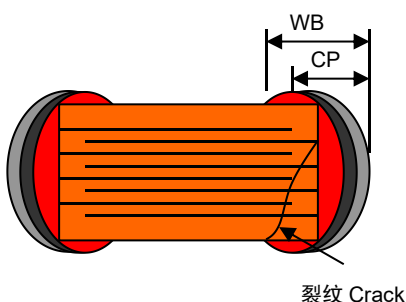


| 序号<br>No | 目 录<br>TABLE OF CONTENTS                         |
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## ■ 开路设计片式陶瓷电容器 Open-Mode Design MLCC

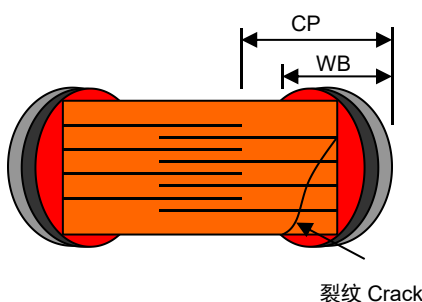
### ◆ 特征 Feature

- \* 叠层独石结构，具有高可靠性  
There is high reliability on monolithic structure of laminated layers.
- \* 具有优良的焊接与耐焊性能，适用于回流焊接与波峰焊接  
And its character of excellent soldering ability and soldering resistance ability is suitable for reflow soldering and peak soldering.
- \* 具有较高的容量且容量性能稳定  
It includes high and stable capacitance.
- \* 电路在电容器出现断裂失效时开放，可以对电路进行保护。  
Open circuit during capacitor cracking can protect the circuit.
- \* 此类型电容器的采用特殊的电极结构设计，如下图 2 和图 3 的内部结构。  
This type of capacitor adopts special inner electrode designs as picture2 and picture3 below
- \* 执行标准：GB/T 21041-2007 GB/T 21042-2007  
Executive Standard: GB/T 21041-2007 GB/T 21042-2007



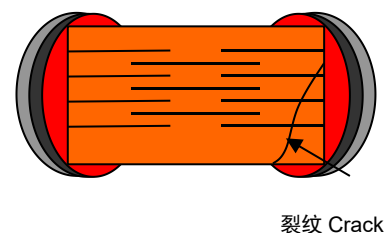
正常设计 ( $CP < WB$ )，开裂时电路泄漏电流  
Normal design ( $CP < WB$ )，Circuit leakage current during cracking

图 1



开路设计 ( $CP > WB$ )，开裂时电路开放  
Open-mode design ( $CP > WB$ )，the circuit is open when cracked

图 2



悬浮设计，开裂时电路开放  
Suspension design, the circuit is open when cracked

图 3

### ◆ 应用范围 Application

- \* 应用于各种滤波、耦合、去耦、高可靠性保护线路  
It is applied to various filtering, coupling, decoupling and high-reliability protection circuits

## ◆ 型号表示法

### How To Order

|                                 |                         |      |                             |                               |                                                                                                                                           |                                                                                                                                              |                                                            |                                                |
|---------------------------------|-------------------------|------|-----------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------|
| OP                              | 05                      | B    | 102                         | K                             | 500                                                                                                                                       | N                                                                                                                                            | T                                                          |                                                |
| OP:<br>开路设计<br>Open-Mode Design | 介质种类<br>Dielectric Code |      | 标称容量<br>Nominal Capacitance |                               | 额定电压<br>Rated Voltage<br>单位(unit): V                                                                                                      |                                                                                                                                              | 包装方式<br>Package Styles                                     |                                                |
|                                 |                         |      | 表示方式<br>Express Method      | 实际值<br>Actual Value           | 表示方式<br>Express Method                                                                                                                    | 实际值<br>Actual Value                                                                                                                          | 表示方式<br>Express Method                                     | 包装方式<br>Package Styles                         |
|                                 | 介质种类<br>Dielectric Code |      | 0R5                         | 0.5                           | 6R3                                                                                                                                       | 6.3                                                                                                                                          | T                                                          | 编带 7 寸<br>盘包装<br>Braided 7 inch disc packing   |
|                                 | CG                      |      | 1R0                         | 1.0                           | 500                                                                                                                                       | $50 \times 10^0$                                                                                                                             | D                                                          | 编带 13 寸<br>盘包装<br>Braided 13 inch disc packing |
| B                               |                         |      |                             | 201                           | $20 \times 10^1$                                                                                                                          |                                                                                                                                              |                                                            |                                                |
|                                 |                         |      | 102                         | $10 \times 10^2$              | 注: 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。<br>Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point. |                                                                                                                                              |                                                            |                                                |
| 尺寸规格<br>Size Code               |                         |      |                             |                               |                                                                                                                                           |                                                                                                                                              |                                                            |                                                |
| 代号<br>Code                      | 尺寸规格<br>Size Code       | EIA  | 长×宽<br>(L×W)<br>mm          |                               |                                                                                                                                           |                                                                                                                                              |                                                            |                                                |
| 03                              | 0603                    | 0603 | 1.60×0.80                   |                               |                                                                                                                                           |                                                                                                                                              |                                                            |                                                |
| 05                              | 0805                    | 0805 | 2.00×1.25                   |                               |                                                                                                                                           |                                                                                                                                              |                                                            |                                                |
| 06                              | 1206                    | 1206 | 3.20×1.60                   |                               |                                                                                                                                           |                                                                                                                                              |                                                            |                                                |
| 10                              | 1210                    | 1210 | 3.20×2.50                   |                               |                                                                                                                                           |                                                                                                                                              |                                                            |                                                |
| 12                              | 1812                    | 1812 | 4.50×3.20                   |                               |                                                                                                                                           |                                                                                                                                              |                                                            |                                                |
|                                 |                         |      |                             | 容量误差<br>Capacitance Tolerance |                                                                                                                                           | 端头材料<br>Terminal Material Styles                                                                                                             |                                                            |                                                |
|                                 |                         |      |                             | 代码<br>Code                    | 误差<br>Tolerance                                                                                                                           |                                                                                                                                              | 端头类别<br>Termination Styles                                 | 表示方式<br>Express Method                         |
|                                 |                         |      |                             | A                             | ±0.05pF                                                                                                                                   | A、B、C、D 级误差适用于容量 ≤ 10pF 的产品。<br>These Capacitance tolerance A, B, C, D are just applicable the capacitance that equals to or less than 10pF。 | 三层电镀端头<br>Nickel Barrier Termination                       | N                                              |
|                                 |                         |      |                             | B                             | ±0.10pF                                                                                                                                   |                                                                                                                                              | 柔性端头多层片式陶瓷电容器<br>MLCC with Flexible Solderable Termination | A                                              |
|                                 |                         |      |                             | C                             | ±0.25pF                                                                                                                                   |                                                                                                                                              |                                                            |                                                |
|                                 |                         |      |                             | D                             | ±0.50pF                                                                                                                                   |                                                                                                                                              |                                                            |                                                |
|                                 |                         |      |                             | F                             | ±1%                                                                                                                                       |                                                                                                                                              |                                                            |                                                |
|                                 |                         |      |                             | G                             | ±2%                                                                                                                                       |                                                                                                                                              |                                                            |                                                |
|                                 |                         |      |                             | J                             | ±5%                                                                                                                                       |                                                                                                                                              |                                                            |                                                |
|                                 |                         |      |                             | K                             | ±10%                                                                                                                                      |                                                                                                                                              |                                                            |                                                |
|                                 |                         |      |                             | M                             | ±20%                                                                                                                                      |                                                                                                                                              |                                                            |                                                |

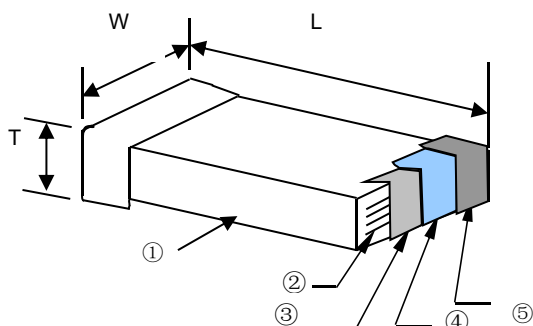
## ◆ 温度系数/特性

### Temperature Coefficient /Characteristics

| 介质种类<br>Dielectric | 参考温度点<br>Reference Temperature Point | 标称温度系数<br>Temperature Coefficient     | 工作温度范围<br>Operation Temperature Range |
|--------------------|--------------------------------------|---------------------------------------|---------------------------------------|
| C0G                | 25°C                                 | $0 \pm 30 \text{ ppm/}^\circ\text{C}$ | -55°C ~ 125°C                         |
| X7R                | 25°C                                 | $\pm 15\%$                            | -55°C ~ 125°C                         |

◆ 产品结构

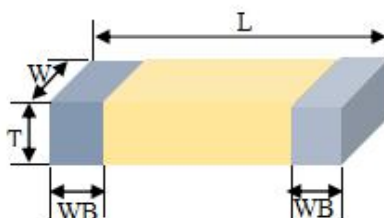
**Product Structure**



| 序号<br>NO | 名称<br>Name                 |
|----------|----------------------------|
| ①        | 陶瓷介质<br>Ceramic dielectric |
| ②        | 内电极<br>Inner electrode     |
| ③        | 外电极<br>Substrate electrode |
| ④        | 镍层<br>Nickel Layer         |
| ⑤        | 锡层<br>Tin Layer            |

◆ 产品尺寸

**Product Dimensions**



| 型号 Type                    |                           | 尺寸 Dimensions (mm) |           |           |           | 厚度代码<br>Thickness<br>code |
|----------------------------|---------------------------|--------------------|-----------|-----------|-----------|---------------------------|
| 英制表示<br>British expression | 公制表示<br>Metric expression | L                  | W         | T         | WB        |                           |
| OP03                       | 1608                      | 1.60±0.10          | 0.80±0.10 | 0.80±0.10 | 0.35±0.20 | DA                        |
| OP05                       | 2012                      | 2.00±0.20          | 1.25±0.25 | 0.80±0.20 | 0.50±0.20 | EA                        |
|                            |                           |                    |           | 1.25±0.25 |           | EB                        |
| OP06                       | 3216                      | 3.20±0.30          | 1.60±0.30 | 0.80±0.20 | 0.60±0.30 | FA                        |
|                            |                           |                    |           | 1.25±0.25 |           | FB                        |
|                            |                           |                    |           | 1.60±0.30 |           | FC                        |
| OP10                       | 3225                      | 3.20±0.30          | 2.50±0.30 | 1.25±0.25 | 0.60±0.30 | GA                        |
|                            |                           |                    |           | 1.60±0.30 |           | GB                        |
|                            |                           |                    |           | 2.00±0.30 |           | GC                        |
| OP08                       | 4620                      | 4.60±0.40          | 2.00±0.30 | 1.60±0.30 | 0.60±0.30 | HA                        |
|                            |                           |                    |           | 2.0±0.30  |           | HB                        |
| OP12                       | 4632                      | 4.60±0.40          | 3.20±0.30 | 1.25±0.25 | 0.60±0.30 | IA                        |
|                            |                           |                    |           | 1.60±0.30 |           | IB                        |
|                            |                           |                    |           | 2.00±0.30 |           | IC                        |
|                            |                           |                    |           | 2.50±0.30 |           | ID                        |

备注：1、产品具体厚度“T”查阅本承认书中“容量范围及其电压”。2、可根据客户的特殊要求设计符合客户需求的产品。

Note: 1、The specific thickness of the product can read "capacity range and Voltage" in this approval sheet.

