



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、COH 电容器和温度补偿型高频 HG、LG、PH、RH、SH、TH、UJ、SL 电容器。其中 COG、COH 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，HG、LG、PH、RH、SH、TH、UJ、SL 电容器容量随温度变化而相应变化，适用于低损耗、温度补偿型电路中。

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。

Z5U：此类介质材料的电容器为 类电容器，其温度特性介于 X7R 和 Y5V 之间，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，使用温度范围接近于室温的旁路，耦合等，低直流偏压的电路中。

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、COH capacitor and temperature compensating capacitor such as HG, LG, PH, RH,SH, TH, UJ, SL. The electrical properties of COG、COH capacitor are the most stable one and change invariably with temperature, voltage and time. They are suited for applications where low-losses and high-stability are required, HG ,LG ,PH ,RH ,SH ,TH ,UJ ,SL capacitor's capacitance changes with temperature.They are suited for applications where low-losses and temperature compensating circuits.

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.

Z5U :The capacitor made of this kind of material is considered as Class capacitor, whose temperature characteristic is between that of X7R and Y5V. The capacitance of this kind of capacitor is unstable and sensible to temperature and voltage. Ideally suited for bypassing and decoupling application circuits operating with low DC bias in the environment approaches to room temperature.



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 ± 0.03	0.3 ± 0.03	0.3 ± 0.03	0.15 ± 0.10
0402	1005	1.00 ± 0.05	0.50 ± 0.05	0.50 ± 0.05	0.25 ± 0.10
0603	1608	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.10
0805	2012	2.00 ± 0.20	1.25 ± 0.20	0.55	0.50 ± 0.20
				0.80 ± 0.20	
				1.00 ± 0.20	
				1.25 ± 0.20	
1206	3216	3.20 ± 0.30	1.60 ± 0.30	0.80 ± 0.20	0.60 ± 0.30
				1.00 ± 0.20	
				1.25 ± 0.20	
				1.60 ± 0.30	
1210	3225	3.20 ± 0.30	2.50 ± 0.30	2.80	0.60 ± 0.30
1808	4520	4.50 ± 0.40	2.00 ± 0.20	2.20	0.60 ± 0.30
1812	4532	4.50 ± 0.40	3.20 ± 0.30	3.50	0.60 ± 0.30
2220	5750	5.70 ± 0.40	5.00 ± 0.40	3.50	0.60 ± 0.30
2225	5763	5.70 ± 0.50	6.30 ± 0.50	6.20	0.60 ± 0.30
3012	7632	7.60 ± 0.50	3.20 ± 0.30	8.10	0.60 ± 0.30
3035	7690	7.60 ± 0.50	9.00 ± 0.50	8.10	0.60 ± 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

0805 CG 101 J 500 N T

说明 NOTES :

尺寸 DIMENSIONS

尺寸规格 Size Code	0201	0402	0603	0805	1206	1210	1808	1812	2220	2225	3035
长×宽 (L×W) inch	002×001	004×002	006×003	008×005	012×006	012×010	018×008	018×012	022×020	022×025	030×035
长×宽 (L×W) mm	0.60×0.30	1.00×0.50	1.60×0.80	2.00×1.25	3.20×1.60	3.20×2.50	4.50×2.00	4.50×3.20	5.70×5.00	5.70×6.30	7.60×9.00

介质种类 DIELECTRIC STYLE

介质种类 (Dielectric Code)	CG	CH	HG	LG	PH	RH	SH	TH	UJ	SL	X	B	BS	DS	E	F
介质材料 (Dielectric)	CO G	CO H	HG	LG	PH	RH	SH	TH	UJ	SL	X5 R	X7 R	X7 S	X6 S	Z5 U	Y5 V

标称容量 NOMINAL CAPACITANCE

单位(unit) : pF

表示方式 (Express Method)	实际值 (Actual Value)	注：头两位数字为有效数字，第三位数字为0的个数；R为小数点。 Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.
0R5	0.5	
1R0	1.0	
102	10×10^2	
224	22×10^4	
...	...	

容量误差 CAPACITANCE TOLERANCE

代码 (Code)	A	B	C	D	F	G	J	K	M	S	Z
误差 (Tolerance)	± 0.05pF	± 0.10pF	± 0.25pF	± 0.5pF	± 1.0%	± 2.0%	± 5.0%	±10%	±20%	+50% -20%	+80% -20%

备注：A、B、C、D级误差适用于容量 10pF 的产品。

Note :These capacitance tolerance A ,B, C, D are just applicable the capacitance that equals to or less than 10pF.



额定电压 RATED VOLTAGE

单位(unit) : V

表示方式 (Express Method)	实际值 (Actual Value)	注 :头两位数字为有效数字 ,第三位数字为 0 的个数 ; R 为小数点。 Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.
6R3	6.3	
500	50×10^0	
201	20×10^1	
102	10×10^2	
...	...	

端头材料 TERMINAL MATERIAL STYLES

端头类别 (Termination Styles)	表示方式 (Express Method)
纯银端头 (Silver Solderable Termination)	S
纯铜端头 (Copper Solderable Termination)	C
三层电镀端头 (Nickel Barrier Termination)	N

包装方式 PACKAGE STYLES

B	T
散包装 (Bulk Bag)	编带包装 (Taping Package)

四、温度系数/特性 Temperature Coefficient /Characteristics

介质种类 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	20°C	0±30 ppm/	-55 ~ 125
COH	20°C	0±60 ppm/	-55 ~ 125
HG	20°C	-33±30 ppm/	-25 ~ 85
LG	20°C	-75±30 ppm/	-25 ~ 85
PH	20°C	-150± 60 ppm/	-25 ~ 85
RH	20°C	-220± 60 ppm/	-25 ~ 85
SH	20°C	-330± 60 ppm/	-25 ~ 85
TH	20°C	-470± 60 ppm/	-25 ~ 85
UJ	20°C	-750± 120 ppm/	-25 ~ 85
SL	20°C	-1000 ~ +140 ppm/	-25 ~ 85
X7R	20°C	±15%	-55 ~ 125
X5R	20°C	±15%	-55 ~ 85
X7S	20°C	±22%	-55 ~ 125
X6S	20°C	±22%	-55 ~ 105
Z5U	20°C	-56% ~ +22%	10 ~ 85
Y5V	20°C	-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°C 和 85°C 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°C 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°C and 85°C. Nominal temperature coefficient of class are decided by the temperature of 20°C.



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)(PF)	Y5V (Z5U)(PF)
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 ~ 6,800	1,000 ~ 1,000,000
0805	4V	—	—
	6.3V	—	1,000 ~ 22,000,000
	10V	—	1,000 ~ 22,000,000
	16V	—	1,000 ~ 10,000,000
	25V	—	1,000 ~ 4,700,000
	50V	0.3 ~ 22,000	1,000 ~ 2,200,000



尺寸规格 Size Code	额定电压 Rated Voltage	容量范围 Capacitance	
		COG(NPO)(PF)	Y5V (Z5U)(PF)
1206	4V	—	—
	6.3V	—	1,000 ~ 47,000,000
	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
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 ~ 4,700,000
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 (PF)	X7S(PF)	X5R(uF)	X6S(uF)
0201	4V	—	—	0.015 uF ~ 1uF	—
	6.3V	—	—	0.015 uF ~ 1uF	—
	10V	100 ~ 10,000	—	0.015 uF ~ 0.1 uF	—
	16V	100 ~ 10,000	—	—	—
	25V	100 ~ 10,000	—	—	—
	50V	—	—	—	—
0402	4V	—	—	0.1uF~10uF	0.1~2.2 uF
	6.3V	100 ~ 470,000	100,000 ~ 470,000	0.1uF~4.7uF	0.1~2.2 uF
	10V	100 ~ 470,000	100,000 ~ 470,000	0.1uF~4.7uF	0.1~1 uF
	16V	100 ~ 220,000	47,000 ~ 220,000	0.1uF~2.2 uF	—
	25V	100 ~ 100,000	22,000 ~ 100,000	0.1uF~2.2 uF	—
	50V	100 ~ 100,000	4,700 ~ 100,000	0.047uF~0.1 uF	—
0603	4V	—	—	0.47uF ~ 22uF	0.1~10 uF
	6.3V	150 ~ 2,200,000	470,000 ~ 2,200,000	0.47uF ~ 22uF	0.1~10 uF
	10V	150 ~ 2,200,000	470,000 ~ 2,200,000	0.47uF ~ 22uF	0.1~10 uF
	16V	150 ~ 1,000,000	470,000 ~ 1,000,000	0.47uF ~ 10uF	0.1~4.7 uF
	25V	150 ~ 1,000,000	470,000 ~ 1,000,000	0.47uF ~ 10uF	0.1~4.7 uF
	50V	150 ~ 470,000	—	0.47uF ~ 1uF	—
0805	4V	—	—	1uF ~ 47uF	0.1~47 uF
	6.3V	150 ~ 10,000,000	1,000,000 ~ 10,000,000	1uF ~ 47uF	0.1~22 uF
	10V	150 ~ 10,000,000	1,000,000 ~ 10,000,000	1uF ~ 22uF	0.1~10 uF
	16V	150 ~ 4,700,000	1,000,000 ~ 4,700,000	1uF ~ 22uF	0.1~10 uF
	25V	150 ~ 4,700,000	1,000,000 ~ 4,700,000	1uF ~ 10uF	0.1~10 uF
	50V	150 ~ 2,200,000	—	—	—



尺寸规格 Size Code	额定电压 Rated Voltage	容量范围 Capacitance			
		X7R (PF)	X7S (PF)	X5R(uF)	X6S(uF)
1206	4V	—	—	2.2uF ~ 100uF	—
	6.3V	200 ~ 22,000,000	2,200,000 ~ 22,000,000	2.2uF ~ 100uF	0.1~100 uF
	10V	200 ~ 22,000,000	2,200,000 ~ 22,000,000	2.2uF ~ 47uF	0.1~22 uF
	16V	200 ~ 10,000,000	2,200,000 ~ 10,000,000	2.2uF ~ 22uF	0.1~22 uF
	25V	200 ~ 10,000,000	1,500,000 ~ 10,000,000	2.2uF ~ 22uF	0.1~10 uF
	50V	200 ~ 4,700,000	1,000,000 ~ 4,700,000	2.2uF ~ 10uF	—
1210	6.3V	220 ~ 47,000,000	—	47uF ~ 100uF	0.1~100 uF
	10V	220 ~ 47,000,000	—	4.7uF ~ 100uF	0.1~47 uF
	16V	220 ~ 22,000,000	3,300,000 ~ 22,000,000	4.7uF ~ 47uF	0.1~22 uF
	25V	220 ~ 22,000,000	2,200,000 ~ 22,000,000	4.7uF ~ 22uF	0.1~22 uF
	50V	220 ~ 10,000,000	1,000,000 ~ 10,000,000	—	—
1808	6.3V	220 ~ 4,700,000	—	4.7uF ~ 100uF	—
	10V	220 ~ 4,700,000	—	4.7uF ~ 47uF	—
	16V	220 ~ 4,700,000	—	4.7uF ~ 22uF	—
	25V	220 ~ 4,700,000	—	4.7uF ~ 10uF	—
	50V	220 ~ 4,700,000	—	—	—
1812	6.3V	—	—	10uF ~ 100uF	—
	10V	—	—	10uF ~ 47uF	—
	16V	470 ~ 6,800,000	—	4.7uF ~ 22uF	—
	25V	470 ~ 6,800,000	—	4.7uF ~ 10uF	—
	50V	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 .



六、高 Q 值 COG 电容器 Hi-Q COG MLCC

应用:

适合于射频 RF 电路及要求 Hi-Q、低 ESR、高频率响应的微波电路中。

CQ、CG 电容器说明：

下述 Q 值标准是相对通用客户而制定的，对要求更高 Q 值产品的客户，可专门设计和生产。

使用频率在 1MHz~2.4GHz 之间，对要求更高频率产品的客户，可根据客户的要求另外专门设计。

CQ 比 CG 相对可应用频率略高,请客户按需选定。

Application:

Hi-Q COG capacitors are ideally suited for RF and microwave application requiring high Q, low ESR, and high resonant frequency.

Note for CQ and CG:

The following Q value is just confirmed by general customer. If there is a higher requirement for Q value requirements, we can design and produce according to the special requirements.

For the customer whose requirements for frequency is between 1MHz and 2.4GHz or higher frequency, we can design it according to their requirements.

The frequency of CQ is a little higher than that of CG. Please choose them according to your requirements.

CQ 电容器的容量值及其 Q 值 CQ Capacitance value and Q value

容量 Capacitance (pF)	300MHz 时的Q 值 Q value at 300MHz		容量 Capacitance (pF)	300MHz 时的Q 值 Q value at 300MHz		容量 Capacitance (pF)	300MHz 时的Q 值 Q value at 300MHz	
	0805	0603		0805	0603		0805	0603
	4.7	1000		800	12		400	320
5.2	900	720	13	375	300	33	140	112
5.6	850	680	14	350	280	36	130	104
6.2	800	640	15	325	260	39	120	96
6.8	700	560	16	300	240	43	110	88
7.5	650	520	18	250	200	47	100	80
8.2	575	460	20	225	180	56	80	80
9.1	525	420	22	215	172	62	80	80
10	500	400	24	200	160	68	80	80
11	450	360	27	175	140	82	80	80



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 ~ 2,200,000	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	——
1812	100V	3.0 ~ 10,000	270 ~ 1,000,000	150,000 ~ 2,200,000
	200V	3.0 ~ 6,800	270 ~ 1,000,000	100,000 ~ 470,000
	250V	3.0 ~ 6,800	270 ~ 1,000,000	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	——
1825	100V	3.0 ~ 22,000	12,000 ~ 1,200,000	150,000 ~ 2,200,000
	200V	3.0 ~ 8,200	12,000 ~ 1,000,000	100,000 ~ 470,000
	250V	3.0 ~ 8,200	12,000 ~ 1,000,000	100,000 ~ 470,000
	500V	3.0 ~ 5,600	1,000 ~ 470,000	——
	630V	3.0 ~ 5,600	1,000 ~ 470,000	——
	1000V	3.0 ~ 1,800	1,000 ~ 100,000	——
	2000V	3.0 ~ 1,000	1,000 ~ 22,000	——
	3000V	3.0 ~ 680	1,000 ~ 10,000	——
	4000V	3.0 ~ 470	1,000 ~ 6,800	——
5000V	3.0 ~ 82	——	——	



尺寸规格 Size Code	工作电压 Rated Voltage	容量范围 Capacitance		
		NPO	X7R	Y5V
2220	100V	5.0 ~ 27,000	22,000 ~ 1,200,000	150,000 ~ 1,500,000
	200V	5.0 ~ 12,000	22,000 ~ 1,000,000	100,000 ~ 1,000,000
	250V	5.0 ~ 12,000	22,000 ~ 1,000,000	100,000 ~ 1,000,000
	500V	5.0 ~ 6,800	1,500 ~ 470,000	——
	630V	5.0 ~ 6,800	1,500 ~ 470,000	——
	1000V	5.0 ~ 3,900	1,500 ~ 100,000	——
	2000V	5.0 ~ 1,000	1,500 ~ 33,000	——
	3000V	5.0 ~ 680	1,500 ~ 10,000	——
	4000V	5.0 ~ 560	1,500 ~ 6,800	——
	5000V	5.0 ~ 120	——	——
2225	100V	5.0 ~ 27,000	2,200 ~ 2,200,000	250,000 ~ 3,300,000
	200V	5.0 ~ 12,000	2,200 ~ 2,200,000	220,000 ~ 2,200,000
	250V	5.0 ~ 12,000	2,200 ~ 2,200,000	220,000 ~ 2,200,000
	500V	5.0 ~ 6,800	2,200 ~ 470,000	——
	630V	5.0 ~ 6,800	2,200 ~ 470,000	——
	1000V	5.0 ~ 3,900	2,200 ~ 100,000	——
	2000V	5.0 ~ 1,000	2,200 ~ 47,000	——
	3000V	5.0 ~ 680	2,200 ~ 15,000	——
	4000V	5.0 ~ 560	2,200 ~ 6,800	——
	5000V	5.0 ~ 120	——	——
3012	100V	5.0 ~ 27,000	150 ~ 3,300,000	15,000 ~ 1,500,000
	200V	5.0 ~ 12,000	150 ~ 2,200,000	15,000 ~ 1,000,000
	250V	5.0 ~ 12,000	150 ~ 1,200,000	——
	500V	5.0 ~ 6,800	150 ~ 220,000	——
	630V	5.0 ~ 6,800	150 ~ 150,000	——
	1000V	5.0 ~ 3,900	150 ~ 47,000	——
	2000V	5.0 ~ 1,000	150 ~ 33,000	——
	3000V	5.0 ~ 1,000	150~10,000	——
	4000V	5.0 ~ 1,000	150~8,200	——
	5000V	5.0 ~ 120	——	——
3035	100V	5.0 ~ 27,000	47,000 ~ 4,700,000	10,000 ~ 2,200,000
	200V	5.0 ~ 12,000	47,000 ~ 2,200,000	10,000 ~ 2,200,000
	250V	5.0 ~ 12,000	47,000 ~ 2,200,000	10,000 ~ 2,200,000
	500V	5.0 ~ 6,800	5,600 ~ 1,000,000	——
	630V	5.0 ~ 6,800	5,600 ~ 470,000	——
	1000V	5.0 ~ 3,900	5,600 ~ 56,000	——
	2000V	5.0 ~ 1,000	5,600 ~ 47,000	——
	5000V	5.0 ~ 120	——	——

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.



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.

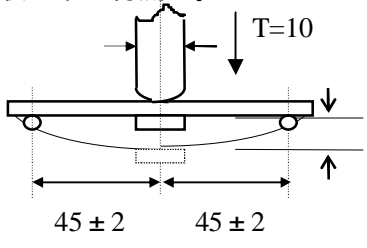
八、可靠性测试 Reliability Test

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 Z5U：测试频率：1 ± 0.1KHZ 测试电压：0.5 ± 0.05Vrms Test Frequency: 1 ± 0.1KHZ Test Voltage: 0.5 ± 0.05Vrms		
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 Z5U:测试频率: 1 ± 0.1KHZ 测试电压: 0.5 ± 0.05Vrms Test Frequency: 1 ± 0.1KHZ Test Voltage: 0.5 ± 0.05Vrms	
		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 Z5U		25V 7.0% (C < 1.0μF) 9.0% (C < 1.0μF)	16V 15%	10V 15%	6.3V 15%		
绝缘电阻 (IR) Insulation Resistance	类 Class	C < 10 nF, Ri 50000M C > 10 nF, Ri C _R 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 _R > 100S						
	Y5V Z5U	C < 25 nF, Ri 4000M C > 25 nF, Ri C _R > 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		
耐焊热 Resistance to Soldering Heat	项目 Item	NPO 至 SL NPO to SL	X7R/X5R/ X7S/X6S	Y5V、 Z5U	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~+2 0%	
	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 ₂ O ₃ 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 ₂ O ₃ 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^(NPO/X7R/X7S/X6S/X5R:-55 Y5V:-25 Z5U:+10)</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^(NPO/X7R/X7S: Y5V/Z5U/X5R:+85 X6S:+105)</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. ^(NPO/X7R/X7S/X6S/X5R:-55 Y5V:-25 Z5U:+10)</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. ^(NPO/X7R/X7S: Y5V/Z5U/X5R:+85 X6S:+105)</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 ^(NPO/X7R/X7S/X6S/X5R:-55 Y5V:-25 Z5U:+10)	30	第2步	常温 (+20)	2 ~ 3	第3步	上限温度 ^(NPO/X7R/X7S: Y5V/Z5U/X5R:+85 X6S:+105)	30	第4步	常温 (+20)	2 ~ 3	Step	Temperature ()	Time (min.)	1	Low-category temp. ^(NPO/X7R/X7S/X6S/X5R:-55 Y5V:-25 Z5U:+10)	30	2	Normal temp. (+20)	2 ~ 3	3	Up-category temp. ^(NPO/X7R/X7S: Y5V/Z5U/X5R:+85 X6S:+105)	30	4	Normal temp. (+20)	2 ~ 3
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4	Normal temp. (+20)	2 ~ 3																														
潮湿试验 Moisture Resistance	C/C	<p>类： ± 2% 或 ± 1pF, 取两者之中较大者 类: B,X,BS,DS: ± 10% E,F: ± 30%</p> <p>Class : ± 2% or ± 1pF, whichever is larger. Class : B,X,BS,DS: ± 10% E,F: ± 30%</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>																													
	DF	2倍初始标准 Not more than twice of initial value.																														
	IR	类：Ri 2500M 或 Ri C _R 25S 取两者之中较小者。 Class：Ri 2500M 或 Ri C _R 25S whichever is smaller.																														
		类：Ri 1000M 或 Ri C _R 25S 取两者之中较小者。 Class：Ri 1000M 或 Ri C _R 25S whichever is smaller.																														
外观：无损伤 Appearance: No visible damage.																																



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：±2%或±1pF 取两者之中较大者 类：B,X,BS,DS: ±20% E,F: ±30% Class : ±2% or ±1pF, whichever is larger. Class : B,X,BS,DS: ±20% E,F: ±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 × 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	
	IR	类：Ri 4000M 或 Ri C _R 40S 取两者之中较小者。 Class : Ri 4000M 或 Ri C _R 40S whichever is smaller.	
		类：Ri 2000M 或 Ri C _R 50S 取两者之中较小者。 Class : Ri 2000M 或 Ri 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：±2%或±1pF 取两者之中较大者 类：B,X,BS,DS: ±20% E,F: ±30% Class : ±2% or ±1pF, whichever is larger. Class : B,X,BS,DS: ±20% E,F: ±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	
	IR	类：Ri 4000M 或 Ri C _R 40S 取两者之中较小者。 Class : Ri 4000M 或 Ri C _R 40S whichever is smaller.	
		类：Ri 2000M 或 Ri C _R 50S 取两者之中较小者。 Class : Ri 2000M 或 Ri 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）：

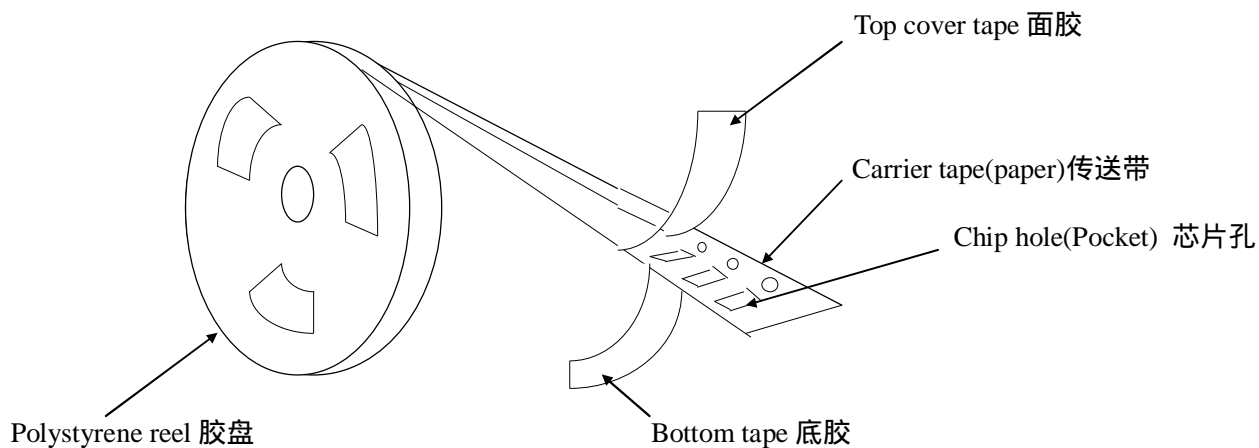
将电容器放在上限类别温度或按详细规范中可能规定的更高温度下经 1h 后，接着在试验的标准大气条件下恢复 24 ± 1h。

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 ± 1hours.

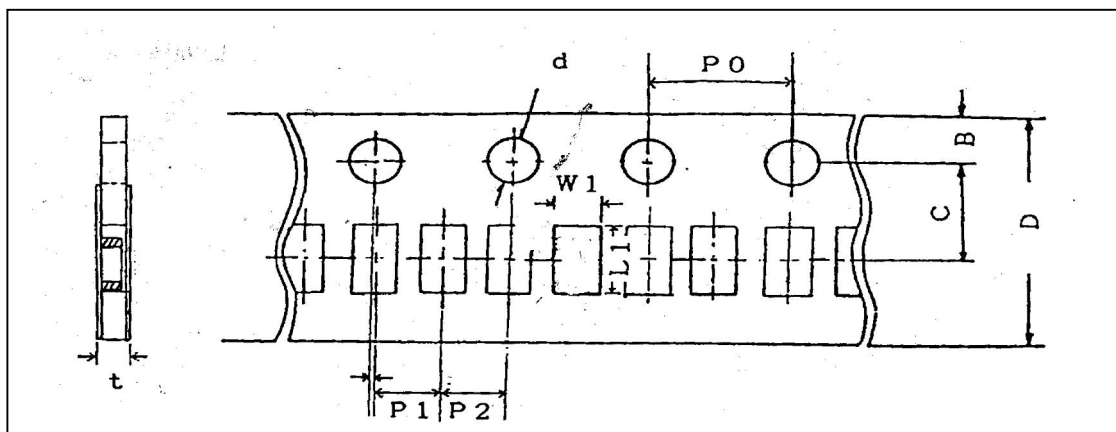
九、包装 PACKAGE

纸带卷盘结构 PAPER TAPING



0201、0402 纸带编带尺寸大小

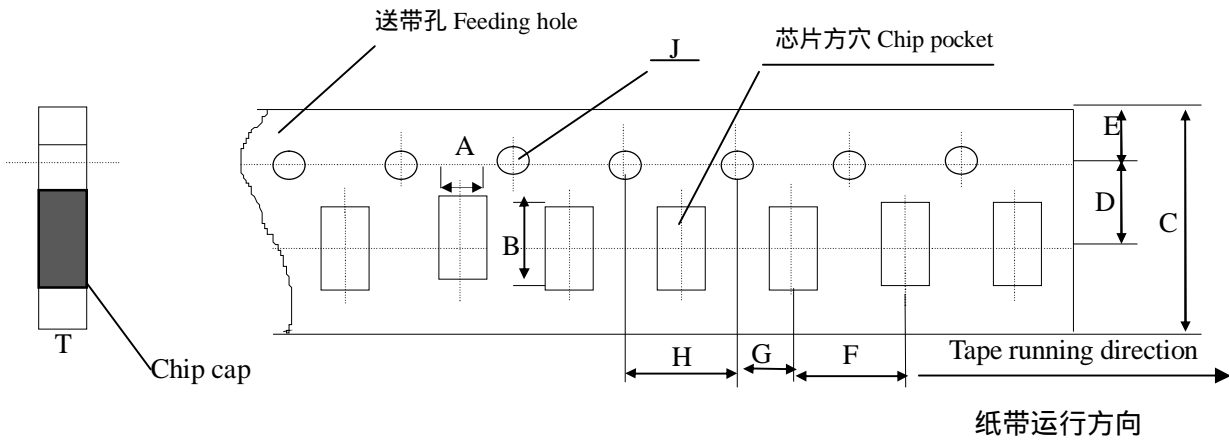
Dimensions of paper taping for 0402 type



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.



