

# SANYEAR

## 多层片式陶瓷电容器规格书 MULTILAYER CHIP CERAMIC CAPACITOR CATALOG

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### 一、概述

#### 电容器及介质种类：

高频类：此类介质材料的电容器为 类电容器，包括通用型高频 COG (NPO) 电容器。其中 COG(NPO) 电容器电性能最稳定，几乎不随温度、电压和时间的变化而变化，适用于低损耗，稳定性要求高的高频电路。

X7R、X5R、X7S、X6S：此类介质材料的电容器为 类电容器，具有较高的介电常数，容量比 类电容器高，具有较稳定的温度特性，适用于容量范围广，稳定性要求不高的电路中，如隔直、耦合、旁路、鉴频等电路中。

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

### SUMMARY

#### Types of Dielectric Material and Capacitor

HIGH FREQUENCY TYPE: The capacitor of this kind dielectric material is considered as Class capacitor,

including high frequency COG (NPO) capacitor. The electrical properties of COG(NPO) capacitor are the most stable one and change invariabllly

with temperature, vottage and time. They are suited for applications where low-losses and high-stability are required.

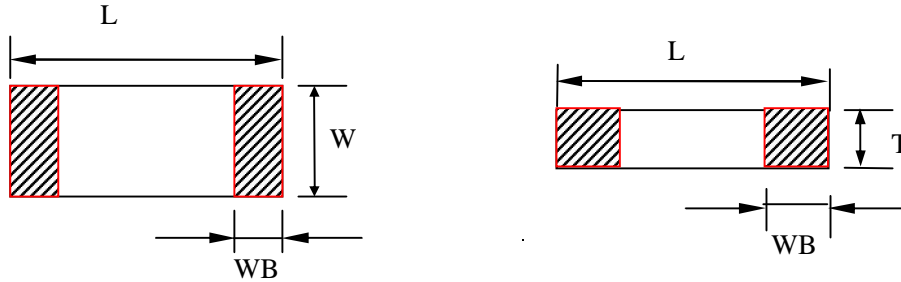
X7R、X5R、X7S、X6S :X7R、X5R、 X7S、X6S material is a kind of material has high dielectric constant. The capacitor

made of this kind material is considered as Class capacitor whose capacitance is higher than that of class . These capacitors are classified as having a semi-stable temperature characteristic and used over a wide temperature range, such in these kinds of circuits, DC-blocking, decoupling, bypassing, frequency discriminating etc.

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

### 二、尺寸及结构 DIMENSIONS AND STRUCTURE

#### 尺寸 DIMENSIONS

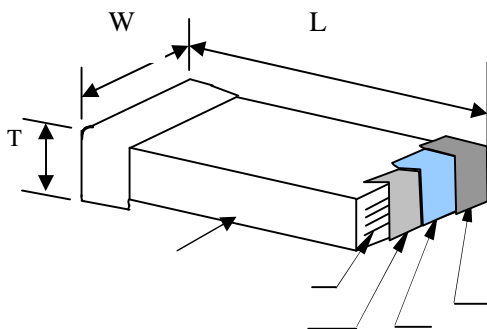


型号 Type		尺寸 Dimensions (mm)			
英制表示 British expression	公制表示 Metric expression	L	W	T	WB
0201	0603	$0.6 \pm 0.03$	$0.3 \pm 0.03$	$0.3 \pm 0.03$	$0.15 \pm 0.10$
0402	1005	$1.00 \pm 0.05$	$0.50 \pm 0.05$	$0.50 \pm 0.05$	$0.25 \pm 0.10$
0603	1608	$1.60 \pm 0.10$	$0.80 \pm 0.10$	$0.80 \pm 0.10$	$0.30 \pm 0.10$
0805	2012	$2.00 \pm 0.20$	$1.25 \pm 0.20$	0.55	$0.50 \pm 0.20$
				$0.80 \pm 0.20$	
				$1.00 \pm 0.20$	
				$1.25 \pm 0.20$	
1206	3216	$3.20 \pm 0.30$	$1.60 \pm 0.30$	$0.80 \pm 0.20$	$0.60 \pm 0.30$
				$1.00 \pm 0.20$	
				$1.25 \pm 0.20$	
				$1.60 \pm 0.30$	
1210	3225	$3.20 \pm 0.30$	$2.50 \pm 0.30$	2.80	$0.60 \pm 0.30$
1808	4520	$4.50 \pm 0.40$	$2.00 \pm 0.20$	2.20	$0.60 \pm 0.30$
1812	4532	$4.50 \pm 0.40$	$3.20 \pm 0.30$	3.50	$0.60 \pm 0.30$
2220	5750	$5.70 \pm 0.40$	$5.00 \pm 0.40$	3.50	$0.60 \pm 0.30$

备注：可根据客户的特殊要求设计符合客户需求的产品。

Note: We can design according to customer special requirements

#### 结构 STRUCTURE



序号 NO	名称 Name
	陶瓷介质 Ceramic dielectric
	内电极 Inner electrode
	外电极 Substrate electrode
	镍层 Nickel Layer
	锡层 Tin Layer

### 三、型号规格表示方法 HOW TO ORDER

C 0603 X7R 102 K 500 N T

产品类型 PRODUCT TYPE	尺寸 Size	温度系数 温度特性 T.C.	电容值 Capacitance	允许偏差 Tolerance	额定电压 Rate Voltage	端头类型 Terminal Type	包装 Packaging
C=多层 式陶瓷 电容器 MLCC	01005 0201 0402 0603 0805 1206 1210 1808 1812 2220	COG (NPO) X7R X7S X6S X5R Y5V	1R5=1.5pF 100=10pF 222=2.2nF 105=1uF 475=4.7uF 107=10uF	A=±0.05pF B=±0.1pF C=±0.25pF D=±0.5pF F=±1% G=±2% J=±5% K=±10% M=±20% Z=+80% -20%	4R0=4V 6R3=6.3V 100=10V 160=16V 250=25V 500=50V 101=100V 251=250V 102=1KV 202=2KV	N: 银 (或铜) /镍/锡 N: Ag (or Cu) /Ni /Sn	T= 常规包装 Routine B= 超薄包装 Ultra thin S= 特殊包装 Special

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

介质物种 Dielectric	参考温度点 Reference Temperature Point	标称温度系数 Temperature Coefficient	工作温度范围 Operation Temperature Range
COG(NPO)	20	0+30 ppm/	-55 ~ 125
X7R	20	± 15%	-55 ~ 125
X7S	20	± 22%	-55 ~ 125
X6S	20	± 22%	-55 ~ 105
X5R	20	± 15%	-55 ~ 85
Y5V	20	-80% ~ +30%	-25 ~ 85

备注：类电容器标称温度系数和允许偏差是采用温度在20 和85 之间的电容量变化来确定的，而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 的电容量变化来确定的。

NOTE: Nominal temperature coefficient and allowed tolerance of class are decided by the changing of the capacitance between 20 and 85 . Nominal temperature coefficient of class are decided by the temperature of 20