2、We can design according to customer special requirements

**◆ 容量范围及电压**
**Capacitance Range and Voltage**

\*I 类电容器具体电压对应容量及厚度情况列表

A list of the specific Voltage-specific capacitors of Class I capacitors

| 材料<br>Dielectric              | C0G                   |     |      |      |      |                        |     |      |      |      |      |       |
|-------------------------------|-----------------------|-----|------|------|------|------------------------|-----|------|------|------|------|-------|
| 尺寸<br>Dimension               | OP03<br>(1.6mm*0.8mm) |     |      |      |      | OP05<br>(2.0mm*1.25mm) |     |      |      |      |      |       |
| 容量/电压<br>Capacity/<br>Voltage | ≤25V                  | 50V | 100V | 200V | 250V | ≤25V                   | 50V | 100V | 200V | 250V | 500V | 1000V |
| 0.1pF                         |                       | DA  |      |      |      |                        |     |      |      |      |      |       |
| 0.3pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 0.47pF                        |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 1pF                           |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 1.2pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 1.5pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 1.8pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 2.0pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 2.2pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 2.7pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 3.0pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 3.3pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 3.6pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 3.9pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 4.7pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 5.0pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 5.6pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      |       |
| 6.8pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      | EA    |
| 8.0pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      | EA    |
| 8.2pF                         |                       | DA  |      |      |      |                        | EA  |      |      |      |      | EA    |
| 10pF                          |                       | DA  |      |      |      |                        | EA  | EA   |      |      |      | EB    |
| 12pF                          |                       | DA  |      |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 15pF                          |                       | DA  |      |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 18pF                          |                       | DA  |      |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 22pF                          |                       | DA  | DA   |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 27pF                          |                       | DA  | DA   |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 33pF                          |                       | DA  | DA   |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 39pF                          |                       | DA  | DA   |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 47pF                          |                       | DA  | DA   |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 56pF                          |                       | DA  | DA   |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 68pF                          |                       | DA  | DA   |      |      |                        | EA  | EA   |      |      | EA   | EB    |
| 100pF                         |                       | DA  | DA   | DA   |      |                        | EA  | EA   | EA   | EA   | EA   | EB    |
| 120pF                         |                       | DA  | DA   | DA   |      |                        | EA  | EA   | EA   | EA   | EA   |       |
| 150pF                         |                       | DA  | DA   | DA   |      |                        | EA  | EA   | EA   | EA   | EA   |       |
| 180pF                         |                       | DA  | DA   | DA   | DA   |                        | EA  | EA   | EA   | EA   | EB   |       |
| 220pF                         |                       | DA  | DA   | DA   | DA   |                        | EA  | EA   | EA   | EA   | EB   |       |
| 270pF                         |                       | DA  | DA   | DA   | DA   |                        | EA  | EA   | EA   | EA   | EB   |       |
| 330pF                         |                       | DA  | DA   | DA   | DA   |                        | EA  | EA   | EA   | EA   | EB   |       |
| 390pF                         |                       | DA  | DA   | DA   |      |                        | EA  | EA   | EA   | EA   | EB   |       |
| 470pF                         |                       | DA  | DA   | DA   |      |                        | EA  | EA   | EA   | EA   | EB   |       |
| 560pF                         |                       | DA  |      |      |      |                        | EA  | EA   | EA   | EA   |      |       |
| 680pF                         |                       | DA  |      |      |      |                        | EA  | EA   | EA   | EA   |      |       |
| 820pF                         |                       | DA  |      |      |      |                        | EA  | EA   | EA   | EA   |      |       |
| 1nF                           |                       | DA  |      |      |      |                        | EA  | EA   | EA   | EA   |      |       |
| 1.5nF                         |                       |     |      |      |      |                        | EA  | EA   |      |      |      |       |
| 1.8nF                         |                       |     |      |      |      |                        | EA  | EA   |      |      |      |       |
| 2.2nF                         |                       |     |      |      |      |                        | EA  | EA   |      |      |      |       |
| 3.3nF                         |                       |     |      |      |      |                        |     |      |      |      |      |       |
| 4.7nF                         |                       |     |      |      |      |                        |     |      |      |      |      |       |
| 6.8nF                         |                       |     |      |      |      |                        |     |      |      |      |      |       |
| 10nF                          |                       |     |      |      |      |                        |     |      |      |      |      |       |

| 代码<br>Code | DA        | EA        | EB        |
|------------|-----------|-----------|-----------|
| T          | 0.80±0.10 | 0.80±0.20 | 1.25±0.25 |

| 材料<br>Dielectric              | C0G                   |     |      |      |      |        |      |        |       |
|-------------------------------|-----------------------|-----|------|------|------|--------|------|--------|-------|
| 尺寸<br>Dimension               | OP06<br>(3.2mm*1.6mm) |     |      |      |      |        |      |        |       |
| 容量/电压<br>Capacity/<br>Voltage | ≤25V                  | 50V | 100V | 200V | 250V | 500V   | 630V | 1000V  | 2000V |
| 0.3pF                         |                       | FA  |      |      | AF   | FA     | FB   | FB     |       |
| 0.47pF                        |                       | FA  |      |      |      | FA     | FB   | FB     |       |
| 1pF                           |                       | FA  |      |      |      | FA     | FB   | FB     |       |
| 1.2pF                         |                       | FA  |      |      |      | FA     | FB   | FB     |       |
| 1.5pF                         |                       | FA  |      |      |      | FA     | FB   | FB     |       |
| 1.8pF                         |                       | FA  |      |      |      | FA     | FB   | FB     |       |
| 2.0pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 2.2pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 2.7pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 3.0pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 3.3pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 3.6pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 3.9pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 4.7pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 5.0pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 5.6pF                         |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 6.8pF                         |                       | FA  |      |      |      | FB     | FB   | FB     | FB    |
| 8.0pF                         |                       | FA  |      |      |      | FB     | FB   | FB     | FB    |
| 8.2pF                         |                       | FA  |      |      |      | FB     | FB   | FB     | FB    |
| 10pF                          |                       | FA  |      |      |      | FA     | FB   | FB     | FB    |
| 12pF                          |                       | FA  |      |      |      | FA/FB* | FB   | FB     | FB    |
| 15pF                          |                       | FA  |      |      |      | FB     | FB   | FB     | FB    |
| 18pF                          |                       | FA  |      |      |      | FB     | FB   | FB     | FB    |
| 22pF                          |                       | FA  |      |      |      | FB     | FB   | FA*/FB | FB    |
| 27pF                          |                       | FA  |      | FA   |      | FB     | FB   | FB     | FB    |
| 33pF                          |                       | FA  |      | FA   |      | FB     | FB   | FB     | FB    |
| 39pF                          |                       | FA  |      | FA   |      | FA     | FB   | FB     | FB    |
| 47pF                          |                       | FA  |      | FA   |      | FA/FB* | FB   | FB     | FB    |
| 56pF                          |                       | FA  |      | FA   |      | FB     | FB   | FB     | FB    |
| 68pF                          |                       | FA  |      | FA   | FA   | FB     | FB   | FB     | FC    |
| 82pF                          |                       | FA  |      | FA   | FA   | FB     | FB   | FB     | FC    |
| 100pF                         |                       | FA  |      | FA   | FA   | FA     | FB   | FB     | FC    |
| 120pF                         |                       | FA  |      | FA   | FA   | FA     | FB   | FB     | FC    |
| 150pF                         |                       | FA  |      | FA   | FA   | FA/FB* | FB   | FB     | FC    |
| 180pF                         |                       | FA  |      | FA   | FA   | FA/FB* | FB   | FB     | FC    |
| 220pF                         |                       | FA  |      | FA   | FA   | FA/FB* | FB   | FB     | FC    |
| 270pF                         |                       | FA  |      | FA   | FA   | FB     | FB   | FB     |       |
| 330pF                         |                       | FA  | FA   | FA   | FA   | FB     | FB   | FB/FC* |       |
| 390pF                         |                       | FA  | FA   | FA   | FA   | FB     | FB   | FB/FC* |       |
| 470pF                         |                       | FA  | FA   | FA   | FA   | FB     | FB   | FB     |       |
| 560pF                         |                       | FA  | FA   | FA   | FA   | FB     | FB   | FC     |       |
| 680pF                         |                       | FA  | FA   | FA   | FA   | FB/FC* | FB   | FC     |       |
| 820pF                         |                       | FA  | FA   | FA   | FA   | FC     | FB   |        |       |
| 1nF                           |                       | FA  | FA   | FB   | FB   | FC     | FC   |        |       |
| 1.2nF                         |                       | FA  |      |      |      |        |      |        |       |
| 1.5nF                         |                       | FA  |      |      |      |        |      |        |       |
| 1.8nF                         |                       | FA  |      |      |      |        |      |        |       |
| 2.2nF                         |                       | FA  |      |      |      |        |      |        |       |
| 2.7nF                         |                       | FA  |      |      |      |        |      |        |       |
| 3.3nF                         |                       | FA  |      |      |      |        |      |        |       |
| 4.7nF                         |                       |     |      |      |      |        |      |        |       |
| 6.8nF                         |                       |     |      |      |      |        |      |        |       |
| 10nF                          |                       |     |      |      |      |        |      |        |       |

| 代码<br>Code | FA        | FB        | FC        | 备注<br>Note                              |
|------------|-----------|-----------|-----------|-----------------------------------------|
| T          | 0.80±0.20 | 1.25±0.25 | 1.60±0.30 | 加“*”为特殊品<br>Add “*” as special product. |

| 材料 Dielectric          | C0G                   |     |      |      |      |      |      |        |        |
|------------------------|-----------------------|-----|------|------|------|------|------|--------|--------|
| 尺寸 Dimension           | OP10<br>(3.2mm*2.5mm) |     |      |      |      |      |      |        |        |
| 容量/电压 Capacity/Voltage | ≤25V                  | 50V | 100V | 200V | 250V | 500V | 630V | 1000V  | 2000V  |
| 0.1pF                  |                       |     |      |      |      |      |      |        |        |
| 0.3pF                  |                       |     |      |      |      |      |      |        |        |
| 0.47pF                 |                       |     |      |      |      |      |      |        |        |
| 1pF                    |                       |     |      |      |      |      |      |        |        |
| 1.2pF                  |                       |     |      |      |      |      |      |        |        |
| 1.5pF                  |                       |     |      |      |      |      |      |        |        |
| 1.8pF                  |                       |     |      |      |      |      |      |        |        |
| 2.0pF                  |                       |     |      |      |      |      |      |        |        |
| 2.2pF                  |                       |     |      |      |      |      |      |        |        |
| 2.7pF                  |                       |     |      |      |      |      |      |        |        |
| 3.0pF                  |                       |     |      |      |      |      |      |        |        |
| 3.3pF                  |                       |     |      |      |      |      |      |        |        |
| 3.6pF                  |                       |     |      |      |      |      |      |        |        |
| 3.9pF                  |                       |     |      |      |      |      |      |        |        |
| 4.7pF                  |                       |     |      |      |      |      |      |        |        |
| 5.0pF                  |                       |     |      |      |      |      |      |        |        |
| 5.6pF                  |                       |     |      |      |      |      |      |        |        |
| 6.8pF                  |                       |     |      |      |      |      |      |        |        |
| 8.2pF                  |                       |     |      |      |      |      |      |        |        |
| 10pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA     |
| 12pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA     |
| 15pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA     |
| 18pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA     |
| 22pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA     |
| 27pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA     |
| 33pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA     |
| 39pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA     |
| 47pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA*/GB |
| 56pF                   |                       | GA  |      | GA   | GA   | GA   |      |        | GA*/GB |
| 68pF                   |                       | GA  |      | GA   | GA   | GA   |      | GA     | GA*/GB |
| 82pF                   |                       | GA  |      | GA   | GA   | GA   |      | GA     | GA*/GB |
| 100pF                  |                       | GA  | GA   | GA   | GA   | GA   | GA   | GA*/GB | GB     |
| 120pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GC     | GB     |
| 150pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GC     | GB     |
| 180pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GC     | GB     |
| 220pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GC     | GB     |
| 270pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GC     | GB     |
| 330pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GC     | GA*/GB |
| 390pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GC     |        |
| 470pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GB*/GC |        |
| 560pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GB     |        |
| 680pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GB     |        |
| 820pF                  |                       | GA  | GA   | GA   | GA   | GA   | GB   | GB*/GC |        |
| 1nF                    |                       | GA  | GA   | GA   | GA   | GB   | GC   | GB*/GC |        |
| 1.5nF                  |                       | GA  | GA   | GA   | GA   | GB   | GB   |        |        |
| 1.8nF                  |                       | GA  | GA   | GA   | GA   | GB   | GB   |        |        |
| 2.2nF                  |                       | GA  | GA   |      |      |      |      |        |        |
| 2.7nF                  |                       | GA  | GA   |      |      |      |      |        |        |
| 3.3nF                  |                       | GA  | GA   |      |      |      |      |        |        |
| 3.9nF                  |                       | GA  | GA   |      |      |      |      |        |        |
| 4.7nF                  |                       |     |      |      |      |      |      |        |        |
| 5.6nF                  |                       |     |      |      |      |      |      |        |        |
| 6.8nF                  |                       |     |      |      |      |      |      |        |        |
| 8.2nF                  |                       |     |      |      |      |      |      |        |        |
| 10nF                   |                       |     |      |      |      |      |      |        |        |

| 代码 Code | GA        | GB        | GC        | 备注 Note                                   |
|---------|-----------|-----------|-----------|-------------------------------------------|
| T       | 1.25±0.25 | 1.60±0.30 | 2.00±0.30 | 加 “*” 为特殊品<br>Add “*” as special product. |