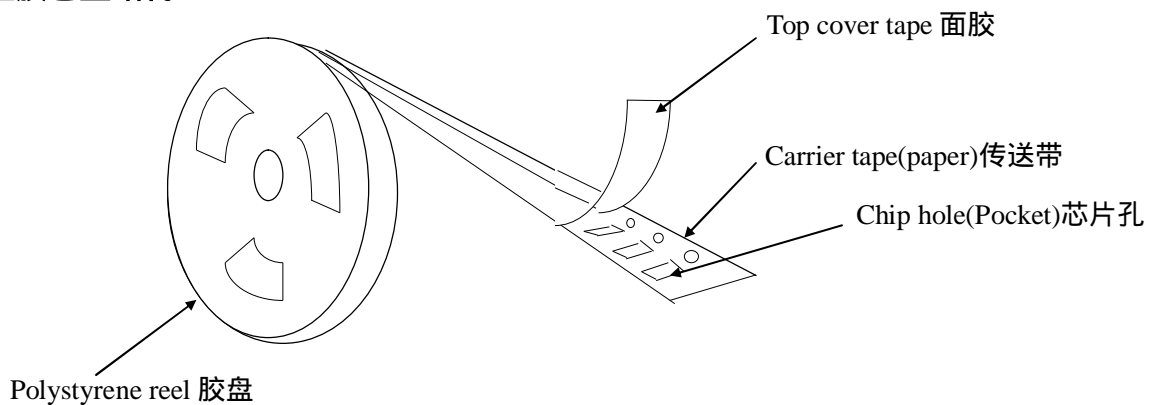
Unit : mm

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。

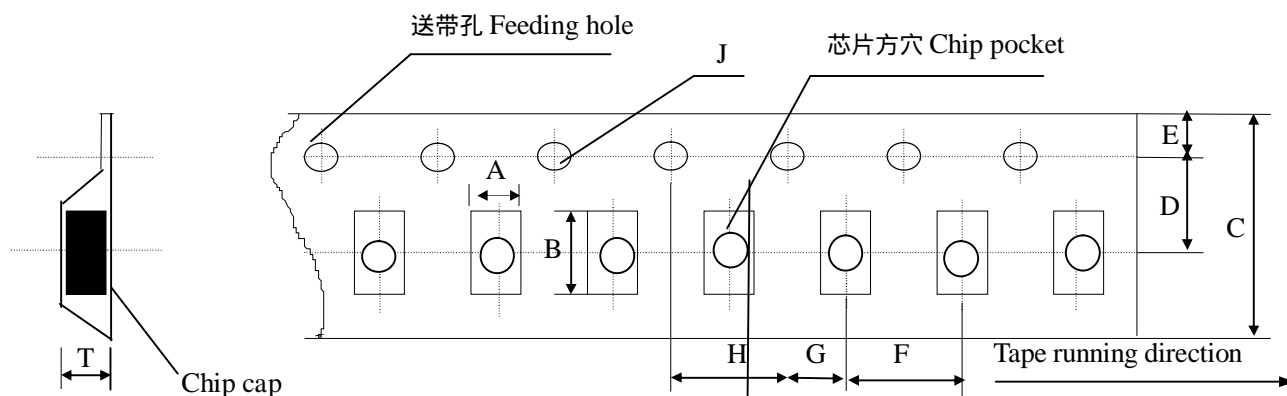
Note: The place with "*" means where needs exactly dimensions.

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

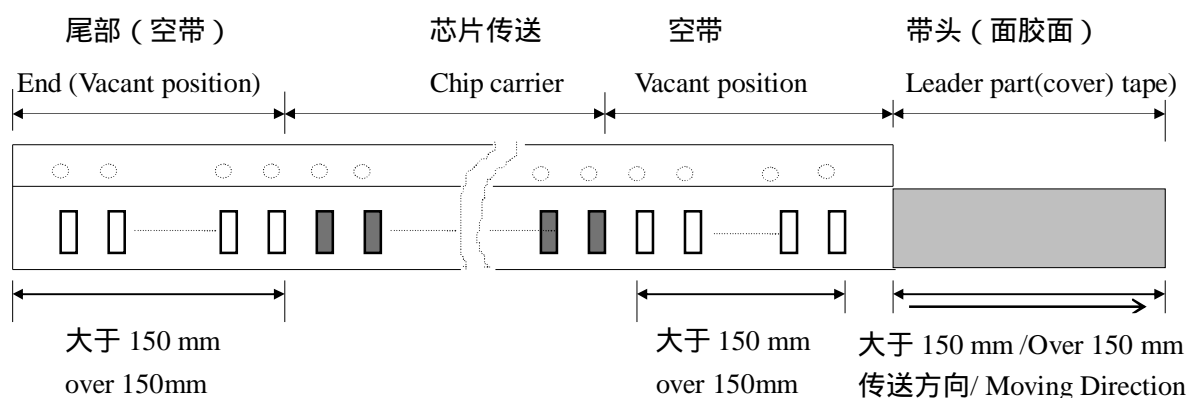


塑胶带传送方向

代号 Code	A	B	C	D*	E	F	G*	H	J	T
规格 Tape size										
0805	1.55 ±0.20	2.35 ±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	1.50 Max
1206	1.95 ±0.20	3.60 ±0.20	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.1	1.50 -0/+0.10	1.85 Max
1210	2.70 ±0.10	3.42 ±0.10	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.55 -0/+0.10	3.2 Max
1808	2.20 ±0.10	4.95 ±0.10	12.00 ±0.10	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	3.0 Max
1812	3.66 ±0.10	4.95 ±0.10	12.00 ±0.10	5.50 ±0.05	1.75 ±0.10	8.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.55 -0/+0.10	4.0 Max

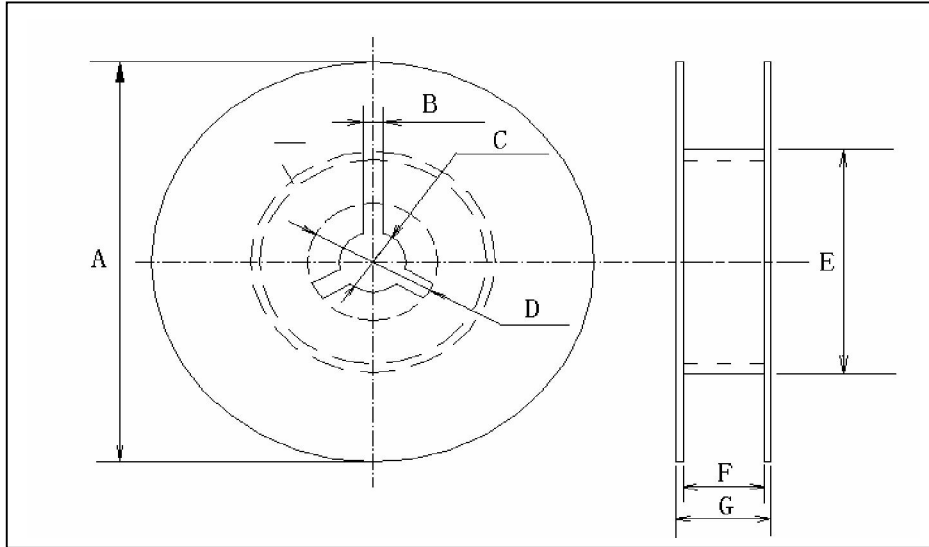
备注：*表示此处对尺寸的要求非常精确。

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

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




卷盘尺寸 Reel Dimensions (unit: mm)



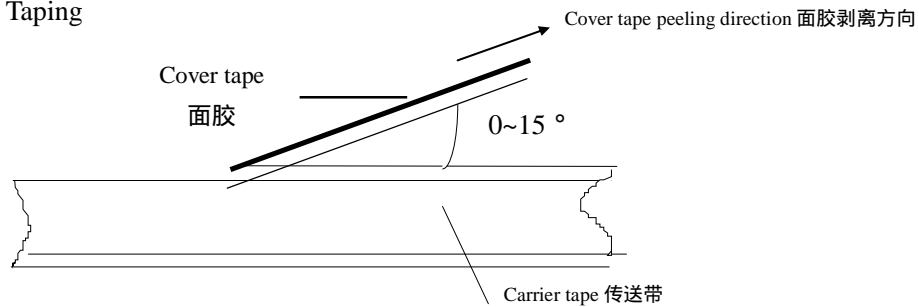
尺寸代码 (CODE)

卷盘型号	A	B	C	D	E	F	G
7 REEL	178±20	3.0	13±0.5	21±0.8	50 或更大 50 or more	100±1.5	12max
13 REEL	330±20	3.0	13±0.5	21±0.8	50 或更大 50 or more	100±1.5	12max

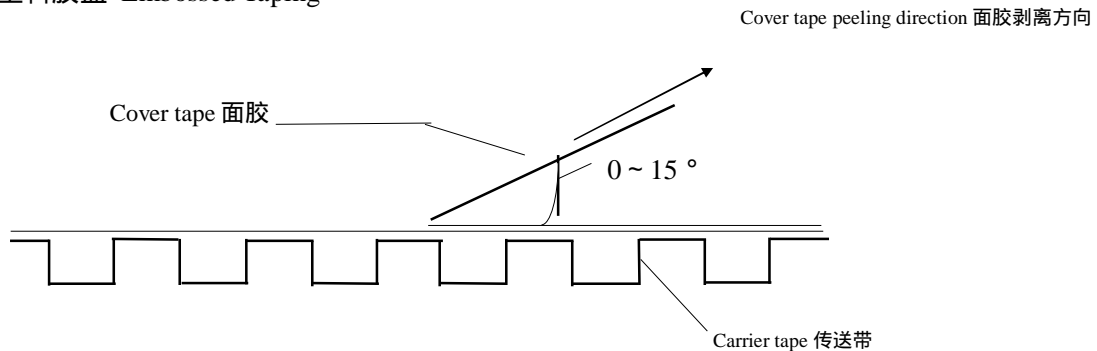
关于卷带的说明 Taping specification

面胶剥离强度 Top tape peeling strength

(a) 纸带 Paper Taping



(b) 塑料胶盘 Embossed Taping



标准：0.1N<剥离强度<0.7N

Standard: 0.1N < peeling strength < 0.7N

在剥离时，纸带不能有纸碎，也不能粘在底、面胶上。

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



塑料盒散包装 Bulk Case Package

单位 (unit) :mm

Symbol	A	B	T	C	D	E
Dimension	6.80 ± 0.10	8.80 ± 1.00	12.00 ± 0.10	15.00+0.10/-0	2.00+0/-0.10	4.70 ± 0.10
Symbol	F	W	G	H	L	I
Dimension	31.50+0.20/-0	36.00+0/-0.20	19.00 ± 0.35	7.00 ± 0.35	110.00 ± 0.70	5.00 ± 0.35

包装数量 Packing Quantity

尺寸 (SIZE)	包装形式和数量 (PACKAGE STYLE & QUANTITY) unit: pcs			
	纸带卷盘 (PT)	胶带卷盘 (ET)	塑料盒散装 (BC)	一般散装 (BP)
0201	15000	-----	20000	5000
0402	10000	-----	20000	5000
0603	4000	-----	15000	5000
0805	4000	3000	10000	5000
1206	4000	T 1.35mm 3000 T > 1.35mm 2000	5000	5000
1210	-----	T 1.80mm 2000 T > 1.80mm 1000	-----	2000
1410	-----	2000	-----	-----
1808	-----	2000	-----	2000
1812	-----	T 1.85mm 1000 T > 1.85mm 500	-----	2000
1825、2220、 2025、2225、 3035	-----	500	-----	500

注意：包装的形式和数量可根据客户的要求来定。

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



外包装 Outer packing

小包装 The first package

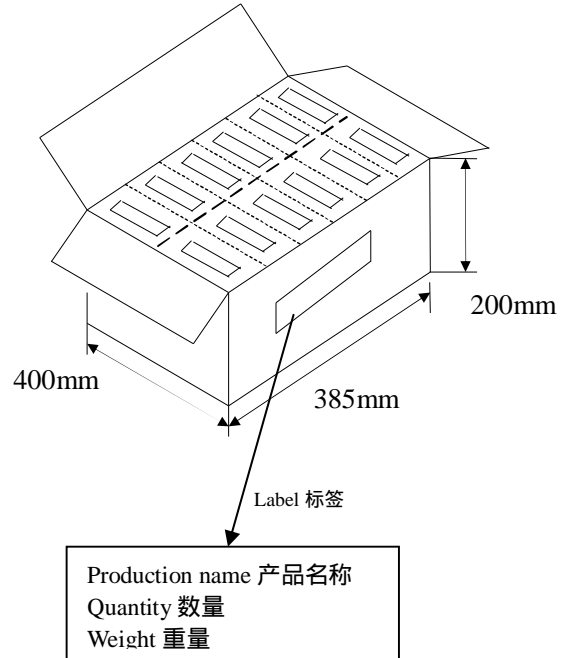
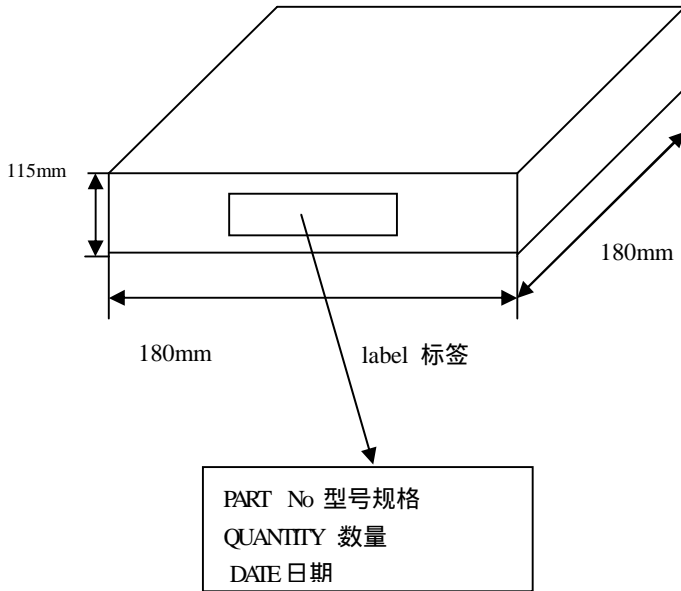
Quantity: 10 reels

数量：10卷

大包装 The second package

Quantity: 6 cases

数量：6盒



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).



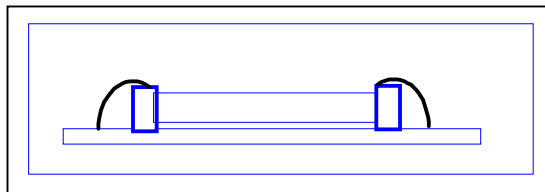
2. 手工焊接 Manual Soldering

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.

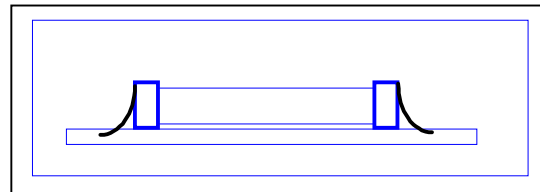
3. 适量的焊料 Optimum Solder Amount for Reflow Soldering

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

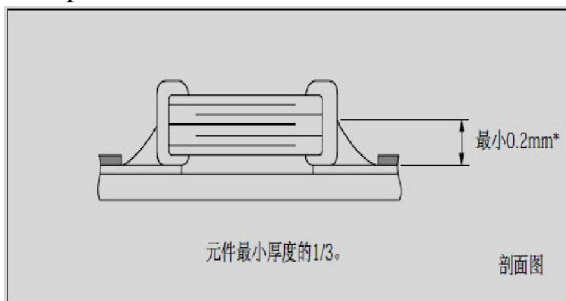


固定力量不足,可能会引起电容芯片与线路接触不良
Weak holding force may cause bad connection between the capacitor and PCB.

4. 推荐焊料用量 Recommended Soldering amounts

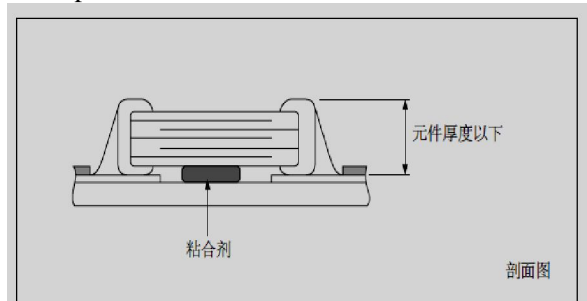
4.1 回流焊接的最佳焊料用量

The optimal solder fillet amounts for re-flow soldering



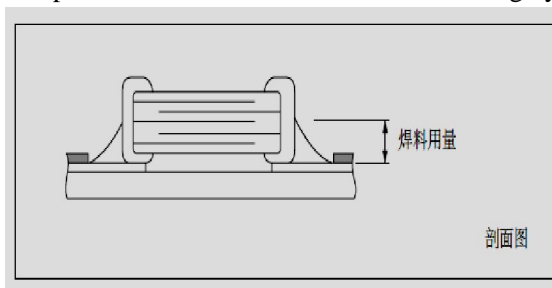
4.2 波峰焊接的最佳焊料用量

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	NPO	/		R
	X7R/X5R/X7S/X6S	/		R
	Y5V	/		R
0402	NPO	/		R
	X7R/X5R/X7S/X6S	/		R
	Y5V	/		R
0603	NPO	/		R/W
	X7R/X5R/X7S/X6S	/	C 1uf	R
			C < 1uf	R/W
	Y5V	/	C 1uf	R
C < 1uf			R/W	
0805	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	NPO	/	/	R/W
	X7R/X5R/X7S/X6S	/	C 10uf	R
			C < 10uf	R/W
	Y5V	/	C 10uf	R
C < 10uf			R/W	
1210	NPO	/	/	R
	X7R/X5R/X7S/X6S	/	/	R
	Y5V	/	/	R

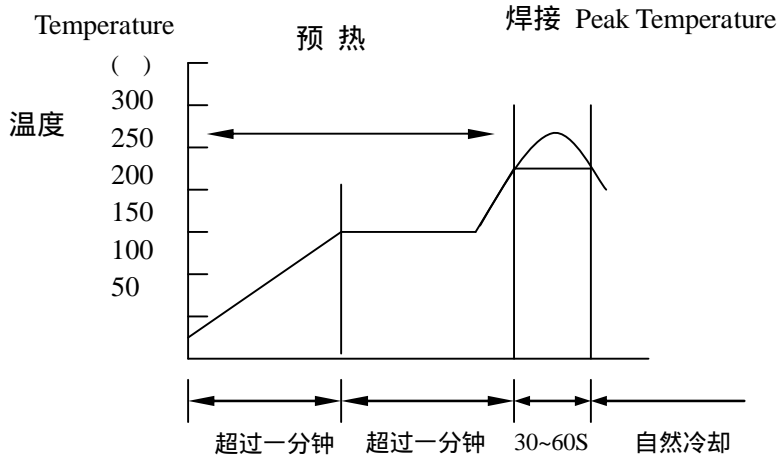
焊接方式 Soldering method : R—回流焊 Reflow Solering

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)

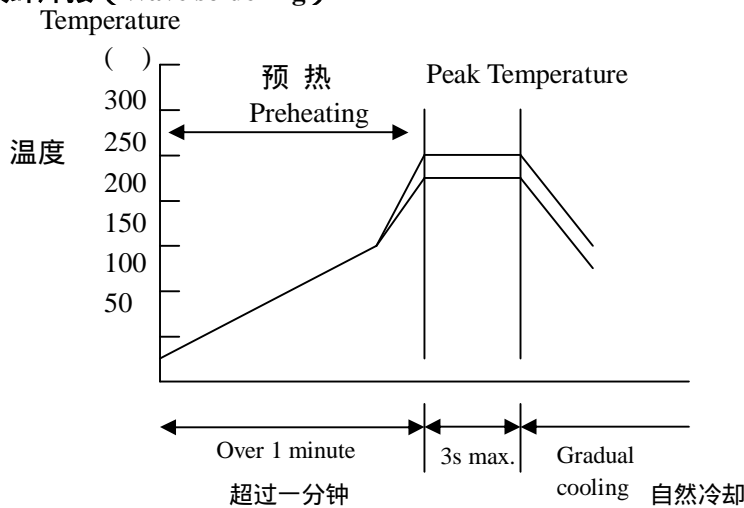


	Pb-Sn 焊接 Pb-Sn soldering	无铅焊接 Lead-free soldering
尖峰温度 Peak temperature	230 ~ 250	240 ~ 260

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 $T \pm 150$ 。

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

波峰焊接 (Wave soldering)



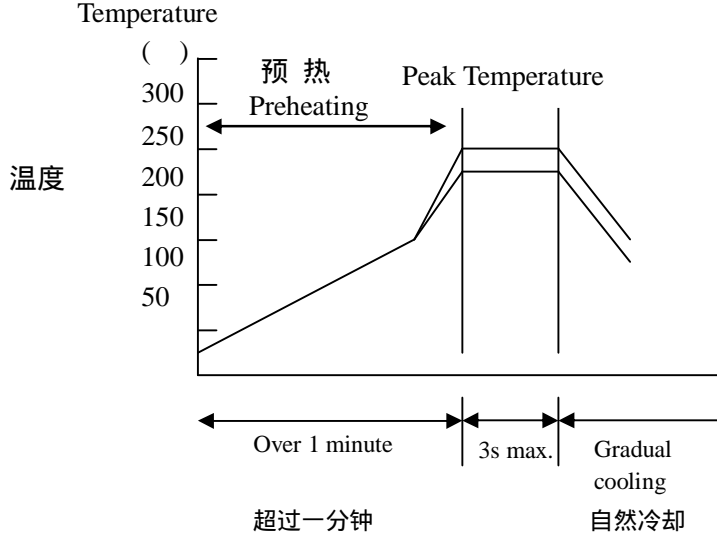
	Pb-Sn 焊接 Pb-Sn soldering	无铅焊接 Lead-free soldering
尖峰温度 Peak temperature	230 ~ 260	240 ~ 270

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 $T \pm 150$ 。

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



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

以最新版本的内容为准

产品规格书

PRODOCUT SPECIFICATION

客户名称

CUSTOMER : _____

产品名称

通用型系列片式容陶瓷电容器

PART NAME: Multilayer Chip Ceramic Capacitors

规格

SPECIFICATION: 1005~1812TYPE

版本

VERSION: _____

日期

DATE OF ISSUE: _____

制 造 MANUFACTURER			客 户 CUSTOMER		
拟制 DESIGN	审核 CHECK	批准 APPROVAL	检验 INSPECTOR	审核 CHECK	批准 APPROVAL

序号 No	目 录 TABLE OF CONTENTS
1	应用范围 Application
2	型号表示法 Ordering Code
3	产品结构 Product Structure
4	容量范围及其电压 Capacitance Range and Operating Voltage
5	可靠性测试方法 Reliability Test Methods
6	包装 Package
7	储存方法 Storage Methods
8	使用前的注意事项 Precautions Before Use

■通用型系列片式陶瓷电容器

General series of ceramic chip capacitors

◆特征

Feature

*叠层独石结构，具有高可靠性能

There is high reliability on monolithic structure of laminated layers.

*具有优良的焊接与耐焊性能，适用于回流焊接与波峰焊接

And its character of excellent soldering ability and

soldering resistance ability is suitable for reflow soldering and peak soldering.

*具有较高的容量且容量性能稳定

It includes high and stable capacitance.

*高频类：此类介质材料的电容器为Ⅰ类电容器。其中COG、COH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。

High Frequency Type: This kind of dielectric material is considered as Class I capacitor. COG and COH capacitors have the most stable electrical performance, which almost does not change with the change of temperature, voltage or time, they are suitable for the low-loss and high stability requirement circuits.

*X7R、X7S、X7T、X6S、X6T、X5R、：此类介质材料的电容器为Ⅱ类电容器，具有较高的介电常数，容量比Ⅰ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。

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 II capacitor whose capacitance is higher than that of class I. 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.

执行标准：GB/T 21041-2007 GB/T 21042-2007

Executive Standard: GB/T 21041-2007 GB/T 21042-2007

◆应用

Application

*应用于各种滤波、耦合、谐振、旁路、高频电子线路

It is suitable for all kinds of filter, coupled, harmonic vibration, bypassing and high frequency circuits.

