多层陶瓷电容

MLCC是一种电子部件，其临时存储电荷和电容器当今最普遍的类型。新技术使MLCC厂商遵循由小的电子设备，诸如蜂窝电话，计算机，DSC，DVC所决定的趋势。

特征

- 微型尺寸;
- 宽的电容和电压范围;
- 磁带和卷轴表面贴装;
- 低ESR.

应用

- 一般的电子电路

产品型号

CL	10	B	104	K	B	8	N	N	N	C
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫

❶ 平尚多层陶瓷电容
❷ 尺寸（mm）
❸ 电容温度特性
❹ 标称电容量
❺ 电容容差
❻ 额定电压
❼ 厚度选项
❽ 产品及电镀方法
❾ 平尚控制代码
❿ 保留为将来使用
⓫ 包装类型

❶ 平尚多层陶瓷电容

❷ 尺寸（mm）

Code	EIA CODE	Size(mm)
03	0201	0.6 × 0.3
05	0402	1.0 × 0.5
10	0603	1.6 × 0.8
21	0805	2.0 × 1.25
31	1206	3.2 × 1.6
32	1210	3.2 × 2.5
43	1812	4.5 × 3.2
55	2220	5.7 × 5.0

❸ 电容温度特性

Code	Temperature Characteristics				Temperature Range
C	Class Ⅰ	COG	C△	0±30(ppm/℃)	-55 ~ +125℃
P		P2H	P△	-150±60	
R		R2H	R△	-220±60	
S		S2H	S△	-330±60	
T		T2H	T△	-470±60	
U		U2J	U△	-750±60	
L		S2L	S△	+350 ~ -1000	
A	Class Ⅱ	X5R	X5R	±15%	-55 ~ +85℃
B		X7R	X7R	±15%	-55 ~ +125℃
X		X6S	X6S	±22%	-55 ~ +105℃
F		Y5V	Y5V	+22 ~ -82%	-30 ~ +85℃

※ 温度特性

Temperature Characteristics	Below 2.0pF	2.2 ~ 3.9pF	Above 4.0pF	Above 10pF
CΔ	C0G	C0G	C0G	C0G
PΔ	-	P2J	P2H	P2H
RΔ	-	R2J	R2H	R2H
SΔ	-	S2J	S2H	S2H
TΔ	-	T2J	T2H	T2H
UΔ	-	U2J	U2J	U2J

J : ±120PPM/℃, H : ±60PPM/℃, G : ±30PPM/℃

❹ 标称电容量

标称电容量是确定的3位数字。
在第一和第二个数字确定电容的第一和第二显著数字。
第三个数字标识乘数。“R”标识小数点。

● 例如

Code	Nominal Capacitance
1R5	1.5pF
103	10,000pF, 10nF, 0.01μF
104	100,000pF, 100nF, 0.1μF

❺ 电容容差

Code	Tolerance	Nominal Capacitance
A	±0.05pF	Less than 10pF (Including 10pF)
B	±0.1pF	
C	±0.25pF	
D	±0.5pF	
F	±1pF	
F	±1%	More than 10pF
G	±2%	
J	±5%	
K	±10%	
M	±20%	
Z	+80, -20%	

❻ 额定电压

Code	Rated Voltage	Code	Rated Voltage
R	4.0V	D	200V
Q	6.3V	E	250V
P	10V	G	500V
O	16V	H	630V
A	25V	I	1,000V
L	35V	J	2,000V
B	50V	K	3,000V
C	100V		

❼ 厚度选项

Size	Code	Thickness(T)	Size	Code	Thickness(T)
0201(0603)	3	0.30±0.03	1812(4532)	F	1.25±0.20
0402(1005)	5	0.50±0.05		H	1.6±0.20
0603(1608)	8	0.80±0.10		I	2.0±0.20
0805(2012)	A	0.65±0.10		J	2.5±0.20
	C	0.85±0.10		L	3.2±0.30
	F	1.25±0.10	2220(5750)	F	1.25±0.20
	Q	1.25±0.15		H	1.6±0.20
1206(3216)	C	0.85±0.15		I	2.0±0.20
	F	1.25±0.15		J	2.5±0.20
	H	1.6±0.20		L	3.2±0.30
1210(3225)	F	1.25±0.20			
	H	1.6±0.20			
	I	2.0±0.20			
	J	2.5±0.20			
	V	2.5±0.30			

❽ 产品及电镀方法

Code	Electrode	Termination	Plating Type
A	Pd	Ag	Sn_100%
N	Ni	Cu	Sn_100%
G	Cu	Cu	Sn_100%

