



# PRODUCT SHEET

## VISHAY – Basic Commodity MLCC

<b>PART NUMBER</b>	<b>VJ1206A470KXGTW1BC</b>
SIZE	: 1206
CERAMIC	: «A» = COG(NPO)
CAPACITANCE	: « 470 » = 47 pF
TOLERANCE	: « K » = +/- 10%
TERMINATION	: « X » = Ni-Barrier with 100% Tin termination
VOLTAGE	: « G » = 1000 Volt DC
PACKAGING	: « T » = 7" reel – PU : 3000 pcs.
PROCESS CODE	: «W1BC » = Vishay Basic Commodity

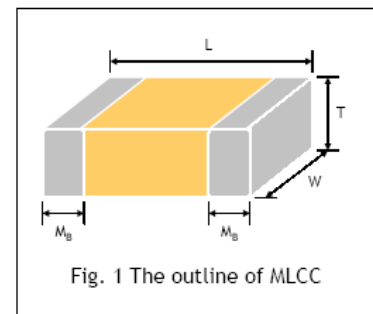


**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**  
**GREEN**  
(5-2008)

Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

### DIMENSIONS

LENGTH	: 3.20 mm +/- 0.15 mm
WIDTH	: 1.60 mm +/- 0.15 mm
THICKNESS	: 0.95 mm +/- 0.10 mm
M <sub>B</sub>	: 0.50 mm +/- 0.25 mm



THICKNESS CODE : C  
Note : Reflow soldering only

### GENERAL ELECTRICAL DATA

Dielectric	NPO	X7R	Y5V
Size	0603, 0805, 1206, 1210, 1808, 1812		0805, 1206, 1210, 1812
Capacitance*	0.5pF to 0.01µF	100pF to 1.0µF	0.01µF to 0.68µF
Capacitance tolerance***	Cap ≤ 5pF: C (±0.25pF) 5pF < Cap < 10pF: D (±0.5pF) Cap ≥ 10pF: F (±1%), G (±2%), J (±5%), K (±10%)	K (±10%), M (±20%)	Z (-20/+80%)
Rated voltage (WVDC)	200V to 3kV		200V, 250V
Q/DF*	Cap < 30pF: Q ≥ 400+20C Cap ≥ 30pF: Q ≥ 1000	DF ≤ 2.5%	DF ≤ 5%
Insulation resistance at U <sub>r</sub> **	U <sub>r</sub> =200~630V: ≥ 10GΩ or R×C ≥ 1000Ω·F whichever is smaller U <sub>r</sub> =1000~3000V: ≥ 10GΩ		
Dielectric strength	200~300V: ≥ 2 x WVDC 500~999V: ≥ 1.5 x WVDC 1000~3000V: ≥ 1.2 x WVDC		
Operating temperature	-55 to +125°C		-25 to +85°C
Capacitance characteristic	±30ppm	±15%	+30/-80%
Termination	Ni/Sn (lead-free termination)		

\* Measured at the condition of 30~70% related humidity.

NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap ≤ 1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap > 1000pF, 25°C at ambient temperature

X7R, X5R: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 25°C ambient temperature.

Y5V: Apply 1.0±0.2Vrms, 1.0kHz±10%, at 20°C ambient temperature.

\*\* Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.



## RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Test Condition	Requirements																
1.	Visual and Mechanical		<ul style="list-style-type: none"> <li>* No remarkable defect.</li> <li>* Dimensions to conform to individual specification sheet.</li> </ul>																
2.	Capacitance	Class I: (NPO)	* Shall not exceed the limits given in the detailed spec.																
3.	Q/ D.F. (Dissipation Factor)	Caps 1000pF, 1.0±0.2Vrms, 1MHz±10 % Cap > 1000pF, 1.0±0.2Vrms, 1KHz±10 % Class II: (X7R, Y5V) 1.0±0.2Vrms, 1kHz±10 %	NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R: ≤2.5 % Y5V: ≤5.0 %																
4.	Dielectric Strength	<ul style="list-style-type: none"> <li>* To apply voltage:</li> <li>200V~300V      ≥2 times VDC</li> <li>500V~999V      ≥1.5 times VDC</li> <li>1000V~3000V    ≥1.2 times VDC</li> <li>* Cut-off, set at 10mA</li> <li>* TEST= 15 sec.</li> <li>* RAMP=0</li> </ul>	* No evidence of damage or flash over during test.																
5.	Insulation Resistance	Rated voltage: 200~630V      To apply rated voltage (500V max.) for 60 sec.	≥10GΩ or RxC≥100Ω·F whichever is smaller																
		Rated voltage: ≥630V      To apply 500V for 60 sec.	≥10GΩ																
6.	Temperature Coefficient	With no electrical load. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>T.C.</th> <th>Operating Temp</th> </tr> </thead> <tbody> <tr> <td>NPO</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7R</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>Y5V</td> <td>-25~85°C at 20°C</td> </tr> </tbody> </table>	T.C.	Operating Temp	NPO	-55~125°C at 25°C	X7R	-55~125°C at 25°C	Y5V	-25~85°C at 20°C	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>T.C.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>NPO</td> <td>Within ±30ppm/°C</td> </tr> <tr> <td>X7R</td> <td>Within ±15 %</td> </tr> <tr> <td>Y5V</td> <td>Within +30 %/-80 %</td> </tr> </tbody> </table>	T.C.	Capacitance Change	NPO	Within ±30ppm/°C	X7R	Within ±15 %	Y5V	Within +30 %/-80 %
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7.	Adhesive Strength of Termination	<ul style="list-style-type: none"> <li>* Pressurizing force : 5 N (±0.03) and 10N (&gt;0.03)</li> <li>* Test time: 10±1 sec.</li> </ul>	* No remarkable damage or removal of the terminations.																
8.	Vibration Resistance	<ul style="list-style-type: none"> <li>* Vibration frequency: 10~55 Hz/min.</li> <li>* Total amplitude: 1.5mm</li> <li>* Test time: 6 hrs. (Two hrs each in three mutually perpendicular directions.)</li> <li>* Measurement to be made after keeping at room temp. for 24±2 hrs.</li> </ul>	<ul style="list-style-type: none"> <li>* No remarkable damage.</li> <li>* Cap change and Q/D.F.: To meet initial spec.</li> </ul>																
9.	Solderability	<ul style="list-style-type: none"> <li>* Solder temperature: 235±5°C</li> <li>* Dipping time: 2±0.5 sec.</li> </ul>	95 % min. coverage of all metalized area.																
10.	Bending Test	<ul style="list-style-type: none"> <li>* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5±1 sec.</li> <li>* Measurement to be made after keeping at room temp. for 24±2 hrs.</li> </ul>	<ul style="list-style-type: none"> <li>* No remarkable damage.</li> <li>* Cap change : NPO: within ±5.0 % or ±0.5pF whichever is larger. X7R: within ±12.5 % Y5V: within ±30 %</li> <li>(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</li> </ul>																
11.	Resistance to Soldering Heat	<ul style="list-style-type: none"> <li>* Solder temperature: 260±5°C</li> <li>* Dipping time: 10±1 sec</li> <li>* Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder.</li> <li>* Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp.</li> <li>* Measurement to be made after keeping at room temp. for 24±2 hrs.</li> </ul>	<ul style="list-style-type: none"> <li>* No remarkable damage.</li> <li>* Cap change: NPO: within ±2.5 % or ±0.25pF whichever is larger. X7R: within ±7.5 % Y5V: within ±20 %</li> <li>* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</li> <li>* 25 % max. leaching on each edge.</li> </ul>																



No.	Item	Test Condition	Requirements															
12.	Temperature Cycle	<p>* Conduct the five cycles according to the temperatures and time.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp. +0/-3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>Max. operating temp. +3/-0</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>2~3</td> </tr> </tbody> </table> <p>* Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp.            * Measurement to be made after keeping at room temp. for 24±2 hrs.</p>	Step	Temp. (°C)	Time (min.)	1	Min. operating temp. +0/-3	30±3	2	Room temp.	2~3	3	Max. operating temp. +3/-0	30±3	4	Room temp.	2~3	<p>No remarkable damage.</p> <p>Cap change :            NP0: within ±2.5% or ±0.25pF whichever is larger.            X7R: within ±7.5%            Y5V: within ±20%</p> <p>* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</p>
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3	Max. operating temp. +3/-0	30±3																
4	Room temp.	2~3																
13.	Humidity (Damp Heat) Steady State	<p>* Test temp.: 40±2°C            * Humidity: 90-95 % RH            * Test time: 500+24/-0 hrs.</p> <p>* Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp.            * Measurement to be made after keeping at room temp. for 24±2 hrs.</p>	<p>No remarkable damage.</p> <p>Cap change: NP0: within ±5.0% or ±0.5pF whichever is larger.            X7R: within ±12.5%            Y5V: within ±30%</p> <p>* Q/D.F. value:            NP0: Cap≥30pF, Q≥350; 10pFs Cap&lt;30pF, Q≥275+2.5C            Cap&lt;10pF; Q≥200+10C            X7R: ≤3.0%            Y5V: ≤7.5%</p> <p>* I.R.: ≥1 GΩ or Rx C≥50Ω-F whichever is smaller.</p>															
14.	Humidity (Damp Heat) Load	<p>* Test temp.: 40±2°C            * Humidity: 90-95 % RH            * Test time: 500+24/-0 hrs.</p> <p>* To apply voltage : rated voltage (Max. 500V)            * Before initial measurement (Class II only): To apply test voltage for 1hr at 40°C and then set for 24±2 hrs at room temp.            * Measurement to be made after keeping at room temp. for 24±2 hrs.</p>	<p>No remarkable damage.</p> <p>Cap change: NP0: within ±7.5% or ±0.75pF whichever is larger.            X7R: within ±12.5%            Y5V: within ±30%</p> <p>* Q/D.F. value:            NP0: Cap≥30pF, Q≥200; Cap&lt;30pF, Q≥100+10/3C            X7R: ≤3.0%            Y5V: ≤7.5%</p> <p>* I.R.: ≥500MΩ or Rx C≥25Ω-F whichever is smaller.</p>															
15.	High Temperature Load (Endurance)	<p>* Test temp.:            NP0, X7R: 125±3°C            Y5V: 85±3°C</p> <p>* To apply voltage:            (1) &lt;500V: 200% of rated voltage.            (2) 500V: 150% of rated voltage.            (3) ≥630V: 120% of rated voltage.            (4) 1206/NP0 (3kV) ≥1.5pF: 100% of rated voltage.</p> <p>* Test time: 1000+24/-0 hrs.</p> <p>* Before initial measurement (Class II only): To apply test voltage for 1hr at test temp. and then set for 24±2 hrs at room temp.            * Measurement to be made after keeping at room temp. for 24±2 hrs</p>	<p>No remarkable damage.</p> <p>Cap change: NP0: within ±3.0% or ±0.3pF whichever is larger.            X7R: within ±12.5%            Y5V: within ±30%</p> <p>* Q/D.F. value:            NP0: Cap≥30pF, Q≥350            10pFs Cap&lt;30pF, Q≥275+2.5C            Cap&lt;10pF, Q≥200+10C            X7R: ≤3.0%            Y5V: ≤7.5%</p> <p>* I.R.: ≥1 GΩ or Rx C≥50Ω-F whichever is smaller.</p>															

