

• 電容器及介質種類

* NPO (COG): 此類介質材料的電容器，其電性能最穩定，幾乎不隨溫度、電壓和時間的變化而變化。適用於低損耗，穩定性要求高的高頻電路，如濾波器，振動器和計時電路中。

* X7R: X7R 材料具有較高的介電常數。

此類電容器的容量比 NPO 類電容器的容量高，具有較穩定的溫度特性，適用於容量範圍廣，穩定性要求不高的電路中，如隔直、耦合、旁路、鑿頻等電路中。

* Y5V: 此類介質的電容器是所有電容器中介電常數最大的電容器，但其容量穩定性較差，對溫度、電壓等條件較敏感，適用於要求大容量，溫度變化不大的電路中。

• 容量和容量偏差:

不同的電路需要不同的容量和容量偏差。因此，客戶應根據自己的需要進行選擇。

• 電壓:

電壓的選擇也應根據客戶自身要求而定。

• 外電極(端頭電極)

我公司可提供兩種端頭電極的電容器。一種是純銀端頭。另一種是三層電鍍端頭，三層指銀層，鎳層和錫層。客戶可根據自己的焊接方式選擇合適的端頭類別。

• 包裝:

我公司電容器的包裝形式主要有散包裝和編帶包裝，其中散包裝有盒裝散包裝和袋裝散包裝，編帶包裝有紙帶編帶包裝和膠帶編帶包裝。

• 非標項目:

我公司可根據客戶的特殊要求對電容器產品進行客戶附加的特殊性能指標項目的測試。



• DIELECTRIC MATERIAL TYPE OF CAPACITOR

* NPO(COG):The electrical properties of this kind of capacitor are the most stable one and have little change with temperature, voltage and time.They are suited of applications where low-losses and high stability are required , such as filters,oscillators,and timing circuits.

* X7R: X7R material is a kind of material, which has high dielectric constant. The capacitance of this kind of capacitors is higher than that of NPO . These capacitors are classified as having a semisatble temperature characteristic and used over a wide temperature range, such as blocking, coupling, bypassing and frequency discriminating circuit.

* Y5V: These capacitors have 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 and measuring conditions, such as temperature and voltage, etc.

• CAPACITANCE AND CAPACITANCE TOLERANCE

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

• VOLTAGE

The selection of voltage is depended on the customer's requirements.

• OUTER ELECTRODE(TERMINATIONS)

We can provide two kinds of teminations.One is Silver. The other is built up of three plating layers,Silverlayer, Nickel layer and Tin layer. What kind of termination to be chosen is depended on the soldering method.

• PACKAGE

There are two types of package. One is bulk package, including bulk case and bulk bag. The other is taping package, including paper tape and embossed tape.

• NONSTANDARD ITEMS

For nonstandard items, we can test the extra items according to customers' special requirements.

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

• MLCC的結構及其尺寸 STRUCTURE AND DIMENSIONS OF MLCC

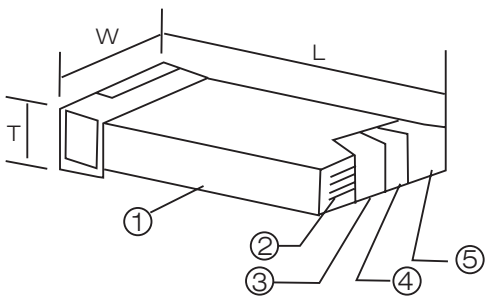


• 尺寸 DIMENSIONS

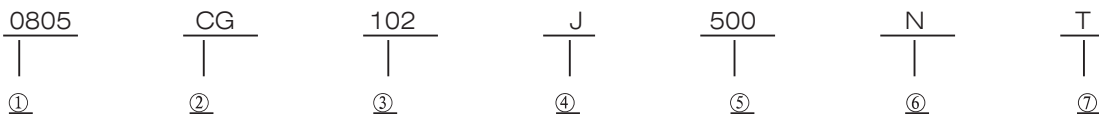
Table 3

| 型號 Type | 尺寸 Dimensions (mm) | | | |
|------------|--------------------|-------------|---|-------------|
| | L | W | T | WB |
| 0402 | 1.00 ± 0.05 | 0.50 ± 0.05 | 0.5 ± 0.05 | 0.25 ± 0.10 |
| 0603 | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.80 ± 0.1 | 0.30 ± 0.10 |
| 0805 | 2.00 ± 0.20 | 1.25 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.20 |
| 1206 | 3.20 ± 0.30 | 1.6 ± 0.2 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.25 |
| 1210 | 3.20 ± 0.30 | 2.50 ± 0.30 | 1.25 ± 0.30 1.50 ± 0.30 | 0.75 ± 0.25 |
| 1808 | 4.50 ± 0.40 | 2.00 ± 0.20 | ≤ 2.0 | 0.75 ± 0.25 |
| 1812 | 4.50 ± 0.40 | 3.20 ± 0.30 | ≤ 2.5 | 0.75 ± 0.20 |
| 2225 | 5.70 ± 0.50 | 6.30 ± 0.50 | ≤ 2.5 | 1.00 ± 0.25 |
| 3035 | 7.60 ± 0.50 | 9.00 ± 0.50 | ≤ 3.0 | 1.00 ± 0.25 |

• 結構 STRUCTURE



| 序號 NO | 名稱 Name | 材料 Material |
|----------|----------------------------|----------------------------------|
| ① | 陶瓷介質 Ceramic dielectric | 瓷粉 ceramic Powder |
| ② | 內電極 Inner electrode | 鈀/銀/鎳 Palladium/Silver/Nickel |
| ③ | 外電極 substrate electrode | 銀/銅 Silver/Copper |
| ④ | 鎳層 Nickel Plating Layer | 鎳 Nickel |
| ⑤ | 錫層 Tin Plating Layer | 錫 Tin |

• 訂貨方式 HOW TO ORDER


說明(NOTES) :

①產品的尺寸說明DIMENSIONS

單位unit: inch

| 尺寸規格 Size Code | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2225 | 3035 |
|-------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 長×寬 (L×W) | 0.04×0.02 | 0.06×0.03 | 0.08×0.05 | 0.12×0.06 | 0.12×0.10 | 0.18×0.12 | 0.22×0.25 | 0.30×0.35 |

②介質種類DIELECTRIC STYLE

| 介質種類代號(Dielectric Code) | CG | B | F | E |
|---------------------------|---------|-----|-----|-----|
| 介質材料(Dielectric material) | COG/NPO | X7R | Y5V | Z5U |

③標稱容量NOMINAL CAPACITANCE

單位unit: PF

| | | |
|-----|--------------------|---|
| 102 | 10×10 ² | 注：頭兩位數字為有效數字，第三位數字為0的個數；R為小數點。 Note: 1 st two digits are significant; third digit denotes number of zeros; R=decimal. |
| 0R5 | 0.5 | |
| 1R0 | 1.0 | |
| 224 | 22×10 ⁴ | |
| ... | ... | |

④容量誤差CAPACITANCE TOLERANCE

| 代 碼 (CODE) | B | C | D | F | G | J | K | M | S | Z |
|--------------------|---------|---------|--------|-------|-------|-------|------|------|--------------|--------------|
| 誤 差 (Tolerance) | ±0.10pF | ±0.25pF | ±0.5pF | ±1.0% | ±2.0% | ±5.0% | ±10% | ±20% | +50% -20% | +80% -20% |

⑤額定電壓Rated Voltage

單位unit: V

| 表示方式 (express method) | 160 | 250 | 500 | 630 | 101 | 201 | 501 | 102 | 202 |
|--------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| 實際值 (actual value) | 16×10 ⁰ | 25×10 ⁰ | 50×10 ⁰ | 63×10 ⁰ | 10×10 ¹ | 20×10 ¹ | 50×10 ¹ | 10×10 ² | 20×10 ² |

⑥端頭材料TERMINAL MATERIALS

| | |
|---|---|
| S | 純銀端頭 Silver |
| N | 電鍍端頭 Plating Termination 銀層 Copper/Silver Layer 鎳層 Nickel Layer 錫層 Tin Layer |

⑦包裝方式PACKAGE STYLES

| 無標記(NO MARKS) | T | B |
|-------------------|-----------------------|--------------------|
| 塑料袋散包裝(BULK BAG) | 編帶包裝(TAPING PACKAGE) | 塑料盒散包裝(BULK CASE) |

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

■ 通用型高頻COG類多層片狀陶瓷電容器 GENERAL COG MLCC

● 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

| 尺寸規格 SIZE CODE | 尺寸 DIMENSIONS(mm) | | | | 工作電壓 OPERATING VOLTAGE(V) | 容量範圍 CAPACITANCE(pF) |
|-------------------|-------------------|-------------|---|-------------|---------------------------------|-------------------------|
| | L | W | T | WB | | NPO(COG) |
| 0402 | 1.00 ± 0.05 | 0.50 ± 0.05 | 0.50 ± 0.05 | 0.25 ± 0.10 | 25 | 1.0 ~ 470 |
| | | | | | 50 | 1.0 ~ 220 |
| 0603 | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.80 ± 0.10 | 0.30 ± 0.10 | 25 | 1.0 ~ 1000 |
| | | | | | 50 | 0.5 ~ 820 |
| | | | | | 100 | 0.5 ~ 820 |
| | | | | | 200 | 0.5 ~ 330 |
| 0805 | 2.00 ± 0.20 | 1.25 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.20 | 25 | 0.5 ~ 3300 |
| | | | | | 50 | 0.5 ~ 2200 |
| | | | | | 100 | 0.5 ~ 1000 |
| | | | | | 200 | 0.5 ~ 820 |
| | | | | | 500 | 0.5 ~ 470 |
| 1206 | 3.20 ± 0.30 | 1.60 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.25 | 25 | 0.5 ~ 4700 |
| | | | | | 50 | 0.5 ~ 3900 |
| | | | | | 100 | 0.5 ~ 2700 |
| | | | | | 200 | 0.5 ~ 1000 |
| | | | | | 500 | 0.5 ~ 820 |
| | | | | | 1000 | 0.5 ~ 470 |
| 1210 | 3.20 ± 0.30 | 2.50 ± 0.30 | 1.25 ± 0.30 1.50 ± 0.30 | 0.75 ± 0.25 | 25 | 560 ~ 10000 |
| | | | | | 50 | 560 ~ 7500 |
| | | | | | 100 | 10 ~ 4700 |
| | | | | | 200 | 10 ~ 2700 |
| | | | | | 500 | 10 ~ 1800 |
| | | | | | 1000 | 10 ~ 820 |
| | | | | | 2000 | 10 ~ 220 |
| 1808 | 4.50 ± 0.40 | 2.00 ± 0.20 | ≤ 2.0 | 0.75 ± 0.25 | 25 | 10 ~ 8200 |
| | | | | | 50 | 10 ~ 6800 |
| | | | | | 100 | 10 ~ 4700 |
| | | | | | 200 | 10 ~ 2700 |
| | | | | | 500 | 10 ~ 1800 |
| | | | | | 1000 | 10 ~ 820 |
| 1812 | 4.50 ± 0.40 | 3.20 ± 0.30 | ≤ 2.5 | 1.00 ± 0.25 | 25 | 10 ~ 15000 |
| | | | | | 50 | 10 ~ 10000 |
| | | | | | 100 | 10 ~ 10000 |
| | | | | | 200 | 10 ~ 5600 |
| | | | | | 500 | 10 ~ 2700 |
| | | | | | 1000 | 10 ~ 1000 |
| | | | | | 2000 | 10 ~ 330 |
| 2225 | 5.70 ± 0.50 | 6.30 ± 0.50 | ≤ 2.5 | 1.00 ± 0.25 | 3000 | 10 ~ 270 |
| | | | | | 25 | 1000 ~ 4700 |
| | | | | | 50 | 1000 ~ 22000 |
| | | | | | 100 | 10 ~ 22000 |
| | | | | | 200 | 10 ~ 12000 |
| | | | | | 500 | 10 ~ 3900 |
| | | | | | 1000 | 10 ~ 2200 |
| 3035 | 7.60 ± 0.50 | 9.00 ± 0.50 | ≤ 3.0 | 1.00 ± 0.25 | 2000 | 10 ~ 1000 |
| | | | | | 3000 | 10 ~ 680 |
| | | | | | 25 | 1000 ~ 100000 |
| | | | | | 50 | 1000 ~ 47000 |
| | | | | | 100 | 1000 ~ 33000 |
| | | | | | 200 | 1000 ~ 22000 |
| | | | | | 500 | 1000 ~ 18000 |
| | | | | | 1000 | 1000 ~ 8200 |
| | | | | | 2000 | 1000 ~ 3300 |