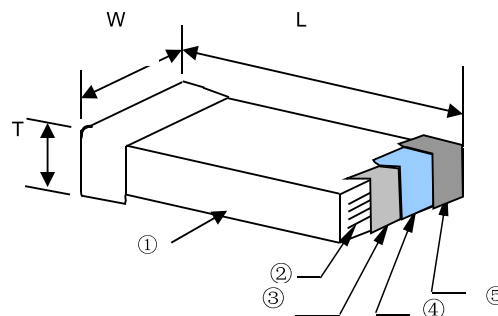


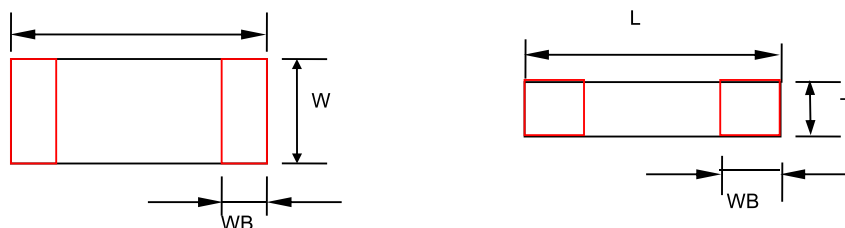
◆ 型号表示法
How To Order

0805			CG		102		J		500		N		T		
尺寸规格 Size Code			标称容量 Nominal Capacitance		额定电压 Rated Voltage 单位(unit): V		包装方式 Package Styles								
尺寸规格 Size Code	长×宽 (L×W) inch	长×宽 (L×W) mm	表示方式 Express Method	实际值 Actual Value	表示方式 Express Method	实际值 Actual Value	表示方式 Express Method	包装方式 Package Styles							
1005	0.01×0.005	0.40×0.20	0R5	0.5	6R3	6.3	B	散包装 Bulk Bag							
0201	0.02×0.01	0.60×0.30	1R0	1.0	500	50×10 ⁰	T	编带包装 Taping Package							
0402	0.04×0.02	1.00×0.50	102	10×10 ²	201	20×10 ¹									
0603	0.06×0.03	1.60×0.80	注：头两位数字为有效数字，第三位数字为0的个数；R为小数点。 Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.		注：头两位数字为有效数字，第三位数字为0的个数；R为小数点。 Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.										
0805	0.08×0.05	2.00×1.25													
1206	0.12×0.06	3.20×1.60													
1210	0.12×0.10	3.20×2.50													
1808	0.18×0.08	4.50×2.00													
1812	0.18×0.12	4.50×3.20													
介质种类 Dielectric Code			容量误差 Capacitance Tolerance			终端材料 Terminal Material Styles									
介质种类 Dielectric Code	介质材料 Dielectric		代码 Code	误差 Tolerance	备注 Note		终端类别 Termination Styles	表示方式 Express Method							
CG	C0G		A	±0.05pF	A、B、C、D级误差适用于容量≤10pF的产品。 These Capacitance tolerance A, B, C, D are just applicable the capacitance that equals to or less than 10pF.		纯铜端头 Copper Solderable Termination	C							
X	X5R		B	±0.10pF				N							
B	X7R		C	±0.25pF											
BS	X7S		D	±0.50pF											
BT	X7T		F	±1%											
DS	X6S		G	±2%											
DT	X6T		J	±5%											
			K	±10%											
			M	±20%											
			S	-20% +50%											
			Z	-20% +80%											

◆ 产品结构
Product Structure

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



◆产品尺寸
Product Dimensions


型号 Type		尺寸 Dimensions (mm)				特别说明 Special Instructions
英制表示 British expression	公制表示 Metric expression	L	W	T	WB	
1005	0402	0.4±0.02	0.2±0.02	0.2±0.02	0.1±0.03	All
0201	0603	0.6±0.03	0.3±0.03	0.3±0.03	0.15±0.05	C<0.1uF
		0.6±0.05	0.3±0.05	0.3±0.05	0.15±0.05	C≥0.1uF
0402	1005	1.00±0.05	0.50±0.05	0.50±0.05	0.25±0.05	C<0.22uF
		1.00±0.15	0.50±0.15	0.50±0.15	0.25±0.05	0.22uF≤C<10uF
		1.00±0.20	0.50±0.20	0.50±0.20	0.25±0.05	C≥10uF
0603	1608	1.60±0.10	0.80±0.10	0.80±0.10	0.35±0.20	C<1uF
		1.60±0.20	0.80±0.20	0.80±0.20	0.35±0.20	C≥1uF
0805	2012	2.00±0.20	1.25±0.20	0.80±0.20	0.50±0.20	C<0.47μF
		2.00±0.20	1.25±0.20	1.25±0.20	0.50±0.20	C≥0.47μF
1206	3216	3.20±0.30	1.60±0.30	0.80±0.20	0.60±0.30	C≤220nF
		3.20±0.30	1.60±0.30	1.00±0.20	0.60±0.30	220nF<C<1μF
		3.20±0.30	1.60±0.30	1.60±0.30	0.60±0.30	C≥1μF
1210	3225	3.20±0.30	2.50±0.30	≤2.80	0.60±0.30	All
1808	4520	4.50±0.40	2.00±0.20	≤2.20	0.60±0.30	All
1812	4532	4.50±0.40	3.20±0.30	≤3.50	0.60±0.30	All

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

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

2、We can design according to customer special requirements

◆温度系数/特性 Temperature Coefficient /Characteristics

介质种类 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	20°C	0±30 ppm/°C	-55°C~125°C
X7R	20°C	±15%	-55°C~125°C
X7S	20°C	±22%	-55°C~125°C
X7T	20°C	-33%~+22%	-55°C~125°C
X6S	20°C	±22%	-55°C~105°C
X6T	20°C	-33%~+22%	-55°C~105°C
X5R	20°C	±15%	-55°C~85°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温度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.

◆容量范围及其电压
Capacitance Range and Operating Voltage

*I 类电容器具体电压对应容量及厚度情况列表

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

材料 Dielectric	C0G									
尺寸 Dimension	1005 (0.4mm*0.2mm)				0201 (0.6mm*0.3mm)		0402 (1.0mm*0.5mm)		0603 (1.6mm*0.8mm)	
容量/电压 Capacity/ Voltage	10V	16V	25V	50V	25V	50V	25V	50V	25V	50V
0.1pF	0.2±0.02									
0.2pF										
0.5pF										
1pF										
1.2pF										
1.5pF										
1.8pF										
2.0pF										
2.2pF										
2.7pF										
3.0pF										
3.3pF										
3.6pF										
3.9pF										
4.7pF										
5.0pF										
5.6pF										
6.8pF										
8.0pF										
8.2pF										
10pF	0.3±0.03		0.3±0.03		0.50±0.05		0.50±0.05		0.80±0.10	
12pF										
15pF										
18pF										
22pF										
27pF										
33pF										
39pF										
47pF										
56pF										
68pF										
100pF										
120pF										
150pF										
180pF										
220pF										
270pF										
330pF										
390pF										
470pF										
560pF										
680pF										
1nF										
1.5nF										
1.8nF										
2.2nF										
2.7nF										
3.3nF										
4.7nF										
10nF										

备注：1、对应产品设计厚度，单位：mm 2、可根据客户的特殊要求设计符合客户需求的产品

Note: 1、Corresponding product design thickness , unit:mm 2、We can design according to customer special requirements

材料 Dielectric	COG							
	0805 (2.0mm*1.25mm)		1206 (3.2mm*1.6mm)		1210 (3.2mm*2.5mm)		1812 (4.5mm*3.2mm)	
尺寸 Dimension	25V	50V	25V	50V	25V	50V	25V	50V
容量/电压 Capacity/ Voltage								
0.1pF								
0.22pF								
0.3pF								
0.47pF								
1pF								
1.2pF								
1.5pF								
1.8pF								
2.0pF								
2.2pF								
2.7pF								
3.0pF								
3.3pF								
3.6pF								
3.9pF								
4.7pF								
5.0pF								
5.6pF								
6.8pF								
8.0pF								
8.2pF								
10pF								
12pF								
15pF								
18pF								
22pF								
27pF	0.8±0.02		0.8±0.02					
33pF								
39pF								
47pF								
56pF								
68pF								
100pF								
120pF								
150pF								
180pF								
220pF								
270pF								
330pF								
390pF								
470pF								
560pF								
680pF								
1nF								
1.5nF								
1.8nF								
2.2nF								
2.7nF								
3.3nF								
4.7nF								
6.8nF								
10nF				1.25±0.20				
12nF	1.25±0.20							
22nF								
33nF				1.60±0.30				
47nF								
100nF								

备注：1、对应产品设计厚度，单位：mm 2、可根据客户的特殊要求设计符合客户需求的产品

Note: 1、Corresponding product design thickness , unit:mm 2、We can design according to customer special requirement.

***II 类电容器具体电压对应容量及厚度情况列表**

A list of the specific voltage-specific capacitors of Class II capacitors

尺寸 Dimension	1005 (0.4mm*0.2mm)														
材料 Dielectric	X7R 系列			X7S 系列			X7T 系列			X6S/X6T 系列			X5R 系列		
容量/电压 Capacity/ Voltage	6.3V	10V	16V	6.3V	10V	16V	6.3V	10V	16V	6.3V	10V	16V	6.3V	10V	16V
120pF	0.2±0.02			0.2±0.02			0.2±0.02			0.2±0.02			0.2±0.02		
180pF															
220pF															
270pF															
330pF															
390pF															
470pF															
560pF															
680pF															
1nF															
1.2nF													0.2±0.02		
1.5nF															
1.8nF															
2.2nF															
2.7nF															
3.3nF															
3.9nF															
4.7nF															
5.6nF															
6.8nF															
10nF													0.2±0.02		
15nF															
22nF															
33nF															
47nF															
68nF															
100nF															

尺寸 Dimension	0201 (0.6mm*0.3mm)																																							
材料 Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列																			
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V															
120pF	0.3±0.03					0.3±0.03					0.3±0.03					0.3±0.03																								
180pF																																								
220pF																																								
330pF																																								
470pF																																								
560pF																																								
680pF																																								
1nF																																								
2.2nF	0.3±0.03					0.3±0.03					0.3±0.03					0.3±0.03																								
3.9nF																																								
4.7nF																																								
5.6nF	0.3±0.03					0.3±0.03					0.3±0.03					0.3±0.03																								
6.8nF																																								
10nF																																								
15nF																																								
18nF	0.3±0.03					0.3±0.03					0.3±0.03					0.3±0.03					0.30±0.03																			
22nF																																								
33nF																																								

备注：1、对应产品设计厚度，单位：mm 2、可根据客户的特殊要求设计符合客户需求的产品

Note: 1、Corresponding product design thickness , unit:mm 2、We can design according to customer special requirement

尺寸 Dimension	0201 (0.6mm*0.3mm)																													
材料 Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列									
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
47nF																														
56nF																														
68nF																														
100nF																														
220nF																														
330nF																														
470nF																														
1μF																														
2.2μF																														

尺寸 Dimension	0402 (1.0mm*0.5mm)																													
材料 Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列									
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF																														
470pF																														
560pF																														
680pF																														
1nF																														
2.2nF																														
3.9nF																														
4.7nF																														
5.6nF																														
6.8nF																														
10nF																														
15nF																														
18nF																														
22nF																														
33nF																														
47nF																														
56nF																														
68nF																														
100nF																														
220nF																														
330nF																														
470nF																														
680nF																														
1μF																														
2.2μF																														
4.7μF																														
6.8μF																														
10μF																														

备注：1、对应产品设计厚度，单位：mm 2、可根据客户的特殊要求设计符合客户需求的产品

Note: 1、Corresponding product design thickness , unit:mm 2、We can design according to customer special requirement

尺寸 Dimension	0603 (1.6mm*0.8mm)																													
材料 Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列									
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF																														
470pF																														
560pF																														
680pF																														
1nF																														
2.2nF																														
3.9nF																														
4.7nF																														
5.6nF																														
6.8nF																														
10nF																														
15nF	0.8±0.1					0.8±0.1					0.8±0.1					0.8±0.1														
18nF																														
22nF																														
33nF																														
47nF																														
56nF																														
68nF																														
100nF																														
220nF																														
330nF																														
470nF																					0.8±0.1									
680nF																														
1μF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2									
2.2 μF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2														
3.3 μF																														
4.7 μF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2									
6.8 μF																0.8±0.2					0.8±0.2									
10 μF											0.8±0.2																			
15 μF																0.8±0.2														
22 μF																0.8±0.2					0.8±0.2									
47 μF																					0.8±0.2									

尺寸 Dimension	0805 (2.0mm*1.25mm)																													
材料 Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列									
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF																														
470pF																														
560pF																														
680pF																														
1nF																														
2.2nF																														
3.9nF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2														
4.7nF																														
5.6nF																														
6.8nF																														
10nF																														
15nF																														

备注：1、对应产品设计厚度，单位：mm 2、可根据客户的特殊要求设计符合客户需求的产品。

Note: 1、Corresponding product design thickness , unit:mm 2、We can design according to customer special requiremen

尺寸 Dimension	0805 (2.0mm*1.25mm)																													
材料 Dielectric	X7R 系列					X7S					X7T 系列					X6S/X6T 系列					X5R 系列									
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V					
18nF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2														
22nF																														
33nF																														
47nF																														
56nF																														
68nF																														
100nF																														
220nF																														
330nF																														
470nF																														
680nF																														
1µF	1.25±0.2					1.25±0.2					1.25±0.2					1.25±0.2					1.25±0.2									
2.2µF																														
3.3µF	1.25±0.2					1.25±0.2																								
4.7µF																														
6.8µF	1.25±0.2					1.25±0.2					1.25±0.2					1.25±0.2														
10µF																														
15µF																1.25±0.2					1.25±0.2									
22µF																														
47µF																1.25±0.2					1.25±0.2									

尺寸 Dimension	1206 (3.2mm*1.6mm)																								
材料 Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	0.8±0.2					0.8±0.2					0.8±0.2					0.8±0.2									
470pF																									
560pF																									
680pF																									
1nF																									
2.2nF																									
3.9nF																									
4.7nF																									
5.6nF																									
6.8nF																									
10nF																									
15nF																									
18nF																									
22nF																									
33nF																									
47nF																									
56nF																									
68nF																									
100nF																									
220nF																									
330nF																									
470nF	1.25±0.2					1.25±0.2					1.25±0.2					1.25±0.2									
680nF																									
1µF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3				
2.2µF																									

备注：1、对应产品设计厚度，单位：mm 2、可根据客户的特殊要求设计符合客户需求的产品。

Note: 1、Corresponding product design thickness , unit:mm 2、We can design according to customer special requirement

尺寸 Dimension	1206 (3.2mm*1.6mm)																								
	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
材料 Dielectric																									
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
3.3μF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3				
4.7μF																									
6.8μF																									
10μF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3				
15μF																									
22μF																									
47μF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3				
100μF																									

尺寸 Dimension	1210 (3.2mm*2.5mm)																																																																
	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列																																												
材料 Dielectric																																																																	
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V																																								
330pF	1.25±0.2					1.25±0.2					1.25±0.2					1.25±0.2																																																	
470pF																																																																	
560pF																																																																	
680pF																																																																	
1nF																																																																	
2.2nF																																																																	
3.9nF																																																																	
4.7nF																																																																	
5.6nF																																																																	
6.8nF																																																																	
10nF	1.4±0.2					1.4±0.2					1.4±0.2					1.4±0.2																																																	
15nF																																																																	
18nF																																																																	
22nF																																																																	
33nF																																																																	
47nF																																																																	
56nF																																																																	
68nF																																																																	
100nF																																																																	
220nF																										1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3																								
330nF																																																																	
470nF																																																																	
680nF																																																																	
1μF	2.5±0.3					2.5±0.3					2.5±0.3																																																						
2.2μF																																																																	
3.3μF																																																																	
4.7μF																					2.5±0.3																														2.5±0.3					2.5±0.3					2.5±0.3				
6.8μF																																																																	
10μF																																																																	
15μF																					2.5±0.3					2.5±0.3					2.5±0.3					2.5±0.3																													
22μF																																																																	
47μF																																									2.5±0.3					2.5±0.3					2.5±0.3					2.5±0.3									
100μF																																																																	

备注：1、对应产品设计厚度，单位：mm 2、可根据客户的特殊要求设计符合客户需求的产品。

Note: 1、Corresponding product design thickness , unit:mm 2、We can design according to customer special requirement

尺寸 Dimension	1808 (4.5mm*2.0mm)																													
材料 Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列									
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3									
470pF																														
560pF																														
680pF																														
1nF																														
2.2nF																														
3.9nF																														
4.7nF																														
5.6nF																														
6.8nF																														
10nF																														
15nF																														
18nF																														
22nF																														
33nF																														
47nF																														
56nF																														
68nF																														
100nF																														
220nF																														
330nF																														
470nF																														
680nF																														
1μF																														
2.2μF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3									
3.3μF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3									
4.7μF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3									
6.8μF	1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3					1.6±0.3									

尺寸 Dimension	1812 (4.5mm*3.2mm)																													
材料 Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列									
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	1.60±0.20					1.60±0.20					1.60±0.20					1.60±0.20					1.60±0.20									
470pF																														
560pF																														
680pF																														
1nF																														
2.2nF																														
3.9nF																														
4.7nF																														
5.6nF																														
6.8nF																														
10nF																														
15nF																														
18nF																														
22nF																														
33nF																														
47nF																														
56nF																														
68nF																														
100nF																														
220nF																														

尺寸 Dimension	1812 (4.5mm*3.2mm)																								
材料 Dielectric	X7R 系列					X7S 系列					X7T 系列					X6S/X6T 系列					X5R 系列				
容量/电压 Capacity/ Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330nF	1.60±0.20					1.60±0.20					1.60±0.20					1.60±0.20					1.60±0.20				
470nF																									
680nF																									
1μF																									
2.2μF	2.0±0.20					2.0±0.20					2.0±0.20					2.0±0.20					2.0±0.20				
3.3μF																									
4.7μF																									
6.8μF																									

备注：1、【】对应容量的通用厚度，单位：mm 2、可根据客户的特殊要求设计符合客户需求的产品

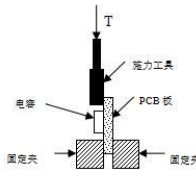
Note: 1、【】 General thickness corresponds to the capacity, unit: mm2、 We can design according to the customer requirements

◆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	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
			> 1000 pF	1KHz±10%	
	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℃±3℃ Test Temperature: 25℃±3℃ C≤10μF: 测试频率：1KHz±10% Test Frequency: 1KHz±10% 测试电压：1.0±0.2Vrms Test Voltage: 1.0±0.2Vrms C> 10μF 测试频率：120±24 Hz Test Frequency: 120±24 Hz 测试电压：0.5±0.1Vrms Test Voltage: 0.5±0.1Vrms		
绝缘电阻 (IR) Insulation Resistance	I类 Class I	C≤10 nF, Ri≥50000MΩ C> 10 nF, Ri·Cr≥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℃±3℃ Test Current: ≤50mA		
	II类 Class II	C≤25 nF, Ri≥10000MΩ C> 25 nF, Ri·Cr> 100S			
	注：S=Q·F				
损耗角正切 (DF, tanδ) Dissipation Factor	I类 Class I	DF	标称容量 Capacitance	测试频率 Measuring Frequency	测试电压 Measuring Voltage
		≤1/ (400+20C)	C<30 pF	1MHz±10% (C> 1000 pF, 1KHz±10%)	1.0±0.2Vrms
		≤0.1%	C≥30pF		

项目 Item	技术规格 Technical Specification						测试方法 Test Method and Remarks						
损耗角正切 (DF, tanδ) Dissipation Factor	II类 Class II	电压	DF($\times 10^{-4}$)	1005	0201	0402	0603	0805	1206 及 上	$C \leq 10\mu\text{F}$ 测试频率: 1KHz $\pm 10\%$ 测试电压: 1.0 $\pm 0.2\text{Vrms}$ Test Frequency: 1KHz $\pm 10\%$ Test Voltage: 1.0 $\pm 0.2\text{Vrms}$ $C > 10\mu\text{F}$ X7R、X5R、X7T、 X6S 测试频率: 120 ± 24 Hz 测试电 压: 0.5 $\pm 0.1\text{Vrms}$ Test Frequency: 120 ± 24 Hz Test Voltage: 0.5 $\pm 0.1\text{Vrms}$			
		50V	≤ 250	---	---	$\leq 10\text{nF}$	$< 100\text{nF}$	---	$\leq 680\text{nF}$				
			≤ 350	---	$\leq 3.3\text{nF}$	$\leq 47\text{nF}$	$< 470\text{nF}$	$\leq 1\mu\text{F}$	$\leq 2.2\mu\text{F}$				
			≤ 500	---	$\leq 10\text{nF}$	$\leq 0.1\mu\text{F}$	---	---	---				
			≤ 750	---	---	---	---	$\leq 2.2\mu\text{F}$	$\leq 4.7\mu\text{F}$				
			≤ 1000	---	---	---	$\leq 2.2\mu\text{F}$	$\leq 10\mu\text{F}$	$\leq 10\mu\text{F}$				
		25V	≤ 250	---	---	$\leq 10\text{nF}$	$< 100\text{nF}$	---	$\leq 680\text{nF}$				
			≤ 350	---	F	$\leq 3.3\text{nF}$	$\leq 47\text{nF}$	$< 470\text{nF}$	$\leq 1\mu\text{F}$				
			≤ 500	---	$\leq 10\text{nF}$	0.22 μF	---	---	---				
			≤ 750	---	$> 10\text{nF}$	---	---	$\leq 2.2\mu\text{F}$	$\leq 10\mu\text{F}$				
			≤ 1000	---	$\leq 100\text{nF}$	$\leq 2.2\mu\text{F}$	$\leq 10\mu\text{F}$	$\leq 22\mu\text{F}$	$\leq 22\mu\text{F}$				
		16V	250	---	---	$\leq 10\text{nF}$	$< 100\text{nF}$	---	$\leq 680\text{nF}$				
			≤ 350	$\leq 1\text{nF}$	$\leq 3.3\text{nF}$	$\leq 47\text{nF}$	$< 470\text{nF}$	$\leq 1\mu\text{F}$	---				
			≤ 500	---	$\leq 15\text{nF}$	$\leq 220\text{nF}$	---	---	---				
			≤ 750	$\leq 10\text{nF}$	$\leq 47\text{nF}$	---	---	$\leq 4.7\mu\text{F}$	$\leq 10\mu\text{F}$				
			≤ 1000	---	$\leq 100\text{nF}$	$\leq 4.7\mu\text{F}$	$\leq 10\mu\text{F}$	$\leq 22\mu\text{F}$	$\leq 47\mu\text{F}$				
		10V	≤ 250	---	---	$\leq 10\text{nF}$	$< 100\text{nF}$	---	$\leq 680\text{nF}$				
			≤ 350	$\leq 1\text{nF}$	$\leq 3.3\text{nF}$	$\leq 47\text{nF}$	$< 470\text{nF}$	$\leq 1\mu\text{F}$	---				
			≤ 500	---	$\leq 15\text{nF}$	$\leq 220\text{nF}$	---	---	---				
			≤ 750	$\leq 10\text{nF}$	$\leq 100\text{nF}$	---	---	$\leq 2.2\mu\text{F}$	$\leq 10\mu\text{F}$				
			≤ 1000	---	$\leq 2.2\mu\text{F}$	$\leq 10\mu\text{F}$	$\leq 22\mu\text{F}$	$\leq 47\mu\text{F}$	$\leq 47\mu\text{F}$				
		≤ 6.3 V	≤ 250	---	---	$\leq 10\text{nF}$	$< 100\text{nF}$	---	$\leq 680\text{nF}$				
			≤ 350	$\leq 1\text{nF}$	$\leq 3.3\text{nF}$	47nF	$< 470\text{nF}$	$\leq 1\mu\text{F}$	---				
			≤ 500	---	$\leq 15\text{nF}$	$\leq 220\text{nF}$	---	---	---				
			≤ 750	$\leq 10\text{nF}$	$\leq 47\text{nF}$	---	---	$\leq 2.2\mu\text{F}$	$\leq 10\mu\text{F}$				
≤ 1000	$\leq 100\text{nF}$		$\leq 2.2\mu\text{F}$	$\leq 10\mu\text{F}$	$\leq 47\mu\text{F}$	$\leq 47\mu\text{F}$	$\leq 100\mu\text{F}$						
介质耐电强度 (DW) Dielectric Withstanding Voltage	不应有介质被击穿或损伤 No breakdown or damage.				测量电压: I类: 300%额定电压 II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 I :300% Rated voltage Class II :250% Rated voltage Duration: 1~5s Charge/ Discharge Current: 50mA max. (This method excludes high-voltage MLCC)								
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 $\pm 5^\circ\text{C}$ 浸锡时间: 2 ± 0.5 s Pb-Sn soldering Solder Temperature: 235 $\pm 5^\circ\text{C}$ Duration: 2 ± 0.5 s			无铅焊料: 浸锡温度: 245 $\pm 5^\circ\text{C}$ 浸锡时间: 2 ± 0.5 s Lead-free soldering Solder Temperature: 245 $\pm 5^\circ\text{C}$ Duration: 2 ± 0.5 s		

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	II类	将电容在 100~200℃的温度下预热 60~120 秒。 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。 试验后放置时间：24±2 小时。 放置条件：室温 Preheating conditions: 100 to 200℃; 60~120 seconds. 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															
	ΔC/C	≤±2.5%或±0.25pF, 取较大值 ≤±2.5% or ±0.25PF, whichever is larger	±15%																
	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：PCB 弯曲深度：1mm 施压速度：1mm/sec. 单位：mm 应在弯曲状态下进行测量。 Test Board: PCB Warp: 1mm Speed: 1mm/sec. Unit: mm The measurement should be made with the board in the bending position.															
	ΔC/C:	I类：≤±5%或±0.5pF, 取两者中最大者 II类：≤±10% Class I: ≤±5% or ±0.5pF, whichever is larger. Class II: ≤±10%																	
端头结合强度 Termination Adhesion	外观无可见损伤 No visible damage.			如图所示：慢慢施加一个 T 的力到电容侧面瓷体上，并保持 60+1 秒。 As shown in the picture, Slowly apply a T force to the porcelain body on the side of the capacitor and hold for 60+1 seconds.															
	<table border="1"> <thead> <tr> <th>规格</th> <th>施加力 T</th> </tr> </thead> <tbody> <tr> <td>≤0402</td> <td>2N</td> </tr> <tr> <td>≥0603</td> <td>5N</td> </tr> </tbody> </table>				规格	施加力 T	≤0402	2N	≥0603	5N									
规格	施加力 T																		
≤0402	2N																		
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温度循环 Temperature Cycle	项目 Item	I类	II类	预处理* (II类)：上限类别温度，1 小时 恢复：24±1h Preheating conditions: up-category temperature, 1h Recovery time: 24±1h 初始测量 Initial Measurement 循环次数：5 次，一个循环分以下 4 步： Cycling Times: 5 times, 1 cycle, 4 steps:															
	ΔC/C	≤±1%或±1PF, 取较大值 ≤±1% or ±1PF, whichever is larger	-15% ~+15%																
	外观无可见损伤 No visible damage.																		
				<table border="1"> <thead> <tr> <th>阶段 Step</th> <th>温度 (Temperature) (°C)</th> <th>时间 (Time)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>下限温度(Low- category temp.): :-55</td> <td>30min</td> </tr> <tr> <td>2</td> <td>常温 (Normal temp.): +20°C</td> <td>2~3min</td> </tr> <tr> <td>3</td> <td>上限温度 (Up- category temp.) (COG/X7R/X7T/X7S: +125 X5R:+85 X6S/X6T:+105)</td> <td>30min</td> </tr> <tr> <td>4</td> <td>常温 (Normal temp.): +20°C</td> <td>2~3min</td> </tr> </tbody> </table>	阶段 Step	温度 (Temperature) (°C)	时间 (Time)	1	下限温度(Low- category temp.): :-55	30min	2	常温 (Normal temp.): +20°C	2~3min	3	上限温度 (Up- category temp.) (COG/X7R/X7T/X7S: +125 X5R:+85 X6S/X6T:+105)	30min	4	常温 (Normal temp.): +20°C	2~3min
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				试验后放置 (恢复) 时间：24±2h Recovery time after test: 24±2h															

