

B

## Multilayer Ceramic Capacitor



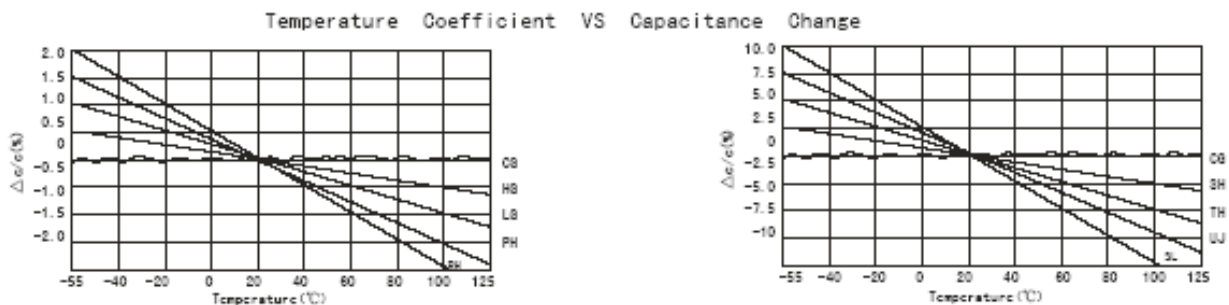
## INTRODUCTION (介绍)

### ● TYPES OF DIELECTRIC MATERIAL AND CAPACITOR (电容器及介质种类)

\*HIGH FREQUENCY TYPE: The capacitor of this kind dielectric material is considered as Class I capacitor, including high frequency COG capacitor and temperature compensating capacitor such as HG, LG, PH, RH, SH, TH, UJ, SL. The electrical properties of COG capacitor are the most stable one and have little change with temperature, voltage and time. They are suited for applications where low-losses and high-stability are required, such as filters, oscillators, and timing circuits.

\*高频类: 此类介质材料的电容器为 I 类电容器, 包括通用型高频 COG 电容器和温度补偿型高频 HG、LG、PH、RH、SH、TH、UJ、SL 电容器。其中 COG 电容器电性能最稳定, 几乎不随温度、电压和时间的变化而变化。适用于低损耗, 稳定性要求高的高频电路, 如滤波器, 振荡器和计时电路中。

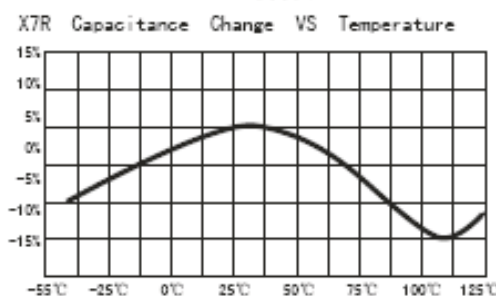
高频电容温度系数



\*X7R/X5R: X7R/X5R material is a kind of material which has high dielectric constant. The capacitor made of this kind material is considered as Class II capacitor whose capacitance is higher than that of Class I. These capacitors are classified as having a semi-stable temperature characteristic and used over a wide temperature range, such in these kinds of circuits, DC-blocking, decoupling, bypassing, frequency discriminating etc.

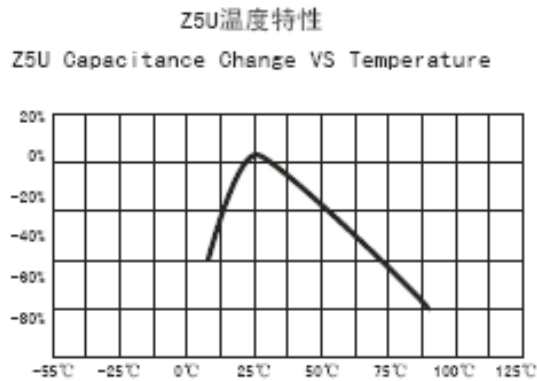
\*X7R/X5R: 此类介质材料的电容器为 II 类电容器, 具有较高的介电常数, 容量比 I 类电容器高, 具有较稳定的温度特性, 适用于容量范围广, 稳定性要求不高的电路中, 如隔直、耦合、旁路、鉴频等电路中。

