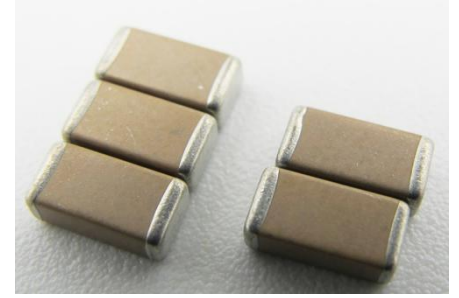


**OPERATING TEMPERATURE**

Operating Temperature	NPO (COG)	X7R	Y5V (Z5U)
	-55°C~+125°C	-55°C~+125°C	-30°C~+85°C



**PN Structure**

WCE	102	M	103	1206	N
Series	Voltage	Tolerance	Capacitance	Size Code	Dielectric
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>

**1. Voltage**

501	500V
102	1000V
502	5000V

**2. Tolerance**

A	B	C	D	F	G	H	J	K	M	Z
±0.05pF	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±2.5%	±5%	±10%	±20%	+80%-20%

**3. Capacitance**

103	10x10 <sup>3</sup> pF
4R7	4.7pF

**4. Size Code: Chip Size (LxW)**

0402	0.04x0.02 Inches
0603	0.06x0.03 Inches
0805	0.08x0.05 Inches
1206	0.12x0.06 Inches

**5. Dielectric**

N	NPO
B	X7R
X	X5R
Y	Y5V



## Capacitance and Capacitance Tolerance

Different circuit needs different capacitance and capacitance tolerance. So the selection of capacitance is depended on the need of customers.

## Dielectric Material Type of Capacitor

- **NPO:** The capacitor of this kind dielectric material is considered as Class I capacitor, including general capacitor and high frequency NPO capacitor. The electrical properties of NPO capacitor are the most stable one and have little change with temperature, voltage and time. They are suited for applications where low-losses and high-stability are required, such as filters, oscillators, and timing circuits.
- **X7R, X5R:** X7R, X5R material is a kind of material has high dielectric constant. The capacitor made of this kind material is considered as Class II capacitor whose capacitance is higher than that of class I. These capacitors are classified as having a semi-stable temperature characteristic and used over a wide temperature range, such in these kinds of circuits, DC-blocking, decoupling, bypassing, frequency discriminating etc.
- **Y5V:** The capacitor made of this kind of material is the highest dielectric constant of all ceramic capacitors. They are used over a moderate temperature range in application where high capacitance is required because of its unstable temperature coefficient, but where moderate losses and capacitance changes can be tolerated. Its capacitance and dissipation factors are sensible to measuring conditions, such as temperature and voltage, etc.

## Voltage

100 VDC, 500 VDC, 1000 VDC, 2000 VDC, 3000 VDC, 4000 VDC, 5000 VDC...

## Capacitance

0.5pF ~ 0.68uF

## Tolerance

±0.05pF, ±0.1pF, ±0.25pF, ±0.5pF, ±1%, ±2%, ±2.5%, ±5%, ±10%, ±20%, +80%-20%

## Packing

Tape and Reel (0402, 0603, 0805, 1206, 1210, 1812, 2220)

## Dielectric & Values

NPO X7R Y5V Z5U consult product pages of catalog for cap ranges and voltage rating

## FEATURES

- Small size
- Excellent Break down voltage, low DF
- RoHS compliant
- Suit to re-flow soldering, wave soldering, hand soldering

## APPLICATIONS

Widely used in Analog & Digital Modems, LAN/WAN Interface, Lighting Ballast Circuits, Voltage Multipliers, DC-DC Converter, Back-lighting Inverters.



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For more details and updates, please visit our website.