| 材料<br>Dielectric              | C0G                   |     |        |        |        |                       |               |               |        |        |        |     |
|-------------------------------|-----------------------|-----|--------|--------|--------|-----------------------|---------------|---------------|--------|--------|--------|-----|
| 尺寸<br>Dimension               | OP08<br>(4.6mm*2.0mm) |     |        |        |        | OP12<br>(4.6mm*3.2mm) |               |               |        |        |        |     |
| 容量/电压<br>Capacity/<br>Voltage | 500V                  | 1KV | 2KV    | 3KV    | 5KV    | 100V                  | 200V/<br>250V | 500V/<br>630V | 1KV    | 2KV    | 3KV    | 5KV |
| 2.0pF                         | HA                    |     |        | HA     |        |                       |               |               |        |        |        | IB  |
| 2.2pF                         | HA                    |     |        | HA     |        |                       |               |               |        |        |        | IB  |
| 2.7pF                         | HA                    |     |        | HA     |        |                       |               |               |        |        |        | IB  |
| 3.0pF                         | HA                    |     |        | HA     | HA     |                       |               |               |        |        |        | IB  |
| 3.3pF                         | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 3.6pF                         | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 3.9pF                         | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 4.7pF                         | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 5.0pF                         | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 5.6pF                         | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 6.8pF                         | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 8.0pF                         | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 8.2pF                         | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 10pF                          | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 12pF                          | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 15pF                          | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 18pF                          | HA                    |     |        | HA     | HA     |                       |               |               | IB     |        | IB     | IB  |
| 22pF                          | HA                    |     |        | HA     | HA     |                       |               | IA            | IB     | IB     | IB     | IB  |
| 27pF                          | HA                    |     |        | HA     | HA     |                       |               | IA            | IB     | IB     | IB     |     |
| 33pF                          | HA                    | HA  |        | HA     | HA     |                       |               | IA            | IB     | IB     | IB     |     |
| 39pF                          | HA                    | HA  |        | HA     | HA     |                       |               | IA            | IB     | IB     | IB     |     |
| 47pF                          | HA                    | HA  |        | HA     | HA     |                       |               | IA            | IB     | IB     | IB     |     |
| 56pF                          | HA                    | HA  |        | HA     | HA     | IA                    |               | IA            | IB     | IB     | IB     |     |
| 68pF                          | HA                    | HA  |        | HA     | HA     | IA                    |               | IA            | IB     | IB     | IB     |     |
| 82pF                          | HA                    | HA  |        | HA     | HA*/HB | IA                    |               | IA            | IB     | IB     | IB     |     |
| 100pF                         | HA                    | HA  | HA     | HA     | HB     | IA                    |               | IA            | IB     | IB     | IB     |     |
| 120pF                         | HA                    | HA  | HA     | HA     |        | IA                    |               | IA            | IB     | IB     | IB     |     |
| 150pF                         | HA                    | HA  | HA     | HA     |        | IA                    |               | IA            | IB     | IB     | IB     |     |
| 180pF                         | HA                    | HA  | HA     | HA     |        | IA                    |               | IA            | IB     | IB     | IB     |     |
| 220pF                         | HA                    | HA  | HA     | HA     |        | IA                    |               | IA            | IB     | IB     | IB     |     |
| 270pF                         | HA                    | HA  | HA     | HA     |        | IA                    |               | IA            | IB     | IB     | IB*/IC |     |
| 300pF                         | HA                    | HA  | HA     | HA/HB* |        | IA                    |               | IA            | IB     | IB     | IB*/IC |     |
| 330pF                         | HA                    | HA  | HA     | HA     |        | IA                    |               | IA            | IB     | IB     | IB*/IC |     |
| 390pF                         | HA                    | HA  | HA     |        |        | IA                    |               | IA            | IB     | IB     | IC     |     |
| 470pF                         | HA                    | HA  | HA*/HB |        |        | IA                    |               | IA            | IB     | IB     | IC     |     |
| 560pF                         | HA                    | HA  | HA*/HB |        |        | IA                    |               | IA            | IB     | IB*/IC |        |     |
| 680pF                         | HA                    | HA  | HA*/HB |        |        | IA                    |               | IA            | IB     | IB*/IC |        |     |
| 820pF                         | HA                    | HA  | HA*/HB |        |        | IA                    |               | IA            | IB     | IB*/IC |        |     |
| 1nF                           | HA                    | HA  | HB     |        |        | IA                    |               | IA/IB*        | IB     | ID     |        |     |
| 1.5nF                         | HA                    |     |        |        |        | IA*/IB                |               | IB            | IB     |        |        |     |
| 1.8nF                         | HA                    |     |        |        |        | IA*/IB                |               | IB            | IB*/ID |        |        |     |
| 2.2nF                         | HA                    |     |        |        |        | IA*/IB                |               | IB            |        |        |        |     |
| 2.7nF                         | HA                    |     |        |        |        | IA*/IB                |               | IB            |        |        |        |     |
| 3.3nF                         | HA                    |     |        |        |        | IA*/IB                |               | IB            |        |        |        |     |
| 4.7nF                         |                       |     |        |        |        | IA*/IB                | IB            | IB            |        |        |        |     |
| 5.6nF                         |                       |     |        |        |        |                       |               |               |        |        |        |     |
| 6.8nF                         |                       |     |        |        |        |                       |               |               |        |        |        |     |
| 10nF                          |                       |     |        |        |        |                       |               |               |        |        |        |     |
| 15nF                          |                       |     |        |        |        |                       |               |               |        |        |        |     |

| 代码 | HA        | HB        | IA        | IB        | IC        | ID       | 备注       |
|----|-----------|-----------|-----------|-----------|-----------|----------|----------|
| T  | 1.60±0.30 | 2.00±0.30 | 1.25±0.25 | 1.60±0.30 | 2.00±0.30 | 2.5±0.30 | 加“*”为特殊品 |



**\*II 类电容器具体电压对应容量及厚度情况列表**

A list of the specific Voltage-specific capacitors of Class I capacitors

| 材料 Dielectric                 | X7R                   |     |     |     |     |      |      |      |
|-------------------------------|-----------------------|-----|-----|-----|-----|------|------|------|
| 尺寸<br>Dimension               | OP03<br>(1.6mm*0.8mm) |     |     |     |     |      |      |      |
| 容量/电压<br>Capacity/<br>Voltage | ≤6.3V                 | 10V | 16V | 25V | 50V | 100V | 200V | 250V |
| 100pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 120pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 150pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 180pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 220pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 270pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 330pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 390pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 470pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 560pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 680pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 820pF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 1nF                           | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 1.2nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 1.5nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 1.8nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 2.2nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 2.7nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 3.3nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 3.9nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 4.7nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 5.6nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 6.8nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 8.2nF                         | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 10nF                          | DA                    | DA  | DA  | DA  | DA  | DA   | DA   | DA   |
| 12nF                          | DA                    | DA  | DA  | DA  | DA  | DA   |      |      |
| 15nF                          | DA                    | DA  | DA  | DA  | DA  | DA   |      |      |
| 18nF                          | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 22nF                          | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 27nF                          | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 33nF                          | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 39nF                          | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 47nF                          | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 56nF                          | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 68nF                          | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 82nF                          | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 100nF                         | DA                    | DA  | DA  | DA  | DA  |      |      |      |
| 120nF                         | DA                    |     |     |     |     |      |      |      |
| 150nF                         | DA                    |     |     |     |     |      |      |      |
| 180nF                         | DA                    |     |     |     |     |      |      |      |
| 220nF                         | DA                    |     |     |     |     |      |      |      |
| 270nF                         | DA                    |     |     |     |     |      |      |      |
| 330nF                         | DA                    |     |     |     |     |      |      |      |
| 390nF                         | DA                    |     |     |     |     |      |      |      |
| 470nF                         | DA                    |     |     |     |     |      |      |      |

|         |           |
|---------|-----------|
| 代码 Code | DA        |
| T       | 0.80±0.20 |

| 材料<br>Dielectric              | X7R                    |     |     |     |     |      |      |      |               |        |       |
|-------------------------------|------------------------|-----|-----|-----|-----|------|------|------|---------------|--------|-------|
| 尺寸<br>Dimension               | OP05<br>(2.0mm*1.25mm) |     |     |     |     |      |      |      |               |        |       |
| 容量/电压<br>Capacity/<br>Voltage | ≤6.3V                  | 10V | 16V | 25V | 50V | 100V | 200V | 250V | 500V/<br>630V | 1000V  | 2000V |
| 200pF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA            |        |       |
| 220pF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA            |        |       |
| 270pF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA            |        |       |
| 330pF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA            |        |       |
| 390pF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA            |        |       |
| 470pF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA            |        |       |
| 560pF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA            |        |       |
| 680pF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA            |        |       |
| 820pF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA            |        |       |
| 1nF                           | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA/EB*        | EA     | EB    |
| 1.2nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA/EB*        | EA/EB* |       |
| 1.5nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA/EB*        | EA/EB* |       |
| 1.8nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA/EB*        | EA/EB* |       |
| 2.2nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA/EB*        | EB     |       |
| 2.7nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA/EB*        |        |       |
| 3.3nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EB            |        |       |
| 3.9nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EB            |        |       |
| 4.7nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA/EB*        |        |       |
| 5.6nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EA/EB*        |        |       |
| 6.8nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EB            |        |       |
| 8.2nF                         | EA                     | EA  | EA  | EA  | EA  | EA   | EA   | EB   | EB            |        |       |
| 10nF                          | EA                     | EA  | EA  | EA  | EA  | EA   | EB   | EB   | EB            |        |       |
| 12nF                          | EA                     | EA  | EA  | EA  | EA  | EA   | EB   | EB   |               |        |       |
| 15nF                          | EA                     | EA  | EA  | EA  | EA  | EA   | EB   | EB   |               |        |       |
| 18nF                          | EA                     | EA  | EA  | EA  | EA  | EA   | EB   | EB   |               |        |       |
| 22nF                          | EA                     | EA  | EA  | EA  | EA  | EA   | EB   | EB   |               |        |       |
| 27nF                          | EA                     | EA  | EA  | EA  | EA  | EA   | EB   | EB   |               |        |       |
| 33nF                          | EA                     | EA  | EA  | EA  | EA  | EB   | EB   | EB   |               |        |       |
| 39nF                          | EA                     | EA  | EA  | EA  | EA  | EB   |      |      |               |        |       |
| 47nF                          | EA                     | EA  | EA  | EA  | EA  | EB   |      |      |               |        |       |
| 56nF                          | EA                     | EA  | EA  | EA  | EA  | EB   |      |      |               |        |       |
| 68nF                          | EA                     | EA  | EA  | EA  | EA  | EB   |      |      |               |        |       |
| 82nF                          | EA                     | EA  | EA  | EA  | EA  | EB   |      |      |               |        |       |
| 100nF                         | EA                     | EA  | EA  | EA  | EA  | EB   |      |      |               |        |       |
| 220nF                         | EA                     | EA  | EA  |     |     |      |      |      |               |        |       |
| 270nF                         | EA                     | EA  |     |     |     |      |      |      |               |        |       |
| 330nF                         | EA                     | EA  |     |     |     |      |      |      |               |        |       |
| 390nF                         | EA                     | EA  |     |     |     |      |      |      |               |        |       |
| 470nF                         | EB                     | EB  |     |     |     |      |      |      |               |        |       |
| 560nF                         | EB                     |     |     |     |     |      |      |      |               |        |       |
| 680nF                         | EB                     |     |     |     |     |      |      |      |               |        |       |
| 820nF                         | EB                     |     |     |     |     |      |      |      |               |        |       |
| 1μF                           | EB                     |     |     |     |     |      |      |      |               |        |       |

| 代码 Code | EA        | EB        | 备注 Note                                 |
|---------|-----------|-----------|-----------------------------------------|
| T       | 0.80±0.20 | 1.25±0.25 | 加“*”为特殊品<br>Add "*" as special product. |

