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EYANG TECHNOLOGY DEVELOPMENT CO.,LTD

High-Q, High-Power Multilayer Ceramic Chip Capacitors

Model selection reference book

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Mark：The Model selection reference book is for design reference only.

High-Q, High-Power Multilayer Ceramic Chip Capacitors

1. Scope

This specification applies to High-Q, High-Power Multilayer Ceramic Chip Capacitors (MLCCs).

Application Scope: High-power RF signal transmission/reception in: Telecommunications base station power amplifiers,Low Earth Orbit (LEO) satellite transceiver systems.

1.1 Temperature Characteristics:

Class1 (Temperature Compensating Type): C0G\X8G

1.2 Size Code: 0201\0402\0603\0805

1.3 Capacitance: 0.1pF~1nF

2. Part Number System

P	0603	C0G	8R2	C	251	N	T	U
① Series Code	② Size Code	③ Temperature Characteristics	④ Nominal Capacitance	⑤ Capacitance Tolerance	⑥ Rated Voltage	⑦ Termination Type	⑧ Packaging Code	⑨ Thickness Code

① Series Code P - High-Q, High-Power MLCC (Internal Electrodes: Cu)

② Size Code (Unit:mm)

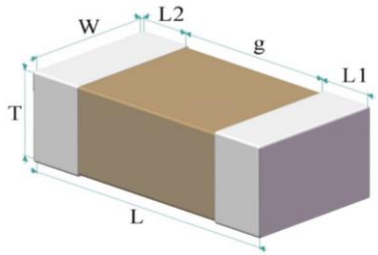


Fig.1 Structure & Dimension

Size Code	L	W	L1,L2	g	T	**⑨ Thickness Code**
0201	0.60±0.03	0.30±0.03	0.10 ~ 0.20	0.20min.	0.30±0.03	**A**
0402	1.00±0.05	0.50±0.05	0.15 ~ 0.35	0.30min.	0.50±0.05	**B**
0603	1.60±0.10	0.80±0.10	0.20 ~ 0.50	0.50min.	0.70±0.10	**U**
0805	2.00±0.10	1.25±0.10	0.20 ~ 0.70	0.70min.	0.85±0.10	**E**

③ Temperature Characteristics

Temperature Characteristics	Operating Temp. Range	Temperature Characteristics		
		Temp. coeff. or Cap. Change	Temp. Range	Ref. Temp.
C0G	-55℃~125℃	0±30ppm/℃	25℃~125℃	25℃
X8G	-55℃~150℃	0±30ppm/℃	25℃~150℃	25℃

④ Nominal Capacitance （Unit: pF）1pF=10^{-3}nF =10^{-6}μF

Example :R47=0.47 pF ,2R2=2.2 pF ,120=12×10^{0}=12pF，104=10×10^{4}=100000 pF=100 nF，

Class1(C0G) Capacitance Step in E24 series. Capacitance: See Table3

⑤ Capacitance Tolerance

Code	Capacitance Tolerance	Code	Capacitance Tolerance
A	±0.05pF	**F**	±1%
B	±0.1pF	**G**	±2%
C	±0.25pF	**J**	±5%
D	±0.5pF	**K**	±10%

⑥ Rated Voltage

Code	Voltage Values
201	200V
251	250V
501	500V

⑦ Termination Type

Code	Terminal Electrodes	Plating Material
N	Cu	Ni/Sn
M	Cu	Cu/Sn

⑧ Packaging Code See Table 4.

Table 3: Capacitance Table (Class1-C0G\X8G)

NO.	Series Code	Temperature Characteristics	Size Code	Rated Voltage	Thickness code	Capacitance
1	P	C0G	0201	200V	A	0.1pF~22pF
2	P	C0G	0402	250V	B	0.1pF~100pF
3	P	C0G	0402	200V	B	0.1pF~100pF
4	P	C0G	0603	250V	U	0.1pF~130pF
5	P	C0G	0805	250V	E	0.2pF~1nF
6	P	X8G	0201	200V	A	0.1pF~22pF
7	P	X8G	0402	250V	B	0.1pF~100pF
8	P	X8G	0402	200V	B	0.1pF~100pF
9	P	X8G	0603	250V	U	0.1pF~130pF
10	P	X8G	0805	500V	E	0.2pF~270pF
11	P	X8G	0805	250V	E	0.2pF~1nF

Table 4 Packaging（Minimum Quantity）

NO.	Size Code	Thickness Code	Square hole spacing	Disc Size	Carrier Tape Type	QTY (Kpcs)	Packaging Code
1	0201	A	2mm	7〃	Paper	15	T
2	0201	A	2mm	13〃	Paper	50	J
3	0201	A	1mm	13〃	Paper	140	A
4	0201	A	2mm	13〃	Paper	70	M
5	0402	B	2mm	7〃	Paper	10	T
6	0402	B	2mm	13〃	Paper	50	J
7	0603	U	4mm	7〃	Paper	4	T
8	0805	E	4mm	7〃	Paper	4	T

First packaging: Each multi-disc material is packed into a box.

The second packaging: the first packaged packaging box is loaded into the paper packaging box,and the remaining space in the box is filled with light auxiliary materials.

The above packaging forms can also be packaged according to user needs.

