

# 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: X2Y 滤波器和去耦电容器

SERIES: X2Y FILTER & DECOUPLING CAPACITORS

规 格: 0603 ~ 1812 尺寸

SPECIFICATION: 0603 ~ 1812 Size

供 应 商 (SUPPLIER) : 利和兴电子元件(江门)有限公司

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批 准 (APPROVED BY) :

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## 一、概述 GENERAL INTRODUCTION

X2Y 滤波电容器采用独特的低电感设计，具有两个平衡电容器，不受温度、电压和老化性能差异的影响。

这些元件具有卓越的去耦和 EMI 滤波性能，几乎消除了寄生效应，并可以取代多个电容器和电感器，节省了板空间，降低了组装成本。

The X2Y filter capacitor adopts a unique low inductance design with two balanced capacitors, which are not affected by temperature, voltage, and aging performance differences.

These components have excellent decoupling and EMI filtering performance, almost eliminating parasitic effects, and can replace multiple capacitors and inductors, saving board space and reducing assembly costs.

## 二、特点 FEATURES

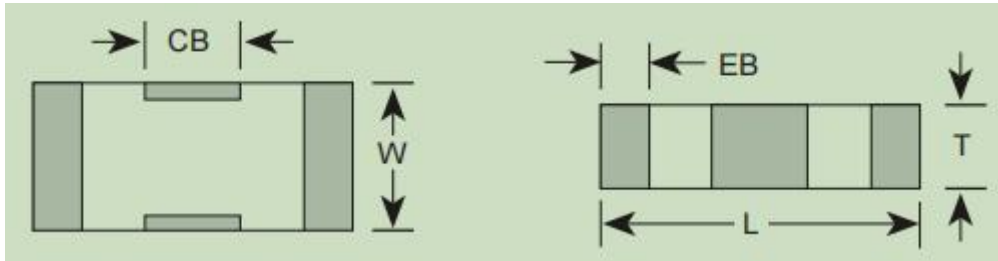
- a、一个用于 EMI 抑制或去耦的设备。One device for EMI suppression or decoupling.
- b、用一个 X2Y 最多更换 7 个部件。Replace up to 7 components with one X2Y.
- c、差模和共模衰减。Differential and common mode attenuation.
- d、匹配电容线路对地，两条线路。Matched capacitance line to ground, both lines.
- e、由于抵消效应，电感较低。Low inductance due to cancellation effect.

## 三、应用领域 APPLICATIONS

- a、放大器滤波器和去耦。Amplifier Filter & Decoupling.
- b、高速数据过滤。High Speed Data Filtering.
- c、EMC I/O 筛选。EMC I/O Filtering.
- d、FPGA/AASIC/ $\mu$ -P 去耦。FPGA / ASIC /  $\mu$ -P Decoupling.
- e、DDR 内存解耦。DDR Memory Decoupling.

## 四、产品外围尺寸与结构 EXTERNAL DIMENSIONS AND STRUCTURE

### 1、产品外围尺寸 Product peripheral dimension



型号 Type		尺寸 Dimensions (mm)				
英制表示 British expression	公制表示 Metric expression	L	W	T	EB	CB
0603	1608	1.60±0.10	0.80±0.10	Max0.65	0.25±0.15	0.45±0.10
0805	2012	2.00±0.20	1.20±0.20	Max1.00	0.30±0.20	0.55±0.15
1206	3216	3.20±0.20	1.60±0.20	Max1.30	0.40±0.25	1.00±0.15
1210	3225	3.20±0.20	2.50±0.30	Max1.75	0.45±0.25	1.10±0.15
1410	3525	3.50±0.25	2.50±0.30	Max1.75	0.45±0.25	1.10±0.15
1812	4532	4.50±0.25	3.20±0.30	Max2.30	0.55±0.25	1.10±0.15

### 2、产品结构 Structure

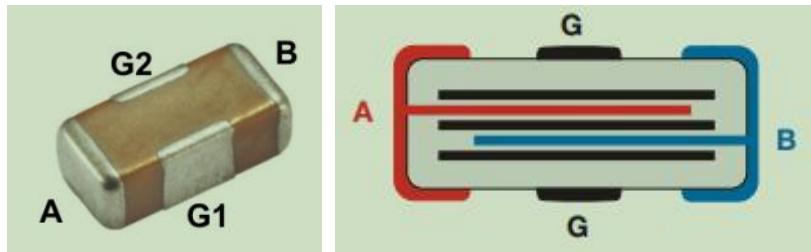


图 1 片式多层陶瓷电容器外形与内部结构

Figure 1 Dimension and Cross-section of MLCC

## 五、产品规格表示方法 HOW TO ORDER

LCX	1410	X7R	103	K	501	N	S	P
产品系列 Series	尺寸 Size	材质 Dielectric	标称容量 Capacitance	精度级别 Tolerance	额定电压 Rated Voltage	端电极类型 Termination	包装方式 Packaging	厚度代号 Thickness
①	②	③	④	⑤	⑥	⑦	⑧	⑨

### ①产品系列 Series

代号	表示名称
L	利和兴
C	电容器
X	X2Y 系列

②尺寸规格 Size

英制表示 BRITISH EXPRESSION	长×宽 (L×W) INCH	长×宽 (L×W) MM
0603	0.06×0.03	1.60×0.80
0805	0.08×0.05	2.00×1.20
1206	0.12×0.06	3.20×1.60
1210	0.12×0.10	3.20×2.50
1410	0.14×0.10	3.50×2.50
1812	0.18×0.12	4.50×3.20