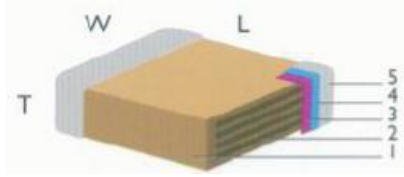
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**Structure and Dimension (Unit: Inches)**

**Structure**

No	Name
1	Ceramic Dielectric
2	Inner Electrode
3	Silver Layer
4	Nickel Layer
5	Tin Layer



**Dimensions (Unit: mm)**

Size	Length	Width	Thickness
0603	1.52 ± 0.25	0.76 ± 0.25	1.01 max
0805	2.00 ± 0.25	1.25 ± 0.25	1.45 max
1206	3.20 ± 0.30	1.60 ± 0.30	1.90 max
1210	3.20 ± 0.40	2.50 ± 0.30	2.80 max
1808	4.50 ± 0.40	2.00 ± 0.25	2.80 max
1812	4.50 ± 0.40	3.20 ± 0.40	3.10 max
2220	5.70 ± 0.40	5.00 ± 0.40	3.00 max
2225	5.70 ± 0.50	6.30 ± 0.50	6.20 max

**Coefficient**

Parameter	NPO (COG) Temperature Wave -55~+125°C	X7R Temperature Wave -55~+125°C	
Operating Temperature Range			
Temperature Coefficient			
Dissipation Factor	DF ≤ 0.15%	DF ≤ 2.50%	
Aging	None	≤ 2.5% decade hour	
Insulation Resistance	≥ 100GΩ	≥ 500ΩF OR 50 GΩ	
Dielectric Strength	<b>Rated Voltage</b>	<b>Test Voltage</b>	<b>Time</b>
	Ur = 100V	2.5Ur	60 ± 5S
	200V ≤ Ur ≤ 1000V	1.5Ur	60 ± 5S
	Ur > 1000V	1.2Ur	60 ± 5S



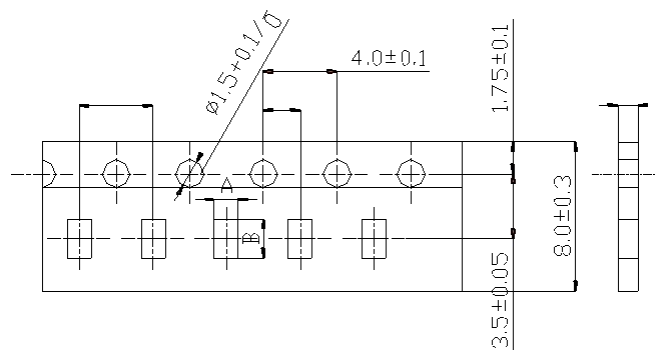
## Packing Details

### 1. Tape Packing:

**Paper Tape:** Standard taping (8mm paper width) suitable to 0603,0805,4Kpcs/reel To 0402, 10Kpcs/reel.

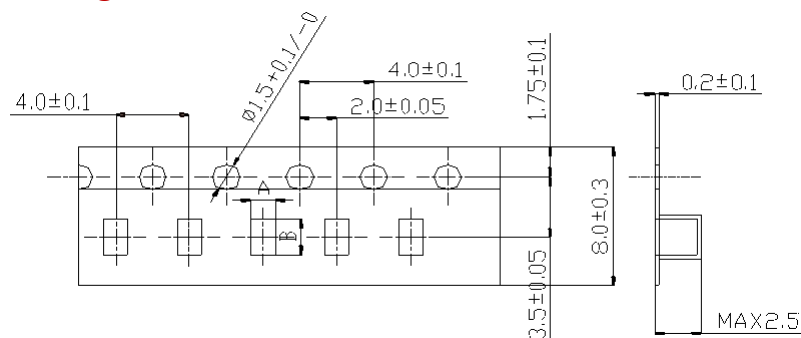
**Plastic Tape:** Suitable 0805, 1206 sizes, for chip thickness over 0.95 mm, 4Kpcs/reel or 3Kpcs/reel are available.