■ 通用型X7R多層片狀陶瓷電容器

GENERAL X7R MLCC

● 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

| 尺寸規格 SIZE CODE | 尺寸 DIMENSIONS(mm) | | | | 工作電壓 OPERATING VOLTAGE(V) | 容量範圍 CAPACITANCE(pF) |
|-------------------|-------------------|-------------|---|-------------|---------------------------------|-------------------------|
| | L | W | T | WB | | X7R(B) |
| 0402 | 1.00 ± 0.05 | 0.50 ± 0.05 | 0.50 ± 0.05 | 0.25 ± 0.10 | 16 | 100 ~ 10000 |
| | | | | | 25 | 100 ~ 10000 |
| | | | | | 50 | 100 ~ 10000 |
| 0603 | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.80 ± 0.10 | 0.30 ± 0.10 | 25 | 100 ~ 100000 |
| | | | | | 50 | 100 ~ 100000 |
| | | | | | 100 | 100 ~ 10000 |
| | | | | | 200 | 100 ~ 5600 |
| 0805 | 2.00 ± 0.20 | 1.25 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.20 | 25 | 150 ~ 220000 |
| | | | | | 50 | 150 ~ 220000 |
| | | | | | 100 | 150 ~ 33000 |
| | | | | | 200 | 150 ~ 22000 |
| | | | | | 500 | 150 ~ 12000 |
| 1206 | 3.20 ± 0.30 | 1.60 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.25 | 25 | 1000 ~ 220000 |
| | | | | | 50 | 470 ~ 150000 |
| | | | | | 100 | 150 ~ 100000 |
| | | | | | 200 | 150 ~ 68000 |
| | | | | | 500 | 150 ~ 15000 |
| | | | | | 1000 | 150 ~ 3300 |
| | | | | | 2000 | 150 ~ 1000 |
| 1210 | 3.20 ± 0.30 | 2.50 ± 0.30 | 1.25 ± 0.30 1.50 ± 0.30 | 0.75 ± 0.25 | 25 | 1000 ~ 330000 |
| | | | | | 50 | 470 ~ 220000 |
| | | | | | 100 | 150 ~ 220000 |
| | | | | | 200 | 150 ~ 100000 |
| | | | | | 500 | 150 ~ 27000 |
| | | | | | 1000 | 150 ~ 10000 |
| | | | | | 2000 | 150 ~ 2200 |
| 1808 | 4.50 ± 0.40 | 2.00 ± 0.20 | ≤ 2.0 | 0.75 ± 0.25 | 25 | 3300 ~ 470000 |
| | | | | | 50 | 3300 ~ 330000 |
| | | | | | 100 | 150 ~ 220000 |
| | | | | | 200 | 150 ~ 100000 |
| | | | | | 500 | 150 ~ 27000 |
| | | | | | 1000 | 150 ~ 10000 |
| | | | | | 2000 | 150 ~ 2200 |
| | | | | | 3000 | 150 ~ 1000 |
| 1812 | 4.50 ± 0.40 | 3.20 ± 0.30 | ≤ 2.5 | 0.75 ± 0.25 | 25 | 4700 ~ 470000 |
| | | | | | 50 | 4700 ~ 330000 |
| | | | | | 100 | 150 ~ 330000 |
| | | | | | 200 | 150 ~ 100000 |
| | | | | | 500 | 150 ~ 33000 |
| | | | | | 1000 | 150 ~ 15000 |
| | | | | | 2000 | 150 ~ 2200 |
| | | | | | 3000 | 150 ~ 1000 |
| 2225 | 5.70 ± 0.50 | 6.30 ± 0.50 | ≤ 2.5 | 1.00 ± 0.25 | 25 | 10000 ~ 2000000 |
| | | | | | 50 | 10000 ~ 1200000 |
| | | | | | 100 | 150 ~ 1200000 |
| | | | | | 200 | 150 ~ 100000 |
| | | | | | 500 | 150 ~ 68000 |
| | | | | | 1000 | 150 ~ 33000 |
| | | | | | 2000 | 150 ~ 10000 |
| | | | | | 3000 | 150 ~ 3300 |
| 3035 | 7.60 ± 0.50 | 9.00 ± 0.50 | ≤ 3.0 | 1.00 ± 0.25 | 25 | 10000 ~ 4700000 |
| | | | | | 50 | 10000 ~ 2200000 |
| | | | | | 100 | 1000 ~ 2200000 |
| | | | | | 200 | 1000 ~ 1000000 |
| | | | | | 500 | 1000 ~ 150000 |
| | | | | | 1000 | 1000 ~ 100000 |
| | | | | | 2000 | 1000 ~ 22000 |
| | | | | | 3000 | 1000 ~ 10000 |

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

■ 通用型Y5V、Z5U多層片狀陶瓷電容器

GENERAL Y5V, Z5U MLCC

● 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

| 尺寸規格 SIZE CODE | 尺寸 DIMENSIONS(mm) | | | | 工作電壓 OPERATING VOLTAGE | 容量範圍 CAPACITANCE(pF) | |
|-------------------|-------------------|-------------|---|-------------|------------------------------|-------------------------|--------|
| | L | W | T | WB | | Y5V(F) | Z5U(E) |
| 0402 | 1.00 ± 0.05 | 0.50 ± 0.05 | 0.50 ± 0.05 | 0.25 ± 0.10 | 16 | 1000 ~ 100000 | |
| | | | | | 25 | 1000 ~ 100000 | |
| | | | | | 50 | 1000 ~ 100000 | |
| 0603 | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.80 ± 0.10 | 0.30 ± 0.10 | 25 | 2200 ~ 1000000 | |
| | | | | | 50 | 2200 ~ 1000000 | |
| | | | | | 100 | 2200 ~ 68000 | |
| 0805 | 2.00 ± 0.20 | 1.25 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.20 | 25 | 10000 ~ 1000000 | |
| | | | | | 50 | 10000 ~ 1000000 | |
| | | | | | 100 | 10000 ~ 100000 | |
| | | | | | 200 | 10000 ~ 56000 | |
| 1206 | 3.20 ± 0.30 | 1.60 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.25 | 25 | 10000 ~ 1200000 | |
| | | | | | 50 | 10000 ~ 1000000 | |
| | | | | | 100 | 10000 ~ 220000 | |
| | | | | | 200 | 10000 ~ 1000000 | |
| 1210 | 3.20 ± 0.30 | 2.50 ± 0.30 | 1.25 ± 0.30 1.50 ± 0.30 | 0.75 ± 0.25 | 25 | 100000 ~ 1500000 | |
| | | | | | 50 | 100000 ~ 1500000 | |
| | | | | | 100 | 10000 ~ 560000 | |
| | | | | | 200 | 10000 ~ 150000 | |
| 1808 | 4.50 ± 0.40 | 2.00 ± 0.20 | ≤ 2.0 | 0.75 ± 0.25 | 25 | 100000 ~ 2200000 | |
| | | | | | 50 | 100000 ~ 2000000 | |
| | | | | | 100 | 10000 ~ 560000 | |
| | | | | | 200 | 10000 ~ 150000 | |
| 1812 | 4.50 ± 0.40 | 3.20 ± 0.30 | ≤ 2.5 | 0.75 ± 0.25 | 25 | 100000 ~ 3300000 | |
| | | | | | 50 | 100000 ~ 2200000 | |
| | | | | | 100 | 10000 ~ 1000000 | |
| | | | | | 200 | 10000 ~ 220000 | |
| 2225 | 5.70 ± 0.50 | 6.30 ± 0.50 | ≤ 2.5 | 1.00 ± 0.25 | 25 | 150000 ~ 4700000 | |
| | | | | | 50 | 150000 ~ 3300000 | |
| | | | | | 100 | 10000 ~ 2000000 | |
| | | | | | 200 | 10000 ~ 220000 | |
| 3035 | 7.60 ± 0.50 | 9.00 ± 0.50 | ≤ 3.0 | 1.00 ± 0.25 | 25 | 220000 ~ 10000000 | |
| | | | | | 50 | 220000 ~ 6800000 | |
| | | | | | 100 | 150000 ~ 2000000 | |
| | | | | | 200 | 150000 ~ 680000 | |

■ 溫度補償型多層片狀陶瓷電容器

TEMPERATURE COMPENSATING MLCC (HG, LG, PH, RH, SH, TH, UJ, SL)

• 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

| 尺寸規格 SIZE CODE | DIMENSIONS(mm) | | | | 工作電壓 OPERATING VOLTAGE (V) | 容量範圍CAPACITANCE(pF) | | | | | |
|-------------------|-----------------|-------------|---|-------------|-------------------------------------|----------------------|----|-----------|----------|------------|------------|
| | L | W | T | WB | | HG | LG | PH SH | RH TH | SL | UJ |
| 0603 | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.80 ± 0.10 | 0.30 ± 0.10 | 25 | 0.5 ~ 100 | | 0.5 ~ 270 | | 0.2 ~ 1000 | 0.2 ~ 330 |
| | | | | | 50 | 0.5 ~ 100 | | 0.5 ~ 270 | | 0.2 ~ 1000 | 0.2 ~ 330 |
| | | | | | 100 | 0.5 ~ 100 | | 0.5 ~ 220 | | 0.2 ~ 470 | 0.2 ~ 270 |
| | | | | | 200 | 0.5 ~ 100 | | 0.5 ~ 150 | | 0.2 ~ 330 | 0.2 ~ 220 |
| 0805 | 2.00 ± 0.20 | 1.25 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.20 | 25 | 0.5 ~ 220 | | 0.5 ~ 390 | | 0.5 ~ 1000 | 0.5 ~ 470 |
| | | | | | 50 | 0.5 ~ 220 | | 0.5 ~ 390 | | 0.5 ~ 1000 | 0.5 ~ 470 |
| | | | | | 100 | 0.5 ~ 220 | | 0.5 ~ 390 | | 0.5 ~ 470 | 0.5 ~ 390 |
| | | | | | 200 | 0.5 ~ 220 | | 0.5 ~ 330 | | 0.5 ~ 330 | 0.5 ~ 330 |
| | | | | | 500 | 0.5 ~ 220 | | 0.5 ~ 270 | | 0.5 ~ 330 | 0.5 ~ 270 |
| 1206 | 3.20 ± 0.30 | 1.60 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.25 | 25 | 0.5 ~ 470 | | 0.5 ~ 680 | | 0.5 ~ 4700 | 0.5 ~ 1000 |
| | | | | | 50 | 0.5 ~ 470 | | 0.5 ~ 680 | | 0.5 ~ 4700 | 0.5 ~ 1000 |
| | | | | | 100 | 0.5 ~ 470 | | 0.5 ~ 680 | | 0.5 ~ 2200 | 0.5 ~ 680 |
| | | | | | 200 | 0.5 ~ 470 | | 0.5 ~ 560 | | 0.5 ~ 560 | 0.5 ~ 560 |
| | | | | | 500 | 0.5 ~ 330 | | 0.5 ~ 470 | | 0.5 ~ 470 | 0.5 ~ 470 |
| | | | | | 1000 | 0.5 ~ 220 | | 0.5 ~ 330 | | 0.5 ~ 390 | 0.5 ~ 390 |
| | | | | | 2000 | 0.5 ~ 100 | | 0.5 ~ 150 | | 0.5 ~ 220 | 0.5 ~ 220 |

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

■ 高頻率響應高Q多層片狀陶瓷電容器

HIHG FREQUENCY RESPONDING HI-Q (CF,CQ) MLCC

● 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

| 尺寸規格 Size Code | 尺寸DIMENSIONS (mm) | | | |
|-------------------|-------------------|-------------|---|-------------|
| | L | W | T | WB |
| 0603 | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.80 ± 0.10 | 0.30 ± 0.10 |
| 0805 | 2.00 ± 0.20 | 1.25 ± 0.20 | 0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20 | 0.50 ± 0.20 |

CF 容量值及其Q值 CF Capacitance value and Q value:

| 容量 Capacitance (pF) | 300MHz時的Q值 Q value at 300MHz | | 容量 Capacitance (pF) | 300MHz時的Q值 Q value at 300MHz | | 容量 Capacitance (pF) | 300MHz時的Q值 Q value at 300MHz | |
|---------------------------|---------------------------------|------|---------------------------|---------------------------------|------|---------------------------|---------------------------------|------|
| | 0805 | 0603 | | 0805 | 0603 | | 0805 | 0603 |
| 4.7 | 400 | 320 | 15 | 130 | 104 | 47 | 40 | 32 |
| 5.2 | 360 | 288 | 16 | 120 | 96 | 51 | 36 | 29 |
| 5.6 | 340 | 272 | 18 | 100 | 80 | 56 | 34 | 28 |
| 6.2 | 320 | 256 | 20 | 90 | 72 | 62 | 32 | 26 |
| 6.8 | 280 | 224 | 22 | 86 | 69 | 68 | 30 | 24 |
| 7.5 | 260 | 208 | 24 | 80 | 64 | 75 | 28 | 23 |
| 8.2 | 230 | 184 | 27 | 70 | 56 | 82 | 26 | 21 |
| 9.1 | 210 | 168 | 30 | 60 | 48 | 91 | 24 | 20 |
| 10 | 200 | 160 | 33 | 56 | 45 | 100 | 22 | 18 |
| 11 | 180 | 144 | 36 | 52 | 42 | 110 | 20 | 16 |
| 12 | 160 | 128 | 39 | 48 | 39 | 120 | 28 | 15 |
| 13 | 150 | 120 | 43 | 44 | 36 | 130 | 16 | 13 |
| 14 | 140 | 112 | | | | | | |