③介质种类 Dielectric Material Characteristics

I类陶瓷介质 C0G	II类陶瓷介质 X7R
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④静电容量 Electrostatic Capacity

代号	表示值	静电容量	说明
R50	0.5	0.50pF	<p>静电容量由3位字符表示。单位为皮法（pF）。第1位和第2位数字为有效数字，第3位数字表示有效数字后的0的个数。有小数点时以大写字母“R”表示。此时，所有数字均为有效数字。如果包含有任何不是“R”的字母，则表明该特指的品名是一个非标准的部件。</p> <p>The electrostatic capacitance is represented by 3 characters, and the unit is picofarad (pF). The first and second digits are significant digits, and the third digit represents the number of 0s after the significant digits. When there is a decimal point, it is represented by a capital letter "R". At this time, all numbers are valid numbers. If it contains any letter other than "R", it indicates that the specified product name is a non-standard part.</p>
1R0	1	1.0pF	
100	10	10pF	
102	10×10 <sup>2</sup>	1000pF	
104	10×10 <sup>4</sup>	100000pF	
...	...	...	

⑤静容量公差 Static Capacity Tolerance

代号	静容量公差	说明
A	±0.05pF	<p>A、B、C、D级误差适用于容量≤10pF的产品。</p> <p>A, B, C, D level error is applicable to products with capacity ≤10pF.</p>
B	±0.10pF	
C	±0.25pF	
D	±0.5pF	
F	±1.0%	
G	±2.0%	
J	±5.0%	
K	±10%	
M	±20%	

⑥脉冲电压 Impulse Voltage

代号	表示值	额定电压	说明
101	$10 \times 10^1$	100Vdc	额定电压前面两位数字代表电压数字, 第三位数字表示 0 的个数。The first two digits of the rated voltage represent the voltage digits, and the third digit represents the number of zeros.
501	$50 \times 10^1$	500Vdc	
500	$50 \times 10^0$	50Vdc	

⑦端电极类型 Termination

代号	端电极材料	注释
N	三层电镀端电极	Cu/Ni/Sn

⑧包装形式 Packaging Type

代号	包装方式
S	塑胶带 Plastic tape
T	纸带

⑨厚度代码 Thickness Code

代号	厚度尺寸 (T)
C	0.30mm
D	0.40mm
E	0.50mm
F	0.60mm
G	0.70mm
H	0.80mm
J	1.00mm
L	1.25mm
P	1.60mm
S	1.8mm
U	2.0mm

## 六、容量范围 CAPACITANCE RANGE

### 1、I类介质电容范围

容量	EMI 滤波 (1Y-容量)	电源旁路 (2Y-容量)	COG				
			0603		0805		1206
额定电压 (V)			50	100	50	100	100
XRX	< 10pF	< 20pF		F			
100	10pF	20pF		F		H	
220	22pF	44pF		F		H	
270	27pF	54pF		F		H	
330	33pF	66pF		F		H	
470	47pF	94pF	F			H	
101	100pF	200pF	F			H	
221	220pF	440pF	F			H	
471	470pF	940pF			H		
102	1000pF	2000pF					P

### 2、II类介质电容范围

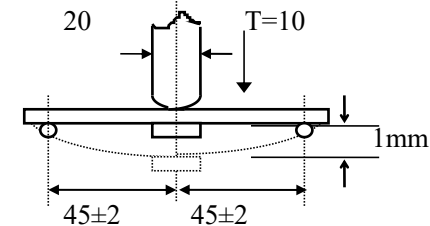
容量	滤波 (1Y-容量)	旁路 (2Y-容量)	X7R																				
			0603					0805			1206			1210		1410		1812					
额定电压 (V)			10	16	25	50	100	25	50	100	10	16	100	16	25	100	500	100	500	100	500		
XRX	< 10pF	< 20pF																					
100	10pF	20pF																					
220	22pF	44pF																					
270	27pF	54pF																					
330	33pF	66pF																					
470	47pF	94pF					F																
101	100pF	200pF					F			H													
221	220pF	440pF					F			H													
471	470pF	940pF					F			H													
102	1000pF	2000pF					F			H													
152	1500pF	3000pF					F			H													
222	2200pF	4400pF					F			H													
472	4700pF	9400pF					F			H													
103	10nF	20nF				F				H			L				P						
153	15nF	30nF			F					H			L						P				
223	22nF	44nF			F					H			L										
393	39nF	78nF	F							H			L										U
473	47nF	94nF	F							H			L										
104	100nF	200nF	F							H			L						P				
184	180nF	360nF	F									L							P				
224	220nF	440nF	F									L							P				
334	330nF	660nF										L							P				
404	0.4μF	0.8μF																	P				
474	0.47μF	0.94μF									L								P				U
105	1μF	2μF																	P				