## 五、容量范围及其电压 Capacitance Range and Operating Voltage

尺寸规格 Size Code	额定电压 Rated Voltage	容量范围 Capacitance	
		COG(NPO)	Y5V
0201	4V	—	—
	6.3V	—	10,000 ~ 100,000
	10V	—	—
	16V	—	10,000
	25V	—	—
	50V	0.5 ~ 100	—
0402	4V	—	—
	6.3V	—	1,000 ~ 1,000,000
	10V	—	1,000 ~ 1,000,000
	16V	—	1,000 ~ 220,000
	25V	—	1,000 ~ 220,000
	50V	0.1 ~ 1,000	1,000 ~ 100,000
0603	4V	—	—
	6.3V	—	1,000 ~ 10,000,000
	10V	—	1,000 ~ 10,000,000
	16V	—	1,000 ~ 2,200,000
	25V	—	1,000 ~ 2,200,000
	50V	0.1 ~ 10,000	1,000 ~ 1,000,000
0805	4V	—	—
	6.3V	—	1,000 ~ 22,000,000
	10V	—	1,000 ~ 22,000,000
	16V	—	1,000 ~ 22,000,000
	25V	—	1,000 ~ 10,000,000
	50V	0.3 ~ 100,000	1,000 ~ 4,700,000

尺寸规格 Size Code	额定电压 Rated Voltage	容量范围 Capacitance	
		COG(NPO)	Y5V
1206	4V	—	—
	6.3V	—	1,000 ~ 47,000,000
	10V	—	1,000 ~ 47,000,000
	16V	—	1,000 ~ 47,000,000
	25V	—	1,000 ~ 10,000,000
	50V	0.3 ~ 100,000	1,000 ~ 10,000,000
1210	6.3V	—	4,700 ~ 100,000,000
	10V	—	4,700 ~ 47,000,000
	16V	—	4,700 ~ 22,000,000
	25V	—	4,700 ~ 10,000,000
	50V	10 ~ 100,000	4,700 ~ 10,000,000
1808	6.3V	—	—
	10V	—	—
	16V	—	—
	25V	—	—
	50V	10 ~ 100,000	—
1812	6.3V	—	10,000 ~ 100,000,000
	10V	—	10,000 ~ 100,000,000
	16V	—	10,000 ~ 22,000,000
	25V	—	10,000 ~ 10,000,000
	50V	10 ~ 100,000	10,000 ~ 10,000,000

尺寸规格 Size Code	额定电压 Rated Voltage	容量范围 Capacitance			
		X7R	X7S	X5R	X6S
0201	4V	—	—	0.015 uF ~ 1uF	0.015 uF ~ 1uF
	6.3V	—	—	0.015 uF ~ 1uF	0.015 uF ~ 1uF
	10V	100 ~ 10,000	100 ~ 10,000	0.015 uF ~ 0.1 uF	0.015 uF ~ 0.1 uF
	16V	100 ~ 10,000	100 ~ 10,000	0.015 uF ~ 0.1 uF	—
	25V	100 ~ 100,000	100 ~ 100,000	0.015 uF ~ 0.1 uF	—
	50V	—	—	—	—
0402	4V	—	—	0.1uF~10uF	0.1uF~10 uF
	6.3V	100 ~ 470,000	100 ~ 470,000	0.1uF~22uF	0.1uF~22uF
	10V	100 ~ 470,000	100 ~ 470,000	0.1uF~10uF	0.1uF~10uF
	16V	100 ~ 470,000	100 ~ 220,000	0.1uF~4.7uF	0.1uF~4.7uF
	25V	100 ~ 470,000	100 ~ 100,000	0.1uF~2.2 uF	0.1uF~2.2 uF
	50V	100 ~ 100,000	100 ~ 100,000	0.047uF~0.1 uF	0.047uF~0.1 uF
0603	4V	—	—	0.47uF ~ 47uF	0.47uF ~ 22uF
	6.3V	150 ~ 2,200,000	150 ~ 2,200,000	0.47uF ~ 47uF	0.47uF ~ 22uF
	10V	150 ~ 2,200,000	150 ~ 2,200,000	0.47uF ~ 22uF	0.47uF ~ 10uF
	16V	150 ~ 4,700,000	150 ~ 1,000,000	0.47uF ~ 22uF	0.47uF ~ 10uF
	25V	150 ~ 1,000,000	150 ~ 1,000,000	0.47uF ~ 10uF	0.47uF ~ 10uF
	50V	150 ~ 1,000,000	150 ~ 470,000	0.47uF ~ 2.2uF	0.47uF ~ 1uF
0805	4V	—	—	1uF ~ 100uF	1uF~47 uF
	6.3V	150 ~ 10,000,000	150 ~ 10,000,000	1uF ~ 100uF	1uF ~ 47uF
	10V	150 ~ 10,000,000	150 ~ 10,000,000	1uF ~ 47uF	1uF ~ 22uF
	16V	150 ~ 10,000,000	150 ~ 4,700,000	1uF ~ 22uF	1uF ~ 22uF
	25V	150 ~ 10,000,000	150 ~ 4,700,000	1uF ~ 22uF	1uF ~ 10uF
	50V	150 ~ 2,200,000	150 ~ 1,000,000	1uF ~ 10uF	—

尺寸规格 Size Code	额定电压 Rated Voltage	容量范围 Capacitance			
		X7R	X7S	X5R	X6S
1206	4V	—	—	2.2uF ~ 100uF	2.2uF ~ 100uF
	6.3V	200 ~ 22,000,000	200 ~ 22,000,000	2.2uF ~ 220uF	2.2uF ~ 100uF
	10V	200 ~ 22,000,000	200 ~ 22,000,000	2.2uF ~ 100uF	2.2uF ~ 47uF
	16V	200 ~ 22,000,000	200 ~ 10,000,000	2.2uF ~ 47uF	2.2uF ~ 22uF
	25V	200 ~ 22,000,000	200 ~ 10,000,000	2.2uF ~ 47uF	2.2uF ~ 22uF
	50V	200 ~ 10,000,000	200 ~ 4,700,000	2.2uF ~ 10uF	2.2uF ~ 10uF
1210	6.3V	220 ~ 47,000,000	220 ~ 47,000,000	47uF ~ 330uF	47uF ~ 100uF
	10V	220 ~ 47,000,000	220 ~ 47,000,000	4.7uF ~ 100uF	4.7uF ~ 100uF
	16V	220 ~ 22,000,000	220 ~ 22,000,000	4.7uF ~ 100uF	4.7uF ~ 47uF
	25V	220 ~ 22,000,000	220 ~ 22,000,000	4.7uF ~ 47uF	4.7uF ~ 22uF
	50V	220 ~ 10,000,000	220 ~ 10,000,000	4.7uF ~ 100uF	—
1808	6.3V	220 ~ 4,700,000	220 ~ 4,700,000	4.7uF ~ 100uF	4.7uF ~ 100uF
	10V	220 ~ 4,700,000	220 ~ 4,700,000	4.7uF ~ 47uF	4.7uF ~ 47uF
	16V	220 ~ 4,700,000	220 ~ 4,700,000	4.7uF ~ 22uF	4.7uF ~ 22uF
	25V	220 ~ 4,700,000	220 ~ 4,700,000	4.7uF ~ 10uF	4.7uF ~ 10uF
	50V	220 ~ 4,700,000	220 ~ 4,700,000	—	—
1812	6.3V	—	—	10uF ~ 100uF	10uF ~ 100uF
	10V	—	—	10uF ~ 47uF	10uF ~ 47uF
	16V	470 ~ 6,800,000	470 ~ 6,800,000	4.7uF ~ 22uF	4.7uF ~ 22uF
	25V	470 ~ 6,800,000	470 ~ 6,800,000	4.7uF ~ 10uF	4.7uF ~ 10uF
	50V	470 ~ 10,000,000	470 ~ 4,700,000	—	—