CQ 容量值及其Q值 CQ Capacitance value and Q value:

| 容量 Capacitance (pF) | 300MHz時的Q值 Q value at 300MHz | | 容量 Capacitance (pF) | 300MHz時的Q值 Q value at 300MHz | | 容量 Capacitance (pF) | 300MHz時的Q值 Q value at 300MHz | |
|---------------------------|---------------------------------|------|---------------------------|---------------------------------|------|---------------------------|---------------------------------|------|
| | 0805 | 0603 | | 0805 | 0603 | | 0805 | 0603 |
| 4.7 | 960 | 640 | 11 | 432 | 288 | 24 | 192 | 128 |
| 5.2 | 864 | 576 | 12 | 384 | 256 | 27 | 168 | 112 |
| 5.6 | 816 | 544 | 13 | 360 | 240 | 30 | 144 | 96 |
| 6.2 | 768 | 512 | 14 | 336 | 224 | 33 | 125 | 90 |
| 6.8 | 672 | 448 | 15 | 312 | 208 | 36 | 115 | 83 |
| 7.5 | 624 | 416 | 16 | 288 | 192 | 39 | 105 | 77 |
| 8.2 | 552 | 368 | 18 | 240 | 160 | 43 | 96 | 70 |
| 9.1 | 504 | 336 | 20 | 216 | 144 | 47 | 86 | 64 |
| 10 | 480 | 320 | 22 | 206 | 134 | | | |

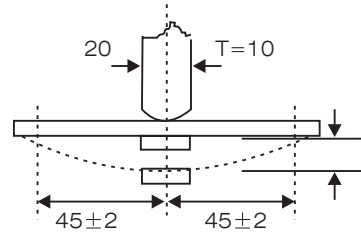
● 可靠性 RELIABILITY DATA

| 項目 Item | 技術規格 Technical Specification | | 測試方法 Test Method and Remarks | | |
|--|--|---|--|--|---------------------------|
| 容量 Capacitance | I 類 Class I | 應符合指定的誤差級別 Should be within the specified tolerance. | 標稱容量 Capacitance | 測試頻率 Measuring Frequency | 測試電壓 Measuring Voltage |
| | | | ≤ 1000pF | 1MHZ ± 10% | 1.0 ± 0.2Vrms |
| | | | > 1000pF | 1KHZ ± 10% | |
| | II 類 Class II | 應符合指定的誤差級別 Should be within the specified tolerance. | 對於 II 類電容器, 測試前應先預處理 For class II, pretreatment should be done before measurement. | | |
| | | | 測試頻率 Measuring Frequency | 測試電壓 Measuring Voltage | |
| | | | 1KHZ ± 10% | x7R | 1.0 ± 0.2Vrms |
| | | | | y5V | 0.5 ± 0.2Vrms |
| 損耗角正切 (DF, tan δ) Dissipation Factor | I 類 Class I | DF ≤ 0.15% | 標稱容量 Capacitance | 測試頻率 Measuring Frequency | 測試電壓 Measuring Voltage |
| | | | ≤ 1000pF | 1MHZ ± 10% | 1.0 ± 0.2Vrms |
| | | | > 1000pF | 1KHZ ± 10% | |
| | II 類 Class II | X7R | 額定電壓: Rated Voltage: ≥ 50V, DF ≤ 2.5% = 25V, DF ≤ 3.0% = 16V, DF ≤ 3.5% | 測試頻率: 1KHZ ± 10% 測試電壓: 1.0 ± 0.2Vrms Test Frequency: 1KHZ ± 10% Test Voltage: 1.0 ± 0.2Vrms | |
| | Y5V Z5U | 額定電壓: Rated Voltage: ≥ 50V, DF ≤ 5.0% = 25V, DF ≤ 7.0% = 16V, DF ≤ 9.0% | 測試頻率: 1KHZ ± 10% 測試電壓: 0.5 ± 0.2Vrms Test Frequency: 1KHZ ± 10% Test Voltage: 0.5 ± 0.2Vrms | | |
| 絕緣電阻(IR) Insulation Resistance | I 類 Class I | C ≤ 10nF, IR ≥ 50000MΩ C > 10nF, R.C ≥ 500ΩF | | 測試電壓: 額定電壓 測試時間: 60 ± 5秒 Measuring Voltage: Rated Voltage Duration: 60 ± 5s | |
| | II 類 Class II | X7R | C ≤ 25 nF, IR ≥ 10000MΩ C > 25 nF, R.C > 100ΩF | | |
| | | Y5V Z5U | C ≤ 25 nF, IR ≥ 4000MΩ C > 25 nF, R.C > 100ΩF | | |
| 介質耐電強度(DWV) Dielectric Withstanding Voltage | 不應有介質被擊穿或損傷 No breakdown or damage. | | 測量電壓: I 類: 300%額定電壓 II 類: 250%額定電壓 時間: 5 ± 1秒 充/放電電流: 不應超過50mA (這部分說明不包括中高壓MLCC) Measuring Voltage: Class I :300% Rated voltage Class II :250% Rated voltage Duration: 5 ± 1S Charge/ Discharge Current: 50mA max. (This method excludes high-voltage MLCC) | | |

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

| 項目 Item | 技術規格 Technical Specification | | | | | 測試方法 Test Method and Remarks |
|---|---|---|-----------|------------|-----|--|
| 可焊性 Solderability | 上錫率應大于95% 外觀：無可見損傷 At least 95% of the terminal electrode is covered by new solder. No visible damage. | | | | | 浸錫溫度：235 ± 5°C 浸錫速度：25 ± 2mm/sec 浸錫時間：2 ± 0.5s Solder Temperature: 235 ± 5°C Immersed Speed: 25 ± 2mm/sec Duration: 2 ± 0.5s |
| 耐焊接熱 Resistance to Soldering Heat | 項目 Item | NPO至SL NPO to SL | X7R | Y5V | Z5U | 將電容在100 ~ 200°C的溫度下預熱10 ± 2分鐘。 浸錫溫度：265 ± 5°C 浸錫時間：5 ± 1s 然後取出溶劑清洗干淨，在10倍以上的顯微鏡底下觀察。 Preheating conditions: 100 to 200°C 10 ± 2min Solder Temperature: 265 ± 5°C Duration: 5 ± 1s Clean the capacitor with solvent and examine it with a 10X(min.) Microscope. |
| | ΔC/C | ≤ 0.5% | -5 ~ +10% | -10 ~ +20% | | |
| | DF | 同初始標準 Same to initial value. | | | | |
| | ER | 同初始標準 Same to initial value. | | | | |
| 外觀：無可見損傷 上錫率：≥ 95% Appearance: No visible damage. At least 95% of the terminal electrode is covered by new solder. | | | | | | |
| 抗彎曲強度 Resistance to flexure of Substrate (Bending Strength) | 外觀：無可見損傷 Appearance: No visible damage. | | | | | 試驗基板：A1203或PCB 彎曲深度：1mm 施壓速度：0.5mm/sec. 單位：mm 應在彎曲狀態下進行測量。 Test Board: A1203 or PCB warp: 1mm Speed: 0.5mm/sec. Unit: mm The measurement should be made with the board in the bending position. |
| | ΔC/C | I類：≤ ± 0.5% Class I: ≤ ± 0.5% II類： B: ≤ ± 12.5% E, F: ≤ ± 30% Class II: B: ≤ ± 12.5% E, F: ≤ ± 30% | | | | |
| 端頭結合強度 Termination Adhesion | 外觀無可見損傷 No visible damage. | | | | | 施加的力：5N 時間：10 ± 1S Applied Force: 5N Duration: 10 ± 1S |



| 溫度循環 Temperature Cycle | $\Delta C/C$ | I 類: $\leq \pm 2.5\%$ 或 $\pm 0.25pF$ 取兩者中最大者 II 類: B: $\leq \pm 7.5\%$ E, F: $\leq \pm 20\%$ Class I: $\leq \pm 2.5\%$ or $\pm 0.25pF$ whichever is larger. Class II: B: $\leq \pm 7.5\%$ E, F: $\leq \pm 20\%$ | 預處理(2類)*: 上限類別溫度, 1小時 恢復: $24 \pm 1h$ 初始測量 循環次數: 5次 一個循環分以下4步: <table border="1" data-bbox="801 398 1388 683"> <thead> <tr> <th>階段</th> <th>溫度 (°C)</th> <th>時間 (分鐘)</th> </tr> </thead> <tbody> <tr> <td>第1步</td> <td>下限溫度</td> <td>30</td> </tr> <tr> <td>第2步</td> <td>常溫</td> <td>2 ~ 3</td> </tr> <tr> <td>第3步</td> <td>上限溫度</td> <td>30</td> </tr> <tr> <td>第4步</td> <td>常溫</td> <td>2 ~ 3</td> </tr> </tbody> </table> | 階段 | 溫度 (°C) | 時間 (分鐘) | 第1步 | 下限溫度 | 30 | 第2步 | 常溫 | 2 ~ 3 | 第3步 | 上限溫度 | 30 | 第4步 | 常溫 | 2 ~ 3 |
|--------------------------------|---------------------------------|--|--|-------------------|--------------|---------|--------------------|------|----|--------------|-------|-------|-------------------|------|----|--------------|-------|-------|
| | 階段 | 溫度 (°C) | 時間 (分鐘) | | | | | | | | | | | | | | | |
| | 第1步 | 下限溫度 | 30 | | | | | | | | | | | | | | | |
| 第2步 | 常溫 | 2 ~ 3 | | | | | | | | | | | | | | | | |
| 第3步 | 上限溫度 | 30 | | | | | | | | | | | | | | | | |
| 第4步 | 常溫 | 2 ~ 3 | | | | | | | | | | | | | | | | |
| DF | 同初始標準 Same to initial value. | 試驗后放置(恢復)時間: $24 \pm 2h$ | | | | | | | | | | | | | | | | |
| IR | 同初始標準 Same to initial value. | Preheating conditions* : up- category temperature, 1h Recovery time: $24 \pm 1h$ Initial Measurement Cycling Times: 5 times 1 cycle, 4 steps: <table border="1" data-bbox="801 878 1388 1162"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time(minute)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Low-category temp.</td> <td>30</td> </tr> <tr> <td>2</td> <td>Normal temp.</td> <td>2 ~ 3</td> </tr> <tr> <td>3</td> <td>Up-category temp.</td> <td>30</td> </tr> <tr> <td>4</td> <td>Normal temp.</td> <td>2 ~ 3</td> </tr> </tbody> </table> Recovery time after test: $24 \pm 2h$ | Step | Temperature (°C) | Time(minute) | 1 | Low-category temp. | 30 | 2 | Normal temp. | 2 ~ 3 | 3 | Up-category temp. | 30 | 4 | Normal temp. | 2 ~ 3 | |
| Step | Temperature (°C) | Time(minute) | | | | | | | | | | | | | | | | |
| 1 | Low-category temp. | 30 | | | | | | | | | | | | | | | | |
| 2 | Normal temp. | 2 ~ 3 | | | | | | | | | | | | | | | | |
| 3 | Up-category temp. | 30 | | | | | | | | | | | | | | | | |
| 4 | Normal temp. | 2 ~ 3 | | | | | | | | | | | | | | | | |
| 潮濕試驗 Moisture Resistance | $\Delta C/C$ | I 類: $\leq \pm 2.5\%$ 或 $\pm 0.25pF$, 取兩者中最大者 II 類: B: $\leq \pm 12.5\%$ E, F: $\leq \pm 30\%$ Class I: $\leq \pm 2.5\%$ or $\pm 0.25pF$ whichever is larger. Class II: B: $\leq \pm 12.5\%$ E, F: $\leq \pm 30\%$ | 溫度: $40 \pm 2^{\circ}C$ 濕度: 90 ~ 95%RH 施加電壓: 額定工作電壓 時間: 500小時 充/放電電流: 不應超過50mA 放置條件: 室溫 放置時間: 24小時(I 類) ; 48小時(II 類) Temperature: $40 \pm 2^{\circ}C$ Humidity: 90 ~ 95%RH Voltage: Rated Voltage Duration: 500h Charge / Discharge Current: 50mA max. Recovery conditions: Room temperature Recovery Time: 24h(Class I) or 48h(Class II) | | | | | | | | | | | | | | | |
| | DF | I 類: $DF \leq 0.3\%$ II 類: B: $C < 47nF, DF \leq 5\%$ $C > 47nF, DF \leq 7\%$ E, F: $C < 470nF, DF \leq 7\%$ $C > 470nF, DF \leq 9\%$ Class I: $DF \leq 0.3\%$ Class II: B: $C < 47nF, DF \leq 5\%$ $C > 47nF, DF \leq 7\%$ E, F: $C < 470nF, DF \leq 7\%$ $C > 470nF, DF \leq 9\%$ | | | | | | | | | | | | | | | | |
| | IR | 500M Ω 或 25 ΩF 取兩者之中較小者 500M Ω or 25 ΩF , whichever is smaller. | | | | | | | | | | | | | | | | |
| | | 外觀: 無損傷 Appearance: No visible damage. | | | | | | | | | | | | | | | | |

