

# SANYEAR

## 多层片式陶瓷电容器规格书

MULTILAYER CHIP CERAMIC CAPACITOR CATALOG

### 深圳市叁叶源电子有限公司

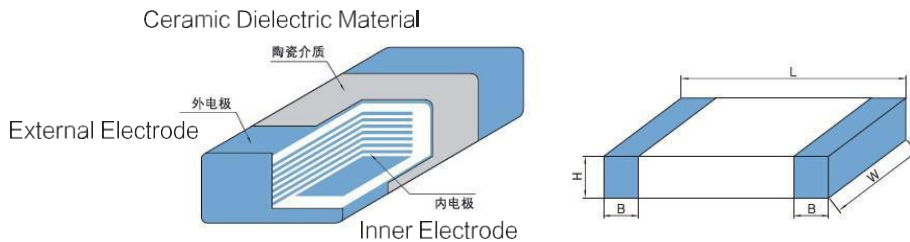
Shenzhen Sanyear electronic co. , ltd

多层片式陶瓷电容器 Multilayer Chip Ceramic Capacitor

■ 产品特点 Product Features

- 产品尺寸精度高，便于自动贴片机高效率装配
  - 端电极三层电极，适合波峰焊与回流焊；介电体与外表为同种材料，环境条件影响小
  - 含有C0G到Y5V各种温度特性介质，适用于计算机、通讯、家用电器和仪器仪表等普通电子设备
- The precision of product size is high,suitable for auto SMT machines high efficiency assembly.
  - External Electrode has 3 layers,suitable for both wave and reflow soldering.
  - Consist of all kinds of temperature dielectric material from C0G to Y5V,suitable for computers, communications,home appliances,instruments and other normal electronic equipments.

■ 产品结构 Product Construction



■ 产品尺寸 Product Dimensions

| 尺寸<br>Size | MLCC尺寸规格 (单位: mm) |           |         |         |
|------------|-------------------|-----------|---------|---------|
|            | L                 | W         | H (max) | B (max) |
| 01005      | 0.40±0.09         | 0.20±0.09 | 0.29    | 0.13    |
| 0201       | 0.60±0.09         | 0.30±0.09 | 0.39    | 0.20    |
| 0402       | 1.00±0.30         | 0.50±0.30 | 0.80    | 0.35    |
| 0603       | 1.60±0.20         | 0.80±0.20 | 1.00    | 0.60    |
| 0805       | 2.00±0.20         | 1.25±0.20 | 1.45    | 0.75    |
| 1206       | 3.20±0.30         | 1.60±0.30 | 1.90    | 0.80    |
| 1210       | 3.20±0.40         | 2.50±0.30 | 2.80    | 0.80    |
| 1808       | 4.50±0.40         | 2.00±0.30 | 2.80    | 1.50    |
| 1812       | 4.50±0.40         | 3.20±0.40 | 3.50    | 1.50    |
| 2220       | 5.70±0.50         | 5.00±0.40 | 3.50    | 1.30    |
| 2225       | 5.70±0.50         | 6.40±0.50 | 3.00    | 1.10    |

常规多层片式陶瓷电容器 General Multilayer Chip Ceramic Capacitor

■ 产品特点 Product Features

- C0G (NP0) : 最常用的温度补偿型电容器,属于I类介质材料,其性能稳定,温度系数在 $0 \pm 30\text{ppm}/^\circ\text{C}$ 以内,具有好的高频特性。
  - X7R: 工业中广泛使用的一种温度稳定型电容器,属于II类介质材料,具有较高的介电常数,在使用温度(  $-55^\circ\text{C} \sim +125^\circ\text{C}$  ) 范围内容值变化率在 $\pm 15\%$ 以内。
  - X5R: 工业中广泛使用的一种温度稳定型电容器,属于II类介质材料,具有较高的介电常数,在使用温度(  $-55^\circ\text{C} \sim +85^\circ\text{C}$  ) 范围内容值变化率在 $\pm 15\%$ 以内。
  - Y5V: 普通用途的电容器,属于II类介质材料,在使用温度(  $-30^\circ\text{C} \sim +85^\circ\text{C}$  ) 范围内容值变化率较大,  $+22\% \sim -82\%$ 以内,具有高介电常数,可以用小的尺寸做大容量的电容。
- C0G (NP0) : The most normal temperature compensated capacitor,belongs to Class I dielectric material with stable performance, TC  $0 \pm 30\text{ppm}/^\circ\text{C}$ ,high frequency.
  - X7R: Widely used in industries temperature stable capacitor,belongs to Class II dielectric material with high dielectric constant,and the capacitance changed rate is  $\pm 15\%$  for workingtemperature (  $-55^\circ\text{C} \sim +125^\circ\text{C}$  ).
  - X5R: Widely used in industries temperature stable capacitor,belongs to Class II dielectric material with high dielectric constant,and the capacitance changed rate is  $\pm 15\%$  for working temperature (  $-55^\circ\text{C} \sim +85^\circ\text{C}$  ).
  - Y5V: Y5V dielectric is generally used dielectric material,belongs to Class II dielectric material, it shows a variation of capacitance within  $+22\% \sim -82\%$  when the temperature is between  $-30^\circ\text{C} \sim +85^\circ\text{C}$ .This kind of dielectric is with very high dielectric constant and suitable for high value capacitors.