X7R温度特性



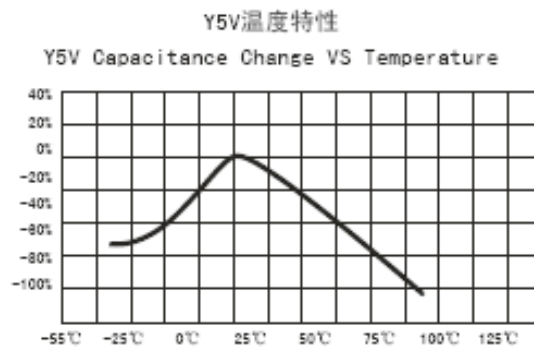
\*Z5U: The capacitor made of this kind of material is considered as Class III capacitor, whose temperature characteristic is between that of X7R and Y5V. The capacitance of this kind of capacitor is unstable and sensible to temperature and voltage. Ideally suited for bypassing and decoupling application circuits operating with low DC bias in the environment approaches to roomtemperature.

\*Z5U: 此类介质的电容器为III类电容器，其温度特性介于X7R和Y5V之间，容量稳定性较差，对温度、电压等条件较敏感，适用于要求大容量，使用温度范围接近于室温的旁路，耦合等，低直流偏压的电路中。



\*Y5V: The capacitors made of this kind of material is the highest dielectric constant of all ceramic capacitors. They are used over a moderate temperature range in application where high capacitance is required because of its unstable temperature coefficient, but where moderate losses and capacitance changes can be tolerated. Its capacitance and dissipation factors are sensible to measuring conditions, such as temperature and voltage, etc.

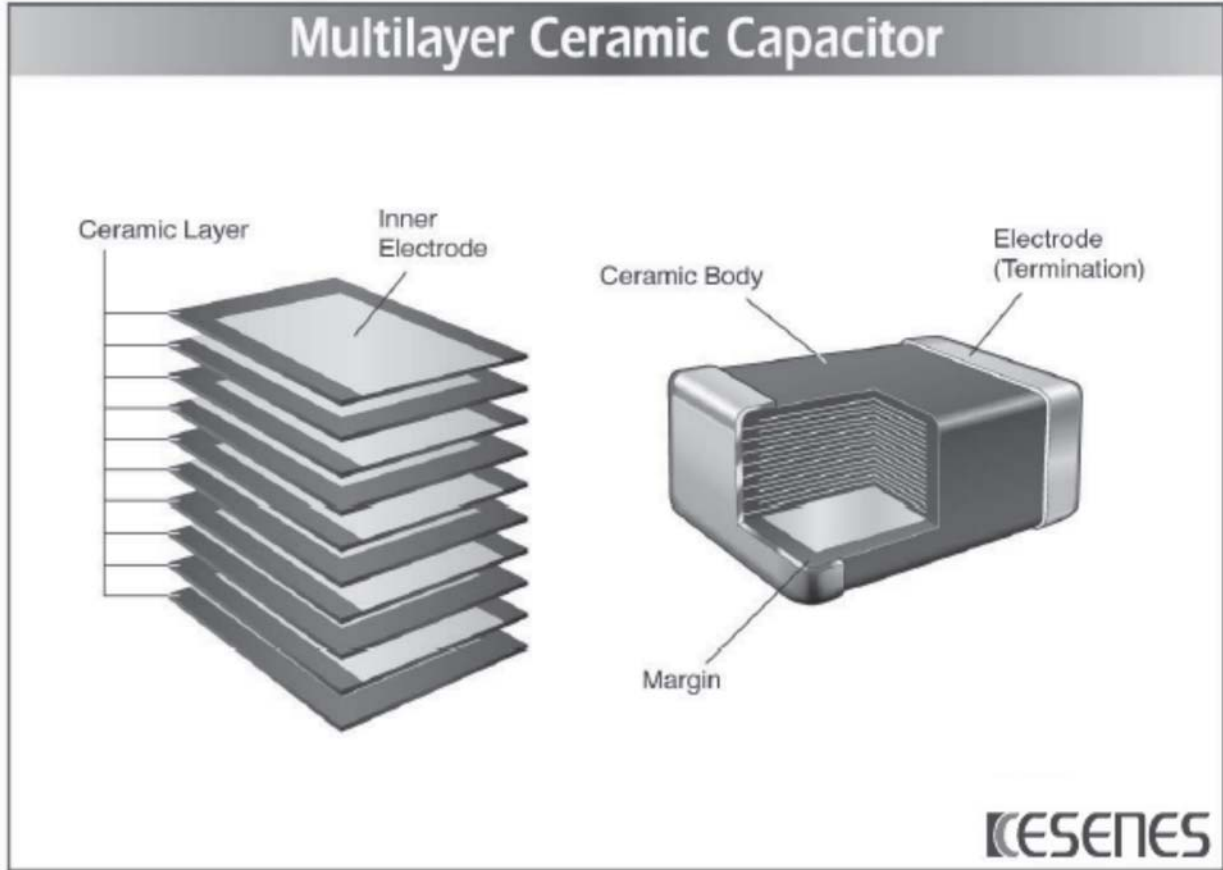
\*Y5V: 此类介质的电容器为III类电容器，是所有电容器中介电常数最大的电容器，但其容量稳定性较差，对温度、电压等条件较敏感，适用于要求大容量，温度变化不大的电路中。