## 七、可靠性测试条件及要求 RELIABILITY TEST CONDITIONS

### AND REQUIREMENTS

项目 Item	技术规格 Technical Specification		测试方法 Test Method and Remarks		
容量 Capacitance	I类 Class I	应符合指定的误差级别 Should be within the specified tolerance.	标称容量 Capacitance	测试频率 Measuring Frequency	测试电压 Measuring Voltage
			≤1000pF	1MHz±10%	1.0±0.2Vrms
	> 1000pF	1KHz±10%	1.0±0.2Vrms		
	II类 Class II	应符合指定的误差级别 Should be within the specified tolerance.	测试温度: 25°C±3°C Test Temperature: 25°C±3°C 测试频率: 1KHz±10% Test Frequency: 1KHz±10% 测试电压: 1.0±0.2Vrms Test Voltage: 1.0±0.2Vrms		
损耗角正切 (DF, tanδ) Dissipation Factor	电压	I类 Class I	II类 Class II	I类 Class I:	
	≥50V	≤0.10%	≤2.5%	测试频率: 1MHz±10% Test Frequency: 1MHz±10%	
	25V		≤3.5%	测试电压: 1.0±0.2Vrms Test Voltage: 1.0±0.2Vrms	
	10/16V		≤5.0%	II类 Class II:	
6.3V	≤10.0%		测试频率: 1KHz±10% Test Frequency: 1KHz±10% 测试电压: 1.0±0.2Vrms Test Voltage: 1.0±0.2Vrms		
绝缘电阻 (IR) Insulation Resistance	C≤ 0.047μF: 1000ΩF 或 100GΩ取较小值; C>0.047μF: 500ΩF 或 10GΩ取较小值; C≤ 0.047μF: 1000 ΩF or 100 GΩ, whichever is less C> 0.047μF: 500 ΩF or 10 GΩ, whichever is less		测试电压: 额定电压 Measuring Voltage: Rated Voltage 测试时间: 60±5 秒 Duration: 60±5s 测试湿度: ≤75% Test Humidity: ≤75% 测试温度: 25°C±3°C Test Temperature: 25°C±3°C 测试充放电电流: ≤50mA Test Current: ≤50mA		
介质耐电强度(DWV) Dielectric Withstanding Voltage	不应有介质被击穿或损伤 No breakdown or damage.		测量电压: Measuring Voltage: 额定电压≤100Vdc: 耐电压为 2.5 倍额定电压; 额定电压=500Vdc: 耐电压为 1.5 倍额定电压。 时间: 1~5 秒 Duration: 1~5s 充/放电电流: 不应超过 50mA		
可焊性 Solderability	上锡率应大于 95%, 外观无可见损伤。 At least 95% of the terminal electrode is covered by new solder, Visual Appearance: No visible damage.		将电容在 80~120°C 的温度下预热 10~30 秒。 Preheating Conditions: 80 to 120°C; 10~30s.		
			有铅焊料: (Sn/Pb: 63/37) 浸锡温度: 235±5°C 浸锡时间: 2±0.5s Solder Temperature: 235±5°C Duration: 2±0.5s	无铅焊料: (Lead Free) 浸锡温度: 245±5°C 浸锡时间: 2±0.5s Solder Temperature: 245±5°C Duration: 2±0.5s	

项目 Item	技术规格 Technical Specification		测试方法 Test Method and Remarks
耐焊接热 Resistance to Soldering Heat	项目 Item	I类 Class I	II类 Class II
	$\Delta C/C$	$\leq \pm 0.5\%$ 或 $\pm 0.5PF$ , 取较大值。 $\leq \pm 0.5\%$ or $\pm 0.5PF$ , whichever is larger.	-5~+10%
	DF	同初始标准。 Same to initial value.	
	IR	同初始标准。 Same to initial value.	
	外观	无可见损伤 上锡率: $\geq 95\%$ 。 No visible damage. At least 95% of the terminal electrode is covered by new solder.	
抗弯曲强度 Bending Strength	外观: 无可见损伤。 Appearance: No visible damage.		试验基板: PCB 弯曲深度: 1mm 施压速度: 0.5mm/sec. 单位: mm 应在弯曲状态下进行测量。 
	$\Delta C/C$	$\leq \pm 10\%$	Test Board: PCB Warp: 1mm Speed: 0.5mm/sec. Unit: mm The measurement should be made with the board in the bending position.
寿命试验 Life Test	$\Delta C/C$	I类: $\leq \pm 2\%$ 或 $\pm 1pF$ 取两者之中较大者 II类: $\leq \pm 20\%$ Class I: $\leq \pm 2\%$ or $\pm 1pF$ , whichever is larger. Class II: $\leq \pm 20\%$	
	DF	$\leq 2$ 倍初始标准 Not more than twice of initial value	
	IR	I类: $R_i \geq 4000M\Omega$ 或 $R_i \cdot CR \geq 40S$ 取两者之中较小者。 Class I: $R_i \geq 4000M\Omega$ 或 $R_i \cdot CR \geq 40S$ whichever is smaller	
	外观	无损伤 Visual Appearance: No visible damage	
			电压: 1.5 倍额定工作电压 时间: 1000 小时 *温度: 125°C (C0G、X7R) 85°C (X5R) 充电电流: 不应超过 50mA 放置条件: 室温 放置时间: 24 小时 (I类) 或 48 小时 (II类), Applied Voltage: 1.5 × Rated voltage Duration: 1000h *Temperature: 125°C (C0G、X7R) 85°C (X5R) Charge/ Discharge Current: 50mA max. Recovery Conditions: Room temperature Recovery Time: 24h (Class 1), or 48h (Class2)