■ 产品规格型号 Part Number

| C                         | 0603  | X7R                               | 102   | K  | 500  | N                                       | T                               |
|---------------------------|---|-----------------------------------|---|--|--|---|---------------------------------|
| 产品类型<br>Product Type      | 尺寸<br>Size  | 温度系数<br>温度特性<br>T.C.              | 电容值<br>Capacitance                                  | 允许偏差<br>Tolerance  | 额定电压<br>Rate Voltage   | 端头类型<br>Terminal Type                   | 包装<br>Packaging                 |
| 多层片式<br>陶瓷电<br>容器<br>MLCC | 01005<br>0201<br>0402<br>0603<br>0805<br>1206<br>1210<br>1808<br>1812<br>2220<br>2225 | C0G<br>(NP0)<br>X7R<br>X5R<br>Y5V | 1R5=1.5pF<br>100=10pF<br>222=2.2nF<br>105=1 $\mu$ F | A= $\pm 0.05\text{pF}$<br>B= $\pm 0.1\text{pF}$<br>C= $\pm 0.25\text{pF}$<br>D= $\pm 0.5\text{pF}$<br>F= $\pm 1.0\%$<br>G= $\pm 2.0\%$<br>J= $\pm 5.0\%$<br>K= $\pm 10\%$<br>M= $\pm 20\%$<br>Z= $+80\%$<br>- $20\%$ | 4R0=4V<br>6R3=6.3V<br>250=25V<br>500=50V<br>101=100V<br>251=250V | N:银(或<br>铜)/镍/锡<br>N=Ag(or<br>Cu)/Ni/Sn | T=编带<br>Taping<br>B=袋散装<br>Bulk |

■ 产品容值范围 Product Capacitance Range

背景色代表：可生产型号

| 材质   | COG |       |    |      |    |      |      |      |      |      |      |      |      |      |
|------|-----|-------|----|------|----|------|------|------|------|------|------|------|------|------|
|      | 尺寸  | 01005 |    | 0201 |    | 0402 | 0603 | 0805 | 1206 | 1210 | 1808 | 1812 | 2220 | 2225 |
| VDC  | 6.3 |       |    |      | 10 | 10   | 10   | 16   | 16   | 16   | 16   | 16   | 16   | 16   |
|      | 10  |       | 16 |      | 16 | 16   | 16   | 25   | 25   | 25   | 25   | 25   | 25   | 25   |
|      | 16  |       | 25 | 50   | 25 | 25   | 25   | 50   | 50   | 50   | 50   | 50   | 50   | 50   |
|      | 25  |       |    |      | 50 | 50   | 50   |      |      |      |      |      |      |      |
| Cp   |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
|      |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
|      |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
|      |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 0R47 |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 0R5  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 0R56 |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 0R68 |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 0R82 |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 1R0  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 1R2  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 1R3  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 1R5  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 1R8  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 2R2  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 2R7  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 3R3  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 3R9  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 4R7  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 5R6  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 6R8  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 8R2  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 9R0  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 100  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 120  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 150  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 180  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 220  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 270  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 330  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 390  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 470  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 560  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 680  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 750  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 820  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 101  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 121  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 151  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 181  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 221  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 271  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 331  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 391  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 471  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 511  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 561  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 681  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 821  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 102  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 122  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 152  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 182  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 222  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 272  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 332  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 392  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 472  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 562  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 682  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 822  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 103  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 123  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 153  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 183  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 223  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 273  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 333  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 473  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 563  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |
| 104  |     |       |    |      |    |      |      |      |      |      |      |      |      |      |





