

## Surface Mount Multilayer Ceramic Chip Capacitors for Ultra Small Commodity Applications



### FEATURES

- High capacitance in unit size
- High precision dimensional tolerances
- Suitably used in high-accuracy automatic mounting machine
- 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

- Miniature microwave module
- Portable equipment - mobile phone, PDA

ELECTRICAL SPECIFICATIONS			
Size	0201		
Dielectric	COG (NP0)	X7R	X5R
Capacitance	0.5 pF to 120 pF	100 pF to 10 nF	100 pF to 1.0 $\mu$ F
Capacitance Tolerance <sup>(2)(3)</sup>	Cap. $\leq$ 5 pF: B ( $\pm$ 0.1 pF), C ( $\pm$ 0.25 pF) 5 pF < Cap. < 10 pF: C ( $\pm$ 0.25 pF), D ( $\pm$ 0.5 pF) Cap. $\geq$ 10 pF: F ( $\pm$ 1 %), G (2 %), J (5 %)	J ( $\pm$ 5 %) K ( $\pm$ 10 %) M ( $\pm$ 20 %)	J ( $\pm$ 5 %) K ( $\pm$ 10 %) M ( $\pm$ 20 %)
Rated Voltage ( $V_{DC}$ )	16 V, 25 V, 50 V	10 V, 16 V, 25 V, 50 V	6.3 V, 10 V, 16 V, 25 V, 50 V
$\tan \delta/Q$ <sup>(1)</sup>	Cap. < 30 pF, $Q \geq 400 + 20 C$ Cap. $\geq$ 30 pF, $Q \geq 1000$	See Table 1	
Insulation Resistance at $U_R$	$\geq 10 G\Omega$	$\geq 10 G\Omega$ or $R \times C \geq 500 \Omega F$ , whichever is less	
Operating Temperature	-55 °C to +125 °C		-55 °C to +85 °C
Capacitance Change	$\pm 30$ ppm	$\pm 15$ %	
Termination	Ni/Sn lead (Pb)-free termination		

#### Notes

- (1) Measured at 30 % to 70 % relative humidity  
NP0: apply  $1.0 V_{RMS} \pm 0.2 V_{RMS}$ , 1.0 MHz  $\pm 10$  % at the condition of 25 °C ambient temperature  
X7R, X5R: apply  $1.0 V_{RMS} \pm 0.2 V_{RMS}$ , 1.0 kHz  $\pm 10$  % (224 / 6.3 V - 224 / 10 V - 105 / 10 V - 225 / 6.3 V:  $0.5 V_{RMS} \pm 0.2 V_{RMS}$ , 1.0 kHz  $\pm 10$  %) at the condition of 25 °C ambient temperature
- (2) Preconditioning for X7R / X5R MLCC: perform a heat treatment at 150 °C  $\pm 10$  °C for 1 h, then leave in ambient condition for 24 h  $\pm 2$  h before measurement
- (3) Tolerances restriction see "Selection Chart"

**Table 1**

X7R / X5R:

RATED VOLTAGE	D.F. $\leq$	EXCEPTION OF D.F. $\leq$	
50 V	3 %	-	-
16 V / 25 V	3.5 %	5 %	0201 $\geq 0.01 \mu F$
		10 %	0201 $\geq 0.1 \mu F$
10 V	5 %	10 %	0201 $\geq 0.012 \mu F$
		15 %	0201 $\geq 0.1 \mu F$
6.3 V	10 %	15 %	0201 $\geq 0.1 \mu F$

QUICK REFERENCE DATA				
DIELECTRIC	CASE	MAXIMUM VOLTAGE (V)	CAPACITANCE	
			MINIMUM	MAXIMUM
C0G (NP0)	0201	50	0.5 pF	120 pF
X5R	0201	50	100 pF	1.0 $\mu$ F
X7R	0201	50	100 pF	10 nF