## TAPE & REEL DIMENSIONS (in mm)

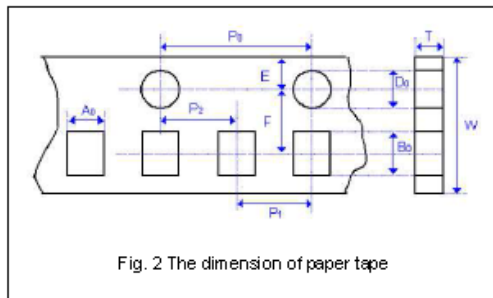


Fig. 2 The dimension of paper tape

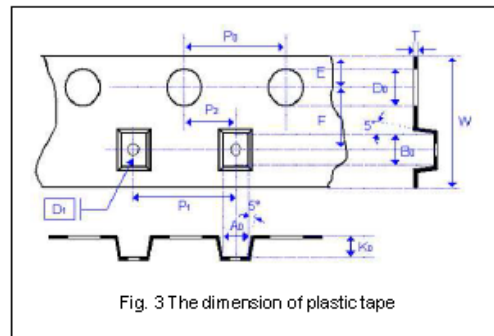


Fig. 3 The dimension of plastic tape

Size	0603	0805	1206			1210			1808		1812		
Thickness	S, X	B	C, D, I	B	C, D	G	C, D	F, G, K	M	D	K	D, K	M
A <sub>0</sub>	1.02±0.05	1.50±0.10	<1.57	2.00±0.10	<1.85	<1.95	<2.97	<2.97	<2.97	<2.35	<2.35	<3.81	<3.81
B <sub>0</sub>	1.80±0.05	2.30±0.10	<2.40	3.50±0.10	<3.46	<3.67	<3.73	<3.73	<3.73	<4.98	<5.00	<5.30	<5.30
T	0.95±0.05	0.95±0.05	0.23±0.05	0.95±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.25±0.05	0.25±0.05	0.25±0.05	0.25±0.05
K <sub>0</sub>	-	-	<2.50	-	<2.50	<2.50	<2.50	<2.50	<3.0	<2.50	<2.50	<2.50	<3.00
W	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	12.0±0.20	12.0±0.20	12.0±0.20	12.0±0.20
P <sub>0</sub>	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
10xP <sub>0</sub>	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10	40.0±0.10
P <sub>1</sub>	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	8.00±0.10	8.00±0.10
P <sub>2</sub>	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D <sub>0</sub>	1.55±0.05	1.55±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05
D <sub>1</sub>	-	-	1.00±0.10	-	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10
E	1.75±0.05	1.75±0.05	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	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	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05

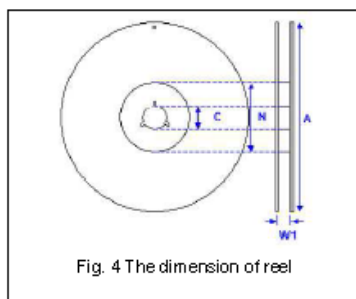


Fig. 4 The dimension of reel

Size	0603, 0805, 1206, 1210			1808, 1812
Reel size	7"	10"	13"	7"
C	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2	13.0+0.5/-0.2
W <sub>1</sub>	8.4+1.5/-0	8.4+1.5/-0	8.4+1.5/-0	12.4+2.0/-0
A	178.0±1.0	250.0±1.0	330.0±1.0	178.0±1.0
N	60.0+1/-0	100.0±1.0	100±1.0	60.5±1.0

### Storage and handling conditions

- (1) To store products at 5 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. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.
- c. Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition. To store products on the shelf and avoid exposure to moisture.