



# 四川华瓷科技有限公司

## 承认书

## APPROVAL SHEET

产 品 名 称 : 多层片式陶瓷电容器

PART NAME : MULTILAYER CERAMIC CAPACITORS

系 列 : 通用系列 ( 4V~63V )

SERIES : General Purpose Series ( 4V~63V )

规 格 : 0201 ~ 1210 尺寸

SPECIFICATION : 0201 ~ 1210 Size

供 应 商 ( SUPPLIER ) : 四川华瓷科技有限公司

发布日期 ( ISSUE DATE ) : 20200701

批 准 ( APPROVED BY ) : \_\_\_\_\_

客户许可 ( CUSTOMER APPROVAL ) :

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# 四川华瓷科技有限公司

## 1、概述 ( GENERAL INFO )

适合厂家高密度、高效表面贴装的陶瓷电容器。

For high density and high efficiency SMT application.

产品采用 NP0 ( C0G、C0H ) , X7R 、 X5R、 X7S 和 X6S 材质制作 , 具有电气性能优越、可靠性高的特点。

We can provide NP0(C0G/C0H)/X7R/X5R/X7S/X6S capacitors with high reliability and excellent electrical performance.

## 2、产品特点 ( FEATURES ):

- a、可选尺寸范围广 , 0201 至 1210 规格。 More selection of size,0201 to 1210 all being available .
- b、给定尺寸容量高。 High capacity and small size can be achieved.

## 3、应用领域 ( APPLICATIONS ):

- a、一般数字电路。 For general digital circuit.
- b、电源旁路。 For power supply bypass capacitors.
- c、消费电子。 For consumer electronics.
- d、通讯行业。 For telecommunication

## 4 、 型号规格表示方法： HOW TO ORDER

| HGC            | 0805                                                                                           | R7                                                                 | 104                                                                                                                                    | K                                                                                                                      | 500                                                                                                                                                                                                                                                                             | N                                          | T                                                                                                   | H                                                                                                                                                                  | J                                                    |
|----------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Series<br>产品系列 | Size<br>inch(mm)<br>尺寸                                                                         | Dielectric<br>材质                                                   | Capacitance<br>电容量                                                                                                                     | Tolerance<br>精度级别                                                                                                      | RatedVoltage<br>额定电压                                                                                                                                                                                                                                                            | Termination<br>端电极类型                       | Packaging<br>包装方式                                                                                   | Thickness<br>( mm)<br>厚度代码                                                                                                                                         | Reel Size<br>卷盘尺寸                                    |
| HGC<br>通用型     | 1005(0402)<br>0201(0603)<br>0402(1005)<br>0603(1608)<br>0805(2012)<br>1206(3216)<br>1210(3225) | R5=X5R<br>S6=X6S<br>R7=X7R<br>S7=X7S<br>T7=X7T<br>G0=C0G<br>H0=C0H | R75=0.75pF<br>0R5=0.5pF<br>1R0=1pF<br>100=10pF<br>101=100pF<br>102=1000pF<br>103=10nF<br>104=100nF<br>105=1μF<br>106=10μF<br>107=100μF | A=±0.05pF<br>B=±0.1pF<br>C=±0.25pF<br>D=±0.5pF<br>F=±1%<br>G=±2%<br>J=±5%<br>K=±10%<br>L=±15%<br>M=±20%<br>S=-20%~+50% | 4R0=4 Vdc<br>6R3=6.3 Vdc<br>100=10 Vdc<br>160=16 Vdc<br>250=25 Vdc<br>500=50 Vdc<br>101=100 Vdc<br>201=200 Vdc<br>251=250 Vdc<br>501=500 Vdc<br>631=630 Vdc<br>102=1k Vdc<br>152=1.5k Vdc<br>202=2k Vdc<br>252=2.5k Vdc<br>302=3k Vdc<br>402=4k Vdc<br>502=5k Vdc<br>602=6k Vdc | N=Cu/Ni/Sn<br><br>C=Cu/Resin/<br><br>Ni/Sn | T=纸带<br><br>Paper<br><br>taping<br><br>B=散包装<br><br>Bulk<br><br>S=塑胶带<br><br>Embossed<br><br>taping | A=0.1mm<br>B=0.2mm<br>C=0.3mm<br>D=0.4mm<br>E=0.5mm<br>F=0.6mm<br>G=0.7mm<br>H=0.8mm<br>J=1.0mm<br>L=1.25mm<br>P=1.6mm<br>S=1.8mm<br>U=2.0mm<br>V=2.5mm<br>W=3.0mm | J=7Inch<br>D=13Inch<br>K=7Inch<br>12mm<br>width tape |



## 5、温度系数/特性 Temperature Coefficient /Characteristics

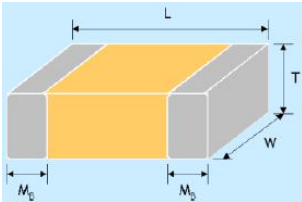
| 介质种类<br>Dielectric | 参考温度点<br>Reference Temperature Point | 标称温度系数<br>Temperature Coefficient | 工作温度范围<br>Operation Temperature Range |
|--------------------|--------------------------------------|-----------------------------------|---------------------------------------|
| C0G                | 20°C                                 | 0±30 ppm/°C                       | -55°C ~ 125°C                         |
| C0H                | 20°C                                 | 0±60 ppm/°C                       | -55°C ~ 125°C                         |
| X7R                | 20°C                                 | ±15%                              | -55°C ~ 125°C                         |
| X5R                | 20°C                                 | ±15%                              | -55°C ~ 85°C                          |
| X7S                | 20°C                                 | ±22%                              | -55°C ~ 125°C                         |
| X6S                | 20°C                                 | ±22%                              | -55°C ~ 105°C                         |

备注：I 类电容器标称温度系数和允许偏差是采用温度在 20°C 和 85°C 之间的电容量变化来确定的，而 II 类电容器标称温度系数是按照工作范围之间的电容量相对 20°C 的电容量变化来确定的。

Note：Nominal temperature coefficient and allowed tolerance of class I are decided by the changing of the capacitance between 20°C and 85°C. Nominal temperature coefficient of class II are decided by the temperature of 20°C.

## 6、产品外围尺寸及内部结构 EXTERNAL DIMENSIONS AND STRUCTURE

### 6-1 产品外围尺寸 Product peripheral dimension

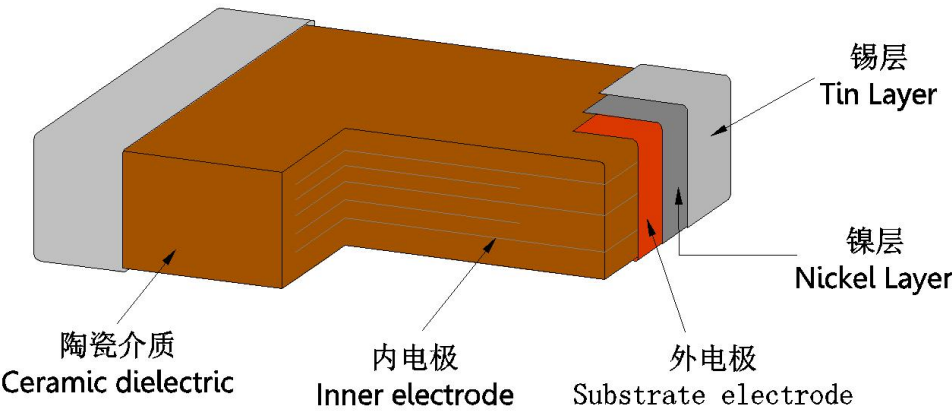
| 外观 Outline                                                                         | 尺寸 Size     | 长度 L      | 宽度 W ( mm) | 厚度 T ( mm)/厚度代码 |            | 焊 接 方 式          | 端头宽度<br>MB(mm) |
|------------------------------------------------------------------------------------|-------------|-----------|------------|-----------------|------------|------------------|----------------|
|                                                                                    | Inch ( mm)  | ( mm)     |            | Symbol          |            | Soldering Method |                |
|  | 0201 (0603) | 0.60±0.03 | 0.30±0.03  | 0.30±0.03       | C          | R                | 0.15±0.05      |
|                                                                                    | 0402 (1005) | 1.00±0.05 | 0.50±0.05  | 0.50±0.05       | E(C < 105) | R                | 0.25±0.10      |
|                                                                                    |             | 1.00±0.20 | 0.50±0.20  | 0.50±0.20       | E(C≥105)   | R                |                |
|                                                                                    | 0603 (1608) | 1.60±0.20 | 0.80±0.20  | 0.80±0.20       | H          | R / W            | 0.40±0.15      |
|                                                                                    | 0805 (2012) | 2.00±0.20 | 1.25±0.20  | 0.70±0.10       | G          | R / W            | 0.50±0.20      |
|                                                                                    |             |           |            | 0.80±0.20       | H          |                  |                |
|                                                                                    |             |           |            | 1.25±0.20       | L          | R                |                |
|                                                                                    | 1206 (3216) | 3.20±0.20 | 1.60±0.20  | 0.70±0.10       | G          | R / W            | 0.60±0.20      |
|                                                                                    |             |           |            | 0.80±0.20       | H          |                  |                |
|                                                                                    |             |           |            | 1.00±0.10       | J          | R                |                |
|                                                                                    |             |           |            | 1.25±0.20       | L          |                  |                |
|                                                                                    |             |           |            | 1.60±0.20       | P          |                  |                |
|                                                                                    | 1210 (3225) | 3.20±0.30 | 2.50±0.30  | 1.25±0.20       | L          | R                | 0.75±0.25      |
|                                                                                    |             |           |            | 1.60±0.20       | P          |                  |                |
|                                                                                    |             |           |            | 2.00±0.20       | U          |                  |                |
|                                                                                    |             |           |            | 2.50±0.30       | V          |                  |                |

说明：R=Reflow Soldering 回流焊

W=Wave Soldering 波峰焊



6-2 结构 STRUCTURE



7、包装标准数量 PACKAGING STANDARD QUANTITY

| Size 尺寸     | Thickness ( mm)/Symbol 厚度/符号 |            | Paper tape 纸带 | Plastic Tape 胶带 |
|-------------|------------------------------|------------|---------------|-----------------|
|             |                              |            | 7"reel        | 7"reel          |
| 0201 (0603) | 0.30±0.03                    | C          | 15,000        | -----           |
| 0402 (1005) | 0.50±0.05                    | E(C < 105) | 10,000        | -----           |
|             | 0.50±0.20                    | E(C≥105)   | 10,000        | -----           |
| 0603 (1608) | 0.80±0.20                    | H          | 4000          | -----           |
| 0805 (2012) | 0.70±0.10                    | G          | 4000          | -----           |
|             | 0.80±0.20                    | H          | 4000          | -----           |
|             | 1.25±0.20                    | L          | -----         | 3000            |
| 1206 (3216) | 0.70±0.10                    | G          | 4000          | -----           |
|             | 0.80±0.20                    | H          | 4000          | -----           |
|             | 1.00±0.10                    | J          | -----         | 3000            |
|             | 1.25±0.20                    | L          | -----         | 3000            |
|             | 1.60±0.20                    | P          | -----         | 2000            |
| 1210 (3225) | 1.25±0.20                    | L          | -----         | 2000            |
|             | 1.60±0.20                    | P          | -----         | 2000            |
|             | 2.00±0.20                    | U          | -----         | 2000            |
|             | 2.50±0.30                    | V          | -----         | 1000            |



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## 8、容量范围及其电压 Capacitance Range and rating Voltage