项目 Item	技术规格 Technical Specification		测试方法 Test Method and Remarks																														
温度循环 Temperature Cycle	$\Delta C/C$ : I类: $\leq \pm 1\%$ 或 $\pm 1pF$ , 取两者中最大者 II类: $\leq \pm 10\%$  Class I: $\leq \pm 1\%$ or $\pm 1pF$ , whichever is larger. Class II: $\leq \pm 10\%$		预处理* (2类): 上限温度, 1小时, 恢复: $24 \pm 1h$ 初始测量 循环次数: 5次, 一个循环分以下4步: <table border="1"> <thead> <tr> <th>阶段</th> <th>温度 (°C)</th> <th>时间 (分钟)</th> </tr> </thead> <tbody> <tr> <td>第1步</td> <td>下限温度(-55°C)</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 (+125/+105/+85°C)</td> <td>30</td> </tr> <tr> <td>第4步</td> <td>常温 (+20)</td> <td>2~3</td> </tr> </tbody> </table> 试验后放置(恢复)时间: $24 \pm 2h$ Preheating Conditions: Up-Limit temperature, 1h Recovery Time: $24 \pm 1h$ Initial Measurement Cycling Times: 5 times, 1 cycle, 4 steps: <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Low-Limit temp. (-55°C)</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-Limit temp. (+125/+105/+85°C)</td> <td>30</td> </tr> <tr> <td>4</td> <td>Normal temp. (+20)</td> <td>2~3</td> </tr> </tbody> </table> Recovery time after test: $24 \pm 2h$	阶段	温度 (°C)	时间 (分钟)	第1步	下限温度(-55°C)	30	第2步	常温 (+20)	2~3	第3步	上限温度 (+125/+105/+85°C)	30	第4步	常温 (+20)	2~3	Step	Temperature (°C)	Time (min.)	1	Low-Limit temp. (-55°C)	30	2	Normal temp. (+20)	2~3	3	Up-Limit temp. (+125/+105/+85°C)	30	4	Normal temp. (+20)	2~3
	阶段	温度 (°C)	时间 (分钟)																														
第1步	下限温度(-55°C)	30																															
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3	Up-Limit temp. (+125/+105/+85°C)	30																															
4	Normal temp. (+20)	2~3																															
潮湿试验 Moisture Resistance	$\Delta C/C$	I类: $\leq \pm 2\%$ 或 $\pm 1pF$ , 取两者之中较大者 II类: $\leq \pm 10\%$ Class I: $\leq \pm 2\%$ or $\pm 1pF$ , whichever is larger. Class II: $\leq \pm 10\%$	温度: $40 \pm 2^\circ C$ 湿度: 90~95%RH 时间: 500小时 放置条件: 室温 放置时间: 24小时(I类); 48小时(II类) Temperature: $40 \pm 2^\circ C$ Humidity: 90~95%RH Duration: 500h Recovery Conditions: Room temperature Recovery Time: 24h (Class1) or 48h (Class2)																														
	DF	$\leq 2$ 倍初始标准 Not more than twice of initial value.																															
	IR	I类: $R_i \geq 2500M\Omega$ 或 $R_i \cdot C_R \geq 25S$ 取两者之中较小者. Class I: $R_i \geq 2500M\Omega$ 或 $R_i \cdot C_R \geq 25S$ whichever is smaller.																															
		II类: $R_i \geq 1000M\Omega$ 或 $R_i \cdot C_R \geq 25S$ 取两者之中较小者. Class II: $R_i \geq 1000M\Omega$ 或 $R_i \cdot C_R \geq 25S$ whichever is smaller.																															
外观	无损伤 Appearance: No visible damage.																																

## 八、包装 PACKAGE

### 1、产品厚度和包装数量 Thickness and Packing amount

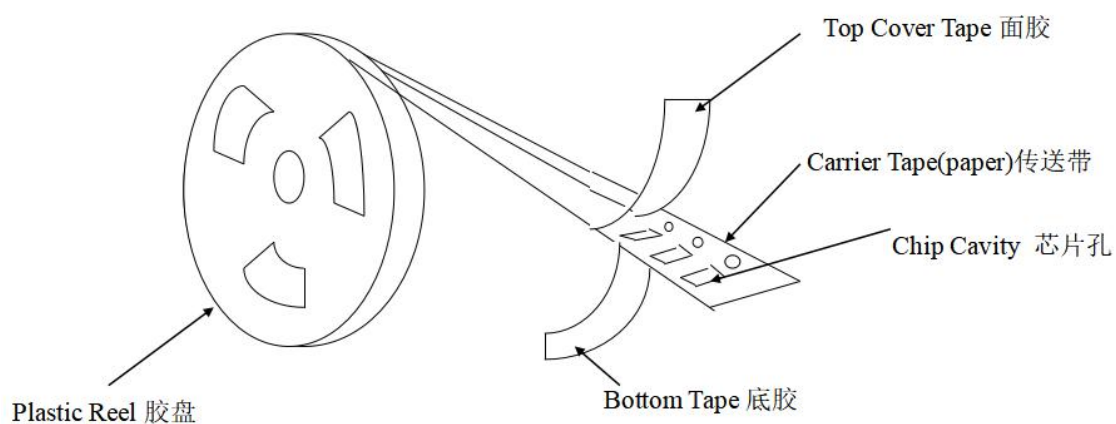
尺寸 Size	厚度代号 Thickness (mm)/Code		纸带 7"Reel Paper Tape	胶带 7"Reel Embossed Tape
			Standard Qty(pcs)	Standard Qty(pcs)
0603	0.60±0.10	F	4000	-----
0805	0.80±0.10	H	4000	-----
1206	0.80±0.10	H	4000	
	1.00±0.10	J	-----	3000
	1.25±0.20	L	-----	3000
1210	1.25±0.20	L	-----	2000
	1.60±0.20	P	-----	2000
1410	1.60±0.20	P	-----	2000
1812	1.25±0.20	L	-----	1000
	1.60±0.20	P	-----	1000
	2.00±0.20	U	-----	1000

### 2、带式圆盘包装 Tape and Reel Package

带式圆盘包装在高速 SMT 生产中广泛应用.典型的直径为 180mm(7 英寸)的圆盘可以包装 1500-15000 粒电容, 直径为 330mm(13 英寸)的圆盘可以包装 10000-50000 粒电容。带式圆盘包装包括纸带包装、胶带包装两种方式。

Tape and reel packaging is currently the most popular system for high-speed SMT production , A typical 180mm(7inch)diameter reel contains 1500 to 15, 000 capacitors, 330mm(13inch)diameter reel contains 10,000 to 50,000 capacitors , Tape and reel packaging comprises paper tapes and embossed tapes.