**Note**

- Detail ratings see "Selection Chart" table

ORDERING INFORMATION							
VJ0201	A	100	J	X	X	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE <sup>(1)</sup>	TERMINATION	RATED VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0201	A = C0G (NP0) G = X5R Y = X7R	Two significant digits followed by the number of zeros. R is in place of decimal point: 0R5 = 0.5 pF 1R0 = 1.0 pF 100 = 10 pF	B = $\pm$ 0.10 pF C = $\pm$ 0.25 pF D = $\pm$ 0.5 pF F = $\pm$ 1 % G = $\pm$ 2 % J = $\pm$ 5 % K = $\pm$ 10 % M = $\pm$ 20 %	X = Ni barrier 100 % matte tin	Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V	C = 7" reel / paper tape	

**Note**

- <sup>(1)</sup> Detail tolerance see under "Electrical Specifications" table

DIMENSIONS in inches (millimeters)				
SIZE CODE	L	W	T MAX.	MB
0201 <sup>(1)</sup> (0603)	0.024 $\pm$ 0.0012 (0.60 $\pm$ 0.03)	0.012 $\pm$ 0.0012 (0.30 $\pm$ 0.03)	0.013 (0.33)	0.006 $\pm$ 0.002 (0.15 $\pm$ 0.05)
	0.024 $\pm$ 0.002 <sup>(2)</sup> (0.60 $\pm$ 0.05)	0.012 $\pm$ 0.002 <sup>(2)</sup> (0.30 $\pm$ 0.05)	0.014 <sup>(2)</sup> (0.35)	
	0.024 $\pm$ 0.0035 <sup>(3)</sup> (0.60 $\pm$ 0.09)	0.012 $\pm$ 0.0035 <sup>(3)</sup> (0.30 $\pm$ 0.09)	0.0153 <sup>(3)</sup> (0.39)	0.006 + 0.004 / - 0.002 <sup>(3)</sup> (0.15 + 0.1 / - 0.05)

**Notes**

- <sup>(1)</sup> Reflow soldering only  
<sup>(2)</sup> For capacitance values 0.1  $\mu$ F < cap. < 0.68  $\mu$ F  
<sup>(3)</sup> For capacitance values  $\geq$  0.68  $\mu$ F



SELECTION CHART													
DIELECTRIC		C0G (NP0)				X5R				X7R			
STYLE		VJ0201											
SIZE CODE		0201											
VOLTAGE V <sub>DC</sub>		16 V	25 V	50 V	6.3 V	10 V	16 V	25 V	50 V	10 V	16 V	25 V	50 V
VOLTAGE CODE		J	X	A	Y	Q	J	X	A	Q	J	X	A
CAP. CODE	CAP.												
0R5	0.5 pF		L	L									
1R0	1.0 pF		L	L									
1R2	1.2 pF		L	L									
1R5	1.5 pF		L	L									
1R8	1.8 pF		L	L									
2R2	2.2 pF		L	L									
2R7	2.7 pF		L	L									
3R3	3.3 pF		L	L									
3R9	3.9 pF		L	L									
4R7	4.7 pF		L	L									
5R6	5.6 pF		L	L									
6R8	6.8 pF		L	L									
8R2	8.2 pF		L	L									
100	10 pF		L	L									
120	12 pF		L	L									
150	15 pF		L	L									
180	18 pF		L	L									
220	22 pF		L	L									
270	27 pF		L	L									
330	33 pF		L	L									
390	39 pF		L	L									
470	47 pF		L	L									
560	56 pF	L	L	L									
680	68 pF	L	L	L									
820	82 pF	L	L	L									
101	100 pF	L	L	L				L		L	L	L	L
121	120 pF	L	L	L				L		L	L	L	L
151	150 pF							L		L	L	L	L
181	180 pF							L		L	L	L	L
221	220 pF							L		L	L	L	L
271	270 pF							L		L	L	L	L
331	330 pF							L		L	L	L	L
391	390 pF							L		L	L	L	L
471	470 pF							L		L	L	L	L
561	560 pF							L		L	L	L	L
681	680 pF							L		L	L	L	L
821	820 pF							L		L	L	L	L
102	1000 pF						L		L	L	L	L	L
152	1500 pF					L	L		L	L			
222	2200 pF					L	L		L	L			
332	3300 pF					L	L		L	L			
472	4700 pF					L	L		L	L			
682	6800 pF					L	L		L	L			
103	0.010 μF					L	L <sup>(3)</sup>		L	L			
153	0.015 μF			L									
223	0.022 μF			L									
333	0.033 μF			L									
473	0.047 μF			L									
683	0.068 μF			L									
104	0.10 μF			L	L	L <sup>(3)</sup>	L <sup>(3)</sup>						
224	0.22 μF			L <sup>(3)</sup>	L <sup>(3)</sup>								
474	0.47 μF			L <sup>(3)</sup>									
105	1.0 μF			L <sup>(3)</sup>	L <sup>(1)</sup>								