### 8-1 C0G、C0H Dielectric

| Dielectric                   |                | C0G、C0H        |          |          |          |          |          |          |          |          |   |
|------------------------------|----------------|----------------|----------|----------|----------|----------|----------|----------|----------|----------|---|
| (尺寸)Size                     |                | 0201           | 0402     | 0603     | 0805     |          | 1206     |          | 1210     |          |   |
| 额定电压 Rated Voltage<br>( VDC) |                | 16<br>25<br>50 | 25<br>50 | 25<br>50 | 10<br>16 | 25<br>50 | 10<br>16 | 25<br>50 | 10<br>16 | 25<br>50 |   |
| Capacitance                  | 0.3pF ( 0R3)   | C              | E        | H        |          |          |          |          |          |          |   |
|                              | 0.4pF ( 0R4)   | C              | E        | H        |          |          |          |          |          |          |   |
|                              | 0.5pF ( 0R5)   | C              | E        | H        | G        | G        |          |          |          |          |   |
|                              | 0.6pF ( 0R6)   | C              | E        | H        | G        | G        |          |          |          |          |   |
|                              | 0.7pF ( 0R7)   | C              | E        | H        | G        | G        |          |          |          |          |   |
|                              | 0.8pF ( 0R8)   | C              | E        | H        | G        | G        |          |          |          |          |   |
|                              | 0.9pF ( 0R9)   | C              | E        | H        | G        | G        |          |          |          |          |   |
|                              | 1.0pF ( 1R0)   | C              | E        | H        | G        | G        |          |          |          |          |   |
|                              | 1.2pF ( 1R2)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 1.5pF ( 1R5)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 1.8pF ( 1R8)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 2.0pF ( 2R0)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 2.2pF ( 2R2)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 2.7pF ( 2R7)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 3.0pF ( 3R0)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 3.3pF ( 3R3)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 3.9pF ( 3R9)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 4.0pF ( 4R0)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 4.7pF ( 4R7)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 5.0pF ( 5R0)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 5.6pF ( 5R6)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 6.0pF ( 6R0)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 6.8pF ( 6R8)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 7.0pF ( 7R0)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 8.0pF ( 8R0)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 8.2pF ( 8R2)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 9.0pF ( 9R0)   | C              | E        | H        | G        | G        | G        | G        |          |          |   |
|                              | 10pF ( 100)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 12pF ( 120)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 15pF ( 150)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 18pF ( 180)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 22pF ( 220)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 27pF ( 270)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 33pF ( 330)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 39pF ( 390)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 47pF ( 470)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 56pF ( 560)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 68pF ( 680)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 82pF ( 820)    | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 100pF ( 101)   | C              | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 120pF ( 121)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 150pF ( 151)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 180pF ( 181)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 220pF ( 221)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 270pF ( 271)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 330pF ( 331)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 390pF ( 391)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 470pF ( 471)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 560pF ( 561)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 680pF ( 681)   |                | E        | H        | G        | G        | G        | G        |          | L        | L |
|                              | 820pF ( 821)   |                | E        | H        | G        | G        | H        | H        |          | L        | L |
|                              | 1,000pF ( 102) |                | E        | H        | G        | G        | H        | H        |          | L        | L |
|                              | 1,200pF ( 122) |                |          | H        | G        | G        | H        | H        |          | L        | L |
|                              | 1,500pF ( 152) |                |          | H        | G        | G        | H        | H        |          | L        | L |
|                              | 1,800pF ( 182) |                |          | H        | G        | G        | H        | H        |          | L        | L |
|                              | 2,200pF ( 222) |                |          | H        | G        | G        | H        | H        |          | L        | L |
|                              | 2,700pF ( 272) |                |          |          | H        | H        | H        | H        |          | L        | L |
|                              | 3,300pF ( 332) |                |          |          | H        | H        | H        | H        |          | L        | L |
|                              | 3,900pF ( 392) |                |          |          | H        | H        | H        | H        |          | L        | L |
|                              | 4,700pF ( 472) |                |          |          | H        | H        | H        | H        |          | L        | L |
|                              | 5,600pF ( 562) |                |          |          | H        | H        | L        | L        |          | L        | L |
|                              | 6,800pF ( 682) |                |          |          | H        | H        | L        | L        |          | L        | L |
|                              | 8,200pF ( 822) |                |          |          | H        | H        | L        | L        |          | L        | L |
|                              | 0.010μF ( 103) |                |          |          | L        | L        | P        | P        |          | L        | L |
|                              | 0.012μF ( 123) |                |          |          |          |          | P        | P        |          | L        | L |
|                              | 0.015μF ( 153) |                |          |          |          |          | P        | P        |          | L        | L |
|                              | 0.018μF ( 183) |                |          |          |          |          | P        | P        |          | U        | U |
|                              | 0.022μF ( 223) |                |          |          |          |          | P        | P        |          | U        | U |
|                              | 0.027μF ( 273) |                |          |          |          |          | P        | P        |          | U        | U |
|                              | 0.033μF ( 333) |                |          |          |          |          | P        | P        |          | U        | U |
|                              | 0.039μF ( 393) |                |          |          |          |          | P        | P        |          | U        | U |
|                              | 0.047μF ( 473) |                |          |          |          |          | P        | P        |          | U        | U |
|                              | 0.056μF ( 563) |                |          |          |          |          | P        | P        |          | U        | U |
|                              | 0.068μF ( 683) |                |          |          |          |          | P        | P        |          | U        | U |
|                              | 0.082μF ( 823) |                |          |          |          |          | P        | P        |          | U        | U |
|                              | 0.10μF ( 104)  |                |          |          |          |          | P        | P        |          | U        | U |



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## 8-2 X7R Dielectric

| Dielectric          |              | X7R      |    |           |          |    |                 |    |    |                 |    |    |                 |    |    |      |    |    |    |   |
|---------------------|--------------|----------|----|-----------|----------|----|-----------------|----|----|-----------------|----|----|-----------------|----|----|------|----|----|----|---|
| Size                | 0201         |          |    | 0402      |          |    | 0603            |    |    | 0805            |    |    | 1206            |    |    | 1210 |    |    |    |   |
| Rated Voltage (VDC) | 6.3<br>10    | 16<br>25 | 50 | 6.3<br>10 | 16<br>25 | 50 | 6.3<br>10<br>16 | 25 | 50 | 6.3<br>10<br>16 | 25 | 50 | 6.3<br>10<br>16 | 25 | 50 | 10   | 16 | 25 | 50 |   |
| capacitance         | 100pF(101)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    |    |      |    |    |    |   |
|                     | 120pF(121)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    |    |      |    |    |    |   |
|                     | 150pF(151)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 180pF(181)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 220pF(221)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 270pF(271)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 330pF(331)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 390pF(391)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 470pF(471)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 560pF(561)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 680pF(681)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 820pF(821)   | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 1,000pF(102) | C        | C  | C         |          | E  | E               |    | H  | H               |    | H  | H               |    | H  | H    |    |    |    |   |
|                     | 1,200pF(122) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 1,500pF(152) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 1,800pF(182) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 2,200pF(222) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 2,700pF(272) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 3,300pF(332) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 3,900pF(392) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 4,700pF(472) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 5,600pF(562) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 6,800pF(682) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 8,200pF(822) | C        | C  |           | E        | E  | E               |    | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.010μF(103) | C        | C  |           | E        | E  | E               | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.012μF(123) |          |    |           | E        | E  | E               | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.015μF(153) |          |    |           | E        | E  | E               | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.018μF(183) |          |    |           | E        | E  | E               | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.022μF(223) |          |    |           | E        | E  | E               | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.027μF(273) |          |    |           | E        | E  |                 | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.033μF(333) |          |    |           | E        | E  |                 | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.039μF(393) |          |    |           | E        | E  |                 | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.047μF(473) |          |    |           | E        | E  |                 | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.056μF(563) |          |    |           | E        | E  |                 | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.068μF(683) |          |    |           | E        | E  |                 | H  | H  | H               | H  | H  | H               | H  | H  | H    |    |    |    |   |
|                     | 0.082μF(823) |          |    |           | E        | E  |                 | H  | H  | H               | H  | H  | H               | H  | H  | H    | J  | J  | J  | J |
|                     | 0.10μF(104)  |          |    |           | E        | E  |                 | H  | H  | H               | H  | H  | H               | H  | H  | H    | J  | J  | J  | J |
|                     | 0.12μF(124)  |          |    |           |          |    |                 | H  | H  | H               | H  | H  | H               | H  | H  | H    | J  | J  | J  | J |
|                     | 0.15μF(154)  |          |    |           |          |    |                 | H  | H  | H               | H  | H  | H               | H  | J  | J    | J  | J  | J  | J |
|                     | 0.18μF(184)  |          |    |           |          |    |                 | H  | H  | H               | H  | H  | H               | H  | J  | J    | J  | J  | J  | J |
|                     | 0.22μF(224)  |          |    |           | E        |    |                 | H  | H  | H               | H  | H  | H               | H  | J  | J    | J  | J  | J  | J |
|                     | 0.27μF(274)  |          |    |           |          |    |                 | H  | H  | H               | H  | H  | H               | H  | J  | L    | J  | J  | J  | J |
|                     | 0.33μF(334)  |          |    |           |          |    |                 | H  | H  | H               | H  | H  | H               | H  | J  | L    | J  | J  | J  | L |
|                     | 0.39μF(394)  |          |    |           |          |    |                 | H  | H  | H               | H  | H  | H               | H  | L  | P    | J  | J  | J  | L |
|                     | 0.47μF(474)  |          |    |           |          |    |                 | H  | H  | H               | L  | L  | L               | H  | L  | P    | J  | J  | J  | L |
|                     | 0.56μF(564)  |          |    |           |          |    |                 | H  | H  | H               | L  | L  | L               | H  | L  | P    | L  | L  | L  | L |
|                     | 0.68μF(684)  |          |    |           |          |    |                 | H  | H  | H               | L  | L  | L               | H  | L  | P    | L  | L  | L  | L |
|                     | 0.82μF(824)  |          |    |           |          |    |                 | H  | H  | H               | L  | L  | L               | H  | L  | P    | L  | L  | L  | L |
|                     | 1.0μF(105)   |          |    |           |          |    |                 | H  | H  | H               | L  | L  | L               | L  | L  | P    | L  | L  | L  | L |
|                     | 1.5μF(155)   |          |    |           |          |    |                 |    |    |                 | L  | L  |                 | L  | P  |      |    | P  | P  | V |
|                     | 2.2μF(225)   |          |    |           |          |    |                 | H  |    |                 | L  | L  | L               | L  | P  | P    |    | P  | P  | V |
|                     | 3.3μF(335)   |          |    |           |          |    |                 |    |    |                 | L  | L  |                 | P  | P  |      |    | P  | P  | V |
|                     | 4.7μF(475)   |          |    |           |          |    |                 |    |    |                 | L  | L  | L               | P  | P  | P    | U  | U  | U  | V |
|                     | 6.8μF(685)   |          |    |           |          |    |                 |    |    |                 | L  |    |                 | P  |    |      |    |    |    |   |
|                     | 10μF(106)    |          |    |           |          |    |                 |    |    |                 | L  |    |                 | P  | P  |      | U  | U  | U  | V |
|                     | 22μF(226)    |          |    |           |          |    |                 |    |    |                 |    |    |                 | P  |    |      | V  | V  | V  |   |
|                     | 47μF(476)    |          |    |           |          |    |                 |    |    |                 |    |    |                 |    |    |      | V  |    |    |   |