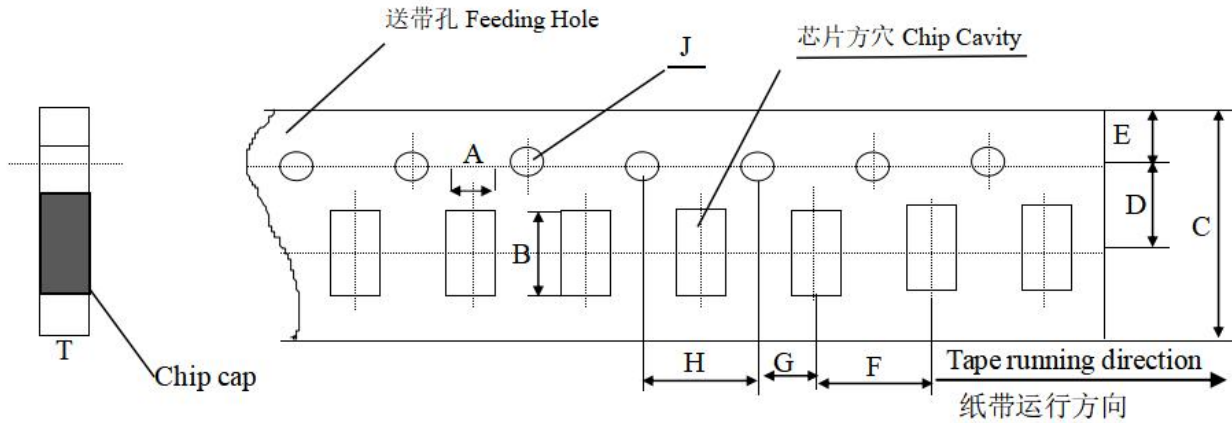
### 3、纸带卷盘结构 Paper Taping



#### 4、纸带规格 Paper Tape Specifications

适合 0603、0805、1206 常规产品的纸带尺寸。

Dimensions of paper taping for 0603, 0805, 1206 types.

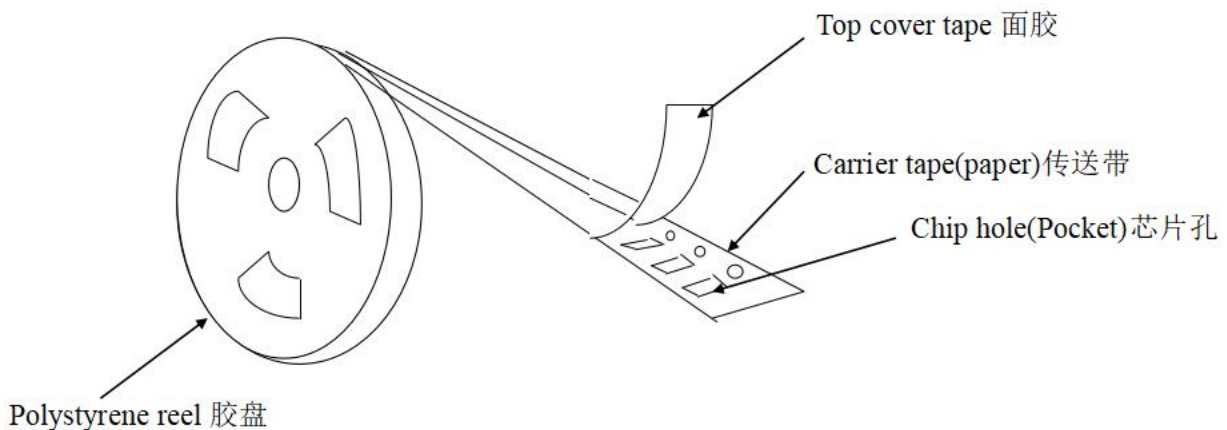


代号 Code	A	B	C	D*	E	F	G*	H	J	T
0603	1.10 ±0.10	1.90 ±0.10	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max
0805	1.45 ±0.15	2.30 ±0.15	8.0 ±0.15	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max
1206	1.80 ±0.20	3.40 ±0.20	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 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