| 材料<br>Dielectric              | X7R                   |     |     |     |        |        |        |      |      |        |       |
|-------------------------------|-----------------------|-----|-----|-----|--------|--------|--------|------|------|--------|-------|
| 尺寸<br>Dimension               | OP06<br>(3.2mm*1.6mm) |     |     |     |        |        |        |      |      |        |       |
| 容量/电压<br>Capacity/<br>Voltage | ≤10V                  | 16V | 25V | 50V | 100V   | 200V   | 250V   | 500V | 630V | 1000V  | 2000V |
| 200pF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FB     | FB    |
| 220pF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FA*/FB | FB    |
| 270pF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FB     | FB    |
| 330pF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FA*/FB | FB    |
| 390pF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FB     | FB    |
| 470pF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FA*/FB | FB    |
| 560pF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FB     | FB    |
| 680pF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FA*/FB | FB    |
| 820pF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FB     | FB    |
| 1nF                           | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FA*/FB | FB    |
| 1.2nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FB     | FB    |
| 1.5nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FB     | FB    |
| 1.8nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FB     | FB    |
| 2.2nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FA   | FA   | FB     | FB    |
| 2.7nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   | FB     | FB    |
| 3.3nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   | FB     | FB    |
| 4.7nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   | FB     |       |
| 5.6nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   | FB     |       |
| 6.8nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   | FC     |       |
| 8.2nF                         | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   | FB     |       |
| 10nF                          | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   | FB     |       |
| 12nF                          | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   |        |       |
| 15nF                          | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   |        |       |
| 18nF                          | FA                    | FA  | FA  | FA  | FA     | FA     | FA     | FB   | FB   |        |       |
| 22nF                          | FA                    | FA  | FA  | FA  | FA     | FA/FB* | FA/FB* | FB   | FB   |        |       |
| 33nF                          | FA                    | FA  | FA  | FA  | FA/FB* | FB     | FB     |      |      |        |       |
| 47nF                          | FA                    | FA  | FA  | FA  | FA/FB* | FB     | FB     |      |      |        |       |
| 56nF                          | FA                    | FA  | FA  | FA  |        |        |        |      |      |        |       |
| 68nF                          | FA                    | FA  | FA  | FA  |        |        |        |      |      |        |       |
| 82nF                          | FA                    | FA  | FA  | FA  |        |        |        |      |      |        |       |
| 100nF                         | FA                    | FA  | FA  | FA  |        |        |        |      |      |        |       |
| 220nF                         | FA                    | FA  | FA  | FA  |        |        |        |      |      |        |       |
| 330nF                         | FB                    | FB  | FB  | FB  |        |        |        |      |      |        |       |
| 470nF                         | FB                    | FB  | FB  | FB  |        |        |        |      |      |        |       |
| 680nF                         | FB                    | FB  | FB  | FB  |        |        |        |      |      |        |       |
| 820nF                         | FB                    | FB  | FB  | FB  |        |        |        |      |      |        |       |
| 1μF                           | FC                    | FC  | FC  | FC  |        |        |        |      |      |        |       |
| 1.2μ                          | FC                    |     |     |     |        |        |        |      |      |        |       |
| 1.5μ                          | FC                    |     |     |     |        |        |        |      |      |        |       |
| 1.8μ                          | FC                    |     |     |     |        |        |        |      |      |        |       |
| 2.2μF                         | FC                    |     |     |     |        |        |        |      |      |        |       |
| 3.3μF                         | FC                    |     |     |     |        |        |        |      |      |        |       |
| 4.7μF                         | FC                    |     |     |     |        |        |        |      |      |        |       |
| 5.6μF                         | FC                    |     |     |     |        |        |        |      |      |        |       |
| 6.8μF                         | FC                    |     |     |     |        |        |        |      |      |        |       |
| 8.2μF                         | FC                    |     |     |     |        |        |        |      |      |        |       |
| 10μF                          | FC                    |     |     |     |        |        |        |      |      |        |       |
| 12μF                          | FC                    |     |     |     |        |        |        |      |      |        |       |
| 15 μF                         | FC                    |     |     |     |        |        |        |      |      |        |       |
| 18 μF                         | FC                    |     |     |     |        |        |        |      |      |        |       |
| 22 μF                         | FC                    |     |     |     |        |        |        |      |      |        |       |

| 代码 Code | FA        | FB        | FC        | 备注 Note                                 |
|---------|-----------|-----------|-----------|-----------------------------------------|
| T       | 0.80±0.20 | 1.25±0.25 | 1.60±0.30 | 加“*”为特殊品<br>Add “*” as special product. |

| 材料<br>Dielectric              | X7R                   |     |     |      |      |      |      |        |        |       |
|-------------------------------|-----------------------|-----|-----|------|------|------|------|--------|--------|-------|
| 尺寸<br>Dimension               | OP10<br>(3.2mm*2.5mm) |     |     |      |      |      |      |        |        |       |
| 容量/电压<br>Capacity/<br>Voltage | ≤16V                  | 25V | 50V | 100V | 200V | 250V | 500V | 630V   | 1000V  | 2000V |
| 220pF                         | GA                    | GA  | GA  |      |      |      |      |        | GA     | GA    |
| 270pF                         | GA                    | GA  | GA  |      |      |      |      |        | GA     | GA    |
| 330pF                         | GA                    | GA  | GA  |      |      |      |      |        | GA     | GA    |
| 390pF                         | GA                    | GA  | GA  |      |      |      |      |        | GA     | GA    |
| 470pF                         | GA                    | GA  | GA  |      |      |      |      |        | GA     | GA    |
| 560pF                         | GA                    | GA  | GA  |      |      |      |      |        | GA     | GA    |
| 680pF                         | GA                    | GA  | GA  |      |      |      | GA   | GA     | GA     | GA    |
| 820pF                         | GA                    | GA  | GA  |      |      |      | GA   | GA     | GA     | GA    |
| 1nF                           | GA                    | GA  | GA  |      | GA   | GA   | GA   | GA     | GA     | GA    |
| 1.2nF                         | GA                    | GA  | GA  |      | GA   | GA   | GA   | GA     | GA     | GA    |
| 1.5nF                         | GA                    | GA  | GA  |      | GA   | GA   | GA   | GA     | GA     | GA    |
| 1.8nF                         | GA                    | GA  | GA  |      | GA   | GA   | GA   | GA     | GA     | GA    |
| 2.2nF                         | GA                    | GA  | GA  |      | GA   | GA   | GA   | GA     | GA     | GA    |
| 2.7nF                         | GA                    | GA  | GA  |      | GA   | GA   | GA   | GA     | GA     | GA    |
| 3.3nF                         | GA                    | GA  | GA  |      | GA   | GA   | GA   | GA     | GA     | GA    |
| 3.9nF                         | GA                    | GA  | GA  |      | GA   | GA   | GA   | GA     | GA     | GA    |
| 4.7nF                         | GA                    | GA  | GA  | GA   | GA   | GA   | GA   | GA     | GA/GB* | GB    |
| 5.6nF                         | GA                    | GA  | GA  | GA   | GA   | GA   | GA   | GA     | GA/GB* | GB    |
| 6.8nF                         | GA                    | GA  | GA  | GA   | GA   | GA   | GA   | GA     | GA*/GB | GB    |
| 8.2nF                         | GA                    | GA  | GA  | GA   | GA   | GA   | GA   | GA     | GA*/GB | GB    |
| 10nF                          | GA                    | GA  | GA  | GA   | GA   | GA   | GA   | GA     | GA*/GB | GB    |
| 12nF                          | GA                    | GA  | GA  | GA   | GA   | GA   | GA   | GA     | GB     |       |
| 15nF                          | GA                    | GA  | GA  | GA   | GA   | GA   | GA   | GA     | GB     |       |
| 18nF                          | GA                    | GA  | GA  | GA   | GA   | GA   | GA   | GA     | GB     |       |
| 22nF                          | GA                    | GA  | GA  | GA   | GA   | GA   | GA   | GA     | GB     |       |
| 27nF                          | GA                    | GA  | GA  | GA   | GA   | GA   | GB   | GB     |        |       |
| 33nF                          | GA                    | GA  | GA  | GA   | GA   | GA   | GB   | GB/GC* |        |       |
| 39nF                          | GA                    | GA  | GA  | GA   | GA   | GA   | GB   | GB/GC* |        |       |
| 47nF                          | GA                    | GA  | GA  | GA   | GA   | GA   |      |        |        |       |
| 56nF                          | GA                    | GA  | GA  | GA   |      |      |      |        |        |       |
| 68nF                          | GA                    | GA  | GA  | GA   |      |      |      |        |        |       |
| 82nF                          | GA                    | GA  | GA  | GA   |      |      |      |        |        |       |
| 100nF                         | GA                    | GA  | GA  | GA   |      |      |      |        |        |       |
| 120nF                         | GA                    | GA  | GA  | GA   |      |      |      |        |        |       |
| 150nF                         | GA                    | GA  | GA  | GA   |      |      |      |        |        |       |
| 180nF                         | GA                    | GA  | GA  | GA   |      |      |      |        |        |       |
| 220nF                         | GB                    | GB  | GB  | GB   |      |      |      |        |        |       |
| 270nF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 330nF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 390nF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 470nF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 560nF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 680nF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 820nF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 1μF                           | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 1.2μF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 1.5μF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 1.8μF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 2.2μF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 3.3μF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |
| 4.7μF                         | GC                    | GC  | GC  |      |      |      |      |        |        |       |

| 代码 Code | GA        | GB        | GC        | 备注 Note                                 |
|---------|-----------|-----------|-----------|-----------------------------------------|
| T       | 1.25±0.25 | 1.60±0.30 | 2.00±0.30 | 加“*”为特殊品<br>Add “*” as special product. |

| 材料 Dielectric   | X7R                   |      |     |        |        |        |        |
|-----------------|-----------------------|------|-----|--------|--------|--------|--------|
| 尺寸<br>Dimension | OP08<br>(4.6mm*2.0mm) |      |     |        |        |        |        |
| 电压<br>Voltage   | 250V                  | 500V | 1KV | 2KV    | 3KV    | 4KV    | 5KV    |
| 100pF           |                       |      |     | HA     | HA     |        |        |
| 120pF           |                       |      |     | HA     | HA     |        |        |
| 150pF           |                       |      |     | HA     | HA     |        | HA     |
| 180pF           |                       |      |     | HA     | HA     |        | HA     |
| 220pF           |                       |      | HA  | HA     | HA     |        | HA     |
| 270pF           |                       |      | HA  | HA     | HA     |        | HA     |
| 330pF           |                       |      | HA  | HA     | HA     |        | HA     |
| 390pF           |                       |      | HA  | HA     | HA     |        | HA     |
| 470pF           | HA                    |      | HA  | HA     | HA     |        | HA     |
| 560pF           | HA                    |      | HA  | HA     | HA     |        | HA     |
| 680pF           | HA                    |      | HA  | HA     | HA     |        | HA     |
| 1nF             | HA                    |      | HA  | HA/HB* | HA/HB* | HA/HB* | HA/HB* |
| 1.5nF           | HA                    |      | HA  | HA     | HA/HB* |        |        |
| 1.8nF           | HA                    |      | HA  | HA     | HA/HB* |        |        |
| 2.2nF           | HA                    |      | HA  | HA/HB* | HA/HB* |        |        |
| 2.7nF           | HA                    |      | HA  | HA     | HA     |        |        |
| 3.3nF           | HA                    |      | HA  | HA/HB* | HA/HB* |        |        |
| 4.7nF           | HA                    |      | HA  | HA     | HA     |        |        |
| 5.6nF           |                       |      | HA  | HA     |        |        |        |
| 6.8nF           |                       |      | HA  | HA     |        |        |        |
| 8.2nF           |                       |      | HA  | HA     |        |        |        |
| 10nF            |                       |      | HA  | HA     |        |        |        |
| 15nF            |                       |      | HA  |        |        |        |        |
| 18nF            |                       |      | HA  |        |        |        |        |
| 22nF            |                       |      | HA  |        |        |        |        |
| 33nF            |                       |      |     |        |        |        |        |
| 47nF            |                       |      |     |        |        |        |        |
| 56nF            |                       |      |     |        |        |        |        |
| 68nF            |                       |      |     |        |        |        |        |
| 82nF            |                       |      |     |        |        |        |        |
| 100nF           |                       |      |     |        |        |        |        |
| 220nF           |                       |      |     |        |        |        |        |
| 330nF           |                       |      |     |        |        |        |        |
| 470nF           |                       |      |     |        |        |        |        |
| 680nF           |                       |      |     |        |        |        |        |
| 820nF           |                       |      |     |        |        |        |        |
| 1μF             |                       |      |     |        |        |        |        |
| 2.2μF           |                       |      |     |        |        |        |        |
| 3.3μF           |                       |      |     |        |        |        |        |
| 4.7μF           |                       |      |     |        |        |        |        |
| 6.8μF           |                       |      |     |        |        |        |        |

| 代码 | HA        | HB        | 备注       |
|----|-----------|-----------|----------|
| T  | 1.60±0.30 | 2.00±0.30 | 加“*”为特殊品 |