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### 8-3 X7S Dielectric

| Dielectric          |             | X7S  |    |    |    |      |    |    |    |      |    |    |    |     |      |    |    |    |    |      |    |    |    |    |
|---------------------|-------------|------|----|----|----|------|----|----|----|------|----|----|----|-----|------|----|----|----|----|------|----|----|----|----|
| Size                |             | 0402 |    |    |    | 0603 |    |    |    | 0805 |    |    |    |     | 1206 |    |    |    |    | 1210 |    |    |    |    |
| Rated Voltage (VDC) |             | 6.3  | 10 | 16 | 25 | 6.3  | 10 | 16 | 25 | 10   | 16 | 25 | 50 | 100 | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 |
| Capacitance         | 1.0μF (105) |      | E  |    |    |      |    |    | H  |      |    |    |    | L   |      |    |    |    |    |      |    |    |    |    |
|                     | 1.5μF (155) |      |    |    |    |      |    |    |    |      |    |    |    |     |      |    |    |    |    |      |    |    |    |    |
|                     | 2.2μF (225) | E    | E  |    |    | H    |    | H  | H  |      |    |    | L  |     |      |    |    |    |    |      |    |    |    |    |
|                     | 3.3μF (335) |      |    |    |    |      |    |    |    |      |    |    |    |     |      |    |    |    |    |      |    |    |    |    |
|                     | 4.7μF (475) |      |    |    |    | H    | H  | H  |    |      |    |    | L  |     | p    | p  | p  | p  | p  |      |    |    |    |    |
|                     | 6.8μF (685) |      |    |    |    |      |    |    |    |      |    |    |    |     |      |    |    |    |    |      |    |    |    |    |
|                     | 10μF (106)  |      |    |    |    |      |    |    |    |      | L  | L  |    |     | p    | p  | p  | p  | P  | U    | U  | U  | U  | U  |
|                     | 22μF (226)  |      |    |    |    |      |    |    |    |      |    |    |    |     | P    |    | P  |    |    | V    | V  | V  | V  |    |
|                     | 47μF (476)  |      |    |    |    |      |    |    |    |      |    |    |    |     | P    |    |    |    |    |      | V  | V  |    |    |
|                     | 100μF (107) |      |    |    |    |      |    |    |    |      |    |    |    |     |      |    |    |    |    | V    |    |    |    |    |

### 8-4 X5R Dielectric

| Dielectric          |              | X5R  |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|---------------------|--------------|------|----|----|----|----|------|----|----|----|----|------|----|----|----|----|------|----|----|----|----|------|----|----|----|----|------|-----|----------|----|----|---|
| Size                |              | 0201 |    |    |    |    | 0402 |    |    |    |    | 0603 |    |    |    |    | 0805 |    |    |    |    | 1206 |    |    |    |    | 1210 |     |          |    |    |   |
| Rated Voltage (VDC) |              | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 | 6.3  | 10 | 16 | 25 | 50 | 4    | 6.3 | 10<br>16 | 25 | 50 |   |
| Capacitance         | 100pF(101)   | C    | C  | C  | C  | C  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 220pF(221)   | C    | C  | C  | C  | C  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 470pF(471)   | C    | C  | C  | C  | C  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 1,000pF(102) | C    | C  | C  | C  | C  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 2,200pF(222) | C    | C  | C  | C  | C  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 4,700pF(472) | C    | C  | C  | C  | C  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.010μF(103) | C    | C  | C  | C  | C  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.027μF(273) | C    | C  | C  | C  |    |      |    | E  |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.033μF(333) | C    | C  | C  | C  |    |      |    | E  |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.039μF(393) | C    | C  | C  | C  |    |      |    | E  |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.047μF(473) | C    | C  | C  | C  |    |      |    | E  |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.056μF(563) | C    | C  | C  | C  |    |      |    | E  | E  |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.068μF(683) | C    | C  | C  | C  |    |      |    | E  | E  |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.082μF(823) | C    | C  | C  | C  |    |      |    | E  | E  |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.10μF(104)  | C    | C  | C  | C  |    | E    | E  | E  | E  | E  |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.15μF(154)  | C    | C  | C  |    |    | E    | E  | E  | E  |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.22μF(224)  | C    | C  | C  |    |    | E    | E  | E  | E  | E  |      |    | H  | H  | H  |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.27μF(274)  | C    | C  | C  |    |    |      |    |    |    |    |      |    | H  | H  |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.33μF(334)  | C    | C  | C  |    |    | E    | E  | E  | E  |    |      |    | H  | H  |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.39μF(394)  | C    | C  |    |    |    |      |    |    |    |    |      |    | H  | H  |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.47μF(474)  | C    | C  |    |    |    | E    | E  | E  | E  | E  | H    | H  | H  | H  | H  |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.68μF(684)  | C    |    |    |    |    | E    | E  |    |    |    | H    | H  | H  | H  |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 0.82μF(824)  | C    |    |    |    |    |      |    |    |    |    | H    | H  | H  | H  |    |      |    |    |    |    |      |    |    |    |    |      |     |          |    |    |   |
|                     | 1.0μF(105)   | C    | C  |    |    |    | E    | E  | E  | E  | E  | H    | H  | H  | H  | H  |      |    |    | L  | L  |      |    |    |    |    |      |     |          |    |    |   |
|                     | 1.5μF(155)   |      |    |    |    |    |      |    |    |    |    | H    |    |    |    |    |      |    |    | L  |    |      |    |    |    |    |      |     | U        |    |    |   |
|                     | 2.2μF(225)   | C    |    |    |    |    | E    | E  | E  | E  |    | H    | H  | H  | H  | H  | L    | L  | L  | L  | L  |      |    |    | L  | P  | P    |     |          | U  |    |   |
|                     | 3.3μF(335)   |      |    |    |    |    |      |    |    |    |    | H    | H  |    |    |    | L    | L  | L  | L  |    |      |    | P  | P  | P  |      |     |          |    |    |   |
|                     | 4.7μF(475)   |      |    |    |    |    | E    | E  | E  |    |    | H    | H  | H  | H  |    | L    | L  | L  | L  | L  | P    | P  | P  | P  | P  |      |     |          | U  | U  | V |
|                     | 6.8μF(685)   |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    | P    | P  |    |    |    |      |     |          |    |    |   |
|                     | 10μF(106)    |      |    |    |    |    | E    | E  |    |    |    | H    | H  | H  | H  |    | L    | L  | L  | L  |    | P    | P  | P  | P  | P  |      |     | U        | U  | U  | V |
|                     | 22μF(226)    |      |    |    |    |    | E    |    |    |    |    | H    | H  |    |    |    | L    | L  | L  | L  |    | P    | P  | P  | P  |    |      |     | V        | V  | V  |   |
|                     | 47μF(476)    |      |    |    |    |    |      |    |    |    |    | H    |    |    |    |    | L    | L  |    |    |    | P    | P  | P  |    |    |      |     | V        | V  | V  |   |
|                     | 100μF(107)   |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    | L    |    |    |    |    | P    | P  |    |    |    |      |     | V        | V  |    |   |
|                     | 220μF(227)   |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    |      |    |    |    |    | P    |    |    |    |    |      |     | V        | V  |    |   |



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## 8-5 X6S Dielectric

| Dielectric          |             | X6S  |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|---------------------|-------------|------|----|----|----|------|-----|----|----|----|------|-----|----|----|----|----|------|-----|----|----|----|----|------|-----|----|----|----|----|
| Size                |             | 0402 |    |    |    | 0603 |     |    |    |    | 0805 |     |    |    |    |    | 1206 |     |    |    |    |    | 1210 |     |    |    |    |    |
| Rated Voltage (VDC) |             | 6.3  | 10 | 16 | 25 | 4    | 6.3 | 10 | 16 | 25 | 4    | 6.3 | 10 | 16 | 25 | 50 | 4    | 6.3 | 10 | 16 | 25 | 50 | 4    | 6.3 | 10 | 16 | 25 | 50 |
| Capacitance         | 0.10μF(104) |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 0.15μF(154) |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 0.22μF(224) |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 0.33μF(334) |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 0.39μF(394) |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 0.47μF(474) | E    |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 0.68μF(684) |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 1.0μF(105)  | E    | E  | E  | E  |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 1.5μF(155)  |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 2.2μF(225)  | E    | E  | E  | E  |      |     |    | H  | H  |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 3.3μF(335)  |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 4.7μF(475)  | E    |    |    |    |      | H   | H  | H  | H  |      |     |    |    | L  | L  |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 6.8μF(685)  |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |      |     |    |    |    |    |
|                     | 10μF(106)   | E    | E  |    |    |      | H   | H  | H  |    | L    | L   | L  | L  | L  |    |      |     |    |    | P  | P  |      | V   | V  | V  | V  | V  |
|                     | 22μF(226)   |      |    |    |    | H    | H   |    |    |    |      | L   | L  | L  | L  |    |      |     | P  | P  | P  | P  |      |     |    |    | V  |    |
|                     | 47μF(476)   |      |    |    |    |      |     |    |    |    | L    | L   |    |    |    |    |      | P   | P  |    |    |    |      | V   | V  | V  |    |    |
| 100μF(107)          |             |      |    |    |    |      |     |    |    | L  |      |     |    |    |    |    | P    |     |    |    |    |    | V    | V   |    |    |    |    |
| 220μF(227)          |             |      |    |    |    |      |     |    |    |    |      |     |    |    |    |    | P    |     |    |    |    |    | V    |     |    |    |    |    |

## 9、可靠性测试 Reliability Test

### 9-1 外观及电性能测试 Appearance and electrical performance test

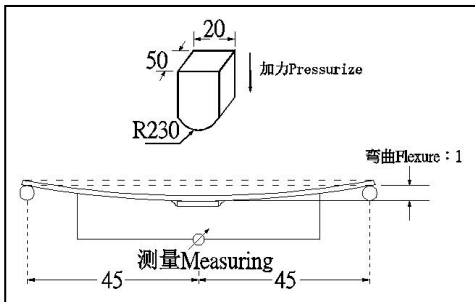
| 编号<br>No. | 项目<br>Item        | 技术要求<br>Technical requirements                        | 测试方法<br>Test Method and Remarks                                                                                                                                                                                           |
|-----------|-------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1         | 外观<br>Appearance  | 没有明显的缺陷或异常<br>No remarkable defects or abnormalities. | 通过显微镜 ( ×10 )<br>Through microscope ( ×10 )                                                                                                                                                                               |
| 2         | 尺寸<br>size        | 在规定尺寸范围内<br>Within the specified size range           | 使用游标卡尺<br>Using a vernier caliper                                                                                                                                                                                         |
| 3         | 容量<br>Capacitance | I 类<br>Class I<br>(C0G,C0H)                           | 测试温度 Test temperature : 25±3℃<br>测试条件 Test condition :<br>C≤1000pF :<br>1MHz±10% , 1.0±0.2Vrms<br>C > 1000pF :<br>1KHz±10% , 1.0±0.2Vrms                                                                                  |
|           |                   | II类<br>Class II<br>(X7R/X5R<br>X7S/X6S)               | 测试温度 Test temperature : 25±3℃<br>测试条件 Test condition :<br>C≤10μF :<br>1KHz±10% , 1.0±0.2Vrms<br>C > 10μF :<br>120±24 Hz , 0.5±0.1Vrms<br>初始测量前 ( 仅限 II 类 ) : 预处理*Before the initial measurement (only for class II):Note1 |

