GYZ

苏州昀冢电子科技股份有限公司

产品规格书

Products Datasheet

产品名称　　片式多层陶瓷电容器

Part Name：　Multilayer Ceramic Capacitor (MLCC)

产品系列

Products Series：　6.3V～630V

产品尺寸

Products Size：　0201～1206

总公司地址：江苏省昆山市宋家港路 269 号

池州分公司地址：安徽省池州市皖江江南新兴产业集中区乐山路以西汉江路以北

联系方式：0512-36691876

备注：本规格书仅供选型参考用

一、规格型号编码 Parts code：

2F01MC	104	X	2	J	7	D	0
①	②	③	④	⑤	⑥	⑦	⑧
产品系列 Products Series	容值代码 Capacitance Value Code	温度特性 Temperature Characteristic	产品尺寸 Product Size	容值允差 Capacitance Tolerance	额定电压 Rated Voltages	包装方式 Package Style	内控码 Internal Control Code

说明 Description：

① 产品系列 Products Series

2F01MC—消费电子级别产品 Consumer electronics grade products

2F01AC—汽车电子级别产品 Automotive electronics grade products

② 容值代码 Capacitance value

单位用pF表示，前两位数码为有效数字；后一位数码为前两位有效数字后所接“0”的个数，字母R表示小数点。

单位之间的换算关系为：1uF= 10^3 nF = 10^6 pF

举例：120=12×10^0=12pF，104=10×10^4=100000 pF=100 nF，R47=0.47 pF，2R2=2.2 pF。

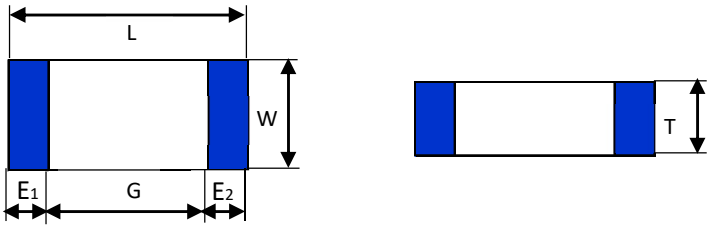
2 significant digits + number of zeros. The third digit signifies the multiplying factor, and letter R is decimal point.

Example: 120=12×10^0=12pF，104=10×10^4=100000 pF=100 nF，R47=0.47 pF，2R2=2.2 pF

③ 温度特性 Temperature Characteristic

陶瓷类别 Ceramic Type	介质种类 Dielectric Type	最低应用温度 Min. operating Temperature	最高应用温度 Max. operating Temperature	参考温度点 Reference Temperature
Class 1	G (C0G)	-55℃	125℃	25℃
	U(U2J)	25℃	85℃	25℃
Class 2	X (X7R)	-55℃	125℃	25℃
	S (X7S)	-55℃	125℃	25℃
	C (X7T)	-55℃	125℃	25℃
	D (X6S)	-55℃	105℃	25℃
	B (X5R)	-55℃	85℃	25℃
	E (X5S)	-55℃	85℃	25℃
	Y (Y5V)	-30℃	85℃	25℃
	Z(Z5U)	-10℃	85℃	25℃

④ 产品尺寸 Products Size



代码 Code	英制 British expression)	公制 Metric expression	长度 L mm	宽度 W mm	高度 T mm	端子 E_1/ E_2 mm	间距 G mm (min.)	识别码 Code
1	0201	0603	0.60±0.03	0.30±0.03	0.30±0.03	0.10~0.20	0.2	A1
			0.60±0.05	0.30±0.05	0.30±0.05	0.10~0.20	0.2	A2
			0.60±0.09	0.30±0.09	0.30±0.09	0.10~0.25	0.2	A3
2	0402	1005	1.00±0.05	0.50±0.05	0.50±0.05	0.15~0.35	0.3	B1
			1.00±0.10	0.50±0.10	0.50±0.10	0.15~0.35	0.3	B2
			1.00±0.15	0.50±0.15	0.50±0.15	0.15~0.35	0.3	B3
			1.00±0.20	0.50±0.20	0.50±0.20	0.15~0.35	0.3	B4
3	0603	1608	1.60±0.10	0.80±0.10	0.80±0.10	0.20~0.60	0.4	C1
			1.60±0.15	0.80±0.15	0.80±0.15	0.20~0.60	0.4	C2
			1.60±0.20	0.80±0.20	0.80±0.20	0.20~0.60	0.4	C3
5	0805	2012	2.00±0.10	1.25±0.10	0.60±0.10	0.25~0.75	0.7	D1
			2.00±0.10	1.25±0.10	0.85±0.10	0.25~0.75	0.7	D2
			2.00±0.20	1.25±0.20	1.25±0.20	0.25~0.75	0.7	D3
6	1206	3216	3.20±0.15	1.60±0.15	0.60±0.10	0.25~0.75	1.4	E1
			3.20±0.15	1.60±0.15	0.85±0.10	0.25~0.75	1.4	E2
			3.20±0.20	1.60±0.20	1.00±0.10	0.25~0.75	1.4	E3
			3.20±0.20	1.60±0.20	1.15±0.10	0.25~0.75	1.4	E4
			3.20±0.20	1.60±0.20	1.25±0.20	0.25~0.75	1.4	E5
			3.20±0.30	1.60±0.30	1.60±0.20	0.25~0.75	1.4	E6
			3.20±0.30	1.60±0.30	1.60±0.30	0.25~0.75	1.4	E7

备注：产品尺寸码请查阅本规格书中第三部分“产品型别与尺寸码”。

Note：Dimension code of products can read part 3 “Products type and dimension code” in this datasheet.

⑤ 容值允差 Capacitance Tolerance

B=±0.1pF	G=±2%	Z=－20%~＋80%
C=±0.25pF	J=±5%	
D=±0.5pF	K=±10%	
F=±1%	M=±20%	

⑥ 额定电压 Rated Voltage

5=6.3V	9=50V	B=500V
6=10V	0=100V	Z=630V
7=16V	A=200V	C=1KV
8=25V	Y=250V	

⑦ 包装方式 Package style

B=散包装 (Bulk)

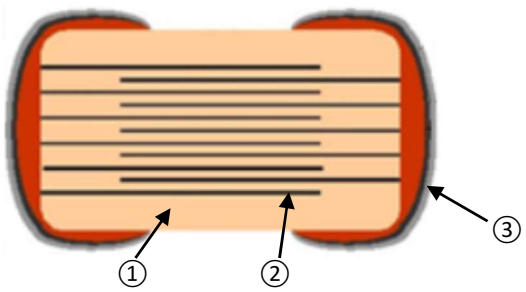
D=纸带包装，7 英寸胶盘 (7" Paper Taping Reel)

E=塑料载带包装，7 英寸胶盘 (7" Plastic Taping Reel)

F=纸带包装，13 英寸胶盘 (13" Paper Taping Reel)

G=塑料载带包装，13 英寸胶盘 (13" Plastic Taping Reel)

二、产品结构及组成 Structure：



序号 No.	名称 Name
①	陶瓷介质 Ceramic Dielectric
②	内电极 Electrode
③	端电极 Termination

三、产品型别与尺寸码 Products type and dimension code

3.1 产品型别与尺寸码（X7R）：Production type & Dimension code (X7R)

容值	0201/X7R					0402/X7R					
	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V
100pF	A1	A1	A1	A1	A1	B1	B1	B1	B1	B1	B1
150pF	A1	A1	A1	A1	A1	B1	B1	B1	B1	B1	B1
220pF	A1	A1	A1	A1	A1	B1	B1	B1	B1	B1	B1
330pF	A1	A1	A1	A1	A1	B1	B1	B1	B1	B1	B1
470pF	A1	A1	A1	A1	A1	B1	B1	B1	B1	B1	B1
680pF	A1	A1	A1	A1	A1	B1	B1	B1	B1	B1	B1
1nF	A1	A1	A1	A1	A1	B1	B1	B1	B1	B1	B1
1.5nF	A1	A1	A1	A1		B1	B1	B1	B1		
1.8nF	A1	A1	A1	A1		B1	B1	B1	B1		
2.2nF	A1	A1	A1	A1		B1	B1	B1	B1		
3.3nF	A1	A1	A1	A1		B1	B1	B1	B1		
4.7nF	A1	A1	A1	A1		B1	B1	B1	B1		
6.8nF	A1	A1	A1	A1		B1	B1	B1	B1		
10nF	A1	A1	A1	A1		B1	B1	B1	B1		
15nF						B1	B1	B1			
22nF						B1	B1	B1			
33nF						B1	B1	B1			
47nF						B1	B1	B1			
68nF						B1	B1	B1			
100nF						B1	B1	B1			
150nF						B1	B1				
220nF						B1	B1				
330nF						B1	B1				
470nF						B1	B1				
680nF						B1	B1				
1.0uF						B1	B1				