❾ 平尚控制代码

Code	Description of the code	Code	Description of the code
A	Array (2-element)	N	Normal
B	Array (4-element)	P	Automotive
C	High - Q	L	LICC

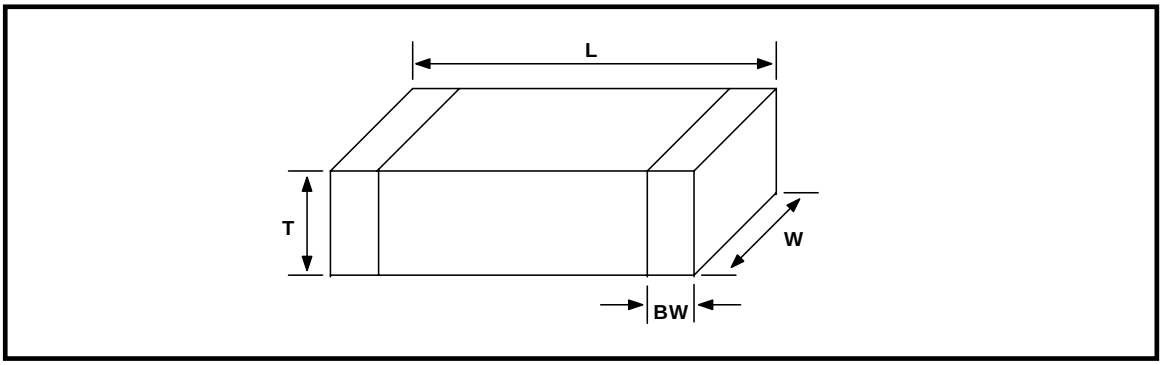
⑩ 保留为将来使用

Code	Description of the code
N	Reserved for future use

⑪ 包装类型

Code	Packaging Type	Code	Packaging Type
B	Bulk	**F**	Embossing 13" (10,000EA)
P	Bulk Case	**L**	Paper 13" (15,000EA)
C	Paper 7"	**O**	Paper 10"
D	Paper 13" (10,000EA)	**S**	Embossing 10"
E	Embossing 7"		

外观和尺寸



CODE	EIA CODE	DIMENSION (mm)			
		L	W	T (MAX)	BW
03	0201	0.6 ± 0.03	0.3 ± 0.03	0.33	0.15 ± 0.05
05	0402	1.0 ± 0.05	0.5 ± 0.05	0.55	0.2 +0.15/-0.1
10	0603	1.6 ± 0.1	0.8 ± 0.1	0.9	0.3 ± 0.2
21	0805	2.0 ± 0.1	1.25 ± 0.1	1.35	0.5 +0.2/-0.3
31	1206	3.2 ± 0.15	1.6 ± 0.15	1.40	0.5 +0.2/-0.3
		3.2 ± 0.2	1.6 ± 0.2	1.8	0.5 +0.3/-0.3
32	1210	3.2 ± 0.3	2.5 ± 0.2	2.7	0.6 ± 0.3
		3.2 ± 0.4	2.5 ± 0.3	2.8	
43	1812	4.5 ± 0.4	3.2 ± 0.3	3.5	0.8 ± 0.3
55	2220	5.7 ± 0.4	5.0 ± 0.4	3.5	1.0 ± 0.3

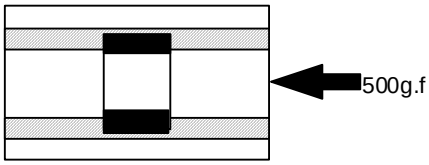
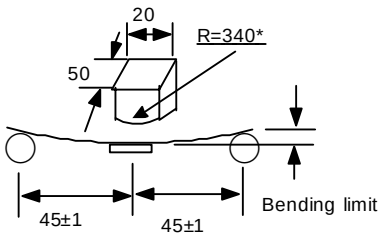
测试条件

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th>PERFORMANCE</th><th colspan="3">TEST CONDITION</th></tr>
<tr><td>1</td><td colspan="2">Appearance</td><td>No Abnormal Exterior Appearance</td><td colspan="3">Through Microscope(×10)</td></tr>
<tr><td>2</td><td colspan="2">Insulation Resistance</td><td>10,000MΩ or 500MΩ·μF whichever is smaller

