Surface Mount Multilayer Ceramic Chip Capacitors for Commodity Applications

FEATURES

- Stable class 2 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)
- Halogen-free according to IEC 61249-2-21

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Consumer electronics
- Telecommunications
- Data processing

ELECTRICAL SPECIFICATION

Note:
Electrical characteristics at 25 °C, unless otherwise specified

Operating Temperature: - 55 °C to + 125 °C

Capacitance Range: 100 pF to 4.7 µF

Voltage Range: 6.3 Vdc to 100 Vdc

Temperature Coefficient of Capacitance (TCC):
± 15 % without voltage applied

Dissipation Factor (DF):
10 V: ≤ **5 %**
≤ 10 % for 0603 ≥ 0.33 µF; 0805 ≥ 2.2 µF; 1206 ≥ 2.2 µF
16 V: ≤ **3.5 %**
≤ 5 % for 0402 ≥ 0.033 µF; 0603 ≥ 0.15 µF; 0805 ≥ 0.68 µF; 1206 ≥ 2.2 µF
≤ 10 % for 0603 ≥ 0.68 µF; 0805 ≥ 2.2 µF; 1206 ≥ 4.7 µF
25 V: ≤ **3.5 %**
≤ 5 % for 0805 ≥ 1 µF
≤ 7 % for 0603 ≥ 0.33 µF; 1206 ≥ 4.7 µF
≤ 10 % for 0402 ≥ 0.10 µF; 0603 ≥ 0.47 µF; 0805 ≥ 2.2 µF; 1206 ≥ 6.8 µF
≥ **50 V:** ≤ **2.5 %**
≤ 3 % for 0603 ≥ 0.047 µF; 0805 ≥ 0.18 µF; 1206 ≥ 0.47 µF

Aging Rate:
≤ 10 V: maximum 1.5 % per decade
≥ 16 V: maximum 1 % per decade

Insulation Resistance (IR):
10 GΩ or 500 ΩF 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 Vdc: 250 % of rated voltage

ORDERING INFORMATION

VJ0402	Y	101	J	X	Q	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR BASIC COMMODITY
0402 0603 0805 1206 1210	Y = X7R	Two significant digits followed by the number of zeros: 101 = 100 pF 102 = 1000 pF 152 = 1500 pF 103 = 10 000 pF	J = ± 5 % (1) K = ± 10 % M = ± 20 %	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	

Note
(1) Not all values, see selection chart sizes 0603, 0805, 1206

SELECTION CHART

DIELECTRIC		X7R														
EIA CAP. CODE	EIA SIZE	0402					0603					0805				
	CAP.	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
101	100 pF	N	N	N	N		S +	S +	S +	S +	S +	B +	B +	B +	B +	B +
121	120 pF	N	N	N	N		S +	S +	S +	S +	S +	B +	B +	B +	B +	B +
151	150 pF	N	N	N	N		S +	S +	S +	S +	S +	B +	B +	B +	B +	B +
181	180 pF	N	N	N	N		S +	S +	S +	S +	S +	B +	B +	B +	B +	B +
221	220 pF	N	N	N	N		S +	S +	S +	S +	S +	B +	B +	B +	B +	B +
271	270 pF	N	N	N	N		S +	S +	S +	S +	S +	B +	B +	B +	B +	B +
331	330 pF	N	N	N	N		S +	S +	S +	S +	S +	B +	B +	B +	B +	B +
391	390 pF	N	N	N	N		S +	S +	S +	S +	S +	B +	B +	B +	B +	B +
471	470 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
561	560 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
681	680 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
821	820 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
102	1000 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
122	1200 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
152	1500 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
182	1800 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
222	2200 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
272	2700 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
332	3300 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
392	3900 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
472	4700 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
562	5600 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
682	6800 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
822	8200 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
103	0.01 µF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
123	0.012 µF	N	N	N			S	S	S	S		B	B	B	B	B
153	0.015 µF	N	N	N			S	S	S	S		B	B	B	B	B
183	0.018 µF	N	N	N			S	S	S	S		B	B	B	B	B
223	0.022 µF	N	N	N			S	S	S	S		B	B	B	B	B
273	0.027 µF	N	N				S	S	S	S		B	B	B	B	D
333	0.033 µF	N	N				S	S	S	X		B	B	B	B	D
393	0.039 µF	N	N				S	S	S	X		B	B	B	B	D
473	0.047 µF	N	N				S	S	S	X		B	B	B	B	D
563	0.056 µF	N	N				S	S	S	X		B	B	B	B	D
683	0.068 µF	N	N				S	S	S	X		B	B	B	B	D
823	0.082 µF	N	N				S	S	S	X		B	B	B	B	D
104	0.1 µF	N	N				S	S	S	X		B	B	B	B/D	D
124	0.12 µF						S	S	X			B	B	B	D	
154	0.15 µF						S	S	X			D	D	D	D	
184	0.18 µF						S	S	X			D	D	D	D	
224	0.22 µF						S	S	X			D	D	D	D	
274	0.27 µF						X	X	X			D	D	D		
334	0.33 µF						X	X	X			D	D	D	I	
394	0.39 µF						X	X				D	D	D		
474	0.47 µF						X	X				D	D	D	I	
564	0.56 µF						X					D	D	D		
684	0.68 µF						X	X				D	D	D		
824	0.82 µF						X					D	D	D		
105	1 µF						X	X				D	D	D		
155	1.5 µF											I				
225	2.2 µF											I	I	I		
335	3.3 µF															
475	4.7 µF															
685	6.8 µF															
106	10 µF															
156	15 µF															
226	22 µF															
336	33 µF															
476	47 µF															
686	68 µF															
107	100 µF															