备注：可根据客户的特殊要求设计符合客户需求的产品。

Note：We can design according to customer special requirements .



### 七、中高压电容器 HIGH VOLTAGE MLCC

中高压多层片状陶瓷电容器是在多层片状陶瓷电容器的工艺技术、设备基础上，通过采用特殊工艺制作的一种具有良好高压可靠性的产品，该产品适合于表面贴装，适合于多种直流高压线路，可以有效的改善电子线路的性能。

#### 应用范围

- 模拟或数字调制解调器。
- 局域网/广域网接口界面。
- 日光灯启动辉器照明电路。
- 倍压电器。
- 直流变速器。
- 背光源驱动电路。

Middle & high voltage MLCC is a kind of special design 、special technology MLCC that bases on the technology of general MLCC. This kind of MLCC has stable high voltage reliability and suitable to SMT. Middle & high MLCC is widely applicable for many direct high voltage circuits in which it can improve the performance of the circuit.

#### APPLICATIONS

- Analog & Digital Modems
- LAN/WAN Interface
- Lighting Ballast Circuits
- Voltage Multipliers
- DC-DC Converters
- Back-lighting Inverters

#### 容量范围及其电压

单位/unit: pF

尺寸规格 Size Code	工作电压 Rated Voltage	容量范围 Capacitance		
		NPO	X7R	Y5V
0603	100V	0.5 ~ 1,000	150 ~ 100,000	2,200 ~ 100,000
	200V	0.5 ~ 470	150 ~ 10,000	——
	250V	0.5 ~ 470	150 ~ 10,000	——
0805	100V	0.5 ~ 3,300	150 ~ 100,000	10,000 ~ 100,000
	200V	0.1 ~ 1,500	150 ~ 22,000	10,000 ~ 47,000
	250V	0.1 ~ 1,500	150 ~ 22,000	10,000 ~ 47,000
	500V	0.1 ~ 470	150 ~ 10,000	——
	630V	0.1 ~ 470	150 ~ 10,000	——
	1000V	0.1 ~ 100	——	——
1206	100V	0.5 ~ 3,300	150 ~ 1,000,000	15,000 ~ 470,000
	200V	0.1 ~ 2,700	150 ~ 220,000	10,000 ~ 220,000
	250V	0.1 ~ 2,700	150 ~ 220,000	10,000 ~ 220,000
	500V	0.1 ~ 1,500	150 ~ 33,000	——
	630V	0.1 ~ 1,500	150 ~ 33,000	——
	1000V	0.1 ~ 1,000	150 ~ 10,000	——
	2000V	0.1 ~ 270	150 ~ 2,700	——

### 容量范围及其电压

单位/unit: pF

尺寸规格 Size Code	工作电压 Rated Voltage	容量范围 Capacitance		
		NPO	X7R	Y5V
1210	100V	1.0 ~ 6,800	150 ~ 10,000,000	15,000 ~ 1,000,000
	200V	1.0 ~ 3,300	150 ~ 220,000	15,000 ~ 470,000
	250V	1.0 ~ 3,300	150 ~ 220,000	15,000 ~ 470,000
	500V	1.0 ~ 2,200	150 ~ 68,000	——
	630V	1.0 ~ 2,200	150 ~ 68,000	——
	1000V	1.0 ~ 1,000	150 ~ 22,000	——
	2000V	1.0 ~ 470	150 ~ 10,000	——
	3000V	——	150 ~ 680	——
	4000V	——	150 ~ 680	——
1808	100V	2.0 ~ 4,700	220 ~ 2,200,000	150,000 ~ 1,000,000
	200V	2.0 ~ 3,900	220 ~ 220,000	10,000 ~ 390,000
	250V	2.0 ~ 3,900	220 ~ 220,000	10,000 ~ 390,000
	500V	2.0 ~ 2,700	220 ~ 68,000	——
	630V	2.0 ~ 2,700	220 ~ 68,000	——
	1000V	2.0 ~ 1,000	150 ~ 22,000	——
	2000V	2.0 ~ 470	150 ~ 10,000	——
	3000V	2.0 ~ 330	150 ~ 4,700	——
	4000V	2.0 ~ 33	150 ~ 2,200	——
	5000V	2.0 ~ 33	——	——
1812	100V	3.0 ~ 10,000	270 ~ 1,000,000	150,000 ~ 2,200,000
	200V	3.0 ~ 6,800	270 ~ 560,000	100,000 ~ 470,000
	250V	3.0 ~ 6,800	270 ~ 560,000	100,000 ~ 470,000
	500V	3.0 ~ 4,700	270 ~ 150,000	——
	630V	3.0 ~ 4,700	270 ~ 150,000	——
	1000V	3.0 ~ 1,200	270 ~ 56,000	——
	2000V	3.0 ~ 1,000	270 ~ 12,000	——
	3000V	3.0 ~ 560	270 ~ 4,700	——
	4000V	3.0 ~ 220	270 ~ 3,300	——
	5000V	3.0 ~ 68	——	——

### 中高压电容器介质耐电强度的测试方法：

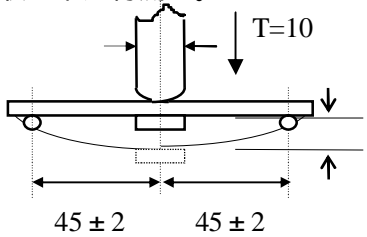
Measurement method of dielectric withstanding voltage for high voltage MLCC

额定电压范围 Rated voltage range	耐电性能的测试方法 Measuring Method
100V Vr < 500V	施加额定电压的 200%，5 秒，最大电流不超过 50mA Force 200% Rated voltage for 5 second. Max..current should not exceed 50 mA.
500V Vr 1000V	施加额定电压的 150%，5 秒，最大电流不超过 50mA Force 150% Rated voltage for 5 second. Max..current should not exceed 50 mA.
1000V < Vr 2000V	施加额定电压的 120%，5 秒，最大电流不超过 50mA Force 120% Rated voltage for 5 seconds. Max..current should not exceed 50 mA.
2000V < Vr 5000V	施加额定电压的 120%，5 秒，最大电流不超过 10mA Force 120% Rated voltage for 5 seconds. Max..current should not exceed 10 mA.