容值	0603/X7R					
	6.3V	10V	16V	25V	50V	100V
100pF	C1	C1	C1	C1	C1	C1
150pF	C1	C1	C1	C1	C1	C1
220pF	C1	C1	C1	C1	C1	C1
330pF	C1	C1	C1	C1	C1	C1
470pF	C1	C1	C1	C1	C1	C1
680pF	C1	C1	C1	C1	C1	C1
1nF	C1	C1	C1	C1	C1	C1
1.5nF	C1	C1	C1	C1	C1	
2.2nF	C1	C1	C1	C1	C1	
3.3nF	C1	C1	C1	C1	C1	
4.7nF	C1	C1	C1	C1	C1	
6.8nF	C1	C1	C1	C1	C1	
10nF	C1	C1	C1	C1	C1	
15nF	C1	C1	C1	C1	C1	
22nF	C1	C1	C1	C1	C1	
33nF	C1	C1	C1	C1	C1	
47nF	C1	C1	C1	C1	C1	
68nF	C1	C1	C1	C1	C1	
100nF	C1	C1	C1	C1	C1	
150nF	C1	C1	C1	C1	C1	
220nF	C1	C1	C1	C1	C1	
330nF	C1	C1	C1	C1	C1	
470nF	C1	C1	C1	C1	C1	
680nF	C1	C1	C1	C1	C2	
1.0uF	C1	C1	C1	C1	C2	
2.2uF	C1	C1				
4.7uF	C3					

容值	0805/X7R					
	6.3V	10V	16V	25V	50V	100V
100pF	D1	D1	D1	D1	D1	D1
150pF	D1	D1	D1	D1	D1	D1
220pF	D1	D1	D1	D1	D1	D1
330pF	D1	D1	D1	D1	D1	D1
470pF	D1	D1	D1	D1	D1	D1
680pF	D1	D1	D1	D1	D1	D1
1nF	D1	D1	D1	D1	D1	D1
1.5nF	D1	D1	D1	D1	D1	
1.8nF	D1	D1	D1	D1	D1	
2.2nF	D1	D1	D1	D1	D1	
3.3nF	D1	D1	D1	D1	D1	
4.7nF	D1	D1	D1	D1	D1	
6.8nF	D1	D1	D1	D1	D1	
10nF	D1	D1	D1	D1	D1	
15nF	D2	D2	D2	D2	D2	
22nF	D2	D2	D2	D2	D2	
33nF	D2	D2	D2	D2	D2	
47nF	D2	D2	D2	D2	D2	
68nF	D2	D2	D2	D2	D2	
100nF	D2	D2	D2	D2	D2	
150nF	D2	D2	D2	D2	D2	
220nF	D3	D3	D3	D3	D3	
330nF	D3	D3	D3	D3	D3	
470nF	D3	D3	D3	D3	D3	
680nF	D3	D3	D3	D3	D3	
1.0uF	D3	D3	D3	D3	D3	
2.2uF	D3	D3	D3	D3		
4.7uF	D3	D3	D3	D3		
10uF	D3	D3	D3			

容值	1206/X7R					
	6.3V	10V	16V	25V	50V	100V
100pF	E2	E2	E2	E2	E2	E2
150pF	E2	E2	E2	E2	E2	E2
220pF	E2	E2	E2	E2	E2	E2
330pF	E2	E2	E2	E2	E2	E2
470pF	E2	E2	E2	E2	E2	E2
680pF	E2	E2	E2	E2	E2	E2
1nF	E2	E2	E2	E2	E2	
1.5nF	E2	E2	E2	E2	E2	
1.8nF	E2	E2	E2	E2	E2	
2.2nF	E2	E2	E2	E2	E2	
3.3nF	E2	E2	E2	E2	E2	
4.7nF	E2	E2	E2	E2	E2	
6.8nF	E2	E2	E2	E2	E2	
10nF	E2	E2	E2	E2	E2	
15nF	E2	E2	E2	E2	E2	
22nF	E2	E2	E2	E2	E2	
33nF	E2	E2	E2	E2	E2	
47nF	E2	E2	E2	E2	E2	
68nF	E2	E2	E2	E2	E2	
100nF	E2	E2	E2	E2	E2	
150nF	E2	E2	E2	E2	E4	
220nF	E2	E2	E2	E2	E4	
330nF	E2	E2	E2	E2	E4	
470nF	E2	E2	E2	E2	E4	
680nF	E3	E3	E3	E3	E6	
1.0uF	E3	E3	E3	E3	E6	
2.2uF	E3	E3	E3	E3		
4.7uF	E6	E6	E6	E6		
10uF	E6	E6	E6	E6		
22uF	E6	E6	E7			

3.2 产品型别与尺寸码（C0G）：Production type & Dimension code (C0G)

容值	0201/C0G		0402/C0G		0603/C0G				
	25V	50V	50V	100V	25V	50V	100V	200V	250V
0.22pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
0.47pf	A1	A1	B1	B1	C1	C1	C1	C1	C1
0.82pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
1.0pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
1.2pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
1.5pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
1.8pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
2.2pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
1.8nF	A1	A1	B1	B1	C1	C1	C1	C1	C1
2.7pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
3.3pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
3.9pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
4.7pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
5.6pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
6.8pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
8.2pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
10pF	A1	A1	B1	B1	C1	C1	C1	C1	C1
12pF			B1	B1	C1	C1	C1	C1	C1
15pF			B1	B1	C1	C1	C1	C1	C1
18pF			B1	B1	C1	C1	C1	C1	C1
22pF			B1	B1	C1	C1	C1	C1	C1
27pF			B1	B1	C1	C1	C1	C1	C1
33pF			B1	B1	C1	C1	C1	C1	C1
39pF			B1	B1	C1	C1	C1	C1	C1
47pF			B1	B1	C1	C1	C1	C1	C1
56pF			B1	B1	C1	C1	C1	C1	C1
68pF			B1	B1	C1	C1	C1	C1	C1
82pF			B1	B1	C1	C1	C1	C1	C1
100pF			B1	B1	C1	C1	C1	C1	C1
120pF					C1	C1	C1	C1	C1
150pF					C1	C1	C1	C1	C1
180pF					C1	C1	C1	C1	C1
220pF					C1	C1	C1	C1	C1
270pF					C1	C1	C1	C1	C1
330pF					C1	C1	C1	C1	C1
390pF					C1	C1	C1	C1	C1
470pF					C1	C1	C1	C1	C1
560pF					C1	C1	C1	C1	C1

容值	0201/C0G		0402/C0G		0603/C0G				
	25V	50V	50V	100V	25V	50V	100V	200V	250V
680pF					C1	C1	C1	C1	C1
820pF					C1	C1	C1		
1nF					C1				
1.2nF					C1				
1.5nF					C1				
1.8nF					C1				

容值	0805/C0G						1206/C0G					
	50V	100V	200V	250V	500V	630V	50V	100V	200V	250V	500V	630V
0.47pf	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1		
0.82pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1		
1.0pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1		
1.2pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1		
1.5pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1		
1.8pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1		
2.2pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	
2.7pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	
3.3pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	
3.9pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	
4.7pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	
5.6pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	
6.8pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	
8.2pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	
10pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
12pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
15pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
18pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
22pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
27pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
33pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
39pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
47pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
56pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
68pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
82pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
100pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
120pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5

容值	0805/C0G						1206/C0G					
	50V	100V	200V	250V	500V	630V	50V	100V	200V	250V	500V	630V
150pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
180pF	D1	D1	D1	D1	D1	D1	E1	E1	E1	E1	E1	E5
220pF	D1	D1	D2	D2	D2	D2	E1	E1	E1	E1	E1	E5
270pF	D1	D1	D2	D2	D2	D2	E1	E1	E1	E1	E1	E5
330pF	D1	D1	D2	D2	D2	D2	E1	E1	E1	E1	E1	E5
390pF	D1	D1	D2	D2	D2	D2	E1	E1	E1	E1	E1	E5
470pF	D1	D1	D2	D2	D2	D2	E1	E1	E1	E1	E1	E5
560pF	D1	D2	D2	D2	D3	D3	E1	E1	E1	E1	E1	E5
680pF	D1	D2	D2	D2	D3	D3	E1	E1	E1	E1	E1	E5
820pF	D1	D2	D2	D2	D3	D3	E1	E1	E2	E2	E2	E5
1nF	D1	D2	D2	D2	D3	D3	E1	E1	E2	E2	E2	E5
1.2nF	D2	D2	D3	D3	D3		E1	E1	E2	E2	E2	E5
1.5nF	D2	D2	D3	D3			E1	E1	E2	E2	E2	E5
1.8nF	D2	D2	D3	D3			E1	E1	E5	E5	E5	E5
2.2nF	D3	D3	D3	D3			E1	E1	E5	E5	E5	E5
2.7nF	D3	D3	D3	D3			E1	E1	E5	E5		
3.3nF	D3	D3	D3	D3			E2	E2	E5	E5		
3.9nF	D3	D3	D3	D3			E2	E2	E5	E5		
4.7nF	D3	D3	D3	D3			E2	E2				
5.6nF	D3	D3					E2	E2				
6.8nF	D3	D3					E2	E2				
8.2nF	D3	D3					E5	E5				
10nF	D3	D3					E5	E5				