| 材料<br>Dielectric              | X7R                   |        |        |        |      |        |        |        |       |        |
|-------------------------------|-----------------------|--------|--------|--------|------|--------|--------|--------|-------|--------|
| 尺寸<br>Dimension               | OP12<br>(4.6mm*3.2mm) |        |        |        |      |        |        |        |       |        |
| 容量/电压<br>Capacity/<br>Voltage | 100V                  | 200V   | 250V   | 500V   | 630V | 1000V  | 2000V  | 3000V  | 4000V | 5000V  |
| 470pF                         |                       |        |        |        |      | IB     | IB     | IB     | IB    |        |
| 560pF                         |                       |        |        |        |      | IB     | IB     | IB     | IB    |        |
| 680pF                         |                       | IB     | IB     |        |      | IB     | IB     | IB     | IB    |        |
| 820pF                         |                       | IB     | IB     |        |      | IB     | IB     | IB     | IB    |        |
| 1nF                           |                       | IB     | IB     |        |      | IB     | IB     | IB     | IB    |        |
| 1.2nF                         |                       | IB     | IB     |        |      | IB     | IB     | IB     | IB    |        |
| 1.5nF                         |                       | IB     | IB     |        |      | IB     | IB     | IB     | IB    |        |
| 1.8nF                         |                       | IB     | IB     | IB     | IB   | IB     | IB     | IB     | IB    |        |
| 2.2nF                         |                       | IB     | IB     | IB     | IB   | IB     | IB     | IB/IC* | IB    | IB/IC* |
| 2.7nF                         |                       | IB     | IB     | IB     | IB   | IB     | IB     | IB     | IB    |        |
| 3.3nF                         |                       | IB     | IB     | IB     | IB   | IB     | IB     | IB     | IB    |        |
| 4.7nF                         |                       | IB     | IB     | IB     | IB   | IB     | IB     | IB     |       |        |
| 5.6nF                         |                       | IB     | IB     | IB     | IB   | IB     | IB     | IB/ID* |       |        |
| 6.8nF                         |                       | IB     | IB     | IB     | IB   | IB     | IB     | IB/ID* |       |        |
| 8.2nF                         |                       | IB     | IB     | IB     | IB   | IB     | IB     | IB/ID* |       |        |
| 10nF                          | IA                    | IB     | IB     | IB     | IB   | IB     | IB     | ID     |       |        |
| 12nF                          | IA                    | IB     | IB     | IB     | IB   | IB     | IB     |        |       |        |
| 15nF                          | IA                    | IB     | IB     | IB     | IB   | IB     | IB/ID* |        |       |        |
| 18nF                          | IA                    | IB     | IB     | IB     | IB   | IB     | ID     |        |       |        |
| 22nF                          | IA                    | IB     | IB     | IB     | IB   | IB     |        |        |       |        |
| 27nF                          | IA                    | IB     | IB     | IA/IB* | IB   | IB     |        |        |       |        |
| 33nF                          | IA                    | IB     | IB     | IA/IB* | IB   | IB     |        |        |       |        |
| 47nF                          | IA                    | IB     | IB     | IB     | IB   | IB/IC* |        |        |       |        |
| 56nF                          | IA                    | IB     | IB     | IB     | IB   | IC     |        |        |       |        |
| 68nF                          | IA                    | IB     | IB     | IB     | IB   |        |        |        |       |        |
| 82nF                          | IA                    | IB     | IB     | IB     | IB   |        |        |        |       |        |
| 100nF                         | IA                    | IB     | IB     | IB     | IB   |        |        |        |       |        |
| 120nF                         | IA                    | IB     | IB     | IB     | IC   |        |        |        |       |        |
| 150nF                         | IA                    | IB     | IB     | IC     | IC   |        |        |        |       |        |
| 180nF                         | IA                    | IB     | IB     | IC     | IC   |        |        |        |       |        |
| 220nF                         | IA                    | IB/IC* | IB/IC* |        |      |        |        |        |       |        |
| 270nF                         | IA                    | IB/IC* | IB/IC* |        |      |        |        |        |       |        |
| 330nF                         | IA                    | IC     | IC     |        |      |        |        |        |       |        |
| 390nF                         | IA                    | IC     | ID     |        |      |        |        |        |       |        |
| 470nF                         | IA                    | IC*/ID | IC*/ID |        |      |        |        |        |       |        |
| 560nF                         | IA                    |        |        |        |      |        |        |        |       |        |
| 680nF                         | IC                    |        |        |        |      |        |        |        |       |        |
| 820nF                         | IC                    |        |        |        |      |        |        |        |       |        |
| 1μF                           | IC                    |        |        |        |      |        |        |        |       |        |

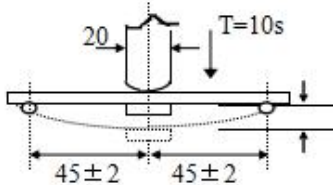
| 代码 Code | IA        | IB        | IC        | ID        | 备注 Note                                 |
|---------|-----------|-----------|-----------|-----------|-----------------------------------------|
| T       | 1.25±0.25 | 1.60±0.30 | 2.00±0.30 | 2.50±0.30 | 加“*”为特殊品<br>Add "*" as special product. |

## ◆ 可靠性测试方法 Reliability Test Methods

二类介质规格测量前需去老化处理：测试温度：25℃±3℃，测试湿度：<70%RH。电容器在150℃热处理1小时，放置48h后进行测量。  
The second type of medium specification needs to be aged before measuring the capacity: test temperature: 25℃±3℃, test humidity: <70%RH. The capacitors were heat treated at 150℃ for 1 hour and measured after 48 hours of placement.

| 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 |
|                                           |                                                                                                                     |                                 |                                                               | ≤1000pF                                                                                                                                                                                          | 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.       | 测试温度： 25℃±3℃      测试频率： 1KHz±10%<br>测试电压： 1.0±0.2Vrms<br>Test Temperature: 25℃±3℃      est Frequency: 1KHz±10%<br>Test Voltage: 1.0±0.2Vrms                                                      |                                 |                           |
| 绝缘电阻 (IR)<br>Insulation Resistance        | I类<br>Class I                                                                                                       |                                 | C≤10 nF, Ri≥50000MΩ<br>C>10 nF, Ri•CR≥500S                    | 测试电压：额定电压（最高 500V）      测试时间： 60±5 秒<br>测试湿度： ≤75%      测试温度： 25℃±3℃<br>测试充放电电流： ≤50mA                                                                                                           |                                 |                           |
|                                           | II类<br>Class II                                                                                                     |                                 | C≤25 nF, Ri≥10000MΩ<br>C>25 nF, Ri•CR>100S                    | Measuring Voltage: Rated Voltage（Max 500V）<br>Duration: 60±5s      Test Humidity: ≤75%<br>Test Temperature: 25℃±3℃      Test Current: ≤50mA                                                      |                                 |                           |
| 损耗角正切<br>(DF, tanδ)<br>Dissipation Factor | I类<br>Class I                                                                                                       |                                 | DF                                                            | 标称容量<br>Capacitance                                                                                                                                                                              | 测试频率<br>Measuring Frequency     | 测试电压<br>Measuring Voltage |
|                                           |                                                                                                                     |                                 | ≤1/（400+20C）                                                  | C<30 pF                                                                                                                                                                                          | 1MHz±10%                        | 1.0±0.2Vrms               |
|                                           |                                                                                                                     |                                 | ≤0.1%                                                         | C≥30pF                                                                                                                                                                                           | （C>1000 pF, 1KHz±10%）           |                           |
|                                           | II类<br>Class II                                                                                                     | <50V                            | ≤5%                                                           | 测试频率： 1KHz±10%      测试电压： 1.0±0.2Vrms                                                                                                                                                            |                                 |                           |
|                                           |                                                                                                                     | ≥50V                            | ≤2.5%                                                         | Test Frequency: 1KHz±10%Test Voltage: 1.0±0.2Vrms                                                                                                                                                |                                 |                           |
| 温度循环<br>Temperature Cycle                 |                                                                                                                     |                                 |                                                               | 初始测量 Initial Measurement<br>循环次数：5 次，一个循环分以下 4 步：<br>Cycling Times: 5 times, 1 cycle, 4 steps:                                                                                                   |                                 |                           |
|                                           | ΔC/C                                                                                                                | C0G                             | ≤±1%或±1PF，取较大值<br>≤±1% or ±1pF, whichever is larger           | 阶段<br>Step                                                                                                                                                                                       | 温度（Temperature）（℃）              | 时间（Time）                  |
|                                           |                                                                                                                     | X7R                             | -15% ~+15%                                                    | 1                                                                                                                                                                                                | 下限温度(Low- category temp.): -55  | 30min                     |
|                                           | 外观：无可见损伤<br>Appearance: No visible damage                                                                           |                                 |                                                               | 2                                                                                                                                                                                                | 常温 (Normal temp.): +20℃         | 2~3min                    |
|                                           |                                                                                                                     |                                 |                                                               | 3                                                                                                                                                                                                | 上限温度 (Up- category temp.): +125 | 30min                     |
|                                           |                                                                                                                     |                                 |                                                               | 4                                                                                                                                                                                                | 常温 (Normal temp.): +20℃         | 2~3min                    |
|                                           |                                                                                                                     |                                 | 试验后放置（恢复）时间：24±2h<br>Recovery time after test: 24±2h          |                                                                                                                                                                                                  |                                 |                           |
| 耐焊接热<br>Resistance to Soldering Heat      |                                                                                                                     |                                 |                                                               |                                                                                                                                                                                                  |                                 |                           |
|                                           | ΔC/C                                                                                                                | C0G                             | ≤±2.5%或±0.25pF，取较大值<br>≤±2.5% or ±0.25PF, whichever is larger | 将电容在 100~200℃的温度下预热 60~120 秒。<br>浸锡温度：265±5℃<br>浸锡时间：10±1s<br>然后取出溶剂清洗干净，在 10 倍以上的显微镜底下观察。<br>放置时间：24±2 小时 放置条件：室温<br>Preheating conditions: 100 to 200℃; 60~120S.<br>Solder Temperature: 265±5℃ |                                 |                           |
|                                           |                                                                                                                     | X7R                             | ±15%                                                          | Duration: 10±1s<br>Clean the capacitor with solvent and examine it with a 10X(min.) microscope.<br>Recovery Time: 24±2h<br>Recovery condition: Room temperature                                  |                                 |                           |
|                                           | DF                                                                                                                  | 同初始标准<br>Same to initial value. |                                                               |                                                                                                                                                                                                  |                                 |                           |
|                                           | IR                                                                                                                  | 同初始标准<br>Same to initial value. |                                                               |                                                                                                                                                                                                  |                                 |                           |
|                                           | 外观：无可见损伤 上锡率：≥95%<br>Appearance: No visible damage.At least 95% of the terminal electrode is covered by new solder. |                                 |                                                               |                                                                                                                                                                                                  |                                 |                           |
| 可焊性<br>Solderability                      | 上锡率应大于 95%<br>外观：无可见损伤.                                                                                             |                                 |                                                               | 将电容在 80~120℃的温度下预热 10~30 秒。<br>Preheating conditions:80 to 120℃; 10~30s.                                                                                                                         |                                 |                           |

|  |                                                                                                           |                                                                                                                                                                                    |
|--|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | At least 95% of the terminal electrode is covered by new solder.<br>Visual Appearance: No visible damage. | 无铅焊料:<br>浸锡温度: $245 \pm 5^{\circ}\text{C}$<br>浸锡时间: $2 \pm 0.5\text{s}$<br>Lead-free soldering<br>Solder Temperature: $245 \pm 5^{\circ}\text{C}$<br>Duration: $2 \pm 0.5\text{s}$ |
|--|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| 项目<br>Item                                                                 | 技术规格<br>Technical Specification                                                                                                                                                 |                                                   |                                                                                | 测试方法<br>Test Method and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 端头结合强度<br>Termination<br>Adhesion                                          | 外观无可见损伤<br>No visible damage.                                                                                                                                                   |                                                   |                                                                                | 施加的力: 5N      时间: 10±1S<br>Applied Force: 5N      Duration: 10±1S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 抗弯曲强度<br>Resistance to<br>Flexure of<br>Substrate<br>(Bending<br>Strength) | 外观: 无可见损伤.<br>Appearance: No visible damage.<br><br>ΔC/C:<br>I 类: ≤±5%或±0. 5pF , 取两者中最大者<br>II 类: ≤±10%<br><br>Class I : ≤±5%或±0. 5pF, whichever is larger.<br>Class II : ≤±10% |                                                   |                                                                                | 试验基板: PCB      弯曲深度: 1mm<br>施压速度: 1mm/sec.      单位: mm<br>应在弯曲状态下进行测量。<br><br>Test Board: PCB      Warp: 1mm<br>Speed: 1mm/sec.      Unit: mm<br>The measurement should be made with the board in the bending position.<br> 弯曲深度                                                                                                                                                                                                                                                                                                                                            |
| 介质耐电强度<br>(DWV)<br>Dielectric<br>Withstanding<br>Voltage                   | 不应有介质被击穿或损伤<br>No breakdown or damage.                                                                                                                                          |                                                   |                                                                                | Ur<100V      测量电压: , I 类: 300% Ur      II 类: 250% Ur<br>时间: 1~5 秒      充/放电电流: 不应超过 50ml<br>Measuring Voltage: I class:300% Ur      II class :250% Ur<br>Duration: 1~5s      Charge/ Discharge Current: 50mA max.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                            |                                                                                                                                                                                 |                                                   |                                                                                | 100V≤Ur<500V      施加额定电压的 200%, 5 秒, 最大电流不超过 50mA<br>Force 200%Rated Voltage for 5 second. Max..current should not exceed 50 mA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                            |                                                                                                                                                                                 |                                                   |                                                                                | 500V≤Ur≤1000V      施加额定电压的 150%, 5 秒, 最大电流不超过 50mA<br>Force 150%Rated Voltage for 5 second. Max..current should not exceed 50 mA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                                                            |                                                                                                                                                                                 |                                                   |                                                                                | 1000V < Ur ≤2000V      施加额定电压的 120%, 5 秒, 最大电流不超过 50mA<br>Force 120%Rated Voltage for 5 seconds. Max..current should not exceed 50 mA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                            |                                                                                                                                                                                 |                                                   |                                                                                | 2000V < Ur ≤5000V      施加额定电压的 120%, 5 秒, 最大电流不超过 10mA<br>Force 120%Rated Voltage for 5 seconds. Max..current should not exceed 10 mA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 耐湿负荷<br>Humidity load                                                      | ΔC/C                                                                                                                                                                            | C0G                                               | ±7.5%或±0.75pF,取两者之中较大者<br>±7.5% or ±0.75pF, whichever is larger.               | 温度: 40±2℃    湿度: 90~95%RH<br>电压: 额定电压 Ur≤1000V 时, 按 Ur 测试;<br>额定电压 Ur>1000V 时, 最高按 1000V 测试<br>时间: 500 小时<br>放置条件: 室温<br>放置时间: 24±2h 小时;<br>II 类: 0201≥47nF、0402≥33nF、0603≥1 μF、0805≥4.7 μF、1206≥10 μF 产品试验后需在 150℃温度下保持 1h , 再放置 24±2h 后测试电性能.<br>Temperature: 40±2℃<br>Humidity: 90~95%RH<br>Voltage: Ur≤1000V, test according to Ur.<br>Ur>1000V, the maximum test is 1000V<br>Duration: 500h<br>Recovery conditions: Room temperature<br>Recovery Time: 24h±2h<br>Class 2: 0201≥47nF、0402≥33nF、0603≥1 μF、0805≥4.7 μF、1206≥10 μF product need to keep in 150℃、1h after the test, and measurement to be made after being kept at room temperature for 24±2h |
|                                                                            |                                                                                                                                                                                 | X7R                                               | ≤±12.5%                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                            | DF                                                                                                                                                                              | ≤2 倍初始标准<br>Not more than twice of initial value. |                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                            | IR                                                                                                                                                                              | C0G                                               | Ri≥2500MΩ或 Ri•CR≥25S 取两者之中较小者.<br>Ri≥2500MΩ or Ri•CR≥25S whichever is smaller. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                            |                                                                                                                                                                                 | X7R                                               | Ri≥1000MΩ或 Ri•CR≥10S 取两者之中较小者.<br>Ri≥1000MΩ or Ri•CR≥10S whichever is smaller. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                            | 外观: 无损伤<br>Appearance: No visible damage.                                                                                                                                       |                                                   |                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                            |                                                                                                                                                                                 |                                                   |                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |



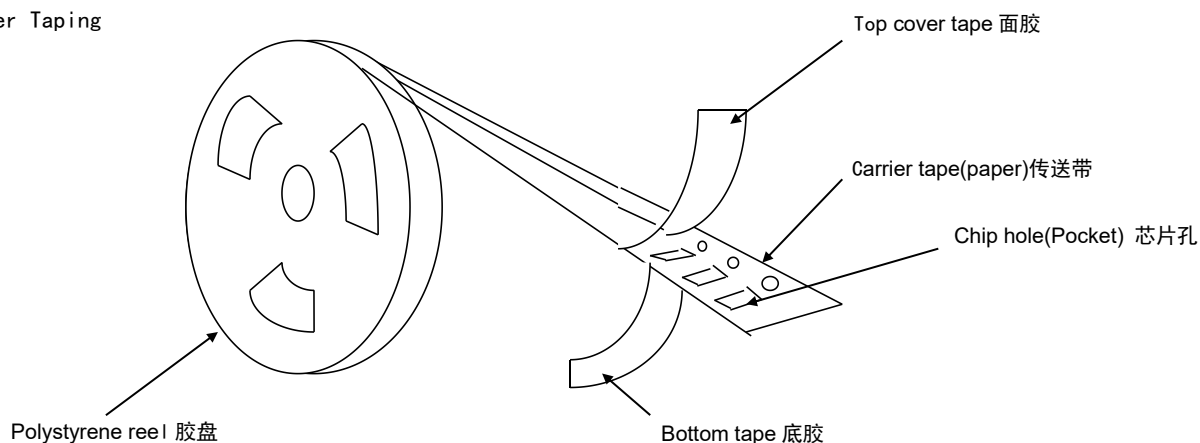
|                   |                                           |                                                         |                                                                                                                                         |
|-------------------|-------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 寿命试验<br>Life Test | $\Delta C/C$                              | C0G                                                     | $\leq \pm 3\%$ 或 $\pm 0.3pF$ , 取两者之中较大者<br>$\leq \pm 3\%$ 或 $\pm 0.3pF$ , whichever is larger.                                          |
|                   |                                           | X7R                                                     | -20% ~ +20%                                                                                                                             |
|                   | DF                                        | $\leq 2$ 倍初始标准<br>Not more than twice of initial value. |                                                                                                                                         |
|                   | IR                                        | C0G                                                     | $R_i \geq 4000M\Omega$ 或 $R_i \cdot C_R \geq 40S$ 取两者之中较小者.<br>$R_i \geq 4000M\Omega$ or $R_i \cdot C_R \geq 40S$ whichever is smaller. |
|                   |                                           | X7R                                                     | $R_i \geq 2000M\Omega$ 或 $R_i \cdot C_R \geq 50S$ 取两者之中较小者.<br>$R_i \geq 2000M\Omega$ or $R_i \cdot C_R \geq 50S$ whichever is smaller. |
|                   | 外观: 无损伤<br>Appearance: No visible damage. |                                                         |                                                                                                                                         |

温度: 125℃ (C0G、X7R)、时间: 1000 小时  
充电电流: 不应超过 50mA.  
电压: 一、低压产品 (<100V) 2 倍额定工作电压。  
二、中高压产品:  
100V≤额定电压≤200V: 1.5 倍工作电压  
200V<额定电压≤500V: 1.3 倍工作电压  
500V<额定电压: 1.2 倍工作电压  
放置条件: 室温 放置时间: 24±2h 小时  
Temperature: 125℃ (C0G、X7R)、Time: 1000h  
Charge/Discharge Current: 50mA max.  
Applied Voltage: 1. Low Voltage products (< 100V)  
2 times rated operating Voltage  
2. Medium and high pressure products:  
100V≤Rated Voltage≤200V: 1.5 Multiple  
200V<Rated Voltage≤500V: 1.3 Multiple  
500V<Rated Voltage: 1.2 Multiple  
Recovery Conditions: Room Temperature  
Recovery Time: :24h±2h

## ◆ 包装 Package

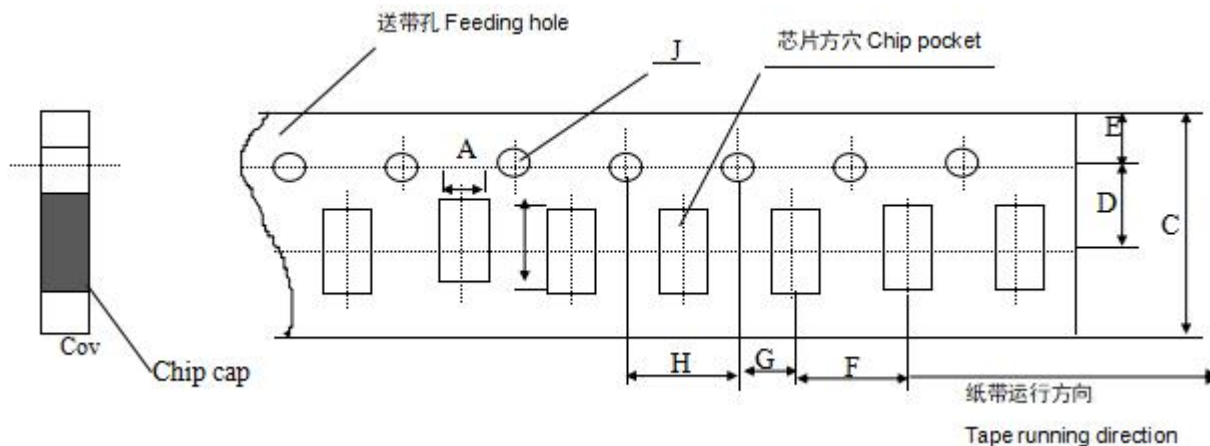
### \* 纸带卷盘结构

Paper Taping



### \* 适合 'OP03, OP05, OP06' 常规尺寸产品的纸带尺寸

Dimensions of paper taping for OP03, OP05, OP06 types.



Unit: mm

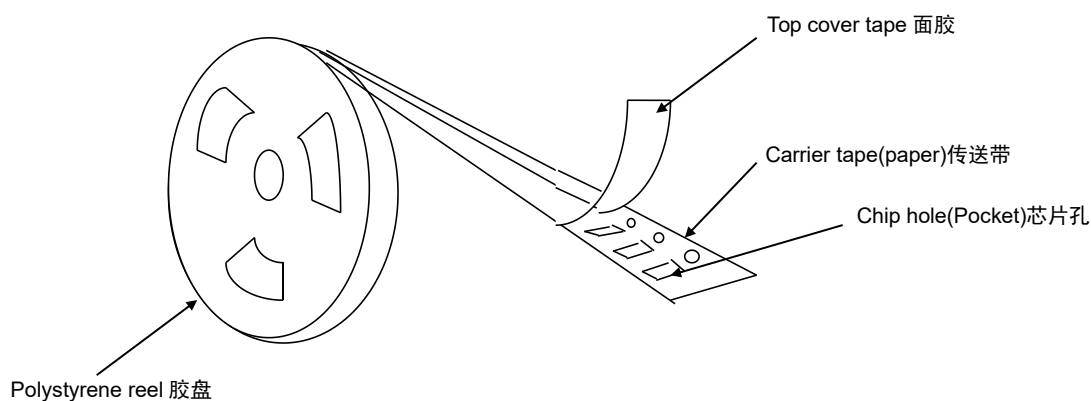
| 代号Code<br>纸带规格<br>paper size | A             | B             | C             | D*            | E             | F             | G*            | H             | J                | T           |
|------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|------------------|-------------|
| OP03                         | 1.10<br>±0.10 | 1.90<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>±0.10 | 4.00<br>±0.10 | 1.55<br>-0/+0.05 | 1.10<br>Max |
| OP05                         | 1.45<br>±0.15 | 2.30<br>±0.15 | 8.0<br>±0.15  | 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/+0.05 | 1.10<br>Max |
| OP06                         | 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/+0.05 | 1.10<br>Max |

注意：\*表示此处对尺寸的要求非常精确。

Note: The place with "\*" means where needs exactly dimensions.

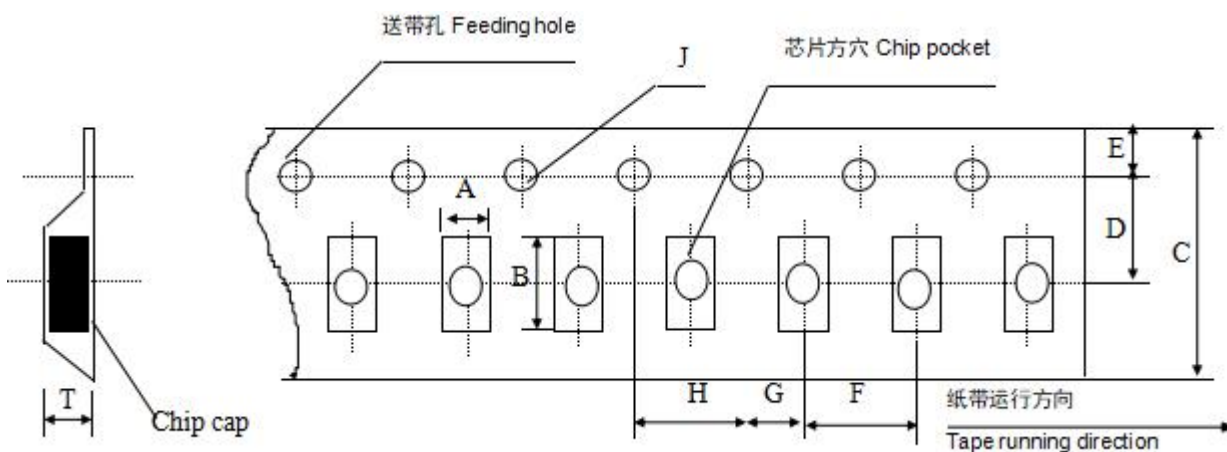
\* 塑胶卷盘结构

Embossed taping



\* 塑胶带尺寸结构 (适合'0805~1812' 型产品)

Dimensions of embossed taping for 0805~1812 type



| 代号Code<br>规格<br>Tape size | A             | B             | C             | D*            | E             | F             | G*            | H             | J                | T           |
|---------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|------------------|-------------|
| OP05                      | 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/+0.05 | 1.50<br>Max |