背景色代表：可生产型号

| 材质        |      | Y5V |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
|-----------|------|-----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|----|------|----|----|------|-----|----|------|----|-----|------|----|----|----|-----|----|----|----|----|--|
| 尺寸        | 0402 |     |    |    | 0603 |    |    |    | 0805 |    |    |    | 1206 |    |    |    | 1210 |    |    |    | 1808 |    |    | 1812 |     |    | 2220 |    |     | 2225 |    |    |    |     |    |    |    |    |  |
| VDC<br>Cp | 6.3  | 16  | 25 | 50 | 6.3  | 16 | 25 | 50 | 6.3  | 16 | 25 | 50 | 6.3  | 10 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50   | 16 | 25 | 50   | 6.3 | 16 | 25   | 50 | 6.3 | 10   | 16 | 25 | 50 | 6.3 | 10 | 16 | 25 | 50 |  |
|           | 103  |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 123       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 153       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 183       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 223       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 273       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 333       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 393       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 473       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 563       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 823       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 104       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 124       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 154       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 184       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 224       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 274       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 334       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 394       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 474       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 564       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 684       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 824       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 105       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 155       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 225       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 275       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 335       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 395       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 475       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 565       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 106       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 226       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 476       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |
| 107       |      |     |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |    |      |    |    |      |     |    |      |    |     |      |    |    |    |     |    |    |    |    |  |

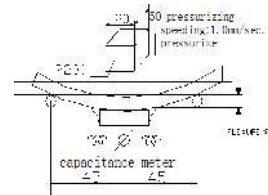
■ 技术指标和试验方法 Specifications and Test Method

| NO | 项目<br>Item                        | 技术指标<br>Specification                      |  | 试验方法<br>Test Method   |
|----|-----------------------------------|--|--|---|
| 1  | 外观<br>Appearance                  | 无异常<br>No abnormalities                    |  | 通过显微镜视觉检测 (X10)<br>On microscope  |
| 2  | 尺寸<br>Dimension                   | 在要求的范围内<br>Within the specified dimensions |  | 采用精度不低于0.01mm千分尺<br>Using calipers on micrometer with tolerance no less than 0.01mm   |
| *3 | 容量(C)<br>Capacitance              | 在要求的范围内<br>Within the specified dimensions |  | Class I:<br>$C_p \leq 1000 \text{ pF}$ 1MHz $\pm 10\%$ , $1.0 \pm 0.1V_{rms}$<br>$C_p > 1000 \text{ pF}$ 1KHz $\pm 10\%$ , $1.0 \pm 0.1V_{rms}$<br><br>Class II:<br>$C_p < 10\mu\text{F}$ 1KHz $\pm 10\%$ , $1.0 \pm 0.1V_{rms}$<br>$C_p \geq 10\mu\text{F}$ 120 $\pm 24\text{Hz}$ $1.0 \pm 0.1V_{rms}$ |
| 4  | 损耗(Q/DF)<br>Dissipation Factor    | C0G  | $C_p < 30\text{pF}$ , $Q \geq 400 + 20C_p$<br>$C_p \geq 30\text{pF}$ , $Q \geq 1000$   |   |
|    |                                   | X7R  | $U_R \geq 100V$ DF $\leq 7.5\%$<br>$25V \leq U_R \leq 50V$ , DF $\leq 3.5\%$<br>DF $\leq 10\%$ 0201 $\geq 104$ , 0402 $\geq 333$<br>0603 $\geq 104$ , 0805 $\geq 684$<br>1206 $\geq 225$ , 1210 $\geq 475$<br>DF $\leq 12.5\%$ 0402 $\geq 474$<br>$U_R \leq 16V$ , DF $\leq 5.0\%$<br>DF $\leq 10\%$ , 0201 $\geq 104$ , 0402 $\geq 563$<br>0603 $\geq 564$ , 0805 $\geq 105$<br>1206 $\geq 475$ , 1210 $\geq 106$   |   |
|    |                                   | X5R  | $U_R \leq 10V$ , DF $\leq 7.0\%$<br>DF $\leq 10\%$ , 01005, 0201 $\geq 123$<br>0402 $\geq 224$ , 0603 $\geq 334$<br>0805 $\geq 225$ , 1206 $\geq 225$<br>1210 $\geq 226$<br>DF $\leq 15\%$ , 0201 $\geq 104$ , 0402 $\geq 105$<br>$U_R = 6.3V$ , DF $\leq 10\%$<br>DF $\leq 15\%$ , 0201 $\geq 104$ , 0402 $\geq 105$<br>0603 $\geq 106$ , 0805 $\geq 475$<br>1206 $\geq 476$ , 1210 $\geq 107$<br>DF $\leq 20\%$ , 0402 $\geq 225$<br>$U_R = 4V$ , DF $\leq 15\%$ |   |
|    |                                   | Y5V  | $U_R \geq 50V$ , DF $\leq 12.5\%$<br>$U_R = 25V$ , DF $\leq 7.0\%$<br>DF $\leq 9\%$ , 0402 $\geq 683$ , 0603 $\geq 474$<br>0805 $\geq 105$ , 1206 $\geq 475$<br>1210 $\geq 106$<br>$U_R = 16V$ , DF $\leq 15\%$<br>$U_R = 10V$ , DF $\leq 20\%$<br>$U_R \leq 6.3V$ , DF $\leq 20\%$  |   |
|    |                                   | 高Q   | $C_p > 30\text{pF}$ $Q \geq 1000$<br>$1\text{pF} < C_p \leq 30\text{pF}$ $Q \geq 400 + 20C_p$<br>$C_p \leq 1\text{pF}$ $Q \geq 300$  |   |
| 5  | 绝缘电阻(IR)<br>Insulation Resistance | C0G  | $R_i \geq 10 \text{ G}\Omega$ 或 $500 \Omega \cdot \text{F}$ , 取较小值<br>$R_i \geq 10 \text{ G}\Omega$ or $500 \Omega \cdot \text{F}$ , whichever is smaller  | 施加电压: $U_R \leq 400V$<br>$U_R > 400V$<br>充电时间: $60 \pm 5$ 秒<br><br>To apply voltage: $U_R \leq 400V$<br>$U_R > 400V$<br>Charge time: $60 \pm 5$ sec   |