3.Technical Specifications and Test Methods

3.1 Operating Environment

Temp. Characteristics	Temp. Range	Relative Humidity	Atmospheric Pressure
C0G	-55℃～125℃	≤95%（25℃）	86 KPa~106KPa
X8G	-55℃～150℃	≤95%（25℃）	86 KPa~106KPa

3.2 Reliablility Test Specifications and Methods

Without specific note, the "test method" in Table 5 is based on GB/T 21041/21042 IDT IEC60384 .

Table 5 Specifications and Methods

No.	Item	Specification	Test Method	
1	Appearance	No obvious defects on ceramic body and termination.	Visual examination under a microscope	
2	Size Code	See Fig.1 and ② Size Code	Measuring by gages which precision is not less than 0.01 mm.	
3	Capacitance	Within the specified tolerance	Measurement Temperature	18～28℃
4	Q	0201 C＜30pF:Q≥400+20C 0402/0603/0805: C≥30pF:Q≥1400 C＜30pF:Q≥800+20C C: Nominal Capacitance (pF)	Relative Humidity Measurement Frequency Measurement Voltage	≤RH 80% C≤1nF，f=1.0±0.1MHz C>1nF，f=1.0±0.1KHz 1.0±0.2Vrms
5	Insulation Resistance (I.R.)	≥10,000MΩ	Measurement Temperature Relative Humidity Measurement Voltage Charging Time Charge/discharge current	18～28℃ ≤RH 80% Rated Voltage 1min 50mA or lower
6	Voltage proof	No defects or abnormalities.	Test Voltage Applied Time Charge/discharge current	≥2.5×U_R t=1s~5s 50mA or lower
7	Temperature Characteristics of Capacitance	C0G: αc≤±30ppm/℃ (125℃)； -72≤αc≤+30ppm/℃ (-55℃); X8G:c≤±30ppm/℃ (150℃)； -72≤αc≤+30ppm/℃ (-55℃);	Pre-drying Measure the capacitance separately in 25℃、θ1、25℃、θ2、25℃, should satisfied relatived Temperature Coefficient of Capacitance (αc) . C0G X8G T.C. Measurement Voltage	16-24 hours θ1=-55℃，θ2=125℃ θ1=-55℃，θ2=150℃ 1.0±0.2Vrms

No.	Item	Specification		Test Method	
8	Resistance to Soldering Heat	Appearance	No visible damage and terminations uncovered shall be less than 25%.	Pre-heating	120℃~150℃,Time:60s
				Test Method	Solder bath
		Cap. Change	ΔC/C≤±2.5% or ±0.25pF, (Whichever is larger)	Solder alloy	Sn-Ag-Cu(Lead Free Solder)
		I.R.	initial specification	Temperature	(270±5)℃
		Q	initial specification	Duration of immersion	(10±1)s
		Voltage proof	No defects or abnormalities.	Depth of immersion	10 mm
				Post-treatment	Let sit for 24±2 hours at room temperature, then measure.
9	Solderability	Appearance	95% of the terminations is to be soldered evenly and continuously	Pre-heating	80℃~120℃,Time:10s~30s
				Test Method	Solder bath
				Flux	Solution of rosin ethanol
				Solder alloy	Sn-Ag-Cu(Lead Free Solder)
				Temperature	(245±5)℃
				Duration of immersion	(2.0±0.5)s
				Depth of immersion	10 mm
10	Substrate Bending test	Appearance	No defects or abnormalities	Mounting method	Solder the capacitor on the test substrate shown in Fig.2
		Cap. Change	ΔC/C≤±5% or ±0.5pF, (Whichever is larger)	Pressurization Method	Shown in Fig.3
				Flexure	1mm
				Holding Time	(5±1)s
11	Adhesive Strength of Termination	Appearance	No defects or abnormalities	Perform heat treament 3 times according to Lead-free reflow soldering profiles, the peak temperature is 260℃, and the time gap between each heat treament is more than 30 minutes.	
				Mounting method	Solder the capacitor on the test substrate shown in Fig.4
				Apply a pushing force of F for 10±1secs.	
				Pushing force	0201:F=2N 0402/0603:F=5N 0805:F=10N

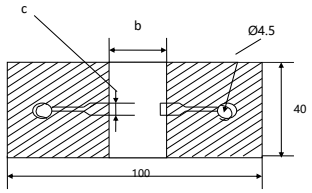


Fig: 2

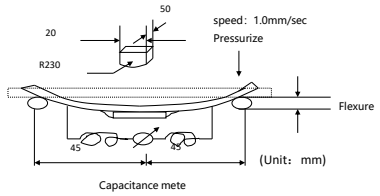


Fig: 3

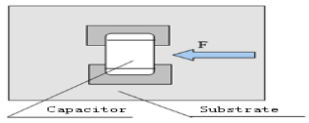
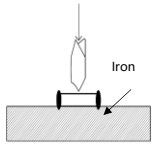
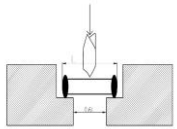