| 编号<br>No. | 项目<br>Item                                    |                                         | 技术要求<br>Technical requirements |                                        |                                  | 测 试 方 法<br>Test Method and Remarks                                                                                                        |            |
|-----------|-----------------------------------------------|-----------------------------------------|--------------------------------|----------------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 4         | 损耗角<br>正切<br>(DF, tanδ)<br>Dissipation Factor | I 类<br>Class I<br>(C0G,C0H)             | 标称容量<br>Capacitance            |                                        | 损耗标准<br>DF Specification         | 测试温度 Test temperature : 25±3℃<br>测试条件 Test condition :<br>C≤1000pF :<br>1MHz±10%, 1.0±0.2Vrms<br><br>C > 1000pF :<br>1KHz±10%,1.0±0.2Vrms |            |
|           |                                               |                                         | Cr < 5 pF                      |                                        | ≤0.56%                           |                                                                                                                                           |            |
|           |                                               |                                         | 5pF≤Cr < 50 pF                 |                                        | 1.5[(150/Cr)+7]×10 <sup>-4</sup> |                                                                                                                                           |            |
|           |                                               |                                         | 50pF≤Cr≤1000 pF                |                                        | ≤0.15%                           |                                                                                                                                           |            |
|           |                                               |                                         | > 1000 pF                      |                                        | ≤0.15%                           |                                                                                                                                           |            |
|           |                                               | II类<br>Class II<br>(X7R/X5R<br>X7S/X6S) | ≥0402                          | <div>项目 Item<br/>额定电压 Rated vol.</div> |                                  | 容量范围<br>C(μF)                                                                                                                             | 损耗标准<br>DF |
|           |                                               |                                         |                                |                                        |                                  | ≥50V                                                                                                                                      | C≥1.0      |
|           |                                               |                                         |                                | C<1.0                                  | ≤2.5%                            |                                                                                                                                           |            |
|           |                                               |                                         |                                | 25V、16V                                | C≥0.47                           | ≤10.0%                                                                                                                                    |            |
|           |                                               |                                         |                                |                                        | C<0.47                           | ≤3.5%                                                                                                                                     |            |
|           | 10V、63V                                       | C≥0.15                                  |                                | ≤10.0%                                 |                                  |                                                                                                                                           |            |
|           |                                               | C<0.15                                  |                                | ≤5.0%                                  |                                  |                                                                                                                                           |            |
|           | <0402                                         | <div>项目 Item<br/>额定电压 Rated vol.</div>  |                                | 容量范围<br>C(μF)                          | 损耗标准<br>DF                       |                                                                                                                                           |            |
|           |                                               |                                         |                                | ≥50V                                   | 所有容量                             | ≤3.5%                                                                                                                                     |            |
|           |                                               | 25V                                     |                                | 所有容量                                   | ≤5.0%                            |                                                                                                                                           |            |
|           |                                               | 16V                                     | C≥0.047                        | ≤10.0%                                 |                                  |                                                                                                                                           |            |
|           |                                               |                                         | C<0.047                        | ≤5.0%                                  |                                  |                                                                                                                                           |            |
|           |                                               | 10V、63V                                 | C≥0.047                        | ≤10.0%                                 |                                  |                                                                                                                                           |            |
|           |                                               |                                         | C<0.047                        | ≤7.5%                                  |                                  |                                                                                                                                           |            |

| 编号<br>No. | 项目<br>Item                        |                                         | 技术要求<br>Technical requirements |                    | 测试方法<br>Test Method and Remarks  |                       |
|-----------|-----------------------------------|-----------------------------------------|--------------------------------|--------------------|----------------------------------|-----------------------|
| 5         | 绝缘电阻(IR)<br>Insulation Resistance | I 类<br>Class I<br>(C0G,C0H)             | 电容量范围<br>Capacitance range     | 绝缘电阻标准<br>Standard | 测量电压<br>Measuring voltage        | 额定电压<br>Rated voltage |
|           |                                   |                                         | C≤10 nF                        | Ri≥50000MΩ         | 测试时间<br>Duration                 | 60±5 秒                |
|           |                                   |                                         | C > 10 nF                      | Ri•CR≥500S         | 测试电流<br>Charge/discharge current | ≤50mA                 |
|           |                                   | II类<br>Class II<br>(X7R/X5R<br>X7S/X6S) | 电容量范围<br>Capacitance range     | 绝缘电阻标准<br>Standard | 测试温度<br>Test temperature         | 25±3℃                 |
|           |                                   |                                         | C≤25 nF                        | Ri≥10000MΩ         | 测试湿度<br>Test humidity            | ≤75%                  |
|           |                                   |                                         | C > 25 nF                      | Ri•CR > 100S       |                                  |                       |

9-2 可靠性测试：Reliability test

| 编号<br>No. | 项目<br>Item                                         | 技术要求<br>Technical requirements                                                                                                             | 测试方法<br>Test Method and Remarks                                                                                                                                                                                                                                                                          |                       |         |
|-----------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------|
| 6         | 介质耐电强度<br>(DWV)<br>Dielectric Withstanding Voltage | 不应有介质被击穿或损伤<br>No breakdown or damage.                                                                                                     | 测量电压：<br>I 类：300%额定电压；II 类：250%额定电压<br>时间： 1~5 秒 充/放电电流：不应超过 50mA<br><br>Measuring Voltage:<br>Class I :300% Rated voltage<br>Class II :250% Rated voltage<br>Duration: 1~5s<br>Charge/ Discharge Current: 50mA max.                                                                                     |                       |         |
| 7         | 可焊性<br>Solderability                               | 上锡率应大于 95% ,<br>外观：无可见损伤.<br><br>At least 95% of the terminal electrode is covered by new solder.<br>Visual Appearance: No visible damage. | 将电容在 80~120℃的温度下预热 10~30 秒.<br>Preheating conditions:80 to 120℃; 10~30s.<br><br>有铅焊料：( Sn/Pb :<br>63/37 )<br>浸锡温度: 235±5℃<br>浸锡时间: 2±0.5s<br><br>Solder Temperature:<br>235±5℃<br>Duration: 2±0.5s<br><br>无铅焊料：<br>浸锡温度: 245±5℃<br>浸锡时间: 2±0.5s<br><br>Solder Temperature:<br>245±5℃<br>Duration: 2±0.5s |                       |         |
| 8         | 端头结合强度<br>Termination Adhesion                     | 外观无可见损伤<br>No visible damage                                                                                                               | 型号 Type                                                                                                                                                                                                                                                                                                  | 施加的力<br>Applied Force | 时间 Time |
|           |                                                    |                                                                                                                                            | 0201                                                                                                                                                                                                                                                                                                     | 2N                    | 10±1S   |
|           |                                                    |                                                                                                                                            | 0402&0603&<br>0805                                                                                                                                                                                                                                                                                       | 5N                    |         |
|           |                                                    |                                                                                                                                            | ≥1206                                                                                                                                                                                                                                                                                                    | 10N                   |         |

| 编号<br>No.                          | 项目<br>Item                                                        | 技术要求<br>Technical requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 测试方法<br>Test Method and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                     |      |        |          |    |                                 |  |    |                                 |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------------|------|--------|----------|----|---------------------------------|--|----|---------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9                                  | 耐焊接热<br>Resistance to Soldering Heat                              | <div>1. 电性能要求：<br/>Electrical performance requirements</div> <table><tr><th>类别<br/>classification<br/>项目<br/>Item</th><th>NPO<br/>(C0G、C0H)</th><th>X7R/X5<br/>R/X7S/X6S</th></tr><tr><td>ΔC/C</td><td>≤±0.5%</td><td>-5%~+10%</td></tr><tr><td>DF</td><td colspan="2">同初始标准<br/>Same to initial value.</td></tr><tr><td>IR</td><td colspan="2">同初始标准<br/>Same to initial value.</td></tr></table> <div>2.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.</div> | 类别<br>classification<br>项目<br>Item                                                                                                                                                                                                                                                                                                                                                                                                                                      | NPO<br>(C0G、C0H) | X7R/X5<br>R/X7S/X6S | ΔC/C | ≤±0.5% | -5%~+10% | DF | 同初始标准<br>Same to initial value. |  | IR | 同初始标准<br>Same to initial value. |  | <div>初始测量前（仅限Ⅱ类）：预处理*<br/>将电容在 100~200℃的温度下预热 2±0.5 分钟。<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/>（ 1210 及以上规格采用回流焊试验）</div> <div>Before the initial measurement (only for class II):Note1<br/>Preheating conditions: 100 to 200℃; 2±0.5min.<br/>Solder Temperature: 265±5℃<br/>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<br/>（ 1210 and Above：Reflow Soldering）</div> |
| 类别<br>classification<br>项目<br>Item | NPO<br>(C0G、C0H)                                                  | X7R/X5<br>R/X7S/X6S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                     |      |        |          |    |                                 |  |    |                                 |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| ΔC/C                               | ≤±0.5%                                                            | -5%~+10%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                     |      |        |          |    |                                 |  |    |                                 |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| DF                                 | 同初始标准<br>Same to initial value.                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                     |      |        |          |    |                                 |  |    |                                 |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| IR                                 | 同初始标准<br>Same to initial value.                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                     |      |        |          |    |                                 |  |    |                                 |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 10                                 | 抗弯曲强度<br>Resistance to Flexure of Substrate<br>(Bending Strength) | <div>1、ΔC/C： ≤±10%；</div> <div>2、外观: 无可见损伤。<br/>Appearance: No visible damage.</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <div>初始测量前（仅限Ⅱ类）：预处理*<br/>试验基板：PCB      厚度      : 1.6±0.2mm<br/>弯曲      :1mm      施压速度      : 1mm/sec.<br/>保持时间：5±1s，然后测量。</div> <div>单位 Unit：mm</div> <div></div> <div>Before the initial measurement (only for class II):Note1<br/>Test Board: PCB    Thickness    : 1.6±0.2mm<br/>Flexure    :1mm.    Holding time: 5±1s<br/>Pressurization Speed : 1mm/sec. Then measure.</div> |                  |                     |      |        |          |    |                                 |  |    |                                 |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



