

## **104 贴片电容**

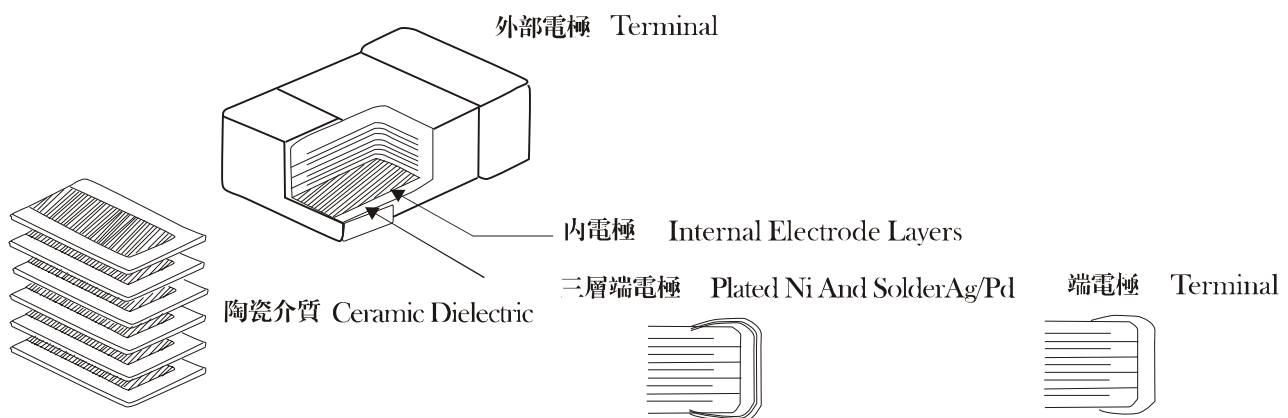
### 产 品 说 明 书

**特點：**

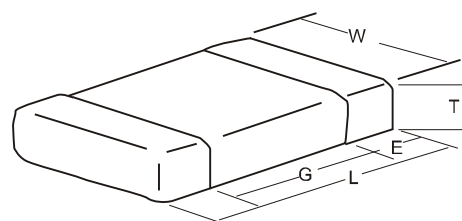
1. 产品尺寸精度高，便于自动贴片机高效率装配；
2. 端电极三层电极，适合波峰焊和回流焊；
3. 介电体与外表为同种材料，环境条件影响小，高绝缘电阻，高可靠性；
4. 含有从COG到Y5V各种温度特性介质，适用于通讯、计算机、家用电器和仪器仪表等普通电子设备。

**FEATURES**

1. Stringent dimensional tolerance allow highly reghly reliable,high speed automatic chip mounting on PCBS;
2. Terminal are plated with ni and solder,suited to flow and reflow soldering.
3. High insulation resistance and high reliability;
4. These capacitors have temperature characteristics ranging form COG to Y5V ,applied to general electronic equipment,instrument panel and household electrical appliances.

**產品結構圖****PERFORMANCE CHARACTERISTICS****產品型號代碼****ORDERING CODE**

例 Ex. :       $\frac{CB}{①}$        $\frac{0603}{②}$        $\frac{C}{③}$        $\frac{102}{④}$        $\frac{J}{⑤}$        $\frac{0.50}{⑥}$        $\frac{C}{⑦}$        $\frac{T}{⑧}$

**① 類別碼 TYPE CODE****② 尺寸碼 DIMENSIONS**

| 規格型號 |      | 尺寸 (mm)   |           |                                     |           |
|------|------|-----------|-----------|-------------------------------------|-----------|
| 英制   | 公制   | L         | W         | T                                   | E         |
| 0201 | 0603 | 0.60±0.03 | 0.30±0.03 | 0.30±0.03                           | 0.15±0.05 |
| 0402 | 1005 | 1.00±0.05 | 0.50±0.05 | 0.50±0.05                           | 0.25±0.10 |
| 0603 | 1608 | 1.60±0.10 | 0.80±0.10 | 0.80±0.10                           | 0.30±0.10 |
| 0805 | 2012 | 2.00±0.20 | 1.25±0.20 | 0.65±0.10                           | 0.50±0.25 |
|      |      |           |           | 0.85±0.10<br>1.00±0.10<br>1.25±0.20 |           |
| 1206 | 3216 | 3.20±0.30 | 1.60±0.20 | 0.80±0.10<br>1.00±0.10<br>1.25±0.20 | 0.50±0.25 |
| 1210 | 3225 | 3.20±0.30 | 2.50±0.20 | ≤2.5                                | 0.50±0.25 |
| 1808 | 4520 | 4.50±0.40 | 2.00±0.20 | ≤2.5                                | 0.50±0.10 |
| 1812 | 4532 | 4.50±0.40 | 3.20±0.30 | ≤2.5                                | 0.50±0.10 |
| 2220 | 5750 | 5.70±0.50 | 5.00±0.50 | ≤2.5                                | 1.00±0.25 |
| 2225 | 5763 | 5.70±0.50 | 6.30±0.50 | ≤2.5                                | 1.00±0.25 |

## ③ 温度特性碼 TEMPERATURE CHARACTERISTICS

| 代號 CODE                             | C         | B    | F       |
|-------------------------------------|-----------|------|---------|
| 介質材料<br>Dielectric Material         | COG或NPO   | X7R  | Y5V     |
| 使用溫度範圍<br>Temperature Range         | -55~125℃  |      | -30~85℃ |
| 溫度特性<br>Temperature Characteristics | 0±30PPM/℃ | ±15% | +22-82% |

## ④ 電容值碼 CAPACITANCE

| 代號<br>CODE | 電容值<br>Capacitance(PF) | 代號<br>CODE | 電容值<br>Capacitance(PF) |
|------------|------------------------|------------|------------------------|
| 0R5        | 0.5                    | 102        | 1000                   |
| 010        | 1                      | 103        | 10000                  |
| 100        | 10                     | 104        | 100000                 |
| 101        | 100                    | 105        | 1000000                |

## ⑤ 電容誤差碼 CAPACI

| 代號<br>CODE | 電容值<br>CAPACITANCE TOLERANCE | 代號<br>CODE | 電容值<br>Capacitance(PF) |
|------------|------------------------------|------------|------------------------|
| C          | ±0.25PF                      | J          | ±5%                    |
| D          | ±0.5PF                       | K          | ±10%                   |
| F          | ±1%                          | M          | ±20%                   |
| G          | ±2%                          | Z          | -80-20%                |

## ⑥ 額定電壓 RATED VOLTAGE

| 代號<br>CODE | 規格<br>CHARACTERISTIC | 額定電壓<br>RATED VOLTAGE |
|------------|----------------------|-----------------------|
| 004        | 4                    | 4V                    |
| 006        | 6.3                  | 6.3V                  |
| 010        | 10                   | 10V                   |
| 016        | 16                   | 16V                   |
| 025        | 25                   | 25V                   |
| 035        | 35                   | 35V                   |
| 050        | 50                   | 50V                   |
| 100        | 100                  | 100V                  |
| 200        | 200                  | 200V                  |
| 250        | 250                  | 250V                  |
| 500        | 500                  | 500V                  |
| 630        | 630                  | 630V                  |
| 102        | 1000                 | 1000V                 |
| 202        | 2000                 | 2000V                 |
| 302        | 3000                 | 3000V                 |
| 402        | 4000                 | 4000V                 |
| 502        | 5000                 | 5000V                 |