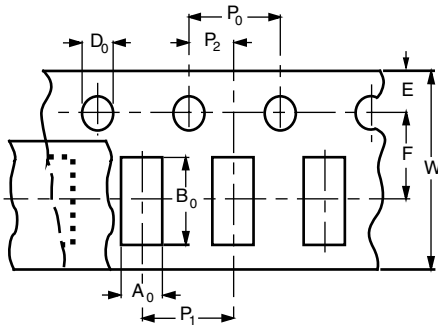
Notes

- Letters indicate product thickness, see "Packaging quantities"
- (1) Only in 20 % (code "M") tolerance
- (2) Only in 10 % (code "K") tolerance
- (3) Not in 5 % (code "J") tolerance



PACKAGING QUANTITIES			
SIZE CODE (inch / mm)	THICKNESS (mm)	PAPER TAPE	
		7" REEL (C)	13" REEL (P)
0201 (0603)	0.39	15K	-

**PAPER TAPE SPECIFICATIONS**

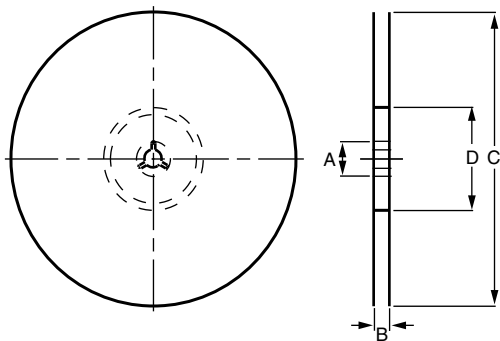


**DIMENSIONS OF PAPER TAPE**

in millimeters

SYMBOL	PRODUCT SIZE CODE
	0201
A <sub>0</sub>	0.38 ± 0.05
B <sub>0</sub>	0.68 ± 0.05
W	8.00 ± 0.10
E	1.75 ± 0.05
F	3.50 ± 0.05
D <sub>0</sub>	1.55 ± 0.05
P <sub>0</sub>	4.00 ± 0.10
P <sub>1</sub>	2.00 ± 0.05
P <sub>2</sub>	2.00 ± 0.05

**REEL SPECIFICATION**

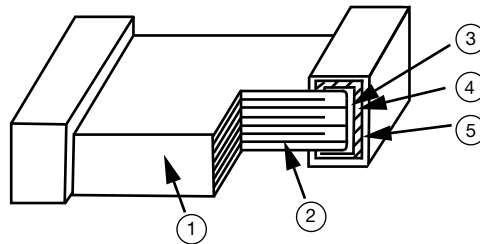


**REEL DIMENSIONS AND TAPE WIDTH**

in millimeters

SYMBOL	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

CONSTRUCTION			
NO.	NAME	COG (NP0)	X5R, X7R
1	Ceramic material	CaZrO <sub>3</sub> based	BaTiO <sub>3</sub> based
2	Inner electrode	Ni	
3	Termination	Inner layer	Cu
4		Middle layer	Ni
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 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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