## ■ FEATURE AND APPLICATION (特征与应用)

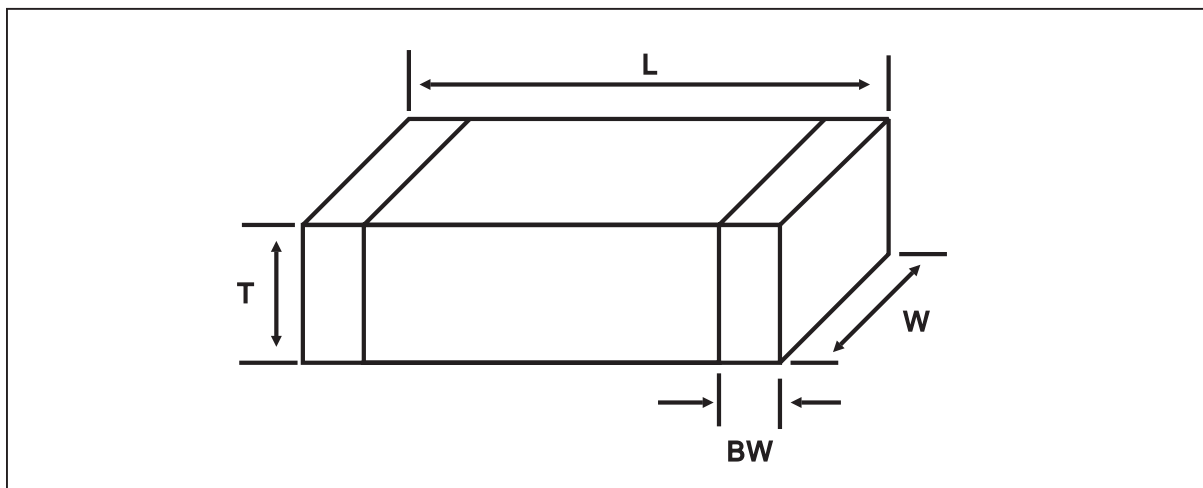
- Feature (特征)
  - Miniature Size
  - Wide Capacitance, Temperature Compensation and Voltage Range
  - Highly Reliable Performance
  - Industry Standard Size
  - Tape & Reel for Surface Mount Assembly
  - Low ESR at high frequencies
  - High Q at high frequencies
  - Stable temperature dependence of capacitance (COG)
  - Ultra-small size
  - Highly reliable performance
  - High RF power handling capabilities
  - Highly reliable performance in high-voltage
  - Industry standard size
  - Tape & reel for surface mount assembly
- Application (应用)
  - General electronic equipment
  - High frequency module and high power circuit
  - Input signal filtering circuit of modem and LAN interface
  - General high voltage circuits
  - Inverter circuits with a liquid backlight

■ STRUCTURE (结构)