Rated Voltage is below 16V ;
10,000MΩ or 100MΩ·μF whichever is smaller</td><td colspan="3">Apply the Rated Voltage For 60 ~ 120 Sec.</td></tr>
<tr><td>3</td><td colspan="2">Withstanding Voltage</td><td>No Dielectric Breakdown or
Mechanical Breakdown</td><td colspan="3">Class Ⅰ : 300% of the Rated Voltage for 1~5 sec.
ClassⅡ :250% of the Rated Voltage for 1~5 sec. is applied with less than 50mA current</td></tr>
<tr><td rowspan="5">4</td><td rowspan="5">Capacitance</td><td rowspan="3">Class Ⅰ</td><td rowspan="3">Within the specified tolerance</td><td>Capacitance</td><td>Frequency</td><td>Voltage</td></tr>
<tr><td>≤ 1,000pF</td><td>1MHz±10%</td><td rowspan="2">0.5 ~ 5 Vrms</td></tr>
<tr><td>>1,000pF</td><td>1kHz±10%</td></tr>
<tr><td rowspan="2">Class Ⅱ</td><td rowspan="2">Within the specified tolerance</td><td>Capacitance</td><td>Frequency</td><td>Voltage</td></tr>
<tr><td>≤ 10μF</td><td>1kHz±10%</td><td>1.0±0.2Vrms</td></tr>
<tr><td></td><td></td><td></td><td>>10μF</td><td>120Hz±20%</td><td>0.5±0.1Vrms</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Q</td><td rowspan="3">Class Ⅰ</td><td rowspan="3">Capacitance ≥ 30pF : Q ≥1,000
< 30pF: Q ≥400 +20C
(C : Capacitance)</td><td>Capacitance</td><td>Frequency</td><td>Voltage</td></tr>
<tr><td>≤ 1,000pF</td><td>1MHz±10%</td><td rowspan="2">0.5 ~ 5 Vrms</td></tr>
<tr><td>>1,000pF</td><td>1kHz±10%</td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Tan δ</td><td rowspan="4">Class Ⅱ</td><td rowspan="4">1. Characteristic : A(X5R), B(X7R), X(X6S)
<table><tr><th>Rated Voltage</th><th>Spec</th></tr><tr><td>≥25V</td><td>0.025 max</td></tr><tr><td>16V</td><td>0.035 max</td></tr><tr><td>10V</td><td>0.05 max</td></tr><tr><td>6.3V</td><td>0.05 max/ 0.10max*1</td></tr></table>
2. Characteristic : F(Y5V)
<table><tr><th>Rated Voltage</th><th>Spec</th></tr><tr><td>50V</td><td>0.05 max, 0.07max*2</td></tr><tr><td>35V</td><td>0.07 max</td></tr><tr><td>25V</td><td>0.05 max/
0.07 max*3/ 0.09max*4</td></tr><tr><td>16V</td><td>0.09 max/ 0.125max*5</td></tr><tr><td>10V</td><td>0.125 max/ 0.16max*6</td></tr><tr><td>6.3V</td><td>0.16max</td></tr></table></td><td>Capacitance</td><td>Frequency</td><td>Voltage</td></tr>
<tr><td>≤ 10μF</td><td>1kHz±10%</td><td>1.0±0.2Vrms</td></tr>
<tr><td>>10μF</td><td>120Hz±20%</td><td>0.5±0.1Vrms</td></tr>
<tr><td colspan="3">*1. 0201 C≥0.022uF, 0402 C≥0.22uF, 0603 C≥2.2uF,
0805 C≥4.7uF, 1206 C≥10uF, 1210 C≥22uF,
1812 C≥47uF, 2220 C≥100uF,
All Low Profile Capacitors (P.16).
*2.. 0603 C≥0.47uF, 0805 C≥1uF
*3. 0402 C≥0.033uF, 0603 C>0.1uF
All 0805, 1206 size, 1210 C≤ 6.8uF
*4.. 1210 C>6.8uF
*5.. 0402 C≥0.22uF
*6.. All 1812 size</td></tr>
</table>