# 四川华瓷科技有限公司

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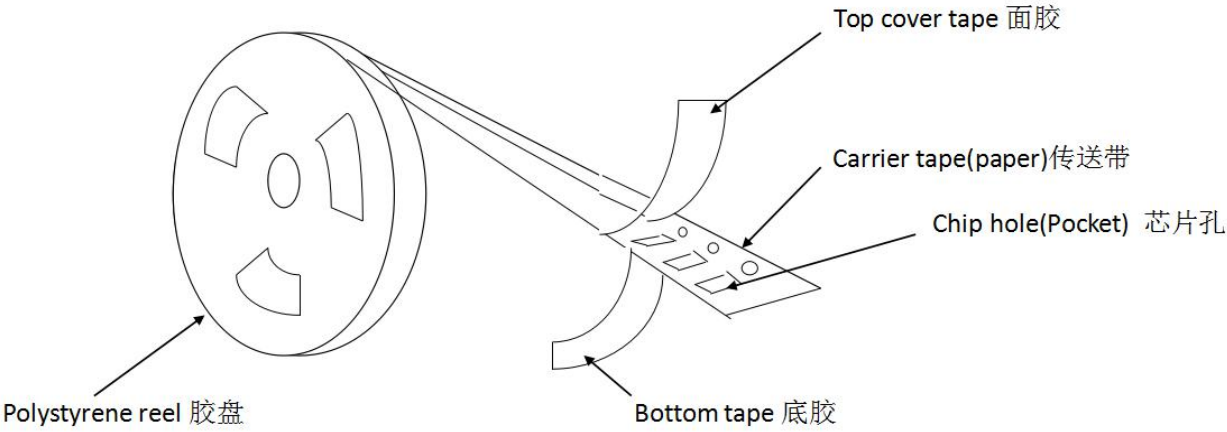
| 编号<br>No.                                                                                                                                                                                                                | 项目<br>Item                                                                      | 技术要求<br>Technical requirements                                                                                                                                                   |                                                                                                                                                                                                                                                      | 测 试 方 法<br>Test Method and Remarks                                                                                                                                                                                                                                                                                                             |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------|------------------------|---------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----------|--------|-------|--------------|----|-------|-------------|-------|-------|-----------------------------------------------------------------|----|-------|-------------|-------|------|--------------------|------------|---|---------------------------|----|---|--------------------|-------|---|---------------------------------------------------------------------------------|----|---|--------------------|-------|
| 11                                                                                                                                                                                                                       | 潮湿<br>试验<br>( 稳态 )<br>Moisture<br>Resistance<br>( Steady<br>State )             | ΔC/C                                                                                                                                                                             | I 类: (C0G,C0H);≤±2%或±1pF,<br>取两者之中较大者<br>II 类: (X7R,X5R,X7S,X6S): ≤±10%<br>Class I : (C0G,C0H);≤±2% or ±1pF,<br>whichever is larger.<br>Class II :( X7R,X5R,X7S,X6S): ≤±10%                                                                          | 试验前和试验后 ( 仅限 II 类 ): 预处理*<br>温度 : 40±2℃<br>湿度 : 90%~95%RH<br>时间 : 500 小时<br>放置时间 : 24±2 小时 , 放置条件 : 室温 , 然后测试。<br><br>Pre-test treatment and Post-test treatment<br>(only for class II):Note1<br>Temperature: 40±2℃<br>Humidity: 90%~95%RH<br>Duration: 500h<br>Recovery Time: 24±2h , Recovery condition: Room<br>temperature , then measure. |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
|                                                                                                                                                                                                                          |                                                                                 | DF                                                                                                                                                                               | ≤2 倍初始标准<br>Not more than twice of initial value.                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
|                                                                                                                                                                                                                          |                                                                                 | IR                                                                                                                                                                               | I 类 : (C0G,C0H);Ri≥2500MΩ 或<br>Ri•CR≥25S 取两者之中较小者.<br>Class I :(C0G,C0H); Ri≥2500MΩ 或<br>Ri•CR≥25S whichever is smaller.<br>II 类 : Ri≥1000MΩ或 Ri•CR≥25S 取两者之<br>中较小者.<br>Class II :(X7R,X5R,X7S,X6S); Ri≥1000MΩ<br>或 Ri•CR≥25S whichever is smaller. |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
|                                                                                                                                                                                                                          |                                                                                 |                                                                                                                                                                                  | 外观<br>Appear<br>ance                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                | 无损伤<br>No visible damage.           |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 12                                                                                                                                                                                                                       | 温度循环<br>Temperature<br>Cycle                                                    | <table><tr><td>类别</td><td>ΔC/C 标准</td></tr><tr><td>I 类<br/>(C0G,C0H)</td><td>≤±1%或±1pF ,<br/>取两者中最大者</td></tr><tr><td>II 类<br/>(X7R,X5R,X7S,X6S)</td><td>≤±10%</td></tr></table> |                                                                                                                                                                                                                                                      | 类别                                                                                                                                                                                                                                                                                                                                             | ΔC/C 标准                             | I 类<br>(C0G,C0H)               | ≤±1%或±1pF ,<br>取两者中最大者 | II 类<br>(X7R,X5R,X7S,X6S) | ≤±10% | 1.预处理* ( II 类 )<br>2.初始测量 :循环次数 :5 次,一个循环分以下 4 步 : <table><tr><td>阶段</td><td>温度 ( °C )</td><td>时间(分钟)</td></tr><tr><td>第 1 步</td><td>下限温度 : (-55)</td><td>30</td></tr><tr><td>第 2 步</td><td>常 温 : (+20)</td><td>2 ~ 3</td></tr><tr><td>第 3 步</td><td>上限温度 : (C0G、C0H、<br/>X7R、X7S :+125 )、(X5R :<br/>+85)、(X6S : +105)</td><td>30</td></tr><tr><td>第 4 步</td><td>常 温 : (+20)</td><td>2 ~ 3</td></tr></table><br>3.放置时间 : 24±2 小时 , 放置条件 : 室温 , 然后<br>测试。<br>1. Pretreatment (only for class2 capacitor): Note1.<br>2.Initial Measurement : Cycling Times: 5 times, 1<br>cycle, 4 steps: <table><tr><td>Step</td><td>Temperature ( °C )</td><td>ime (min.)</td></tr><tr><td>1</td><td>Low- category temp. (-55)</td><td>30</td></tr><tr><td>2</td><td>Normal temp. (+20)</td><td>2 ~ 3</td></tr><tr><td>3</td><td>Up- category temp :( C0G、C0H、 X7R、<br/>X7S : +125 )、(X5R : +85)、<br/>(X6S : +105)</td><td>30</td></tr><tr><td>4</td><td>Normal temp. (+20)</td><td>2 ~ 3</td></tr></table><br>3.Recovery Time: 24±2h ,Recovery condition: Room<br>temperature , then measure. | 阶段 | 温度 ( °C ) | 时间(分钟) | 第 1 步 | 下限温度 : (-55) | 30 | 第 2 步 | 常 温 : (+20) | 2 ~ 3 | 第 3 步 | 上限温度 : (C0G、C0H、<br>X7R、X7S :+125 )、(X5R :<br>+85)、(X6S : +105) | 30 | 第 4 步 | 常 温 : (+20) | 2 ~ 3 | Step | Temperature ( °C ) | ime (min.) | 1 | Low- category temp. (-55) | 30 | 2 | Normal temp. (+20) | 2 ~ 3 | 3 | Up- category temp :( C0G、C0H、 X7R、<br>X7S : +125 )、(X5R : +85)、<br>(X6S : +105) | 30 | 4 | Normal temp. (+20) | 2 ~ 3 |
|                                                                                                                                                                                                                          |                                                                                 | 类别                                                                                                                                                                               | ΔC/C 标准                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
|                                                                                                                                                                                                                          |                                                                                 | I 类<br>(C0G,C0H)                                                                                                                                                                 | ≤±1%或±1pF ,<br>取两者中最大者                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
|                                                                                                                                                                                                                          |                                                                                 | II 类<br>(X7R,X5R,X7S,X6S)                                                                                                                                                        | ≤±10%                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 阶段                                                                                                                                                                                                                       | 温度 ( °C )                                                                       | 时间(分钟)                                                                                                                                                                           |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 第 1 步                                                                                                                                                                                                                    | 下限温度 : (-55)                                                                    | 30                                                                                                                                                                               |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 第 2 步                                                                                                                                                                                                                    | 常 温 : (+20)                                                                     | 2 ~ 3                                                                                                                                                                            |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 第 3 步                                                                                                                                                                                                                    | 上限温度 : (C0G、C0H、<br>X7R、X7S :+125 )、(X5R :<br>+85)、(X6S : +105)                 | 30                                                                                                                                                                               |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 第 4 步                                                                                                                                                                                                                    | 常 温 : (+20)                                                                     | 2 ~ 3                                                                                                                                                                            |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| Step                                                                                                                                                                                                                     | Temperature ( °C )                                                              | ime (min.)                                                                                                                                                                       |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 1                                                                                                                                                                                                                        | Low- category temp. (-55)                                                       | 30                                                                                                                                                                               |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 2                                                                                                                                                                                                                        | Normal temp. (+20)                                                              | 2 ~ 3                                                                                                                                                                            |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 3                                                                                                                                                                                                                        | Up- category temp :( C0G、C0H、 X7R、<br>X7S : +125 )、(X5R : +85)、<br>(X6S : +105) | 30                                                                                                                                                                               |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| 4                                                                                                                                                                                                                        | Normal temp. (+20)                                                              | 2 ~ 3                                                                                                                                                                            |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| <table><tr><td>classification</td><td>ΔC/C standard</td></tr><tr><td>Class I<br/>(C0G,C0H)</td><td>≤±1% or ±1pF,<br/>whichever is large</td></tr><tr><td>Class II (X7R,X5R,<br/>X7S,X6S)</td><td>≤±10%</td></tr></table> |                                                                                 | classification                                                                                                                                                                   | ΔC/C standard                                                                                                                                                                                                                                        | Class I<br>(C0G,C0H)                                                                                                                                                                                                                                                                                                                           | ≤±1% or ±1pF,<br>whichever is large | Class II (X7R,X5R,<br>X7S,X6S) | ≤±10%                  |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| classification                                                                                                                                                                                                           | ΔC/C standard                                                                   |                                                                                                                                                                                  |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| Class I<br>(C0G,C0H)                                                                                                                                                                                                     | ≤±1% or ±1pF,<br>whichever is large                                             |                                                                                                                                                                                  |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
| Class II (X7R,X5R,<br>X7S,X6S)                                                                                                                                                                                           | ≤±10%                                                                           |                                                                                                                                                                                  |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |
|                                                                                                                                                                                                                          |                                                                                 |                                                                                                                                                                                  |                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                |                                     |                                |                        |                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |           |        |       |              |    |       |             |       |       |                                                                 |    |       |             |       |      |                    |            |   |                           |    |   |                    |       |   |                                                                                 |    |   |                    |       |

| <div><div><div>CHINOCERA</div></div><div>四川华瓷科技有限公司</div><div>第 12 页 共 21 页</div></div>                                                                                                                                                                                                                                                                                                                   |                   |                           |                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 编号<br>No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 项目<br>Item        |                           | 技术要求<br>Technical requirements                                                                                                                                                                                                      | 测试方法<br>Test Method and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 耐久性<br>Durability | $\Delta C/C$              | I 类 : (C0G,C0H); $\leq\pm 2\%$ 或 $\pm 1pF$<br>取两者之中较大者<br>II 类 : (X7R,X5R,X7S,X6S): $\leq\pm 20\%$<br><br>Class I : (C0G,C0H); $\leq\pm 2\%$ or $\pm 1pF$ ,<br>whichever is larger.<br>Class II : (X7R,X5R,X7S,X6S): $\leq\pm 20\%$ | 试验前和试验后 ( 仅限 II 类 ): 预处理*<br>低压产品 ( < 100V )<br>电压 : 1.5 倍额定工作电压<br>时间 : 1000 小时<br>温度 : 125℃ ( C0G、C0H、X7R、X7S ) ;<br>85℃ ( X5R ) ; 105℃ ( X6S )<br><br>充电电流 : 不应超过 50mA<br>放置时间 : 24 $\pm$ 2 小时 , 放置条件 : 室温 , 然后测试。<br><br>Pre-test treatment and Post-test treatment (only for class II):Note1<br>Low-voltage ( < 100V )<br>Applied Voltage: 1.5 $\times$ Rated Voltage<br>Duration: 1000h<br>Temperature : 125℃ ( C0G、C0H、X7R、X7S ) ;<br>85℃ ( X5R ) ; 105℃ ( X6S )<br>Charge/ Discharge Current: 50mA max.<br>Recovery Time: 24 $\pm$ 2h , Recovery condition: Room temperature , then measure. |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   | DF                        | $\leq 2$ 倍初始标准<br>Not more than twice of initial value.                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   | IR                        | I 类 : (C0G,C0H); $R_i\geq 4000M\Omega$ 或 $R_i\cdot C_R\geq 40S$<br>取两者之中较小者.<br><br>Class I : (C0G,C0H); $R_i\geq 4000M\Omega$ 或 $R_i\cdot C_R\geq 40S$ whichever is smaller.                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                   |                           | II 类 : (X7R,X5R,X7S,X6S) $R_i\geq 2000M\Omega$ 或 $R_i\cdot C_R\geq 50S$ 取两者之中较小者.<br><br>Class II : (X7R,X5R,X7S,X6S) $R_i\geq 2000M\Omega$ 或 $R_i\cdot C_R\geq 50S$ whichever is smaller.                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 外观<br>Appearance  | 无损伤<br>No visible damage. |                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 备注(Remark) :<br>1、预处理* ( 仅对 2 类电容器 ) :<br>将电容器放在上限类别温度或按详细规范中可能规定的更高温度( 150℃ )下经 1h 后 接着在试验的标准大气条件下恢复 24 $\pm$ 1h。<br>Note1 : Pretreatment (only for class2 capacitor)<br>Pretreatment (only for class2 capacitor) is a method to treat the capacitor before measurement. First, place the capacitor in the up-category temperature or other specified higher temperature environment( 150℃ ) for 1hour. Then recovery the capacitor at standard pressure conditions for 24 $\pm$ 1hours. |                   |                           |                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