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

| | | | |
|-------------------|---|--|--|
| 壽命試驗 Life Test | $\Delta C/C$ | I 類: $\leq \pm 3\%$ 或 $\pm 0.3\text{pF}$ 取兩者中最大者 II 類: B: $\leq \pm 12.5\%$ E, F: $\leq \pm 30\%$ Class I : $\leq \pm 3\%$ or $\pm 0.3\text{pF}$ whichever is larger. Class II : B: $\leq \pm 12.5\%$ E, F: $\leq \pm 30\%$ | 電壓: 2倍額定工作電壓 時間: 1000小時 充/放電電流: 不應超過50mA 放置條件: 室溫 放置時間: 24小時(I 類) ; 48小時(II 類), Applied Voltage: $2 \times \text{Rated Voltage}$ Duration: 1000h Charge / Discharge Current: 50mA max. Recovery conditions: Room temperature Recovery Time: 24h(Class I) or 48h(Class II) |
| | DF | I 類: $\text{DF} \leq 0.3\%$ II 類: B: $C \leq 47\text{nF}, \text{DF} \leq 5\%$ $C > 47\text{nF}, \text{DF} \leq 7\%$ E, F: $C \leq 470\text{nF}, \text{DF} \leq 7\%$ $C > 470\text{nF}, \text{DF} \leq 9\%$ Class I : $\text{DF} \leq 0.3\%$ Class II : B: $C \leq 47\text{nF}, \text{DF} \leq 5\%$ $C > 47\text{nF}, \text{DF} \leq 7\%$ E, F: $C \leq 470\text{nF}, \text{DF} \leq 7\%$ $C > 470\text{nF}, \text{DF} \leq 9\%$ | |
| | IR | $500\text{M}\Omega$ 或 $25\Omega\text{F}$ 取兩者之中較小者 $500\text{M}\Omega$ or $25\Omega\text{F}$, whichever is smaller. | |
| | 外觀: 無損傷 Appearance: No visible damage. | | |

注: * 專門預處理的說明:

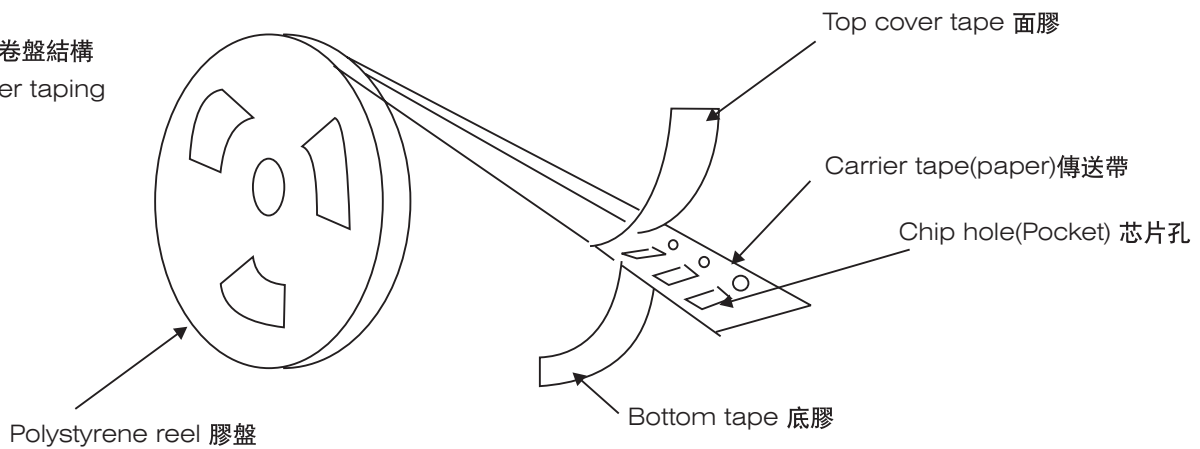
專門預處理(僅對2類電容器): 將電容器放置在最高溫度下或其它標準規範中可能規定的更高溫度下須1h之后接着在試驗的標準大氣條件下恢復24h。

Note: * pretreatment (only for Class II capacitor)

Pretreatment (only for Class II capacitor) is a method to treat the capacitor before measurement. First, place the capacitor in the up-category temperature or other specified higher temperature environment for 1 hour. Then recover the capacitor at standard pressure conditions for 24 hours.

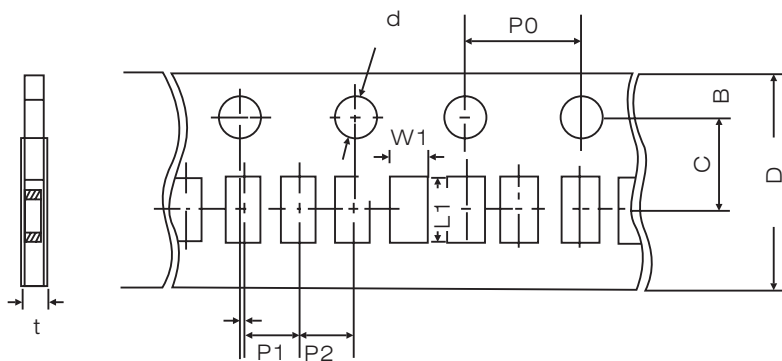
●包裝 PACKAGE OF MLCC

* 紙帶卷盤結構
paper taping



* 0402紙帶編帶尺寸大小

Dimensions of paper taping for 0402 type

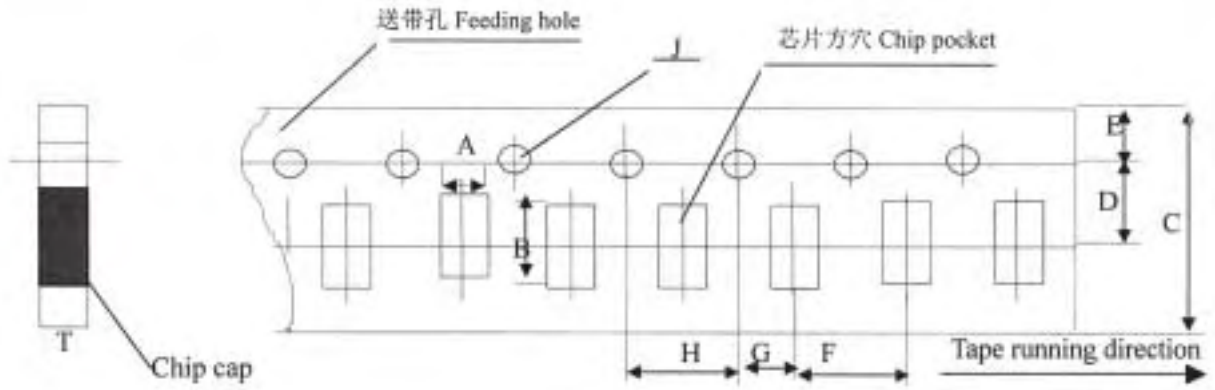


| 代碼 Code | W1 | L1 | D | C | B | P1 | P2 | P0 | d | t |
|------------|--------------|--------------|-------------|--------------|--------------|--------------|--------------|-------------|----------------|---------------|
| 0402 | 0.65 ±0.2 | 1.15 ±0.2 | 8.0 ±0.2 | 3.5 ±0.05 | 1.75 ±0.1 | 2.0 ±0.05 | 2.0 ±0.05 | 4.0 ±0.1 | 1.5 -0/+0.1 | 0.80 Below |

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

*適合 '0603, 0805, 1206' 常規尺寸產品的紙帶尺寸
 dimensions of paper taping for 0603,0805,1206types.



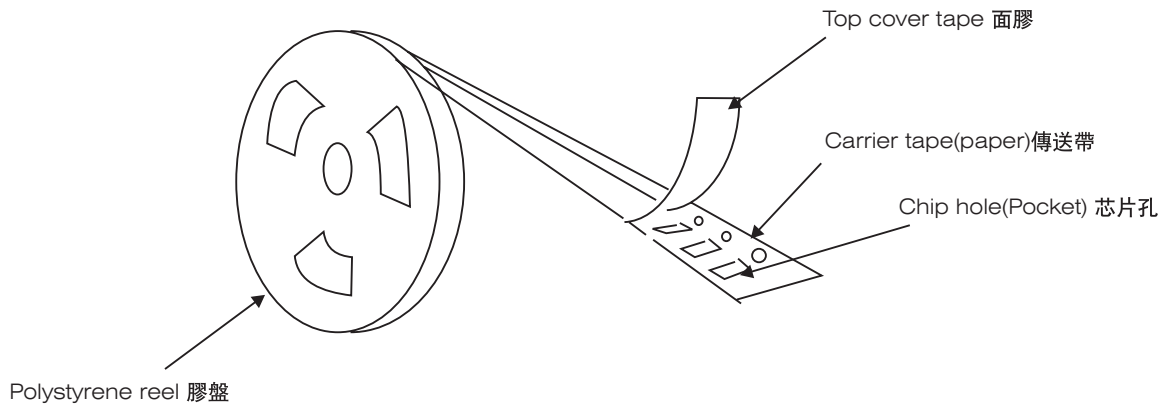
Unit:mm

| 代號Code 紙帶規格 paper size | A | B | C | D* | E | F | G* | H | J | T |
|------------------------------|--------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|----------------|--------------|
| 0603 | 1.1 ±0.2 | 1.9 ±0.2 | 8.0 ±0.2 | 3.5 ±0.05 | 1.75 ±0.1 | 4.0 ±0.1 | 2.0 ±0.1 | 4.0 ±0.1 | 1.5 -0/+0.1 | 1.1 Below |
| 0805 | 1.45 ±0.2 | 2.3 ±0.2 | 8.0 ±0.2 | 3.5 ±0.05 | 1.75 ±0.1 | 4.0 ±0.1 | 2.0 ±0.1 | 4.0 ±0.1 | 1.5 -0/+0.1 | 1.1 Below |
| 1206 | 1.80 ±0.2 | 3.4 ±0.2 | 8.0 ±0.2 | 3.5 ±0.05 | 1.75 ±0.1 | 4.0 ±0.1 | 2.0 ±0.1 | 4.0 ±0.1 | 1.5 -0/+0.1 | 1.1 Below |

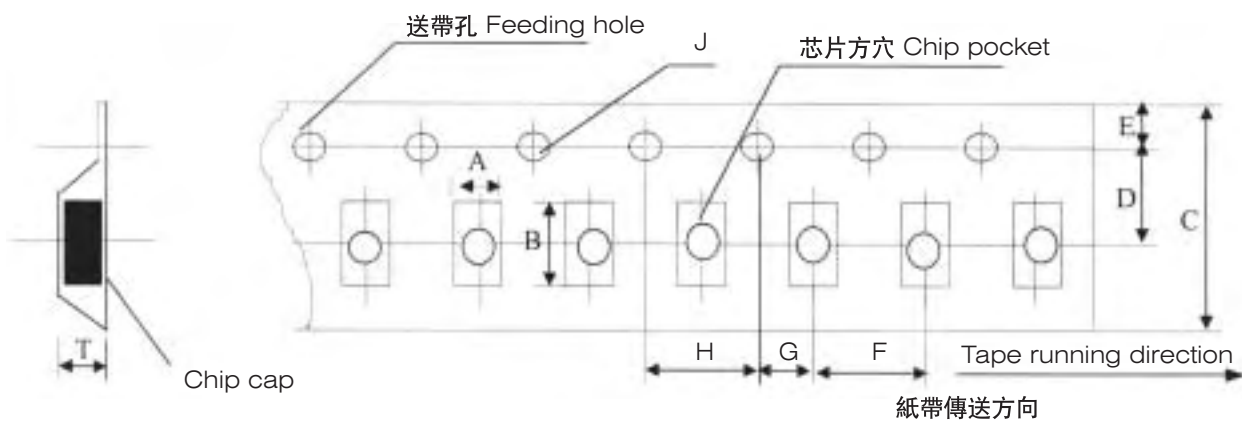
注意: * 表示處對尺寸的要求非常精確。

Notes: The place with “*” means where needs exactly dimensions.

***塑膠卷盤結構**
embossed taping



***塑膠帶尺寸結構 (適合 '0805, 1206' 型產品)**
Dimensions of embossed taping for 0805 and 1206 type



Unit:mm

| 代號 Code 規格 Tape size | A | B | C | D* | E | F | G* | H | J | T |
|-------------------------|--------------|--------------|-------------|--------------|--------------|-------------|-------------|-------------|----------------|--------------|
| 0805 | 1.55 ±0.2 | 2.35 ±0.2 | 8.0 ±0.2 | 3.5 ±0.05 | 1.75 ±0.1 | 4.0 ±0.1 | 2.0 ±0.1 | 4.0 ±0.1 | 1.5 -0/+0.1 | 1.5 Below |
| 1206 | 1.95 ±0.2 | 3.6 ±0.2 | 8.0 ±0.2 | 3.5 ±0.05 | 1.75 ±0.1 | 4.0 ±0.1 | 2.0 ±0.1 | 4.0 ±0.1 | 1.5 -0/+0.1 | 1.5 Below |

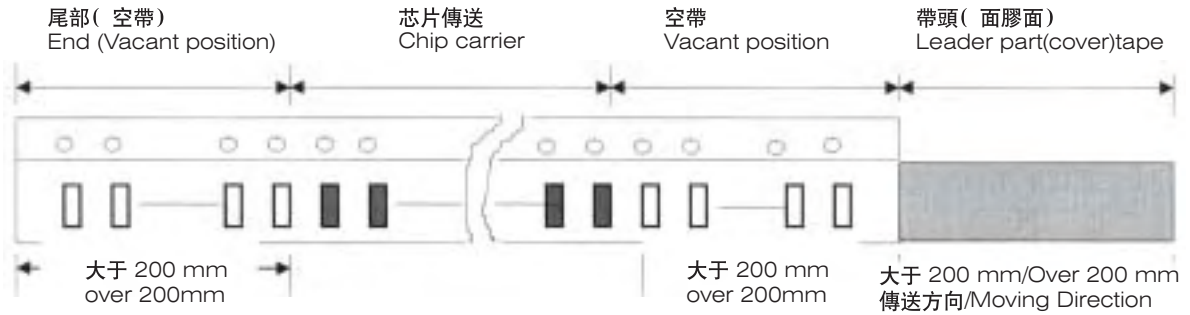
注意: * 表示處對尺寸的要求非常精確。
Notes: The place with "*" means where needs exactly dimensions.

