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

Pb-free
RoHS COMPLIANT
HALOGEN FREE
GREEN (5-2008)

APPLICATIONS

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

ELECTRICAL SPECIFICATIONS			
Size	**0201**		
Dielectric	**C0G (NP0)**	**X7R**	**X5R**
Capacitance	0.5 pF to 120 pF	100 pF to 10 nF	100 pF to 2.2 µF
Capacitance Tolerance [2][3]	Cap. ≤ 5 pF: B (± 0.1 pF), C (± 0.25 pF) 5 pF < Cap. < 10 pF: C (± 0.25 pF), D (± 0.5 pF) Cap. ≥ 10 pF: F (± 1 %), G (2 %), J (5 %)	J (± 5 %) K (± 10 %) M (± 20 %)	J (± 5 %) K (± 10 %) M (± 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 δ/Q [1]	Cap. < 30 pF, Q ≥ 400 + 20 C Cap. ≥ 30 pF, Q ≥ 1000	See Table 1	
Insulation Resistance at U_R	≥ 10 GΩ	≥ 10 GΩ or R x C ≥ 500 ΩF, whichever is less	
Operating Temperature	-55 °C to +125 °C		-55 °C to +85 °C
Capacitance Change	± 30 ppm	± 15 %	
Termination	Ni/Sn lead (Pb)-free termination		

Notes

(1) Measured at 30 % to 70 % relative humidity
NP0: apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 MHz ± 10 % at the condition of 25 °C ambient temperature
X7R, X5R: apply 1.0 V_{RMS} ± 0.2 V_{RMS}, 1.0 kHz ± 10 % (224 / 6.3 V - 224 / 10 V - 105 / 10 V - 225 / 6.3 V: 0.5 V_{RMS} ± 0.2 V_{RMS}, 1.0 kHz ± 10 %) at the condition of 25 °C ambient temperature

(2) Preconditioning for X7R / X5R MLCC: perform a heat treatment at 150 °C ± 10 °C for 1 h, then leave in ambient condition for 24 h ± 2 h before measurement

(3) Tolerances restriction see “Selection Chart”

Table 1

X7R / X5R:

RATED VOLTAGE	D.F. ≤	EXCEPTION OF D.F. ≤	
50 V	3 %	-	-
16 V / 25 V	3.5 %	5 %	0201 ≥ 0.01 µF
		10 %	0201 ≥ 0.1 µF
10 V	5 %	10 %	0201 ≥ 0.012 µF
		15 %	0201 ≥ 0.1 µF
6.3 V	10 %	15 %	0201 ≥ 0.1 µF

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	2.2 µF
X7R	0201	50	100 pF	10 nF

Note

- Detail ratings see “Selection Chart” table

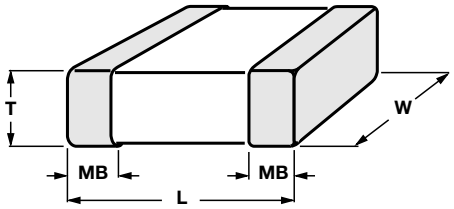
ORDERING INFORMATION

VJ0201	A	100	J	X	X	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE (1)	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 = ± 0.10 pF C = ± 0.25 pF D = ± 0.5 pF F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 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

(1) Detail tolerance see under “Electrical Specifications” table

DIMENSIONS in inches (millimeters)



SIZE CODE	L	W	T MAX.	MB
0201 (1) (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)
	0.024 ± 0.002 (2) (0.60 ± 0.05)	0.012 ± 0.002 (2) (0.30 ± 0.05)	0.014 (2) (0.35)	
	0.024 ± 0.0035 (3) (0.60 ± 0.09)	0.012 ± 0.0035 (3) (0.30 ± 0.09)	0.0153 (3) (0.39)	0.006 + 0.004 / - 0.002 (3) (0.15 + 0.1 / - 0.05)

Notes

(1) Reflow soldering only

(2) For capacitance values 0.1 µF < cap. < 0.68 µF

(3) For capacitance values ≥ 0.68 µF

SELECTION CHART

DIELECTRIC		C0G (NP0)			X5R					X7R			
STYLE		VJ0201											
SIZE CODE		0201											
VOLTAGE V_{DC}		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
121	120 pF	L	L	L					L		L	L	L
151	150 pF								L		L	L	L
181	180 pF								L		L	L	L
221	220 pF								L		L	L	L
271	270 pF								L		L	L	L
331	330 pF								L		L	L	L
391	390 pF								L		L	L	L
471	470 pF								L		L	L	L
561	560 pF								L		L	L	L
681	680 pF								L		L	L	L
821	820 pF								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			
103	0.010 µF					L	L [3]			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 [3]	L [2][4]					
224	0.22 µF				L [3]	L [3]							
474	0.47 µF				L [3]								
105	1.0 µF				L [3]	L [1][4]							
225	2.2 µF				L [1][4]								

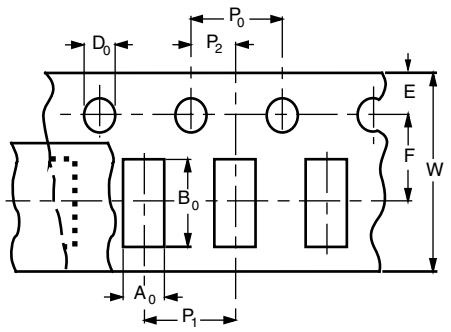
Notes

- 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
(4) Contact mlcc@vishay.com for availability

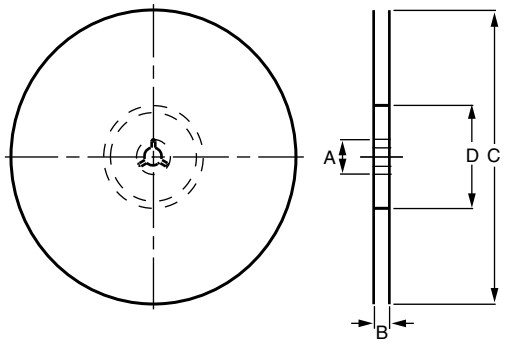
PACKAGING QUANTITIES			
SIZE CODE (inch / mm)	THICKNESS (mm)	PAPER TAPE	
		7" REEL (C)	13" REEL (P)
0201 (0603)	0.39	15K	-

PAPER TAPE SPECIFICATIONS



DIMENSIONS OF PAPER TAPE in millimeters	
SYMBOL	PRODUCT SIZE CODE
	0201
A_0	0.38 ± 0.05
B_0	0.68 ± 0.05
W	8.00 ± 0.10
E	1.75 ± 0.05
F	3.50 ± 0.05
D_0	1.55 ± 0.05
P_0	4.00 ± 0.10
P_1	2.00 ± 0.05
P_2	2.00 ± 0.05

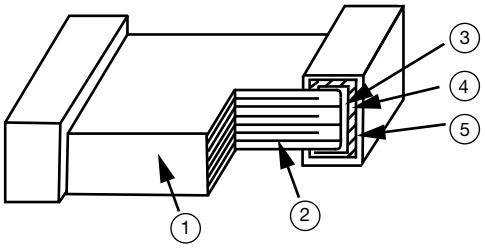
REEL SPECIFICATION



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		C0G (NP0)	X5R, X7R
1	Ceramic material		$CaZrO_3$ based	$BaTiO_3$ 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.

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.