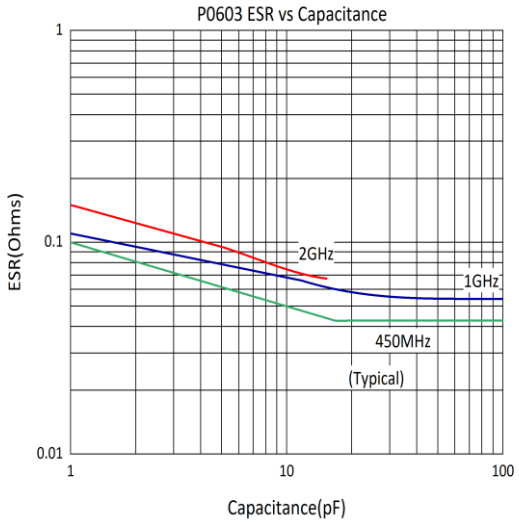
Fig: 4

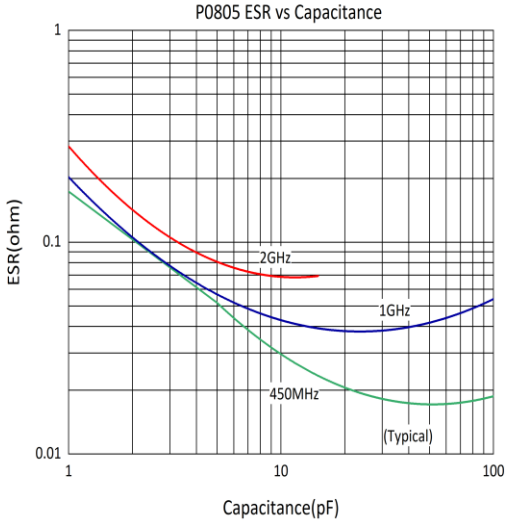
<table>
<tr><th>No.</th><th>Item</th><th>Specification</th><th>Test Method</th></tr>
<tr><td>12</td><td>Vibration</td><td>Appearance: No defects or abnormalities
Cap. Change: initial specification
I.R.: initial specification
Q: initial specification</td><td>Mounting method: Solder the capacitor on the test substrate
Amplitude: 1.5mm
Kind of Vibration: A simple harmonic motion
Frequency: 10Hz-55Hz-10Hz
Vibration Time: 1 min
Repeat this for 2hrs each in 3 perpendicular directions X, Y, Z, total 6hrs.</td></tr>
<tr><td>13</td><td>Rapid Change of Temperature</td><td>Appearance: No defects or abnormalities
Cap. Change: ΔC/C≤±2.5% or ±0.25pF, (Whichever is larger)
I.R.: initial specification
Q: initial specification
Voltage proof: No defects or abnormalities.</td><td>Perform heat treament 3 times according to Lead-free reflow soldering profiles, the peak temperature is 260℃, and the time gap between each heat treament is more than 30 minutes.
Mounting method: Solder the capacitor on the test substrate
The number of cycles: 100 cycles
Temperature Step
<table>
<tr><th>Step</th><th>Temp.(℃)</th><th>Time (min.)</th></tr>
<tr><td>1</td><td>θ1</td><td>30±3</td></tr>
<tr><td>2</td><td>25</td><td>2~5</td></tr>
<tr><td>3</td><td>θ2</td><td>30±3</td></tr>
<tr><td>4</td><td>25</td><td>2~5</td></tr>
</table>
C0G: θ1=-55℃、θ2=125℃
X8G: θ1=-55℃、θ2=150℃
Post-treatment: Let sit for 24±2 hours at room temperature, then measure.</td></tr>
<tr><td>14</td><td>Damp heat
(steady
state)</td><td>Appearance: No defects or abnormalities
Cap. Change: ΔC/C≤±7.5% or 0.75pF, (Whichever is larger)
I.R.: ≥500MΩ
Q: C≥30pF, Q≥200
C＜30pF，Q≥100+10C/3
C: Nominal Capacitance (pF)</td><td>Perform heat treament 3 times according to Lead-free reflow soldering profiles, the peak temperature is 260℃, and the time gap between each heat treament is more than 30 minutes.
Mounting method: Solder the capacitor on the test substrate
Test Temperature: 60±2℃
Test Humidity: RH 90～95%
Test Time: 500±12h
Post-treatment: Let sit for 24±2 hours at room temperature, then measure.</td></tr>
<tr><td>15</td><td>High Temperature
High Humidity
(Steady)</td><td>Appearance: No defects or abnormalities
Cap. Change: ΔC/C≤±7.5% or 0.75pF, (Whichever is larger)
I.R.: ≥500MΩ
Q: C≥30pF, Q≥200
C＜30pF，Q≥100+10C/3
C: Nominal Capacitance (pF)</td><td>Perform heat treament 3 times according to Lead-free reflow soldering profiles, the peak temperature is 260℃, and the time gap between each heat treament is more than 30 minutes.
Mounting method: Solder the capacitor on the test substrate
Test Temperature: 60±2℃
Test Humidity: RH 90～95%
Test Voltage: 1.0×U_R
Test Time: 500±12h
Charge/discharge curren: 50mA or lower
Post-treatment: Let sit for 24±2 hours at room temperature, then measure.</td></tr>
</table>