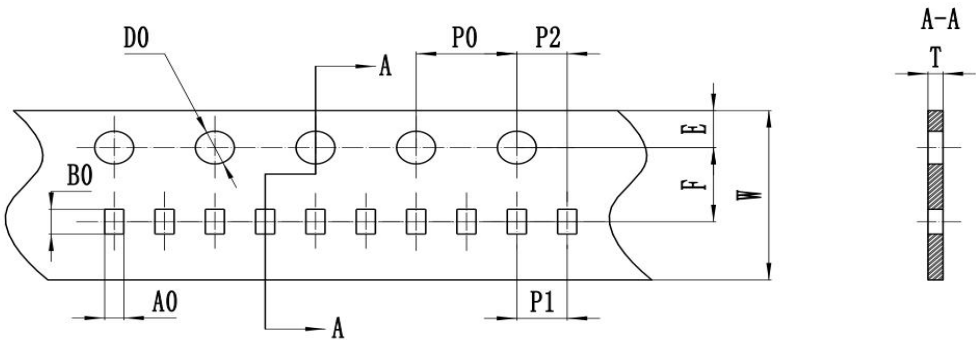


10、包装 PACKAGE

10-1 纸带卷盘结构 PAPER TAPING



10-1-1 0201、0402 纸带编带尺寸大小。 Dimensions of paper taping for 0201、0402 type。



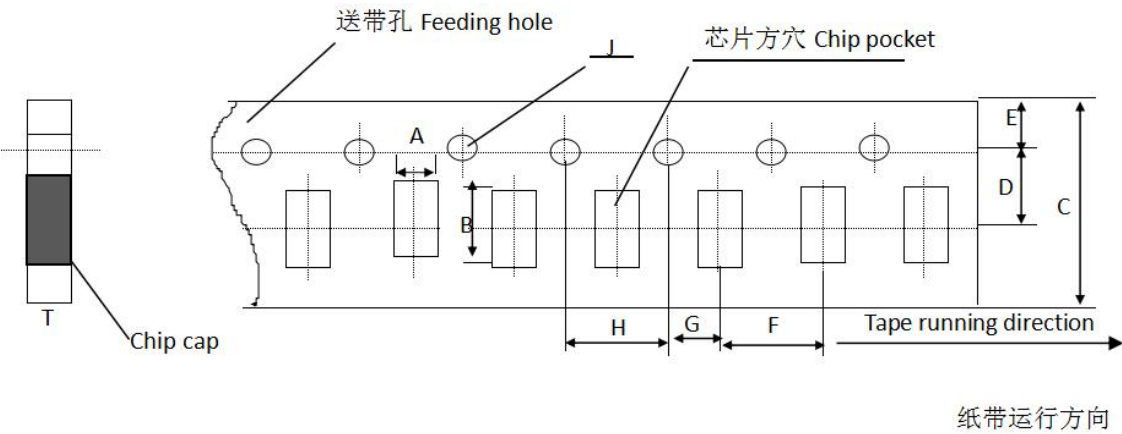
单位 Unit: mm

| 代号<br>Code | A0            | B0            | W             | F*            | E             | P1            | P2*           | P0            | D0               | T             |
|------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|------------------|---------------|
| 0201       | 0.37±<br>0.10 | 0.67±0.<br>10 | 8.00±<br>0.10 | 3.50±<br>0.05 | 1.75±<br>0.10 | 2.00±<br>0.05 | 2.00±<br>0.05 | 4.00±0<br>.10 | 1.50<br>-0/+0.10 | 0.80<br>Below |
| 0402       | 0.65±<br>0.10 | 1.15±<br>0.10 | 8.00±<br>0.10 | 3.50±<br>0.05 | 1.75±<br>0.10 | 2.00±<br>0.05 | 2.00±<br>0.05 | 4.00±0<br>.10 | 1.50<br>-0/+0.10 | 0.80<br>Below |

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.



10-1-2 0603 , 0805 , 1206 , 常规尺寸产品的纸带尺寸。  
Dimensions of paper taping for 0603 , 0805 , 1206 types.

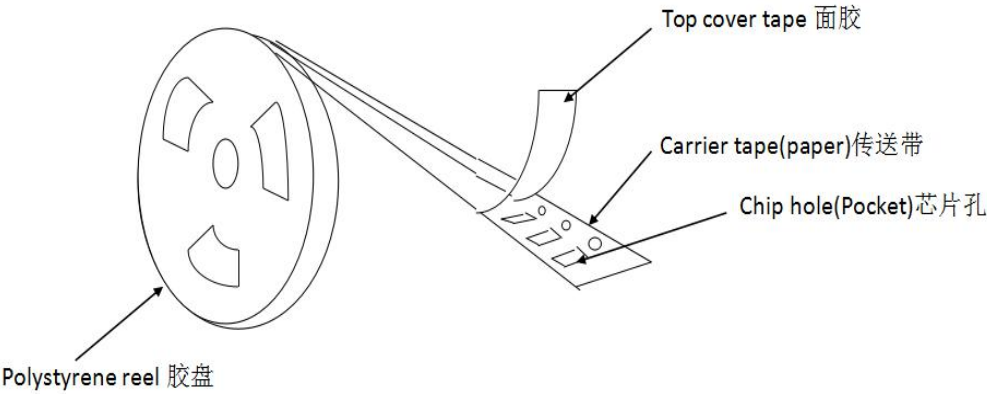


单位 Unit: mm

| 代号Code<br>纸带规格<br>papersize | A             | B             | C             | D*            | E             | F             | G*            | H             | J                | T           |
|-----------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|------------------|-------------|
| 0603                        | 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 | 1.50<br>-0/+0.10 | 1.10<br>Max |
| 0805                        | 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 | 1.50<br>-0/+0.10 | 1.10<br>Max |
| 1206                        | 1.80<br>±0.20 | 3.40<br>±0.20 | 8.00<br>±0.20 | 3.50<br>±0.05 | 1.75<br>±0.10 | 4.00<br>±0.10 | 2.00<br>±0.10 | 4.00<br>±0.10 | 1.50<br>-0/+0.10 | 1.10<br>Max |

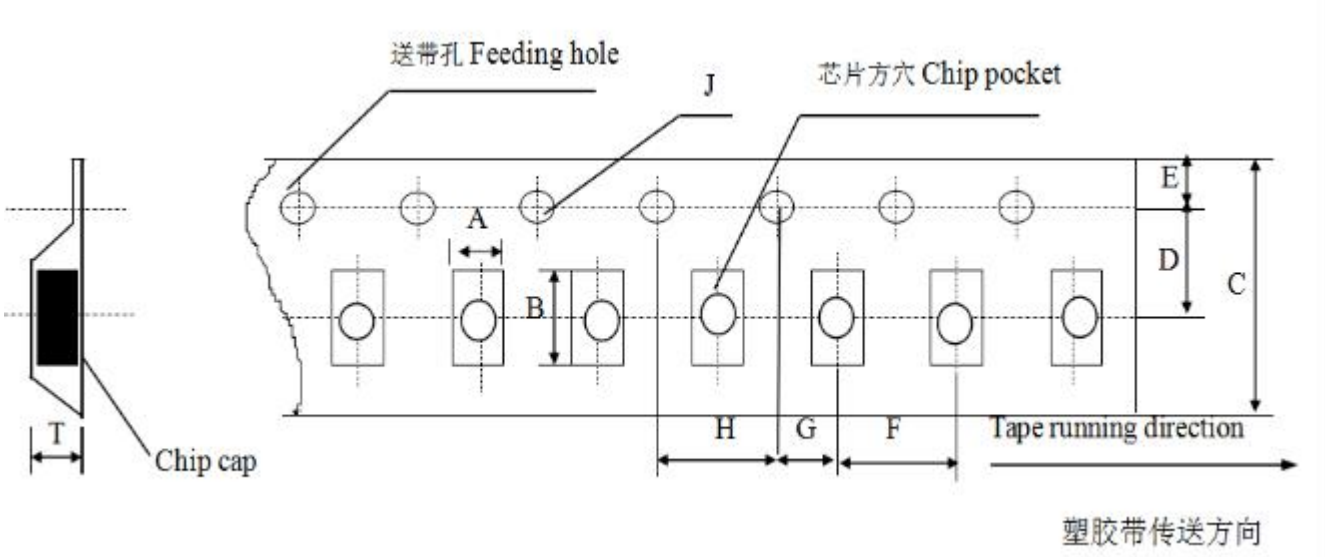
注意：\*表示此处对尺寸的要求非常精确。 Note: The place with “\*” means where needs exactly dimensions.

10-2 塑胶卷盘结构 EMBOSED TAPING





10-2-1 塑胶带尺寸结构 (适合‘0805~1812’型产品)。  
Dimensions of embossed tapping for 0805~1812 type.

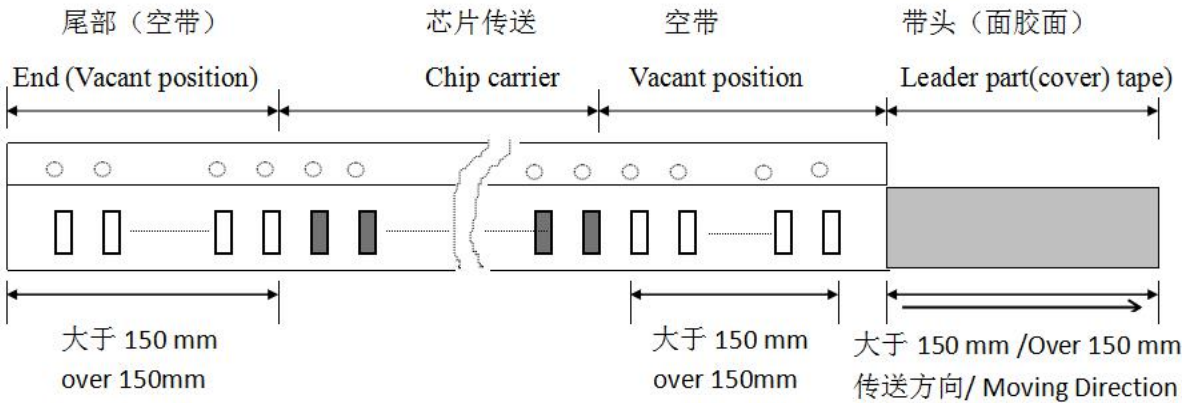


Unit: mm

| 代号<br>Code<br>规格<br>Tape size | A              | B              | C              | D*             | E              | F              | G*             | H              | J                | T           |
|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|-------------|
| 0805                          | 1.55<br>± 0.20 | 2.35<br>± 0.20 | 8.00<br>± 0.20 | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.10 | 4.00<br>± 0.10 | 1.50<br>-0/+0.10 | 1.50<br>Max |
| 1206                          | 1.95<br>± 0.20 | 3.60<br>± 0.20 | 8.00<br>± 0.20 | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.10 | 4.00<br>± 0.1  | 1.50<br>-0/+0.10 | 1.85<br>Max |
| 1210                          | 2.70<br>± 0.10 | 3.42<br>± 0.10 | 8.00<br>± 0.10 | 3.50<br>± 0.05 | 1.75<br>± 0.10 | 4.00<br>± 0.10 | 2.00<br>± 0.05 | 4.00<br>± 0.10 | 1.55<br>-0/+0.10 | 3.2<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 dimensions.