项目 Item	技术规格 Technical Specification		测试方法 Test Method and Remarks																
耐湿负荷 Humidity load	$\Delta C/C$	I 类: $\pm 7.5\%$ 或 $\pm 0.75pF$,取两者之中较大者 II 类: $\leq \pm 12.5\%$ Class I : $\pm 7.5\%$ or $\pm 0.75pF$, whichever is larger. Class II : $\leq \pm 12.5\%$	※预处理 (仅针对 II 类电容器): 在 $140^{\circ}C \sim 150^{\circ}C$ 下预热 $1h \pm 10min$ 后, 在室温下放置 $24 \pm 2h$ 温度: $40 \pm 2^{\circ}C$ 湿度: $90 \sim 95\%RH$ 电压: 额定电压 时间: 500 小时 放置条件: 室温 放置时间: $24 \pm 2h$ 小时; II 类: $0201 \geq 47nF$, $0402 \geq 33nF$, $0603 \geq 1 \mu F$, $0805 \geq 4.7 \mu F$, $1206 \geq 10 \mu F$ 产品试验后需在 $150^{\circ}C$ 温度下保持 $1h$, 再放置 $24 \pm 2h$ 后测试电性能。 ※ Pretreatment (Class II): After preheating at $140^{\circ}C \sim 150^{\circ}C$ for $1h \pm 10min$, place at room temperature for $24 \pm 2h$. Humidity: $90 \sim 95\%RH$ Voltage: Rated Voltage Duration: 500h Recovery Time: $24h \pm 2h$ Class 2: $0201 \geq 47nF$, $0402 \geq 33nF$, $0603 \geq 1 \mu F$, $0805 \geq 4.7 \mu F$, $1206 \geq 10 \mu F$ product need to keep in $150^{\circ}C$, 1h after the test, and measurement to be made after being kept at room temperature for $24 \pm 2h$.																
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外观: 无损伤 Appearance: No visible damage.																			
寿命试验 Life Test	$\Delta C/C$	<table border="1"> <tr> <td>I 类</td> <td>$\leq \pm 3\%$或$\pm 0.3pF$,取两者之中较大者 $\leq \pm 3\%$或$\pm 0.3pF$, whichever is larger.</td> </tr> <tr> <td>II 类</td> <td>$-20\% \sim +20\%$</td> </tr> </table>	I 类	$\leq \pm 3\%$ 或 $\pm 0.3pF$,取两者之中较大者 $\leq \pm 3\%$ 或 $\pm 0.3pF$, whichever is larger.	II 类	$-20\% \sim +20\%$	※预处理 (仅针对 II 类电容器): 在 $140^{\circ}C \sim 150^{\circ}C$ 下预热 $1h \pm 10min$ 后, 在室温下放置 $24 \pm 2h$ 低压产品 ($< 100V$) 时间: 1000 小时 电压: 2 倍额定工作电压, 除了表 1 外 温度: $125^{\circ}C$ (C0G, X7R, X7S) $85^{\circ}C$ (X5R) $105^{\circ}C$ (X6S, X6T) 充电电流: 不应超过 $50mA$. 放置时间: $24 \pm 2h$ 小时; II 类: $0201 \geq 47nF$, $0402 \geq 33nF$, $0603 \geq 1 \mu F$, $0805 \geq 4.7 \mu F$, $1206 \geq 10 \mu F$ 产品试验后需在 $150^{\circ}C$ 温度下保持 $1h$, 再放置 $24 \pm 2h$ 后测试电性能。 ※ Pretreatment (Class II): After preheating at $140^{\circ}C \sim 150^{\circ}C$ for $1h \pm 10min$, place at room temperature for $24 \pm 2h$. Low-Voltage ($< 100V$) Applied Voltage: $2 \cdot U_r$, except the table 1 Duration: 1000h Temperature: $125^{\circ}C$ (C0G, X7R, X7S) $85^{\circ}C$ (X5R) $105^{\circ}C$ (X6S, X6T) Charge/ Discharge Current: $50mA$ max. Recovery Time: $24h \pm 2h$ Class 2: $0201 \geq 47nF$, $0402 \geq 33nF$, $0603 \geq 1 \mu F$, $0805 \geq 4.7 \mu F$, $1206 \geq 10 \mu F$ product need to keep in $150^{\circ}C$, 1h after the test, and measurement to be made after being kept at room temperature for $24 \pm 2h$.												
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<table border="1"> <thead> <tr> <th colspan="4">表 1(table 1)</th> </tr> <tr> <th>容量</th> <th>试验电压</th> <th>容量</th> <th>试验电压</th> </tr> </thead> <tbody> <tr> <td>$0201 \geq 10nF$</td> <td rowspan="3">1.5Ur</td> <td>$0805 \geq 0.47\mu F$</td> <td rowspan="3">1.5Ur</td> </tr> <tr> <td>$0402 \geq 47nF$</td> <td>$1206 \geq 1\mu F$</td> </tr> <tr> <td>$0603 \geq 220nF$</td> <td>$1210 \geq 1\mu F$</td> </tr> </tbody> </table>				表 1(table 1)				容量	试验电压	容量	试验电压	$0201 \geq 10nF$	1.5Ur	$0805 \geq 0.47\mu F$	1.5Ur	$0402 \geq 47nF$	$1206 \geq 1\mu F$	$0603 \geq 220nF$	$1210 \geq 1\mu F$
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$0402 \geq 47nF$		$1206 \geq 1\mu F$																	
$0603 \geq 220nF$		$1210 \geq 1\mu F$																	

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 $24 \pm 1h$ 。

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

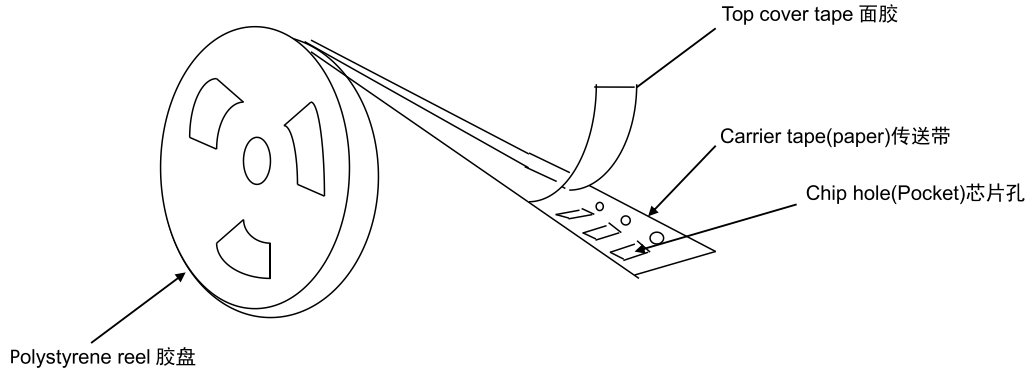
conditions for 24±1hours.

◆包装

Package

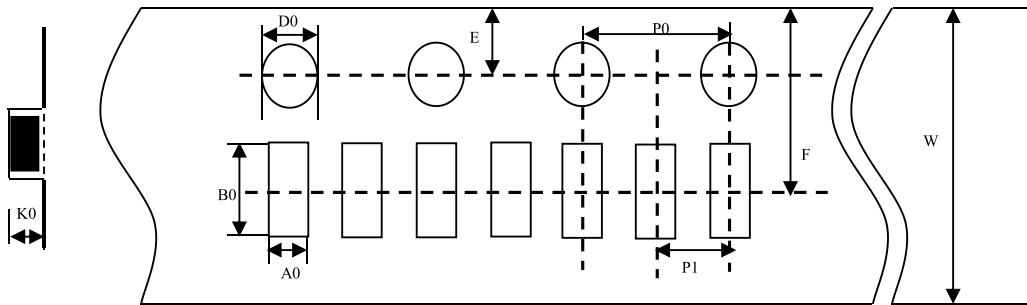
* 塑料压纹带卷盘结构

Embossed Plastic Taping



* 仅适用于 1005 规格，压纹带尺寸如下：

The emboss plastic applies only to 1005 type, the dimensions as follows:

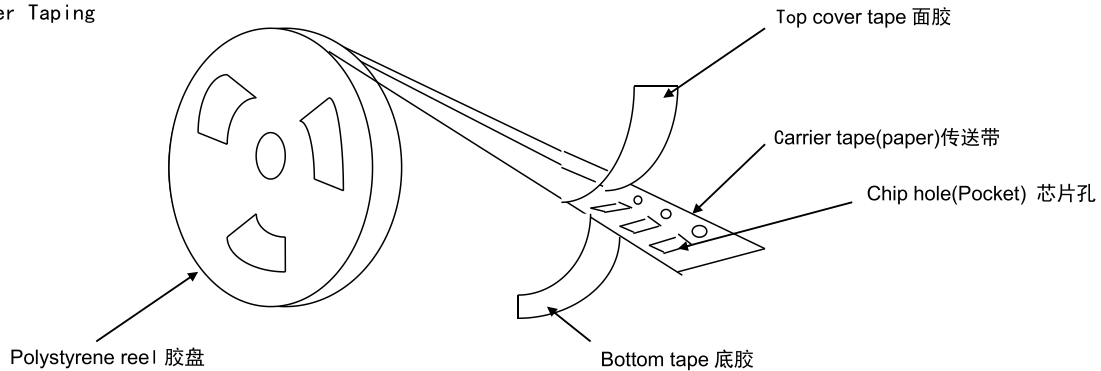


Unit: mm

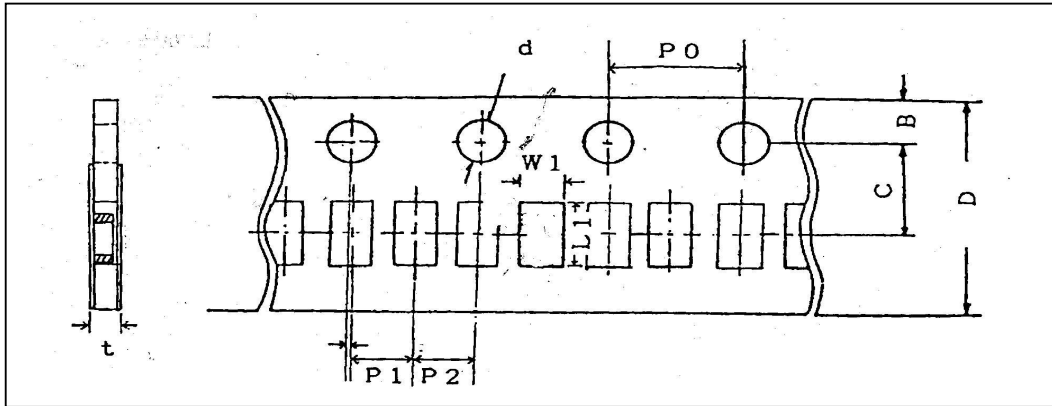
W	P0	P1	E	F	D0	A0	B0	K0
4±0.05	2±0.04	1±0.02	0.9±0.05	1.8±0.02	0.8±0.04	0.24±0.02	0.45±0.02	0.24±0.02

* 纸带卷盘结构

Paper Taping

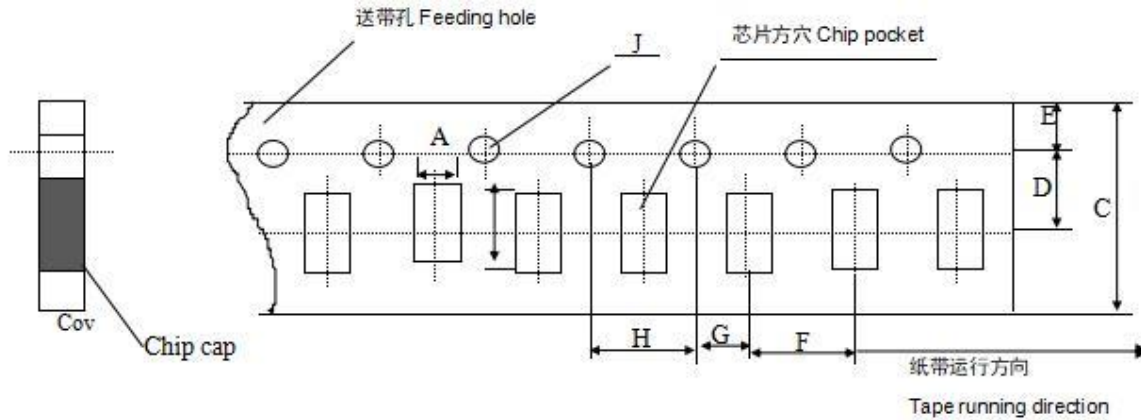


* 1005、0201、0402 纸带编带尺寸大小
Dimensions of paper taping for 1005、0201、0402 type



代号 Code	W1	L1	D	C	B	P1	P2	P0	d	t
1005	0.24 ±0.02	0.45 ±0.02	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	0.30 Below
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.



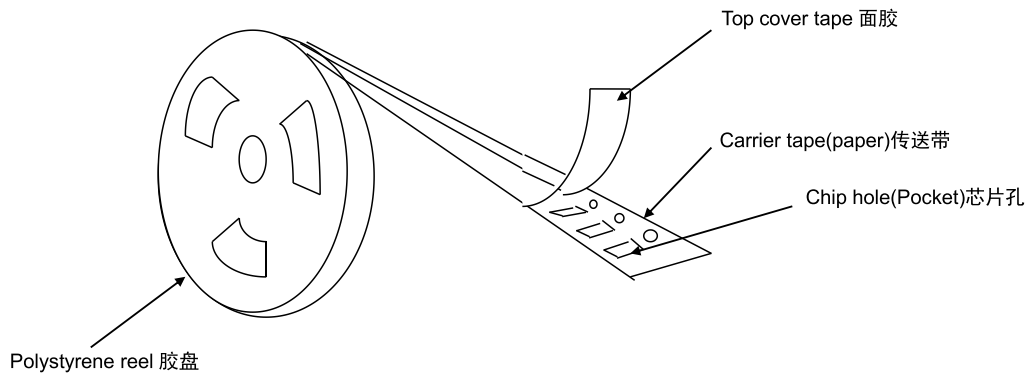
Unit: mm

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.

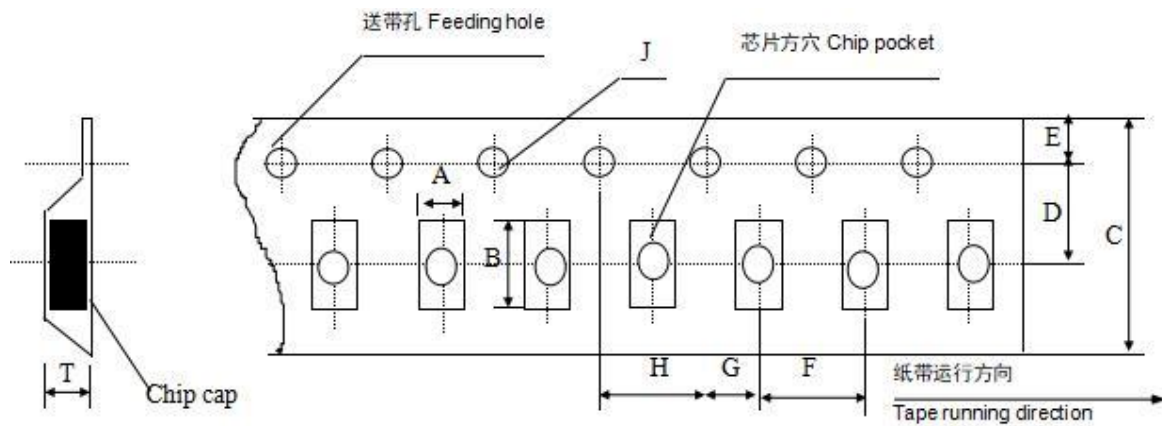
* 塑胶卷盘结构

Embossed taping



* 塑胶带尺寸结构 (适合'0805~1812' 型产品)

Dimensions of embossed taping for 0805~1812 type

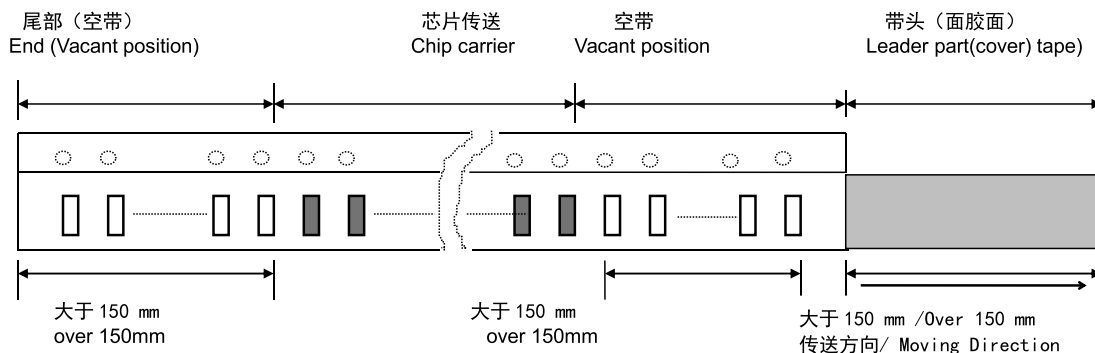


代号 Code 规格 Tape size	A	B	C	D*	E	F	G*	H	J	T
0805	1.55 ± 0.20	2.35 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	4.00 ± 0.10	1.50 -0/+0.10	1.50 Max
1206	1.95 ± 0.20	3.60 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	4.00 ± 0.1	1.50 -0/+0.10	1.85 Max
1210	2.70 ± 0.10	3.42 ± 0.10	8.00 ± 0.10	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.55 -0/+0.10	3.2 Max
1808	2.20 ± 0.10	4.95 ± 0.10	12.00 ± 0.10	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	3.0 Max
1812	3.66 ± 0.10	4.95 ± 0.10	12.00 ± 0.10	5.50 ± 0.05	1.75 ± 0.10	8.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.55 -0/+0.10	4.0 Max

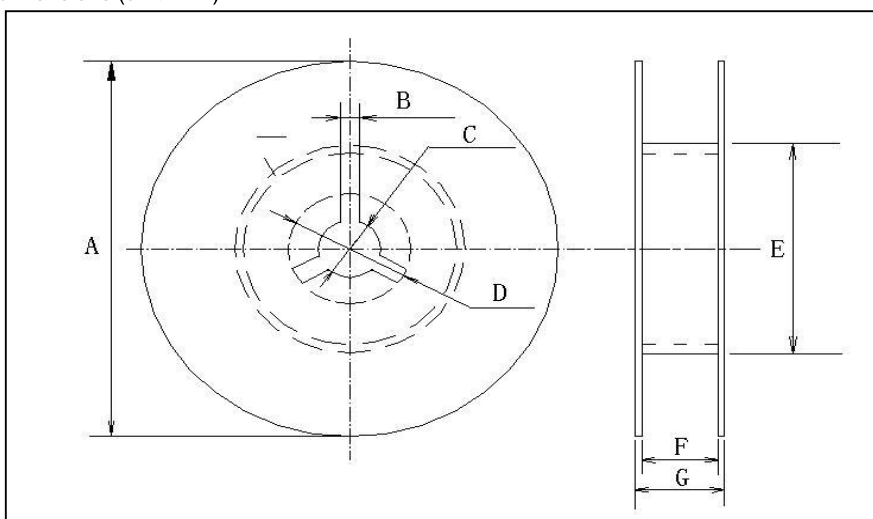
备注：*表示此处对尺寸的要求非常精确。

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

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

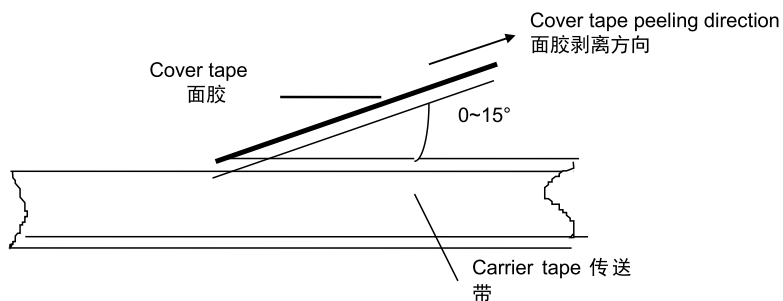


* 卷盘尺寸
Reel dimensions (unit: mm)



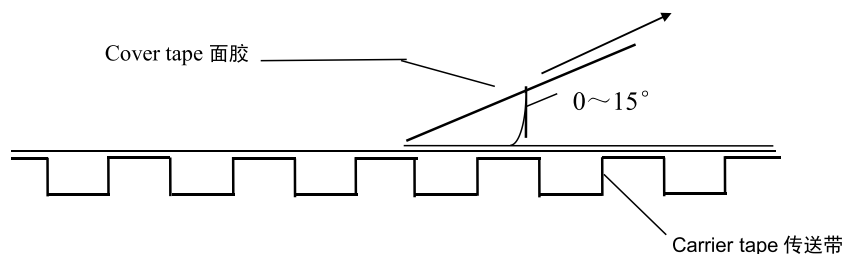
卷盘型号	A	B	C	D	E	F	G
7'REEL	$\phi 178 \pm 2.0$	3.0	$\phi 13 \pm 0.5$	$\phi 21 \pm 0.8$	$\phi 50$ 或更大 $\phi 50$ or more	10.0 ± 1.5	12max

* 关于卷带的说明: 面胶剥离强度
Taping specification: top tape peeling strength
纸带 Paper Taping



* 塑料胶盘 Embossed Taping

Cover tape peeling direction 面胶剥离方向



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.

* 塑料盒散包装

Bulk Case Package

单位 (unit) :mm

Symbol	A	B	T	C	D	E
Dimension	6.80±0.10	8.80±1.00	12.00±0.10	15.00+0.10/-0	2.00+0/-0.10	4.70±0.10
Symbol	F	W	G	H	L	I
Dimension	31.50+0.20/-0	36.00+0/-0.20	19.00±0.35	7.00±0.35	110.00±0.70	5.00±0.35

* 包装数量

Packing Quantity

尺寸 (SIZE)	包装形式和数量 (Package Style & Quantity) unit: pcs				
	塑料压纹带卷盘 (EPT)	纸带卷盘 (PT)	胶带卷盘 (ET)	塑料盒散装 (BC)	一般散装 (BP)
1005	---	20000	---	---	---
0201	---	15000	---	---	---
0402	-----	10000	-----	20000	5000
0603	-----	4000	-----	15000	5000
0805	-----	4000	3000	10000	5000
1206	-----	4000	T≤1.35mm 3000 T>1.35mm 2000	5000	5000
1210	-----	-----	T≤1.80mm 2000 T>1.80mm 1000	-----	2000
1808	-----	-----	2000	-----	2000
1812	-----	-----	T≤1.85mm 1000 T>1.85mm 500	-----	2000

注意: 包装的形式和数量可根据客户的要求来定。

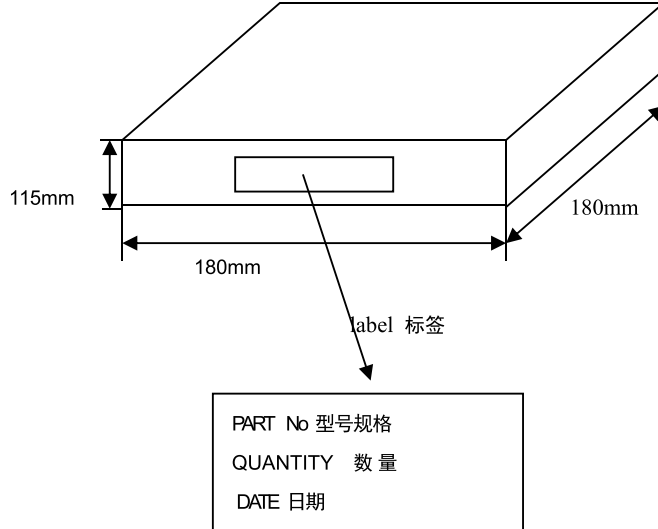
Note: We can choose packing style and quantity can be according to the customer's requirement.

*** 外包装**
Outer packing

小包装 The first package

Quantity: 10 reels

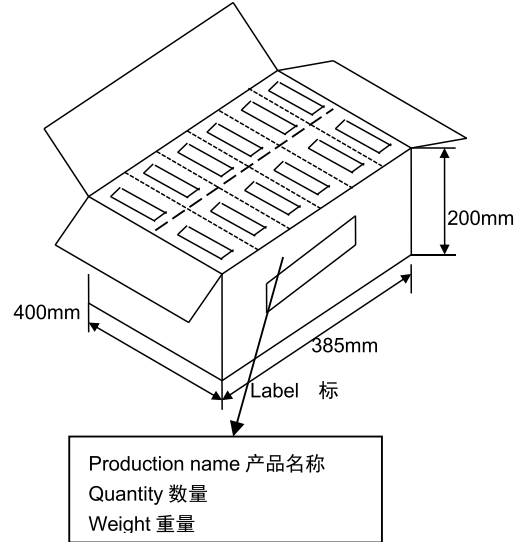
数量: 10 卷



大包装 The second package

Quantity: 6 cases

数量: 6 盒


◆ 储存方法
Storage Methods

* 确保芯片可焊性良好的贮存期限为 12 个月(在包装好已交付的情况下)。

The guaranteed period for solderability is 12 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%

◆ 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,在超出本承诺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,首先应考虑按本承诺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.

* 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).

* 手工焊接

Manual Soldering

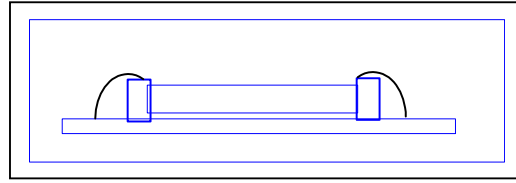
手工焊接很容易因为芯片局部受热不均而引起瓷体微裂或局部爆炸的现象,在焊接时,如果操作者不小心,会使烙铁头直接同电容芯片的瓷体部分接触,这样很容易使电容芯片因热冲击而受损或出现其他意外.因此,使用电烙铁手工焊接时应仔细操作,并对电烙铁的尖端的选择和尖端温度控制应多加小心。

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.