## ⑦ 元件厚度 COMPONENTS THICKNESS

| 代號<br>CODE | 厚度<br>THICKNESS |
|------------|-----------------|
| P          | 0.30±0.03MM     |
| A          | 0.50±0.05MM     |
| B          | 0.65±0.10MM     |
| C          | 0.8±0.10MM      |
| D          | 0.85±0.10MM     |
| E          | 1.15±0.10MM     |
| F          | 1.25±0.10MM     |
| H          | 1.60±0.20MM     |
| I          | 1.90±0.20MM     |
| J          | 2.50±0.20MM     |
| K          | 3.20±0.30MM     |

## ⑧ 包裝 PACKAGING CODE

| 代號<br>CODE | 包裝<br>PACKAGING              |
|------------|------------------------------|
| B          | 袋散裝<br>BULK PACKAGE IN A BAG |
| T          | 編帶<br>TAPE&REEL PACKAGE      |

## COG (NPO) 介质电容器

### COG (NPO) DIELECTRIC CAPACITORS

COG(NPO)類介質電容器是最常用的溫度補償型電容器，屬於I類介質材料，其性能穩定。溫度系數在 $0 \pm 30 \text{ppm}/^\circ\text{C}$ 以內，電容值隨頻率和電壓的變化小於 $\pm 0.05\%$ ，具有好的高频特性，Q值超過1000。

COG(NPO) is the most popular formulation of the "temperature-compensation" capacitor according to EIA, it is class I dielectric materials. COG(NPO) ceramics offer very stable capacitor dielectrics. And temperature coefficient is within  $0 \pm 30 \text{ppm}/^\circ\text{C}$ . Typical capacitance change with frequency and voltage is negligible at less than 0.05%. COG(NPO) formulations show no aging characteristics. COG(NPO) formulation usually have a "Q" in excess of 1000 and shows little capacitance.

#### 主要性能參數 PERFORMANCE CHARACTERISTICS

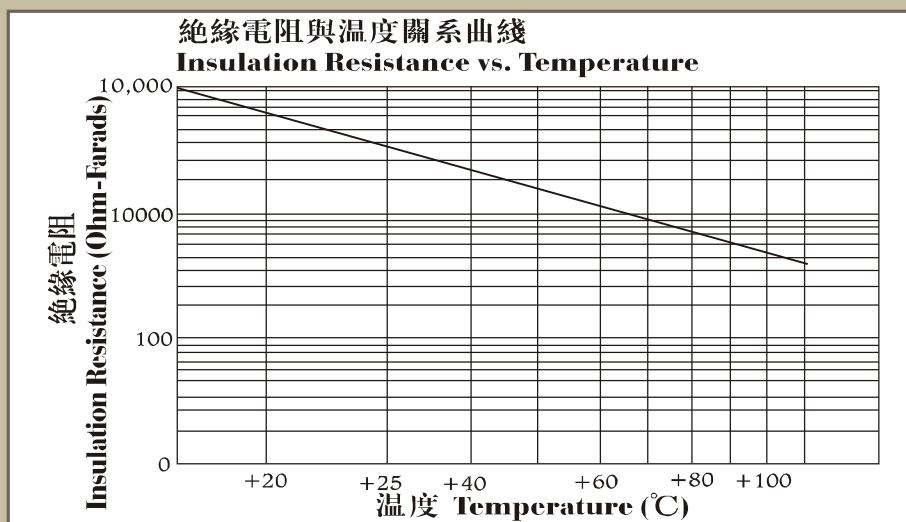
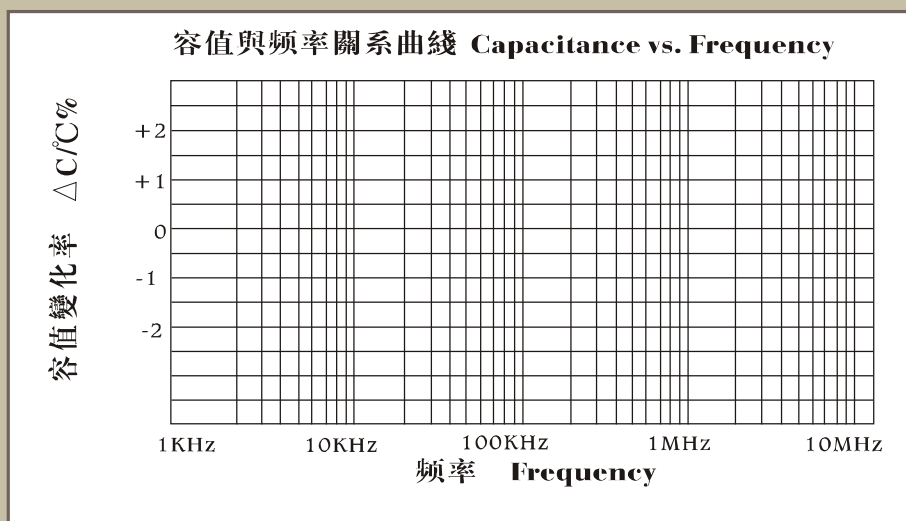
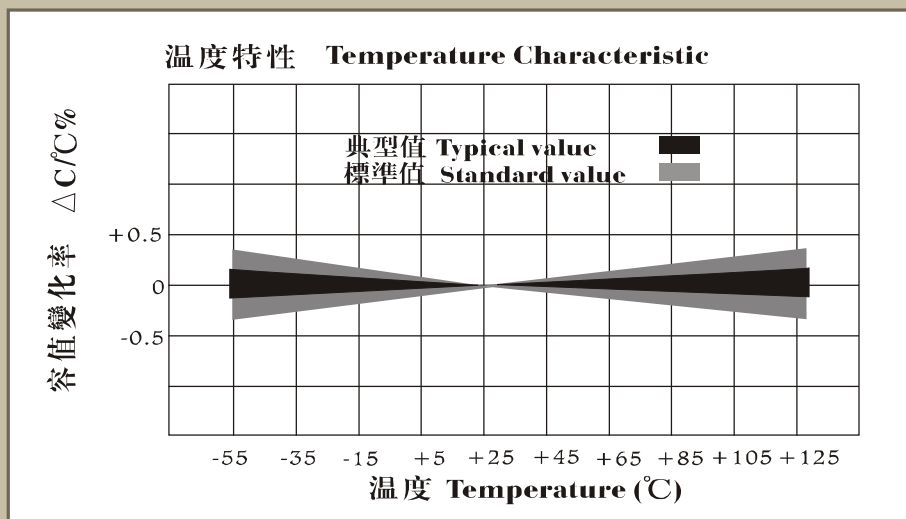
|                                       |                                                                                                                                                                                                                                                                        |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 容值範圍<br>Capacitance Range             | 0.2pF~10nF                                                                                                                                                                                                                                                             |
| 容差<br>Capacitance Tolerance           | 通常: $\pm 5\%$ , $\pm 10\%$<br>Preferred $\pm 5\%$ , $\pm 10\%$<br>當 $\text{CR} \leq 10 \text{pF}$ 時 $\pm 0.25 \text{pF}$ ,<br>$\pm 0.5 \text{pF}$<br>For values $\leq 10 \text{pF}$ , Preferred tolerance is $\pm 0.5 \text{pF}$ , also available $\pm 0.25 \text{pF}$ |
| 使用溫度<br>Operating Temperature Range   | $-55 \sim 125^\circ\text{C}$                                                                                                                                                                                                                                           |
| 溫度系數<br>Temperature Coefficient       | $0 \pm 30 \text{ppm}/^\circ\text{C}$                                                                                                                                                                                                                                   |
| 額定電壓<br>Rated Voltage                 | 25V, 50V, 100V, 200V                                                                                                                                                                                                                                                   |
| 損耗或Q值<br>Dissipation Factor And "Q"   | $\text{CR} \leq 30 \text{pF}$ $Q \leq 1000$<br>$\text{CR} < 30 \text{pF}$ $Q \leq 400 + 20 \text{CR}$                                                                                                                                                                  |
| 絕緣電阻<br>Insulation Resistance         | 10 GΩ 以上<br>more than 10 GΩ                                                                                                                                                                                                                                            |
| 耐壓<br>Dielectric Withstanding Voltage | 2.5倍額定電壓<br>250% rated voltage                                                                                                                                                                                                                                         |
| 測試電壓<br>Test Voltage                  | $1 \pm 0.2 \text{V}_{\text{rms}}$                                                                                                                                                                                                                                      |
| 測試頻率<br>Test Frequency                | $\text{CR} \leq 1000 \text{pF}$ 時, 1KHz<br>For values $1000 \text{pF} \leq 1 \text{KHz}$<br>$\text{CR} \leq 1000 \text{pF}$ 時, 1MHz<br>For values $1000 \text{pF} \leq 1 \text{MHz}$                                                                                   |