| NO      | 项目 Item  | 技术指标 Specification        |   | 试验方法 Test Method   |                          |   |   |   |   |   |         |                          |                           |                          |                           |                          |     |                          |                           |                          |                          |                          |     |                          |                           |                          |                          |                          |
|---------|--|---------------------------|---|--|--------------------------|---|---|---|---|---|---------|--------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-----|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|-----|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|
| 5       | 绝缘电阻(IR)<br>Insulation Resistance  | X7R<br>X5R<br>Y5V<br>中高压  | $R_i \geq 4 \text{ G}\Omega$ 或 $100 \Omega \cdot \text{F}$ (以下范围为 $50 \Omega \cdot \text{F}$ ], 取较小值<br>$R_i \geq 4 \text{ G}\Omega$ or $100 \Omega \cdot \text{F}$ ( $50 \Omega \cdot \text{F}$ of below range], whichever is smaller<br>以下范围 below range:<br>■50V: 0402 $\geq 104$ ; 0603 $\geq 225$ ;<br>0805 $\geq 106$ ; 1206 $\geq 106$<br>■25V: 0201 $\geq 104$ ; 0402 $\geq 224$ ;<br>0603 $\geq 106$ ; 0805 $\geq 106$ ;<br>1206 $\geq 226$ ; 01005(X5R)<br>■16V: 0603 $\geq 106$ ; 01005(X5R)<br>■10V: 0201 $> 104$ ; 0603 $\geq 106$ ;<br>0805 $\geq 476$ ; 01005(X5R)<br>■6.3V: 0201 $\geq 104$ ; 0603 $\geq 475$ ;<br>1206 $\geq 106$ ; 01005(X5R)<br>■4V: 0603 $\geq 226$ ; 0805 $\geq 476$ ;<br>1206 $\geq 107$ ; 01005(X5R) | To apply voltage: $U_R \leq 400\text{V}$<br>$U_R > 400\text{V}$<br>Charge time: $60 \pm 5\text{sec}$   |                          |   |   |   |   |   |         |                          |                           |                          |                           |                          |     |                          |                           |                          |                          |                          |     |                          |                           |                          |                          |                          |
| 6       | 耐电压<br>Dielectric Strength   | C0G<br>X7R<br>X5R<br>Y5V  | 无介质击穿和材料裂缝<br>No dielectric breakdown or mechanical breakdown   | 施加电压: $U_R < 100\text{V}$ : 250%<br>$100\text{V} \leq U_R < 1000\text{V}$ : 150%<br>$U_R \geq 1000\text{V}$ : 120%<br>测试时间: $60 \pm 5\text{秒}$<br>最大电流: 不超过50mA<br>To apply voltage: $U_R < 100\text{V}$ : 250%<br>$100\text{V} \leq U_R < 1000\text{V}$ : 150%<br>$U_R \geq 1000\text{V}$ : 120%<br>Test time: $60 \pm 5\text{sec}$<br>Max current: should not exceed 50mA  |                          |   |   |   |   |   |         |                          |                           |                          |                           |                          |     |                          |                           |                          |                          |                          |     |                          |                           |                          |                          |                          |
| *7      | 电容量温度系数或温度特性<br>Capacitance Temperature Coefficient or Temperature Characteristics | C0G<br>X7R<br>X5R<br>Y5V  | 温度系数 $\leq 0 \pm 30\text{ppm}/^\circ\text{C}$<br>Temperature coefficient within $0 \pm 30\text{ppm}/^\circ\text{C}$<br>容量变化 $\leq \pm 15\%$<br>Capacitance change within $\pm 15\%$<br>容量变化 $\leq +22\% \sim -82\%$<br>Capacitance change within $+22\% \sim -82\%$   | 按系列温度顺序测试电容量<br>Measure capacitance under follow table list<br><table border="1"> <thead> <tr> <th>步骤 Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>C0G/X7R</td> <td><math>25 \pm 2^\circ\text{C}</math></td> <td><math>-55 \pm 3^\circ\text{C}</math></td> <td><math>25 \pm 2^\circ\text{C}</math></td> <td><math>125 \pm 3^\circ\text{C}</math></td> <td><math>25 \pm 2^\circ\text{C}</math></td> </tr> <tr> <td>X5R</td> <td><math>25 \pm 2^\circ\text{C}</math></td> <td><math>-55 \pm 3^\circ\text{C}</math></td> <td><math>25 \pm 2^\circ\text{C}</math></td> <td><math>85 \pm 3^\circ\text{C}</math></td> <td><math>25 \pm 2^\circ\text{C}</math></td> </tr> <tr> <td>Y5V</td> <td><math>25 \pm 2^\circ\text{C}</math></td> <td><math>-30 \pm 3^\circ\text{C}</math></td> <td><math>25 \pm 2^\circ\text{C}</math></td> <td><math>85 \pm 3^\circ\text{C}</math></td> <td><math>25 \pm 2^\circ\text{C}</math></td> </tr> </tbody> </table> PS: C0G预先干燥: 16-24小时<br>C0G Preliminary Drying for 16-24hr<br>$\Delta C = [(C_i - C_1) / (C_1 * \Delta T)] * 10^6$ 或 (or)<br>$\Delta C = (C_i - C_1) / C_1 * 100\%$<br>C <sub>i</sub> : 1~5温度下的容值<br>Capacitance value at 1~5 temperature<br>$\Delta T$ : 温度变化量 (Temperature variation)<br>$\Delta T = T_i - T_1$ | 步骤 Step                  | 1 | 2 | 3 | 4 | 5 | C0G/X7R | $25 \pm 2^\circ\text{C}$ | $-55 \pm 3^\circ\text{C}$ | $25 \pm 2^\circ\text{C}$ | $125 \pm 3^\circ\text{C}$ | $25 \pm 2^\circ\text{C}$ | X5R | $25 \pm 2^\circ\text{C}$ | $-55 \pm 3^\circ\text{C}$ | $25 \pm 2^\circ\text{C}$ | $85 \pm 3^\circ\text{C}$ | $25 \pm 2^\circ\text{C}$ | Y5V | $25 \pm 2^\circ\text{C}$ | $-30 \pm 3^\circ\text{C}$ | $25 \pm 2^\circ\text{C}$ | $85 \pm 3^\circ\text{C}$ | $25 \pm 2^\circ\text{C}$ |
| 步骤 Step | 1  | 2                         | 3   | 4  | 5                        |   |   |   |   |   |         |                          |                           |                          |                           |                          |     |                          |                           |                          |                          |                          |     |                          |                           |                          |                          |                          |
| C0G/X7R | $25 \pm 2^\circ\text{C}$   | $-55 \pm 3^\circ\text{C}$ | $25 \pm 2^\circ\text{C}$  | $125 \pm 3^\circ\text{C}$  | $25 \pm 2^\circ\text{C}$ |   |   |   |   |   |         |                          |                           |                          |                           |                          |     |                          |                           |                          |                          |                          |     |                          |                           |                          |                          |                          |
| X5R     | $25 \pm 2^\circ\text{C}$   | $-55 \pm 3^\circ\text{C}$ | $25 \pm 2^\circ\text{C}$  | $85 \pm 3^\circ\text{C}$   | $25 \pm 2^\circ\text{C}$ |   |   |   |   |   |         |                          |                           |                          |                           |                          |     |                          |                           |                          |                          |                          |     |                          |                           |                          |                          |                          |
| Y5V     | $25 \pm 2^\circ\text{C}$   | $-30 \pm 3^\circ\text{C}$ | $25 \pm 2^\circ\text{C}$  | $85 \pm 3^\circ\text{C}$   | $25 \pm 2^\circ\text{C}$ |   |   |   |   |   |         |                          |                           |                          |                           |                          |     |                          |                           |                          |                          |                          |     |                          |                           |                          |                          |                          |
| 8       | 附着<br>Adhesion   | C0G<br>X7R<br>X5R<br>Y5V  | 无明显的损伤或端电极脱落,<br>No remarkable damage or removal of the terminations.   | 施加压力: 5N (0201:2N; 01005:1N)<br>时间: $10 \pm 1\text{秒}$<br>Pressurizing force: 5N (0201:2N; 01005:1N)<br>time: $10 \pm 1\text{ sec}$<br>  |                          |   |   |   |   |   |         |                          |                           |                          |                           |                          |     |                          |                           |                          |                          |                          |     |                          |                           |                          |                          |                          |