*适量的焊料

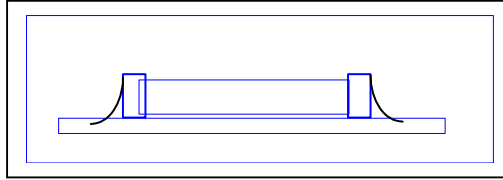
Optimum Solder Amount for Reflow Soldering

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



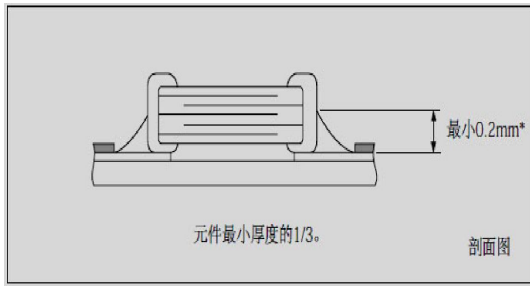
固定力量不足, 可能会引起
电容芯片与线路接触不良
Weak holding force may cause
badconnection
between the capacitor and PCB.

* 推荐焊料用量

Recommended Soldering amounts

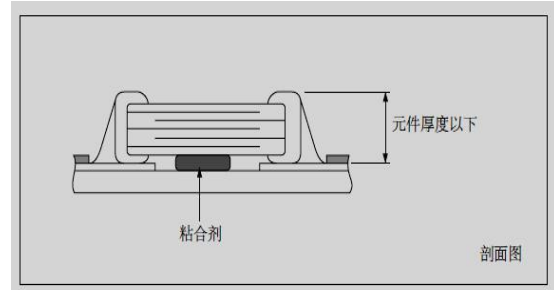
回流焊接的最佳焊料用量

The optimal solder fillet amounts for re-flow soldering



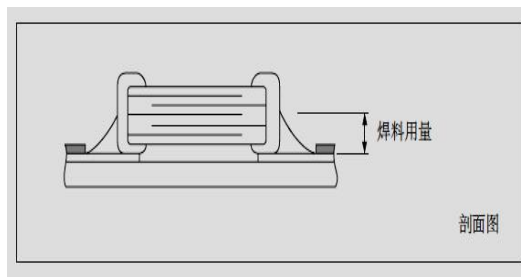
波峰焊接的最佳焊料用量

The optimal solder fillet amounts for wave soldering



使用烙铁返修时的最佳焊料量

The optimal solder fillet amounts for reworking by using soldering iron



* 推荐焊接方式

Recommended Soldering Method

规格尺寸 Size	温度特性 Temperature Characteristics	额定电压 Rated Voltage	容量范围 Capacitance	焊接方式 Soldering Method
1005	C0G	/	/	R
	X7R/X5R/X7T/X6S	/	/	R
0201	C0G	/	/	R
	X7R/X5R/X7T/X6S	/	/	R

***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
0402	C0G	/	/	R
	X7R/X5R/X7T/X6S	/	/	R
0603	C0G	/	/	R/W
	X7R/X5R/X7T/X6S	/	C \geq 1 μ f	R
			C $<$ 1 μ f	R/W
0805	C0G	/	/	R/W
	X7R/X5R/X7T/X6S	/	C \geq 4.7 μ f	R
			C $<$ 4.7 μ f	R/W
1206	C0G	/	/	R/W
	X7R/X5R/X7T/X6S	/	C \geq 10 μ f	R
			C $<$ 10 μ f	R/W
\geq 1210	C0G	/	/	R
	X7R/X5R/X7T/X6S	/	/	R

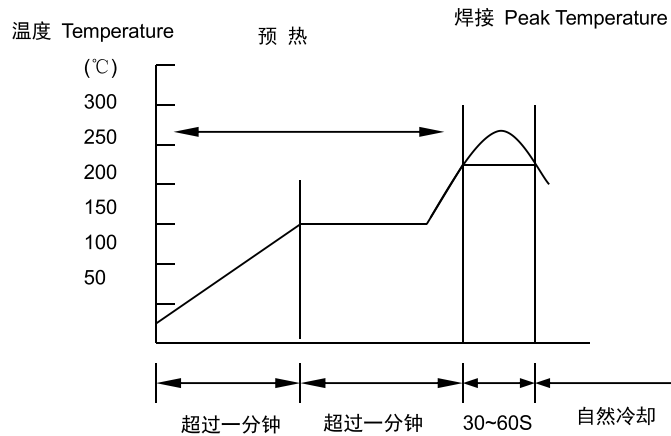
焊接方式 Soldering method:

R—回流焊 Reflow Soldering

W—波峰焊 Wave Soldering

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

* 回流焊接 (Re-flow soldering)

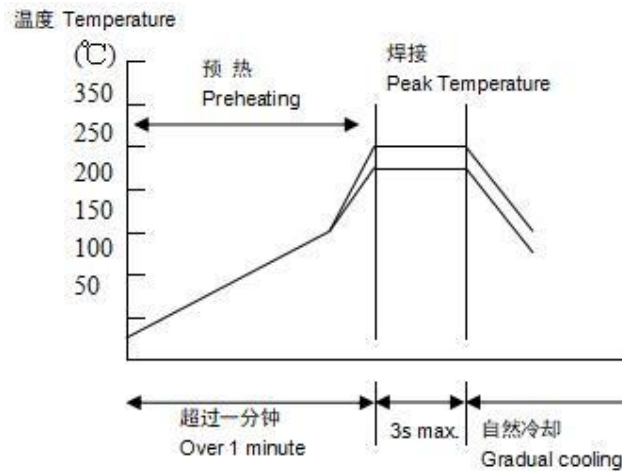


	Pb-Sn 焊接 Pb-Sn soldering	无铅焊接 Lead-free soldering
尖峰温度 Peak temperature	230°C~250°C	240°C~260°C

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

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

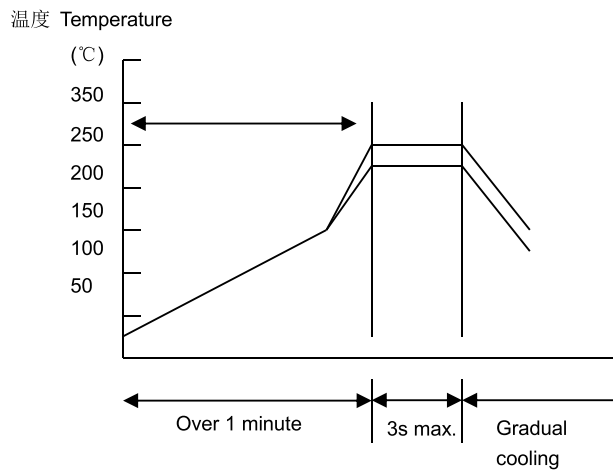
* 波峰焊接
 (Wave soldering)



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

在预热时, 请将焊接温度与芯片表面温度之间的温差维持在 $T \leq 150^\circ\text{C}$ 。
 While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as: $T \leq 150^\circ\text{C}$.

* 手工焊接
 Hand soldering



条件 Conditions:

预热 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 350°C Highest temperature: 350°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

*以最新版本的内容为准

Temperature Compensating MLCC

Features

- Miniature size
- Wide capacitance, TC, voltage and tolerance range
- Industry standard sizes
- 8mm and 12mm Tape & Reel for auto-placement
- Available for wave, reflow or vapor phase solder

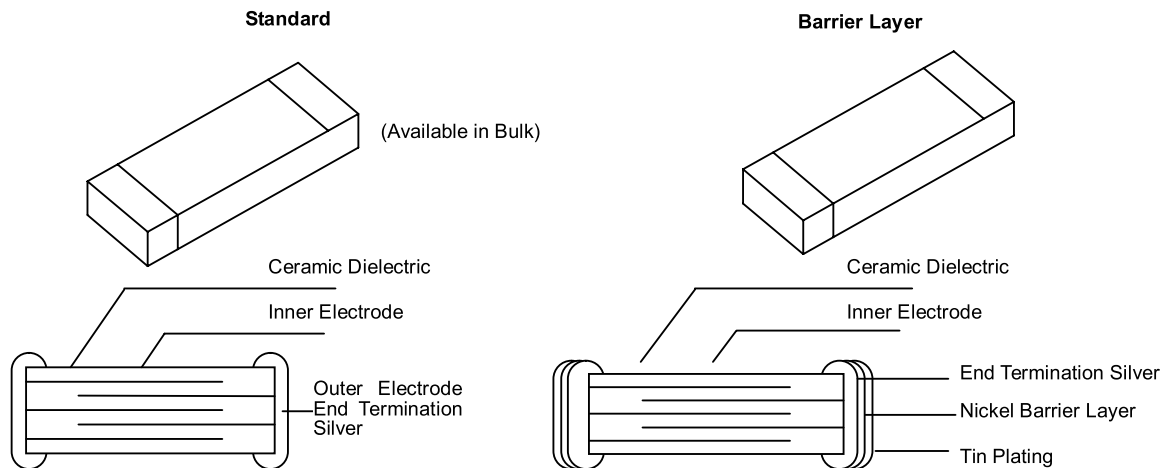
How to Order

0805	UJ	101	J	500	N	T	G
↑	↑	↑	↑	↑	↑	↑	↑
A	B	C	D	E	F	G	H

A		B		C	
Size Code Inches		T.C. Characteristics		Normal Capacitance	
0603	0.06×0.03	HG	-33±30 PPM/°C	102	10×10 ²
0805	0.08×0.05	LG	-75±30 PPM/°C	2R0	2.0
1206	0.12×0.06	PH	-150±60 PPM/°C	Express by three figures. Unit used is pF (pico-farad)	
		RH	-220±60 PPM/°C	First two figures are significant digit, third figure expresses number of zeros which follow the two significant digit	
		SH	-330±60 PPM/°C	If there is a decimal place it is represented by a "R". In this scenario all figures are significant digit	
		TH	-470±60PPM/°C		
		UJ	-750±120 PPM/°C		
		SL	+140-1000 PPM/°C		

D		E		F		G			H	
Tolerance		Rated Voltage		Termination		Packaging Style			Lead Free	
B	±0.10PF	160	16×10 ⁰	S	Silver	No Mark	Bulk		G	Lead Free
C	±0.25PF	250	25×10 ⁰	N	Nickel Barrier Tin plating	T	Tape & Reel			*
D	±0.5PF	500	50×10 ⁰			B	Bulk	Cartridge	*May contain toxin material if left blanked	
F	±1.0%	630	63×10 ⁰							
G	±2.0%	101	10×10 ¹							
J	±5.0%	201	20×10 ¹							
K	±10%	501	50×10 ¹							
M	±20%	102	10×10 ²							
		202	20×10 ²							

Termination Diagrams



Temperature Compensating MLCC

Dielectric Characteristic Introduction & Test Method

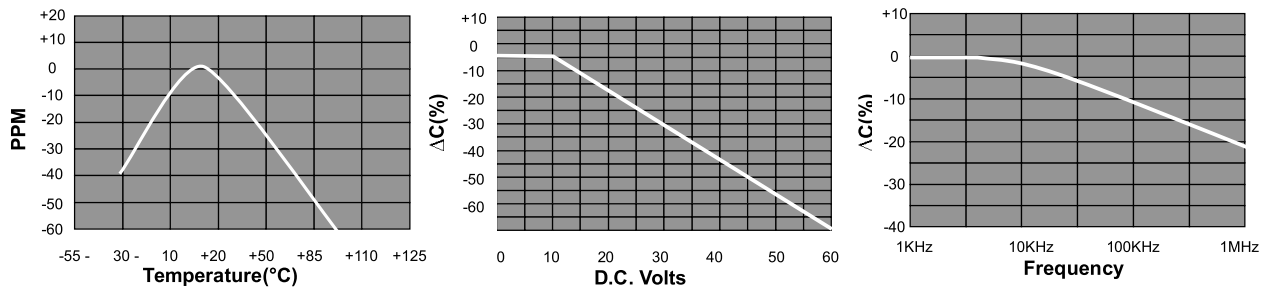
Item	Specification	Test Method		
Capacitance	Tolerance Requirement	C≤1000PF:1MHz±10% 0.5TO5Vrms C>1000PF:1KHz±10% 1.0±0.2Vrms		
Capacitance Tolerance	B=±0.1PF C=±0.25PF D=±0.5PF F=±1%G=±2% J=±5%K=±10% M=±20% B. C. D for C<10PF			
Rated Voltage	16: 25: 50: 63: 100: 200: 500: 1000: 2000VDC			
Dissipation Factor (DF)	C≥50PF:DF<0.15% C<50PF: DF≤15((150/c)+7)×10 ⁻⁴			
Insulation Resistance (IR)	C≤10nF:R>1000MΩ C>10nF:RxC>1000S	Test Voltage: rating voltage Charging time:1min Temperature:18~25°C Humidity: <80°C		
Dielectric Withstanding Voltage	There shall be no evidence of damage or flash over during the test.	Apply 2.5x rating Voltage to both Terminations for 5 seconds. Charge and discharge current are less than 50mA.		
Termination Adhesion	There shall be no evidence of damage during the test.	Test Condition: 5N± 10±1s		
Bending Strength	There shall be no evidence of damage during the test, capacitance tolerance shall be not more than 10%.	After soldering capacitor on the PCB,1mm of bending shall be applied for 1 second as shown by Drawing:		
Solderability	Termination area shall be at least 80% covered with a new solder coating . There shall be no crack and ceramic exposure of terminated surface by melting.	The capacitors are completely immersed during 2 in the molten rosin, Then immersed 10mm during 2±1s in the molten solder with a temperature of 235±5°C.Pick up the capacitors-and cleaned with solvent, and put in on the> 10 times microscope.		
Resistance to Soldering Heat	Type			
	Temp		265±5°C	
	Time		5±1s	
	Cover%		≥85%	
	△C/C	≥5%		
Temperature Cycling	Type	HG LG PH RH SH TH UJ SL	Condition	
	△C/C	≤1%	Temp.Oa	-55±3°C
			Temp.Ob	+125±3°C
	There shall be no evidence of damage during the test.		Cycle times	5 times 30min/time
			Resume time	24h
			Changing times	2~3min

Temperature Compensating MLCC

Dielectric Characteristic Introduction & Test Method

Item	Specification		Test Method	
Humidity & Moisture Resistance	Type	HG LG PH RH SH TH UJ SL	Permanent moisture: $T=40\pm 2^{\circ}\text{C}$ $t=21\text{d}$ Relative humidity: $93\pm 2\%-3\%$ Resume time: $1\sim 2\text{h}$	
	$\Delta C/C$	$\leq 20\%$		
	DF	0.003		
	IR	$RxC > 25\text{s}$		
	There shall be no evidence of damage during the test.			
T.C. Characteristics			T.C.	
			$+20^{\circ}\text{C} \rightarrow -55^{\circ}\text{C} \rightarrow +20^{\circ}\text{C} \rightarrow +125^{\circ}\text{C}$	
Vibration	There shall be no evidence of damage during the test.		Vibration frequency: $f=10\sim 500\text{HZ}$ Vibration range: 0.75mm/s^2 in 3 direction: 2h/direction	
Bump	Type	HG LG PH RH SH TH UJ SL	4000 adder speed: 390m/s^2 Pulse duration: 6ms	
	$\Delta C/C$	$\leq 2\%$		
	There shall be no evidence of damage during the test.			
Life test	Type	HG LG PH RH SH TH UJ SL	Condition	
	$\Delta C/C$	$\leq 20\%$	Temperature	$+125^{\circ}\text{C}$
	DF	0.003	time	$T=100\text{th}$
	IR	$RxC > 25\text{s}$	Voltage	$V=1.5V_r$
	There shall be no evidence of damage during the test.		Resume time	24 ± 1 小时
6 grade failure test	Type		Condition	
	$\Delta C/C$	$\leq 2\%$	Creditability	60%
	DF	0.003	Temperature	$+125^{\circ}\text{C}$
	IR	$RxC > 25\text{s}$	Voltage	Rating Voltage
	There shall be no evidence of damage during the test.		time	1000 小时

Typical Characteristics



Temperature Compensating MLCC

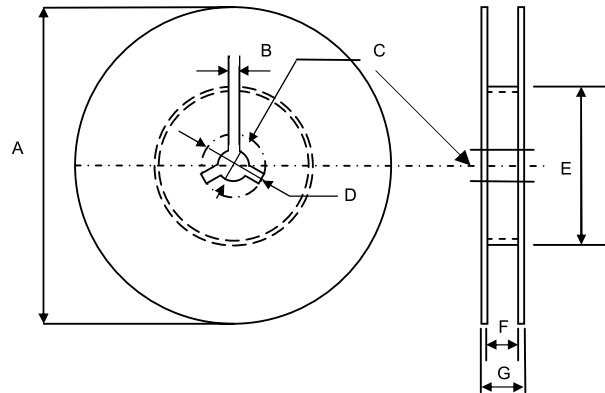
Size Code Capacitance and Voltage

Size Code	Dimensions (Mm)				Voltage	Capacitance(Pf)		
	L		T			HG LG	PH RH SH TH	UJ SL
0603	1.6±0.1	0.8±0.10	0.8±0.1	0.3±0.1	25V	0.5~470	0.5~560	0.2~1000
					50V	0.5~330	0.5~470	0.2~560
					100V	0.5~270	0.5~330	0.2~470
					200V	0.5~220	0.5~270	0.2~330
0805	2.00±0.20	1.25±0.20	1.25±0.15	0.5±0.25	25V	0.5~820	0.5~1000	0.5~1000
					50V	0.5~820	0.5~1000	0.5~560
					100V	0.5~470	0.5~560	0.5~470
					200V	0.5~330	0.5~470	0.5~330
					500V	0.5~220	0.5~330	0.5~330
1206	3.20±0.30	1.60±0.20	1.0± _{0.2} ⁰ 1.25±0.15	0.5±0.25	25V	0.5~2200	0.5~2200	0.5~3300
					50V	0.5~1500	0.5~1500	0.5~2200
					100V	0.5~1000	0.5~1000	0.5~1500
					200V	0.5~470	0.5~560	0.5~560
					500V	0.5~330	0.5~470	0.5~470
					1000V	0.5~220	0.5~330	0.5~390
					2000V	0.5~100	0.5~150	0.5~220

Packaging - Structure and Dimension

Tape & Reel

A	B*	C	D*	E	F	G
178±2.0	3.0	13±0.5	φ32	50MIN	10.0±	14.9
				φ±1	1.5	12±2.0



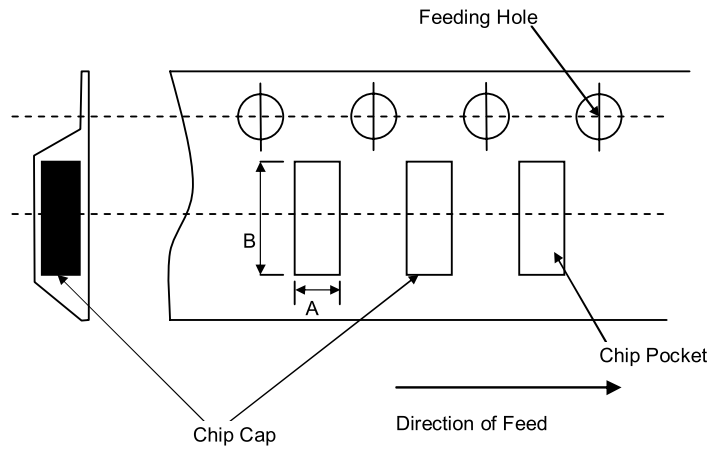
Temperature Compensating MLCC

Paper Tape

Size	A	B
0603	1.1±0.2	1.4±0.2
0805	1.45±0.2	2.3±0.2
1206	1.8±0.2	3.4±0.2

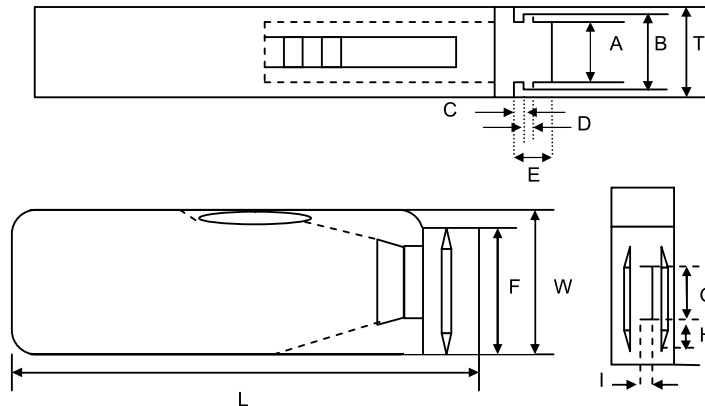
Plastic Tape (Te)

Size	A	B
0603	0.8±0.2	2.0±0.2
0805	1.65±0.2	2.4±0.2
1206	2.0±0.2	3.6±0.2



Cartridge

Symbol	A	B	D	C	T	E
Dimension	6.8±0.1	8.8±0.1	12±0.1	15±0.1-0	2±0-0.1	4.7±0.1
Symbol	F	W	G	H	L	I
Dimension	31.5±0.2-0	36±0-0.2	19±0.35	7±0.35	110±0.7	5±0.35



Packaging Quantity

Size	Quantity			
	(TP)	(TE)	(BC)	(BP)
0603	5000	2500	15000	2000
0805	5000	2500	1000	2000
1206	5000	1000	5000	2000

● 電容器及介質種類

* NPO (COG): 此類介質材料的電容器，其電性能最穩定，幾乎不隨溫度、電壓和時間的變化而變化。適用於低損耗，穩定性要求高的高頻電路，如濾波器，振動器和計時電路中。

* X7R: X7R 材料具有較高的介電常數。

此類電容器的容量比 NPO 類電容器的容量高，具有較穩定的溫度特性，適用於容量範圍廣，穩定性要求不高的電路中，如隔直、耦合、旁路、鑿頻等電路中。

* Y5V: 此類介質的電容器是所有電容中介電常數最大的電容器，但其容量穩定性較差，對溫度、電壓等條件較敏感，適用於要求大容量，溫度變化不大的電路中。

● 容量和容量偏差:

不同的電路需要不同的容量和容量偏差。因此，客戶應根據自己的需要進行選擇。

● 電壓:

電壓的選擇也應根據客戶自身要求而定。

● 外電極(端頭電極)

我公司可提供兩種端頭電極的電容器。一種是純銀端頭。另一種是三層電鍍端頭，三層指銀層，鎳層和錫層。客戶可根據自己的焊接方式選擇合適的端頭類別。

● 包裝:

我公司電容器的包裝形式主要有散包裝和編帶包裝，其中散包裝有盒裝散包裝和袋裝散包裝，編帶包裝有紙帶編帶包裝和膠帶編帶包裝。

● 非標項目:

我公司可根據客戶的特殊要求對電容器產品進行客戶附加的特殊性能指標項目的測試。



● DIELECTRIC MATERIAL TYPE OF CAPACITOR

* NPO(COG):The electrical properties of this kind of capacitor are the most stable one and have little change with temperature, voltage and time.They are suited of applications where low-losses and high stability are required , such as filters,oscillators,and timing circuits.

* X7R: X7R material is a kind of material, which has high dielectric constant. The capacitance of this kind of capacitors is higher than that of NPO . These capacitors are classified as having a semisatble temperature characteristic and used over a wide temperature range, such as blocking, coupling, bypassing and frequency discriminating circuit.

* Y5V: These capacitors have 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 and measuring conditions, such as temperature and voltage, etc.

● CAPACITANCE AND CAPACITANCE TOLERANCE

Different circuit needs different capacitance and capacitance tolerance. So the selection of capacitance is depended on the need of customers.

● VOLTAGE

The selection of voltage is depended on the customer's requirements.

● OUTER ELECTRODE(TERMINATIONS)

We can provide two kinds of terminations.One is Silver. The other is built up of three plating layers,Silverlayer, Nickel layer and Tin layer. What kind of termination to be chosen is depended on the soldering method.

● PACKAGE

There are two types of package. One is bulk package, including bulk case and bulk bag. The other is taping package, including paper tape and embossed tape.

● NONSTANDARD ITEMS

For nonstandard items, we can test the extra items according to customers' special requirements.

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

• MLCC的結構及其尺寸 STRUCTURE AND DIMENSIONS OF MLCC

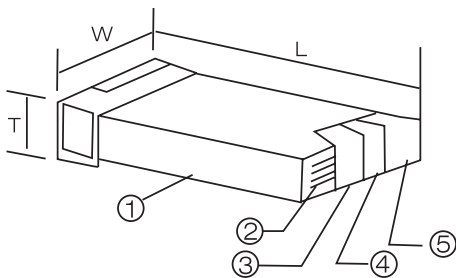


• 尺寸 DIMENSIONS

Table 3

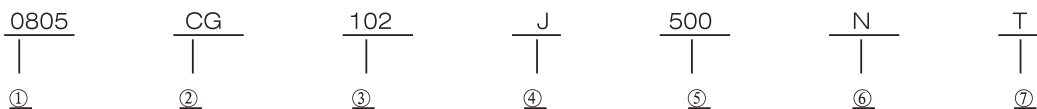
型號 Type	尺寸 Dimensions (mm)			
	L	W	T	WB
0402	1.00 ± 0.05	0.50 ± 0.05	0.5 ± 0.05	0.25 ± 0.10
0603	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.1	0.30 ± 0.10
0805	2.00 ± 0.20	1.25 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.20
1206	3.20 ± 0.30	1.6 ± 0.2	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.25
1210	3.20 ± 0.30	2.50 ± 0.30	1.25 ± 0.30 1.50 ± 0.30	0.75 ± 0.25
1808	4.50 ± 0.40	2.00 ± 0.20	< 2.0	0.75 ± 0.25
1812	4.50 ± 0.40	3.20 ± 0.30	< 2.5	0.75 ± 0.20
2225	5.70 ± 0.50	6.30 ± 0.50	< 2.5	1.00 ± 0.25
3035	7.60 ± 0.50	9.00 ± 0.50	< 3.0	1.00 ± 0.25

• 結構 STRUCTURE



序號 NO	名稱 Name	材料 Material
①	陶瓷介質 Ceramic dielectric	瓷粉 ceramic Powder
②	內電極 Inner electrode	鈀/銀/鎳 Palladium/silver/Nickel
③	外電極 substrate electrode	銀/銅 Silver/Copper
④	鎳層 Nickel Plating Layer	鎳 Nickel
⑤	錫層 Tin Plating Layer	錫 Tin

• 訂貨方式 HOW TO ORDER



說明 (NOTES) :

① 產品的尺寸說明 DIMENSIONS

單位 unit: inch

尺寸規格 Size Code	0402	0603	0805	1206	1210	1812	2225	3035
長 × 寬 (L × W)	0.04 × 0.02	0.06 × 0.03	0.08 × 0.05	0.12 × 0.06	0.12 × 0.10	0.18 × 0.12	0.22 × 0.25	0.30 × 0.35

② 介質種類 DIELECTRIC STYLE

介質種類代號 (Dielectric Code)	CG	B	F	E
介質材料 (Dielectric material)	COG/NPO	X7R	Y5V	Z5U

③ 標稱容量 NOMINAL CAPACITANCE

單位 unit: PF

102	10 × 10 ²	注: 頭兩位數字為有效數字, 第三位數字為0的個數; R為小數點。 Note: 1 st two digits are significant; third digit denotes number of zeros; R=decimal.
0R5	0.5	
1R0	1.0	
224	22 × 10 ⁴	
...	...	