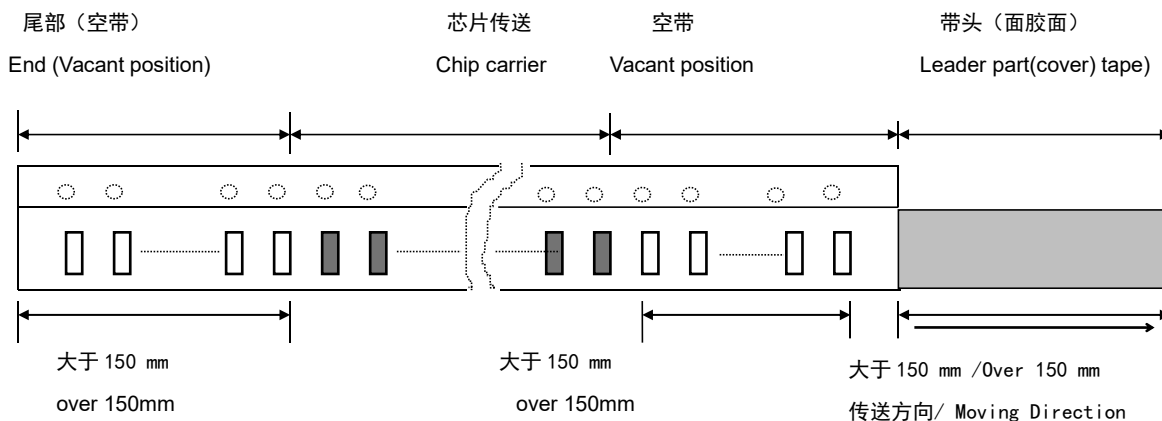
|      |                |                |                 |                |                |                |                |                |                  |             |
|------|----------------|----------------|-----------------|----------------|----------------|----------------|----------------|----------------|------------------|-------------|
| OP06 | 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>± 0.1  | 1.55<br>-0/+0.05 | 1.85<br>Max |
| OP10 | 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 | 1.55<br>-0/+0.05 | 3.2<br>Max  |
| OP12 | 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 | 1.55<br>-0/+0.05 | 4.0<br>Max  |

备注：\*表示此处对尺寸的要求非常精确。

Note: The place with "\*" means where needs exactly dimension

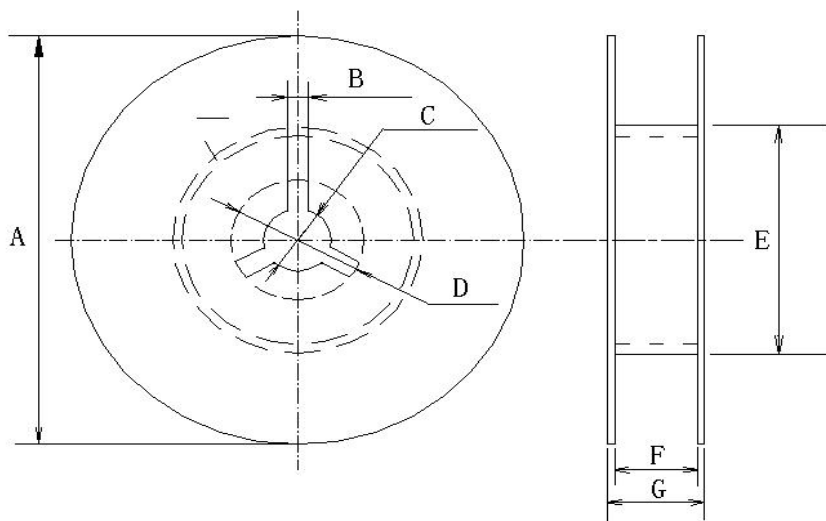
\* 传送带的前后结构

Structure of leader part and end part of the carrier paper



\* 卷盘尺寸

Reel dimensions (unit: mm)

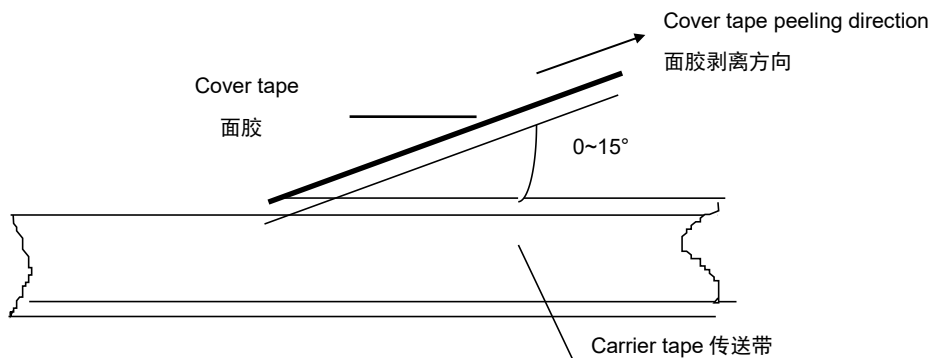


| 卷盘型号<br>Reel Code | A        | B   | C       | D       | E                      | F        | G     |
|-------------------|----------|-----|---------|---------|------------------------|----------|-------|
| 7'REEL            | φ178±2.0 | 3.0 | φ13±0.5 | φ21±0.8 | φ50 或更大<br>φ50 or more | 10.0±1.5 | 12max |

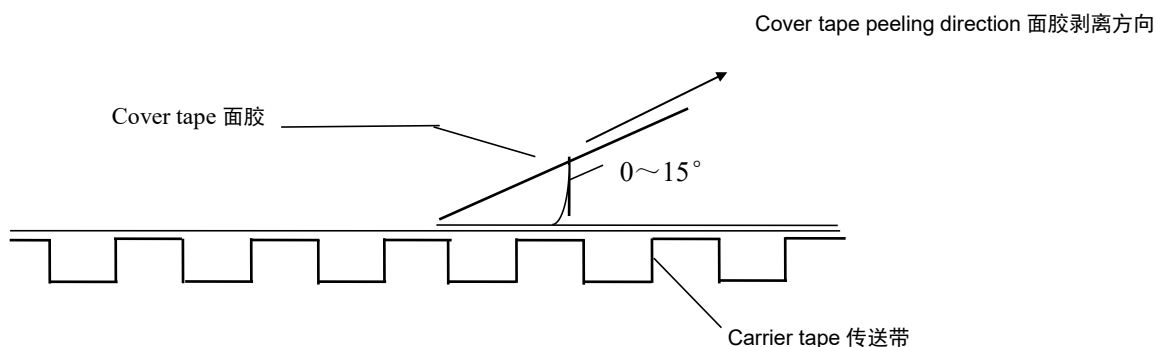
\* 关于卷带的说明：面胶剥离强度

Taping specification: top tape peeling strength

\* 纸带 Paper Taping



\* 塑料胶盘 Embossed Taping



标准: 0.1N<剥离强度<0.7N

Standard: 0.1N < peeling strength < 0.7N

在剥离时, 纸带不能有纸碎, 也不能粘在底、面胶上。

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

\* 包装数量 Packing Quantity

| 尺寸代码<br>SizeCode | 厚度 (T)<br>Thickness | 7 寸纸带卷盘 (PT) | 7 寸胶带卷盘 (ET)                   | 13 寸纸带卷盘 (PT) | 13 寸胶带卷盘 (ET) |
|------------------|---------------------|--------------|--------------------------------|---------------|---------------|
| 0603             | 0.80±0.10           | 4000         | -----                          | 15000         | -----         |
| 0805             | 0.80±0.20           | 4000         | -----                          | 15000         | -----         |
|                  | 1.25±0.25           | -----        | T≤1.35mm 3000<br>T>1.35mm 2000 | -----         | 10000         |
| 1206             | 0.80±0.20           | 4000         | -----                          | 15000         | -----         |
|                  | 1.25±0.25           | -----        | T≤1.35mm 3000<br>T>1.35mm 2000 | -----         | 10000         |
|                  | 1.60±0.30           | -----        | 2000                           | -----         | 8000          |
| 1210             | 1.25±0.25           | -----        | 2000                           | -----         | -----         |
|                  | 1.60±0.30           | -----        | 1000                           | -----         | 8000          |
|                  | 2.00±0.30           | -----        | 1000                           | -----         |               |
| 1812             | 1.25±0.25           | -----        | 1000                           | -----         | 3000          |
|                  | 1.60±0.30           | -----        | 500                            | -----         |               |
|                  | 2.00±0.30           | -----        | 500                            | -----         |               |

注意: 包装的形式和数量可根据客户的要求来定。

Note: We can choose packing style and quantity can be according to the customer's requirement.

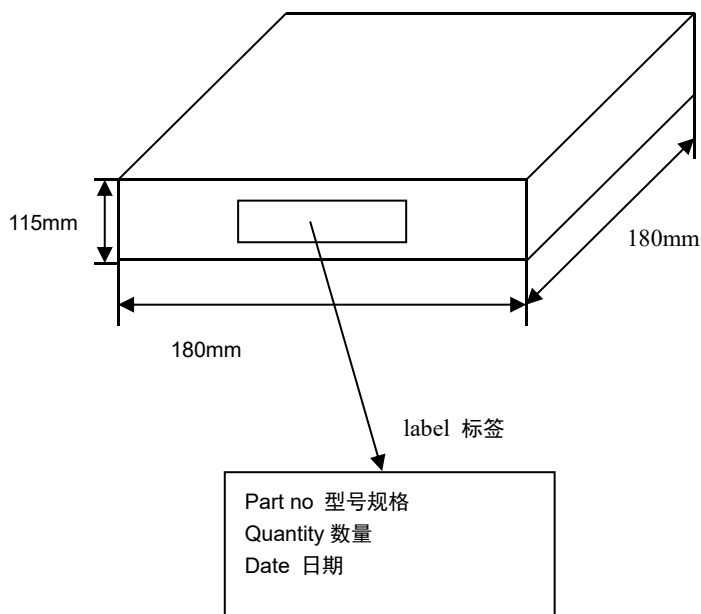
## \* 外包装

### Outer packing

小包装 The first package

Quantity: 10 reels

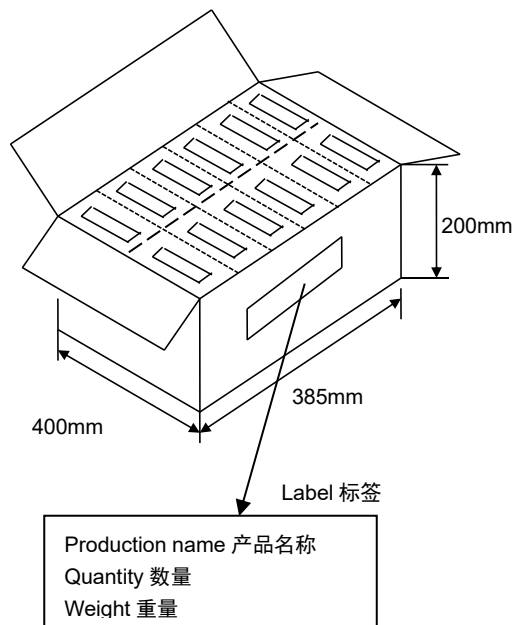
数量: 10 卷



大包装 The second package

Quantity: 6 cases

数量: 6 盒



### ◆ 储存注意事项

\*MLCC 的储存条件: 相对湿度为 20~70%, 储存温度为 5~40℃, 建议温度低于 30℃。

\*MLCC 的性能可能会受到储存条件的影响, 交货后请立即使用。高温高湿条件、长期储存可能会导致包装材料变质、产品端头电极氧化。如自交付后已超过六个月, 使用前检查包装、外观等。如果交付后超过一年, 在使用前要检查可焊性。

\* 不要将电容器存放在含有腐蚀性气体(例如硫化氢、二氧化硫、氯气、氨气等)的环境中。

\* 不要在阳光直射下或高湿度条件下储存电容器。

### ◆ Storage Precautions

\* Storage Conditions for MLCC: Relative humidity: 20~70%, storage temperature: 5~40℃, recommended temperature is below 30℃.

\* The performance of MLCCs may be affected by storage conditions. Please use immediately after delivery. High temperature and high humidity conditions, or long-term storage, may lead to packaging material deterioration and oxidation of the product's end electrodes. If it has been over six months since delivery, check the packaging and appearance before use. If it has been over a year, check the solderability before use.

\* Do not store capacitors in environments containing corrosive gases (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia, etc.).

\* Do not store capacitors under direct sunlight or in high humidity conditions.

### ◆ 使用前注意事项

\* 安装前的信息

- 1、不要重复使用从设备上拆下的电容器。
- 2、确认额定容量、额定电压等电气特性。
- 3、确认施加电压下的电容特性。
- 4、确认使用下的机械应力。
- 5、确认长期存放的电容器的可焊性。
- 6、在测量电容之前, 对长期存放的电容器进行热处理。

### ◆ Precautions Before Use

Pre-installation Information

- 1、Do not reuse capacitors removed from equipment.

- 2、Confirm electrical characteristics such as rated capacitance and rated Voltage.
- 3、Confirm the capacitor characteristics under applied Voltage.
- 4、Confirm the mechanical stress under use conditions.
- 5、Confirm the solderability of capacitors stored for long periods.
- 6、Perform heat treatment on capacitors that have been stored for a long time before measuring capacitance.