MLCC

■ APPEARANCE AND DIMENSION (外观与尺寸)



| Size Code | DIMENSION (mm) |                |                |                 |
|-----------|----------------|----------------|----------------|-----------------|
|           | L              | W              | T              | BW              |
| 0402      | $1.0 \pm 0.05$ | $0.5 \pm 0.05$ | $0.5 \pm 0.05$ | $0.25 \pm 0.1$  |
| 0603      | $1.6 \pm 0.1$  | $0.8 \pm 0.1$  | $0.8 \pm 0.1$  | $0.3 \pm 0.1$   |
| 0805      | $2.0 \pm 0.2$  | $1.25 \pm 0.2$ | $0.7 \pm 0.2$  | $0.5 \pm 0.2$   |
|           |                |                | $1.0 \pm 0.2$  |                 |
|           |                |                | $1.25 \pm 0.2$ |                 |
| 1206      | $3.2 \pm 0.3$  | $1.6 \pm 0.2$  | $0.7 \pm 0.2$  | $0.5 \pm 0.25$  |
|           |                |                | $1.0 \pm 0.2$  |                 |
|           |                |                | $1.25 \pm 0.2$ |                 |
| 1210      | $3.2 \pm 0.3$  | $2.5 \pm 0.3$  | $1.25 \pm 0.3$ | $0.75 \pm 0.25$ |
|           |                |                | $1.5 \pm 0.3$  |                 |
| 1808      | $4.5 \pm 0.4$  | $2.0 \pm 0.2$  | $\leq 2.0$     | $0.75 \pm 0.25$ |
| 1812      | $4.5 \pm 0.4$  | $3.2 \pm 0.3$  | $\leq 2.5$     | $0.75 \pm 0.25$ |

## ■ PART NUMBERING (型号命名方式)

### ● Product symbol (产品代码)

|                  |                  |                |                |                 |               |                 |                 |
|------------------|------------------|----------------|----------------|-----------------|---------------|-----------------|-----------------|
| <u>CC41</u><br>① | <u>0805</u><br>② | <u>CG</u><br>③ | <u>1H</u><br>④ | <u>102</u><br>⑤ | <u>J</u><br>⑥ | <u>(N)</u><br>⑦ | <u>(A)</u><br>⑧ |
|------------------|------------------|----------------|----------------|-----------------|---------------|-----------------|-----------------|

#### ① Type (类型)

CC41: High Frequency Capacitor, Class I (I类高频电容器)  
 CT41G: Middle Frequency Capacitor, Class II (II类中频电容器)  
 CT41: Low Frequency Capacitor, Class III (III类低频电容器)

#### ② Size (尺寸)

#### ③ Dielectric Style (介质种类)

|                             |                  |                  |                 |
|-----------------------------|------------------|------------------|-----------------|
| Symbol                      | CG               | 2X1              | 2F4             |
| EIA Code                    | COG              | X7R              | Y5V             |
| Type                        | CC41             | CT41G            | CT41            |
| Temperature Coefficient     | 0 ± 30 ppm/°C    | ± 15%            | + 22% ~ - 82%   |
| Operation Temperature Range | - 55°C ~ + 125°C | - 55°C ~ + 125°C | - 30°C ~ + 85°C |

#### ④ Rated Voltage (额定电压)

|                   |     |    |    |    |    |     |     |     |      |      |      |      |
|-------------------|-----|----|----|----|----|-----|-----|-----|------|------|------|------|
| Symbol            | 0J  | 1A | 1C | 1E | 1H | 2A  | 2D  | 2H  | 1KV  | 2KV  | 3KV  | 4KV  |
| Rated Voltage (V) | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 500 | 1000 | 2000 | 3000 | 4000 |

#### ⑤ Nominal Capacitance (标称容量)

The first two digits are significant; third digit denotes number of zeros; R = decimal point.  
 (头两位数字为有效数字, 第三位数字为0的个数; R为小数点。)  
 (0R5 = 0.5pF, 1R0 = 1.0pF, 100 = 10pF, 101 = 100pF, 102 = 1000pF, 103 = 10000pF)

#### ⑥ Capacitance Tolerance (容量偏差)

|           |         |          |         |      |      |      |       |       |                |                |
|-----------|---------|----------|---------|------|------|------|-------|-------|----------------|----------------|
| Code      | B       | C        | D       | F    | G    | J    | K     | M     | S              | Z              |
| Tolerance | ± 0.1pF | ± 0.25pF | ± 0.5pF | ± 1% | ± 2% | ± 5% | ± 10% | ± 20% | + 50%<br>- 20% | + 80%<br>- 20% |