### 八、可靠性测试 Reliability Test

项目 Item	技术规格 Technical Specification		测试方法 Test Method and Remarks		
容量 Capacitance	类 Class	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
	类 Class	应符合指定的误差级别 Should be within the specified tolerance.	1000pF > 1000 pF	1MHZ ± 10% 1KHZ ± 10%	1.0 ± 0.2Vrms
			测试温度：25 ± 3 Test Temperature: 25 ± 3 C 10μF：测试频率: 1KHZ ± 10% 测试电压: 1.0 ± 0.2Vrms Test Frequency: 1KHZ ± 10% Test Voltage: 1.0 ± 0.2Vrms C > 10μF X7R、X5R、X7S、X6S、Y5V： 测试频率: 120 ± 24 HZ 测试电压: 0.5 ± 0.1Vrms Test Frequency: 120 ± 24 HZ Test Voltage: 0.5 ± 0.1Vrms		
损耗角正切 (DF, tan ) Dissipation Factor	类 Class	DF	标称容量 Capacitance	测试频率 Measuring Frequency	测试电压 Measuring Voltage
		0.56%	Cr < 5 pF	1MHZ ± 10%	1.0 ± 0.2Vrms
		$1.5[(150/Cr)+7] \times 10^{-4}$	5pF Cr < 50 pF	1MHZ ± 10%	
		0.15%	50pF Cr 1000 pF	1MHZ ± 10%	
0.15%	> 1000 pF	1KHZ ± 10%			

项目 Item	技术规格 Technical Specification							测试方法 Test Method and Remarks		
损耗角正切(DF, tan ) Dissipation Factor	类 Class	X7R/ X5R	50V	25V	16V	10V	6.3V	C < 10μF 测试频率: 1KHZ ± 10% 测试电压: 1.0 ± 0.2Vrms Test Frequency: 1KHZ ± 10% Test Voltage: 1.0 ± 0.2Vrms  C > 10μF X7R、X5R、X7S、X6S、Y5V 测试频率: 120 ± 24 HZ 测试电压: 0.5 ± 0.1Vrms Test Frequency: 120 ± 24HZ Test Voltage: 0.5 ± 0.1Vrms		
		X7S/ X6S ( 0402)	2.5%	3.5% ( C < 0.47μF) 100% ( C < 0.47μF)	3.5% ( C < 0.47μF) 100% ( C < 0.47μF)	5.0% ( C < 0.15μF) 100% ( C < 0.15μF)	5.0% ( C < 0.15μF) 100% ( C < 0.15μF)			
	X7R/ X5R	50V	25V	16V	10V	6.3V				
	X7S/ X6S ( < 0402)	3.5%	5.0% ( C < 0.047μF) 10% ( C > 0.047μF)	5.0% ( C < 0.047μF) 10% ( C > 0.047μF)	7.5% ( C < 0.047μF) 10% ( C > 0.047μF)	7.5% ( C < 0.047μF) 10% ( C > 0.047μF)	7.5% ( C < 0.047μF) 10% ( C > 0.047μF)			
		Y5V		25V	16V	10V	6.3V			
				7.0% ( C < 1.0μF) 9.0% ( C < 1.0μF)	15%	15%	15%			
绝缘电阻 (IR) Insulation Resistance	类 Class	C < 10 nF, Ri 50000M C > 10 nF, Ri C <sub>R</sub> 500S							测试电压: 额定电压 (最高 500V) 测试时间: 60 ± 5 秒 测试湿度: 75% 测试温度: 25 ± 3 测试充放电电流: 50mA Measuring Voltage: Rated Voltage ( Max 500V ) Duration: 60 ± 5s Test Humidity: 75% Test Temperature: 25 ± 5 Test Current: 50mA	
	类 Class	X7R/ X5R/ X7S/ X6S	C < 25 nF, Ri 10000M C > 25 nF, Ri C <sub>R</sub> > 100S							
	Y5V	C < 25 nF, Ri 4000M C > 25 nF, Ri C <sub>R</sub> > 100S								
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: 类:300%额定电压 类:250%额定电压 时间: 1 ~ 5 秒 充/放电电流: 不应超过 50mA (这部分说明不包括中高压 MLCC) Measuring Voltage: Class :300% Rated voltage Class :250% Rated voltage Duration: 1 ~ 5s Charge/ Discharge Current: 50mA max. (This method excludes high-voltage MLCC)		

项目 Item	技术规格 Technical Specification				测试方法 Test Method and Remarks
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 的温度下预热 10~30 秒。 Preheating conditions: 80 to 120 ; 10~30s.
	有铅焊料: (Sn/Pb : 63/37) 浸锡温度: 235 ± 5 浸锡时间: 2 ± 0.5s Solder Temperature: 235 ± 5 Duration: 2 ± 0.5s		无铅焊料: 浸锡温度: 245 ± 5 浸锡时间: 2 ± 0.5s Solder Temperature: 245 ± 5 Duration: 2 ± 0.5s		
耐焊耐热 Resistance to Soldering Heat	项目 Item	NPO 至 SL NPO to SL	X7R/X5R/ X7S/X6S	Y5V	将电容在 100~200 的温度下预热 10 ± 2 分钟。 浸锡温度: 265 ± 5 浸锡时间: 10 ± 1s 然后取出溶剂清洗干净，在 10 倍以上的显微镜底下观察。 放置时间：24 ± 2 小时 放置条件：室温 Preheating conditions: 100 to 200 ; 10 ± 2min. Solder Temperature: 265 ± 5 Duration: 10 ± 1s Clean the capacitor with solvent and examine it with a 10X(min.) microscope. Recovery Time: 24 ± 2h Recovery condition: Room temperature
	CC	± 0.5% 或 ± 0.5PF, 取较大值 ± 0.5% or ± 0.5PF whichever is larger	-5~+10%	-10~+20%	
	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： 95% Appearance :No visible damage. At least 95% of the terminal electrode is covered by new solder.				
抗弯曲强度 Resistance to Flexure of Substrate (Bending Strength)	外观：无可见损伤。 Appearance: No visible damage.				试验基板：Al <sub>2</sub> O <sub>3</sub> 或 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。 
	C/C	± 10%			Test Board: Al <sub>2</sub> O <sub>3</sub> or PCB Warp: 1mm Speed: 0.5mm/sec. Unit: mm The measurement should be made with the board in the bending position.