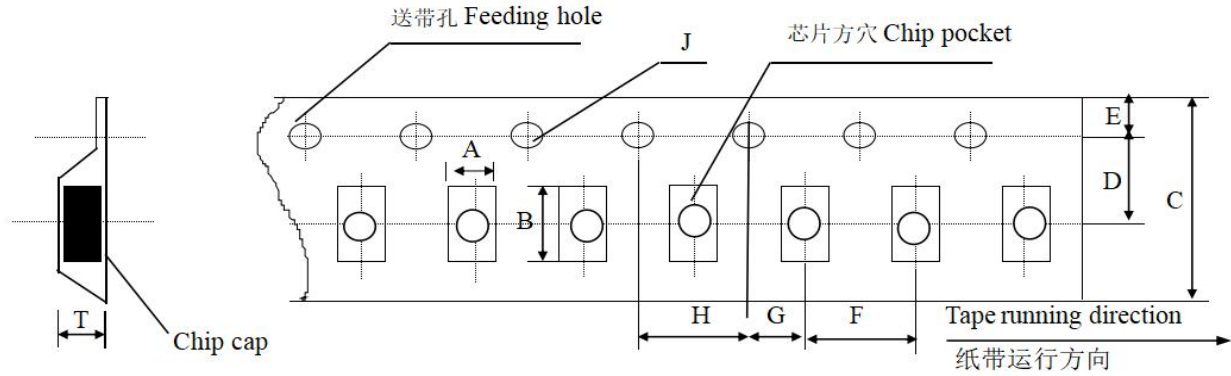
#### 5、塑胶卷盘结构 Embossed Taping



### 6、塑胶带规格 Plastic tape Specifications

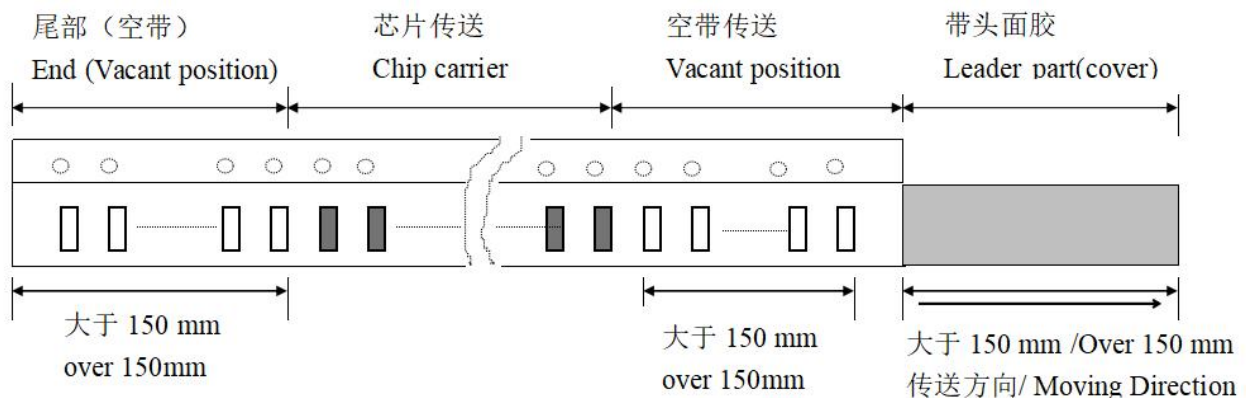
塑胶带尺寸结构 (适合“1206~1812”型产品)。

Dimensions of embossed taping for 1206~1812 type.

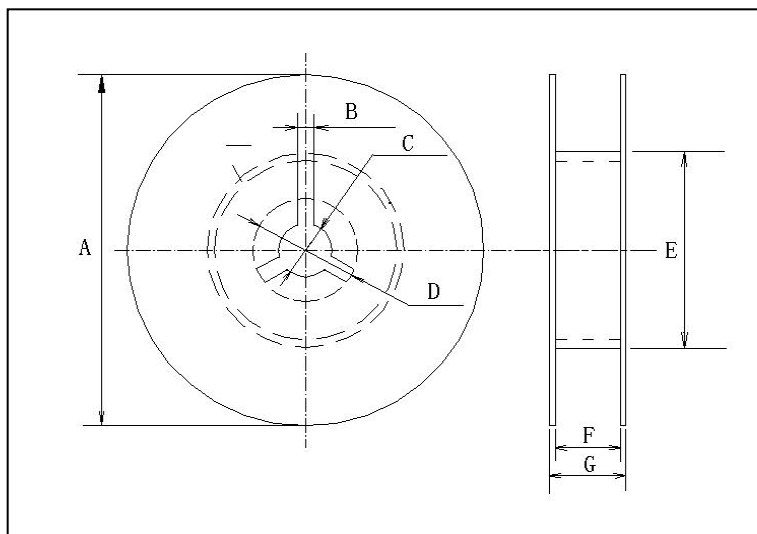


代号 Code	产品厚度 Chip Thickness	A	B	C	D	E	F	G	H	J	T
规格 Tape size	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
单位 Unit	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1206	1.25±0.10	<2.00	<3.60	8.00±0.10	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50-0/+0.10	<2.50
1210	1.25±0.10	<2.50	<5.30	12.00±0.20	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50-0/+0.10	<2.50
	1.40±0.15										
	1.60±0.20										
1410	1.25±0.10	<2.50	<5.30	12.00±0.20	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50-0/+0.10	<2.50
	1.40±0.15										
	1.60±0.20										
1812	1.25±0.10	<3.90	<5.30	12.00±0.20	5.50±0.05	1.75±0.10	8.00±0.10	2.00±0.05	4.00±0.10	1.50-0/+0.10	<2.50
	1.60±0.20										
	2.00±0.20										

### 7、传送带的前后结构 Structure of leader part and end part of the carrier paper



### 8、卷盘尺寸 Reel Dimensions



卷盘型号	A	B	C	D	E	F	G
7" REEL	$\phi 178 \pm 0.1$	3.0	$\phi 13 \pm 0.5$	$\phi 21 \pm 0.8$	$\phi 50$ 或更大 $\phi 50$ or more	$100 \pm 1.5$	12max

(unit: mm)