#### ⑦ Termination (端头材料)

S = Silver (纯银端头电极)  
 C = Copper (纯铜端头电极)  
 N = Silver/Copper Layer, Nickel Layer, Tin Layer  
 (银/铜层、镍层、锡层三层电镀端头电极)

#### ⑧ Packaging Type (包装方式)

T = Bulk (散装)  
 A = Tape Reel (编带盘装)

## ■ CAPACITANCE RANGE (容量范围)

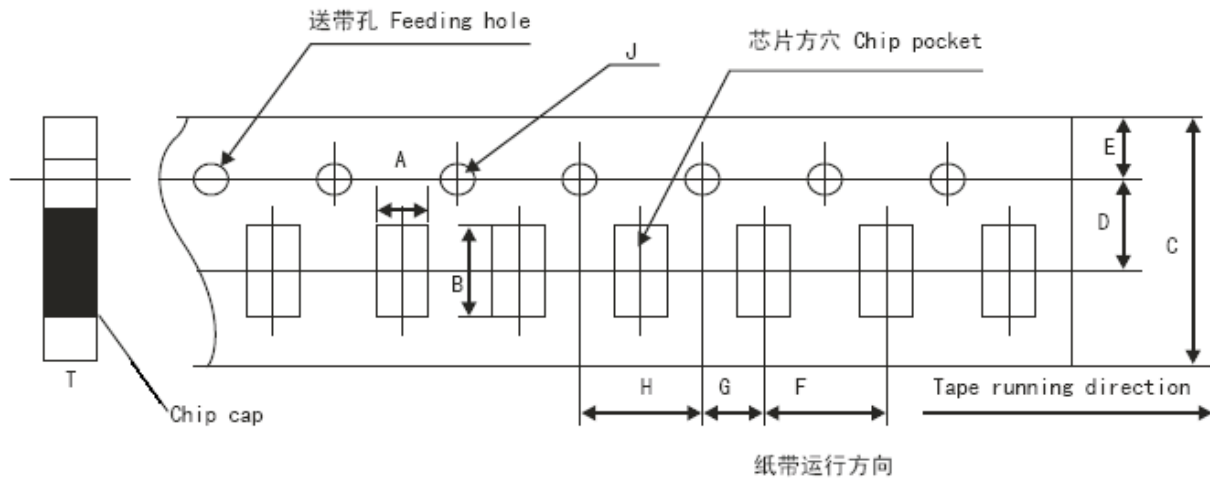
| 尺寸规格<br>Size Code | 工作电压<br>Rated Voltage | 容量范围 Capacitance (pF) |                |                  |
|-------------------|-----------------------|-----------------------|----------------|------------------|
|                   |                       | CG (COG)              | 2X1 (X7R)      | 2F4 (Y5V)        |
| 0402              | 6.3V                  | 0.2~470               | 100~100,000    | 1,000~100,000    |
|                   | 10V                   | 0.2~470               | 100~100,000    | 1,000~100,000    |
|                   | 16V                   | 0.2~470               | 100~33,000     | 1,000~100,000    |
|                   | 25V                   | 0.2~470               | 100~22,000     | 1,000~100,000    |
|                   | 50V                   | 0.2~220               | 100~10,000     | 1,000~100,000    |
| 0603              | 6.3V                  | 0.3~1,000             | 100~1,000,000  | 1,000~1,000,000  |
|                   | 10V                   | 0.3~1,000             | 100~330,000    | 1,000~1,000,000  |
|                   | 16V                   | 0.3~1,000             | 100~150,000    | 1,000~1,000,000  |
|                   | 25V                   | 0.3~1,000             | 100~150,000    | 1,000~1,000,000  |
|                   | 50V                   | 0.3~1,000             | 100~100,000    | 1,000~470,000    |
|                   | 100V                  | 0.5~820               | 100~10,000     | 1,000~68,000     |
|                   | 200V                  | 0.5~330               | 100~6,800      | —                |
| 0805              | 6.3V                  | 0.5~2,700             | 100~10,000,000 | 1,000~15,000,000 |
|                   | 10V                   | 0.5~2,700             | 100~4,700,000  | 1,000~10,000,000 |
|                   | 16V                   | 0.5~2,700             | 100~680,000    | 1,000~10,000,000 |
|                   | 25V                   | 0.5~2,700             | 100~220,000    | 1,000~1,200,000  |
|                   | 50V                   | 0.5~2,200             | 100~100,000    | 1,000~1,000,000  |
|                   | 100V                  | 0.5~1,000             | 100~33,000     | 1,000~100,000    |
|                   | 200V                  | 0.5~820               | 100~22,000     | 1,000~56,000     |
|                   | 500V                  | 0.5~560               | 100~10,000     | —                |
| 1206              | 6.3V                  | 0.5~5,600             | 100~10,000,000 | 1,000~10,000,000 |
|                   | 10V                   | 0.5~5,600             | 100~4,700,000  | 1,000~4,700,000  |
|                   | 16V                   | 0.5~5,600             | 100~2,200,000  | 1,000~2,200,000  |
|                   | 25V                   | 0.5~5,600             | 100~1,000,000  | 1,000~1,200,000  |
|                   | 50V                   | 0.5~4,700             | 100~470,000    | 1,000~1,000,000  |
|                   | 100V                  | 0.5~3,300             | 100~100,000    | 1,000~330,000    |
|                   | 200V                  | 0.5~2,200             | 100~47,000     | 1,000~150,000    |
|                   | 500V                  | 0.5~1,000             | 100~22,000     | —                |
|                   | 1000V                 | 0.5~680               | 100~5,600      | —                |
|                   | 2000V                 | 0.5~100               | 100~1,500      | —                |