项目 Item	技术规格 Technical Specification	测试方法 Test Method and Remarks																														
端头结合强度 Termination Adhesion	外观无可见损伤 No visible damage.	施加的力：5N 时间：10 ± 1S Applied Force: 5N Duration: 10 ± 1S																														
温度循环 Temperature Cycle	<p>C/C: 类： ± 1% 或 ± 1pF , 取两者中最大者 类： B,X,BS,DS: ± 10% E,F: ± 20%</p> <p>Class : ± 1% or ± 1pF, whichever is larger. Class : B,X,BS,DS: ± 10% E,F: ± 20%</p>	<p>预处理 (2类): 上限类别温度, 1小时 恢复：24 ± 1h 初始测量 循环次数：5次，一个循环分以下4步：</p> <table border="1"> <thead> <tr> <th>阶段</th> <th>温度 ( )</th> <th>时间(分钟)</th> </tr> </thead> <tbody> <tr> <td>第1步</td> <td>下限温度<sup>(NPO/X7R/X7S/X6S/X5R:-55 Y5V:-25 Z5U:+10)</sup></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<sup>(NPO/X7R/X7S: Y5V/Z5U/X5R:+85 X6S:+105)</sup></td> <td>30</td> </tr> <tr> <td>第4步</td> <td>常温 (+20)</td> <td>2 ~ 3</td> </tr> </tbody> </table> <p>试验后放置 (恢复) 时间：24 ± 2h Preheating conditions: up-category temperature, 1h Recovery time: 24 ± 1h Initial Measurement Cycling Times: 5 times, 1 cycle, 4 steps:</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature ( )</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Low-category temp. <sup>(NPO/X7R/X7S/X6S/X5R:-55 Y5V:-25 Z5U:+10)</sup></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. <sup>(NPO/X7R/X7S: Y5V/Z5U/X5R:+85 X6S:+105)</sup></td> <td>30</td> </tr> <tr> <td>4</td> <td>Normal temp. (+20)</td> <td>2 ~ 3</td> </tr> </tbody> </table> <p>Recovery time after test: 24 ± 2h</p>	阶段	温度 ( )	时间(分钟)	第1步	下限温度 <sup>(NPO/X7R/X7S/X6S/X5R:-55 Y5V:-25 Z5U:+10)</sup>	30	第2步	常温 (+20)	2 ~ 3	第3步	上限温度 <sup>(NPO/X7R/X7S: Y5V/Z5U/X5R:+85 X6S:+105)</sup>	30	第4步	常温 (+20)	2 ~ 3	Step	Temperature ( )	Time (min.)	1	Low-category temp. <sup>(NPO/X7R/X7S/X6S/X5R:-55 Y5V:-25 Z5U:+10)</sup>	30	2	Normal temp. (+20)	2 ~ 3	3	Up-category temp. <sup>(NPO/X7R/X7S: Y5V/Z5U/X5R:+85 X6S:+105)</sup>	30	4	Normal temp. (+20)	2 ~ 3
阶段	温度 ( )	时间(分钟)																														
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4	Normal temp. (+20)	2 ~ 3																														
潮湿试验 Moisture Resistance	<p>C/C 类： ± 2% 或 ± 1pF, 取两者之中较大者 类: B,X,BS,DS: ± 10% E,F: ± 30% Class : ± 2% or ± 1pF, whichever is larger. Class : B,X,BS,DS: ± 10% E,F: ± 30%</p> <p>DF 2倍初始标准 Not more than twice of initial value.</p> <p>IR 类: Ri 2500M 或 Ri C<sub>R</sub> 25S 取两者之中较小者. Class : Ri 2500M 或 Ri C<sub>R</sub> 25S whichever is smaller. 类: Ri 1000M 或 Ri C<sub>R</sub> 25S 取两者之中较小者. Class : Ri 1000M 或 Ri C<sub>R</sub> 25S whichever is smaller.</p> <p>外观：无损伤 Appearance: No visible damage.</p>	<p>温度：40 ± 2 湿度：90~95%RH 时间：500小时 放置条件：室温 放置时间：24小时( 类)；48小时( 类) Temperature：40 ± 2 Humidity：90~95%RH Duration：500h Recovery conditions：Room temperature Recovery Time：24h (Class1) or 48h (Class2)</p>																														

项目 Item	技术规格 Technical Specification		测试方法 Test Method and Remarks
寿命试验 Life Test	C/C	类： $\pm 2\%$ 或 $\pm 1\text{pF}$ 取两者之中较大者 类：B,X,BS,DS: $\pm 20\%$ E,F: $\pm 30\%$ Class : $\pm 2\%$ or $\pm 1\text{pF}$ , whichever is larger. Class : B,X,BS,DS: $\pm 20\%$ E,F: $\pm 30\%$	低压产品 ( 100V ) 电压：1.5 倍额定工作电压 时间：1000 小时 温度：125 ( NPO、X7R、X7S ) 85 ( X5R、Y5V ) 105 ( X6S ) 充电电流：不应超过 50mA 放置条件：室温 放置时间：24 小时 ( 类 ), 或 48 小时 ( 类 ), Low-Voltage ( 100V ) Applied Voltage: $1.5 \times \text{Rated Voltage}$ Duration: 1000h Temperature : 125 ( NPO、X7R、X7S ) 85 ( X5R、Y5V ) 105 ( X6S ) Charge/ Discharge Current: 50mA max. Recovery Conditions: Room Temperature Recovery Time: 24h (Class 1), or 48h (Class2)
	DF	2 倍初始标准 Not more than twice of initial value.	
	IR	类： $R_i$ 4000M 或 $R_i C_R$ 40S 取两者之中较小者。 Class : $R_i$ 4000M 或 $R_i C_R$ 40S whichever is smaller.	
		类： $R_i$ 2000M 或 $R_i C_R$ 50S 取两者之中较小者。 Class : $R_i$ 2000M 或 $R_i C_R$ 50S whichever is smaller.	
外观：无损伤 Visual Appearance: No visible damage.			
中高压产品 寿命试验 Middle & high voltage Life Test	C/C	类： $\pm 2\%$ 或 $\pm 1\text{pF}$ 取两者之中较大者 类：B,X,BS,DS: $\pm 20\%$ E,F: $\pm 30\%$ Class : $\pm 2\%$ or $\pm 1\text{pF}$ , whichever is larger. Class : B,X,BS,DS: $\pm 20\%$ E,F: $\pm 30\%$	中高压产品： 100V 额定电压 < 500V : 2 倍工作电压 500V 额定电压 1000V : 1.5 倍工作电压 额定电压 > 1000V : 1.2 倍工作电压 时间：1000 小时 充电电流：不应超过 50mA 温度：125 ( NPO X7R、X7S ); 85 ( X5R、Y5V ) 105 ( X6S ) 放置条件：室温 放置时间：24 小时 ( 类 ), 或 48 小时 ( 类 ), Applied Voltage: 100V Rated Voltage < 500V : 2 Multiple 500V Rated Voltage 1000V : 1.5 Multiple > 1000V Rated Voltage : 1.2 Multiple Duration: 1000h Charge/ Discharge Current: 50mA max. Temperature : 125 ( NPO X7R、X7S ); 85 ( X5R、Y5V ) 105 ( X6S ) Recovery Conditions: Room Temperature Recovery Time: 24h (Class 1), or 48h (Class2)
	DF	2 倍初始标准 Not more than twice of initial value.	
	IR	类： $R_i$ 4000M 或 $R_i C_R$ 40S 取两者之中较小者。 Class : $R_i$ 4000M 或 $R_i C_R$ 40S whichever is smaller.	
		类： $R_i$ 2000M 或 $R_i C_R$ 50S 取两者之中较小者。 Class : $R_i$ 2000M 或 $R_i C_R$ 50S whichever is smaller.	
外观：无损伤 Visual Appearance: No visible damage.			