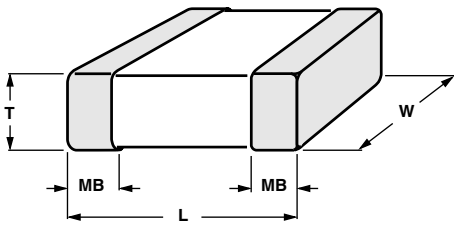
Notes
Letters indicate product thickness, see packaging quantities
+ Not in 5 % (Code “J”) tolerance

SELECTION CHART

DIELECTRIC		X7R									
EIA CAP. CODE	EIA SIZE	1206					1210				
	CAP.	10 V	16 V	25 V	50 V	100 V	10 V	16 V	25 V	50 V	100 V
101	100 pF										
121	120 pF										
151	150 pF	B +	B +	B +	B +	B +					
181	180 pF	B +	B +	B +	B +	B +					
221	220 pF	B +	B +	B +	B +	B +					
271	270 pF	B +	B +	B +	B +	B +					
331	330 pF	B +	B +	B +	B +	B +					
391	390 pF	B +	B +	B +	B +	B +					
471	470 pF	B	B	B	B	B					
561	560 pF	B	B	B	B	B					
681	680 pF	B	B	B	B	B					
821	820 pF	B	B	B	B	B					
102	1000 pF	B	B	B	B	B	C	C	C	C	C
122	1200 pF	B	B	B	B	B	C	C	C	C	C
152	1500 pF	B	B	B	B	B	C	C	C	C	C
182	1800 pF	B	B	B	B	B	C	C	C	C	C
222	2200 pF	B	B	B	B	B	C	C	C	C	C
272	2700 pF	B	B	B	B	B	C	C	C	C	C
332	3300 pF	B	B	B	B	B	C	C	C	C	C
392	3900 pF	B	B	B	B	B	C	C	C	C	C
472	4700 pF	B	B	B	B	B	C	C	C	C	C
562	5600 pF	B	B	B	B	B	C	C	C	C	C
682	6800 pF	B	B	B	B	B	C	C	C	C	C
822	8200 pF	B	B	B	B	B	C	C	C	C	C
103	0.01 µF	B	B	B	B	B	C	C	C	C	C
123	0.012 µF	B	B	B	B	B	C	C	C	C	C
153	0.015 µF	B	B	B	B	B	C	C	C	C	C
183	0.018 µF	B	B	B	B	B	C	C	C	C	C
223	0.022 µF	B	B	B	B	B	C	C	C	C	C
273	0.027 µF	B	B	B	B	B	C	C	C	C	C
333	0.033 µF	B	B	B	B	B	C	C	C	C	C
393	0.039 µF	B	B	B	B	B	C	C	C	C	C
473	0.047 µF	B	B	B	B	B	C	C	C	C	C
563	0.056 µF	B	B	B	B	B	C	C	C	C	C
683	0.068 µF	B	B	B	B	B	C	C	C	C	C
823	0.082 µF	B	B	B	B	D	C	C	C	C	C
104	0.1 µF	B	B	B	B	D	C	C	C	C	C
124	0.12 µF	B	B	B	B	D	C	C	C	C	C
154	0.15 µF	C	C	C	C	G	C	C	C	C	D
184	0.18 µF	C	C	C	C	G	C	C	C	C	D
224	0.22 µF	C	C	C	C	G	C	C	C	C	D
274	0.27 µF	C	C	C	D		C	C	C	C	G
334	0.33 µF	C	C	C	D		C	C	C	D	G
394	0.39 µF	C	C	J	P		C	C	C	D	M
474	0.47 µF	J	J	J	P		C	C	C	D	M
564	0.56 µF	J	J	J	P		D	D	D	D	M
684	0.68 µF	J	J	J	P		D	D	D	D	K
824	0.82 µF	J	J	J	P		D	D	D	D	K
105	1 µF	J	J	J	P		D	D	D	D	K
155	1.5 µF	J	J								
225	2.2 µF	J	J	P				K	G		
335	3.3 µF	P	P	P							
475	4.7 µF	P	P	P							
685	6.8 µF										
106	10 µF										
156	15 µF										
226	22 µF										
336	33 µF										
476	47 µF										
686	68 µF										
107	100 µF										

