \pm 0.10$	$4.00 \pm 0.10$
$P_2$	$2.00 \pm 0.05$	$2.00 \pm 0.05$	$2.00 \pm 0.05$

## REEL SPECIFICATIONS

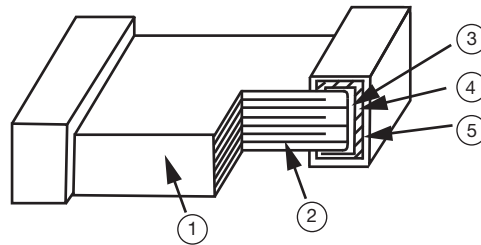


### REEL DIMENSIONS AND TAPE WIDTH

in millimeters

	$\varnothing 180 \text{ mm}; 7''$	$\varnothing 330 \text{ mm}; 13''$
A	$13.0 \pm 0.5$	$13.0 \pm 0.5$
B	$9.0 \pm 1.0$	$9.0 \pm 1.0$
C	$178.0 \pm 1.0$	$330.0 \pm 1.0$
D	$60.0 \pm 1.0$	$100.0 \pm 1.0$

CONSTRUCTION		
NO.	NAME	Y5V
1	Ceramic material	BaTiO <sub>3</sub> based
2	Inner electrode	Ni
3	Termination	Inner layer
4		Middle layer
5		Outer layer



### 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.

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 and agree to fully indemnify and hold Vishay and its distributors harmless from and against any and all claims, liabilities, expenses and damages arising or resulting in connection with such use or sale, including attorneys fees, even if such claim alleges that Vishay or its distributor was negligent regarding the design or manufacture of the part. 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.