| 尺寸规格<br>Size Code | 工作电压<br>Rated<br>Voltage | 容量范围 Capacitance (pF) |                |                   |
|-------------------|--------------------------|-----------------------|----------------|-------------------|
|                   |                          | CG (COG)              | 2X1 (X7R)      | 2F4 (Y5V)         |
| 1210              | 6.3V                     | 10~10,000             | 470~10,000,000 | 4,700~10,000,000  |
|                   | 10V                      | 10~10,000             | 470~4,700,000  | 4,700~4,700,000   |
|                   | 16V                      | 10~10,000             | 470~2,200,000  | 4,700~4,700,000   |
|                   | 25V                      | 10~10,000             | 470~1,000,000  | 4,700~1,500,000   |
|                   | 50V                      | 10~7,500              | 470~1,000,000  | 4,700~1,500,000   |
|                   | 100V                     | 5~4,700               | 100~220,000    | 1,000~820,000     |
|                   | 200V                     | 5~3,300               | 100~100,000    | 1,000~390,000     |
|                   | 500V                     | 5~2,000               | 100~33,000     | —                 |
|                   | 1000V                    | 5~820                 | 100~10,000     | —                 |
|                   | 2000V                    | 5~470                 | 100~6,800      | —                 |
| 1808              | 6.3V                     | 10~10,000             | 470~10,000,000 | 4,700~10,000,000  |
|                   | 10V                      | 10~10,000             | 470~4,700,000  | 4,700~4,700,000   |
|                   | 16V                      | 10~10,000             | 470~2,200,000  | 4,700~4,700,000   |
|                   | 25V                      | 10~10,000             | 470~1,000,000  | 4,700~2,200,000   |
|                   | 50V                      | 10~6,800              | 470~1,000,000  | 4,700~2,200,000   |
|                   | 100V                     | 5~4,700               | 100~220,000    | 1,000~820,000     |
|                   | 200V                     | 5~2,700               | 100~100,000    | 1,000~390,000     |
|                   | 500V                     | 5~1,800               | 100~39,000     | —                 |
|                   | 1000V                    | 5~820                 | 100~10,000     | —                 |
|                   | 2000V                    | 5~220                 | 100~6,800      | —                 |
|                   | 3000V                    | 5~150                 | 100~1,500      | —                 |
|                   | 4000V                    | 5~100                 | 100~1,000      | —                 |
|                   | 1812                     | 6.3V                  | 10~15,000      | 470~22,000,000    |
| 10V               |                          | 10~15,000             | 470~10,000,000 | 10,000~10,000,000 |
| 16V               |                          | 10~15,000             | 470~4,700,000  | 10,000~10,000,000 |
| 25V               |                          | 10~15,000             | 470~3,300,000  | 10,000~3,300,000  |
| 50V               |                          | 10~10,000             | 470~2,200,000  | 10,000~2,200,000  |
| 100V              |                          | 5~10,000              | 100~330,000    | 10,000~1,000,000  |
| 200V              |                          | 5~5,600               | 100~150,000    | 10,000~470,000    |
| 500V              |                          | 5~3,900               | 100~100,000    | —                 |
| 1000V             |                          | 5~1,200               | 100~27,000     | —                 |
| 2000V             |                          | 5~390                 | 100~10,000     | —                 |
| 3000V             |                          | 5~270                 | 100~2,200      | —                 |
| 4000V             |                          | 5~220                 | 100~1,500      | —                 |