多層片狀陶瓷電容器

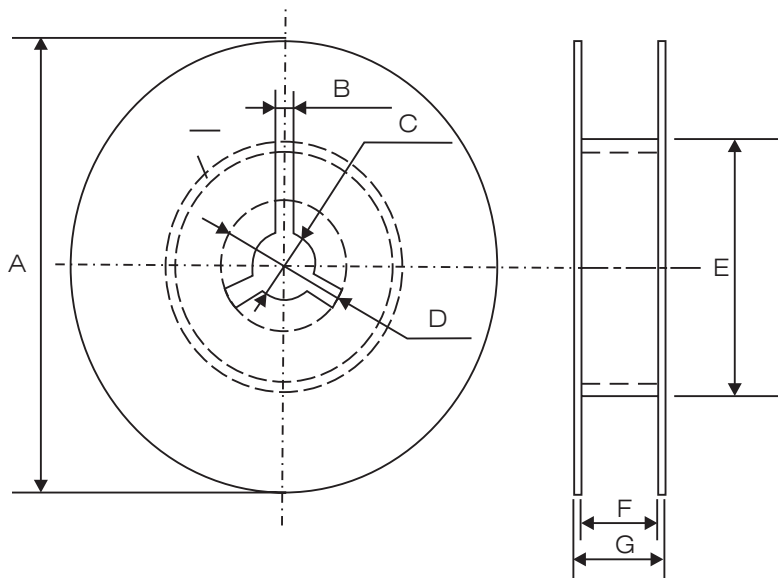
MULTILAYER CHIP CERAMIC CAPACITOR

* 傳送帶的前後結構

Structure of leader part and end part of the carrier paper



* 卷盤尺寸 Reel Dimensions (unit:mm)



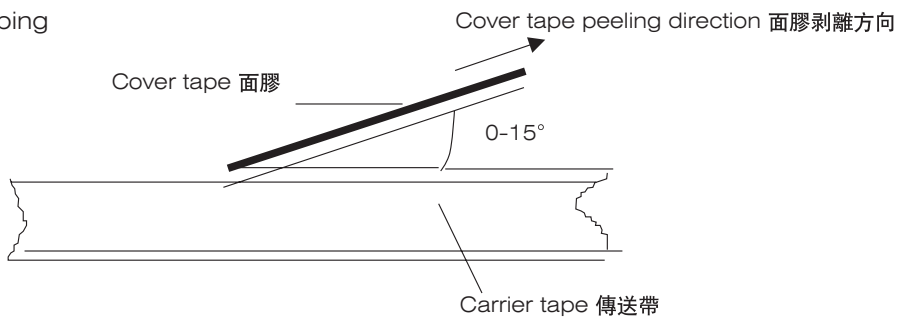
尺寸代碼 (CODE)

Unit:mm

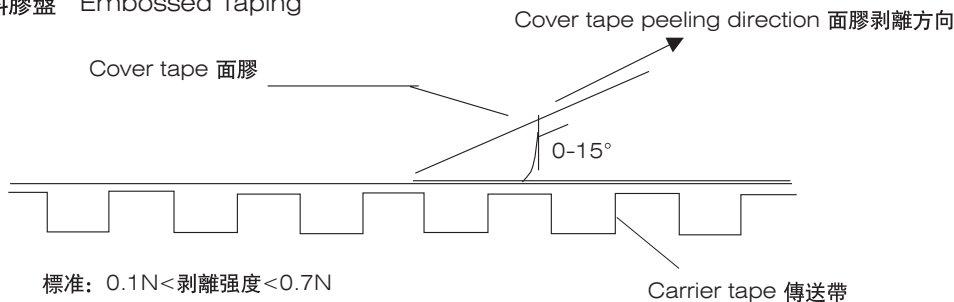
| A | B | C | D | E | F | G |
|--------------------|-----|-------------------|-------------------|------------------------------------|----------------|-------|
| $\Phi 178 \pm 2.0$ | 3.0 | $\Phi 13 \pm 0.5$ | $\Phi 21 \pm 0.8$ | $\Phi 50$ 或更大 $\Phi 50$ or more | 10.0 ± 1.5 | 12max |

* 面膠剝離強度 Top tape peeling strength

(a) 紙帶 Paper Taping



(b) 塑料膠盤 Embossed Taping



標準: 0.1N < 剝離強度 < 0.7N

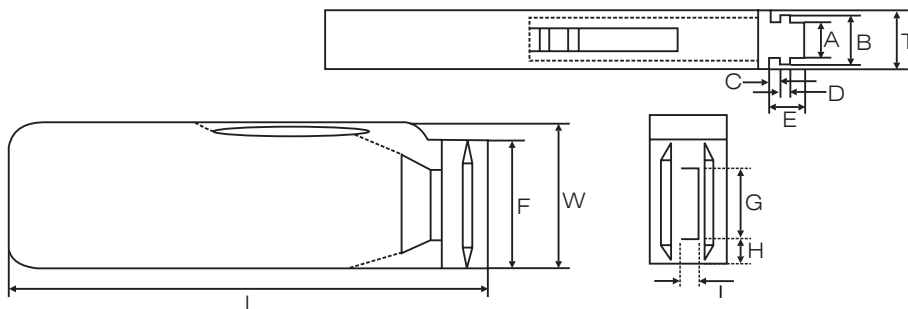
Standard: 0.1N < peeling strength < 0.7N

在剝離時, 紙帶不能有紙碎, 也不能粘在底、面膠上。

No paper dirty remains on the scotch when peeling, or sticks to top and bottom tape.

* 塑料盒散包裝 Bulk Case Package

| | | | | | | |
|-----------|------------|----------|---------|----------|---------|---------|
| Symbol | A | B | T | C | D | E |
| Dimension | 6.8±0.1 | 8.8±0.1 | 12±0.1 | 15±0.1-0 | 2±0-0.1 | 4.7±0.1 |
| Symbol | F | W | G | H | L | I |
| Dimension | 31.5±0.2-0 | 36±0-0.2 | 19±0.35 | 7±0.35 | 110±0.7 | 5±0.35 |



* 包裝數量

Packing Quantity

| 尺寸(SIZE) | 包裝形式和數量 (PACKAGE STYLE & QUANTITY) unit:pcs | | | |
|----------|---|-----------|------------|-----------|
| | 紙帶卷盤 (PT) | 膠帶卷盤 (ET) | 塑料盒散裝 (BC) | 一般散裝 (BP) |
| 0402 | 10000 | | 20000 | 5000 |
| 0603 | 5000 | | 15000 | 5000 |
| 0805 | 5000 | 2500 | 10000 | 5000 |
| 1206 | 5000 | 2500 | 5000 | 5000 |
| 1210 | | 2000 | | 2000 |
| 1812 | | 2000 | | 1000 |
| 2225 | | | | 500 |
| 3035 | | | | |

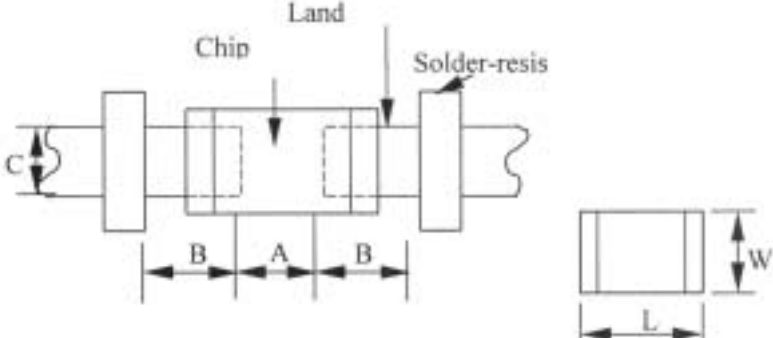
注意: 包裝的形式和數量可根據客戶的要求來定。

Note: We will choose packing style and quantity according to the customer's requirements.

* 使用MLCC的注意事項

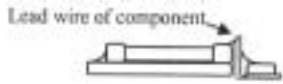
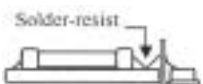
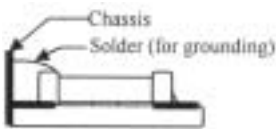
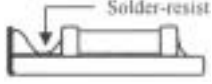
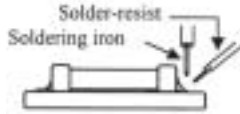
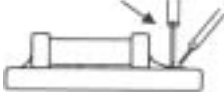
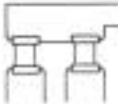
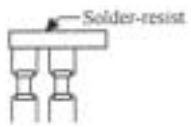
* Precautions on the use of Multi-layer Ceramic Capacitors



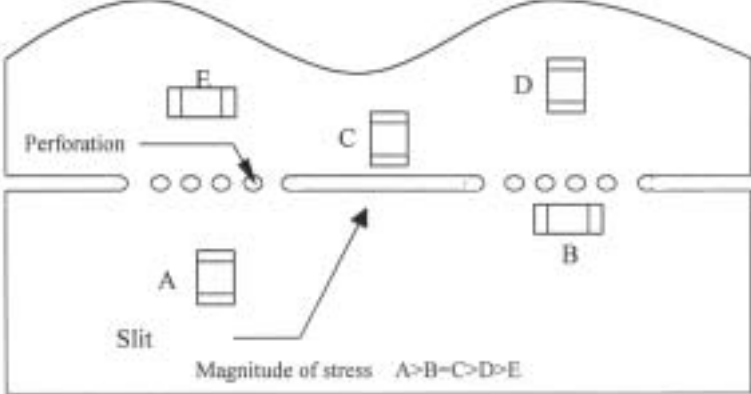




| Stages | Precaution | Technical considerations |
|---------------------------------------|---|--------------------------|
| <p>1、綫路設計</p> <p>1、Circuit Design</p> | <p>使用環境，電子額定系數和性能的確認：</p> <p>1、醫療器械、航空用器、原子彈反應器如果出現故障，會對人的生命和整個社會造成巨大的損壞。因此用于這些設備的電容器必須具有很高的可靠性和安全性，并且比用于普通應用的電容器元件的要求更高，其區別也很明顯。</p> <p>工作電壓（額定電壓的確認）</p> <p>1、電容器的工作電壓應比其額定電壓低。如果在一DC電壓上加載一個AC電壓，那么兩個峰值電壓之和應小于所選擇的電容器的額定值。對於同時使用AC電壓和脈衝電壓的電路，它們的峰值電壓之和也應低于電容器的額定電壓。</p> <p>2、甚至在供給的電壓低于額定電壓值時，如果電路中使用的高頻AC電壓或脈衝電壓升高的時間過快，那么電容器的性能會因此被減弱。</p> <p>Verification of operating environment, electrical rating and performance</p> <p>1.A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications. For this any capacitors to be used in such equipments may require higher safety and /or reliability considerations and should be clearly differentiated from components for general applications.</p> <p>Operating Voltage (Verification of Rated Voltage)</p> <p>1.The operating voltage for capacitors must always be lower than their rated values. If an AC voltage is loaded on a DC voltage, the sum of the two peak voltages should be lower than the rated value of the capacitor chosen. For a circuit where both an AC and a pulse voltage may be present, the sum of their peak voltages should also be lower than the capacitor's rated voltage.</p> <p>2.Even if the applied voltage is lower than the rated value, the reliability of capacitors might be reduced if either a high frequency AC voltage or a pulse voltage having rapid rise time is present in the circuit.</p> | |