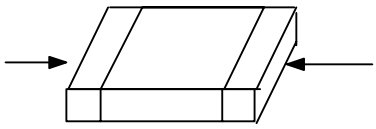
测试条件

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th>PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Temperature Characteristics of Capacitance</td><td>Class Ⅰ</td><td>
<table>
<tr><th>Characteristics</th><th>Temp. Coefficient (PPM/℃)</th></tr>
<tr><td>C0G</td><td>0 ± 30</td></tr>
<tr><td>PH</td><td>-150 ± 60</td></tr>
<tr><td>RH</td><td>-220 ± 60</td></tr>
<tr><td>SH</td><td>-330 ± 60</td></tr>
<tr><td>TH</td><td>-470 ± 60</td></tr>
<tr><td>UL</td><td>-750 ± 120</td></tr>
<tr><td>SL</td><td>+350 ~ -1000</td></tr>
</table>
</td><td rowspan="2">Capacitance shall be measured by the steps shown in the following table.
<table>
<tr><th>Step</th><th>Temp.(℃)</th></tr>
<tr><td>1</td><td>25 ± 2</td></tr>
<tr><td>2</td><td>Min. operating temp. ± 2</td></tr>
<tr><td>3</td><td>25 ± 2</td></tr>
<tr><td>4</td><td>Max. operating temp ± 2</td></tr>
<tr><td>5</td><td>25 ± 2</td></tr>
</table>
(1) Class Ⅰ
Temperature Coefficient shall be calculated from the formula as below.
Temp. Coefficient = $\frac{C2 - C1}{C1 \times \triangle T} \times 10^6$ [ppm/℃]
C1; Capacitance at step 3
C2: Capacitance at 85℃
△T: 60℃(=85℃-25℃)

(2) CLASS Ⅱ
Capacitance Change shall be calculated from the formula as below.
△C = $\frac{C2 - C1}{C1} \times 100(\%)$
C1; Capacitance at step 3
C2: Capacitance at step 2 or 4</td></tr>
<tr><td>Class Ⅱ</td><td>
<table>
<tr><th>Characteristics</th><th>Capacitance Change with No Bias</th></tr>
<tr><td>A(X5R)/ B(X7R)</td><td>±15%</td></tr>
<tr><td>X(X6S)</td><td>±22%</td></tr>
<tr><td>F(Y5V)</td><td>+22% ~ -82%</td></tr>
</table>
</td></tr>
<tr><td>8</td><td colspan="2">Adhesive Strength of Termination</td><td>No Indication Of Peeling Shall Occur On The Terminal Electrode.</td><td>Apply 500g.f * Pressure for 10±1 sec.
* 200g.f for 0201 case size.
 
</td></tr>
<tr><td rowspan="4">9</td><td rowspan="4">Bending Strength</td><td>Apperance</td><td colspan="3">No mechanical damage shall occur.</td><td rowspan="4">Bending limit ; 1mm
Test speed ; 1.0mm/SEC.
Keep the test board at the limit point in 5 sec., Then measure capacitance.
 

R=230 For 0201 Case size</td></tr>
<tr><td rowspan="3">Capacitance</td><td colspan="2">Characteristics</td><td>Capacitance Change</td></tr>
<tr><td colspan="2">Class Ⅰ</td><td>Within ±5% or ± 0.5 pF whichever is larger</td></tr>
<tr><td rowspan="2">Class Ⅱ</td><td>A(X5R)/ B(X7R)/ X(X6S)</td><td>Within ±12.5%</td></tr>
<tr><td>F(Y5V)</td><td>Within ±30%</td></tr>
</table>

测试条件

<table>
<tr><th>NO</th><th colspan="3">ITEM</th><th colspan="3">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td>10</td><td colspan="3">Solderability</td><td colspan="3">More Than 95% of the terminal surface is to be soldered newly, So metal part does not come out or dissolve
  </td><td>
<table>
<tr><td>Solder</td><td>Sn-3Ag-0.5Cu</td><td>63Sn-37Pb</td></tr>
<tr><td>Solder Temp.</td><td>245±5℃</td><td>235±5℃</td></tr>
<tr><td>Flux</td><td colspan="2">RMA Type</td></tr>
<tr><td>Dip Time</td><td>3±0.3 sec.</td><td>5±0.5 sec.</td></tr>
<tr><td>Pre-heating</td><td colspan="2">at 80~120℃ for 10~30 sec.</td></tr>
</table>
</td></tr>
<tr><td rowspan="7">11</td><td rowspan="7">Resistance to Soldering heat</td><td>Apperance</td><td colspan="3">No mechanical damage shall occur.</td><td rowspan="7">Solder Temperature : 270±5℃
Dip Time : 10±1 sec.
Each termination shall be fully immersed and preheated as below :
<table>
<tr><th>STEP</th><th>TEMP.(℃)</th><th>TIME(SEC.)</th></tr>
<tr><td>1</td><td>80~100</td><td>60</td></tr>
<tr><td>2</td><td>150~180</td><td>60</td></tr>
</table>
Leave the capacitor in ambient condition for specified time* before measurement
* 24 ± 2 hours (Class Ⅰ)
48 ± 4 hours (Class Ⅱ)</td></tr>
<tr><td rowspan="4">Capacitance</td><td>Characteristics</td><td colspan="2">Capacitance Change</td></tr>
<tr><td>Class Ⅰ</td><td colspan="2">Within ±2.5% or ±0.25pF whichever is larger</td></tr>
<tr><td rowspan="2">Class Ⅱ</td><td>A(X5R)/ B(X7R)</td><td>Within ±7.5%</td></tr>
<tr><td>X(X6S)</td><td>Within ±15%</td></tr>
<tr><td>Q (Class Ⅰ)</td><td colspan="3">Capacitance ≥30pF : Q≥ 1000
<30pF : Q≥ 400+20×C
(C: Capacitance)</td></tr>
<tr><td>Tan δ (Class Ⅱ)</td><td colspan="3">Within the specified initial value</td></tr>
<tr><td>Insulation Resistance</td><td colspan="3">Within the specified initial value</td></tr>
<tr><td>Withstanding Voltage</td><td colspan="3">Within the specified initial value</td></tr>
<tr><td rowspan="7">12</td><td rowspan="7">Vibration Test</td><td>Appearance</td><td colspan="3">No mechanical damage shall occur.</td><td rowspan="7">The capacitor shall be subjected to a Harmonic Motion having a total amplitude of 1.5mm changing frequency from 10Hz to 55Hz and back to 10Hz In 1 min.