注解：

专门预处理（仅对 2 类电容器）：

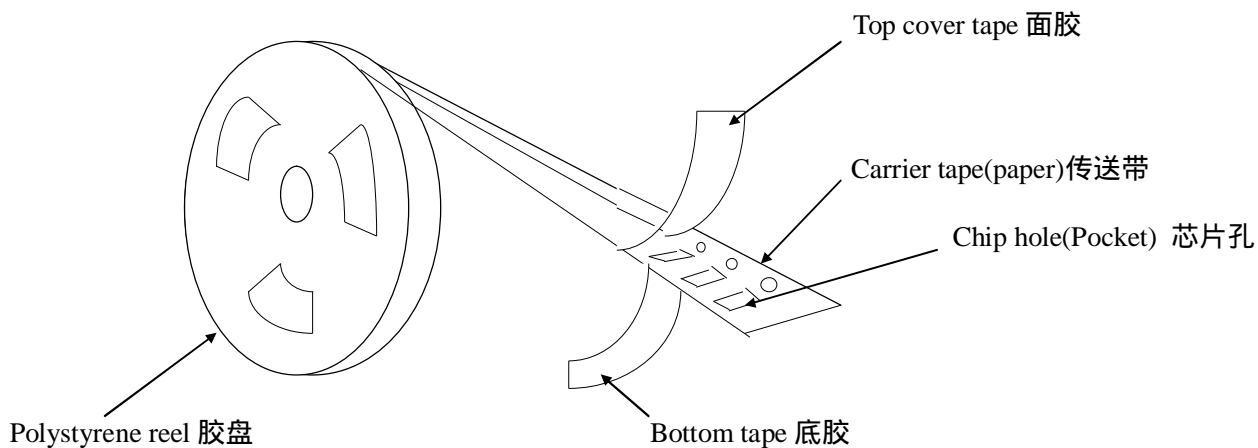
将电容器放在上限类别温度或按详细规范中可能规定的更高温度下经 1h 后，接着在试验的标准大气条件下恢复  $24 \pm 1\text{h}$ 。

Note : Pretreatment (only for class2 capacitor)

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 for 1hour. Then recovery the capacitor at standard pressure conditions for  $24 \pm 1\text{hours}$ .

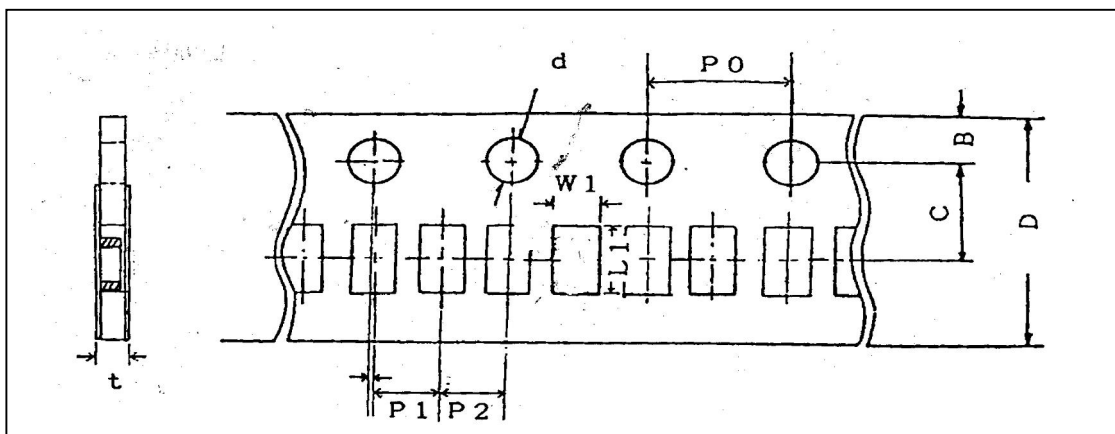
## 九、包装 PACKAGE

### 纸带卷盘结构 PAPER TAPING



0201、0402 纸带编带尺寸大小

Dimensions of paper taping for 0402 type

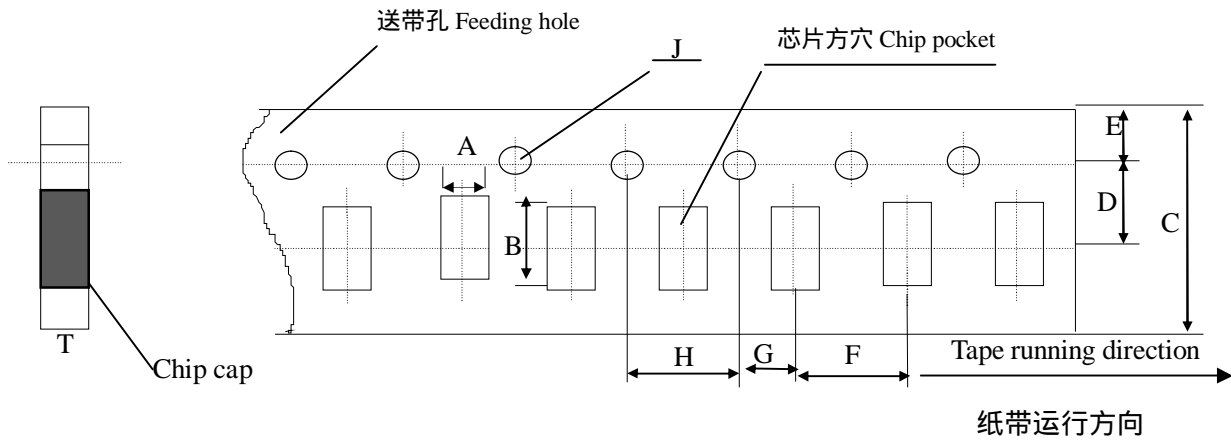


代号 Code	W1	L1	D	C	B	P1	P2	P0	d	t
0201	0.37± 0.10	0.67± 0.10	8.00± 0.10	3.50± 0.05	1.75± 0.10	2.00± 0.05	2.00± 0.05	4.00± 0.10	1.50 -0/+0.10	0.80 Below
0402	0.65± 0.10	1.15± 0.10	8.00± 0.10	3.50± 0.05	1.75± 0.10	2.00± 0.05	2.00± 0.05	4.00± 0.10	1.50 -0/+0.10	0.80 Below