④ 容量誤差 CAPACITANCE TOLERANCE

代 碼 (CODE)	B	C	D	F	G	J	K	M	S	Z
誤 差 (Tolerance)	± 0.10pF	± 0.25pF	± 0.5pF	± 1.0%	± 2.0%	± 5.0%	± 10%	± 20%	+50% -20%	+80% -20%

⑤ 額定電壓 Rated Voltage

單位 unit: V

表示方式 (express method)	160	250	500	630	101	201	501	102	202
實際值 (actual value)	16 × 10 ⁰	25 × 10 ⁰	50 × 10 ⁰	63 × 10 ⁰	10 × 10 ¹	20 × 10 ¹	50 × 10 ¹	10 × 10 ²	20 × 10 ²

⑥ 端頭材料 TERMINAL MATERIALS

S	純銀端頭 Silver
N	電鍍端頭 Plating Termination 銀層 Copper/Silver Layer 鎳層 Nickel Layer 錫層 Tin Layer

⑦ 包裝方式 PACKAGE STYLES

無標記 (NO MARKS)	T	B
塑料袋散包裝 (BULK BAG)	編帶包裝 (TAPING PACKAGE)	塑料盒散包裝 (BULK CASE)

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

■ 通用型高頻COG類多層片狀陶瓷電容器 GENERAL COG MLCC

● 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

尺寸規格 SIZE CODE	尺寸 DIMENSIONS(mm)				工作電壓 OPERATING VOLTAGE(V)	容量範圍 CAPACITANCE(pF)
	L	W	T	WB		NPO(COG)
0402	1.00 ± 0.05	0.50 ± 0.05	0.50 ± 0.05	0.25 ± 0.10	25	1.0 ~ 470
					50	1.0 ~ 220
0603	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.10	25	1.0 ~ 1000
					50	0.5 ~ 820
					100	0.5 ~ 820
					200	0.5 ~ 330
0805	2.00 ± 0.20	1.25 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.20	25	0.5 ~ 3300
					50	0.5 ~ 2200
					100	0.5 ~ 1000
					200	0.5 ~ 820
1206	3.20 ± 0.30	1.60 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.25	500	0.5 ~ 470
					25	0.5 ~ 4700
					50	0.5 ~ 3900
					100	0.5 ~ 2700
					200	0.5 ~ 1000
					500	0.5 ~ 820
1210	3.20 ± 0.30	2.50 ± 0.30	1.25 ± 0.30 1.50 ± 0.30	0.75 ± 0.25	1000	0.5 ~ 470
					2000	0.5 ~ 100
					25	560 ~ 10000
					50	560 ~ 7500
					100	10 ~ 4700
					200	10 ~ 2700
1808	4.50 ± 0.40	2.00 ± 0.20	≤ 2.0	0.75 ± 0.25	500	10 ~ 1800
					1000	10 ~ 820
					2000	10 ~ 220
					25	10 ~ 8200
					50	10 ~ 6800
					100	10 ~ 4700
1812	4.50 ± 0.40	3.20 ± 0.30	≤ 2.5	1.00 ± 0.25	200	10 ~ 2700
					500	10 ~ 1800
					1000	10 ~ 1000
					2000	10 ~ 330
					3000	10 ~ 270
					25	10 ~ 15000
					50	10 ~ 10000
2225	5.70 ± 0.50	6.30 ± 0.50	≤ 2.5	1.00 ± 0.25	100	10 ~ 5600
					200	10 ~ 12000
					500	10 ~ 3900
					1000	10 ~ 2200
					2000	10 ~ 1000
					3000	10 ~ 680
					25	1000 ~ 4700
3035	7.60 ± 0.50	9.00 ± 0.50	≤ 3.0	1.00 ± 0.25	50	1000 ~ 22000
					100	10 ~ 22000
					200	10 ~ 12000
					500	10 ~ 3900
					1000	10 ~ 2200
					2000	10 ~ 1000
25	1000 ~ 100000					
50	1000 ~ 47000					
100	1000 ~ 33000					
200	1000 ~ 22000					
500	1000 ~ 18000					
1000	1000 ~ 8200					
2000	1000 ~ 3300					

■ 通用型X7R多層片狀陶瓷電容器

GENERAL X7R MLCC

● 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

尺寸規格 SIZE CODE	尺寸 DIMENSIONS(mm)				工作電壓 OPERATING VOLTAGE(V)	容量範圍 CAPACITANCE(pF) X7R(B)
	L	W	T	WB		
0402	1.00 ± 0.05	0.50 ± 0.05	0.50 ± 0.05	0.25 ± 0.10	16	100 ~ 10000
					25	100 ~ 10000
					50	100 ~ 10000
0603	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.10	25	100 ~ 100000
					50	100 ~ 100000
					100	100 ~ 10000
					200	100 ~ 5600
0805	2.00 ± 0.20	1.25 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.20	25	150 ~ 220000
					50	150 ~ 220000
					100	150 ~ 33000
					200	150 ~ 22000
					500	150 ~ 12000
1206	3.20 ± 0.30	1.60 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.25	25	1000 ~ 220000
					50	470 ~ 150000
					100	150 ~ 100000
					200	150 ~ 68000
					500	150 ~ 15000
					1000	150 ~ 3300
1210	3.20 ± 0.30	2.50 ± 0.30	1.25 ± 0.30 1.50 ± 0.30	0.75 ± 0.25	2000	150 ~ 1000
					25	1000 ~ 330000
					50	470 ~ 220000
					100	150 ~ 220000
					200	150 ~ 100000
					500	150 ~ 27000
					1000	150 ~ 10000
1808	4.50 ± 0.40	2.00 ± 0.20	≤ 2.0	0.75 ± 0.25	2000	150 ~ 2200
					3000	150 ~ 1000
					25	3300 ~ 470000
					50	3300 ~ 330000
					100	150 ~ 220000
					200	150 ~ 100000
					500	150 ~ 27000
					1000	150 ~ 10000
1812	4.50 ± 0.40	3.20 ± 0.30	≤ 2.5	0.75 ± 0.25	2000	150 ~ 2200
					3000	150 ~ 1000
					25	4700 ~ 470000
					50	4700 ~ 330000
					100	150 ~ 330000
					200	150 ~ 100000
					500	150 ~ 33000
					1000	150 ~ 15000
2225	5.70 ± 0.50	6.30 ± 0.50	≤ 2.5	1.00 ± 0.25	2000	150 ~ 2200
					3000	150 ~ 1000
					25	10000 ~ 2000000
					50	10000 ~ 1200000
					100	150 ~ 1200000
					200	150 ~ 100000
					500	150 ~ 68000
					1000	150 ~ 33000
3035	7.60 ± 0.50	9.00 ± 0.50	≤ 3.0	1.00 ± 0.25	2000	150 ~ 10000
					3000	150 ~ 3300
					25	10000 ~ 4700000
					50	10000 ~ 2200000
					100	1000 ~ 2200000
					200	1000 ~ 1000000
					500	1000 ~ 150000
					1000	1000 ~ 100000
3035	7.60 ± 0.50	9.00 ± 0.50	≤ 3.0	1.00 ± 0.25	2000	1000 ~ 22000
					3000	1000 ~ 10000
					3000	1000 ~ 10000

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

■ 通用型Y5V、Z5U多層片狀陶瓷電容器

GENERAL Y5V, Z5U MLCC

● 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

尺寸規格 SIZE CODE	尺寸 DIMENSIONS(mm)				工作電壓 OPERATING VOLTAGE	容量範圍 CAPACITANCE(pF)
	L	W	T	WB		Y5V(F) Z5U(E)
0402	1.00 ± 0.05	0.50 ± 0.05	0.50 ± 0.05	0.25 ± 0.10	16	1000 ~ 100000
					25	1000 ~ 100000
					50	1000 ~ 100000
0603	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.10	25	2200 ~ 1000000
					50	2200 ~ 1000000
					100	2200 ~ 68000
0805	2.00 ± 0.20	1.25 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.20	25	10000 ~ 1000000
					50	10000 ~ 1000000
					100	10000 ~ 100000
					200	10000 ~ 56000
1206	3.20 ± 0.30	1.60 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.25	25	10000 ~ 1200000
					50	10000 ~ 1000000
					100	10000 ~ 220000
					200	10000 ~ 1000000
1210	3.20 ± 0.30	2.50 ± 0.30	1.25 ± 0.30 1.50 ± 0.30	0.75 ± 0.25	25	100000 ~ 1500000
					50	100000 ~ 1500000
					100	10000 ~ 560000
					200	10000 ~ 150000
1808	4.50 ± 0.40	2.00 ± 0.20	≤ 2.0	0.75 ± 0.25	25	100000 ~ 2200000
					50	100000 ~ 2000000
					100	10000 ~ 560000
					200	10000 ~ 150000
1812	4.50 ± 0.40	3.20 ± 0.30	≤ 2.5	0.75 ± 0.25	25	100000 ~ 3300000
					50	100000 ~ 2200000
					100	10000 ~ 1000000
					200	10000 ~ 220000
2225	5.70 ± 0.50	6.30 ± 0.50	≤ 2.5	1.00 ± 0.25	25	150000 ~ 4700000
					50	150000 ~ 3300000
					100	10000 ~ 2000000
					200	10000 ~ 220000
3035	7.60 ± 0.50	9.00 ± 0.50	≤ 3.0	1.00 ± 0.25	25	220000 ~ 10000000
					50	220000 ~ 6800000
					100	150000 ~ 2000000
					200	150000 ~ 680000

■ 温度補償型多層片狀陶瓷電容器

TEMPERATURE COMPENSATING MLCC (HG, LG, PH, RH, SH, TH, UJ, SL)

• 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

尺寸規格	DIMENSIONS(mm)				工作電壓 OPERATING VOLTAGE (V)	容量範圍CAPACITANCE(pF)					
SIZE CODE	L	W	T	WB		HG	LG	PH SH	RH TH	SL	UJ
0603	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.10	25	0.5 ~ 100		0.5 ~ 270		0.2 ~ 1000	0.2 ~ 330
					50	0.5 ~ 100		0.5 ~ 270		0.2 ~ 1000	0.2 ~ 330
					100	0.5 ~ 100		0.5 ~ 220		0.2 ~ 470	0.2 ~ 270
					200	0.5 ~ 100		0.5 ~ 150		0.2 ~ 330	0.2 ~ 220
0805	2.00 ± 0.20	1.25 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.20	25	0.5 ~ 220		0.5 ~ 390		0.5 ~ 1000	0.5 ~ 470
					50	0.5 ~ 220		0.5 ~ 390		0.5 ~ 1000	0.5 ~ 470
					100	0.5 ~ 220		0.5 ~ 390		0.5 ~ 470	0.5 ~ 390
					200	0.5 ~ 220		0.5 ~ 330		0.5 ~ 330	0.5 ~ 330
					500	0.5 ~ 220		0.5 ~ 270		0.5 ~ 330	0.5 ~ 270
1206	3.20 ± 0.30	1.60 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.25	25	0.5 ~ 470		0.5 ~ 680		0.5 ~ 4700	0.5 ~ 1000
					50	0.5 ~ 470		0.5 ~ 680		0.5 ~ 4700	0.5 ~ 1000
					100	0.5 ~ 470		0.5 ~ 680		0.5 ~ 2200	0.5 ~ 680
					200	0.5 ~ 470		0.5 ~ 560		0.5 ~ 560	0.5 ~ 560
					500	0.5 ~ 330		0.5 ~ 470		0.5 ~ 470	0.5 ~ 470
					1000	0.5 ~ 220		0.5 ~ 330		0.5 ~ 390	0.5 ~ 390
					2000	0.5 ~ 100		0.5 ~ 150		0.5 ~ 220	0.5 ~ 220

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

■ 高頻率響應高Q多層片狀陶瓷電容器

HIHG FREQUENCY RESPONDING HI-Q (CF,CQ) MLCC

● 尺寸、工作電壓及容量範圍

DIMENSIONS, CAPACITANCE RANGE & OPERATING VOLTAGE

尺寸規格 Size Code	尺寸DIMENSIONS (mm)			
	L	W	T	WB
0603	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.10
0805	2.00 ± 0.20	1.25 ± 0.20	0.70 ± 0.20 1.00 ± 0.20 1.25 ± 0.20	0.50 ± 0.20

CF 容量值及其Q值 CF Capacitance value and Q value:

容量 Capacitance (pF)	300MHz時的Q值 Q value at 300MHz		容量 Capacitance (pF)	300MHz時的Q值 Q value at 300MHz		容量 Capacitance (pF)	300MHz時的Q值 Q value at 300MHz	
	0805	0603		0805	0603		0805	0603
4.7	400	320	15	130	104	47	40	32
5.2	360	288	16	120	96	51	36	29
5.6	340	272	18	100	80	56	34	28
6.2	320	256	20	90	72	62	32	26
6.8	280	224	22	86	69	68	30	24
7.5	260	208	24	80	64	75	28	23
8.2	230	184	27	70	56	82	26	21
9.1	210	168	30	60	48	91	24	20
10	200	160	33	56	45	100	22	18
11	180	144	36	52	42	110	20	16
12	160	128	39	48	39	120	28	15
13	150	120	43	44	36	130	16	13
14	140	112						

CQ 容量值及其Q值 CQ Capacitance value and Q value:

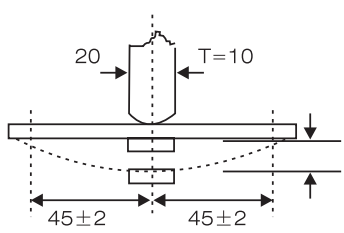
容量 Capacitance (pF)	300MHz時的Q值 Q value at 300MHz		容量 Capacitance (pF)	300MHz時的Q值 Q value at 300MHz		容量 Capacitance (pF)	300MHz時的Q值 Q value at 300MHz	
	0805	0603		0805	0603		0805	0603
4.7	960	640	11	432	288	24	192	128
5.2	864	576	12	384	256	27	168	112
5.6	816	544	13	360	240	30	144	96
6.2	768	512	14	336	224	33	125	90
6.8	672	448	15	312	208	36	115	83
7.5	624	416	16	288	192	39	105	77
8.2	552	368	18	240	160	43	96	70
9.1	504	336	20	216	144	47	86	64
10	480	320	22	206	134			

● 可靠性 RELIABILITY DATA

項目 Item	技術規格 Technical Specification		測試方法 Test Method and Remarks			
容量 Capacitance	I 類 Class I	應符合指定的誤差級別 Should be within the specified tolerance.	標稱容量 Capacitance	測試頻率 Measuring Frequency	測試電壓 Measuring Voltage	
			≤ 1000pF	1MHZ ± 10%	1.0 ± 0.2Vrms	
	> 1000pF	1KHZ ± 10%				
	II 類 Class II	應符合指定的誤差級別 Should be within the specified tolerance.	對於 II 類電容器，測試前應先預處理 For class II, pretreatment should be done before measurement.			
			測試頻率 Measuring Frequency	測試電壓 Measuring Voltage		
			1KHZ ± 10%	x7R	1.0 ± 0.2Vrms	
				y5V	0.5 ± 0.2Vrms	
損耗角正切 (DF, tan δ) Dissipation Factor	I 類 Class I	DF ≤ 0.15%		標稱容量 Capacitance	測試頻率 Measuring Frequency	測試電壓 Measuring Voltage
				≤ 1000pF	1MHZ ± 10%	1.0 ± 0.2Vrms
	> 1000pF	1KHZ ± 10%				
	II 類 Class II	X7R	額定電壓: Rated Voltage: ≥ 50V, DF ≤ 2.5% = 25V, DF ≤ 3.0% = 16V, DF ≤ 3.5%	測試頻率: 1KHZ ± 10% 測試電壓: 1.0 ± 0.2Vrms Test Frequency: 1KHZ ± 10% Test Voltage: 1.0 ± 0.2Vrms		
	Y5V Z5U	額定電壓: Rated Voltage: ≥ 50V, DF ≤ 5.0% = 25V, DF ≤ 7.0% = 16V, DF ≤ 9.0%	測試頻率: 1KHZ ± 10% 測試電壓: 0.5 ± 0.2Vrms Test Frequency: 1KHZ ± 10% Test Voltage: 0.5 ± 0.2Vrms			
絕緣電阻(IR) Insulation Resistance	I 類 Class I	C ≤ 10nF, IR ≥ 50000MΩ C > 10nF, R.C ≥ 500ΩF		測試電壓: 額定電壓 測試時間: 60 ± 5秒 Measuring Voltage: Rated Voltage Duration: 60 ± 5s		
	II 類 Class II	X7R	C ≤ 25 nF, IR ≥ 10000MΩ C > 25 nF, R.C > 100ΩF			
		Y5V Z5U	C ≤ 25 nF, IR ≥ 4000MΩ C > 25 nF, R.C > 100ΩF			
介質耐電强度 (DWV) Dielectric Withstanding Voltage	不應有介質被擊穿或損傷 No breakdown or damage.			測量電壓: I 類: 300% 額定電壓 II 類: 250% 額定電壓 時間: 5 ± 1秒 充/放電電流: 不應超過 50mA (這部分說明不包括中高壓 MLCC) Measuring Voltage: Class I : 300% Rated voltage Class II : 250% Rated voltage Duration: 5 ± 1S Charge/ Discharge Current: 50mA max. (This method excludes high-voltage MLCC)		

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

項目 Item	技術規格 Technical Specification					測試方法 Test Method and Remarks
可焊性 Solderability	上錫率應大於95% 外觀：無可見損傷 At least 95% of the terminal electrode is covered by new solder. No visible damage.					浸錫溫度：235 ± 5°C 浸錫速度：25 ± 2mm/sec 浸錫時間：2 ± 0.5s Solder Temperature: 235 ± 5°C Immersed Speed: 25 ± 2mm/sec Duration: 2 ± 0.5s
耐焊接熱 Resistance to Soldering Heat	項目 Item	NPO至SL NPO to SL	X7R	Y5V	Z5U	將電容在100 ~ 200°C的溫度下預熱10 ± 2分鐘。 浸錫溫度：265 ± 5°C 浸錫時間：5 ± 1s 然後取出溶劑清洗乾淨，在10倍以上的顯微鏡底下觀察。 Preheating conditions: 100 to 200°C 10 ± 2min Solder Temperature: 265 ± 5°C Duration: 5 ± 1s Clean the capacitor with solvent and examine it with a 10X(min.) Microscope.
	△C/C	≤ 0.5%	-5 ~ +10%	-10 ~ +20%		
	DF	同初始標準 Same to initial value.				
	ER	同初始標準 Same to initial value.				
	外觀：無可見損傷 上錫率：≥ 95% Appearance: No visible damage. At least 95% of the terminal electrode is covered by new solder.					
抗彎曲強度 Resistance to flexure of Substrate (Bending Strength)	外觀：無可見損傷 Appearance: No visible damage.					試驗基板：A1203或PCB 彎曲深度：1mm 施壓速度：0.5mm/sec. 單位：mm 應在彎曲狀態下進行測量。 
	△C/C	I類：≤ ± 0.5% Class I：≤ ± 0.5% II類： B：≤ ± 12.5% E, F：≤ ± 30% Class II： B：≤ ± 12.5% E, F：≤ ± 30%				
端頭結合強度 Termination Adhesion	外觀無可見損傷 No visible damage.					施加的力：5N 時間：10 ± 1S Applied Force: 5N Duration: 10 ± 1S

温度循環 Temperature Cycle	$\Delta C/C$	I 類: $\leq \pm 2.5\%$ 或 $\pm 0.25pF$ 取兩者中最大者 II 類: $B: \leq \pm 7.5\%$ $E, F: \leq \pm 20\%$ Class I : $\leq \pm 2.5\%$ or $\pm 0.25pF$ whichever is larger. Class II : $B: \leq \pm 7.5\%$ $E, F: \leq \pm 20\%$	預處理(2類) *: 上限類別溫度, 1小時 恢復: $24 \pm 1h$ 初始測量 循環次數: 5次 一個循環分以下4步: <table border="1"> <thead> <tr> <th>階段</th> <th>溫度 (°C)</th> <th>時間 (分鐘)</th> </tr> </thead> <tbody> <tr> <td>第1步</td> <td>下限溫度</td> <td>30</td> </tr> <tr> <td>第2步</td> <td>常溫</td> <td>2~3</td> </tr> <tr> <td>第3步</td> <td>上限溫度</td> <td>30</td> </tr> <tr> <td>第4步</td> <td>常溫</td> <td>2~3</td> </tr> </tbody> </table>	階段	溫度 (°C)	時間 (分鐘)	第1步	下限溫度	30	第2步	常溫	2~3	第3步	上限溫度	30	第4步	常溫	2~3
	階段	溫度 (°C)	時間 (分鐘)															
	第1步	下限溫度	30															
第2步	常溫	2~3																
第3步	上限溫度	30																
第4步	常溫	2~3																
DF	同初始標準 Same to initial value.	試驗后放置(恢復) 時間: $24 \pm 2h$																
IR	同初始標準 Same to initial value.	Preheating conditions* : up- category 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(minute)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Low-category temp.</td> <td>30</td> </tr> <tr> <td>2</td> <td>Normal temp.</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>Up-category temp.</td> <td>30</td> </tr> <tr> <td>4</td> <td>Normal temp.</td> <td>2~3</td> </tr> </tbody> </table>	Step	Temperature(°C)	Time(minute)	1	Low-category temp.	30	2	Normal temp.	2~3	3	Up-category temp.	30	4	Normal temp.	2~3	
Step	Temperature(°C)	Time(minute)																
1	Low-category temp.	30																
2	Normal temp.	2~3																
3	Up-category temp.	30																
4	Normal temp.	2~3																
潮濕試驗 Moisture Resistance	$\Delta C/C$	I 類: $\leq \pm 2.5\%$ 或 $\pm 0.25pF$, 取兩者中最大者 II 類: $B: \leq \pm 12.5\%$ $E, F: \leq \pm 30\%$ Class I : $\leq \pm 2.5\%$ or $\pm 0.25pF$ whichever is larger. Class II : $B: \leq \pm 12.5\%$ $E, F: \leq \pm 30\%$	溫度: $40 \pm 2^{\circ}C$ 濕度: 90~95%RH 施加電壓: 額定工作電壓 時間: 500小時 充/放電電流: 不應超過50mA 放置條件: 室溫 放置時間: 24小時(I 類) ; 48小時(II 類) Temperature: $40 \pm 2^{\circ}C$ Humidity: 90~95%RH Voltage: Rated Voltage Duration: 500h Charge / Discharge Current: 50mA max. Recovery conditions: Room temperature Recovery Time: 24h(Class I) or 48h(Class II)															
	DF	I 類: $DF \leq 0.3\%$ II 類: $B: C \leq 47nF, DF \leq 5\%$ $C > 47nF, DF \leq 7\%$ $E, F: C \leq 470nF, DF \leq 7\%$ $C > 470nF, DF \leq 9\%$ Class I : $DF \leq 0.3\%$ Class II : $B: C \leq 47nF, DF \leq 5\%$ $C > 47nF, DF \leq 7\%$ $E, F: C \leq 470nF, DF \leq 7\%$ $C > 470nF, DF \leq 9\%$																
	IR	500M Ω 或 25 ΩF 取兩者之中較小者 500M Ω or 25 ΩF , whichever is smaller.																
	外觀: 無損傷 Appearance: No visible damage.																	

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

壽命試驗 Life Test	$\Delta C/C$	I 類: $\leq \pm 3\%$ 或 $\pm 0.3pF$ 取兩者中最大者 II 類: B: $\leq \pm 12.5\%$ E, F: $\leq \pm 30\%$ Class I : $\leq \pm 3\%$ or $\pm 0.3pF$ whichever is larger. Class II : B: $\leq \pm 12.5\%$ E, F: $\leq \pm 30\%$	電壓: 2倍額定工作電壓 時間: 1000小時 充/放電電流: 不應超過50mA 放置條件: 室溫 放置時間: 24小時(I 類); 48小時(II 類), Applied Voltage: $2 \times$ Rated Voltage Duration: 1000h Charge / Discharge Current: 50mA max. Recovery conditions: Room temperature Recovery Time: 24h(Class I) or 48h(Class II)
	DF	I 類: $DF \leq 0.3\%$ II 類: B: $C < 47nF, DF \leq 5\%$ $C > 47nF, DF \leq 7\%$ E, F: $C < 470nF, DF \leq 7\%$ $C > 470nF, DF \leq 9\%$ Class I : $DF \leq 0.3\%$ Class II : B: $C < 47nF, DF \leq 5\%$ $C > 47nF, DF \leq 7\%$ E, F: $C < 470nF, DF \leq 7\%$ $C > 470nF, DF \leq 9\%$	
	IR	500M Ω 或 25 ΩF 取兩者之中較小者 500M Ω or 25 ΩF , whichever is smaller.	
	外觀: 無損傷 Appearance: No visible damage.		