| NO  | 项目 Item                           | 技术指标 Specification       |  | 试验方法 Test Method  |
|-----|-----------------------------------|--------------------------|--|---|
| 9   | 可焊性 Solderability                 | C0G<br>X7R<br>X5R<br>Y5V | 端电极挂锡面积不小于95%<br>95% min.coverage of both terminal electrodes  | 锡炉温度: 245 ± 5°C<br>浸入时间: 2 ± 1秒<br>Solder temperature: 245 ± 5°C<br>Dipping time: 2 ± 1 seconds.  |
| 10  | 弯曲强度 Bending                      | 外观 Appearance            | 无明显可见损伤<br>No remarkable visual damage.  | 将电容安在测试夹具上, 按图所示方向以1.0mm/s的速率施加压力, 弯曲1mm。<br><br>Solder the capacitor on testing substrate and putt on testing stand.<br>The middle part of substrateshall successively be pressurized by pressuringrod at a rated of about 1.0mm/sec.Until the deflection become means of the 1.0mm. |
|     |                                   | 容量变化 Cap change          | C0G: ± 5% 或 ± 0.5pF,取较大值<br>X7R/X5R: ± 12.5%<br>Y5V : ± 30%<br><br>C0G: within ± 5% or ± 0.5pF, whichever is larger<br>X7R/X5R within ± 12.5%<br>Y5V: within ± 30%   |   |
| *11 | 耐焊接热 Resistance to Soldering Heat | 外观 Appearance            | 无明显可见损伤<br>No remarkable visual damage.  | 预热: 120 ~ 150°C 60秒<br>焊接温度: 270 ± 5°C<br>浸入时间: 10 ± 1秒<br><br>Preheating: 120 ~ 150°C 60sec<br>Soldering temperature: 270 ± 5°C<br>Dipping time: 10 ± 1 seconds  |
|     |                                   | 容量变化 Cap change          | C0G: ± 2.5% 或 ± 0.5pF,取较大值<br>X7R/X5R: ± 15%<br>Y5V : ± 30%<br><br>C0G: within ± 2.5% or ± 0.5pF, whichever is larger<br>X7R/X5R within ± 15%<br>Y5V: within ± 30%   |   |
|     |                                   | DF/IR                    | 满足产品初始值的要求<br>Meets initial standard value   |   |
| *12 | 温度快速循环 Temperature Cycle          | 外观 Appearance            | 无明显可见损伤<br>No remarkable visual damage   | 按下列步骤进行5次循环:<br>To perform 5 cycles of the stated environment   |
|     |                                   | 容量变化 Cap change          | C0G: ± 2.5% 或 ± 0.25pF,取较大值<br>X7R/X5R: ± 15%<br>Y5V : ± 30%<br><br>C0G: within ± 2.5% or ± 0.25pF, whichever is larger<br>X7R/X5R within ± 15%<br>Y5V: within ± 30% |   |
|     |                                   | DF/IR                    | 满足产品初始值的要求<br>Meets initial standard value   |   |