3.3 产品型别与尺寸码（X5R）：Production type & Dimension code (X5R)

容值	0201/X5R					0402/X5R			
	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V
100pF	A1	A1	A1	A1	A1				
150pF	A1	A1	A1	A1	A1				
220pF	A1	A1	A1	A1	A1				
330pF	A1	A1	A1	A1	A1				
470pF	A1	A1	A1	A1	A1				
680pF	A1	A1	A1	A1	A1				
1nF	A1	A1	A1	A1	A1				
1.5nF	A1	A1	A1	A1					
1.8nF	A1	A1	A1	A1					
2.2nF	A1	A1	A1	A1					
3.3nF	A1	A1	A1	A1					
4.7nF	A1	A1	A1	A1					
6.8nF	A1	A1	A1	A1					
10nF	A1	A1	A1	A1					
15nF	A1	A1	A1						
22nF	A1	A1	A1			B1	B1	B1	B1
33nF	A1	A1	A1			B1	B1	B1	B1
47nF	A1	A1	A1			B1	B1	B1	B1
68nF	A1	A1	A1			B1	B1	B1	B1
100nF	A1	A1				B1	B1	B1	B1
150nF	A1	A1				B1	B1	B1	
220nF	A1	A1				B1	B1	B1	
330nF	A1	A2				B1	B1	B1	
470nF	A1	A2				B1	B1	B2	
680nF	A2	A2				B1	B1	B2	
1.0uF	A2	A2				B1	B1	B2	
2.2uF	A3					B1	B1	B4	
4.7uF						B3	B3	B4	
10uF						B4	B4		

容值	0603/X5R					0805/X5R				
	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
10nF	C1	C1	C1	C1	C1					
15nF	C1	C1	C1	C1	C1					
22nF	C1	C1	C1	C1	C1					
33nF	C1	C1	C1	C1	C1					
47nF	C1	C1	C1	C1	C1					
68nF	C1	C1	C1	C1	C1					
100nF	C1	C1	C1	C1	C1					
150nF	C1	C1	C1	C1	C1					
220nF	C1	C1	C1	C1	C1					
330nF	C1	C1	C1	C1	C1					
470nF	C1	C1	C1	C1	C1	D2	D2	D2	D3	D3
680nF	C1	C1	C1	C1	C1	D2	D2	D2	D3	D3
1.0uF	C1	C1	C1	C1	C1	D2	D2	D2	D3	D3
2.2uF	C1	C1	C1			D2	D2	D2	D3	D3
4.7uF	C1	C1	C2			D2	D2	D2	D3	D3
10uF	C2	C3	C3			D2	D2	D2	D3	
22uF	C3					D3	D3	D3		
47uF	C3					D3				

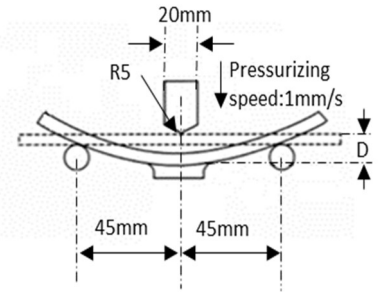
容值	1206/X5R				
	6.3V	10V	16V	25V	50V
1.0uF	E4	E4	E4	E4	E6
2.2uF	E4	E4	E4	E4	
4.7uF	E6	E6	E6	E6	
10uF	E6	E6	E6	E6	
22uF	E6	E6	E6		

四、信赖性测试及要求 Reliability test and judgement condition

<table>
<tr><td>编号
No.</td><td>项目
Item</td><td colspan="2">技术规格
Specification</td><td colspan="3">测试方法
Test Method</td></tr>
<tr><td rowspan="5">1</td><td rowspan="5">容值
Capacitance
(IEC60384-21/22
8.6.1)</td><td rowspan="2">C0G</td><td rowspan="2">符合指定的精度要求
Within the specified tolerance</td><td>额定容值
Capacitance</td><td>测试频率
Measuring
Frequency</td><td>测试电压
Measuring
Voltage</td></tr>
<tr><td>≤1000pF</td><td>1MHz±10%</td><td rowspan="2">1.0±0.2Vrms</td></tr>
<tr><td rowspan="3">X7R
X5R</td><td rowspan="3">符合指定的精度要求
Within the specified tolerance</td><td>>1000pF</td><td>1KHz±10%</td></tr>
<tr><td>额定容值
Capacitance</td><td>测试频率
Measuring
Frequency</td><td>测试电压
Measuring
Voltage</td></tr>
<tr><td>≤10uF (Ur>6.3V)</td><td>1KHz±10%</td><td>1.0±0.2Vrms</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">损耗角正切
（DF, tanδ）
Dissipation Factor
(IEC60384-21/22
8.6.2)</td><td>C0G</td><td>30pFmin: DF≤0.1%
30pFmax: DF≤1/(400+20C)</td><td colspan="3" rowspan="2">参考容值测试方法
Refer to test method of capacitance</td></tr>
<tr><td>X7R
X5R</td><td>参考损耗角规格表
See the table of DF specification</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">绝缘阻抗（IR）
Insulation
Resistance
(IEC60384-21/22
8.6.3)</td><td>C0G</td><td>10,000MΩ 或 RC500Ω·F，取较小值
10,000MΩ or 500Ω·F, whichever is less</td><td colspan="3" rowspan="2">测试电压：额定电压(超过 500V 的产品使用 500V 测试)
测试时间：60 秒
Measurement voltage: Rated voltage (if rated voltage is above 500V, I.R should be measured with 500V)
Charging time:60s</td></tr>
<tr><td>X7R
X5R</td><td>10,000MΩ 或 500/100/50Ω·F，取较小值
10,000MΩ or 500/100/50Ω·F, whichever is less</td></tr>
<tr><td>4</td><td>耐电压
Voltage proof
(IEC60384-21/22
8.6.4)</td><td colspan="2">没有击穿或闪火
No breakdown or flashover</td><td colspan="3">测试电压：
Ur≤100V 系列: 2.5Ur
100V<Ur≤200V 系列：1.5Ur+100
200V<Ur≤500V 系列：1.3Ur+100
500V<Ur<1000V 系列：1.3Ur
电压施加时间 1~5 秒，充/放电电流不超过 50mA
Measurement voltage:
Ur≤100V series: 2.5Ur
100V<Ur≤200V series: 1.5Ur=100
200V<Ur≤500V series: 1.3Ur=100
500V<Ur<1000V series: 1.3Ur
Test time：1~5 second
Charge/discharge current is less than 50mA</td></tr>
</table>

<table>
<tr><th>编号
No.</th><th>项目
Item</th><th colspan="3">技术规格
Specification</th><th colspan="2">测试方法
Test Method</th></tr>
<tr><td>5</td><td>焊锡性
Solderability
(IEC60384-21/22 8.11)</td><td colspan="3">端子的上锡率大于 95%
The solder should cover over 95% of the critical area of each termination</td><td>有铅焊料:(Sn/Pb:63/37)
浸锡温度:235±5°C
浸锡时间:2±0.5s
Solder temperature:235±5°C
Dipping time:2±0.5s</td><td>无铅焊料:(Sn3.0Ag0.5Cu)
浸锡温度:245±5°C
浸锡时间:3±0.5s
Solder temperature:245±5°C
Dipping time:3±0.5s</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">抗焊锡热
Resistance to Soldering Heat
(IEC60384-21/22 8.10)</td><td rowspan="2">△C/C</td><td>C0G</td><td>±0.5% or ±0.5pF 取较大值
±0.5% or ±0.5pF, whichever large</td><td colspan="2" rowspan="4">初始测量：
150+0/-10°C预热 1 小时，然后室温放置 24±2 小时测量。
测试条件：
测试温度：260±5°C；
浸锡时间：10±1s
焊锡要求：Sn3.0Ag0.5Cu
Initial Measurement:
Perform a heat treatment at 150+0/-10°C for 1h then sit for 24±2h at room temperature and measure initial values.
Test method:
Immerse the capacitor in Sn-3.0Ag-0.5Cu solder solution at 260±5°C for 10±1s.</td></tr>
<tr><td>X7R
X5R</td><td>±10%</td></tr>
<tr><td>DF</td><td colspan="2">同产品初始规格
Within initial specification</td></tr>
<tr><td>IR</td><td colspan="2">同产品初始规格
Within initial specification</td></tr>
<tr><td>7</td><td>侧推
Adhesion Test
(IEC60384-21/22 8.8)</td><td colspan="3">外观无可见损伤
Appearance: No visible damage