| <p>2.PC板的設計 PCB Design</p> | <p>基板配置 (墊板的設計)</p> <p>1、當電容器被安裝在PC板上后,所使用的焊料的量(焊盤的大小)會直接影響電容器的性能。因此在設計焊盤時必須考慮到以下幾點:</p> <p>(1)所用焊料的量的大小會影響芯片抗機械應力的能力,從而可能導致電容器破碎或開裂。因此在設計基板時,必須慎重考慮焊盤的大小和配置,這些對組成基板的焊料的量有着着決定的作用。</p> <p>(2)如果不止一個元件被連續焊接在同一基板或焊盤上時,焊盤的設計應可以使每個元件的焊接點被阻焊區隔離開。</p> <p>Pattern configurations (Design of Land-patterns)</p> <p>1.When capacitors are mounted on a PCB,the amount of solder used (size of fillet)can directly affect capacitor performance.The-efore,the following items must be carefully considered in the design of solder land patterns:</p> <p>(1)The amount of solder applied can affect the ability of chips to withstand mechanical stresses,w-which may lead to breaking or cracking.Therefore, when designing land -patterns it is necessary to consider the appropriate size and configuration of the solder pads, which determines the amount of solder necessary to form the fillets.</p> <p>(2)When more than one part are jointly soldered onto the same land or pad, the pad must be designed so that each component's soldering point is separated by soldering-resist.</p> | <p>1、以下圖表為所推薦使用的墊板以防止過量的焊料量(基板較大時會超出元件的端頭)</p> <p>1.The following diagrams and tables show some examples of recommended patterns to prevent excessive solder amounts (larger fillets which extend above the component's end terminations.)</p> <p>同時也給出了不合理的基板設計圖</p> <p>(1)以下為推薦使用的的PCB上焊盤的尺寸</p> <p>Examples of improper pattern designs are also shown.</p> <p>(1)Recommended land dimensions for a typical chip capacitor land patterns for PCB</p>  <p>Recommend land dimensions for wave-soldering(unit:mm) 推薦用于波峰焊的焊盤尺寸(單位:mm)</p> <table border="1" data-bbox="667 1052 1353 1344"> <thead> <tr> <th>Type</th> <th></th> <th>0603</th> <th>0805</th> <th>1206</th> <th>1210</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Size</td> <td>L</td> <td>1.6</td> <td>2.0</td> <td>3.2</td> <td>3.2</td> </tr> <tr> <td>W</td> <td>0.8</td> <td>1.25</td> <td>1.6</td> <td>2.5</td> </tr> <tr> <td>A</td> <td></td> <td>0.8 ~ 1.0</td> <td>1.0 ~ 1.4</td> <td>1.8 ~ 2.5</td> <td>1.8 ~ 2.5</td> </tr> <tr> <td>B</td> <td></td> <td>0.5 ~ 0.8</td> <td>0.8 ~ 1.5</td> <td>0.8 ~ 1.7</td> <td>0.8 ~ 1.7</td> </tr> <tr> <td>C</td> <td></td> <td>0.6 ~ 0.8</td> <td>0.9 ~ 1.2</td> <td>1.2 ~ 1.6</td> <td>1.8 ~ 2.5</td> </tr> </tbody> </table> <p>Recommend land dimensions for reflow-soldering(unit:mm) 推薦用于回流焊的焊盤尺寸(單位:mm)</p> <table border="1" data-bbox="603 1422 1428 1825"> <thead> <tr> <th>Type</th> <th></th> <th>0402</th> <th>0603</th> <th>0805</th> <th>1206</th> <th>1210</th> <th>1812</th> <th>2225</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Size</td> <td>L</td> <td>1.0</td> <td>1.6</td> <td>2.0</td> <td>3.2</td> <td>3.2</td> <td>4.5</td> <td>5.7</td> </tr> <tr> <td>W</td> <td>0.5</td> <td>0.8</td> <td>1.25</td> <td>1.6</td> <td>2.5</td> <td>3.2</td> <td>6.3</td> </tr> <tr> <td>A</td> <td></td> <td>0.45 ~ 0.55</td> <td>0.6 ~ 0.8</td> <td>0.8 ~ 1.2</td> <td>1.8 ~ 2.5</td> <td>1.8 ~ 2.5</td> <td>2.5 ~ 3.5</td> <td>3.7 ~ 4.7</td> </tr> <tr> <td>B</td> <td></td> <td>0.40 ~ 0.50</td> <td>0.6 ~ 0.8</td> <td>0.6 ~ 1.2</td> <td>0.6 ~ 1.5</td> <td>0.6 ~ 1.5</td> <td>1.0 ~ 1.8</td> <td>1.0 ~ 2.3</td> </tr> <tr> <td>C</td> <td></td> <td>0.45 ~ 0.55</td> <td>0.6 ~ 0.8</td> <td>0.9 ~ 1.6</td> <td>1.2 ~ 2.0</td> <td>1.8 ~ 3.2</td> <td>2.3 ~ 3.5</td> <td>3.5 ~ 5.5</td> </tr> </tbody> </table> <p>過量的焊料會影響芯片耐機械應力的能力。因此在設計基板時, 需注意這些 Excess solder can affect the ability of chips to withstand mechanical stresses.Therefore,please take proper precautions when designing Land-patterns.</p> | Type | | 0603 | 0805 | 1206 | 1210 | Size | L | 1.6 | 2.0 | 3.2 | 3.2 | W | 0.8 | 1.25 | 1.6 | 2.5 | A | | 0.8 ~ 1.0 | 1.0 ~ 1.4 | 1.8 ~ 2.5 | 1.8 ~ 2.5 | B | | 0.5 ~ 0.8 | 0.8 ~ 1.5 | 0.8 ~ 1.7 | 0.8 ~ 1.7 | C | | 0.6 ~ 0.8 | 0.9 ~ 1.2 | 1.2 ~ 1.6 | 1.8 ~ 2.5 | Type | | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2225 | Size | L | 1.0 | 1.6 | 2.0 | 3.2 | 3.2 | 4.5 | 5.7 | W | 0.5 | 0.8 | 1.25 | 1.6 | 2.5 | 3.2 | 6.3 | A | | 0.45 ~ 0.55 | 0.6 ~ 0.8 | 0.8 ~ 1.2 | 1.8 ~ 2.5 | 1.8 ~ 2.5 | 2.5 ~ 3.5 | 3.7 ~ 4.7 | B | | 0.40 ~ 0.50 | 0.6 ~ 0.8 | 0.6 ~ 1.2 | 0.6 ~ 1.5 | 0.6 ~ 1.5 | 1.0 ~ 1.8 | 1.0 ~ 2.3 | C | | 0.45 ~ 0.55 | 0.6 ~ 0.8 | 0.9 ~ 1.6 | 1.2 ~ 2.0 | 1.8 ~ 3.2 | 2.3 ~ 3.5 | 3.5 ~ 5.5 |
|--------------------------------|---|---|-----------|-----------|-----------|-----------|-----------|-----------|------|---|-----|-----|-----|-----|---|-----|------|-----|-----|---|--|-----------|-----------|-----------|-----------|---|--|-----------|-----------|-----------|-----------|---|--|-----------|-----------|-----------|-----------|------|--|------|------|------|------|------|------|------|------|---|-----|-----|-----|-----|-----|-----|-----|---|-----|-----|------|-----|-----|-----|-----|---|--|-------------|-----------|-----------|-----------|-----------|-----------|-----------|---|--|-------------|-----------|-----------|-----------|-----------|-----------|-----------|---|--|-------------|-----------|-----------|-----------|-----------|-----------|-----------|
| | Type | | 0603 | 0805 | 1206 | 1210 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Size | L | 1.6 | 2.0 | 3.2 | 3.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | W | 0.8 | 1.25 | 1.6 | 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | | 0.8 ~ 1.0 | 1.0 ~ 1.4 | 1.8 ~ 2.5 | 1.8 ~ 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | | 0.5 ~ 0.8 | 0.8 ~ 1.5 | 0.8 ~ 1.7 | 0.8 ~ 1.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | | 0.6 ~ 0.8 | 0.9 ~ 1.2 | 1.2 ~ 1.6 | 1.8 ~ 2.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type | | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2225 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Size | L | 1.0 | 1.6 | 2.0 | 3.2 | 3.2 | 4.5 | 5.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | W | 0.5 | 0.8 | 1.25 | 1.6 | 2.5 | 3.2 | 6.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | | 0.45 ~ 0.55 | 0.6 ~ 0.8 | 0.8 ~ 1.2 | 1.8 ~ 2.5 | 1.8 ~ 2.5 | 2.5 ~ 3.5 | 3.7 ~ 4.7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | | 0.40 ~ 0.50 | 0.6 ~ 0.8 | 0.6 ~ 1.2 | 0.6 ~ 1.5 | 0.6 ~ 1.5 | 1.0 ~ 1.8 | 1.0 ~ 2.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | | 0.45 ~ 0.55 | 0.6 ~ 0.8 | 0.9 ~ 1.6 | 1.2 ~ 2.0 | 1.8 ~ 3.2 | 2.3 ~ 3.5 | 3.5 ~ 5.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

多層片狀陶瓷電容器

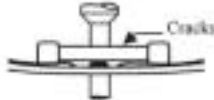
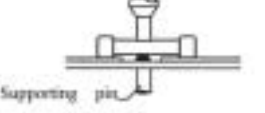
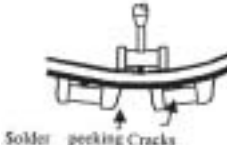
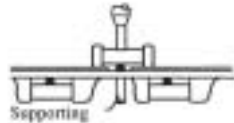
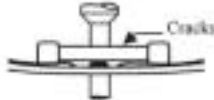
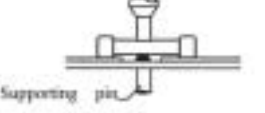
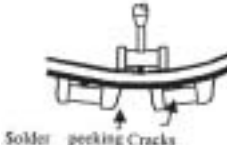
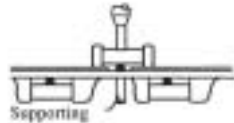
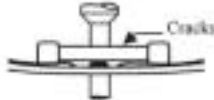
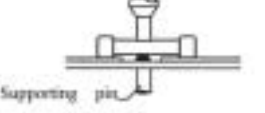
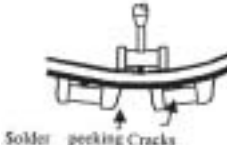
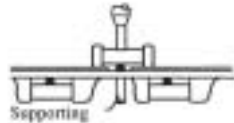
MULTILAYER CHIP CERAMIC CAPACITOR

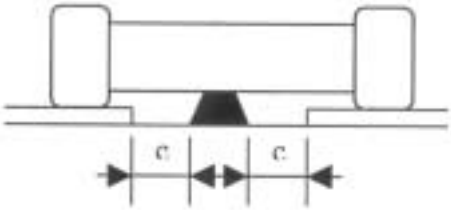
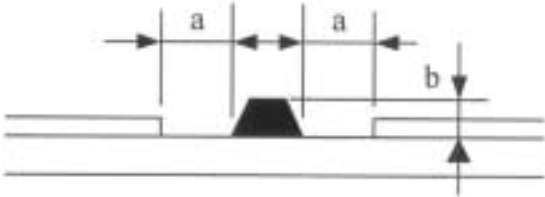
| | | 焊料用量好與差的例子如下： (2) Examples of good and bad solder application. | |
|--|--|---|--|
| 項目 Items | 不推薦 Not recommended | 推薦 Recommended | |
| 混合安裝 SMD 和引線元件 Mixed mounting of SMD and leaded components |  |  | |
| 靠近底盤的元 件的安裝 Component placement close to the chassis |  |  | |
| 在已安裝元件 的附近手工焊 接引線元件 Hand-solder- ing of leaded components near mounted components |  |  | |
| 水平安裝元件 Horizontal component placement |  |  | |

| Stages | Precautions | Technical considerations | | | | | | |
|---|--|--|--|-----------------|-------------|---------------------------------|--|---|
| <p>2.PC板的設計 2.PCB Design</p> | <p>基板配置 (電容器在儀器(分割)PC板上的安裝設計) 1.將電容器安裝在板上之後,芯片將承受在下一加工過程中產生的機械應力(PCB的切割,板的檢驗、其它部件的安裝,裝配到底盤、波峰焊接回流焊板,等)。出于這個原因,在設計焊盤和SMD電容器的位置時,應注意考慮將應力減到最低點。</p> <p>Pattern configurations (Capacitor layout on panelized[breakaway]PCboards) 1.After capacitors have been mounted on the boards,chips can be subjected to mechanical stresses in subsequent manufacturing processes (PCB cutting,board inspection,mounting of additional parts,assembly into the chassis,wave soldering the reflow soldering boards etc.),for this reason,planning pattern configurations and the position of SMD capacitors should be carefully performed to minimize stress.</p> | <p>1-1.以下圖示為電容器在PC板上布局好環的例子:PC板彎曲變形時產生應力,應將電容器安裝在PC板上的受應力影響最小的位置。</p> <p>1-1.The following are examples of good and bad capacitor layout: SMD capacitors should be located to minimize any possible mechanical stresses from board warp or deflection.</p> <table border="1" data-bbox="703 448 1358 705"> <thead> <tr> <th></th> <th>Not recommended</th> <th>Recommended</th> </tr> </thead> <tbody> <tr> <td>板的變形 Deflection of the board</td> <td></td> <td></td> </tr> </tbody> </table> <p>1-2.將電容器安裝在切割PC板上時,電容器所受機械應力的大小由電容器的布局而定。以下為推薦使用的布局方式:</p> <p>1-2.To layout the capacitors for the breakaway PC board,it should be noted that the amount of mechanics stresse given will vary depending on capacitor layout,The example below shows recommendations for better design.</p>  <p>1-3.當PC板沿着接縫孔切割開時,電容器所受機械應力的大小因使用的方法不同而不同。以下方法按應力從小到大進行排列:推板,割裂、V形凹槽、接縫孔。因此,任何理想的SMD電容器的布局必須考慮到PC板的分割方法。</p> <p>1-3.When breaking PC boards along their perforations,the amount of mechanical stress on the capacitors can vary according to the method used.The follwing methods are listed in order from least stressful to most stressful:push-back,slit,V-grooving,and perforation.Thus,any ideal SMD capacitor layout must also consider the PCB splitting procedure.</p> | | Not recommended | Recommended | 板的變形 Deflection of the board |  |  |
| | Not recommended | Recommended | | | | | | |
| 板的變形 Deflection of the board |  |  | | | | | | |
| <p>3.自動安裝應考慮到的問題 3.Considerations for automatic placement</p> | <p>調節安裝機器: 1.在將電容器安裝在PC板上時,不能讓電容器承受過量的衝擊力。 2.應定期對安裝機器進行維修和檢查。</p> <p>Adjustment of mounting machine 1.Excessive impact load should not be imposed on the capacitors when mounting onto the PC boards. 2.The maintenance and inspection of the mounting devices should be conducted periodically.</p> | <p>1.如果吸拾管降低的位置超過最低限位,就會對電容器產生過大的壓力,從而導致電容器破裂,為了避免上述現象的發生,在降低吸拾管時,要注意以下各點: (1)、在校正PC板的偏差后,應將吸拾管的低限位調節到PC板的表面水平位置。 (2)、吸拾管壓力應調節至1到3N之間。 (3)、為了減少吸拾管衝擊力導致PC板的變形程度,支撐釘應放在PC板的下方。 下圖有吸拾管安裝的較好例子。</p> <p>1.If the lower limit of the pick-up nozzle is low.Too much force may be imposed on the capacitors,causing damage.To avoid this,the following points should be considered before lowering the pick-up nozzle: (1)The lower limit of the pick-up nozzle should be adjusted to the surface level of the PC board after correcting for deflection of the board. (2)The pick-up pressure should be adjusted between 1 and 3 N static loads. (3)To reduce the amount of deflection of the board caused by impact of the pick-up nozzle,supporting pins of back-up should be used the under PC board. The following diagrams show some typical examples of good pick-up nozzle Placement.</p> | | | | | | |