#### 尺寸與容值範圍 CAPACITANCE RANGE VS. CHIP SIZE

| 尺寸 Size | 25V         | 50V         | 100V        | 200V        |
|---------|-------------|-------------|-------------|-------------|
| 0402    | --          | 0.2pF~100nF | --          | --          |
| 0603    | 0.2pF~1.0nF | 0.2pF~470nF | 0.2pF~330nF | --          |
| 0805    | 0.5pF~4.7nF | 0.5pF~2.2nF | 0.5pF~1.0nF | 0.5pF~470nF |
| 1206    | 0.5pF~10nF  | 0.5pF~4.7nF | 0.5pF~2.2nF | 0.5pF~1.0nF |

## COG(NPO)介質電容器 COG(NOP) DIELECTRIC CAPACITORS

## 特征曲線 TYPICAL CHARACTERISTIC CURVES



## X7R 介质电容器

### X7R DIELECTRIC CAPACITORS

X7R類介質電容器是在工業中廣泛使用的一種溫度穩定型電容器，屬於Ⅱ類介質材料，具有中等介電常數，在使用溫度(-55℃~+125℃)範圍內容值變化率在±15%以內，容值老化率為1%。

X7R formulations are called "temperature stable" ceramics and fall into eia class II dielectric materials.

X7R is the most popular of these intermediate dielectric constant materials. Its temperature variation of capacitance is within ±15% from -55 to 125°C. Its aging rate is 1%.

#### 主要性能參數 PERFORMANCE CHARACTERISTICS

|                                       |                                                                                                                                                                                             |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 容值範圍<br>Capacitance Range             | 100pF~4.7nF                                                                                                                                                                                 |
| 容差<br>Capacitance Tolerance           | 通常: ±10%, ±20%.<br>Preferred ±10%, ±20%                                                                                                                                                     |
| 使用溫度<br>Operating Temperature Range   | -55~125℃                                                                                                                                                                                    |
| 溫度特性<br>Temperature Characteristics   | ±15%以內<br>within ±15%                                                                                                                                                                       |
| 額定電壓<br>Rated Voltage                 | 6.3V, 10V, 16V, 25V, 50V, 100V                                                                                                                                                              |
| 損耗<br>Dissipation Factor              | 額定電壓6.3V時, $DF \leq 5.0\%$<br>For 6.3V: $DF \leq 5.0\%$<br>額定電壓16V和10V時, $DF \leq 3.5\%$<br>For 16V and 10V: $DF \leq 3.5\%$<br>額定電壓25V以上時, $DF \leq 2.5\%$<br>For 25V min: $DF \leq 2.5\%$ |
| 絕緣電阻<br>Insulation Resistance         | 100GΩ或500Ω以上, 取最小值以上<br>100GΩ min. or 500Ω F min<br>whichever is less                                                                                                                       |
| 耐壓<br>Dielectric Withstanding Voltage | 2.5倍額定電壓<br>250% rated voltage                                                                                                                                                              |
| 測試電壓<br>Test Voltage                  | 1±0.2Vrms                                                                                                                                                                                   |
| 測試頻率<br>Test Frequency                | 1KHz                                                                                                                                                                                        |

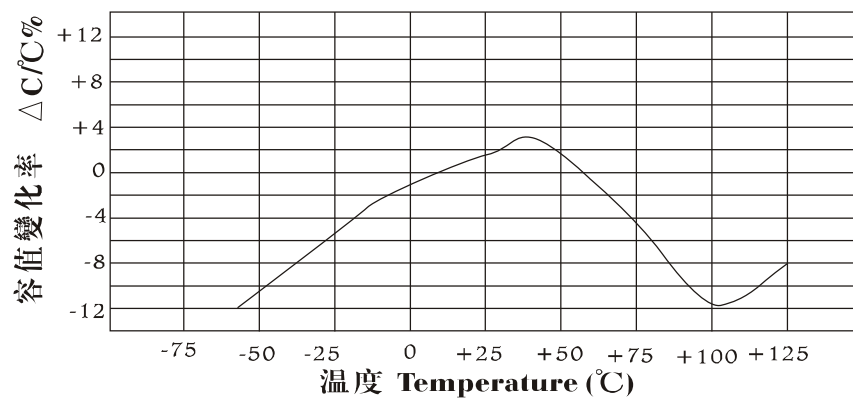
#### 尺寸與容值範圍 CAPACITANCE RANGE VS. CHIP SIZE

| 尺寸 Size | 10V          | 16V          | 25V          | 50V          | 100V        |
|---------|--------------|--------------|--------------|--------------|-------------|
| 0402    | 100pF~47nF   | 100pF~22nF   | 100pF~10nF   | 100pF~4.7nF  | --          |
| 0603    | 100pF~0.47μF | 100pF~0.22μF | 100pF~0.1μF  | 100pF~47μF   | 100pF~4.7nF |
| 0805    | 1.0pF~2.2μF  | 100pF~1.0μF  | 100pF~0.47μF | 100pF~0.22μF | 100pF~22nF  |
| 1206    | 1.0pF~4.7μF  | 1.0pF~2.2μF  | 1.0pF~1.0μF  | 1.0pF~0.47μF | 1.0pF~0.1μF |