适合 '0603, 0805, 1206' 常规尺寸产品的纸带尺寸

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





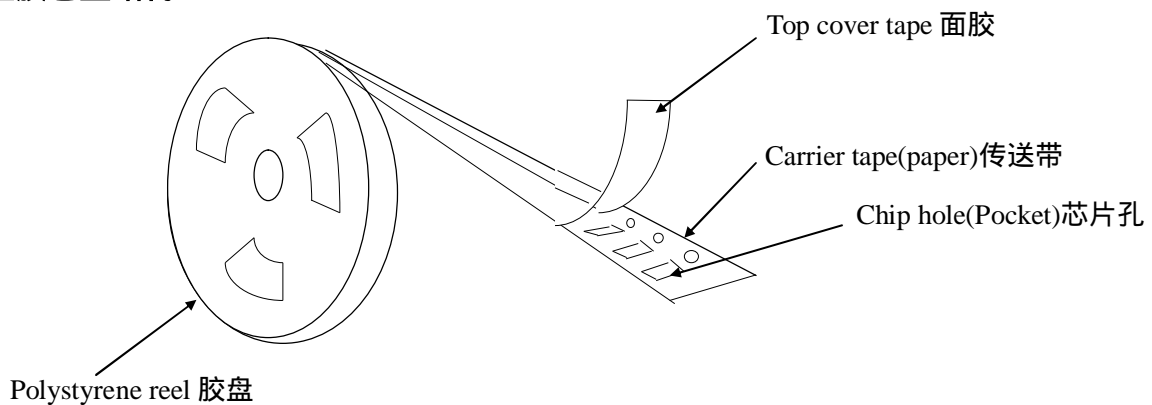
Unit : mm

代号 Code 纸带规格 paper size	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	8.00 ±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.

### 塑胶卷盘结构 EMBOSED TAPING



塑胶带尺寸结构(适合 ' 0805~1812 ' 型产品)

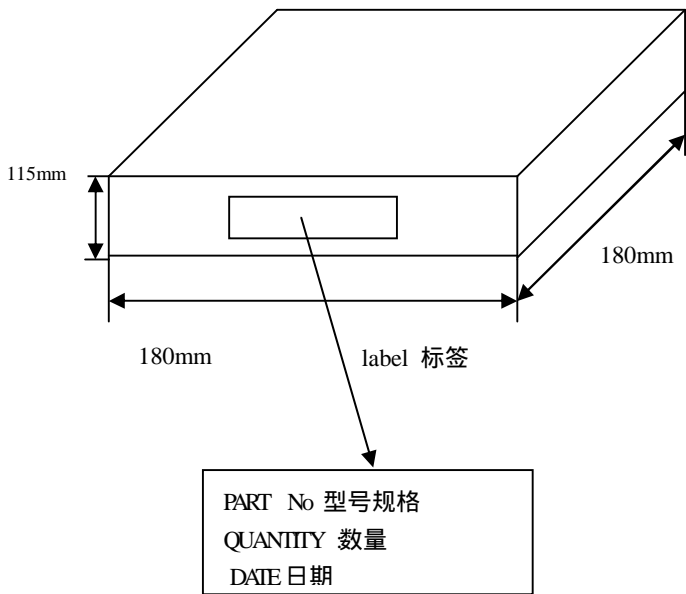
Dimensions of embossed taping for 0805~1812 type

### 外包装 Outer packing

小包装 The first package

Quantity: 10 reels

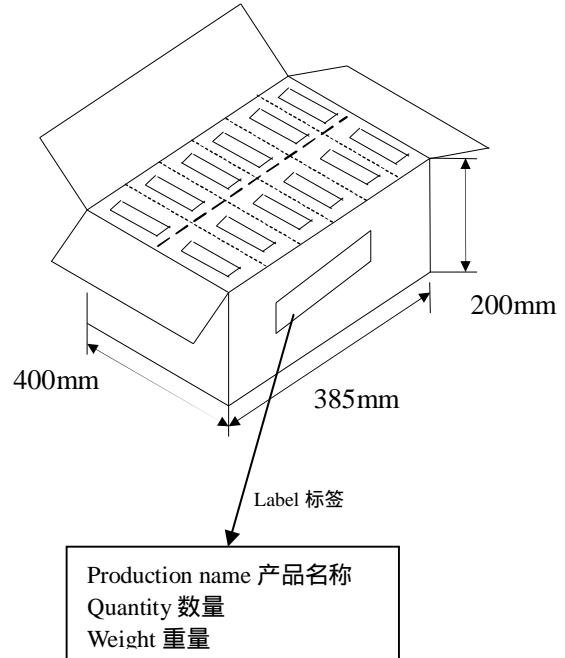
数量：10卷



大包装 The second package

Quantity: 6 cases

数量：6盒



### 十、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%

### 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、品管部或生产部。

The Multi-layer Ceramic Capacitors (MLCC) may fail in a short circuit modern 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.

#### 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).

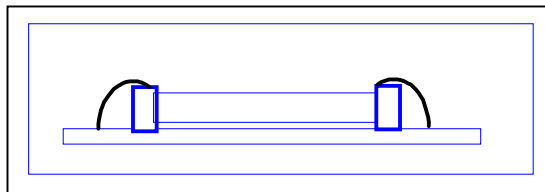
### 2. 手工焊接 Manual Soldering

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.

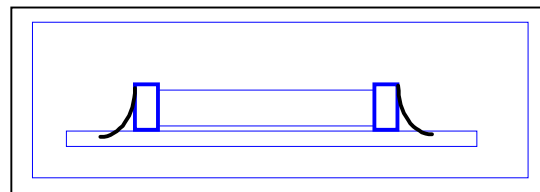
### 3. 适量的焊料 Optimum Solder Amount for Reflow Soldering

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

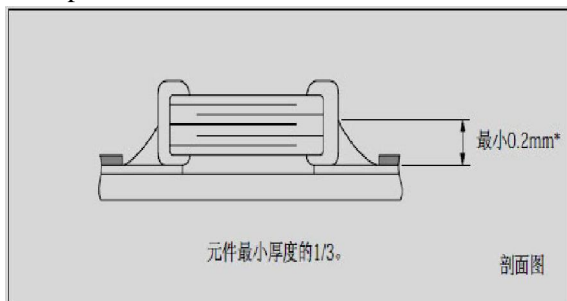


固定力量不足,可能会引起电容芯片与线路接触不良  
Weak holding force may cause bad connection between the capacitor and PCB.