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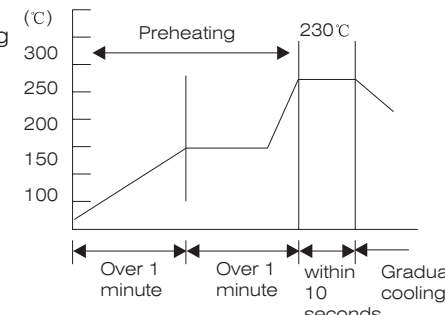
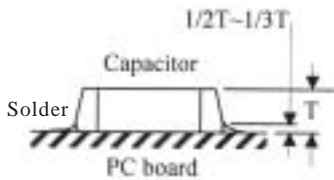
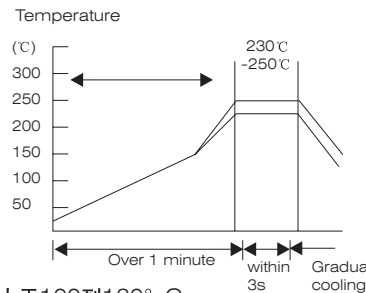
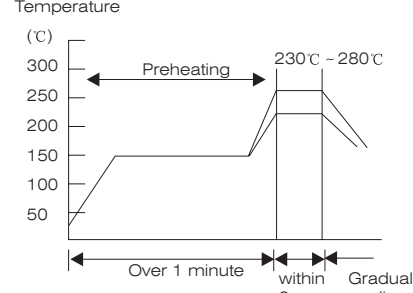
| Stages | Precautions | Technical considerations | | | | | | | | | |
|---|---|--|--|------------------------|-------------------|-------------------------------|--|---|-------------------------------|--|---|
| <p>3、自動安裝應考慮到的問題 3.Considerations for automatic placement</p> | <p>粘着劑的選用： 1、在焊接安裝電容器之前，用粘着劑將電容器固定在基板上，這將導致電容器的特性降級，除非對以下因素進行合理的檢查：基板的大小、粘着劑的類型和用量、硬化的溫度和時間。因此，用戶在使用粘着劑時，要注意其用法和用量。</p> | <table border="1" data-bbox="707 344 1425 754"> <thead> <tr> <th data-bbox="707 344 906 427"></th> <th data-bbox="906 344 1145 427">不推薦 Not recommended</th> <th data-bbox="1145 344 1425 427">推薦 Recommended</th> </tr> </thead> <tbody> <tr> <td data-bbox="707 427 906 573">單面安裝 Single-sided mounting</td> <td data-bbox="906 427 1145 573"></td> <td data-bbox="1145 427 1425 573"></td> </tr> <tr> <td data-bbox="707 573 906 754">雙面安裝 Double-sided mounting</td> <td data-bbox="906 573 1145 754"></td> <td data-bbox="1145 573 1425 754"></td> </tr> </tbody> </table> <p>2. 如果對位釘磨損，吸管的調整會致使電容器受到機械應力的衝擊而缺口或開裂。爲了避免這種現象的發生，在對處於停止狀態下對位釘間寬度和支撐釘進行定期的檢查、維修、檢驗和更換。</p> <p>2.As the alignment pin wears out, adjustment of the nozzle height can cause chipping or cracking of the capacitors because of mechanical impact on the capacitors. To avoid this, the monitoring of the width between the alignment pin in the stopped position, and maintenance. Inspection and replacement of the pin should be conducted periodically.</p> <p>1. 一些粘着劑會減少電容器的絕緣。粘着劑和電容器收縮率的不同會在電容器上產生應力并導致開裂。甚至板上過多或過少的粘着劑會影響元件的安裝。因此在使用粘着劑時應注意以下事項：</p> <p>(1)要求粘着劑具有的特性：</p> <ul style="list-style-type: none"> a. 在安裝和焊接過程中，粘着劑應有足夠大的力來支撐板上的元件。 b. 粘着劑在高溫下要有充足的強度。 c. 粘着劑要有很好的粘稠度。 d. 粘着劑應在其使用期限前使用。 e. 粘着劑應可快速硬化。 f. 粘着劑不能被雜質污染。 G. 粘着劑要有很好的絕緣特性。 H. 粘着劑不能有或不能發出有毒的氣體。 | | 不推薦 Not recommended | 推薦 Recommended | 單面安裝 Single-sided mounting |  |  | 雙面安裝 Double-sided mounting |  |  |
| | 不推薦 Not recommended | 推薦 Recommended | | | | | | | | | |
| 單面安裝 Single-sided mounting |  |  | | | | | | | | | |
| 雙面安裝 Double-sided mounting |  |  | | | | | | | | | |

| Stages | Precautions | Technical considerations | | | | | | | | |
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| <p>3、自動安裝應考慮到的問題</p> <p>3.Considerations for automatic placement</p> | <p>Selection of Adhesives</p> <p>1.Mounting capacitors with adhesives in preliminary assembly, before the soldering stage,may lead to degraded capacitor characteristics unless the following factors are appropriately checked:the size of land patterns,type of adhesive,amount applied, hardening temperature and hardening period. Therefore, It is imperative to consult the manufacturer of the adhesives on proper usage and amounts of adhesive to use.</p> | <p>1.Some adhesives may cause reduced insulation resistance,The difference between the shrinkage percentage of the adhesive and that of the capacitors may result in stresses on the capacitors and lead to cracking.Moreover,too little or too much adhesive applied to the board may adversely affect component placement, so the following precautions should be noted in the application of adhesives.</p> <p>(1)Required adhesive characteristics</p> <ol style="list-style-type: none"> The adhesive should be strong enough to hold parts on the board during the mounting & solder process. The adhesive should have sufficient strength at high temperatures. The adhesive should have good coating and thickness consistency. The adhesive should be used during its prescribed shelf life. The adhesive should harden rapidly. The adhesive must not be contaminated. The adhesive should have excellent insulation characteristics. The adhesive should not be toxic and have no emission of toxic gasses. <p>(2)The recommended amount of adhesives is as follows.</p> <table border="1" data-bbox="635 1012 1428 1209"> <thead> <tr> <th>Figure</th> <th>0805/1206 case sizes as examples</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>0.3 mm min</td> </tr> <tr> <td>B</td> <td>100 ~ 200 μ m</td> </tr> <tr> <td>C</td> <td>Adhesives should not contact the pad</td> </tr> </tbody> </table> <div style="text-align: center;"> <p>After capacitors are bonded</p>  <p>Amount of adhesive</p>  </div> | Figure | 0805/1206 case sizes as examples | A | 0.3 mm min | B | 100 ~ 200 μ m | C | Adhesives should not contact the pad |
| Figure | 0805/1206 case sizes as examples | | | | | | | | | |
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| <p>4. 焊接 4. Soldering</p> | <p>助焊劑的選用: 1. 因助焊劑對電容器的性能有很大的影響, 因此使用有必要核對以下條件。 (1) 使用的助焊劑應少于或等于鹵代物的0.1wt%, (等效于氯), 不能使用含有強酸物質的助焊劑。 (2) 將電容器安裝在板上時, 使用的助焊劑的量要控制在備選的水准範圍之內。 (3) 使用水溶性的助焊劑時, 應特別注意電容器的清洗。</p> <p>Selection of Flux 1. Since flux may have a significant effect on the performance of capacitors, it is necessary to verify the following conditions prior to use: (1) Flux used should be with less than or equal to 0.1wt%(equivalent to chlorine) of halogenated content. Flux having a strong acidity content should not be applied. (2) When soldering capacitors on the board, the amount of flux applied should be controlled at the optimum level. (3) When using water-soluble flux, special care should be taken to properly clean the boards.</p> | <p>1-1 如果活化助焊劑中的鹵化物過多或使用了高酸性的助焊劑, 那么焊接后過多的殘留物會腐蝕電容器端頭電極或降解電容器表面的絕緣。 1-2 在流焊接過程中使用助焊劑是為增強電容器的可焊性, 但如使用過多的助焊劑, 助焊劑大量的霧氣會射到電容器上, 從而使電容器可焊性受到破壞性的影響。應盡可能減少助焊劑的用量, 推薦使用助焊劑氣泡體系。 1-3 由于水溶性助焊劑的殘留物易溶于空氣中的水, 因此高濕條件下電容器表面上的殘留物會導致電容器絕緣下降并影響電容器的可靠性。當選用了水溶性助焊劑時, 要特別留意清洗方法和所使用的機器的能力。</p> <p>1-1 焊接時的預熱處理: 加熱: 在焊接前應對片式陶瓷元件在100到130°C下預熱。 冷卻: 元件和清洗過程中的溫度差異不能大于100°C。 當陶瓷片式電容器曝放在快速或集中致熱或快速致冷的條件下, 會受到熱衝擊的影響。因此在焊接過程中要特別注意防止電容器受到過量熱衝擊的影響。</p> <p>1-1. When too much halogenated substance (Chlorine, etc) content is used to activate the flux, or highly acidic flux is used, an excessive amount of residue after soldering may lead to corrosion of the terminal electrodes or degradation of insulation resistance on the surface of the capacitors. 1-2. Flux is used to increase solderability in flow soldering, but if too much is applied, a large amount of flux gas may be emitted and may detrimentally affect solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system. 1-3. Since the residue of water-soluble flux is easily dissolved by water content in the air, the residue on the surface of capacitors in high humidity conditions may cause a degradation of insulation resistance and therefore affect the reliability of the components. The cleaning methods and the capability of the machines used should also be considered carefully when selecting water-soluble flux.</p> <p>1-1. Preheating when soldering Heating: ceramic chip components should be preheated to within 100 to 130°C of the soldering. Cooling: The temperature difference between the components and cleaning process should not be greater than 100°C. Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.</p> |
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| Stages | Precautions | Technical considerations |
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| <p>4. 焊接 4. Soldering</p> | <p>焊接： 焊接溫度、時間、和焊料的量應按照以下所推薦的條件的規定進行： soldering Temperature, time amount of solder, etc. are specified in accordance with the following recommended conditions.</p> | <p>推薦使用的焊接條件 [回流焊接] Recommended conditions for soldering [Re-flow soldering] Temperature profile</p>  <p>警告： 1、理想的焊料量應為電容器厚度的1/2或1/3。如下圖所示： Caution 1. The ideal condition is to have solder mass (fillet) controlled to 1/2 or 1/3 of the thickness of the capacitor, as shown below.</p>  |
| | | <p>1. 太長的浸焊料時間會損壞電容器的可焊性，因此焊接時間應盡可能接近所推薦的時間。 1. Because excessive dwell times can detrimentally affect solderability, soldering duration should be kept as close to recommended times as possible.</p> <p>[波峰焊接]/[Wave soldering] Temperature profile / 溫度曲綫</p>  <p>警告： 1. 確保電容器已經預熱充分。 2. 電容器和熔化的焊料之間的溫度之差不能大於100到130° C。 3. 焊接後的冷卻方法應盡可能是自然冷卻。 4. 指定僅可用回流焊接的電容器不能用波峰焊接。 Caution 1. Make sure the capacitors are preheated sufficiently. 2. The temperature difference between the capacitor and melted solder should not be greater than 100 to 130° C. 3. Cooling after soldering should be as gradual as possible. 4. Wave soldering must not be applied to the capacitors designated as for reflow soldering only.</p> <p>[手工焊接]/[Hand soldering] 溫度曲綫/Temperature profile</p>  <p>警告： 1. 使用的烙鐵的尖頂的直徑最大為1.0mm。 2. 烙鐵不能直接碰到電容器上(波峰焊接) Caution 1. Use a 35W soldering iron with a maximum tip diameter of 1.0mm. 2. The soldering iron should not directly touch the capacitor. [Wave soldering]</p> |