### 9、载带性能 Performance of Taping

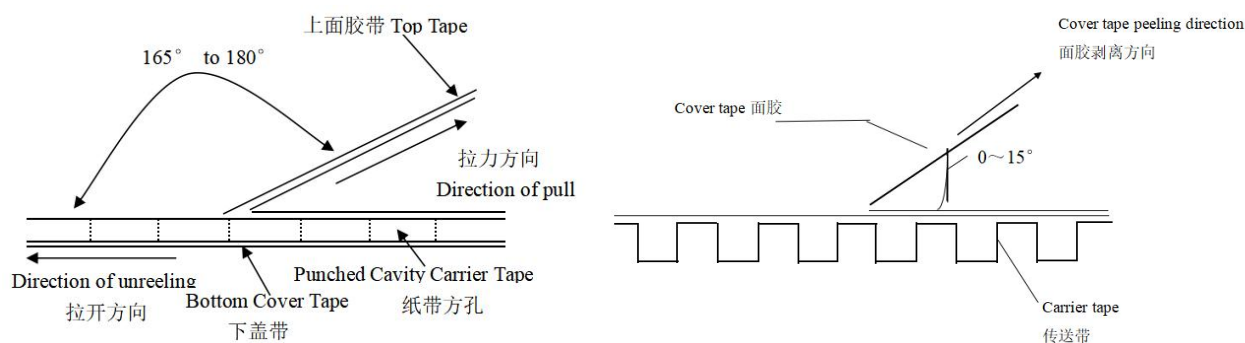


图 a

(a) 纸带在伸直状态下应该能经受 1.02kg 的压力。The paper tape shall be able to withstand a pressure of 1.02kg in the straight state

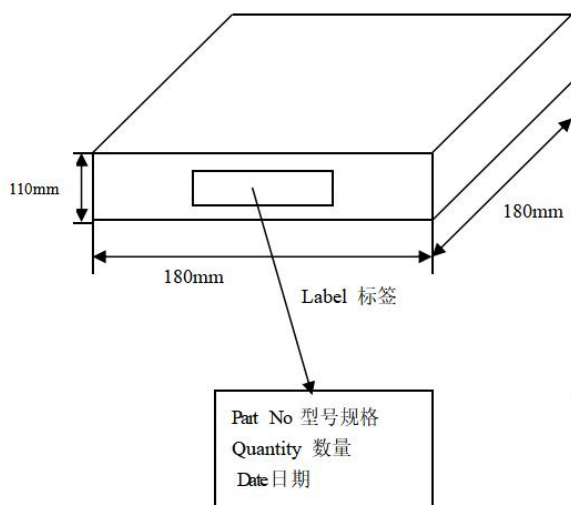
(b) 上盖带应该能经受 1.02kg 的拉力。The top cover tape should withstand 1.02kg of pull force

(c) 上盖带剥离强度 Peeling Force of Top Cover Tape

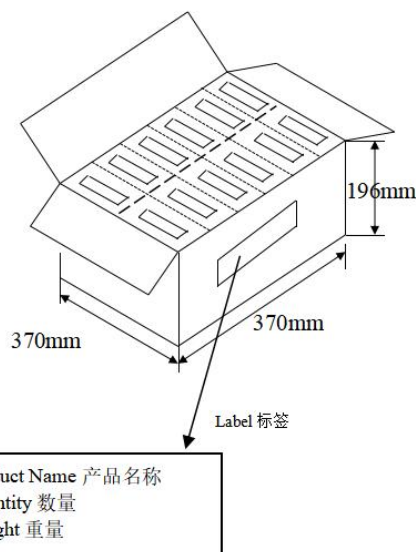
除非有特殊规定，上盖带以 300mm/min 的速度，165~180°的角度（图 a）剥离纸带时，剥离力度应该在 10~60g 之间。

Unless otherwise specified, the peeling force of top cover tape shall be 10g to 60g when the top cover tape is pulled at a speed of 300mm/min with the angle between the taped during peeling and the direction of unreeing maintained at 165 to 180° as shown in figure (a).

## 10、外箱包装 Outer packing



小包装 The first package  
数量: 10 卷 Quantity: 10 reels



大包装 The second package  
数量: 6 盒 Quantity: 6 cases

## 九、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°C~40°C

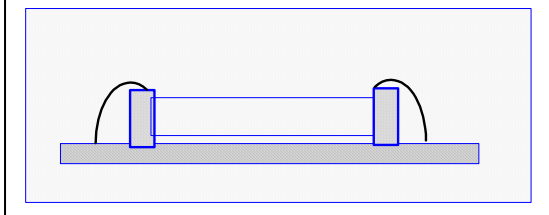
储存相对湿度/Relative Humidity 20%~70%

## 十、焊接的条件与相关图表 SOLDERING PROFILE

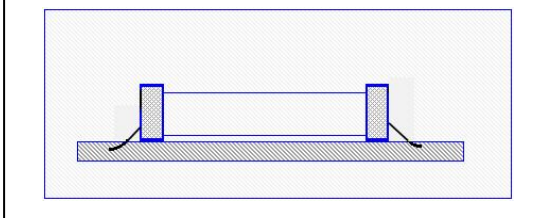
为避免因温度的突然变化而引起的芯片开裂或局部爆炸的现象发生,请按有关温度曲线图表来进行。(请参考附页中的图表) To avoid the crack problem by sudden temperature change, follow the temperature profile in the adjacent graph(refer to the graph in the enclosure page).