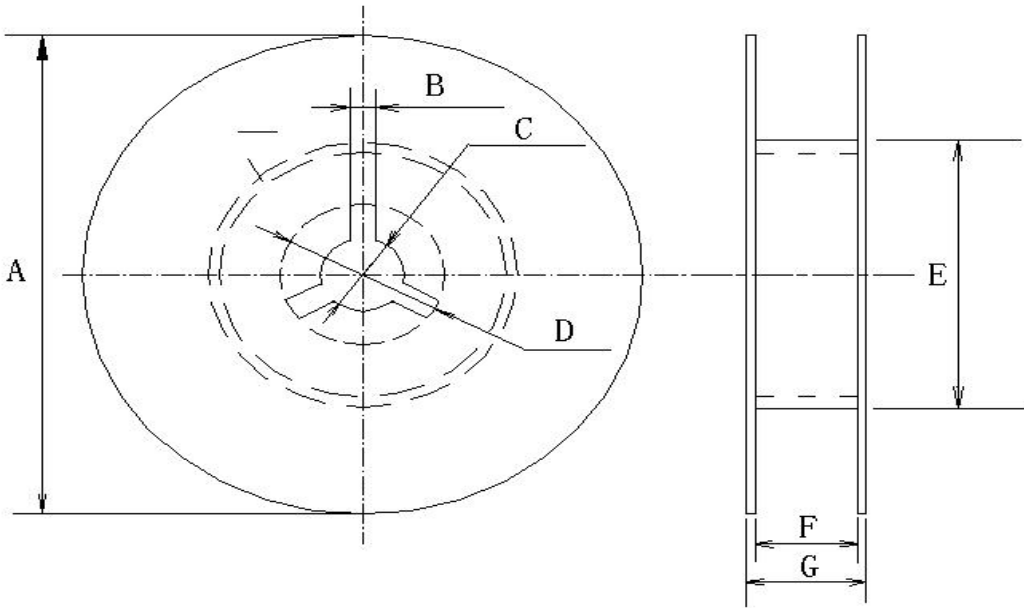
10-3 传送带的前后结构      Structure of leader part and end part of the carrier paper





10-3-1 卷盘尺寸 Reel Dimensions

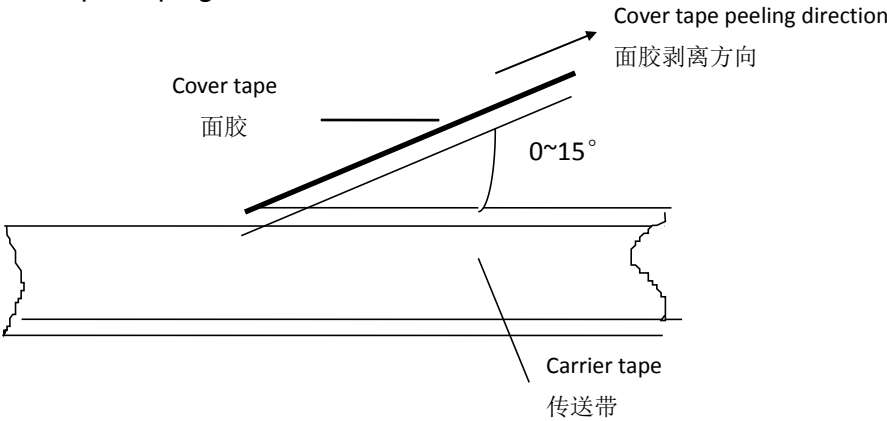
| 尺寸代码 ( CODE ) |                    |     |                   |                   | Unit : mm                          |                |         |
|---------------|--------------------|-----|-------------------|-------------------|------------------------------------|----------------|---------|
| 卷盘型号          | A                  | B   | C                 | D                 | E                                  | F              | G       |
| 8mm/7REEL     | $\phi 178 \pm 2.0$ | 3.0 | $\phi 13 \pm 0.5$ | $\phi 21 \pm 0.8$ | $\phi 50$ 或更大<br>$\phi 50$ or more | $100 \pm 1.5$  | 14.4max |
| 13'REEL       | $\phi 330 \pm 2.0$ | 3.0 | $\phi 13 \pm 0.5$ | $\phi 21 \pm 0.8$ | $\phi 50$ 或更大<br>$\phi 50$ or more | $100 \pm 1.5$  | 14.4max |
| 12mm/7REEL    | $\phi 178 \pm 2.0$ | 3.0 | $\phi 13 \pm 0.5$ | $\phi 21 \pm 0.8$ | $\phi 50$ 或更大<br>$\phi 50$ or more | $13.4 \pm 1.5$ | 18.4max |



10-4 卷带的说明 Taping specification

面胶剥离强度 Top tape peeling strength

(a) 纸带 Paper Taping



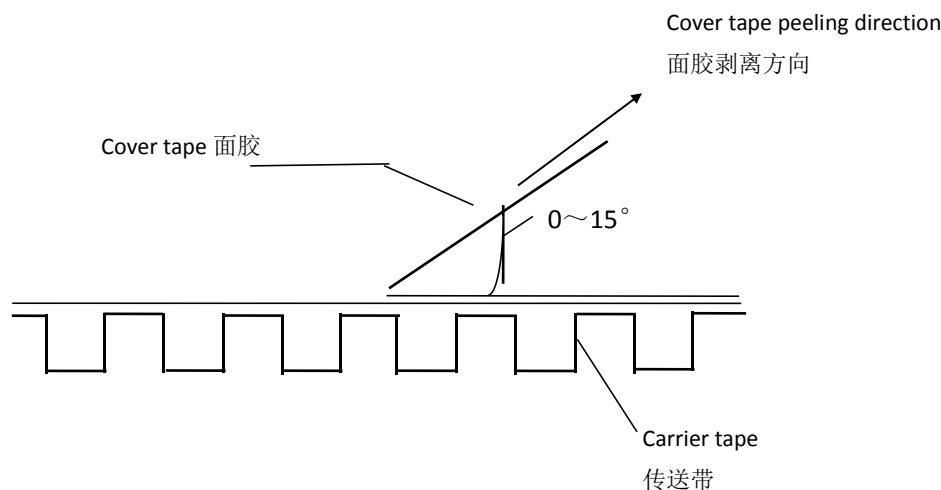
标准：0.1N<剥离强度<0.7N。 Standard: 0.1N < peeling strength < 0.7N

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.

(b) 塑料胶盘 Embossed Taping



标准：0.1N<剥离强度<0.7N。 Standard: 0.1N < peeling strength < 0.7N

## 11、储存方法 Storage Methods

确保芯片可焊性良好的贮存期限为 6 个月(在包装好已交付的情况下)。

The guaranteed period for solderability is 6 months (Under deliver package condition).

储存条件/Storage conditions：

储存温度/Temperature 5℃~40℃

储存相对湿度/Relative Humidity 20%~70%

## 12、使用前的注意事项 Precautions For Use

多层片式瓷介电容器(MLCC)在短路或开路的电路中都有可能失效,在超出本承认书或相关说明书中所述使用频率的恶劣工作环境,或外界机械力超压作用下,电容芯片都有可能着火、燃烧甚至爆炸,所以在使用的時候,首先应考虑按本承认书的有关说明来进行,如有不明之处,请联系我们技术部门。

The Multi-layer Ceramic Capacitors (MLCC) may fail in a short circuit mode or in an open circuit mode when subjected to severe conditions of electrical environment and / or mechanical stress beyond the specified “rating” and specified “conditions” in the specification, which will result in burn out, flaming or glowing in the worst case. Following “precautions for “safety” and Application Notes shall be taken in your major consideration. If you have a question about the precautions for handling, please contact our engineering section or factory.

### 12-1 焊接的条件与相关图表 Soldering 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).



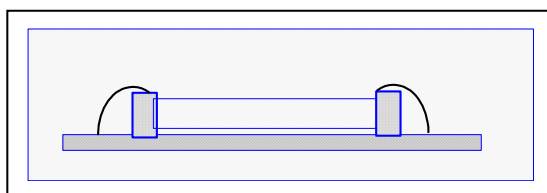
## 12-2 手工焊接 Manual Soldering

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.

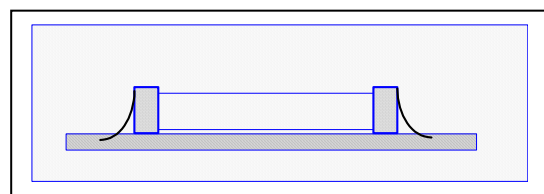
## 12-3 适量的焊料 Optimum Solder Amount for Reflow Soldering

焊料过多  
Too much solder



这样会因端头压力过大而  
可能引起芯片受损  
Cracks tend to occur due to large stress.

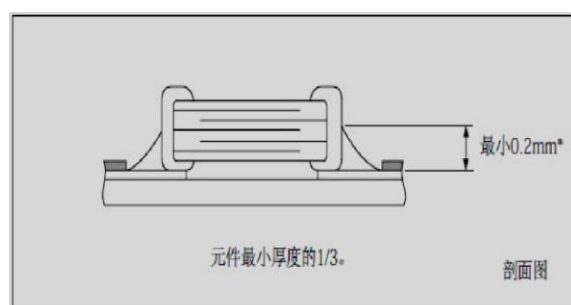
焊料太少  
Not enough solder



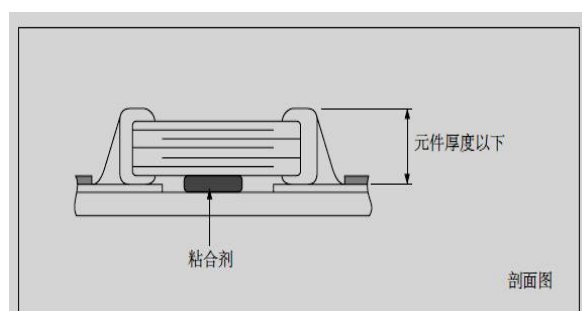
固定力量不足,可能会引起  
电容芯片与线路接触不良  
Weak holding force may cause bad connection  
between the capacitor and PCB.

## 12-4 推荐焊料用量 Recommended Soldering amounts

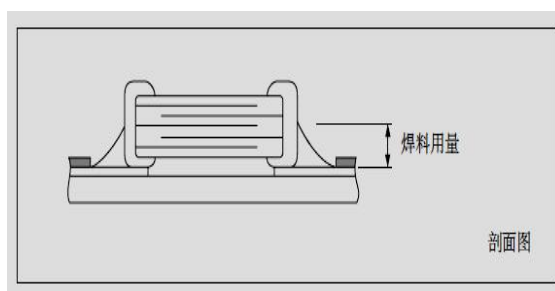
回流焊接的最佳焊料用量  
The optimal solder fillet amounts  
for re-flow soldering



波峰焊接的最佳焊料用量  
The optimal solder fillet amounts  
for wave soldering



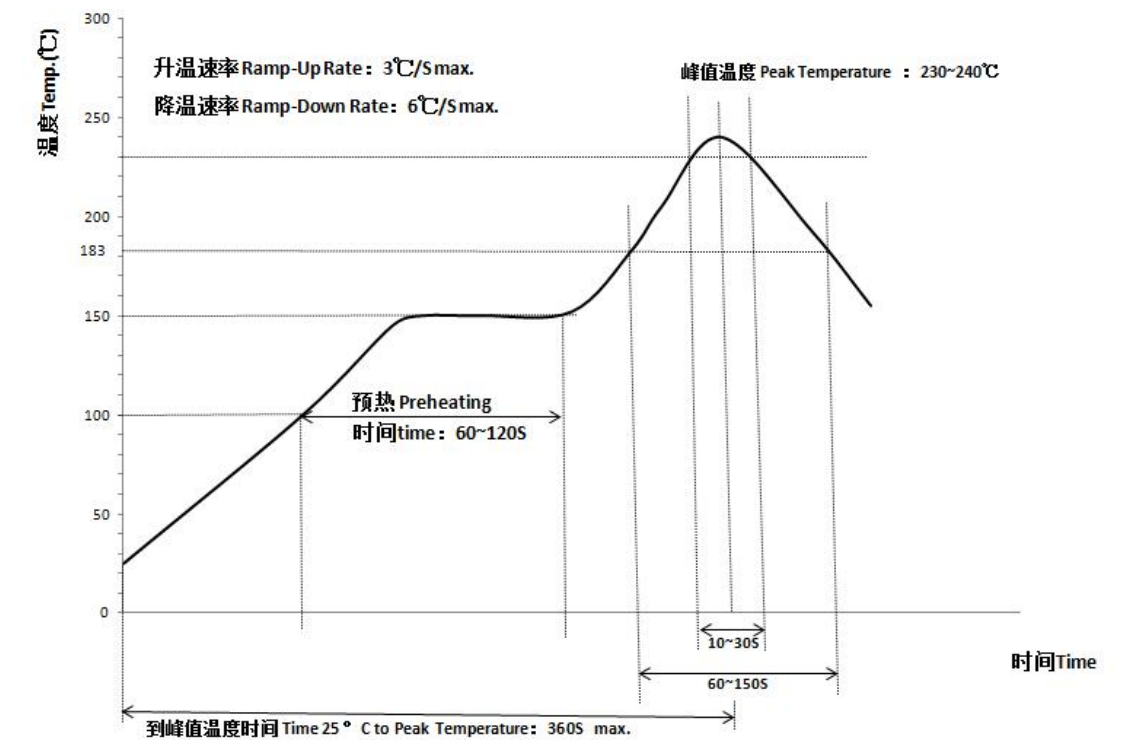
使用烙铁返修时的最佳焊料量  
The optimal solder fillet amounts for rewor