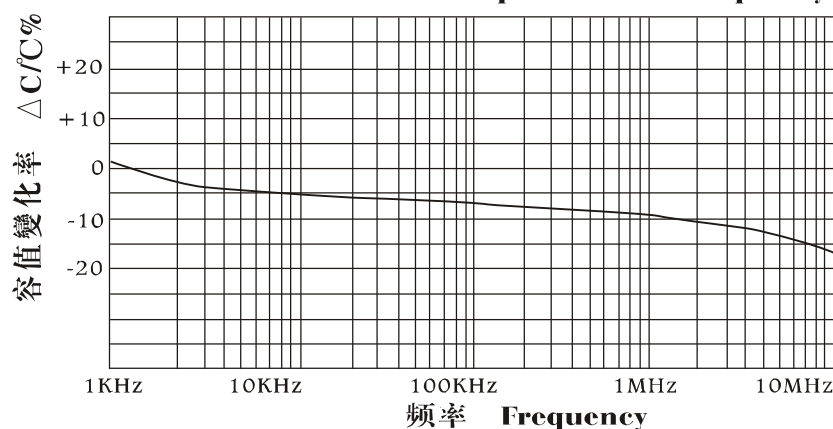
## X7R 介質電容器 X7R DIELECTRIC CAPACITORS

## 特征曲綫 TYPICAL CHARACTERISTIC CURVES

温度特性 Temperature Characteristic

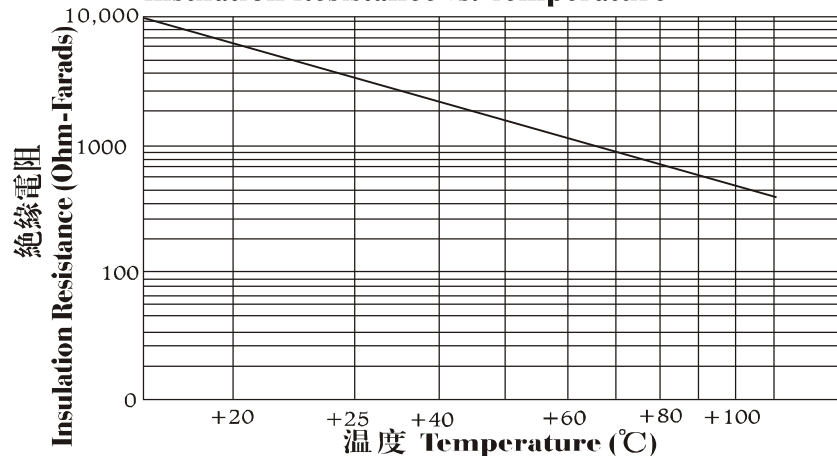


容值與频率關係曲綫 Capacitance vs. Frequency



絕緣電阻與温度關係曲綫

Insulation Resistance vs. Temperature



## Y5V 介质电容器

### Y5V DIELECTRIC CAPACITORS

Y5V類介質電容器是一種普通用途的電容器，在使用溫度（-30~+85℃）範圍內容值變化率較大，+22/-82%以內，具有高介電常數，可以用小的尺寸做大容量的電容。

Y5V formulations are for general-purpose use in a limited temperature range. They have a wide temperature characteristic of +22 / -82% capacitance change over the operating temperature range of -30 to +85 Y5V's high dielectric constant allows the manufacture of the highest capacitance value in given case size.

#### 主要性能參數 PERFORMANCE CHARACTERISTICS

|                                       |                                                                                                                                    |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 容值範圍<br>Capacitance Range             | 1000pF~10nF                                                                                                                        |
| 容差<br>Capacitance Tolerance           | ±80%, -20%.                                                                                                                        |
| 使用溫度<br>Operating Temperature Range   | -30~85℃                                                                                                                            |
| 溫度特性<br>Temperature Characteristics   | ±22%/-82%以內<br>within±22%/-82%                                                                                                     |
| 額定電壓<br>Rated Voltage                 | 10V,16V,25V ,50v                                                                                                                   |
| 損耗<br>Dissipation Factor              | 額定電壓10V時, DF ≤12.50%<br>For 10V: DF≤12.50%<br>額定電壓16V, DF ≤9%<br>For 16V :9.0% max<br>額定電壓25V以上時, DF ≤5.0%<br>For 25V min: 5.0%max |
| 絕緣電阻<br>Insulation Resistance         | 100GΩ或500Ω 以上，取最小值以上<br>100G Ω min.or500 Ω F min<br>whichever is less                                                              |
| 耐壓<br>Dielectric Withstanding Voltage | 2.5倍額定電壓<br>250% rated voltage                                                                                                     |
| 測試電壓<br>Test Voltage                  | 1±0.2Vrms                                                                                                                          |
| 測試頻率<br>Test Frequency                | 1KHz                                                                                                                               |

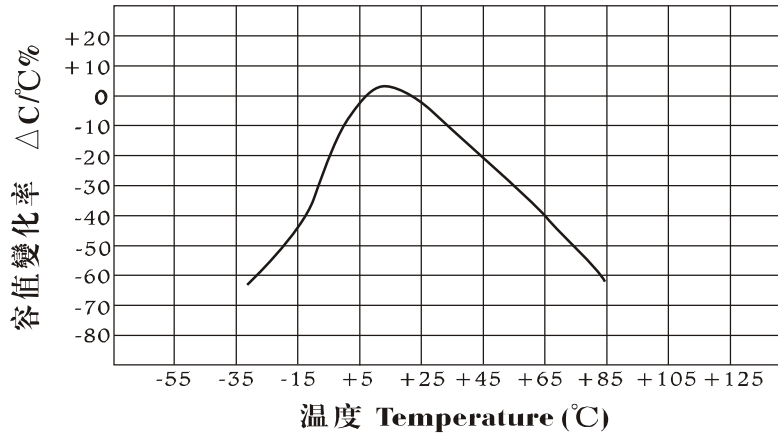
#### 尺寸與容值範圍 CAPACITANCE RANGE VS.CHIP SIZE

| 尺寸 Size | 10V            | 16V            | 25V            | 50V           |
|---------|----------------|----------------|----------------|---------------|
| 0402    | 1.0nF~0.33 μ F | 1.0nF~0.1 μ F  | 1.0nF~0.33 μ F | 1.0nF~10nF    |
| 0603    | 2.2nF~1.0 μ F  | 2.2nF~0.68 μ F | 2.2nF~0.22 μ F | 2.2nF~0.1 μ F |
| 0805    | 10nF~4.7 μ F   | 10nF~2.2 μ F   | 10nF~1.0 μ F   | 10nF~0.47 μ F |
| 1206    | 10nF~10 μ F    | 10nF~4.7 μ F   | 10nF~2.2 μ F   | 10nF~1.0 μ F  |

## Y5V 介質電容器 Y5V DIELECTRIC CAPACITORS

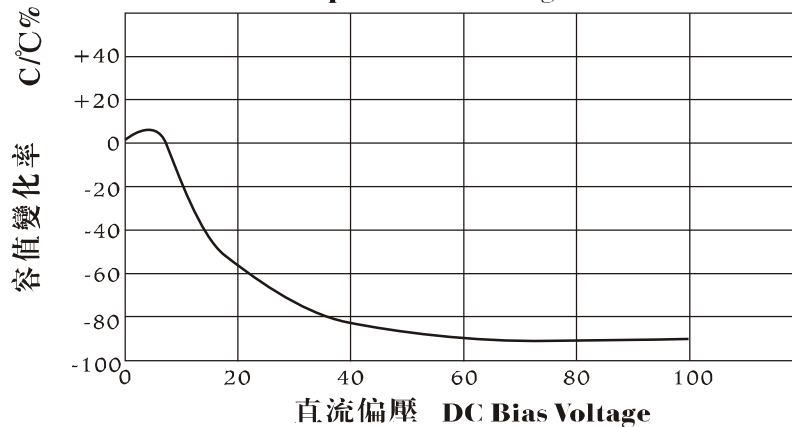
## 特征曲線 TYPICAL CHARACTERISTIC CURVES

温度特性 Temperature Characteristic



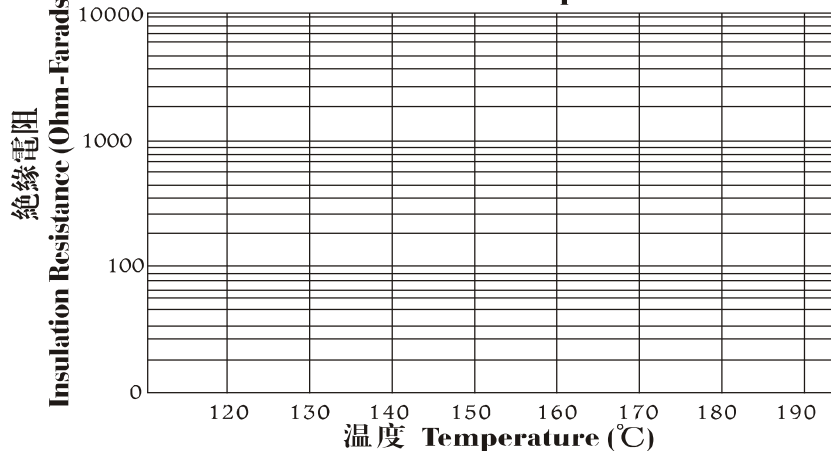
容值與直流偏壓關係曲線

Capacitance Change vs. DC Bias Voltage



絕緣電阻與溫度關係曲線

Insulation Resistance vs. Temperature



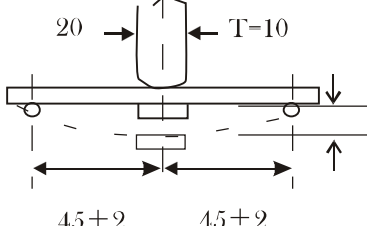
## 特点:

1. 产品尺寸精度高, 便于自动贴片机高效率装配;
2. 端电极三层电极, 适合波峰焊和同流焊;
3. 介电体与外表为同种材料, 环境条件影响小, 高绝缘电阻, 高可靠性;
4. 含有从COG到Y5V各种温度特性介质, 适用于通讯、计算机、家用电器和仪器仪表等普通电子设备。

## 可靠性测试 Reliability Test

| 项目<br>Item                                | 技术规格<br>Technical Specification |                                                         |                                                         |        | 测 试 方 法<br>Test Method and Remarks                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                             |                                         |                                                                                                                                                                                                                         |
|-------------------------------------------|---------------------------------|---------------------------------------------------------|---------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 容量<br>Capacitance                         | I 类<br>Class I                  | 应符合指定的误差级别<br>Should be within the specified tolerance. |                                                         |        | 标称容量<br>Capacitance                                                                                                                                                                                                                                                                                                                  | 测试频率<br>Measuring Frequency                                                                                                                                                                                 |                                         | 测试电压<br>Measuring Voltage                                                                                                                                                                                               |
|                                           |                                 |                                                         |                                                         |        | ≤1000 pF                                                                                                                                                                                                                                                                                                                             | 1MHZ±10%                                                                                                                                                                                                    |                                         | 1.0±0.2Vrms                                                                                                                                                                                                             |
|                                           |                                 |                                                         |                                                         |        | >1000 pF                                                                                                                                                                                                                                                                                                                             | 1KHZ±10%                                                                                                                                                                                                    |                                         |                                                                                                                                                                                                                         |
|                                           | II 类<br>Class II                | 应符合指定的误差级别<br>Should be within the specified tolerance. |                                                         |        | C≤10 uF: 测试频率: 1KHZ±10%<br>测试电压: 1.0±0.2Vrms<br>Test Frequency: 1KHZ±10%<br>Test Voltage: 1.0±0.2Vrms<br>C>10 uF:<br>X7R、Y5V: 测试频率: 120±24HZ<br>测试电压: 0.5±0.1Vrms<br>Test Frequency: 120±24HZ<br>Test Voltage: 0.5±0.1Vrms<br>Z5U:<br>测试频率: 1±0.1KHZ<br>测试电压: 0.5±0.05Vrms<br>Test Frequency: 1±0.1KHZ<br>Test Voltage: 0.5±0.05Vrms |                                                                                                                                                                                                             |                                         |                                                                                                                                                                                                                         |
| 损耗角正切<br>(DF,tan δ)<br>Dissipation Factor | I 类<br>Class I                  | DF≤0.15%                                                |                                                         |        | 标称容量<br>Capacitance                                                                                                                                                                                                                                                                                                                  | 测试频率<br>Measuring Frequency                                                                                                                                                                                 |                                         | 测试电压<br>Measuring Voltage                                                                                                                                                                                               |
|                                           |                                 |                                                         |                                                         |        | ≤1000 pF                                                                                                                                                                                                                                                                                                                             | 1MHZ±10%                                                                                                                                                                                                    |                                         | 1.0±0.2Vrms                                                                                                                                                                                                             |
|                                           |                                 |                                                         |                                                         |        | >1000 pF                                                                                                                                                                                                                                                                                                                             | 1KHZ±10%                                                                                                                                                                                                    |                                         |                                                                                                                                                                                                                         |
|                                           | II 类<br>Class II                | X7R                                                     | ≥50V                                                    | 25V    | 16V                                                                                                                                                                                                                                                                                                                                  | 10V                                                                                                                                                                                                         | 6.3V                                    | C≤10 uF:<br>测试频率: 1KHZ±10%<br>测试电压: 1.0±0.2Vrms<br>Test Frequency: 1KHZ±10%<br>Test Voltage: 1.0±0.2Vrms                                                                                                                |
|                                           |                                 |                                                         | ≤2.5%                                                   | ≤3.5%  | ≤3.5%                                                                                                                                                                                                                                                                                                                                | ≤5.0%                                                                                                                                                                                                       | ≤5.0%<br>(C<33uF)<br>≤10.0%<br>(C<33uF) |                                                                                                                                                                                                                         |
|                                           |                                 | Y5V<br>Z5U                                              | ≥25V                                                    |        | 16V                                                                                                                                                                                                                                                                                                                                  | 10V                                                                                                                                                                                                         | 6.3V                                    | C>10 uF: X7R、Y5V:<br>测试频率: 120±24HZ<br>测试电压: 0.5±0.1Vrms<br>Test Frequency: 120±24HZ<br>Test Voltage: 0.5±0.1Vrms<br>Z5U:测试频率: 1±0.1KHZ<br>测试电压: 0.5±0.05Vrms<br>Test Frequency: 1±0.1KHZ<br>Test Voltage: 0.5±0.05Vrms |
| ≤7.0%<br>(C<10uF)<br>≤9.0%<br>(C≥10uF)    | ≤12.5%                          |                                                         | ≤12.5%                                                  | ≤12.5% |                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                             |                                         |                                                                                                                                                                                                                         |
| 绝缘电阻<br>(IR)<br>Insulation Resistance     | I 类<br>Class I                  | C≤10 nF, Ri≥50000MΩ<br>C>10 nF, Ri C <sub>R</sub> ≥500S |                                                         |        |                                                                                                                                                                                                                                                                                                                                      | 测试电压: 额定电压<br>测试时间: 60±5 秒<br>测试温度: ≤75%<br>测试温度: 25℃±5℃<br>测试充放电电流: ≤50mA<br>Measuring Voltage: Rated Voltage<br>Duration: 60±5s<br>Test Humidity: ≤75%<br>Test Temperature: 25℃±5℃<br>Test Current: ≤50mA |                                         |                                                                                                                                                                                                                         |
|                                           | II 类<br>Class II                | X7R                                                     | C≤25 nF, Ri≥10000MΩ<br>C>25 nF, Ri C <sub>R</sub> ≥100S |        |                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                             |                                         |                                                                                                                                                                                                                         |
|                                           |                                 | Y5V<br>Z5U                                              | C≤25 nF, Ri≥4000MΩ<br>C>25 nF, Ri C <sub>R</sub> ≥100S  |        |                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                             |                                         |                                                                                                                                                                                                                         |