No.	Item	Specification	Test Method
16	Endurance	Appearance: No defects or abnormalities Cap. Change: ΔC/C≤±2% or ±0.2pF, (Whichever is larger) I.R.: ≥1000MΩ Q: C≥30pF, Q≥350 10pF < C < 30pF, Q≥275+5C/2 C≤10pF,Q≥200+10C C: Nominal Capacitance (pF)	Perform heat treament 3 times according to Lead-free reflow soldering profiles, the peak temperature is 260℃, and the time gap between each heat treament is more than 30 minutes. Mounting method: Solder the capacitor on the test substrate Test Temperature: θ2±3℃ [C0G:θ2=125℃,X8G:θ2=150℃] Test Voltage: 0402/0603/0805:2×U_R, 0201:1.5×U_R Test Time: 1000±12h Charge/discharge curren: 50mA or lower Post-treatment: Let sit for 24±2 hours at room temperature, then measure.
17	Beam Load Test	Destruction value: Destruction value should be exceed following one: 0201≥2N 0402/0603/0805≥4N	Mounting method: Place the capacitor in the beam load fixture as Fig 5/6 Speed supplied the Stress Load: 0402min. : 0.5mm/s, 0201: 0.1mm/s <Size Code:0805 max. >  Fig: 5 <Size Code:1206 min.>  Fig: 6
18	ESR	See test report	Measurement Frequency: 500MHz~3GHz Measurement Temperature: Room Temperature Measurement Instrument: Keysight 4991B
19	SRF	See test report	Measurement Temperature: Room Temperature Measurement Instrument: Keysight 4991B/5080B
20	ESR vs CaPacitance	See test report	Measurement Frequency: 450MHz/1GHz/2GHz Measurement Temperature: Room Temperature Measurement Instrument: Keysight 4991B
21	ESR vs Frequency	See test report	Measurement Frequency: 200MHz~2GHz Measurement Temperature: Room Temperature Measurement Instrument: Keysight 4991B
22	Q vs CaPacitance	See test report	Measurement Frequency: 450MHz/1GHz/2GHz Measurement Temperature: Room Temperature Measurement Instrument: Keysight 4991B
23	Resonant Frequency Data	See test report	Measurement Frequency: 500MHz~20GHz Measurement Temperature: Room Temperature Measurement Instrument: Keysight 5080B