### 4. 推荐焊料用量 Recommended Soldering amounts

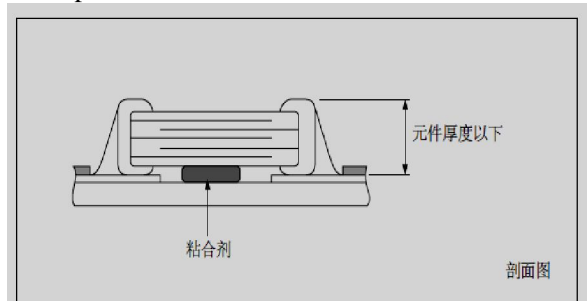
#### 4.1 回流焊接的最佳焊料用量

The optimal solder fillet amounts for re-flow soldering



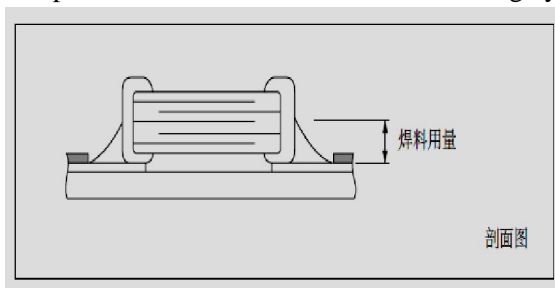
#### 4.2 波峰焊接的最佳焊料用量

The optimal solder fillet amounts for wave soldering



#### 4.3 使用烙铁返修时的最佳焊料量

The optimal solder fillet amounts for reworking by using soldering iron



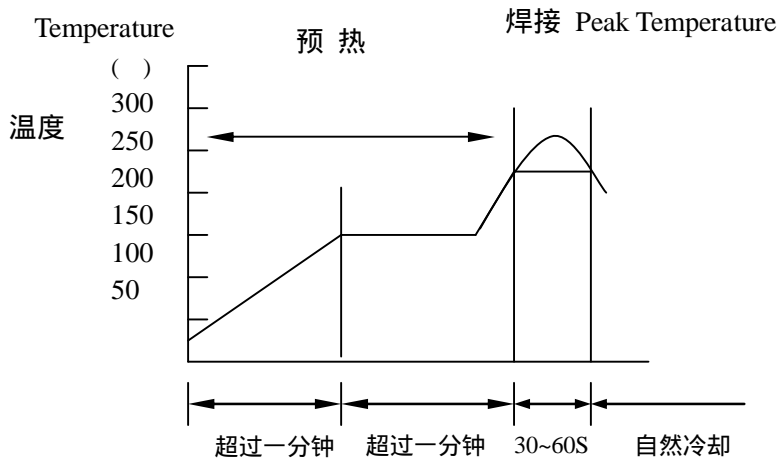
### 十二、推荐焊接方式 Recommended Soldering Method

规格尺寸 Size	温度特性 Temperature Characteristics	额定电压 Rated Voltage	容量范围 Capacitance	焊接方式 Soldering Method
0201	COG(NPO)	/		R
	X7R/X5R/X7S/X6S	/		R
	Y5V	/		R
0402	COG(NPO)	/		R
	X7R/X5R/X7S/X6S	/		R
	Y5V	/		R
0603	COG(NPO)	/		R/W
	X7R/X5R/X7S/X6S	/	C 1uf	R
			C < 1uf	R/W
	Y5V	/	C 1uf	R
C < 1uf			R/W	
0805	COG(NPO)	/	/	R/W
	X7R/X5R/X7S/X6S	/	C 4.7uf	R
			C < 4.7uf	R/W
	Y5V	/	C 1uf	R
C < 1uf			R/W	
1206	COG(NPO)	/	/	R/W
	X7R/X5R/X7S/X6S	/	C 10uf	R
			C < 10uf	R/W
	Y5V	/	C 10uf	R
C < 10uf			R/W	
1210	COG(NPO)	/	/	R
	X7R/X5R/X7S/X6S	/	/	R
	Y5V	/	/	R

焊接方式 Soldering method : R—回流焊 Reflow Solering

W—波峰焊 Wave Soldering

**十三、推荐焊接温度曲线图 The temperature profile for soldering**  
**回流焊接 ( Re-flow soldering )**

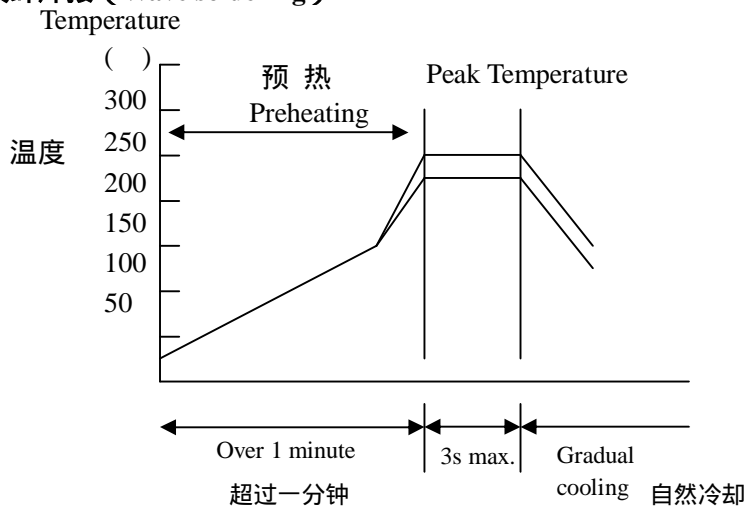


	Pb-Sn 焊接 Pb-Sn soldering	无铅焊接 Lead-free soldering
尖峰温度 Peak temperature	230 ~ 250	240 ~ 260

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  $T = 150$  。

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as:  $T = 150$  .

**波峰焊接 ( Wave soldering )**

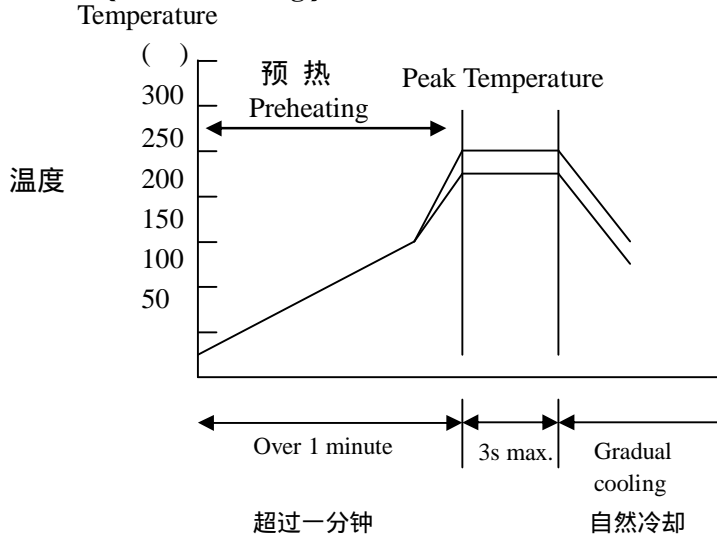


	Pb-Sn 焊接 Pb-Sn soldering	无铅焊接 Lead-free soldering
尖峰温度 Peak temperature	230 ~ 260	240 ~ 270

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  $T = 150$  。

While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as:  $T = 150$  .

### 手工焊接 (Hand soldering)



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
130	最高300 Highest temperature:300	最大20W 20W at the highest	建议1mm 1mm recommended	最长3s 3s at the longest	1/2 芯片厚度 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

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