| 项目<br>Item                                     | 技术规格<br>Technical Specification                                                                                                          |                                                                                              |         |             | 测 试 方 法<br>Test Method and Remarks                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                     |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|---------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| 介质耐电强度(DWV)<br>Dielectric Withstanding Voltage | 不应有介质被击穿或损伤<br>No breakdown or damage                                                                                                    |                                                                                              |         |             | 测量电压：<br>I 类: <b>300%</b> 额定电压    II 类: <b>250%</b> 额定电压<br>时间： <b>1~5秒</b> 充/放电电流：不应超过 <b>50mA</b><br>(这部分说明不包括中高压 <b>MLCC</b> )<br>Measuring Voltage:<br>Class I :300% Rated voltage<br>Class II: 250% Rated voltage<br>Duration:1~5s<br>Charge/Discharge Current:50mA max.<br>(This method excludes high-voltage <b>MLCC</b> )                                                                        |                                                                                                     |
|                                                |                                                                                                                                          |                                                                                              |         |             |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |
| 可焊性<br>Solderability                           | 上锡率应大于 <b>95%</b><br>外观：无可见损伤.<br>At least 95% of the terminal electrode is covered by new solder<br>Visual Appearance:No visible damage |                                                                                              |         |             | 将电容在 <b>80~120℃</b> 的温度下预热 <b>10~30秒</b> .<br>Preheating conditions:80 to 120℃;10~30s                                                                                                                                                                                                                                                                                                                    |                                                                                                     |
|                                                |                                                                                                                                          |                                                                                              |         |             | 有铅焊料:( <b>Sn/Pb:63/37</b> )<br>浸锡温度: <b>235±5℃</b><br>浸锡时间: <b>2±0.5s</b><br>Solder Temperature:235±5℃<br>Duration:2±0.5s                                                                                                                                                                                                                                                                                | 无铅焊料:<br>浸锡温度: <b>245±5℃</b><br>浸锡时间: <b>2±0.5s</b><br>Solder Temperature:245±5℃<br>Duration:2±0.5s |
| 耐焊接热<br>Resistance to Soldering Heat           | 项目<br>Item                                                                                                                               | NPO至SL<br>NPO toSL                                                                           | X7R     | Y5V、<br>Z5U | 将电容在 <b>100~200℃</b> 的温度下预热 <b>10±2分钟</b> .<br>浸锡温度: <b>265±5℃</b><br>浸锡时间: <b>5±1s</b><br>然后取出溶剂清洗干净，在 <b>10倍</b> 以上的显微镜底下观察。<br>放置时间： <b>24±2小时</b> 放置条件：室温<br>Preheating conditions:100 to 200℃;10±2min.<br>Solder Temperature:265±5℃<br>Duration:5±1s<br>Clean the capacitor with solvent and examine it with a 10X(min)minicroscope.<br>Recovery Time:24±2h<br>Recovery condition:Room temperature. |                                                                                                     |
|                                                | $\Delta C/C$                                                                                                                             | $\leq \pm 0.5\%$ 或 $\pm 0.5PF$ ,取较大值<br>$\leq \pm 0.5\%$ or $\pm 0.5PF$ ,whichever is larger | -5~+10% | -10~+20%    |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |
|                                                | DF                                                                                                                                       | 同初始标准<br>Same to initial valuc.                                                              |         |             |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |
|                                                | IR                                                                                                                                       | 同初始标准<br>Same to initial valuc.                                                              |         |             |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |
|                                                | 外观：无可见损伤 上锡率： $\geq 95\%$<br>Appearance:No visible damage.At least 95% of the teminal electrode is covered by new solder.                |                                                                                              |         |             |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |

| 项目<br>Item                                                     | 技术规格<br>Technical Specification                                                                   |            | 测试方法<br>Test Method and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------|-----------|-----|---------------------------------------------------------------------------------------------------|-----------|-----|-------------------|------------|-----|-------------------------------------------------------------------------------------------------|-----------|-----|-------------------|------------|
| 抗弯曲强度<br>Resistance to Flexure of Substrate (Bending Strength) | 外观: 无可见损伤。<br>Appearance: No visible damage.                                                      |            | 试验基板: Al <sub>2</sub> O <sub>3</sub> 或 PCB<br>弯曲深度: 1mm<br>施压速度: 0.5mm/sec.<br>单位: mm<br>应在弯曲状态下进行测量。<br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
|                                                                | ΔC/C                                                                                              | ≤ ±10%     | Test Board: Al <sub>2</sub> O <sub>3</sub> or PCB<br>Warp: 1mm<br>Speed: 0.5mm/sec.<br>Unit: mm<br>The measurement should be made with the board in the bending position.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 端头结合强度<br>Termination Adhesion                                 | 外观无可见损伤<br>No visible damage.                                                                     |            | 施加的力: <b>5N</b> 时间: <b>10 ± 1S</b><br>Applied Force: 5N                  Duration: 10 ± 1S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 温度循环<br>Temperature Cycle                                      | I 类: ≤ ±1%或 ±1pF,<br>取两者中最大者<br>II 类: B: ≤ ±10%<br>E, F: ≤ ±20%                                   |            | 预处理* (2类): 上限类别温度, 1小时      恢复: <b>24 ± 1h</b><br>初始测量<br>循环次数: <b>5</b> 次, 一个循环分以下 <b>4</b> 步:<br><table border="1" data-bbox="791 1270 1383 1494"><thead><tr><th>阶段</th><th>温度( °C )</th><th>时间 ( 分钟 )</th></tr></thead><tbody><tr><td>第1步</td><td>下限温度( <math>\text{NPO/X7R} \begin{smallmatrix} -55 \\ 15V-25Z5U+10 \end{smallmatrix}</math> )</td><td><b>30</b></td></tr><tr><td>第2步</td><td>常温 ( +20 )</td><td><b>2~3</b></td></tr><tr><td>第3步</td><td>上限温度( <math>\text{NPO/X7R} \begin{smallmatrix} +125 \\ 15V/Z5U \end{smallmatrix} +85</math> )</td><td><b>30</b></td></tr><tr><td>第4步</td><td>常温 ( +20 )</td><td><b>2~3</b></td></tr></tbody></table>                                                                                                  | 阶段   | 温度( °C )          | 时间 ( 分钟 ) | 第1步 | 下限温度( $\text{NPO/X7R} \begin{smallmatrix} -55 \\ 15V-25Z5U+10 \end{smallmatrix}$ )                | <b>30</b> | 第2步 | 常温 ( +20 )        | <b>2~3</b> | 第3步 | 上限温度( $\text{NPO/X7R} \begin{smallmatrix} +125 \\ 15V/Z5U \end{smallmatrix} +85$ )              | <b>30</b> | 第4步 | 常温 ( +20 )        | <b>2~3</b> |
|                                                                | 阶段                                                                                                | 温度( °C )   | 时间 ( 分钟 )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 第1步                                                            | 下限温度( $\text{NPO/X7R} \begin{smallmatrix} -55 \\ 15V-25Z5U+10 \end{smallmatrix}$ )                | <b>30</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 第2步                                                            | 常温 ( +20 )                                                                                        | <b>2~3</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 第3步                                                            | 上限温度( $\text{NPO/X7R} \begin{smallmatrix} +125 \\ 15V/Z5U \end{smallmatrix} +85$ )                | <b>30</b>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 第4步                                                            | 常温 ( +20 )                                                                                        | <b>2~3</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
|                                                                | Class I: ≤ ±1%or ±1pF,<br>whichever is larger.<br>Class II: B: ≤ ±10%<br>E, F: ≤ ±20%             |            | 试验后放置 (恢复) 时间: <b>24 ± 2h</b><br>Preheating conditions: up-category temperature, 1h<br>Recovery time: 24 ± 1h<br>Initial Measurement<br>Cycling Times: 5times, 1 cycle, 4steps:<br><table border="1" data-bbox="791 1695 1485 1897"><thead><tr><th>Step</th><th>Temperature( °C )</th><th>Time(min)</th></tr></thead><tbody><tr><td>1</td><td>Low-category temp. ( <math>\text{NPO/X7R} \begin{smallmatrix} -55 \\ 15V-25Z5U+10 \end{smallmatrix}</math> )</td><td>30</td></tr><tr><td>2</td><td>Normal temp.(+20)</td><td>2~3</td></tr><tr><td>3</td><td>Up-category temp.( <math>\text{NPO/X7R} \begin{smallmatrix} +125 \\ 15V/Z5U \end{smallmatrix} +85</math> )</td><td>30</td></tr><tr><td>4</td><td>Normal temp.(+20)</td><td>2~3</td></tr></tbody></table> | Step | Temperature( °C ) | Time(min) | 1   | Low-category temp. ( $\text{NPO/X7R} \begin{smallmatrix} -55 \\ 15V-25Z5U+10 \end{smallmatrix}$ ) | 30        | 2   | Normal temp.(+20) | 2~3        | 3   | Up-category temp.( $\text{NPO/X7R} \begin{smallmatrix} +125 \\ 15V/Z5U \end{smallmatrix} +85$ ) | 30        | 4   | Normal temp.(+20) | 2~3        |
| Step                                                           | Temperature( °C )                                                                                 | Time(min)  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 1                                                              | Low-category temp. ( $\text{NPO/X7R} \begin{smallmatrix} -55 \\ 15V-25Z5U+10 \end{smallmatrix}$ ) | 30         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 2                                                              | Normal temp.(+20)                                                                                 | 2~3        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 3                                                              | Up-category temp.( $\text{NPO/X7R} \begin{smallmatrix} +125 \\ 15V/Z5U \end{smallmatrix} +85$ )   | 30         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
| 4                                                              | Normal temp.(+20)                                                                                 | 2~3        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |
|                                                                |                                                                                                   |            | Recovery time after test: 24 ± 1h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |      |                   |           |     |                                                                                                   |           |     |                   |            |     |                                                                                                 |           |     |                   |            |