端子没有脱离且无其他损伤
No removal of the terminations and other defect occur.</td><td colspan="2">电容焊接在测试板上，从产品侧面施加一个平行与测试板面的力量保持 10 秒钟。
力量要求：
尺寸≥0603:5N(0.51Kg)
尺寸 =0402:2.5N(0.256Kg)
尺寸 =0201:1N(0.102Kg)
Solder capacitor on the test substrate (glass epoxy board), apply a force for 10s to the line joining the terminations and in a plane parallel to the substrate.</td></tr>
</table>

<table>
<tr><th>编号
No.</th><th>项目
Item</th><th colspan="3">技术规格
Specification</th><th>测试方法
Test Method</th></tr>
<tr><td rowspan="3">8</td><td rowspan="3">弯折性
Board Flex
(IEC60384-21/22 8.9)</td><td rowspan="2">△C/C</td><td>C0G</td><td>±1% or ±0.5pF 取较大值
±1% or ±0.5pF, whichever large</td><td rowspan="3">测试基板：PCB
弯曲深度：1mm
下压速度：1mm/s
在弯曲状态进行测量。


Test Board: PCB
Bending Depth:1mm
The measurement should be made with the board in the bending position</td></tr>
<tr><td>X5R
X7R</td><td>±10%</td></tr>
<tr><td colspan="3">外观无可见损伤
Appearance: No visible damage</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">容值温度特性
（TCC）
Temperature Characteristic of Capacitance
(IEC60384-21/22 8.7)</td><td rowspan="2">△C/C</td><td>C0G</td><td>±30ppm/℃</td><td rowspan="2">电容的容值应该在下表所规定的每一个步骤的温度点做测量。
Capacitance shall be measured by the steps shown in the following table
<table><tr><th>步骤Step</th><th>温度Temp.（℃）</th></tr><tr><td>1</td><td>参考温度±2
Reference Temp. ±2</td></tr><tr><td>2</td><td>最小使用温度±3
Min operation Temp. ±3</td></tr><tr><td>3</td><td>参考温度±2
Reference Temp. ±2</td></tr><tr><td>4</td><td>最大使用温度±3
Max operation Temp. ±3</td></tr><tr><td>5</td><td>参考温度±2
Reference Temp. ±2</td></tr></table>容值温度特性计算方法：
TCC calculation method:
Class I(C0G):
$\frac{C_2 - C_1}{C_1 \times \triangle T} \times 10^6$
Class II(X7R/X5R/Y5V):
$\frac{C_2 - C_1}{C_1} \times 100\%$
C1：步骤 3 的容值
C1: Capacitance of step 3
C2：为步骤 2 或 4 的容值
C2: Capacitance of step 2 or 4</td></tr>
<tr><td>X5R
X7R</td><td>±15%</td></tr>
</table>

<table>
<tr><th>编号
No.</th><th>项目
Item</th><th colspan="3">技术规格
Specification</th><th>测试方法
Test Method</th></tr>
<tr><td rowspan="5">10</td><td rowspan="5">温度快速变化
Rapid Change of Temperature
(IEC60384-21/22 8.9)</td><td rowspan="2">△C/C</td><td>C0G</td><td>±1% or ±1pF 取较大值
±1% or ±1pF, whichever is larger</td><td rowspan="5">前处理条件：150+0/-10℃预热 1 小时，然后室温放置 24±2 小时。
测试条件：高温保持 30 分钟，低温保持 30 分钟，温度切换时间小于 1 分钟
测试循环：5 个循环
Precondition: Perform a heat treatment at 150+0/-10℃ for 1h then sit for 24±2h at room temperature and measure initial values.
Test condition:
30 minutes at upper category temperature
30 minutes at Lower category temperature
Test cycle: 5 cycles，transfer time less than 1min.</td></tr>
<tr><td>X5R
X7R</td><td>±10%</td></tr>
<tr><td>DF</td><td colspan="2">同产品初始规格
Within initial specification</td></tr>
<tr><td>IR</td><td colspan="2">同产品初始规格
Within initial specification</td></tr>
<tr><td colspan="3">外观无可见损伤
Appearance: No visible damage</td></tr>
<tr><td rowspan="6">11</td><td rowspan="6">湿热特性
Damp Heat
(IEC60384-21/22 8.14)</td><td rowspan="2">△C/C</td><td>C0G</td><td>±2% or ±1pF 取较大值
±2% or ±1pF, whichever is larger</td><td rowspan="6">初始测量：
150+0/-10℃预热 1 小时，然后室温放置 24±2 小时测量。
测试电压：额定电压
测试时间：500 小时
温度：40±2℃
湿度：90%~95%RH
充放电电流：不超过 50mA
Initial Measurement:
Perform a heat treatment at 150+0/-10℃ for 1h then sit for 24±2h at room temperature and measure initial values.
Applied Voltage: Rated Voltage
Duration:500h
Temperature: 40±2℃
Humidity: 90%~95%RH
Charge/Discharge Current: 50mA max.</td></tr>
<tr><td>X5R
X7R</td><td>常规产品：±15%
高容产品：±20%
General parts: ±15%
High capacitance parts: ±20%</td></tr>
<tr><td>DF</td><td colspan="2">≤2 倍品初始规格
Not more than twice of initial specification</td></tr>
<tr><td rowspan="2">IR</td><td>C0G</td><td>≥2.5E3MΩ 或 RC≥25ΩF，取较小的值
≥2.5E3MΩ or RC≥25ΩF, whichever is smaller</td></tr>
<tr><td>X5R
X7R</td><td>常规产品：
≥5E2MΩ 或 RC≥25ΩF，取较小的值
高容产品：
RC≥5ΩF
General Product:
≥5E2MΩ or RC≥25ΩF, whichever is smaller
High cap product
RC≥5ΩF</td></tr>
<tr><td colspan="3">外观无可见损伤
Appearance: No visible damage</td></tr>
</table>

<table>
<tr><th>编号
No.</th><th>项目
Item</th><th colspan="3">技术规格
Specification</th><th>测试方法
Test Method</th></tr>
<tr><td rowspan="6">12</td><td rowspan="6">耐久性
Operational Life
(IEC60384-21/22 8.15)</td><td rowspan="3">△C/C</td><td>C0G</td><td>±2% or ±1pF 取较大值
±2% or ±1pF, whichever is larger</td><td rowspan="6">初始测量：
150+0/-10℃预热 1 小时，然后室温放置 24±2 小时测量。
测试电压：
常规产品：2 倍额定电压
高容产品：1.5 倍额定电压
中高压产品：
<table><tr><td>额定电压(Ur)</td><td>C0G</td><td>X7R</td></tr><tr><td>Ur≤100V</td><td>2.0Ur</td><td>2.0Ur</td></tr><tr><td>100V<Ur≤250V</td><td>1.5Ur</td><td>1.5Ur</td></tr><tr><td>250V<Ur≤630V</td><td>1.3Ur</td><td>1.2Ur</td></tr><tr><td>630V<Ur</td><td>1.2Ur</td><td>1.1Ur</td></tr></table>
测试时间：1000 小时
温度：C0G/X7R:125℃；X5R：85℃
充放电电流：不超过 50mA
Initial Measurement:
Perform a heat treatment at 150+0/-10℃ for 1h then sit for 24±2h at room temperature and measure initial values.
Applied Voltage:
2 x Rated Voltage(General products)
1.5 x Rated Voltage(High cap products)
Applied voltage for medium/high voltage series as below:
<table><tr><td>额定电压(Ur)</td><td>C0G</td><td>X7R</td></tr><tr><td>Ur≤100V</td><td>2.0Ur</td><td>2.0Ur</td></tr><tr><td>100V<Ur≤250V</td><td>1.5Ur</td><td>1.5Ur</td></tr><tr><td>250V<Ur≤630V</td><td>1.3Ur</td><td>1.2Ur</td></tr><tr><td>630V<Ur</td><td>1.2Ur</td><td>1.1Ur</td></tr></table>
Duration:1000h
Temperature:C0G/X7R:125℃；X5R/Y5V：85℃
Charge/Discharge Current: 50mA max.</td></tr>
<tr><td>X7R
X5R</td><td>常规产品：±15%
高容产品：±20%
General parts: ±15%
High capacitance parts: ±20%</td></tr>
<tr><td>DF</td><td colspan="2">≤2 倍品初始规格
Not more than twice of initial specification</td></tr>
<tr><td rowspan="2">IR</td><td>C0G</td><td>≥4E3MΩ or RC≥40ΩF 取较小的值
≥4E3MΩ or RC≥40ΩF, whichever is smaller</td></tr>
<tr><td>X5R
X7R</td><td>一般产品：
≥1E3MΩ or RC≥50ΩF 取较小的值
高容产品：
RC≥10ΩF
General Product
≥1E3MΩ or RC≥50ΩF, whichever is smaller
High cap product
RC≥10ΩF</td></tr>
<tr><td colspan="3">外观无可见损伤
Appearance: No visible damage</td></tr>
</table>