## ◆应用限制 Application Restrictions

- 1、我们的产品旨在用于一般消费电子设备(例如家用电器、办公设备、信息和通信设备, AV 设备、OA 设备、包括但不限于手机和 PC 等), 产品的设计基于正常操作和使用条件下的通用应用和标准用途。
- 2、不推荐用于下列高可靠性应用场景, 包括但不限于: 航天设备、医疗设备、航空设备、原子能设备、灾难预防设备、犯罪预防设备、电加热设备、燃烧设备、公共信息网络设备、数据处理设备、军事设备、发电控制设备、安全设备、车载设备、交通信号设备、运输设备和海底设备。

3、除非您事先获得风华的书面同意, 否则风华不对您或第三方因将我们的产品用于第 2 点设备而产生的任何损害承担任何责任。

1、Our products are intended for use in general consumer electronic devices (such as household appliances, office equipment, information and communication devices, AV equipment, OA equipment, including but not limited to mobile phones and PCs), based on general applications and standard uses under normal operating and usage conditions.

2、Our products are not recommended for the following high-reliability application scenarios, including but not limited to: aerospace equipment, medical devices, aviation equipment, atomic energy equipment, disaster prevention equipment, crime prevention equipment, electric heating equipment, combustion equipment, public information network devices, data processing equipment, military equipment, power generation control equipment, safety equipment, vehicle-mounted devices, traffic signal equipment, transportation equipment, and underwater equipment.

3、Unless you have prior written consent from Fenghua, Fenghua is not liable for any damages caused to you or third parties by using our products in the devices mentioned in point 2.

## \* 焊接的条件与相关图表

### Soldering Condition and Profile

为避免因温度的突然变化而引起的芯片开裂或局部爆炸的现象发生, 请按有关温度曲线图表来进行。(请参考附页中的图表)

To avoid the crack problem by sudden temperature change, follow the temperature profile in the adjacent graph (refer to the graph in the enclosure page).

## \* 手工焊接 Manual Soldering

手工焊接很容易因为芯片局部受热不均而引起瓷体微裂或局部爆炸的现象, 在焊接时, 如果操作者不小心, 会使烙铁头直接同电容芯片的瓷体部分接触, 这样很容易使电容芯片因热冲击而受损或出现其他意外. 因此, 使用电烙铁手工焊接时应仔细操作, 并对电烙铁的尖端的选择和尖端温度控制应多加小心.

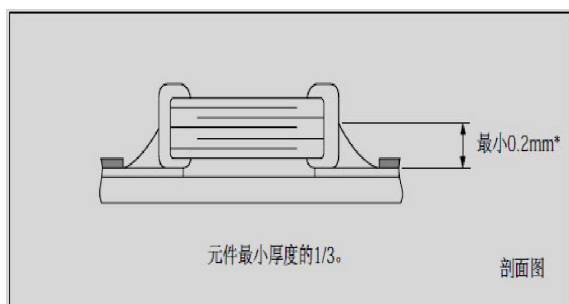
Manual soldering can pose a great risk of creating thermal cracks in capacitors. The hot soldering iron tip comes into direct contact with the end terminations, and operator's careless may cause the tip of the soldering iron to come into direct contact with the ceramic body of the capacitor. Therefore the soldering iron must be handled carefully, and pay much attention to the selection of the soldering iron tip and temperature contact of the tip.

## \* 推荐焊料用量

### Recommended Soldering amounts

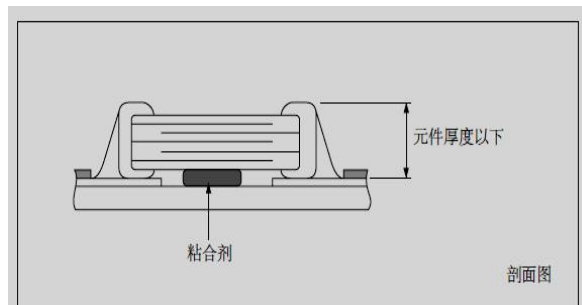
#### 回流焊接的最佳焊料用量

The optimal solder fillet amounts for re-flow soldering



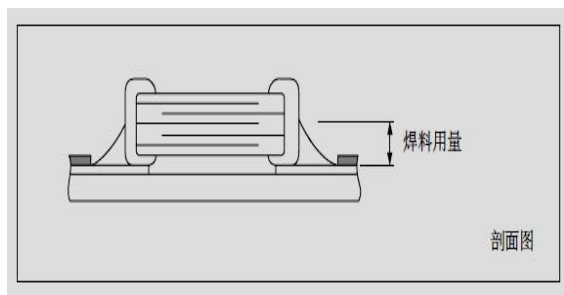
#### 波峰焊接的最佳焊料用量

The optimal solder fillet amounts for wave soldering



使用烙铁返修时的最佳焊料量

The optimal solder fillet amounts for reworking by using soldering iron



**\* 推荐焊接方式**

**Recommended Soldering Method**

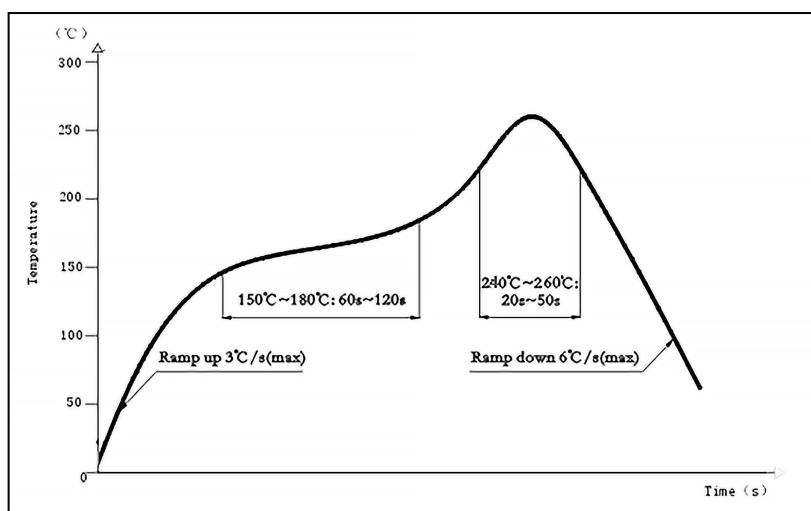
| 规格尺寸<br>Size | 温度特性<br>Temperature Characteristics | 容量范围<br>Capacitance     | 焊接方式<br>Soldering Method |
|--------------|-------------------------------------|-------------------------|--------------------------|
| 0402         | X7R                                 | /                       | R                        |
| 0603         | C0G                                 | /                       | R/W                      |
|              | X7R                                 | $C \geq 1\mu\text{f}$   | R                        |
| 0805         | C0G                                 | $C < 1\mu\text{f}$      | R/W                      |
|              |                                     | /                       | R/W                      |
|              | X7R                                 | $C \geq 4.7\mu\text{f}$ | R                        |
| 1206         | C0G                                 | $C < 4.7\mu\text{f}$    | R/W                      |
|              |                                     | /                       | R/W                      |
|              | X7R                                 | $C \geq 10\mu\text{f}$  | R                        |
| $\geq 1210$  | C0G                                 | $C < 10\mu\text{f}$     | R/W                      |
|              |                                     | /                       | R                        |
| $\geq 1210$  | X7R                                 | /                       | R                        |

焊接方式 Soldering method: R—回流焊 Reflow soldering W—波峰焊 Wave Soldering

**◆ 推荐焊接温度曲线图**

**The temperature profile for soldering**

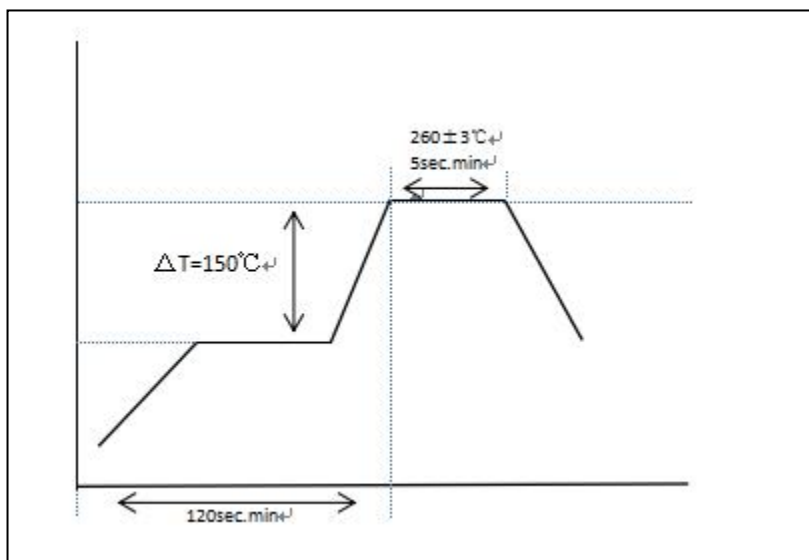
**\* 回流焊接 (Re-flow soldering)**



在预热时, 请将焊接温度与芯片表面温度之间的温差维持在  $T \leq 150^\circ\text{C}$ 。

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as:  $T \leq 150^\circ\text{C}$ .

\* 波峰焊接 (Wave soldering)

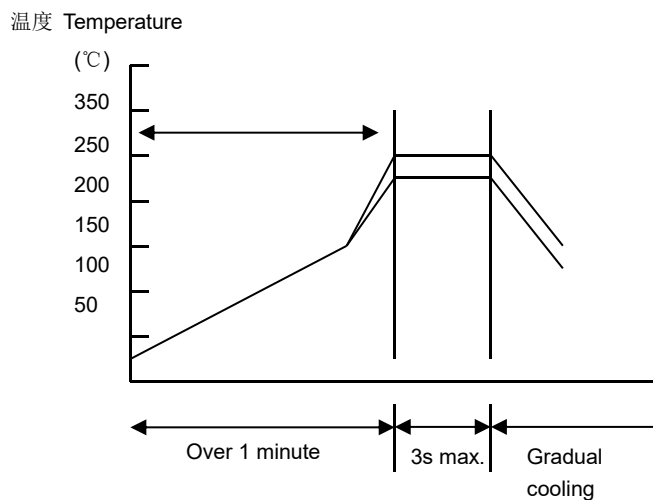


在预热时, 请将焊接温度与芯片表面温度之间的温差维持在  $T \leq 150^{\circ}\text{C}$ 。

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as:  $T \leq 150^{\circ}\text{C}$ .

\* 手工焊接

Hand soldering



条件 Conditions:

| 预热<br>Preheating                  | 烙铁头温度<br>Temperature of<br>soldering iron<br>head                         | 烙铁功率<br>Power of<br>soldering<br>iron | 烙铁头直径<br>Diameter of<br>soldering iron<br>head | 焊接时间<br>Soldering<br>time     | 锡膏量<br>Solder paste<br>amount                   | 限制条件<br>Restricted conditions                                                                               |
|-----------------------------------|---------------------------------------------------------------------------|---------------------------------------|------------------------------------------------|-------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| $\Delta \leq 130^{\circ}\text{C}$ | 最高 $350^{\circ}\text{C}$<br>Highest<br>temperature: $350^{\circ}\text{C}$ | 最大 20W<br>20W at the<br>highest       | 建议 1mm<br>1mm<br>recommended                   | 最长 3s<br>3s at the<br>longest | $\leq 1/2$ 芯片厚度<br>$\leq 1/2$ chip<br>thickness | 请勿使用烙铁头直接接触陶瓷元件<br>Please avoid the direct contact<br>between soldering iron head and<br>ceramic components |

\* 备注: 产品规格书仅供设计选型参考用, 不作为交货依据。

Note: The product specification is for design and selection reference only and shall not serve as a basis for delivery.



## ■修订履历 Revision History

[illegible]

注：1.上述所提供之内容为产品规格说明。在产品未变更时，风华保有修改此内容不另行通知之所有权利，任何产品变更将会以 P C N 通知客户。

1.The content provided above is the produce specification, if the product is not changed, FENGHUA reserves all the right to modify this content without prior notice. any product change will be notified to the customer by PCN.

2.产品规格书中,同规格同容量同温度特性可交付的高电压型号规格,可以完全覆盖低压;同规格同容量同电压产品,温度特性 X7R 产品可覆盖 X7S,X7T,X6S,X5R (如 OP02B104K250NT 可以覆盖 OP02BS104K250NT,OP02BT104K250NT, OP02DS104K250NT, OP02X104K250NT).规格书中就不再列出详细型号规格。

2. In the product specification, deliverable high-Voltage models with the same specifications, capacity, and temperature characteristics can fully cover the low-Voltage models. For products with the same specifications, capacity, and Voltage, X7R temperature characteristic products can cover X7S, X7T, X6S, and X5R (e.g., OP02B104K250NT can cover OP02BS104K250NT, OP02BT104K250NT, OP02DS104K250NT, OP02X104K250NT). Therefore, detailed model specifications will not be listed separately in the specification.