Notes
Letters indicate product thickness, see packaging quantities
+ Not in 5 % (Code “J”) tolerance

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 ± 0.004 [0.25 ± 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]	0.012 - 0.008/+ 0.010 [0.30 - 0.20/+ 0.25]
0805 (2012)	0.080 ± 0.008 [2.00 ± 0.20]	0.050 ± 0.008 [1.25 ± 0.20]	0.057 [1.45]	0.020 - 0.012/+ 0.008 [0.50 - 0.30/+ 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]	0.020 ± 0.012 [0.50 ± 0.30]
1210 (3225)	0.126 ± 0.016 [3.20 ± 0.40]	0.098 ± 0.012 [2.50 ± 0.30]	0.110 [2.80]	0.026 ± 0.014 [0.65 ± 0.35]

STORAGE AND HANDLING CONDITIONS

(1) To store products at 5 °C to 40 °C ambient temperature and 20 % to 70 % related humdity conditions.
(2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

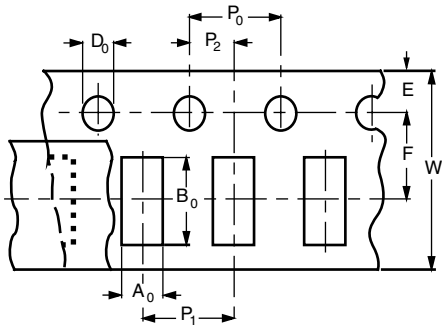
Cautions:

a. Don't 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. Don't expose products to excessive shock, vibration, direct sunlight and so on.

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

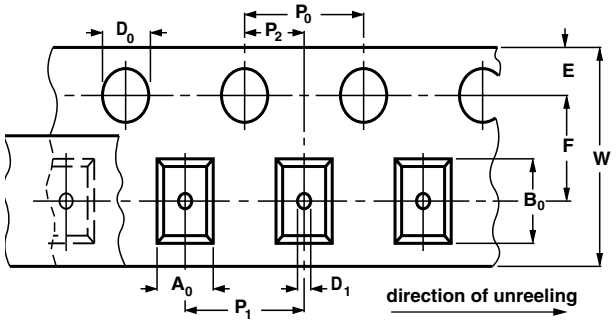
PAPER TAPE SPECIFICATIONS



DIMENSIONS OF PAPER TAPE
in millimeters

SYM.	PRODUCT SIZE CODE			
	0402	0603	0805	1206
A_0	0.62 ± 0.05	1.02 ± 0.05	1.50 ± 0.10	2.00 ± 0.10
B_0	1.12 ± 0.05	1.82 ± 0.05	2.30 ± 0.10	3.50 ± 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 ± 0.10
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	1.50 ± 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	4.00 ± 0.10	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

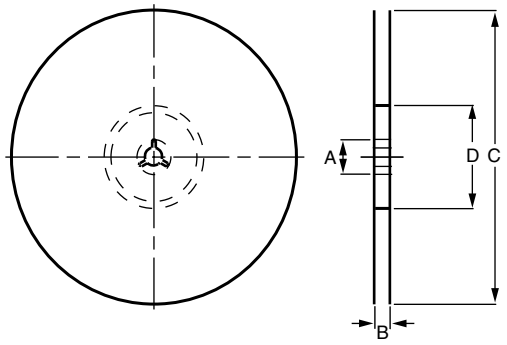
BLISTER TAPE SPECIFICATIONS



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 ± 0.10	8.00 ± 0.10	8.00 ± 0.10
E	1.75 ± 0.10	1.75 ± 0.10	1.75 ± 0.10
F	3.50 ± 0.05	3.50 ± 0.05	3.50 ± 0.05
D_0	1.50 ± 0.05	1.50 ± 0.05	1.50 ± 0.05
D_1	1.00 ± 0.10	1.00 ± 0.10	1.00 ± 0.10
P_0	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_1	4.00 ± 0.10	4.00 ± 0.10	4.00 ± 0.10
P_2	2.00 ± 0.05	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

Disclaimer

All product specifications and data are subject to change without notice.

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