注: * 專門預處理的說明:

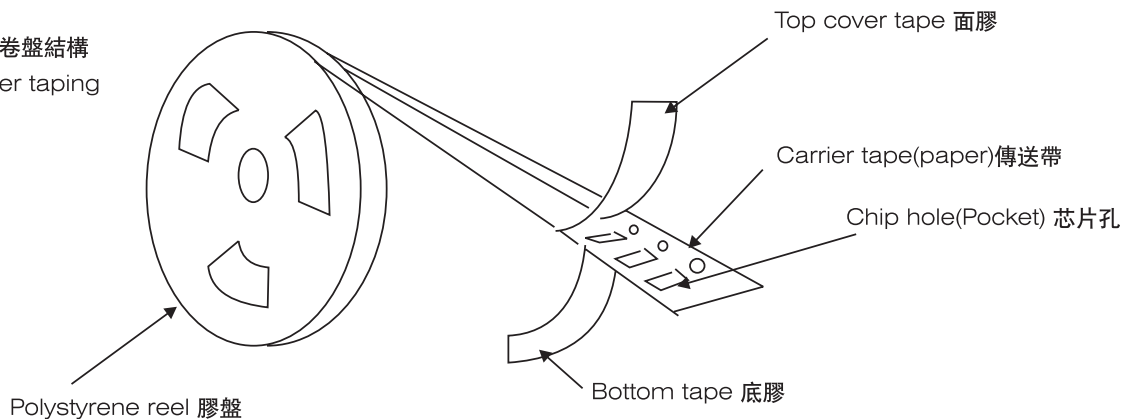
專門預處理(僅對2類電容器): 將電容器放置在最高溫度下或其它標準規範中可能規定的更高溫度下須1h之后接着在試驗的標準大氣條件下恢復24h。

Note: * pretreatment (only for Class II capacitor)

Pretreatment (only for Class II 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 1 hour. Then recovery the capacitor at standard pressure conditions for 24 hours.

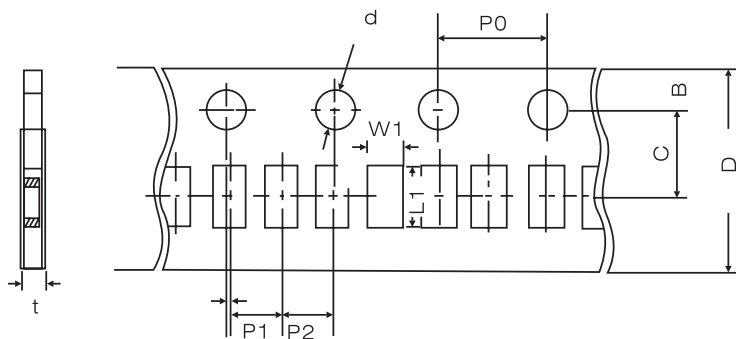
●包裝 PACKAGE OF MLCC

*紙帶卷盤結構
paper taping



*0402紙帶編帶尺寸大小

Dimensions of paper taping for 0402 type

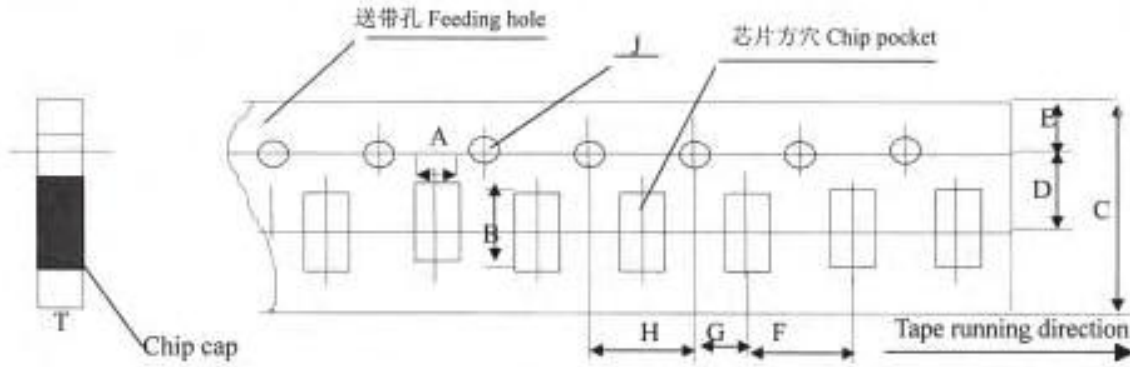


代碼 Code	W1	L1	D	C	B	P1	P2	P0	d	t
0402	0.65 ±0.2	1.15 ±0.2	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	2.0 ±0.05	2.0 ±0.05	4.0 ±0.1	1.5 -0/+0.1	0.80 Below

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MULTILAYER CHIP CERAMIC CAPACITOR

* 適合 '0603, 0805, 1206' 常規尺寸產品的紙帶尺寸
 dimensions of paper taping for 0603,0805,1206types.



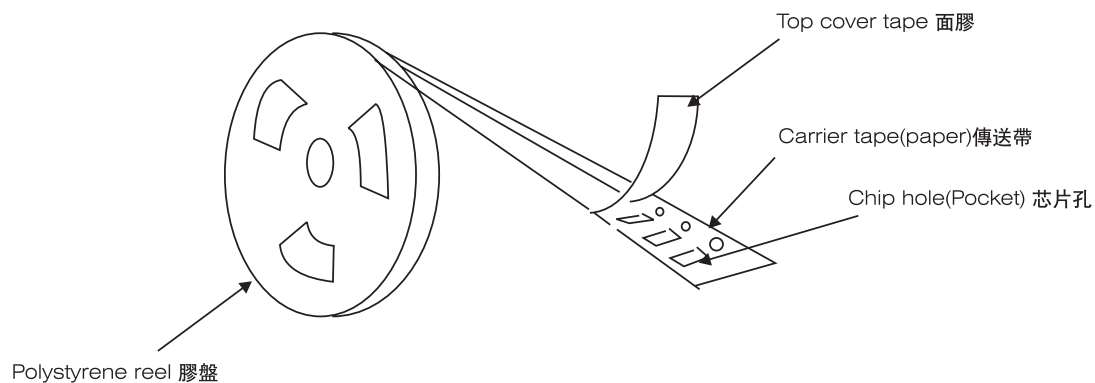
Unit:mm

代號Code 紙帶規格 paper size	A	B	C	D*	E	F	G*	H	J	T
0603	1.1 ±0.2	1.9 ±0.2	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	4.0 ±0.1	1.5 -0/+0.1	1.1 Below
0805	1.45 ±0.2	2.3 ±0.2	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	4.0 ±0.1	1.5 -0/+0.1	1.1 Below
1206	1.80 ±0.2	3.4 ±0.2	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	4.0 ±0.1	1.5 -0/+0.1	1.1 Below

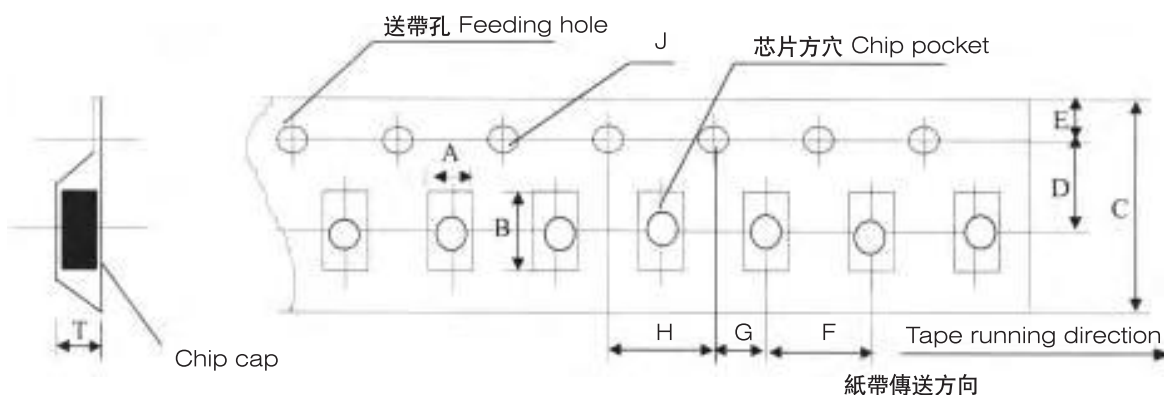
注意: * 表示處對尺寸的要求非常精確。

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

*塑膠卷盤結構
embossed taping



*塑膠帶尺寸結構(適合‘0805, 1206’型產品)
Dimensions of embossed taping for 0805 and 1206 type



Unit:mm

代號Code 規格 Tape size	A	B	C	D*	E	F	G*	H	J	T
0805	1.55 ±0.2	2.35 ±0.2	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	4.0 ±0.1	1.5 -0/+0.1	1.5 Below
1206	1.95 ±0.2	3.6 ±0.2	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	4.0 ±0.1	1.5 -0/+0.1	1.5 Below

注意: * 表示處對尺寸的要求非常精確。

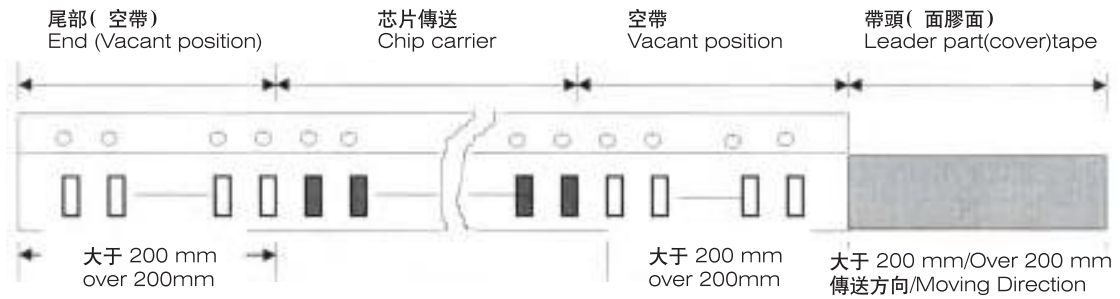
Notes: The place with “*” means where needs exactly dimensions.

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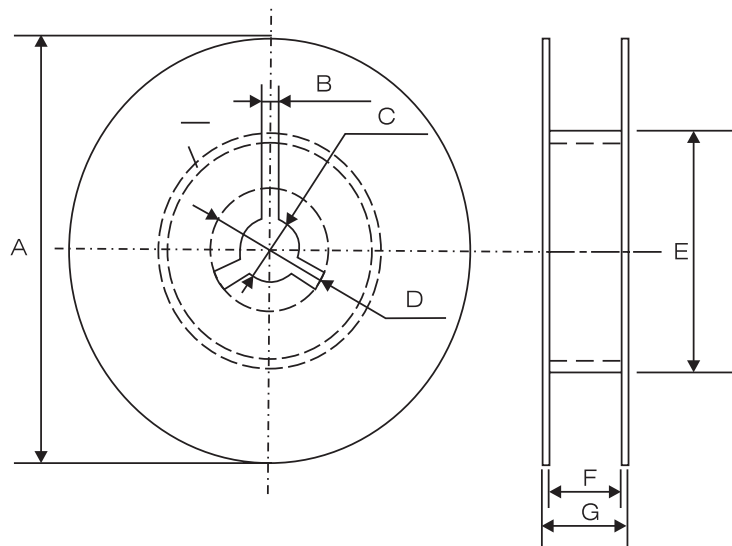
MULTILAYER CHIP CERAMIC CAPACITOR

*傳送帶的前後結構

Structure of leader part and end part of the carrier paper



*卷盤尺寸 Reel Dimensions (unit:mm)



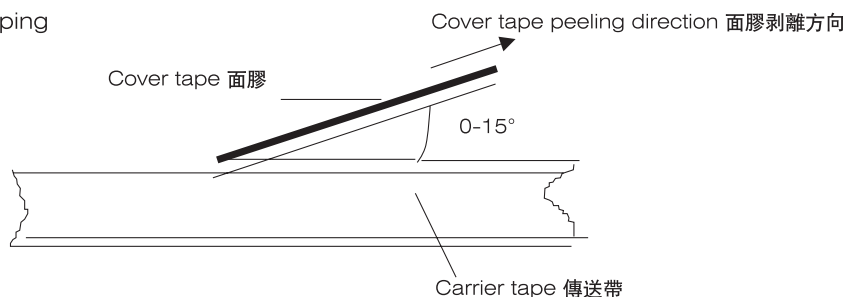
尺寸代碼 (CODE)

Unit:mm

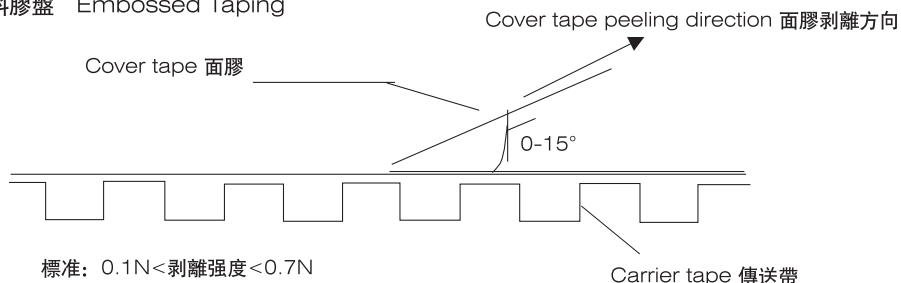
A	B	C	D	E	F	G
$\Phi 178 \pm 2.0$	3.0	$\Phi 13 \pm 0.5$	$\Phi 21 \pm 0.8$	$\Phi 50$ 或更大 $\Phi 50$ or more	10.0 ± 1.5	12max

* 面膠剝離強度 Top tape peeling strength

(a) 紙帶 Paper Taping



(b) 塑料膠盤 Embossed Taping



標準: 0.1N < 剝離強度 < 0.7N

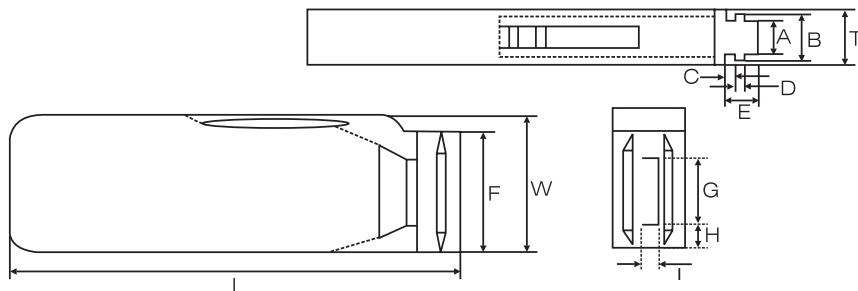
Standard: 0.1N < peeling strength < 0.7N

在剝離時, 紙帶不能有紙碎, 也不能粘在底、面膠上。

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

* 塑料盒散包裝 Bulk Case Package

Symbol	A	B	T	C	D	E
Dimension	6.8±0.1	8.8±0.1	12±0.1	15±0.1-0	2±0-0.1	4.7±0.1
Symbol	F	W	G	H	L	I
Dimension	31.5±0.2-0	36±0-0.2	19±0.35	7±0.35	110±0.7	5±0.35



* 包裝數量

Packing Quantity

尺寸(SIZE)	包裝形式和數量 (PACKAGE STYLE & QUANTITY) unit: pcs			
	紙帶卷盤 (PT)	膠帶卷盤 (ET)	塑料盒散裝 (BC)	一般散裝 (BP)
0402	10000		20000	5000
0603	5000		15000	5000
0805	5000	2500	10000	5000
1206	5000	2500	5000	5000
1210		2000		2000
1812		2000		1000
2225				500
3035				

注意: 包裝的形式和數量可根據客戶的要求來定。

Note: We will choose packing style and quantity according to the customer's requirements.

- * 使用MLCC的注意事項
- * Precautions on the use of Multi-layer Ceramic Capacitors

Stages	Precaution	Technical considerations
<p>1、 綫路設計</p> <p>1、 Circuit Design</p>	<p>使用環境，電子額定系數和性能的確認：</p> <p>1、醫療器械、航空用器、原子彈反應器如果出現故障，會對人的生命和整個社會造成巨大的損壞。因此用于這些設備的電容器必須具有很高的可靠性和安全性，并且比用于普通應用的電容器元件的要求更高，其區別也很明顯。</p> <p>工作電壓（額定電壓的確認）</p> <p>1、電容器的工作電壓應比其額定電壓低。如果在—DC電壓上加載一個AC電壓，那么兩個峰值電壓之和應小于所選擇的電容器的額定值。對於同時使用AC電壓和脈衝電壓的電路，它們的峰值電壓之和也應低于電容器的額定電壓。</p> <p>2、甚至在供給的電壓低于額定電壓值時，如果電路中使用的高頻AC電壓或脈衝電壓升高的時間過快，那么電容器的性能會因此被減弱。</p> <p>Verification of operating environment, electrical rating and performance</p> <p>1.A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have sereve social ramification. For this any capacitors to be used in such equipments may require higher safety and /or reliability considerations and should be clearly differentiated from components for general applications.</p> <p>Operating Voltage (Verification of Rated Voltage)</p> <p>1.The operating voltage for capacitors must always be lower than their rated values. If an AC voltage is loaded on a DC voltage, the sum of the two peak voltages should be lower than the rated value of the capacitor chosen. For a circuit where both an AC and a pulse voltage may be present,the sum of their peak voltages should also be lower than the capacitor's rated voltage.</p> <p>2.Even if the applied voltage is lower than the rated value,the reliability of capacitors might be reducd if either a high frequency AC voltage or a pulse voltage having rapid rise time is present in the circuit.</p>	

2. PCB 的設計
PCB Design

基板配置

(墊板的設計)

1、當電容器被安裝在PC板上后，所使用的焊料的量（焊盤的大小）會直接影響電容器的性能。因此在設計焊盤時必須考慮到以下幾點：

(1)所用焊料的量的大小會影響芯片抗機械應力的能力，從而可能導致電容器破碎或開裂。因此在設計基板時，必須慎重考慮焊盤的大小和配置，這些對組成基板的焊料的量有着決定的作用。

(2)如果不止一個元件被連續焊接在同一基板或焊盤上時，焊盤的設計應可以使每個元件的焊接點被阻焊區隔離開。

Pattern configurations

(Design of Land-patterns)

1. When capacitors are mounted on a PCB, the amount of solder used (size of fillet) can directly affect capacitor performance. Therefore, the following items must be carefully considered in the design of solder land patterns:

(1) The amount of solder applied can affect the ability of chips to withstand mechanical stresses, which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads, which determines the amount of solder necessary to form the fillets.

(2) When more than one part are jointly soldered onto the same land or pad, the pad must be designed so that each component's soldering point is separated by soldering-resist.

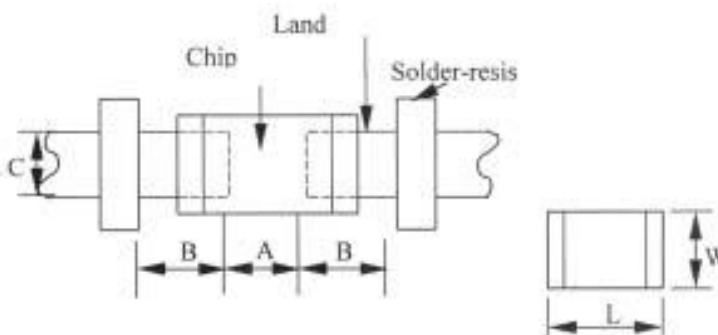
1、以下圖表為所推薦使用的墊板以防止過量的焊料量(基板較大時會超出元件的端頭)
1. The following diagrams and tables show some examples of recommended patterns to prevent excessive solder amounts (larger fillets which extend above the component's end terminations.)

同時也給出了不合理的基板設計圖

(1)以下為推薦使用的的PCB上焊盤的尺寸

Examples of improper pattern designs are also shown.

(1) Recommended land dimensions for a typical chip capacitor land patterns for PCB




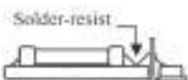
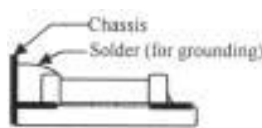

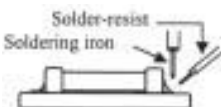
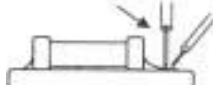

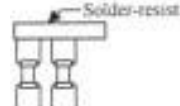
Recommend land dimensions for wave-soldering(unit:mm)
推薦用于波峰焊的焊盤尺寸(單位: mm)



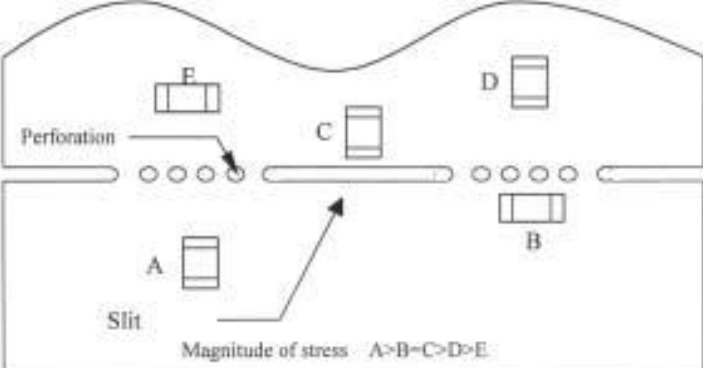




Type		0603	0805	1206	1210
Size	L	1.6	2.0	3.2	3.2
	W	0.8	1.25	1.6	2.5
A		0.8 ~ 1.0	1.0 ~ 1.4	1.8 ~ 2.5	1.8 ~ 2.5
B		0.5 ~ 0.8	0.8 ~ 1.5	0.8 ~ 1.7	0.8 ~ 1.7
C		0.6 ~ 0.8	0.9 ~ 1.2	1.2 ~ 1.6	1.8 ~ 2.5

Recommend land dimensions for reflow-soldering(unit:mm)
推薦用于回流焊的焊盤尺寸(單位: mm)

Type		0402	0603	0805	1206	1210	1812	2225
Size	L	1.0	1.6	2.0	3.2	3.2	4.5	5.7
	W	0.5	0.8	1.25	1.6	2.5	3.2	6.3
A		0.45 ~ 0.55	0.6 ~ 0.8	0.8 ~ 1.2	1.8 ~ 2.5	1.8 ~ 2.5	2.5 ~ 3.5	3.7 ~ 4.7
B		0.40 ~ 0.50	0.6 ~ 0.8	0.6 ~ 1.2	0.6 ~ 1.5	0.6 ~ 1.5	1.0 ~ 1.8	1.0 ~ 2.3
C		0.45 ~ 0.55	0.6 ~ 0.8	0.9 ~ 1.6	1.2 ~ 2.0	1.8 ~ 3.2	2.3 ~ 3.5	3.5 ~ 5.5

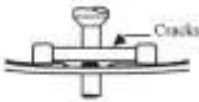
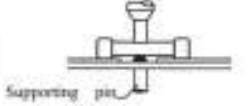
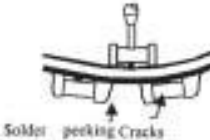
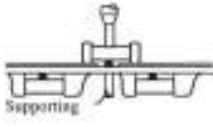
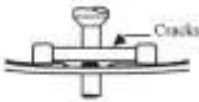
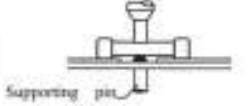
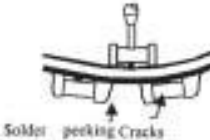
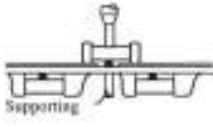
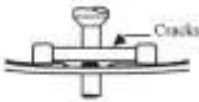
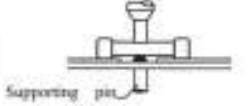
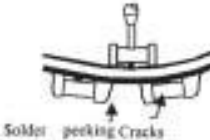
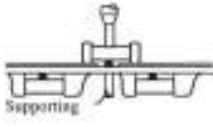
過量的焊料會影響芯片耐機械應力的能力。因此在設計基板時，需注意這些
Excess solder can affect the ability of chips to withstand mechanical stresses. Therefore, please take proper precautions when designing Land-patterns.