※常规产品及高容产品表 General product and high cap product table

X7R	尺寸 Size					产品分类
	0201	0402	0603	0805	1206	Product type
6.3V	100pF~10nF	100pF~100nF	100pF~470nF	220pF~1uF	220pF~1uF	G
		220nF~1uF	560nF~4.7uF	2.2uF~10uF	2.2uF~22uF	H
10V	100pF~10nF	100pF~100nF	100pF~470nF	220pF~1uF	220pF~1uF	G
		220nF~1uF	560nF~4.7uF	2.2uF~10uF	2.2uF~22uF	H
16V	100pF~10nF	100pF~100nF	100pF~470nF	220pF~1uF	220pF~1uF	G
		220nF	560nF~2.2uF	2.2uF~10uF	2.2uF~22uF	H
25V	100pF~10nF	100pF~100nF	100pF~470nF	220pF~1uF	220pF~1uF	G
		220nF	560nF~1uF	2.2uF~4.7uF	2.2uF~10uF	H
50V	100pF~1nF	100pF~47nF	100pF~220nF	220pF~1uF	220pF~1uF	G
		100nF~150nF	560nF~1uF	2.2uF	2.2uF~4.7uF	H
100V		100pF~10nF	100pF~100nF	220pF~1uF	220pF~1uF	G
					2.2uF	H
≥200V			100pF ~ 22nF	100pF ~ 100nF	100pF ~ 100nF	G

X5R	尺寸 Size					产品分类
	0201	0402	0603	0805	1206	Product type
6.3V	100pF~82nF	22nF~820nF	220nF~1uF	470nF~2.2uF	1uF,2.2uF	G
	100nF~2.2uF	1uF~22uF	2.2uF~47uF	4.7uF~47uF	4.7uF~100uF	H
10V	100pF~82nF	22nF~820nF	220nF~1uF	470uF~2.2uF	1uF,2.2uF	G
	100nF~2.2uF	1uF~10uF	2.2uF~10uF	4.7uF~22uF	4.7uF~22uF	H
16V	100pF~82nF	22nF~820nF	220nF~1uF	470nF~2.2uF	1uF,2.2uF	G
	100nF~470nF	1uF~4.7uF	2.2uF~10uF	4.7uF~22uF	4.7uF~22uF	H
25V	100pF~82nF	22nF~220nF	220nF~1uF	470nF~2.2uF	1uF,2.2uF	G
	100nF~220nF	270nF~2.2uF	2.2uF~10uF	4.7uF~22uF	4.7uF~22uF	H
50V	100pF~1nF	22nF~100nF	220nF~820nF	470nF~2.2uF	1uF,2.2uF	G
		220nF~1uF	1uF,2.2uF	4.7uF	4.7uF,10uF	H

产品分类字母意义：G--代表常规产品，H--代表高容产品

Product type letter meaning: G—General product; H—High cap product

※损耗角（DF）规格表（X7R/X5R）: Table of DF specification (X7R/X5R)

材质 Dielectric	电压 Rated Voltage	尺寸 Size					损耗角 DF
		0201	0402	0603	0805	1206	
X7R	≤10V	100pF ~ 10nF	100pF ~ 100nF	100pF ~ 1uF	150pF ~ 2.2uF	220pF ~ 2.2uF	≤5%
			220nF ~ 470nF	2.2uF ~ 4.7uF	4.7uF ~ 10uF	4.7uF ~ 22uF	≤10%
			1uF				≤12.5%
	16V	100pF ~ 1.2nF	100pF ~ 22nF	100pF ~ 220nF	150pF ~ 470nF	220pF ~ 1uF	≤3.5%
		1.5nF ~ 10nF	27nF ~ 100nF	470nF ~ 1uF	680nF ~ 2.2uF	2.2uF	≤5%
			220nF	2.2uF	4.7uF ~ 10uF	4.7uF ~ 22uF	≤10%
	25V		100pF ~ 10nF	100pF ~ 39nF	150pF ~ 180nF	220pF ~ 180nF	≤2.5%
		100pF ~ 470pF	12nF ~ 47 nF	47nF ~ 220nF	220nF ~ 470nF	220nF ~ 1uF	≤3.5%
		560pF ~ 10nF	56nF ~ 100nF	270nF ~ 470nF	560nF ~ 2.2uF	2.2uF	≤5%
			120nF ~ 220nF	560nF ~ 1uF	4.7uF	4.7uF ~ 10uF	≤10%
	50V		100pF ~ 10nF	100pF ~ 39nF	150pF ~ 180nF	220pF ~ 180nF	≤2.5%
		100pF ~ 470pF	12nF ~ 33 nF	47nF ~ 220nF	220nF ~ 470nF	220nF ~ 1uF	≤3.5%
		560pF ~ 1nF			560nF ~ 680nF		≤5%
			47nF ~ 82nF				≤7%
			100nF ~ 150nF	470nF ~ 1uF	1uF ~ 2.2uF	2.2uF ~ 4.7uF	≤10%
	100V		100pF ~ 10nF	100pF ~ 10nF	220pF ~ 470nF	220pF ~ 470nF	≤2.5%
						560nF ~ 820nF	≤3.5%
				12nF ~ 100nF	560nF ~ 1uF	1uF ~ 2.2uF	≤5%
	≥200V			100pF ~ 22nF	100pF ~ 100nF	100pF ~ 100nF	≤2.5%

材质 Dielectric	电压 Rated Voltage	尺寸 Size					损耗角 DF
		0201	0402	0603	0805	1206	
X5R	≤6.3V	100pF ~ 10nF	22nF ~ 100nF	10nF ~ 470nF	470nF ~ 680nF	1uF ~ 4.7uF	≤5%
				680nF ~ 1uF			≤7%
		12nF ~ 1uF	120nF ~ 10uF	2.2uF ~ 47uF	1uF ~ 47uF	10uF ~ 47uF	≤10%
		2.2uF				100uF	≤15%
			22uF				≤20%
	10V	100pF ~ 10nF	22nF ~ 100nF	10nF ~ 470nF	470nF ~ 680nF	1uF ~ 4.7uF	≤5%
				680nF ~ 1uF	1uF ~ 2.2uF		≤7%
		12nF ~ 220nF, 1uF	120nF ~ 10uF	2.2uF ~ 10uF	4.7uF ~ 22uF	10uF ~ 22uF	≤10%
		470nF					≤15%
		2.2uF					≤20%
	16V	100pF ~ 10nF	22nF ~ 100nF	10nF ~ 470nF	470nF ~ 680nF	1uF ~ 4,.7uF	≤5%
				680nF ~ 1uF	1uF ~ 2.2uF		≤7%
		12nF ~ 220nF	120nF ~ 4.7uF	2.2uF ~ 10uF	4.7uF ~ 22uF	10uF ~ 22uF	≤10%
		470nF					≤15%
	25V	100pF ~ 470pF	22nF		470nF ~ 1uF	1uF ~ 2.2uF	≤3.5%
		560PF ~ 10nF	27nF ~ 100nF	220nF ~ 470nF	2.2uF	4.7uF	≤5%
				680nF ~ 1uF			≤7%
		22nF ~100nF	120nF ~ 2.2uF	2.2uF ~ 10uF	4.7uF ~ 22uF	10uF ~ 22uF	≤10%
	50V	100pF ~ 1nF	22nF				≤3.5%
			27nF ~ 100nF				≤5%
			120nF ~ 1uF	220nF ~ 2.2uF	470nF ~ 4.7uF	1uF ~ 10uF	≤10%