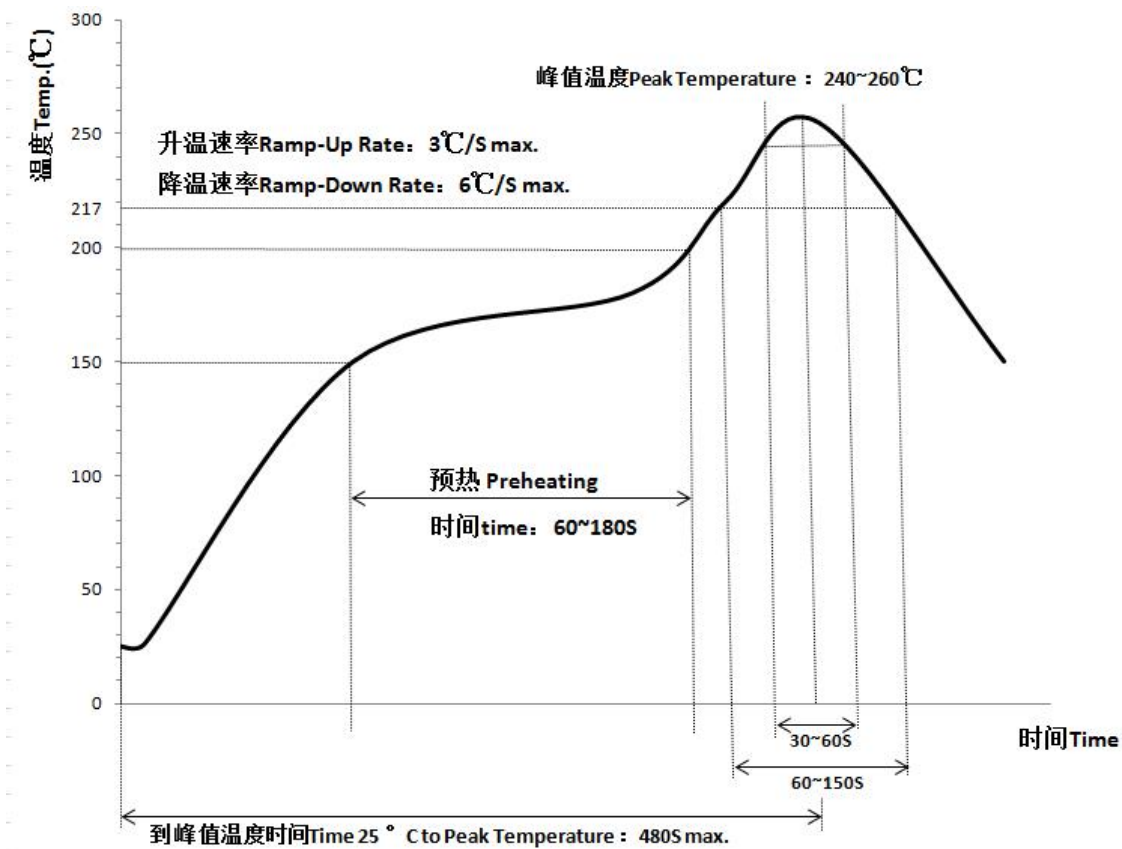


12-5 推荐焊接温度曲线图    The temperature profile for soldering

12-5-1 回流焊接 ( Reflow soldering )



有铅回流焊曲线    SnPb    Reflow soldering    profile



无铅回流焊曲线    Lead-free    Reflow soldering    profile

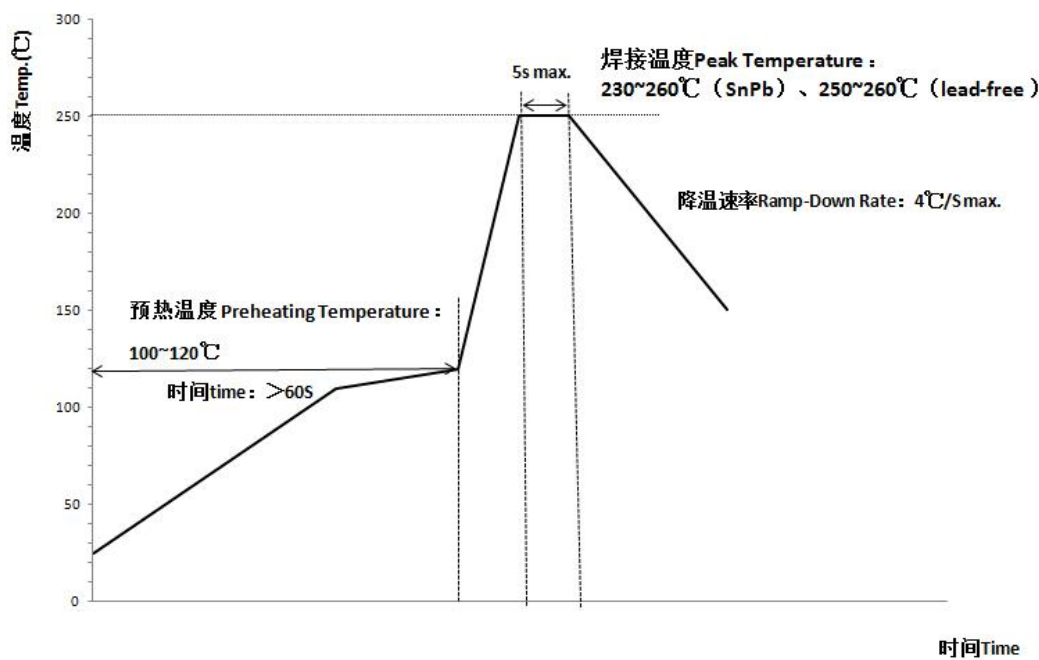


在预热时，需尽可能缩小焊接温度与芯片表面温度之间的温差，如表 1 所示。  
While in preheating, it is required to keep the temperature differential( $\Delta T$ ) between soldering temperature and the components surface as small as possible , shown in the table 1.

表 1 ( table 1 )

| 类型 type                                    | 温差 Temperature differential $\Delta T$ |
|--------------------------------------------|----------------------------------------|
| HGC0201/HGC0402/ HGC0603/ HGC0805/ HGC1206 | $\Delta T \leq 150^{\circ}\text{C}$    |
| HGC1210                                    | $\Delta T \leq 130^{\circ}\text{C}$    |

12-5-2 波峰焊接 ( Wave soldering )



波峰焊曲线 Wave soldering profile

在预热时，需尽可能缩小焊接温度与芯片表面温度之间的温差，如表 2 所示。  
While in preheating, it is required to keep the temperature differential( $\Delta T$ ) between soldering temperature and the components surface as small as possible , shown in the table 2.

表 2 table 2

| 类型 type                   | 温差 Temperature differential $\Delta T$ |
|---------------------------|----------------------------------------|
| HGC0603/ HGC0805/ HGC1206 | $\Delta T \leq 150^{\circ}\text{C}$    |



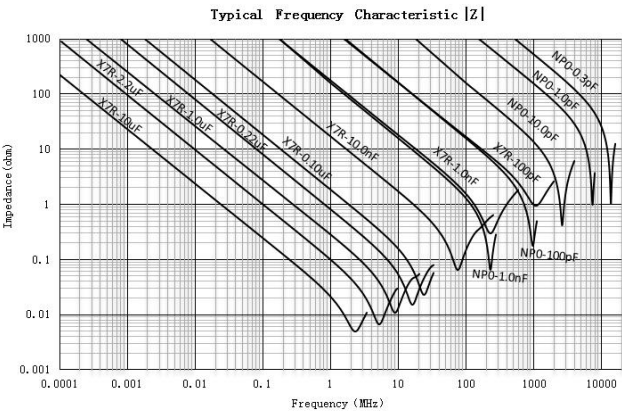
12-5-3 手工焊接 ( Hand soldering )

条件 Conditions :

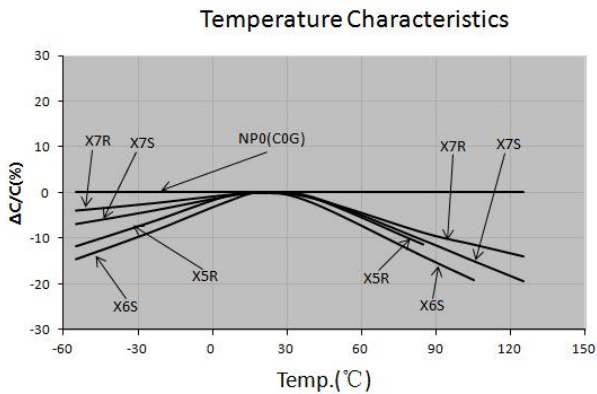
| 预热<br>Preheating                  | 烙铁头温度<br>Temperature of<br>soldering iron head | 烙铁功率<br>Power<br>Of soldering iron | 烙铁头直径<br>Diameter of<br>soldering iron head | 焊接时间<br>Soldering<br>time     | 锡膏量<br>Solder paste<br>amount                   | 限制条件<br>Restricted conditions                                                                                      |
|-----------------------------------|------------------------------------------------|------------------------------------|---------------------------------------------|-------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| $\Delta \leq 130^{\circ}\text{C}$ | 最高 350℃<br>Highest<br>temperature:350℃         | 最大 20W<br>20W at the<br>highest    | 建议 1mm<br>1mm 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<br>接触陶瓷元件<br>Please avoid the derect<br>contact between<br>soldering iron head and<br>ceramic components |

13、典型的特性数据曲线图 Typical characteristic data graph

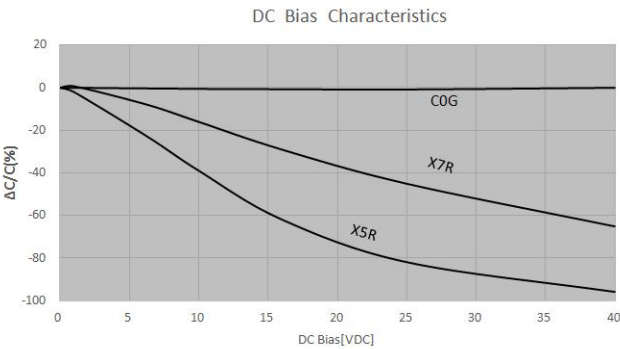
1、|Z|-频率特性曲线 |Z| - Frequency Characteristics



2、温度特性 Temperature Characteristics



3、直流偏压特性 DC Bias Characteristics



注：以上产品特性仅供参考。

Note: The above product characteristics are for reference only.

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[NMC0805X7R224K16TRPLPF](#) [NMC0805X7R224K25TRPF](#) [NMC1206X7R102K50TRPF](#) [NMC1206X7R475K10TRPLPF](#) [NMC-](#)  
[Q0402NPO8R2D200TRPF](#) [C1206C101J1GAC](#) [C1608C0G2A221J](#) [C1608X7R1E334K](#) [C2012C0G2A472J](#) [2220J2K00562KXT](#)  
[1812J2K00332KXT](#) [CDR04BX104AKSR](#) [CDR31BX103AKWR](#) [CDR33BX104AKUR](#) [CDR33BX683AKUS](#) [CGA2B2C0G1H010C](#)  
[CGA2B2C0G1H040C](#) [CGA2B2C0G1H050C](#) [CGA2B2C0G1H060D](#) [CGA2B2C0G1H070D](#) [CGA2B2C0G1H120J](#) [CGA2B2C0G1H151J](#)  
[CGA2B2C0G1H1R5C](#) [CGA2B2C0G1H2R2C](#) [CGA2B2C0G1H390J](#) [CGA2B2C0G1H391J](#) [CGA2B2C0G1H3R3C](#) [CGA2B2C0G1H680J](#)  
[CGA2B2C0G1H6R8D](#) [CGA2B2C0G1H820J](#) [CGA2B2X8R1H152K](#) [CGA2B2X8R1H221K](#)