| 步骤 Step | 温度 Temperature                            | 时间 Time |
|---------|---|---------|
| 1       | 下限温度+0/-3°C<br>Min.operating Temp.+0/-3°C | 30min   |
| 2       | 25°C                                      | 2~3 min |
| 3       | 上限温度+3/-0°C<br>Max.operating Temp.+3/-0°C | 30min   |
| 4       | 25°C                                      | 2~3 min |

| NO  | 项目 Item                     | 技术指标 Specification |   | 试验方法 Test Method  |
|-----|-----------------------------|--------------------|---|---|
| *13 | 耐湿负荷<br>Damp heat with load | 外观<br>Appreance    | 无明显可见损伤<br>No remarkable visual damage  | 测试温度: 40 ± 2℃<br>相对湿度: 90 ~ 95% RH<br>测试电压: 额定电压 (最大500V)<br>测试时间: 500 ± 12hrs<br>Test temperature: 40 ± 2℃<br>Humidity: 90 ~ 95% RH<br>Voltage: 100% of the rated voltage ( max:500V)<br>Testing time: 500 ± 12hrs                                     |
|     |                             | 容量变化<br>Cap change | C0G: ± 7.5% 或 ± 0.75pF,取较大值<br>X7R/X5R: ± 25%<br>Y5V : ± 30%或-40% ~ +30%<br>C0G: within ± 7.5% or ± 0.75pF, whichever is larger<br>X7R/X5R within ± 25%<br>Y5V: within ± 30% or -40% ~ +30% |   |
|     |                             | DF                 | 初始值的2倍以下<br>Not more than 2 times of initial value  |   |
|     |                             | IR                 | Ri > 500MΩ 或 25Ω·F (☆为5Ω·F),<br>取较小值<br>Ri > 500MΩ or 25Ω·F (5Ω·F of ☆),<br>whichever is smaller  |   |
| *14 | 耐久性<br>Life Test            | 外观<br>Appreance    | 无明显可见损伤<br>No remarkable visual damage.   | 测试温度: 上限类别温度 ± 3℃<br>测试电压: UR < 100V 150%<br>100V ≤ UR < 1000V 120%<br>UR ≥ 1000V 100%<br>测试时间: 1000 小时<br>Test temperature: Max. Operating Temp ± 3℃<br>Voltage: UR < 100V 150%<br>100V ≤ UR < 1000V 120%<br>UR ≥ 1000V 100%<br>Testing time : 1000hrs |
|     |                             | 容量变化<br>Cap change | C0G: ± 3% 或 ± 0.5pF, 取较大值<br>X7R/X5R: ± 25%<br>Y5V : ± 30%或-40% ~ +30%<br>C0G: within ± 3% or ± 0.5pF, whichever is larger.<br>X7R/X5R within ± 25%<br>Y5V: within ± 30% or -40% ~ +30%     |   |
|     |                             | DF                 | 初始值的2倍以下<br>Not more than 2 times of initial value  |   |
|     |                             | IR                 | Ri > 1GΩ 或 50Ω·F (☆为10Ω·F),<br>取较小值<br>Ri > 1GΩ or 50Ω·F (10Ω·F of ☆),<br>whichever is smaller  |   |

注:

- \*A.3.7.11.12.13.14项需对II类电容器做预处理(将电容器在160℃下热处理1小时),然后在标准大气条件下恢复48 ± 4小时测量初始值;
- B.3.11.12.13.14项试验后在室温下放置24 ± 2 (C0G) 或48 ± 4(X7R、X5R、Y5V) 小时以后再测量;
- C.3.11.12.13.14项电性能测量的环境条件, 温度: 25℃ ± 2℃ 相对湿度: 25% ~ 80% RH。

☆ ■100V: X7R

■50V: 0402 > 103; 0603 ≥ 105; 0805 ≥ 105; 1206 ≥ 475; 1210 ≥ 475

■25V: 0201 ≥ 104; 0402 ≥ 224; 0603 ≥ 225; 0805 ≥ 225; 1206 ≥ 106; 1210 ≥ 106; 01005 (X5R)

■16V: 0201 ≥ 104; 0402 ≥ 224; 0603 ≥ 105; 0805 ≥ 225; 1206 ≥ 106; 1210 ≥ 476; 01005 (X5R)

■10V: 0201 ≥ 473; 0402 ≥ 474; 0603 ≥ 474; 0805 ≥ 225; 1206 ≥ 475; 1210 ≥ 476; 01005 (X5R)

■ ≤ 6.3V Class II; 01005 (X5R)

Note:

- \*A.3.7.11.12.13.14 Item need to do the pretreatment of class II type capacitor (Perform a heat treatment at 160℃ for 1hour), Then recovery the capacitor at standard pressure conditions for 48 ± 4hours, Perform the initial measurement
- B.3.11.12.13.14 Item end of experiment Measurement to be made after being kept at room temperature for 24 ± 2 (C0G) or 48 ± 4(X7R, X5R, Y5V) hrs.
- C.3.11.12.13.14 Item environmental conditions for electrical performance measurement, Temperature: 25℃ ± 2℃ Humidity: 25% ~ 80% RH

■ II类陶瓷介质电容器容量衰减特性

Ceramic Dielectric Capacitor Capacitance Attenuation Characteristic (Type II)

II类陶瓷介质（包括X7R、X5R及Y5V特性类）的电容器使用的是铁电体材料。当温度低于居里温度时，介质的立方晶体结构转为四方相，其对称性降低，晶体点阵中的离子会连续移动到势能较小的位置，引起电容量按对数规律随时间不断地减小，这一现象称为II类陶瓷介质材料的老化现象。

Ceramic dielectric (including X7R, X5R and Y5V characteristic types) capacitors use a ferroelectric material. When the temperature is below the Curie temperature, the cubic crystal structure of the dielectric changes to the tetragonal phase, which reduce the symmetry. Crystal lattice ions will continuously move to a smaller location potential, which causes capacitance logarithmically reduced by time, and this phenomenon is called aging of Type II ceramic dielectric material.