### 1、适量的焊料 Optimum Solder Amount for Reflow Soldering

#### ①潜在失效分析 Potential failure analysis

不良现象 Undesirable phenomenon	图示 Illustration	后果分析 failure analysis
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.

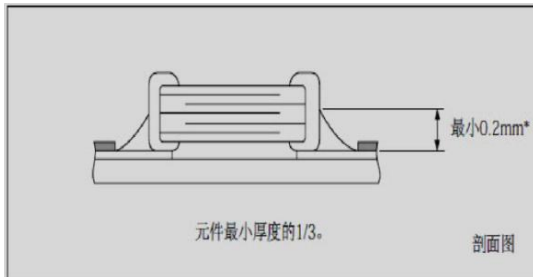


<p>焊料太少 Not enough solder</p>		<p>固定力量不足,可能会引起电容芯片与线路接触不良 Weak holding force may cause bad connection between the capacitor and PCB.</p>
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②推荐焊料用量 Recommended Soldering amounts

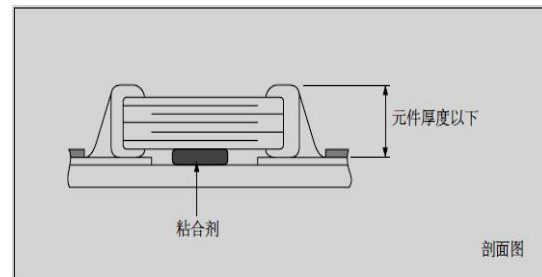
回流焊接的最佳焊料用量

The optimal solder fillet amounts for re-flow soldering



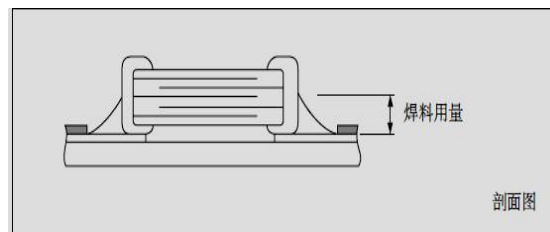
波峰焊接的最佳焊料用量

The optimal solder fillet amounts for wave soldering



使用烙铁返修时的最佳焊料量

The optimal solder fillet amounts for reworking



2、推荐焊接温度曲线图 The temperature profile for soldering

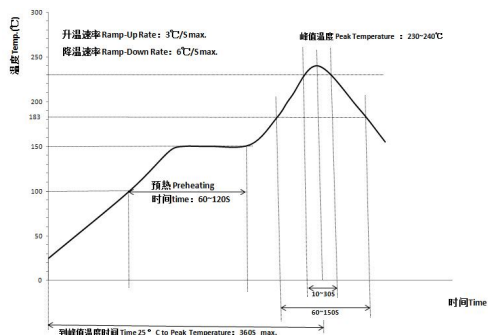
在预热时, 请将焊接温度与芯片表面温度之间的温差维持在  $T \leq 130^\circ\text{C}$ 。

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as:  $T \leq 130^\circ\text{C}$ .

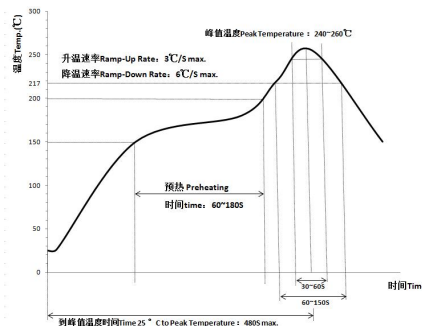
在冷却时, 电容器与清洗过程的温差不大于  $100^\circ\text{C}$ 。

Cooling : The temperature difference between the capacitors and cleaning process shall not be greater than  $100^\circ\text{C}$ .

①回流焊接 ( Re-flow soldering )

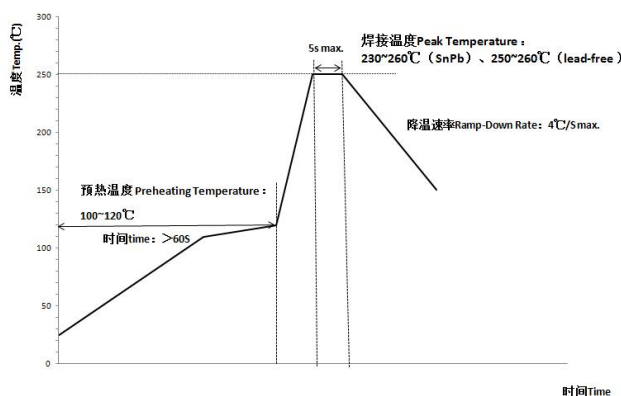


有铅回流焊曲线 SnPb Reflow soldering profile



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

②波峰焊接 ( Wave soldering )



波峰焊曲线 Wave soldering profile

③手工焊接 ( Hand 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.

条件 Conditions:

预热 Preheating	烙铁头温度 Temperature of soldering iron head	烙铁功率 Power of soldering iron	烙铁头直径 Diameter of soldering iron head	焊接时间 Soldering time	锡膏量 Solder paste amount	限制条件 Restricted conditions
$\Delta \leq 130^{\circ}\text{C}$	最高 300°C Highest temperature: 300°C	最大 20W 20W at the highest	建议 1mm 1mm recommended	最长 3s 3s at the longest	$\leq 1/2$ 芯片厚度 $\leq 1/2$ chip thickness	请勿使用烙铁头直接 接触陶瓷元件 Please avoid the direct contact between soldering iron head and ceramic components

## 十一、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,所以在使用的时  
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 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.