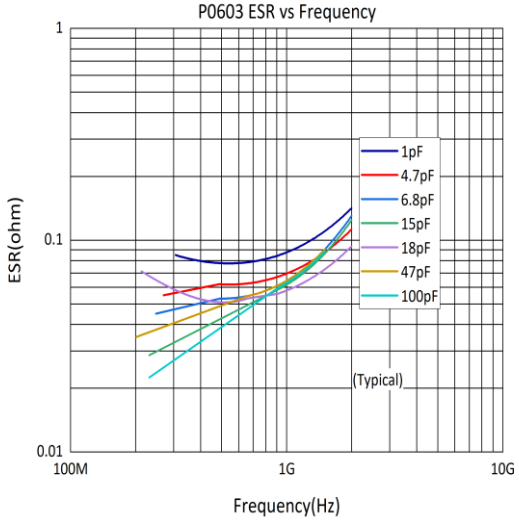
3.3 Characteristic Curve

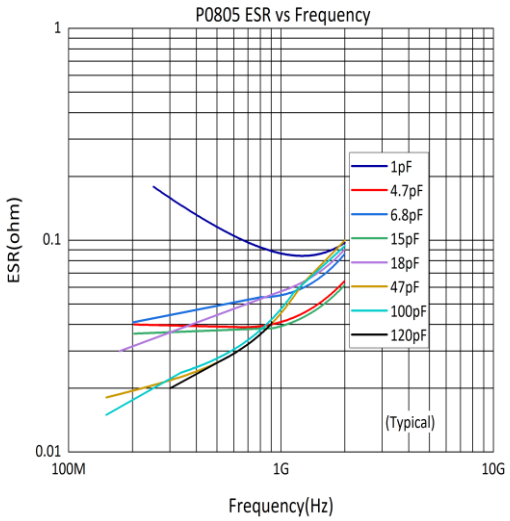
■ **ESR vs CaPacitance**



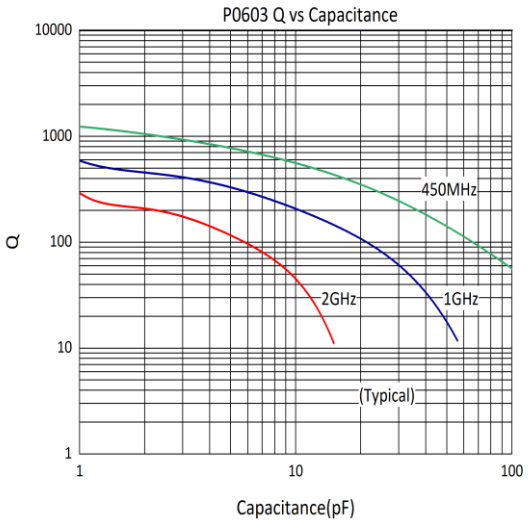


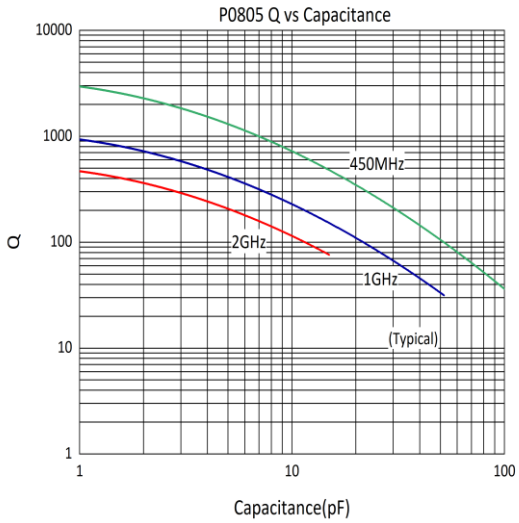
■ **ESR vs Frequency**



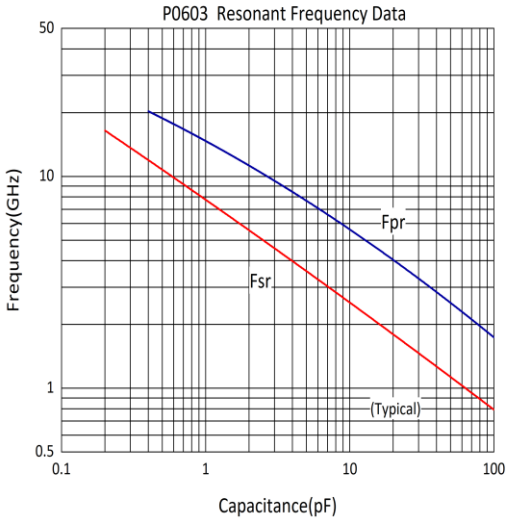


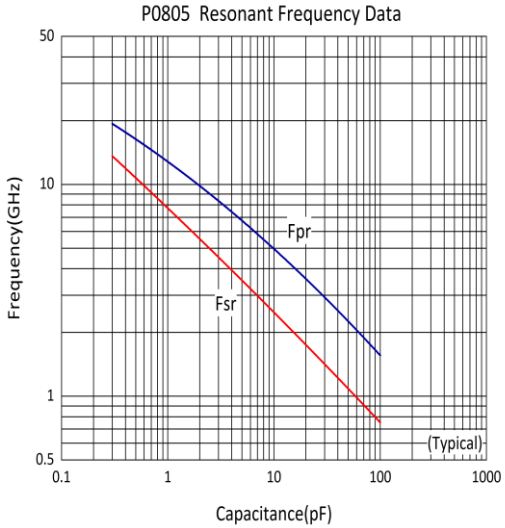
■ Q vs CaPacitance





■ Resonant Frequency Data





4. Packaging,Shipment and storage

4.1 Packaging

4.1.1 packaging type

Reel Packaging (standard carrier tape disc packaging), single disc smallest package See Table 4

4.1.2 Carrier Tape size

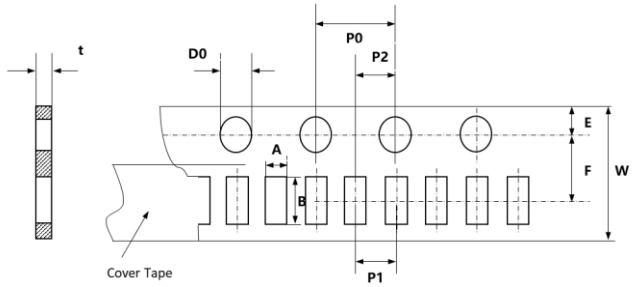


Fig. 7-3: 0402（Paper tape/ 2mm pitch）

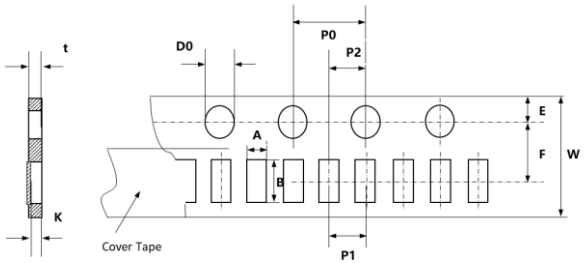


Fig. 7-4: 0201（Paper tape/ 2mm pitch）

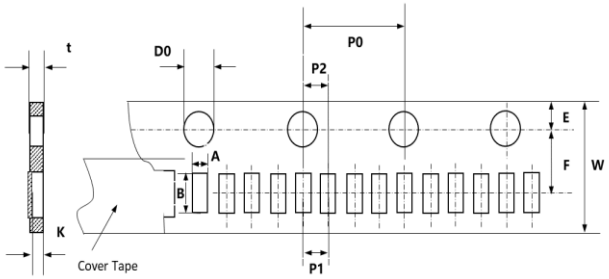


Fig. 7-5: 0201（Paper tape/ 1mm pitch）

Table 6-1 Carrier size (Size Code: 0201,0402) （Unit:mm）

Size Code	Thickness code	Carrier Tape Type	Packaging Code	A	B	F	P1	E	D0	P2	K	W	P0	t
0201	A	Paper	T	0.38 ± 0.03	0.68 ± 0.03	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	0.36 ± 0.02	8.00 ± 0.10	4.00 ± 0.10	0.5 max
0201	A	Paper	J	0.38 ± 0.03	0.68 ± 0.03	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	0.36 ± 0.02	8.00 ± 0.10	4.00 ± 0.10	0.5 max
0201	A	Paper	A	0.38 ± 0.03	0.68 ± 0.03	3.50 ± 0.05	1.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	1.00 ± 0.05	0.36 ± 0.02	8.00 ± 0.10	4.00 ± 0.10	0.5 max
0201	A	Paper	M	0.38 ± 0.03	0.68 ± 0.03	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	0.36 ± 0.02	8.00 ± 0.10	4.00 ± 0.10	0.5 max
0402	B	Paper	T	0.63 ± 0.05	1.13 ± 0.05	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.10	4.00 ± 0.10	0.8 max
0402	B	Paper	J	0.63 ± 0.05	1.13 ± 0.05	3.50 ± 0.05	2.00 ± 0.05	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.10	4.00 ± 0.10	0.8 max