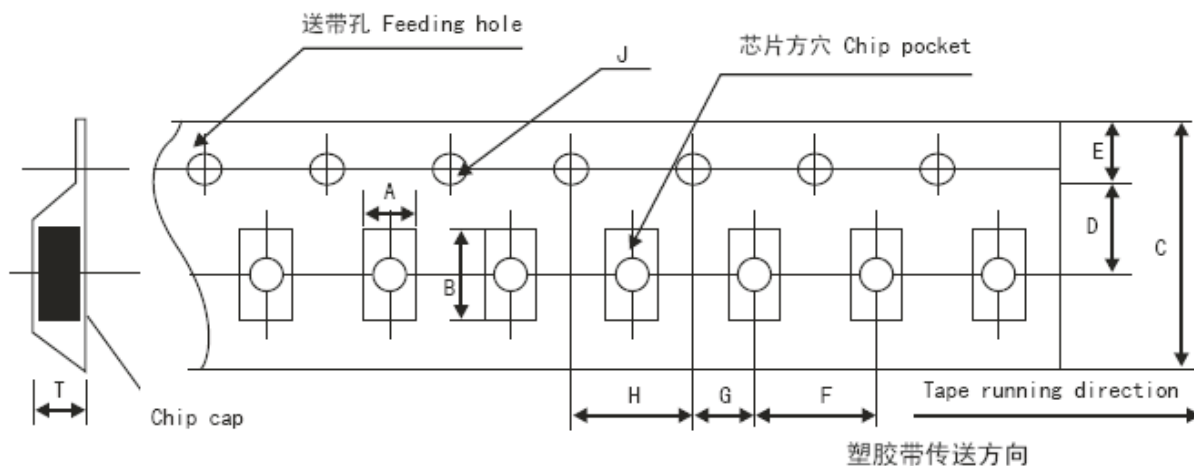
## PACKAGING (包装)

### PAPER TAPING (纸带)



| Code<br>(代码) | A              | B              | C              | D              | E              | F              | G              | H              | J              | T             |
|--------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------|
| 0402         | 0.65<br>± 0.20 | 1.15<br>± 0.20 | 8.00<br>± 0.20 | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 2.00<br>± 0.05 | 2.00<br>± 0.05 | 4.00<br>± 0.10 | 1.55<br>± 0.05 | 0.80<br>Below |
| 0603         | 1.10<br>± 0.20 | 1.90<br>± 0.20 | 8.00<br>± 0.20 | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.10 | 4.00<br>± 0.10 | 1.55<br>± 0.05 | 1.10<br>Below |
| 0805         | 1.45<br>± 0.20 | 2.30<br>± 0.20 | 8.00<br>± 0.20 | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.10 | 4.00<br>± 0.10 | 1.55<br>± 0.05 | 1.10<br>Below |
| 1206         | 1.80<br>± 0.20 | 3.40<br>± 0.20 | 8.00<br>± 0.20 | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.10 | 4.00<br>± 0.10 | 1.55<br>± 0.05 | 1.10<br>Below |