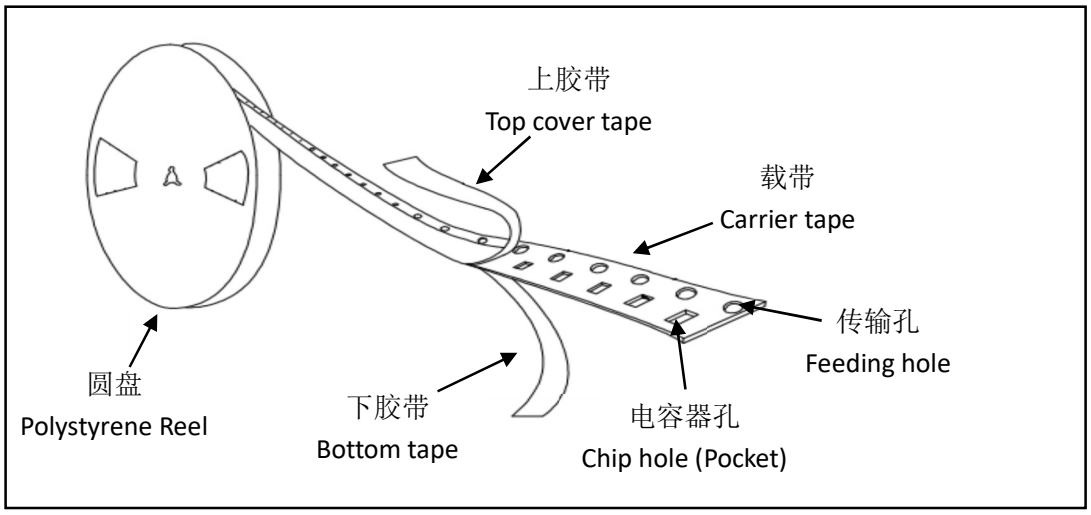
※IR 规格表（X7R/X5R） IR specification table(X7R/Y5V/X5R)

材质 Dielectric	电压 Rated Voltage	尺寸 Size					绝缘阻抗 IR
		0201	0402	0603	0805	1206	
X7R	6.3V	100pF ~ 10nF	100pF ~ 220nF	100pF ~ 470nF	220pF ~ 2.2uF	220pF ~ 2.2uF	≥10,000MΩ or RC≥500Ω·F
				560nF ~ 2.2uF	4.7uF ~ 10uF	4.7uF ~ 22uF	RC≥100Ω·F
			470nF ~ 1uF	4.7uF			RC≥50Ω·F
	10V	100pF ~ 10nF	100pF ~ 100nF	100pF ~ 470nF	220pF ~ 2.2uF	220pF ~ 2.2uF	≥10,000MΩ or RC≥500Ω·F
				560nF ~ 2.2uF	4.7uF ~ 10uF	4.7uF ~ 22uF	RC≥100Ω·F
			220nF ~ 1uF				RC≥50Ω·F
	16V	100pF ~ 10nF	100pF ~ 100nF	100pF ~ 470nF	220pF ~ 2.2uF	220pF ~ 2.2uF	≥10,000MΩ or RC≥500Ω·F
				560nF ~ 1uF	4.7uF ~ 10uF	4.7uF ~ 22uF	RC≥100Ω·F
			220nF	2.2uF			RC≥50Ω·F
	25V	100pF ~ 10nF	100pF ~ 100nF	100pF ~ 220nF	220pF ~ 1uF	220pF ~ 2.2uF	≥10,000MΩ or RC≥500Ω·F
				270nF ~ 1uF	2.2uF ~ 4.7uF	4.7uF ~ 10uF	RC≥100Ω·F
			220nF				RC≥50Ω·F
	50V	100pF ~ 1nF	100pF ~ 82nF	100pF ~ 220nF	220pF ~ 1uF	220pF ~ 100nF	≥10,000MΩ or RC≥500Ω·F
			100nF ~ 150nF	270nF ~ 1uF	2.2uF	120nF ~ 4.7uF	RC≥100Ω·F
	100V		100pF ~ 10nF	100pF ~ 100nF	220pF ~ 1uF	220pF ~ 100nF	≥10,000MΩ or RC≥500Ω·F
						120nF ~ 2.2uF	RC≥100Ω·F
	200V 250V			220pF ~ 22nF	220pF ~ 100nF	220pF ~ 22nF	≥10,000MΩ or RC≥500Ω·F
						27nF ~ 100nF	RC≥100Ω·F
	500V				100pF ~ 3.3nF	100pF ~ 10nF	≥10,000MΩ or RC≥500Ω·F
	630V				≥3.9nF	≥12nF	≥10,000MΩ or RC≥100Ω·F

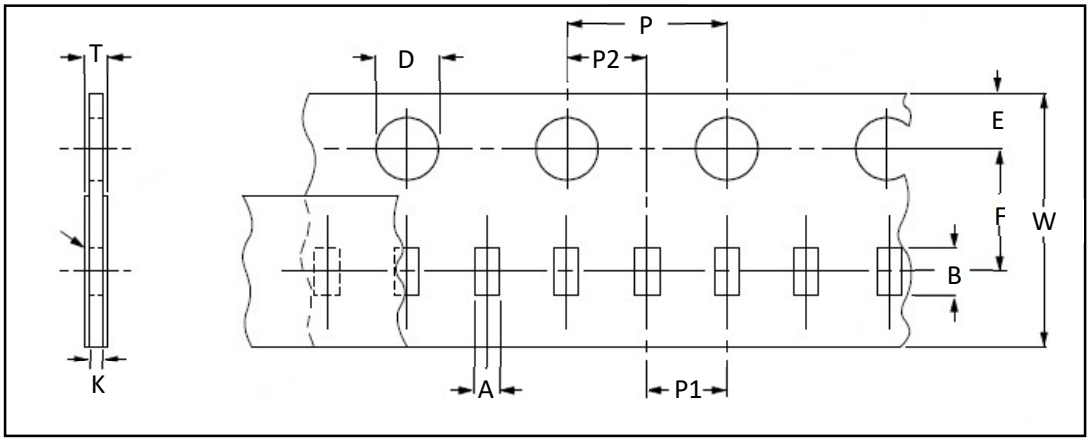
材质 Dielectric	电压 Rated Voltage	尺寸 Size					绝缘阻抗 IR
		0201	0402	0603	0805	1206	
X5R	≤6.3V	100pF ~ 82nF	22nF ~ 470nF	220nF ~ 1uF	470nF ~ 4.7uF	1uF ~2.2uF	≥10,000MΩ or RC≥500Ω·F
		100nF ~ 470nF	560nF ~ 4.7uF	2.2uF ~ 4.7uF	10uF	4.7uF ~ 47uF	RC≥100Ω·F
		560nF ~ 1uF	10uF	10uF ~ 22uF	22uF ~ 47uF	100uF	RC≥50Ω·F
		2.2uF	22uF	47uF			RC≥20Ω·F
	10V	100pF ~ 82nF	22nF ~ 470nF	220nF ~ 1uF	470nF ~ 2.2uF	1uF ~2.2uF	≥10,000MΩ or RC≥500Ω·F
		100nF ~ 470nF	560nF ~ 4.7uF	2.2uF ~ 4.7uF	4.7uF ~ 22uF	4.7uF ~ 22uF	RC≥100Ω·F
		560nF ~ 2.2uF	10uF	10uF			RC≥50Ω·F
	16V	100pF ~ 10nF	22nF ~ 150nF	220nF ~ 1uF	470nF ~ 2.2uF	1uF ~ 2.2uF	≥10,000MΩ or RC≥500Ω·F
		22nF ~ 100nF, 470nF		2.2uF ~ 4.7uF	4.7uF ~ 22uF	4.7uF ~ 10uF	RC≥100Ω·F
		220nF	220nF ~ 4.7uF	10uF		22uF	RC≥50Ω·F
	25V	100pF ~ 10nF	22nF ~ 150nF	220nF ~ 1uF	470nF ~ 2.2uF	1uF ~ 2.2uF	≥10,000MΩ or RC≥500Ω·F
		22nF ~ 100nF		2.2uF ~ 4.7uF	4.7uF ~ 22uF	4.7uF	RC≥100Ω·F
			220nF ~ 2.2uF	10uF		10uF,22uF	RC≥50Ω·F
	50V	100pF ~ 1nF	22nF ~ 100nF		470nF ~ 2.2uF	1uF ~ 2.2uF	≥10,000MΩ or RC≥500Ω·F
				220nF ~ 2.2uF	4.7uF	4.7uF	RC≥100Ω·F
			150nF ~ 1uF			10uF	RC≥50Ω·F

五、包装 Package

5.1 纸带圆盘结构 Paper Taping



纸带结构 Structure of paper tape.