■ MLCC容量衰减特性 MLCC Capacitance Attenuation Characteristic



上述现象是可逆的，如果将电容器加热至高于居里温度的某一温度（160℃）后容量就可以恢复到初始值。故电容贴在PCB板上过炉焊接时，电容容值就会恢复到初始值。

The above phenomenon is reversible, if the capacitor is heated to a temperature above the Curie temperature (160 °C) after the capacity can be restored to the initial value. Therefore, when the capacitor attached to the PCB board is being soldering, the value of capacitance will return to the initial.

■ 电气特性 Electrical Characteristics

1) 频率特性 Frequency characteristics



2) 直流偏压特性 DC Bias characteristics



以上所有典型的电气特性仅供参考。

对于任何特定项目详细信息请与SUP代表联系。

All above typical electronic characteristics are for reference only.

Please contact with SUP representative for detail information of any specific item.

■ **IEC-63 标称电容 Nominal Capacitance**

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| E1  | 1.0 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| E3  | 1.0 |     |     |     | 2.2 |     |     |     | 4.7 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| E6  | 1.0 |     | 1.5 |     | 2.2 |     | 3.3 |     | 4.7 |     | 6.8 |     |     |     |     |     |     |     |     |     |     |     |     |     |
| E12 | 1.0 | 1.2 | 1.5 | 1.8 | 2.2 | 2.7 | 3.3 | 3.9 | 4.7 | 5.6 | 6.8 | 8.2 |     |     |     |     |     |     |     |     |     |     |     |     |
| E24 | 1.0 | 1.1 | 1.2 | 1.3 | 1.5 | 1.6 | 1.8 | 2.0 | 2.2 | 2.4 | 2.7 | 3.0 | 3.3 | 3.6 | 3.9 | 4.3 | 4.7 | 5.1 | 5.6 | 6.2 | 6.8 | 7.5 | 8.2 | 9.1 |

E6: $\sqrt[6]{10} \approx 1.46$  E12: $\sqrt[12]{10} \approx 1.2$

E1系列电容 ( Series Capacitance ) :1pF 10pF 100pF 1000pF 10000pF 100000pF...

■ **EIA温度特性代码 Temperature Characteristics Symbol**

| 温度系数(ppm/°C)<br>Temp.coeff of Cap | 代码<br>Symbol | 温度系数倍数<br>Multiplier | 代码<br>Symbol | 温度系数公差(ppm)<br>Tolerance of Temp. coeff | 代码<br>Symbol |
|-----------------------------------|--------------|----------------------|--------------|---|--------------|
| 0                                 | C            | -1                   | 0            | ±30                                     | G            |
| 0.3                               | B            | -10                  | 1            | ±60                                     | H            |
| 0.8                               | L            | -100                 | 2            | ±120                                    | J            |
| 0.9                               | A            | -1000                | 3            | ±250                                    | K            |
| 1.0                               | M            | -10000               | 4            | ±500                                    | L            |
| 1.5                               | P            | 1                    | 5            | ±1000                                   | M            |
| 2.2                               | R            | 10                   | 6            | ±2500                                   | N            |
| 3.3                               | S            | 100                  | 7            |   |              |
| 4.7                               | T            | 1000                 | 8            |   |              |
| 7.5                               | U            | 10000                | 9            |   |              |

例(eg): C0G

C: 0

0: -'

G: ±30ppm

| 下限温度(°C)<br>Min.Temp | 代码<br>Symbol | 上限温度(°C)<br>Max.Temp | 代码<br>Symbol | 温度范围内最大容值偏差(%)<br>Max.Cap.change over temp. range | 代码<br>Symbol |
|----------------------|--------------|----------------------|--------------|---|--------------|
| +10                  | Z            | +45                  | 2            | ±1.0  | A            |
| -30                  | Y            | +65                  | 4            | ±1.5  | B            |
| -55                  | X            | +85                  | 5            | ±2.2  | C            |
|                      |              | +105                 | 6            | ±3.3  | D            |
|                      |              | +125                 | 7            | ±4.7  | E            |
|                      |              | +150                 | 8            | ±7.5  | F            |
|                      |              | +200                 | 9            | ±10   | P            |
|                      |              |                      |              | ±15   | R            |
|                      |              |                      |              | ±22   | S            |
|                      |              |                      |              | +22to-33  | T            |
|                      |              |                      |              | +22to-56  | U            |
|                      |              |                      |              | +22to-82  | V            |

例(eg): X7R

X5R

Y5V

X: -55°C

X: -55°C

Y: -30°C

7: +25°C

5: +85°C

5: +85°C

R: ±15%

R: ±15%

V: +22% to -82%

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