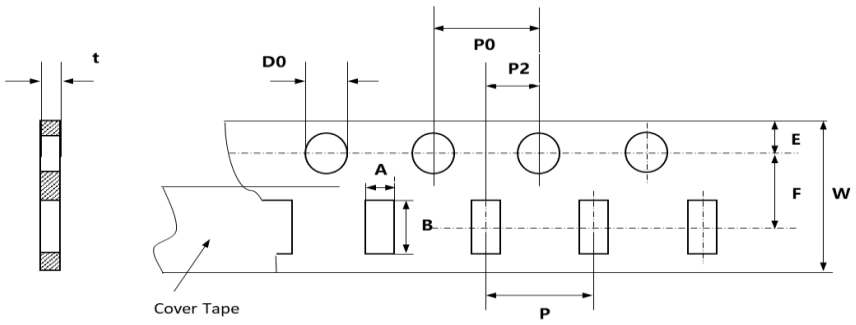


Fig. 7-1: 0603,0805（Paper tape）

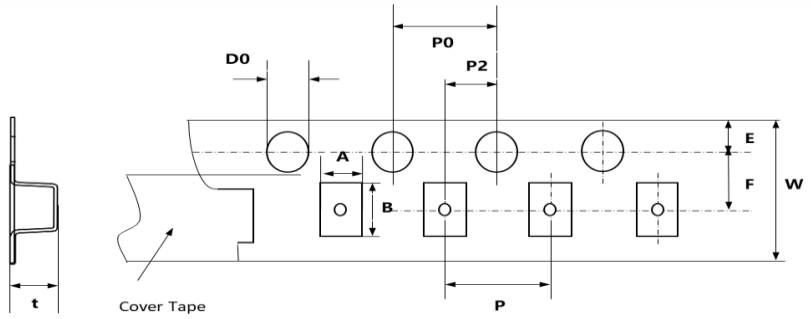


Fig. 7-2: 0603,0805（Plastic tape）

Table 6-2 Carrier size (Size Code:0603,0805) （Unit:mm）

Size Code	Thickness code	Carrier Tape Type	Packaging Code	A	B	F	P	E	D0	P2	K	W	P0	t
0603	U	Paper	T	1.00 ± 0.10	1.80 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	0.95 max
0805	E	Paper	T	1.45 ± 0.20	2.20 ± 0.20	3.50 ± 0.05	4.00 ± 0.10	1.75 ± 0.10	1.55 ± 0.05	2.00 ± 0.05	/	8.00 ± 0.20	4.00 ± 0.10	1.15 max

4.1.3 Disc size

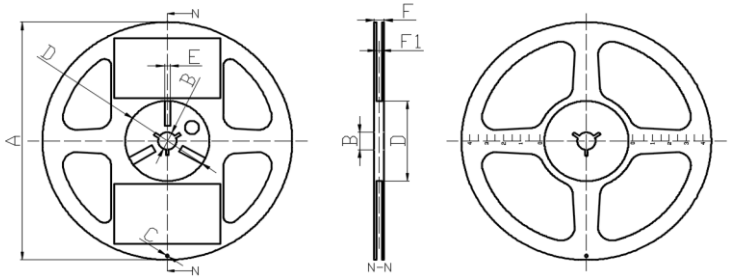


Fig. 8: disc（Width of carrier-8mm)

Table 7: Disc size （Unit:mm）

Disc size	Width of carrier	A	B	C	D	E	F	F1	Size Code
7″	8.00 ± 0.10	Φ178 ± 2.0	Φ13 ± 1.0	Φ4.0 ± 0.5	Φ60 ± 2.0	4.0 ± 1.0	11.5 ± 1.0	10.0 ± 2.0	All
13″	8.00 ± 0.10	Φ330 ± 2.0	Φ13 ± 1.0	Φ4.0 ± 0.5	Φ108 ± 2.0	4.0 ± 1.0	13.5 ± 2.0	10.0 ± 2.0	All

4.1.4 Carrier Tape specifications

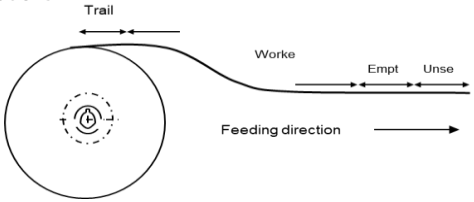


Fig. 9: Carrier

Packaging	The minimum length of the reserved spaces		
Carrier	Trailer	Empty	Unseal
	60 mm	200mm	160mm

4.1.5 Performance of Carrier Taping

4.1.5.1 Strength of Carrier Tape and Top Cover Tape

a. Carrier Tape

When a tensile force 1.02kgf is applied in the direction to unreel the tape, the tape shall withstand this force.

b. Top cover Tape

When a tensile force 1.02kgf is applied to the tape, the tape shall withstand this force.

4.1.5.2 Peeling Strength of Top Cover Tape

Unless otherwise specified, the peeling strength of top cover tape shall be within 10.2 to 71.4 gf when the top cover tape is pulled at a speed of 300mm/min with the angle of 0 to 15°(see Fig.10).