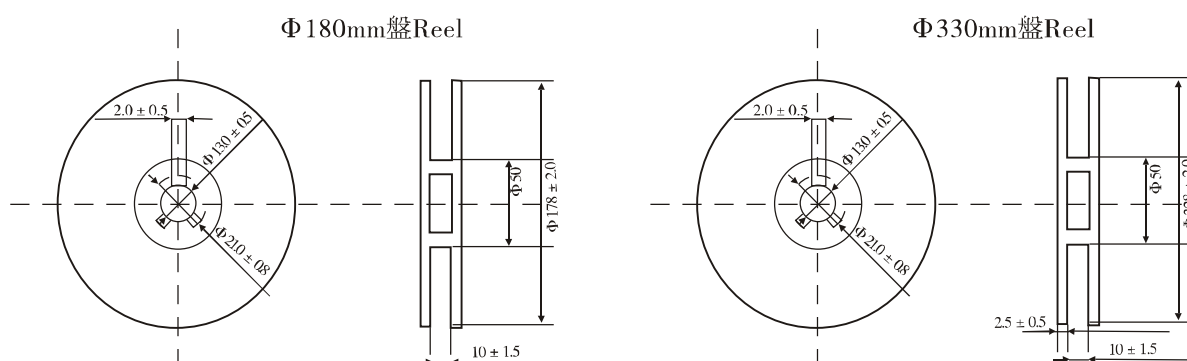
| 项目<br>Item                                        | 技术规格<br>Technical Specification                   |                                                                                                                                                                                                                               | 测试方法<br>Test Method and Remarks                                                                                                                                                                                               |
|---------------------------------------------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 潮湿试验<br>Moisture<br>Resistance                    | $\Delta C/C$                                      | I 类: $\leq \pm 2\%$ 或 $\pm 1pF$ ,<br>取两者之中较大者<br>II 类: $B: \leq \pm 10\%$<br>$E, F: \leq \pm 30\%$<br>Class I: $\leq \pm 2\%$ or $\pm 1pF$ ,<br>whichever is larger.<br>Class II: $B: \leq \pm 10\%$<br>$E, F: \leq \pm 30\%$ | 温度: $40 \pm 2^\circ C$<br>湿度: $90 \sim 95\%RH$<br>时间: 500小时                                                                                                                                                                   |
|                                                   | DF                                                | $\leq 2$ 倍初始标准<br>Not more than twice of initial value.                                                                                                                                                                       | 放置条件: 室温<br>放置时间: 24小时(I 类); 48小时(II 类)                                                                                                                                                                                       |
|                                                   | IR                                                | I 类: $R_i \geq 2500M\Omega$ 或 $R_i \cdot C_R \geq 25S$<br>取两者之中较小者.<br>Class I: $R_i \geq 2500M\Omega$ 或 $R_i \cdot C_R \geq 25S$ whichever is smaller.                                                                       | Temperature: $40 \pm 2^\circ C$<br>Humidity: $90 \sim 95\%RH$<br>Duration: 500h                                                                                                                                               |
|                                                   |                                                   | II 类: $R_i \geq 1000M\Omega$ 或 $R_i \cdot C_R \geq 25S$<br>取两者之中较小者.<br>Class II: $R_i \geq 1000M\Omega$ 或 $R_i \cdot C_R \geq 25S$ whichever is smaller.                                                                     | Recovery conditions: Room temperature<br>Recovery Time: 24h(Class I) or 48h(Class 2)                                                                                                                                          |
|                                                   | 外观: 无损伤.<br>Appearance: No visible damage.        |                                                                                                                                                                                                                               |                                                                                                                                                                                                                               |
| 寿命试验<br>Life Test                                 | $\Delta C/C$                                      | I 类: $\leq \pm 2\%$ 或 $\pm 1pF$<br>取两者之中较大者.<br>II 类: $B: \leq \pm 20\%$<br>$E, F: \leq \pm 30\%$<br>Class I: $\leq \pm 2\%$ or $\pm 1pF$ ,<br>whichever is larger.<br>Class II: $B: \leq \pm 20\%$<br>$E, F: \leq \pm 30\%$  | 低压产品 ( $<100V$ ):<br>电压: 1.5倍额定工作电压<br>时间: 1000小时<br>充电电流: 不应超过50mA<br>放置条件: 室温                                                                                                                                               |
|                                                   | DF                                                | $\leq 2$ 倍初始标准<br>Not more than twice of initial value.                                                                                                                                                                       | 放置时间: 24小时(I 类), 或 48小时(II 类),<br>Low-Voltage ( $<100V$ ):                                                                                                                                                                    |
|                                                   | IR                                                | I 类: $R_i \geq 4000M\Omega$ 或 $R_i \cdot C_R \geq 40S$<br>取两者之中较小者.<br>Class I: $R_i \geq 4000M\Omega$ 或 $R_i \cdot C_R \geq 40S$ whichever is smaller.                                                                       | Applied Voltage: $1.5 \times \text{Rate Voltage}$<br>Duration: 1000h                                                                                                                                                          |
|                                                   |                                                   | II 类: $R_i \geq 2000M\Omega$ 或 $R_i \cdot C_R \geq 50S$<br>取两者之中较小者.<br>Class II: $R_i \geq 2000M\Omega$ 或 $R_i \cdot C_R \geq 50S$ whichever is smaller.                                                                     | Charge/Discharge Current: 50mA max<br>Recovery Conditions: Room Temperature<br>Recover Time: 24h (Class 1), or 48h (Class 2)                                                                                                  |
|                                                   | 外观: 无损伤.<br>Visual Appearance: No visible damage. |                                                                                                                                                                                                                               |                                                                                                                                                                                                                               |
| 中高压产品<br>Middle<br>& high<br>voltage<br>Life Test | $\Delta C/C$                                      | I 类: $\leq \pm 2\%$ 或 $\pm 1pF$ ,<br>取两者之中较大者<br>II 类: $B: \leq \pm 20\%$<br>$E, F: \leq \pm 30\%$<br>Class I: $\leq \pm 2\%$ or $\pm 1pF$ ,<br>whichever is larger.<br>Class II: $B: \leq \pm 20\%$<br>$E, F: \leq \pm 30\%$ | 中高压产品:<br>$100V \leq \text{额定电压} < 500V$ : 2倍工作电压<br>$500V \leq \text{额定电压} \leq 1000V$ : 1.5倍工作电压<br>额定电压 $> 1000V$ : 1.2倍工作电压<br>时间: 100小时<br>充电电流: 不应超过50mA<br>温度: $125^\circ C$ (NPO X7R); $85^\circ C$ (Y5V)<br>放置条件: 室温 |
|                                                   | DF                                                | $\leq 2$ 倍初始标准<br>Not more than twice of initial value.                                                                                                                                                                       | 放置时间: 24小时(I 类), 或 48小时(II 类),<br>Applied Voltage:                                                                                                                                                                            |
|                                                   | IR                                                | I 类: $R_i \geq 4000M\Omega$ 或 $R_i \cdot C_R \geq 40S$<br>取两者之中较小者.<br>Class I: $R_i \geq 4000M\Omega$ 或 $R_i \cdot C_R \geq 40S$ whichever is smaller.                                                                       | $100V \leq \text{Rated Voltage} < 500V$ : 2Multiple<br>$500V \leq \text{Rated Voltage} \leq 1000V$ : 1.5Multiple<br>$> 1000V$ Rated Voltage: 1.2Multiple<br>Duration: 100h                                                    |
|                                                   |                                                   | II 类: $R_i \geq 2000M\Omega$ 或 $R_i \cdot C_R \geq 50S$<br>取两者之中较小者.<br>Class II: $R_i \geq 2000M\Omega$ 或 $R_i \cdot C_R \geq 50S$ whichever is smaller.                                                                     | Charge/Discharge Current: 50mA max.<br>Temperature: $125^\circ C$ (NPO X7R); $85^\circ C$ (Y5V)<br>Recovery Conditions: Room Temperature<br>Recovery Time: 24h (Class 1), or 48h (Class 2)                                    |
|                                                   | 外观: 无损伤.<br>Visual Appearance: No visible damage. |                                                                                                                                                                                                                               |                                                                                                                                                                                                                               |