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| Stages | Precautions | Technical considerations |
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| <p>5.清洗 5.Cleaning</p> | <p>清洗條件:</p> <ol style="list-style-type: none"> 1.在安裝完所有的電容器后,在清洗PC板時,應根據所使用的助焊劑和清洗的目的(如爲了除掉焊接時殘留的助焊劑還是生產過程中的其他材料)來選用適當的清洗溶劑。 2.應對清洗條件進行核對和確認清洗過程不影響電容器的特性。 <p>Cleaning conditions</p> <ol style="list-style-type: none"> 1.When cleaning the PC board after the capacitors are all mounted, select the appropriate cleaning solution according to the type of flux used and purpose of the cleaning (e.g. To remove soldering flux or other materials from the production process.) 2.Cleaning conditions should be determined after verifying. Through a test run, that the cleaning process does not affect the capacitors characteristics. | <ol style="list-style-type: none"> 1.如果使用不恰當的溶劑,會使其他物質如助焊劑殘留物粘到電容器或破壞電容器的外部塗層,從而導致電容器的電性能下降(特別是絕緣)。 2.不恰當的清洗條件(清洗不夠,或過度清洗)會破壞電容器的電性能。 <p>(1)過度清洗: 在用超聲波的情況下,輸出的能源太大則會使PC板承受過量的振動,這會導致電容或焊接點開裂,或降低低端電極強度。因此要特別注意以下檢查條件:</p> <p>超聲波輸出: 低於20W/L 超聲波頻率: 低於40KHz 超聲波清洗時間: 5分鐘或更少</p> <ol style="list-style-type: none"> 1.The use of inappropriate solutions can cause foreign substances such as flux residue to adhere to the capacitor or deteriorate the capacitor's outer coating, resulting in a degradation of the capacitor's electrical (especially insulation resistance). 2.Inappropriate cleaning conditions (insufficient or excessive cleaning) may detrimentally affect the performance of the capacitors. <p>(1)Excessive cleaning In the case of ultrasonic cleaning, too much power output can cause excessive vibration of the PC board which may lead to the cracking of the capacitor or the soldered portion, or decrease the terminal electrodes' strength, thus the following conditions should be carefully checked;</p> <p>Ultrasonic output Below 20W/L Ultrasonic frequency Below 40KHz Ultrasonic washing period 5min or less</p> |

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| <p>6..清洗后處理工作 6.Post cleaning Processes</p> | <p>一些樹脂含有腐蝕性氣體或化學反應氣體會保留在樹脂中，在硬化期或在正常儲存溫度下，均會影響破壞電容器的性能。</p> <p>1.當樹脂硬化的溫度高于電容器的運行溫度時，大量的熱會產生應力從而導致電容器受到損壞或破壞。因此不能推薦使用此類樹脂、熔化材料等。</p> <p>With some type of resins a decomposition gas or chemical reaction vapor may remain inside the resin during the hardening period of while left under normal storage conditions resulting in the deterioration of the capacitor's performance.</p> <p>1.When a resin's hardening temperature is higher than the capacitor's operating temperature, the stresses generated by the excess heat may lead to capacitor damage or destruction.The use of such resins molding materials is not recommended.</p> | |
| <p>7、處理 7.Handling</p> | <p>切割PC板(沿着接縫孔分割開)</p> <p>1、在安裝完電容器和其它元件后，分割PC板時，注意不能在板上施加任何力。</p> <p>2、板的分割不能用手分割，應使用合適的設備</p> <p>機械方面應注意的事項：</p> <p>1、注意不能讓電容器承受過量的機械衝擊</p> <p>(1)如果電容器掉在地上或掉在硬物上，則不能再使用這些電容器。</p> <p>(2)在處理安裝板時，注意安裝元件不能碰到或撞到其它板或元件上。</p> <p>Breakaway PC boards(splitting along perforations)</p> <p>1.When splitting the PC board after mounting capacitors and other components,care is required so as not to give any stresses of twisting to board.</p> <p>2.Board separation should not be done manually,but by using the appropriate devices.</p> <p>Mechanical considerations</p> <p>1.Be careful not to subject the capacitors to excessive mechanical shocks.</p> <p>(1)If ceramic capacitors are dropped onto the floor or a hard surface,they should not be used.</p> <p>(2)When handling the mounted boards,be careful that the mounted components do not come in contact with or bump against other boards or components.</p> | |

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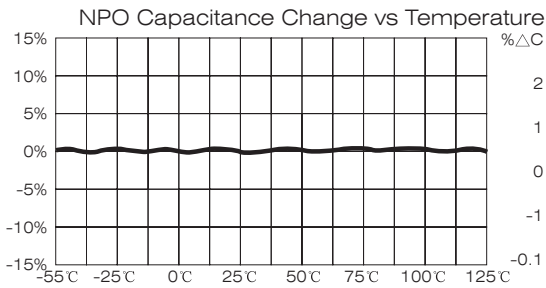
| Stages | Precautions | Technical considerations |
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| <p>8. 儲存條件</p> <p>8.Storage conditions</p> | <p>儲存</p> <p>1. 爲了保持端電極的可焊性和保證包裝材料處於良好的條件狀態，要注意監控好電容器儲存區域的溫度和濕度控制。</p> <p>推薦的條件： 室溫：低於40°C 濕度：低於 70%</p> <p>室溫必須低於40°C。但即使在理想儲存條件下存放，電容器端頭可焊性也會隨着時間的推移而下降，因此電容器應在發貨之日算起6個月內使用。</p> <p>2. 高介電常數的電容器（2類、3類）的容量值將隨着時間的推移而下降，因此在設計電路時要考慮到這一點。如果電容器的容量值減少了，在150°C的條件下對電容器進行預熱，那麼電容器的容量值會恢復到初始值。</p> <p>Storage</p> <p>1.To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area.Humidity should especially be kept as low as possible.</p> <p>※Recommended conditions Ambient temperature Below40°C Humidity Below70%RH ※The Ambient temperature must below 40°C. Even under ideal storage conditions capacitor electrode solderability decreased as time p- asses,so ceramic chip capacitors should be used within 6 months from the time of delivery. ※The packaging material should be dept where no chlorine or sulfur exists in the air. 2.The capacitance value of high dielectric constant capacitors (type2&3) will gradually decrease with the passage of time, so this should be taken into consideration in the circuit design. If such a capacitance reducti- on occurs, a heat treatment of 150°C for 1 hour will return the capacitance to its initial level.</p> | <p>如果將電容器存放在高溫和高濕的環境下，電容器的端電極就會被氧化，從而導致其可焊性下降；另外，在這種儲存條件下，電容器的編帶/包裝材料會受到破壞。出于這個原因，電容器應在自發貨之日算起6個月內使用。如果超出了這個期限，在使用電容器之前要對其可焊性進行檢驗。</p> <p>1.If the parts are stored in a high temperature and humidity environment,problems such as reduced solderability caused by oxidation of terminal elect- rodes and deterioration of taping/packageing mat- erials may take place.For this reason,components should be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the capacitors.</p> |

■ 容量變化及溫度特性、電壓、頻率曲綫圖

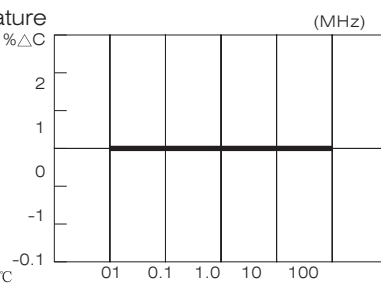
CAPACITANCE CHANGE VS TEMPERATURE CHARACTERISTIC; VOLTAGE; FREQUENCY PROFILES

• NPO

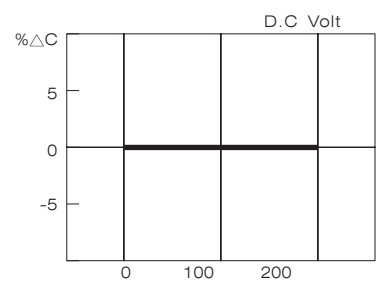
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(2) 頻率(Frequency)

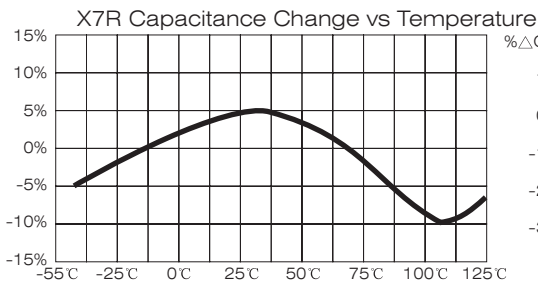


(3) 直流電壓(DC voltage)

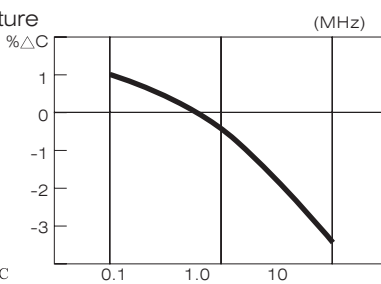


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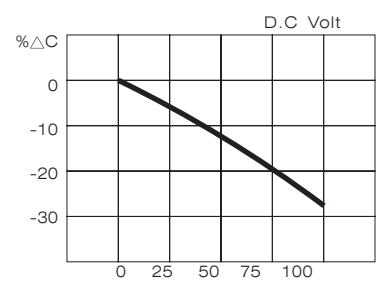
(1) 容量變化及溫度特性



(2) 頻率(Frequency)

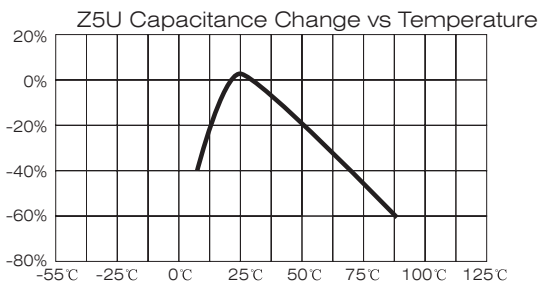


(3) 直流電壓(DC voltage)

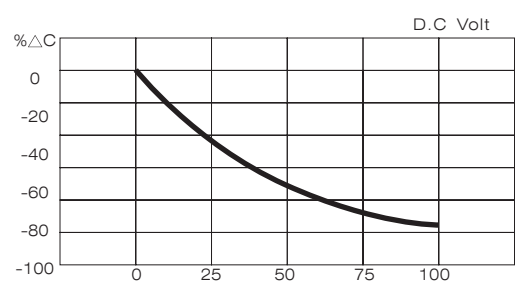


• Z5U

(1) 容量變化及溫度特性



(2) 直流電壓(DC voltage)

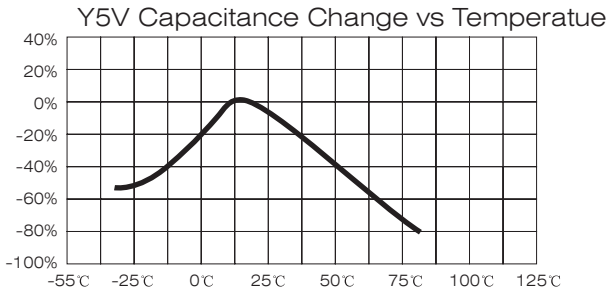


多層片狀陶瓷電容器

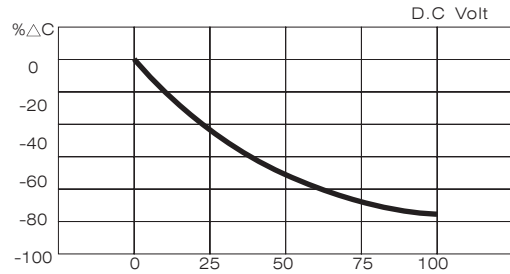
MULTILAYER CHIP CERAMIC CAPACITOR

- Y5V

(1) 容量變化及溫度特性

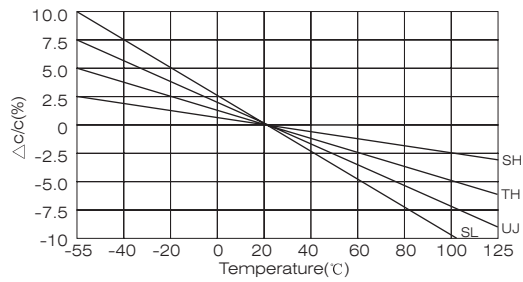
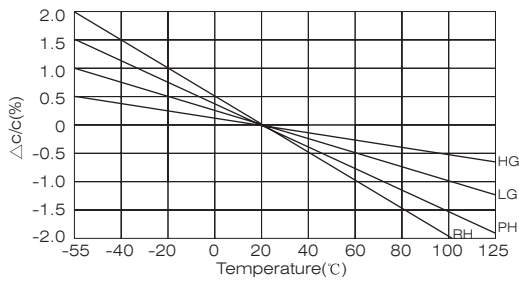


(2) 直流電壓(DC voltage)

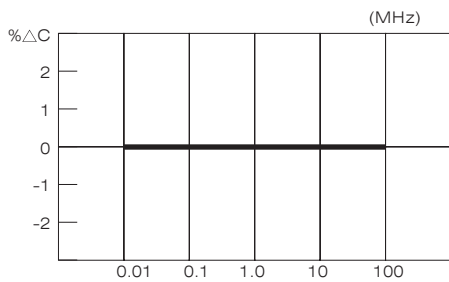


- 溫度補償型片狀多層陶瓷電容器 Temperature Compensating MLCC

(1) 容量變化及溫度特性 (Capacitance Change vs Temperature)



(2) 頻率(Frequency)



(3) 直流電壓(DC voltage)