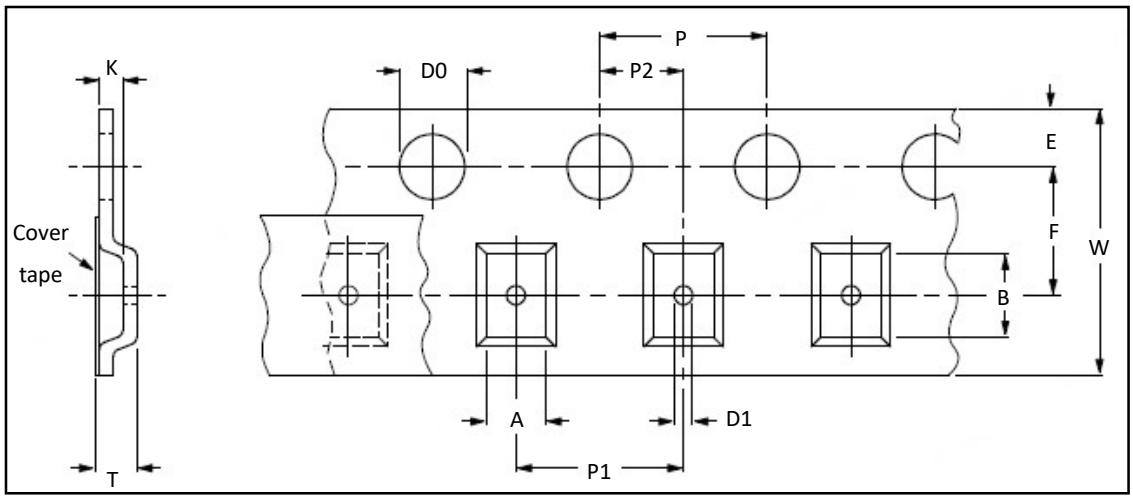


适合纸带的常规尺寸有“0201, 0402, 0603, 0805, 1206”,规格如下：

Dimension of paper taping for “0201, 0402, 0603, 0805, 1206”

尺寸 size	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P (mm)	P1 (mm)	P2 (mm)	øD (mm)	K (mm)	T (mm)
0201	0.39 ±0.06	0.70 ±0.06	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.05	2.00 ±0.05	2.00 ±0.05	1.55 ±0.03	0.38 ±0.05	0.39 ±0.06
0402	0.70 ±0.15	1.21 ±0.12	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.05	2.00 ±0.05	2.00 ±0.05	1.50 +0.1/-0	0.60 ±0.10	0.70 ±0.10
0603	1.05 ±0.14	1.86 ±0.13	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.50 +0.1/-0	0.95 ±0.10	1.05 ±0.10
0805	1.50 ±0.15	2.26 ±0.20	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.50 +0.1/-0	1.05/0.95/0.75 ±0.10	1.15/1.05/0.85 ±0.10
1206	1.90 ±0.15	3.50 ±0.20	8.00 ±0.20	1.75 ±0.10	3.50 ±0.05	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.50 +0.1/-0	0.95/0.75 ±0.10	1.05/0.85 ±0.10

5.2 塑胶带尺寸结构 Structure of plastic tape

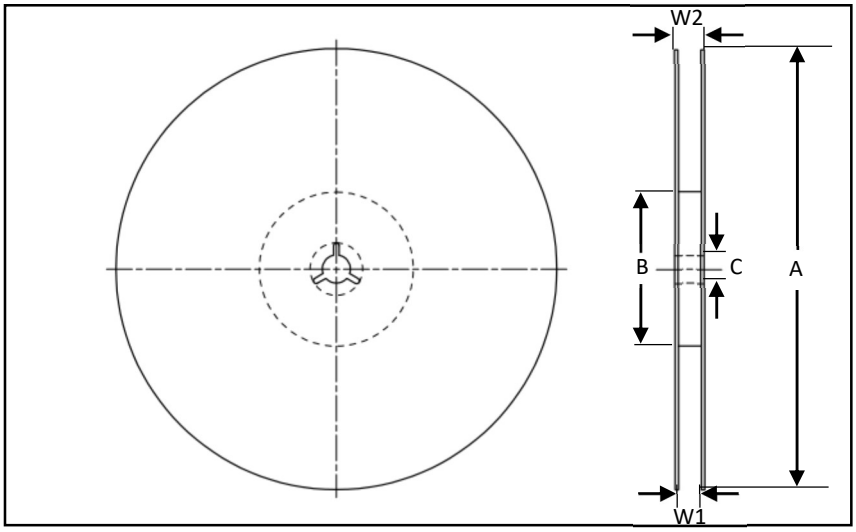


塑胶带适合 0805, 1206 型产品，规格参考下表

Plastic tape is suitable for 0805, 1206 type products, the specification refer to below table

尺寸 size	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	øD0 (mm)	øD1 (mm)	P (mm)	P1 (mm)	P2 (mm)	K (mm)	T (mm)
0805	1.29~ 1.65	2.09~ 2.60	8.10 ±0.20	1.75 ±0.10	3.50 ±0.05	1.50 +0.1/- 0	1.0 +0.1/- 0	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	1.25~ 1.62	1.30~ 1.67
1206	0.70 ±0.15	1.21 ±0.12	8.10 ±0.20	1.75 ±0.10	3.50 ±0.05	1.50 +0.1/- 0	1.0 +0.1/- 0	4.00 ±0.10	4.00 ±0.10	2.00 ±0.05	8.00 ±0.20	1.27~ 2.20

5.3 卷盘尺寸 Reel dimension

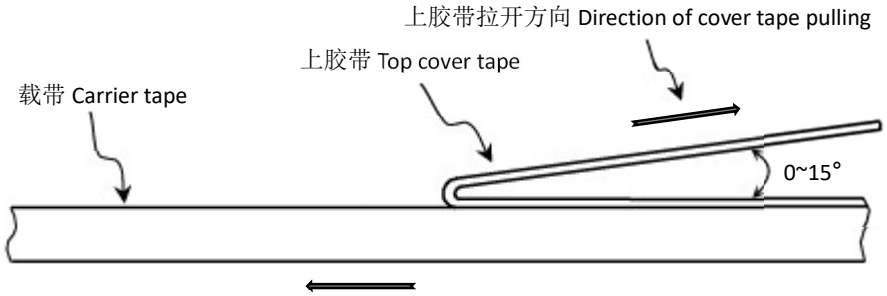


卷盘型号 Reel type	A (mm)	B (mm)	C (mm)	W1 (mm)	W2 (mm)
7' Reel	ø178±2.0	60±1.0	ø13±0.5	10±1.5	14.4 max
13' Reel	ø330±2.0	100±1.0	ø13±0.5	10±1.5	14.4 max

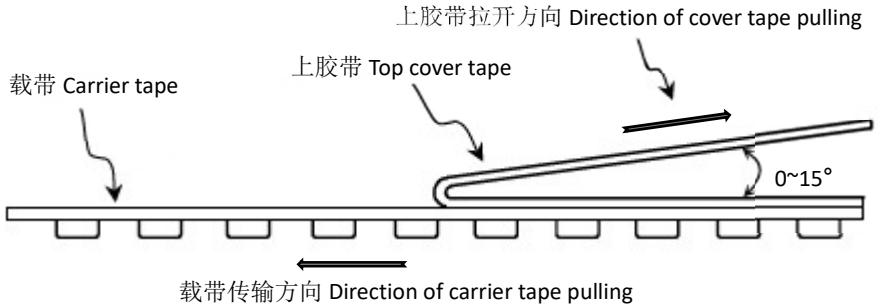
5.4 卷带规格 Taping performance specification

上胶带剥离强度 The top cover tape peeling strength

a)纸带 Paper Tape



b)塑胶带 Plastic Tape



标准： 1）0.1N < 剥离力 < 0.7N (上胶带)

2）剥离速度：300mm/min

3）剥离时，电容器不能粘在上胶带上，纸带不能有纸碎。

Standard: 1) 0.1N < Peeling strength < 0.7N (top cover tape)

2) Speed of peeling off: 300mm/min

3) Component shall not stick to top cover tape and no paper dirty on the scotch when peeling.

5.5 包装数量 Packing Quantity （单位 unit：pcs）

尺寸 Size	厚度(mm) Thickness	Ø180mm / 7 inch		Ø330m / 13 inch	
		纸带 Paper	塑胶带 Plastic	纸带 Paper	塑胶带 plastic
0201	0.3±0.03	15,000	---	50,000	---
0402	0.5±0.05/0.1	10,000	---	50,000	---
0603	0.8±0.1	4,000	---	15,000	---
0805	0.6±0.1	4,000	---	20,000	---
	0.85±0.1	4,000	---	15,000	---
	1.25±0.2	---	3,000	---	10,000
1206	0.6±0.1	4,000	---	20,000	---
	0.85±0.1	4,000	---	15,000	---
	1.0/1.15±0.1	---	3,000	---	10,000
	1.6±0.2	---	2,000	---	8,000

六、储存方法及要求 Storage method and requirement

6.1 确保电容器储存在 5~40℃的温度，20%~70%RH.的湿度环境中；

The MLCC chips must be stored in an ambient temperature of 5 to 40℃ with a relative humidity of 20 to 70% RH.