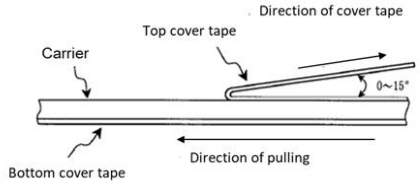


Fig.10: Cover tape peel-off force

4.2 Shipment

Transport packaging products to adapt to the modern means of transport, but the product in the process of transport to prevent rain and acid and alkali corrosion, shall not be whipped extrusion casting and gravit

4.3 Storage

4.3.1 Storage Conditions

Capacitors: Complies with MSL Level 1 standard. Floor Life: Unlimited time, under the condition of ≤ 30°C and 85% RH.

Packaging Material: Standard temperature range: 5°C to 40°C, with a recommended temperature below 30°C; Relative humidity: less than 70% RH.

Storage conditions for the packaged product should be used as the primary reference. High temperature, humidity, and/or prolonged storage may lead to deterioration of the packaging materials.

If the storage duration exceeds one year, solderability should be checked before use. The performance of the product may be affected by storage conditions; therefore, it should be used promptly after delivery.

4.3.2 Corrosive gas can react with the termination (external) electrodes or lead wires of capacitors, and result in poor solderability.

Do not store the capacitors in an atmosphere consisting of corrosive gas (e.g.,hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)

5. MLCC Application of Technical Requirements

5.1 Circuit Design

5.1.1 Operating Temperature

a. Do not use capacitor above the maximum allowable operating temperature.

b. Surface temperature including self-heating should be below maximum operating temperature.

5.1.2 Operating Voltage

The operating voltage for capacitors must always be lower than their rated voltage.

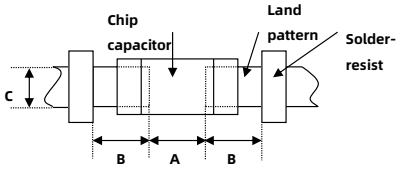
5.2 PCB Design

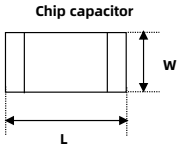
5.2.1 Design of Land-patterns

When the capacitors are mounted on a PCB, the amount of solder at the terminations has a direct effect on the performance of the capacitors.

The greater the amount of solder, the higher the stress on the capacitor. Therefore, when designing land-patterns, it is necessary to consider the appropriate size and configuration of the solder pads.

Size and recommended land dimensions are shown in the following figure and table.



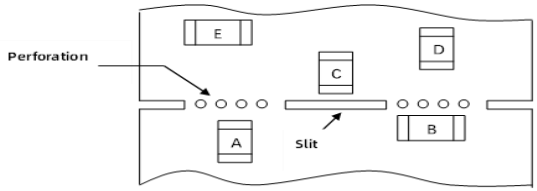


Recommended land dimensions for reflow-soldering (unit: mm)

Size Code	Length	Width	Tolerance	A	B	C
0201	0.6	0.3	±0.03	0.20-0.25	0.20-0.30	0.20-0.35
0201	0.6	0.3	±0.05	0.20-0.25	0.25-0.35	0.30-0.40
0201	0.6	0.3	±0.09,±0.1	0.23-0.30	0.25-0.35	0.30-0.40
0402	1.0	0.5	±0.05	0.30-0.50	0.35-0.45	0.40-0.60
0402	1.0	0.5	±0.15, ±0.20	0.40-0.60	0.40-0.50	0.50-0.70
0402	1.0	0.5	±0.30	0.40-0.60	0.40-0.50	0.50-0.80
0603	1.6	0.8	±0.10	0.60-0.80	0.60-0.70	0.60-0.80
0603	1.6	0.8	±0.20	0.70-0.90	0.70-0.80	0.80-1.00
0603	1.6	0.8	±0.25, ±0.30	0.70-0.90	0.70-0.90	0.80-1.10
0805	2.0	1.25	± 0.10,± 0.15, ± 0.20	1.00-1.40	0.60-0.80	1.20-1.40
0805	2.0	1.25	± 0.25	1.00-1.40	0.70-0.90	1.35-1.55

5.2.2 Capacitor Layout on PC Board

Mechanical stress varies according to the location of capacitors on PC board. The recommendation for better design is as follows

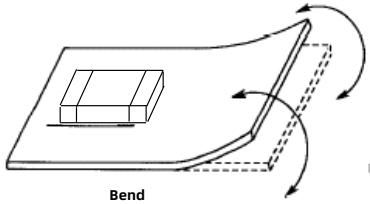


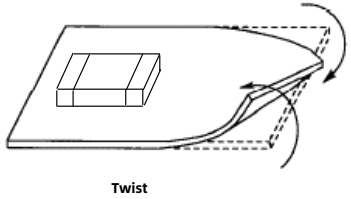
The stress in capacitors is in the following order: A > B = C > D > E

Pay attention not to bend or distort the PC board otherwise the capacitor may crack.