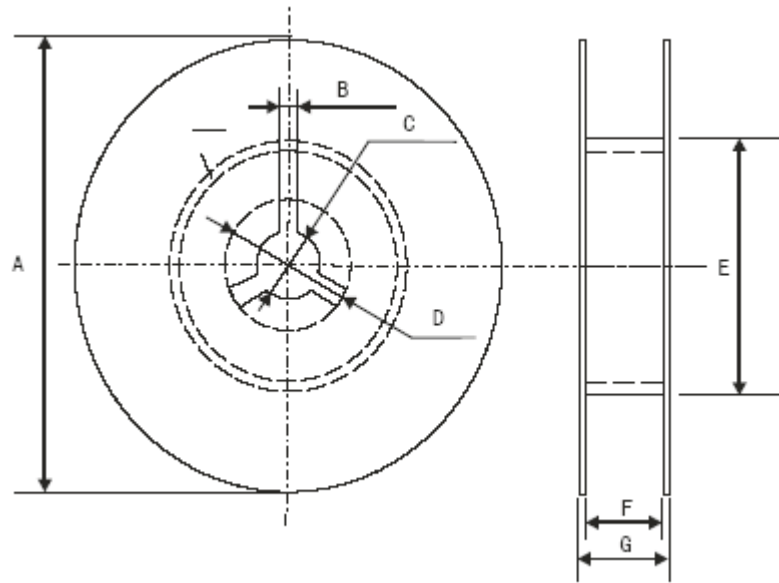
● EMBOSSED TAPING (胶带)



| Code<br>(代码) | A              | B              | C               | D              | E              | F              | G              | H              | J              | T              |
|--------------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 0805         | 1.55<br>± 0.20 | 2.35<br>± 0.20 | 8.00<br>± 0.20  | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.10 | 4.00<br>± 0.10 | 1.55<br>± 0.05 | 1.50<br>Below  |
| 1206         | 1.95<br>± 0.20 | 3.60<br>± 0.20 | 8.00<br>± 0.20  | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.10 | 4.00<br>± 0.10 | 1.55<br>± 0.05 | 1.50<br>Below  |
| 1210         | 2.70<br>± 0.10 | 3.42<br>± 0.10 | 8.00<br>± 0.10  | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.05 | 4.00<br>± 0.10 | 1.60<br>± 0.05 | 1.55<br>± 0.10 |
| 1808         | 2.20<br>± 0.10 | 4.95<br>± 0.10 | 12.00<br>± 0.10 | 5.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.05 | 4.00<br>± 0.10 | 1.55<br>± 0.05 | 1.80<br>± 0.10 |
| 1812         | 3.66<br>± 0.10 | 4.95<br>± 0.10 | 12.00<br>± 0.10 | 5.50<br>± 0.05 | 1.75<br>± 0.10 | 8.00<br>± 0.10 | 2.00<br>± 0.05 | 4.00<br>± 0.10 | 1.60<br>± 0.05 | 1.85<br>± 0.10 |

● REEL DIMENSION (卷盘尺寸)

Unit: mm (单位: mm)



| A                           | B    | C                          | D                          | E  | F                   | G      |
|-----------------------------|------|----------------------------|----------------------------|--|---------------------|--------|
| $\phi 178.00$<br>$\pm 2.00$ | 3.00 | $\phi 13.00$<br>$\pm 0.50$ | $\phi 21.00$<br>$\pm 0.80$ | $\phi 50.00$ or more<br>$\phi 50.00$ 或更大 | 10.00<br>$\pm 1.50$ | 12 max |

● PACKING QUANTITY (包装数量)

| Size<br>(尺寸) | Package Style & Quantity (包装形式和数量) Unit: pcs |             |            |            |
|--------------|--|-------------|------------|------------|
|              | PT (纸带卷盘)                                    | ET (胶带卷盘)   | BC (塑料盒散装) | BP (塑料袋散装) |
| 0402         | 10,000                                       |             | 20,000     | 5,000      |
| 0603         | 4,000  |             | 15,000     | 5,000      |
| 0805         | 4,000  | 2,000/3,000 | 10,000     | 5,000      |
| 1206         | 4,000  | 2,000/3,000 | 5,000      | 5,000      |
| 1210         |  | 2,000/3,000 |            | 2,000      |
| 1808         |  | 1,000       |            | 2,000      |
| 1812         |  | 1,000       |            | 2,000      |