6.2 大气中的腐蚀气体可能导致可靠性下降，如终端电极的焊锡性差。不要将电容器储存在容易接触腐蚀性气体（如硫化氢、二氧化硫、氯氨等）的地方。

Corrosive gasses in the air or atmosphere may result in deterioration of the reliability, such as poor solderability of the terminal electrodes. Do not store capacitors in an atmosphere of corrosive gas (such as hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)

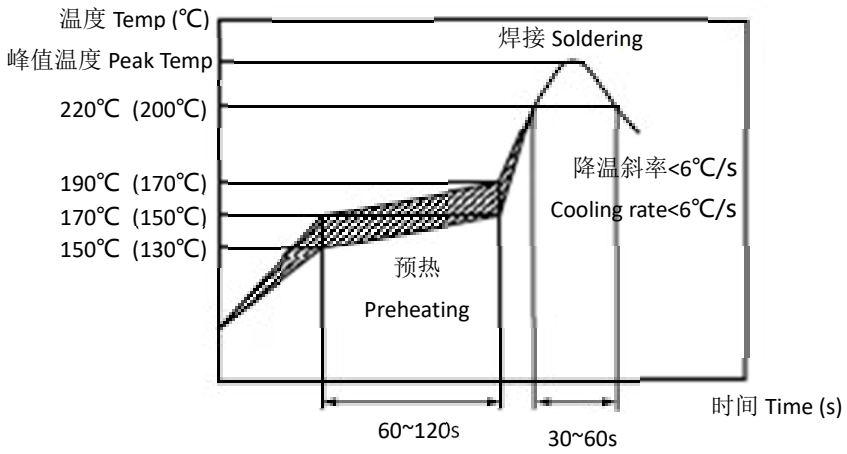
6.3 高温和潮湿的环境会加速电容器的端子氧化，从而影响焊锡性，还会降低卷带和包装的性能，因此贴片电容应在 24 个月内使用。当电容器储存时间超过 24 个月，在使用前需要确认电容器焊锡性。

High temperature and humidity environment may affect a capacitor's solder ability because they accelerate the solder layer of termination oxidization. They deteriorate performance of taping and packaging too. Therefore MLCC chips shall be used within 24 months. When MLCC chips are stored for a longer time period than 24 month, must confirm the solder ability of the chips prior to use.

七、注意事项 Cautions

7.1 焊接的方式和条件 Soldering method and condition

a)回流焊 Reflow soldering



*温度说明：括号（）前为建议的无铅焊锡温度，括号（）内为建议的有铅焊锡温度。

*Temperature specification: The recommended lead-free solder temperature is in front of parentheses ( ) and the recommended leaded solder temperature is in parentheses ( )

焊锡类别 Solder type	有铅焊锡 Pb-Sn soldering	无铅焊锡 Lead-free soldering
峰值温度 Peak temperature	230~250℃	240~260℃
气体 Atmosphere	空气 Air	空气或氮气 Air or N_2

有铅焊锡(Pb-Sn solder): Sn-37Pb

无铅焊锡(Lead-free solder): Sn-3.0Ag-0.5Cu

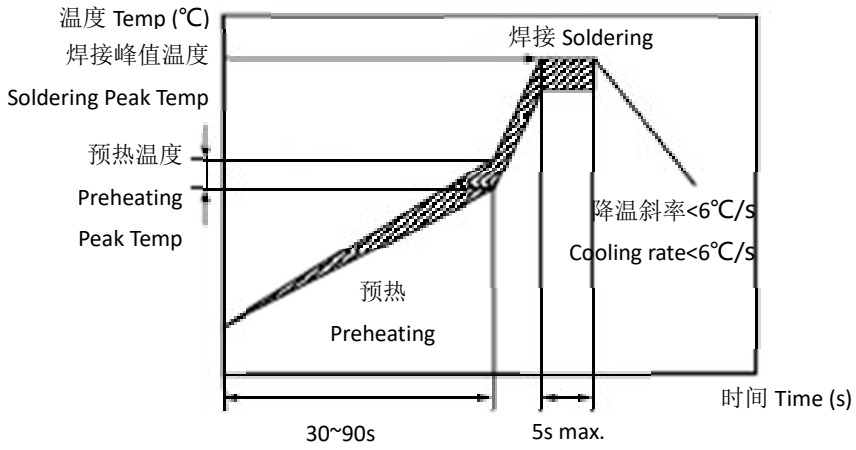
当电容器焊接的温度低于焊锡推荐的峰值温度时，可能会发生以下质量问题。考虑诸如周边组件的放置和回流温度设定的因素，以防止电容器的回流温度下降到规定的峰值温度以下。一定要事先评估焊接情况，并确认没有发生下列问题：

- 焊锡润湿性下降
- 焊锡粘结强度下降
- 焊锡孔洞
- 可能发生电容器在线路板上立碑或偏移

When a chip is mounted at a temperature lower than the peak reflow temperature, the following quality problems can occur. Consider factor such as the placement of dropping below the peak temperature specified. Be sure to evaluate the mounting situation beforehand and verify that none of the follow problems occur.

- Drop in solder wettability
- Drop in bonding strength
- Solder voids
- Possible occurrence of tombstone or shifting issue on the land patterns of PCB

b)波峰焊 Wave soldering



焊锡类别 Solder type	有铅焊锡 Pb-Sn soldering	无铅焊锡 Lead-free soldering
预热峰值温度 Preheating Peak temperature	90~110℃	100~120℃
焊接峰值温度 Soldering Peak temperature	240~250℃	250~260℃
气体 Atmosphere	空气 Air	空气或氮气 Air or N_2

有铅焊锡(Pb-Sn solder): Sn-37Pb

无铅焊锡(Lead-free solder): Sn-3.0Ag-0.5Cu

c) 焊接方式建议 Suggestion for soldering method

焊接方式 Method	0201	0402	0603	0805	1206
Reflow	All	>100nF	>1uF	>2.2uF	>4.7uF
Reflow/Wave		≤100nF	≤1uF	≤2.2uF	≤4.7uF

7.2 焊接维修 Solder repairing

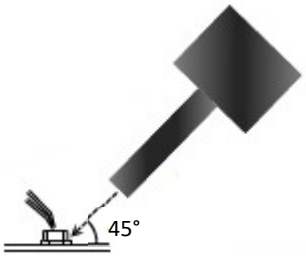
a)热风枪返工 Soldering repair by spot heater

如果热风枪的吹气口离电容器太近，可能会由于热应力的影响在电容中产生裂纹，以下是避免这种情况发生的建议。

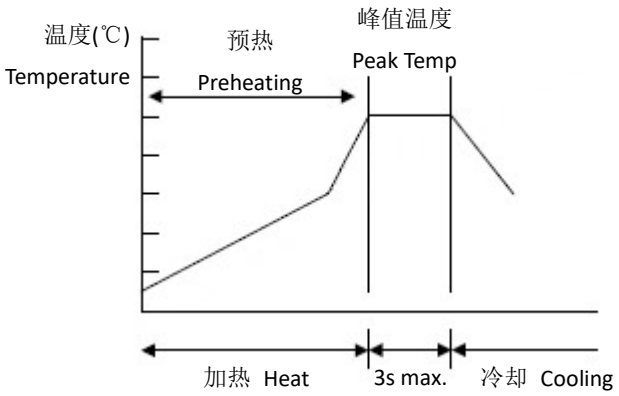
- 电容器和吹气口之间保持 5mm 以上的距离
- 热风枪的加热器温度应低于 400℃
- 吹气气流应设置的尽可能小
- 吹热风的时间建议为 10s 或者更少
- 喷嘴与电容器之间的角度建议为 45°，避免局部加热

If the lower nozzle of a spot heater is too close to a capacitor, the crack in the capacitor may occur because of heat stress. Below are recommendations for avoiding such an occurrence

- The distance between the capacitor and the spot heater nozzle shall be more than 5mm
- The blower temperature of the spot heater shall be lower than 400℃
- The airflow shall be set as slight as possible
- Duration of blowing hot air is recommended to be 10s or less
- The angle between the capacitor and nozzle is recommended to be 45° in order to avoid partial area heating too much



b) 烙铁返工 Soldering repair by solder iron



烙铁头温度 Temperature of solder iron tip	焊接时间 Soldering time	限制条件 Restricted conditions
最高 350℃ 350℃ max.	不大于 3s 3s max.	请勿使用烙铁头直接接触陶瓷本体 Do not directly contact the ceramic body of chip by soldering tip

八、版本 Version history

版本号 Version	日期 Date	变更描述 Version Change Description
Version 1	2023/1/1	新版本发行 New version issue