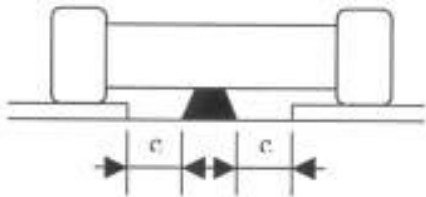
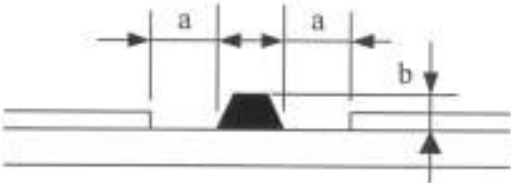
焊料用量好與差的例子如下： (2) Examples of good and bad solder application.		
項目 Items	不推薦 Not recommended	推薦 Recommended
混合安裝 SMD 和引綫元件 Mixed mounting of SMD and leaded components	 <p>Lead wire of component</p>	 <p>Solder-resist</p>
靠近底盤的元 件的安裝 Component placement close to the chassis	 <p>Chassis Solder (for grounding)</p>	 <p>Solder-resist</p>
在已安裝元件 的附近手工焊 接引綫元件 Hand-solder- ing of leaded components near mounted components	 <p>Solder-resist Soldering iron</p>	 <p>Soldering resist</p>
水平安裝元件 Horizontal component placement		 <p>Solder-resist</p>

Stages	Precautions	Technical considerations						
<p>2.PC板的設計 2.PCB Design</p>	<p>基板配置 (電容器在儀器(分割)PC板上的安裝設計)</p> <p>1.將電容器安裝在板上之後,芯片將承受在下一加工過程中產生的機械應力(PCB的切割,板的檢驗、其它部件的安裝,裝配到底盤、波峰焊接回流焊板,等)。出于這個原因,在設計焊盤和SMD電容器的位置時,應注意考慮將應力減到最低點。</p> <p>Pattern configurations (Capacitor layout on panelized[breakaway]PCboards)</p> <p>1.After capacitors have been mounted on the boards,chips can be subjected to mechanical stresses in subsequent manufacturing processes (PCB cutting,board inspection,mounting of additional parts,assembly into the chassis,wave soldering the reflow soldering boards etc.),for this reason,planning pattern configurations and the position of SMD capacitors should be carefully performed to minimize stress.</p>	<p>1-1.以下圖示為電容器在PC板上布局好環的例子:PC板彎曲變形時產生應力,應將電容器安裝在PC板上的受應力影響最小的位置。</p> <p>1-1.The following are examples of good and bad capacitor layout: SMD capacitors should be located to minimize any possible mechanical stresses from board warp or deflection.</p> <table border="1" data-bbox="727 415 1333 659"> <thead> <tr> <th></th> <th>Not recommended</th> <th>Recommended</th> </tr> </thead> <tbody> <tr> <td>板的變形 Deflection of the board</td> <td></td> <td></td> </tr> </tbody> </table> <p>1-2.將電容器安裝在切割PC板上時,電容器所受機械應力的大小由電容器的布局而定。以下為推薦使用的布局方式:</p> <p>1-2.To layout the capacitors for the breakaway PC board,it should be noted that the amount of mechanics stress given will vary depending on capacitor layout,The example below shows recommendations for better design.</p>  <p>1-3.當PC板沿着接縫孔切割開時,電容器所受機械應力的大小因使用的方法不同而不同。以下方法按應力從小到大進行排列:推板,割裂、V形凹槽、接縫孔。因此,任何理想的SMD電容器的布局必須考慮到PC板的分割方法。</p> <p>1-3.When breaking PC boards along their perforations,the amount of mechanical stress on the capacitors can vary according to the method used.The following methods are listed in order from least stressful to most stressful:push-back,slit,V-grooving,and perforation.Thus,any ideal SMD capacitor layout must also consider the PCB splitting procedure.</p>		Not recommended	Recommended	板的變形 Deflection of the board		
	Not recommended	Recommended						
板的變形 Deflection of the board								
<p>3.自動安裝應考慮到的問題 3.Considerations for automatic placement</p>	<p>調節安裝機器:</p> <p>1.在將電容器安裝在PC板上時,不能讓電容器承受過量的衝擊力。</p> <p>2.應定期對安裝機器進行維修和檢查。</p> <p>Adjustment of mounting machine</p> <p>1.Excessive impact load should not be imposed on the capacitors when mounting onto the PC boards.</p> <p>2.The maintenance and inspection of the mounting devices should be conducted periodically.</p>	<p>1.如果吸拾管降低的位置超過最低限位,就會對電容器產生過大的壓力,從而導致電容器破裂,為了避免上述現象的發生,在降低吸拾管時,要注意以下各點:</p> <p>(1)、在校正PC板的偏差后,應將吸拾管的低限位調節到PC板的表面水平位置。</p> <p>(2)、吸拾管壓力應調節至1到3N之間。</p> <p>(3)、為了減少吸拾管衝擊力導致PC板的變形程度,支撐釘應放在PC板的下方。下圖有吸拾管安裝的較好例子。</p> <p>1.If the lower limit of the pick-up nozzle is low.Too much force may be imposed on the capacitors,causing damage.To avoid this,the following points should be considered before lowering the pick-up nozzle:</p> <p>(1)The lower limit of the pick-up nozzle should be adjusted to the surface level of the PC board after correcting for deflection of the board.</p> <p>(2)The pick-up pressure should be adjusted between 1 and 3 N static loads.</p> <p>(3)To reduce the amount of deflection of the board caused by impact of the pick-up nozzle,supporting pins of back-up should be used the under PC board. The following diagrams show some typical examples of good pick-up nozzle Placement.</p>						

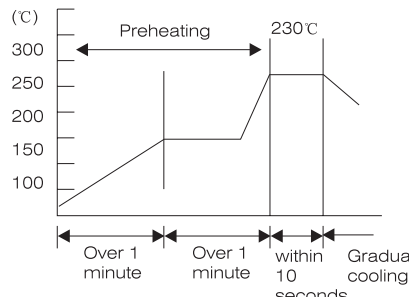
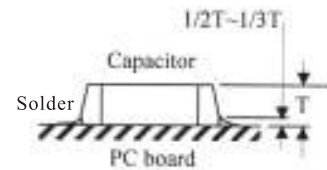
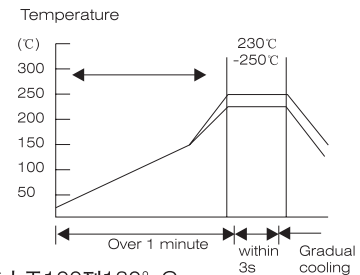
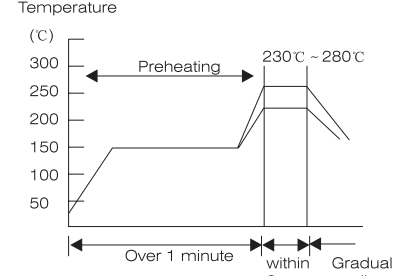
多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

Stages	Precautions	Technical considerations									
<p>3、自動安裝應考慮到的問題 3.Considerations for automatic placement</p>	<p>粘着劑的選用： 1、在焊接安裝電容器之前，用粘着劑將電容器固定在基板上，這將導致電容器的特性降級，除非對以下因素進行合理的檢查：基板的大小、粘着劑的類型和用量、硬化的溫度和時間。因此，用戶在使用粘着劑時，要注意其用法和用量。</p>	<table border="1" data-bbox="727 323 1396 709"> <thead> <tr> <th data-bbox="727 323 911 401"></th> <th data-bbox="911 323 1133 401">不推薦 Not recommended</th> <th data-bbox="1133 323 1396 401">推薦 Recommended</th> </tr> </thead> <tbody> <tr> <td data-bbox="727 401 911 537">單面安裝 Single-sided mounting</td> <td data-bbox="911 401 1133 537"></td> <td data-bbox="1133 401 1396 537"></td> </tr> <tr> <td data-bbox="727 537 911 709">雙面安裝 Double-sided mounting</td> <td data-bbox="911 537 1133 709"></td> <td data-bbox="1133 537 1396 709"></td> </tr> </tbody> </table> <p>2.如果對位釘磨損，吸管的調整會致使電容器受到機械應力的衝擊而缺口或開裂。爲了避免這種現象的發生，在對處於停止狀態下對位釘間寬度和支撐釘進行定期的檢查、維修、檢驗和更換。 2.As the alignment pin wears out, adjustment of the nozzle height can cause chipping or cracking of the capacitors because of mechanical impact on the capacitors. To avoid this, the monitoring of the width between the alignment pin in the stopped position, and maintenance. Inspection and replacement of the pin should be conducted periodically.</p> <p>1.一些粘着劑會減少電容器的絕緣。粘着劑和電容器收縮率的不同會在電容器上產生應力并導致開裂。甚至板上過多或過少的粘着劑會影響元件的安裝。因此在使用粘着劑時應注意以下事項： (1)要求粘着劑具有的特性： a.在安裝和焊接過程中，粘着劑應有足夠大的力來支撐板上的元件。 b.粘着劑在高溫下要有充足的強度。 c.粘着劑要有很好的粘稠度。 d.粘着劑應在其使用期限前使用。 e.粘着劑應可快速硬化。 f.粘着劑不能被雜質污染。 G.粘着劑要有很好的絕緣特性。 H.粘着劑不能有毒或不能發出有毒的氣體。</p>		不推薦 Not recommended	推薦 Recommended	單面安裝 Single-sided mounting			雙面安裝 Double-sided mounting		
	不推薦 Not recommended	推薦 Recommended									
單面安裝 Single-sided mounting											
雙面安裝 Double-sided mounting											

Stages	Precautions	Technical considerations								
<p>3、自動安裝應考慮到的問題</p> <p>3.Considerations for automatic placement</p>	<p>Selection of Adhesives</p> <p>1.Mounting capacitors with adhesives in preliminary assembly, before the soldering stage,may lead to degraded capacitor characteristics unless the following factors are appropriately checked:the size of land patterns,type of adhesive,amount applied, hardening temperature and hardening period. Therefore, It is imperative to consult the manufacturer of the adhesives on proper usage and amounts of adhesive to use.</p>	<p>1.Some adhesives may cause reduced insulation resistance,The difference between the shrinkage percentage of the adhesive and that of the capacitors may result in stresses on the capacitors and lead to cracking.Moreover,too little or too much adhesive applied to the board may adversely affect component placement, so the following precautions should be noted in the application of adhesives.</p> <p>(1)Required adhesive characteristics</p> <p>a.The adhesive should be strong enough to hold parts on the board during the mounting & solder process.</p> <p>b.The adhesive should have sufficient strength at high temperatures.</p> <p>c.The adhesive should have good coating and thickness consistency.</p> <p>d.The adhesive should be used during its prescribed shelf life.</p> <p>e.The adhesive should harden rapidly.</p> <p>f.The adhesive must not be contaminated.</p> <p>g.The adhesive should have excellent insulation characteristics.</p> <p>h.The adhesive should not be toxic and have no emission of toxic gasses.</p> <p>(2)The recommended amount of adhesives is as follows.</p> <table border="1" data-bbox="659 947 1396 1131"> <thead> <tr> <th>Figure</th> <th>0805/1206 case sizes as examples</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>0.3 mm min</td> </tr> <tr> <td>B</td> <td>100 ~ 200 μm</td> </tr> <tr> <td>C</td> <td>Adhesives should not contact the pad</td> </tr> </tbody> </table> <div style="text-align: center;"> <p>After capacitors are bonded</p>  </div> <div style="text-align: center;"> <p>Amount of adhesive</p>  </div>	Figure	0805/1206 case sizes as examples	A	0.3 mm min	B	100 ~ 200 μ m	C	Adhesives should not contact the pad
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A	0.3 mm min									
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C	Adhesives should not contact the pad									

<p>4. 焊接 4.Soldering</p>	<p>助焊劑的選用: 1. 因助焊劑對電容器的性能有很大的影響, 因此使用有必要核對以下條件。 (1) 使用的助焊劑應少于或等于鹵代物的0.1wt%, (等效于氯), 不能使用含有強酸物質的助焊劑。 (2) 將電容器安裝在板上時, 使用的助焊劑的量要控制在備選的水准範圍之內。 (3) 使用水溶性的助焊劑時, 應特別注意電容器的清洗。</p> <p>Selection of Flux 1. Since flux may have a significant effect on the performance of capacitors, it is necessary to verify the following conditions prior to use: (1) Flux used should be with less than or equal to 0.1wt%(equivalent to chlorine) of halogenated content. Flux having a strong acidity content should not be applied. (2) When soldering capacitors on the board, the amount of flux applied should be controlled at the optimum level. (3) When using water-soluble flux, special care should be taken to properly clean the boards.</p>	<p>1-1 如果活化助焊劑中的鹵化物過多或使用了高酸性的助焊劑, 那么焊接后過多的殘留物會腐蝕電容器端頭電極或降解電容器表面的絕緣。 1-2 在流焊接過程中使用助焊劑是為增強電容器的可焊性, 但如使用過多的助焊劑, 助焊劑大量的霧氣會射到電容器上, 從而使電容器可焊性受到破壞性的影響。應盡可能減少助焊劑的用量, 推薦使用助焊劑氣泡體系。 1-3 由于水溶性助焊劑的殘留物易溶于空氣中的水, 因此高濕條件下電容器表面上的殘留物會導致電容器絕緣下降并影響電容器的可靠性。當選用了水溶性助焊劑時, 要特別留意清洗方法和所使用的機器的能力。</p> <p>1-1 焊接時的預熱處理: 加熱: 在焊接前應對片式陶瓷元件在100到130°C下預熱。 冷卻: 元件和清洗過程中的溫度差異不能大于100°C。 當陶瓷片式電容器曝放在快速或集中致熱或快速致冷的條件下, 會受到熱衝擊的影響。因此在焊接過程中要特別注意防止電容器受到過量熱衝擊的影響。</p> <p>1-1. When too much halogenated substance (Chlorine, etc) content is used to activate the flux, or highly acidic flux is used, an excessive amount of residue after soldering may lead to corrosion of the terminal electrodes or degradation of insulation resistance on the surface of the capacitors. 1-2. Flux is used to increase solderability in flow soldering, but of too much is applied, a large amount of flux gas may be emitted and may detrimentally affect solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system. 1-3. Since the residue of water-soluble flux is easily dissolved by water content in the air, the residue on the surface of capacitors in high humidity conditions may cause a degradation of insulation resistance and therefore affect the reliability of the components. The cleaning methods and the capability of the machines used should also be considered carefully when selecting water-soluble flux.</p> <p>1-1. Preheating when soldering Heating: ceramic chip components should be preheated to within 100 to 130°C of the soldering. Cooling: The temperature difference between the components and cleaning process should not be greater than 100°C. Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.</p>
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Stages	Precautions	Technical considerations
4. 焊接 4. Soldering	<p>焊接： 焊接溫度、時間、和焊料的量應按照以下所推薦的條件的規定進行： soldering Temperature, time amount of solder, etc. are specified in accordance with the following recommended conditions.</p>	<p>推薦使用的焊接條件 [回流焊接] Recommended conditions for soldering [Re-flow soldering] Temperature profile</p>  <p>警告： 1. 理想的焊料量應為電容器厚度的1/2或1/3。如下圖所示： Caution 1. The ideal condition is to have solder mass (fillet) controlled to 1/2 or 1/3 of the thickness of the capacitor, as shown below.</p> 
		<p>1. 太長的浸焊料時間會損壞電容器的可焊性，因此焊接時間應盡可能接近所推薦的時間。 1. Because excessive dwell times can detrimentally affect solderability, soldering duration should be kept as close to recommended times as possible.</p> <p>[波峰焊接]/[Wave soldering] Temperature profile / 溫度曲綫</p>  <p>警告： 1. 確保電容器已經預熱充分。 2. 電容器和熔化的焊料之間的溫度之差不能大於100到130° C。 3. 焊接後的冷卻方法應盡可能是自然冷卻。 4. 指定僅可用回流焊接的電容器不能用波峰焊接。 Caution 1. Make sure the capacitors are preheated sufficiently. 2. The temperature difference between the capacitor and melted solder should not be greater than 100 to 130° C. 3. Cooling after soldering should be as gradual as possible. 4. Wave soldering must not be applied to the capacitors designated as for reflow soldering only.</p> <p>[手工焊接]/[Hand soldering] 溫度曲綫/Temperature profile</p>  <p>警告： 1. 使用的烙鐵的尖頂的直徑最大為1.0mm。 2. 烙鐵不能直接碰到電容器上(波峰焊接) Caution 1. Use a 35W soldering iron with a maximum tip diameter of 1.0mm. 2. The soldering iron should not directly touch the capacitor. [Wave soldering]</p>

多層片狀陶瓷電容器

MULTILAYER CHIP CERAMIC CAPACITOR

Stages	Precautions	Technical considerations
<p>5.清洗 5.Cleaning</p>	<p>清洗條件:</p> <p>1.在安裝完所有的電容器后,在清洗PC板時,應根據所使用的助焊劑和清洗的目的(如為了除掉焊接時殘留的助焊劑還是生產過程中的其他材料)來選用適當的清洗溶劑。</p> <p>2.應對清洗條件進行核對和確認清洗過程不影響電容器的特性。</p> <p>Cleaning conditions</p> <p>1.When cleaning the PC board after the capacitors are all mounted, select the appropriate cleaning solution according to the type of flux used and purpose of the cleaning (e.g. To remove soldering flux or other materials from the production process.)</p> <p>2.Cleaning conditions should be determined after verifying. Through a test run, that the cleaning process does not affect the capacitors characteristics.</p>	<p>1.如果使用不恰當的溶劑,會使其他物質如助焊劑殘留物粘到電容器或破壞電容器的外部塗層,從而導致電容器的電性能下降(特別是絕緣)。</p> <p>2.不恰當的清洗條件(清洗不夠,或過度清洗)會破壞電容器的電性能。</p> <p>(1)過度清洗: 在用超聲波的情況下,輸出的能源太大則會使PC板承受過量的振動,這會導致電容或焊接點開裂,或降低低電極強度。因此要特別注意以下檢查條件:</p> <p>超聲波輸出: 低於20W/L 超聲波頻率: 低於40KHz 超聲波清洗時間: 5分鐘或更少</p> <p>1.The use of inappropriate solutions can cause foreign substances such as flux residue to adhere to the capacitor or deteriorate the capacitor's outer coating, resulting in a degradation of the capacitor's electrical (especially insulation resistance).</p> <p>2.Inappropriate cleaning conditions (insufficient or excessive cleaning) may detrimentally affect the performance of the capacitors.</p> <p>(1)Excessive cleaning In the case of ultrasonic cleaning, too much power output can cause excessive vibration of the PC board which may lead to the cracking of the capacitor or the soldered portion, or decrease the terminal electrodes' strength, thus the following conditions should be carefully checked;</p> <p>Ultrasonic output Below 20W/L Ultrasonic frequency Below 40KHz Ultrasonic washing period 5min or less</p>

<p>6. 清洗后處理工作 6. Post cleaning Processes</p>	<p>一些樹脂含有腐蝕性氣體或化學反應氣體會保留在樹脂中，在硬化期或在正常儲存溫度下，均會影響破壞電容器的性能。</p> <p>1. 當樹脂硬化的溫度高于電容器的運行溫度時，大量的熱會產生應力從而導致電容器受到損壞或破壞。因此不能推薦使用此類樹脂、熔化材料等。</p> <p>With some type of resins a decomposition gas or chemical reaction vapor may remain inside the resin during the hardening period of while left under normal storage conditions resulting in the deterioration of the capacitor's performance.</p> <p>1. When a resin's hardening temperature is higher than the capacitor's operating temperature, the stresses generated by the excess heat may lead to capacitor damage or destruction. The use of such resins molding materials is not recommended.</p>	
<p>7. 處理 7. Handling</p>	<p>切割PC板(沿着接縫孔分割開)</p> <p>1、在安裝完電容器和其它元件后，分割PC板時，注意不能在板上施加任何力。</p> <p>2、板的分割不能用手分割，應使用合適的設備</p> <p>機械方面應注意的事項：</p> <p>1、注意不能讓電容器承受過量的機械衝擊</p> <p>(1)如果電容器掉在地上或掉在硬物上，則不能再使用這些電容器。</p> <p>(2)在處理安裝板時，注意安裝元件不能碰到或撞到其它板或元件上。</p> <p>Breakaway PC boards(splitting along perforations)</p> <p>1. When splitting the PC board after mounting capacitors and other components, care is required so as not to give any stresses of twisting to board.</p> <p>2. Board separation should not be done manually, but by using the appropriate devices.</p> <p>Mechanical considerations</p> <p>1. Be careful not to subject the capacitors to excessive mechanical shocks.</p> <p>(1) If ceramic capacitors are dropped onto the floor or a hard surface, they should not be used.</p> <p>(2) When handling the mounted boards, be careful that the mounted components do not come in contact with or bump against other boards or components.</p>	

多層片狀陶瓷電容器 MULTILAYER CHIP CERAMIC CAPACITOR

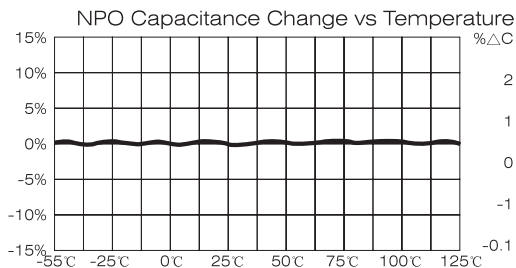
Stages	Precautions	Technical considerations
<p>8.儲存條件</p> <p>8.Storage conditions</p>	<p>儲存</p> <p>1.爲了保持端電極的可焊性和保證包裝材料處於良好的條件狀態，要注意監控好電容器儲存區域的溫度和濕度控制。</p> <p>推薦的條件：</p> <p>室溫：低於40°C</p> <p>濕度：低於 70%</p> <p>室溫必須低於40°C。但即使在理想儲存條件下存放，電容器端頭可焊性也會隨着時間的推移而下降，因此電容器應在發貨之日算起6個月內使用。</p> <p>2.高介電常數的電容器（2類、3類）的容量值將隨着時間的推移而下降，因此在設計電路時要考慮到這一點。如果電容器的容量值減少了，在150°C的條件下對電容器進行預熱，那麼電容器的容量值會恢復到初始值。</p> <p>Storage</p> <p>1.To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area.Humidity should especially be kept as low as possible.</p> <p>※Recommended conditions Ambient temperature Below40°C Humidity Below70%RH ※The Ambient temperature must below 40°C. Even under ideal storage conditions capacitor electrode solderability decreased as time passes,so ceramic chip capacitors should be used within 6 months from the time of delivery. ※The packaging material should be kept where no chlorine or sulfur exists in the air.</p> <p>2.The capacitance value of high dielectric constant capacitors (type2&3) will gradually decrease with the passage of time, so this should be taken into consideration in the circuit design. If such a capacitance reduction occurs, a heat treatment of 150°C for 1 hour will return the capacitance to its initial level.</p>	<p>如果將電容器存放在高溫和高濕的環境下，電容器的端電極就會被氧化，從而導致其可焊性下降；另外，在這種儲存條件下，電容器的編帶/包裝材料會受到破壞。出于這個原因，電容器應在自發貨之日算起6個月內使用。如果超出了這個期限，在使用電容器之前要對其可焊性進行檢驗。</p> <p>1.If the parts are stored in a high temperature and humidity environment,problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.For this reason,components should be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the capacitors.</p>

■ 容量變化及溫度特性、電壓、頻率曲線圖

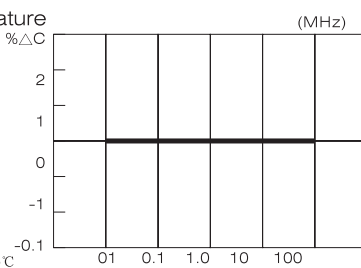
CAPACITANCE CHANGE VS TEMPERATURE CHARACTERISTIC; VOLTAGE; FREQUENCY PROFILES

● NPO

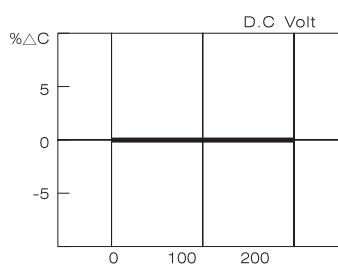
(1) 容量變化及溫度特性



(2) 頻率(Frequency)

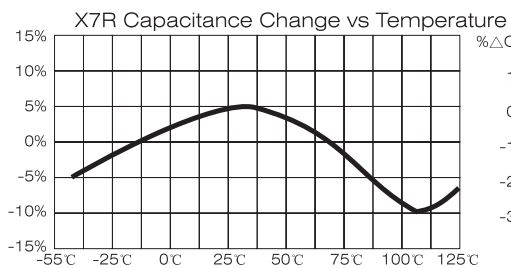


(3) 直流電壓(DC voltage)

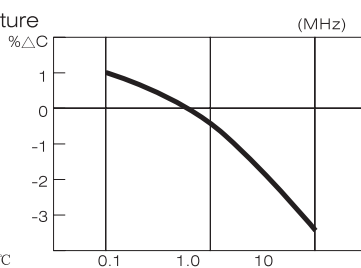


● X7R

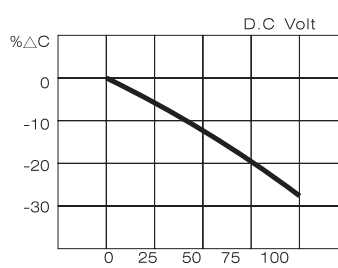
(1) 容量變化及溫度特性



(2) 頻率(Frequency)

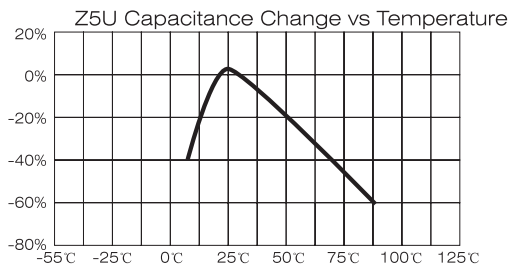


(3) 直流電壓(DC voltage)

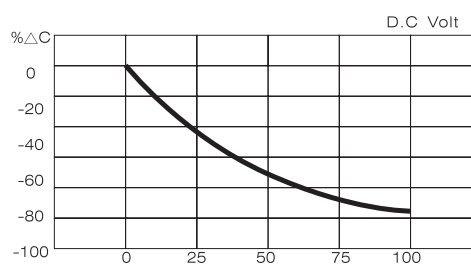


● Z5U

(1) 容量變化及溫度特性



(2) 直流電壓(DC voltage)

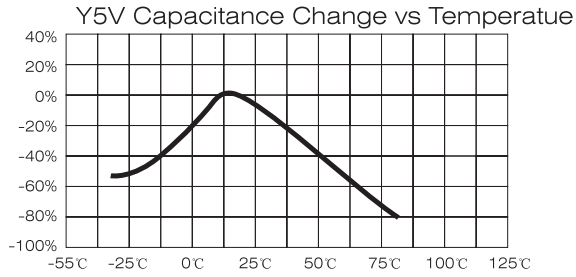


多層片狀陶瓷電容器

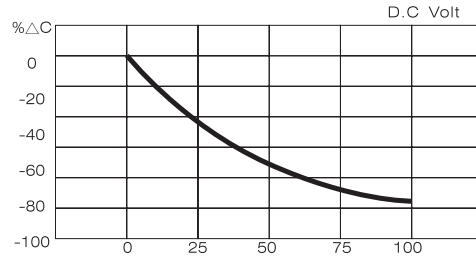
MULTILAYER CHIP CERAMIC CAPACITOR

- Y5V

(1) 容量變化及溫度特性

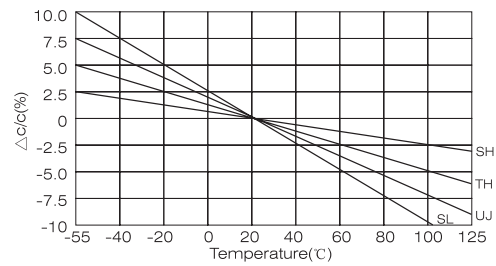
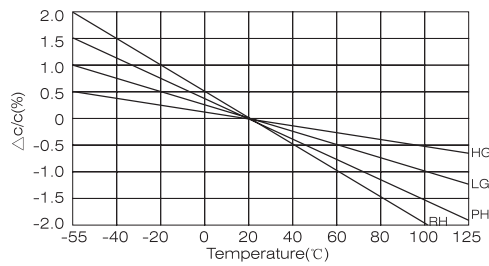


(2) 直流電壓(DC voltage)

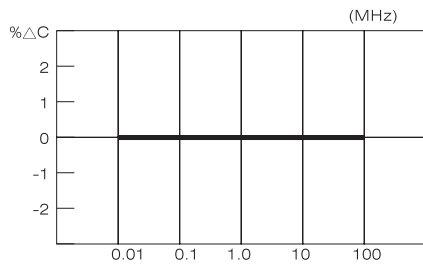


- 溫度補償型片狀多層陶瓷電容器 Temperature Compensating MLCC

(1) 容量變化及溫度特性 (Capacitance Change vs Temperature)



(2) 頻率(Frequency)



(3) 直流電壓(DC voltage)