### 2. Dimensions of Packing Paper:



Type	A	B	C	D	T
0402	0.65±0.10	1.15±0.10	2.0±0.05	2.0±0.05	0.8max
0603	1.05±0.10	1.85±0.10	4.0±0.10	2.0±0.10	1.1max
0805	1.55±0.15	2.3±0.15	4.0±0.10	2.0±0.10	1.1max
1206	1.95±0.15	3.5±0.15	4.0±0.10	2.0±0.10	1.1max

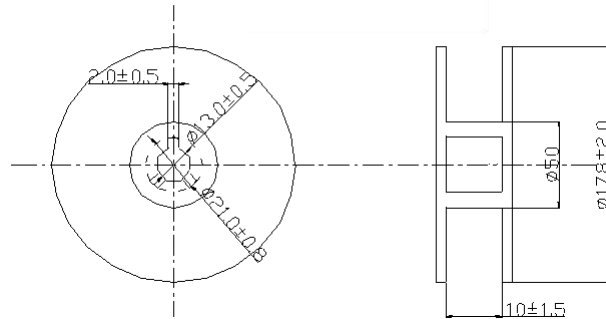
### 3. Dimensions of Embossed Packing:



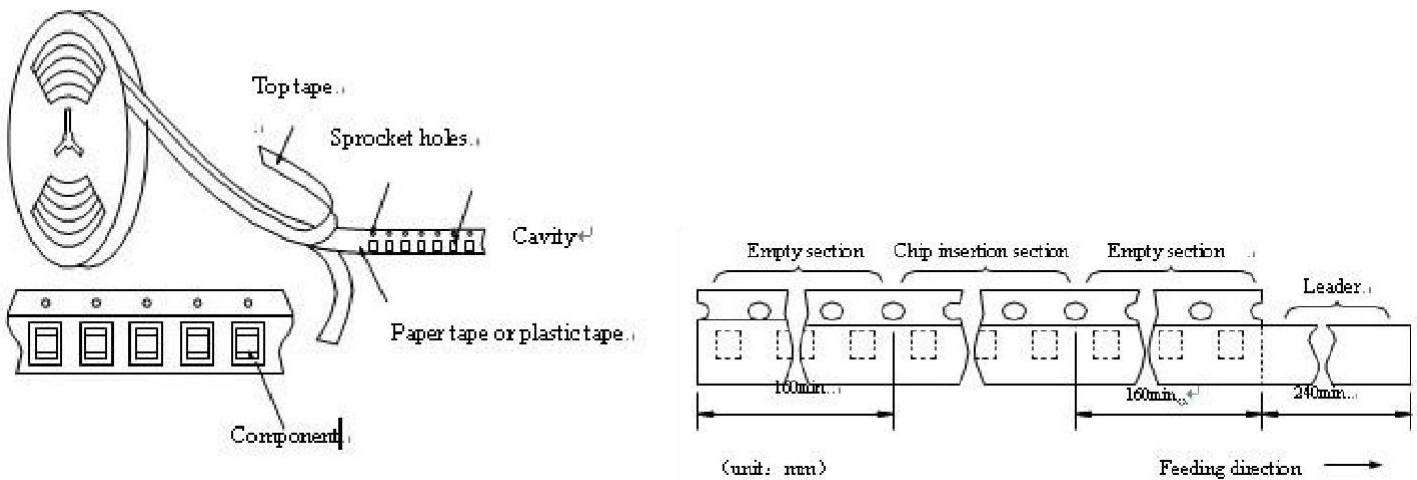
A: 1.45±0.20      B: 2.25±0.20      (0805)  
A: 1.95±0.20      B: 3.50±0.20      (1206)



#### 4. Dimensions of Reel:



#### 5. Taping Figure:



#### 6. Taping Method

- ① Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.
- ② The top tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.
- ③ Part of the leader and part of the empty tape shall be attached to the end of the tape as follows.
- ④ Missing capacitors number within 0.1% of the number per reel or 1pc, whichever is greater, and are not continuous.
- ⑤ The top tape and bottom tape shall not protrude beyond the edges of the tape and shall not cover sprocket holes.
- ⑥ Cumulative tolerance of sprocket holes, 10 pitches:  $\pm 0.3\text{mm}$ .
- ⑦ Peeling off force: 0.1 to 0.6N in the direction shown down.

Note: Specifications are subject to change without notice.