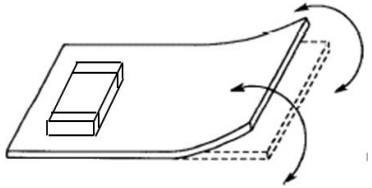
Please refer to the following examples of good and bad capacitors layout.

a. Not recommended



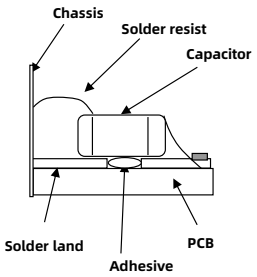


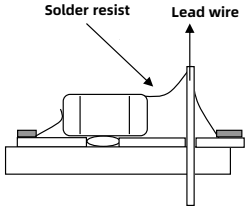
b. Recommended

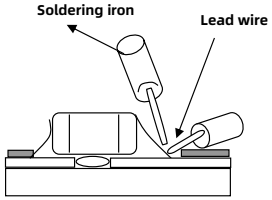


5.2.3 Solder Buildup and Soldering

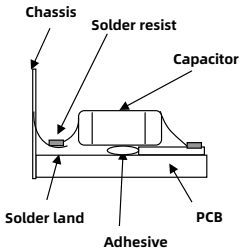
a. Examples of soldering method not recommended

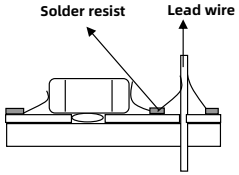


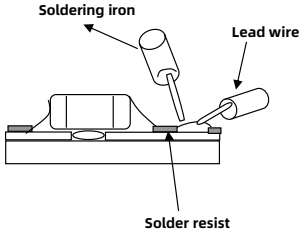




b. Examples of soldering method recommended







5.3 Consideration for Automatic Placement

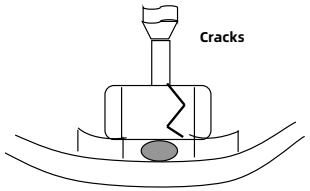
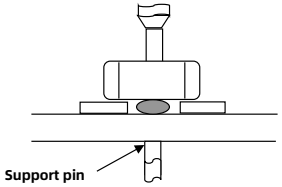
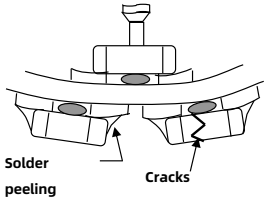
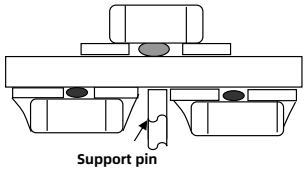
If the mounting head is adjusted too low, it may induce excessive stress in the chip capacitor to result in cracking. Please take following precautions

a.Adjust the bottom dead center of the mounting head to reach on the PC board surface and not press it;

b.Adjust the mounting head pressure to be 1N to 3N of static weight;

c.To minimize the impact energy from mounting head, it is important to provide support from the bottom side of the PC board.

Please refer to the following samples

Mounting	Not recommended	Recommended
Singel-sided Mounting		
Double-sided Mounting		

5.4 Soldering

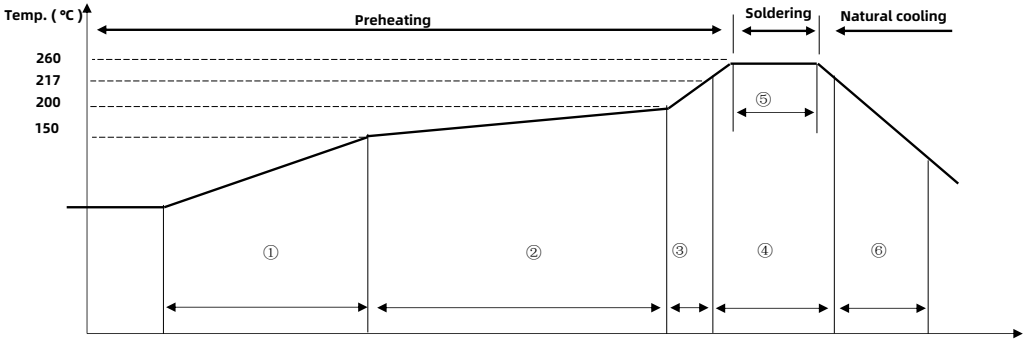
5.4.1 Flux Selection

a.It is recommended to use a mildly activated rosin flux (less than 0.1wt% chlorine). Strong flux is not recommended.

b.Please provide proper amount of flux. Excessive flux must be avoided.

c.When water-soluble flux is used, enough washing is necessary.

5.4.2 Recommended Soldering Profile



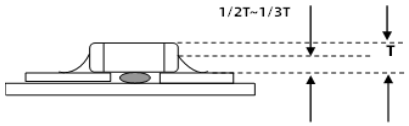
5.4.2.1 Reflow Soldering Condition

NO.	Reflow Soldering zone	Reflow Soldering Condition
①	Preheating 1	≤ 3 ℃/s, ≥ 60 s
②	Constant temperature	150℃- 200℃, 60 s-120 s, ≤1 ℃/s
③	Preheating 1	1-5 ℃/s
④	Soldering 1	Above 217 ℃, 60-150 s
⑤	Soldering 1	Above 260 ℃,over 10 s
⑥	Natural cooling	≤6 ℃/s

Caution

a.Excessive solder will induce higher tensile force in chip capacitor when temperature changes and result in cracking. Insufficient solder may detach the capacitor from the PC board.

The ideal condition is to have solder mass controlled to 1/2 to 1/3 of the thickness of the capacitors.



b.Soldering duration should be kept as close to recommended times as possible, because excessive duration can detrimentally affect solderability.

c.The peak temperature of reflow soldering is 245 ℃ ± 15 ℃.

d. For MLCC applications, EYANG recommends no more than 3 reflow soldering cycles.

6. All products in this specification comply with the EU RoHS directive

The EU RoHS Directive refers to the "Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment" stipulated by the European Union.