## ■ 電容器包裝 PACKAGE OF CAPACITORS

### 產品包裝 PACKAGING

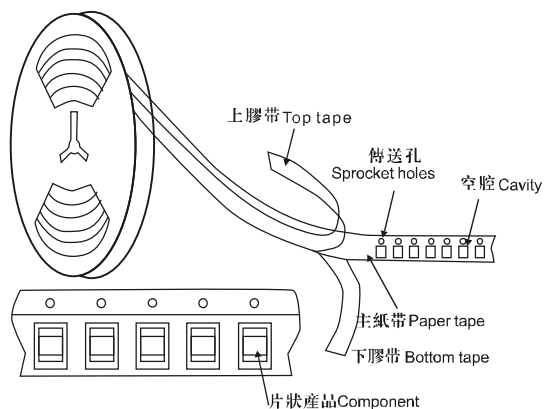
#### 編帶盤式包裝 Tape&Reel Package

##### A. 編帶盤尺寸 Dimension of Reel

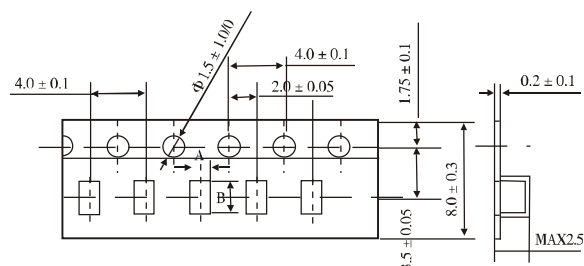
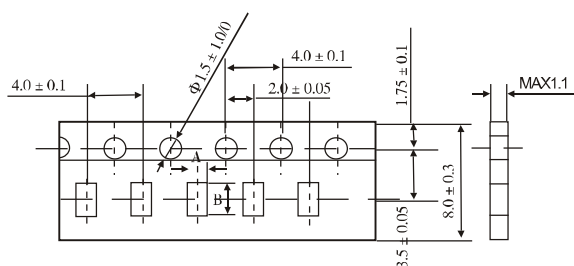
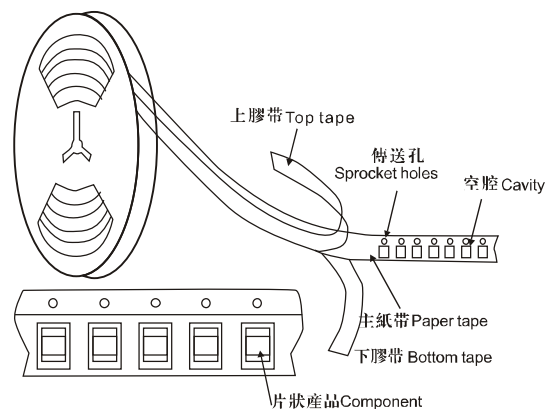


15

##### B. 紙帶 Paper Tape



##### C. 塑料帶 Embossed Tape



14

## 电容器包装 PACKAGE OF CAPACITORS

| 型号 Type        | A         | B        |
|----------------|-----------|----------|
| 0402           | 0.65±0.1  | 1.15±0.1 |
| 0603           | 1.05±0.1  | 1.85±0.1 |
| 0805 (T<1.0mm) | 1.55±0.15 | 2.3±0.15 |
| 1206 (T<1.0mm) | 2.0±0.2   | 3.6±0.2  |

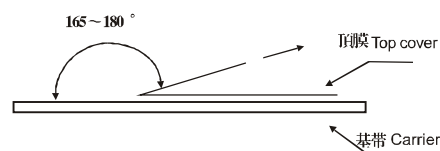
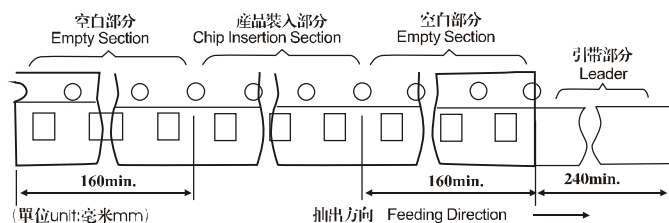
| 型号 Type        | A        | B        |
|----------------|----------|----------|
| 0805(T=1.25mm) | 1.45±0.2 | 2.25±0.2 |
| 1206(T>1mm)    | 1.9±0.2  | 3.5±0.2  |

### 包装要求

- (1) 包装电容器的编带是顺时针卷绕的，由上往下的方向拉出编带时，传送孔处于编带的右侧。
- (2) 在编带的前端，至少留出5个间距的引出带。
- (3) 在编带时，必须按下图留出印带部分或空白部分。
- (4) 在盘带的安装中的产品装错的数量每盘必须小6：表示数量的0.1%或1个为限，不连续发生错误。
- (5) 上胶带和下胶带不应超出编带的边缘，不能挡住传送孔。
- (6) 传送孔的累计误差为10个间距：0.3毫米以内。
- (7) 上胶带的剥离力矩应在0.1至0.6牛顿以内，其方向如右下图所示。

### Taping Method

- (1) Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.
- (2) The top tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.
- (3) Part of the leader and part of the empty tape shall be attached to the end of the tape as following illustration
- (4) Number of missing capacitors is less than 0.1% of the total number quoted per reel or 1pc, whichever is greater, and are not continuous.
- (5) The top tape and bottom tape shall not protrude beyond the edges of the tape and shall not cover sprocket below.
- (6) Cumulative tolerance of sprocket holes, 10 pitches: ±0.3mm.
- (7) Peeling off force: 0.1 to 0.6n in the direction shown down.



- 袋式散装数量: 2000个/袋或按客户要求 Bulk Packaging In A Bag.2000Pcs Or Customer-Made