Repeat this for 2hours each in 3 mutually perpendicular directions</td></tr>
<tr><td rowspan="4">Capacitance</td><td>Characteristics</td><td colspan="2">Capacitance Change</td></tr>
<tr><td>Class Ⅰ</td><td colspan="2">Within ±2.5% or ±0.25pF whichever is larger</td></tr>
<tr><td rowspan="3">Class Ⅱ</td><td>A(X5R)/ B(X7R)</td><td>Within ±5%</td></tr>
<tr><td>X(X6S)</td><td>Within ±10%</td></tr>
<tr><td>F(Y5V)</td><td>Within ±20%</td></tr>
<tr><td>Q (Class Ⅰ)</td><td colspan="3">Within the specified initial value</td></tr>
<tr><td>Tan δ (Class Ⅱ)</td><td colspan="3">Within the specified initial value</td></tr>
<tr><td>Insulation Resistance</td><td colspan="3">Within the specified initial value</td></tr>
</table>

测试条件

NO	ITEM		PERFORMANCE		TEST CONDITION
13	Humidity (Steady State)	Appearance	No mechanical damage shall occur.		Temperature : 40±2 ℃ Relative humidity : 90~95 %RH Duration time : 500 +12/-0 hr. Leave the capacitor in ambient condition for specified time* before measurement. CLASS Ⅰ : 24±2 Hr. CLASSⅡ : 48±4 Hr.
		Capacitance	Characteristics	Capacitance Change	
			Class Ⅰ	Within ±5.0% or ±0.5pF whichever is larger	
			Class Ⅱ A(X5R)/ B(X7R)/ X(X6S)	Within ±12.5%	
			Class Ⅱ F(Y5V)	Within ±30%	
		Q CLASS Ⅰ	Capacitance ≥ 30pF : Q≥ 350 10≤ Capacitance <30pF : Q≥ 275 + 2.5×C Capacitance < 10pF : Q≥ 200 + 10×C (C: Capacitance)		
		Tan δ CLASS Ⅱ	1. Characteristic : A(X5R), B(X7R) 0.05max (16V and over) 0.075max (10V) 0.075max (6.3V except Table 1) 0.125max* (refer to Table 1)	2. Characteristic : F(Y5V) 0.075max (25V and over) 0.1max (16V, C<1.0μF) 0.125max(16V, C≥1.0μF) 0.15max (10V) 0.195max (6.3V)	
		Insulation Resistance	1,000 MΩ or 50MΩ·μF whichever is smaller.		
14	Moisture Resistance	Appearance	No mechanical damage shall occur.		Applied Voltage : rated voltage Temperature : 40±2 ℃ Humidity : :90~95%RH Duration Time : 500 +12/-0 Hr. Charge/Discharge Current : 50mA max. Perform the initial measurement according to Note1. Perform the final measurement according to Note2.
		Capacitance	Characteristics	Capacitance Change	
			Class Ⅰ	Within ±5.0% or ±0.5pF whichever is larger	
			Class Ⅱ A(X5R)/ B(X7R)/ X(X6S)	Within ±12.5% Within ±12.5% Within ±30%	
			Class Ⅱ F(Y5V)	Within ±30% Within +30~−40% In case of Table 2 *	
		Q (Class Ⅰ)	Capacitance ≥30pF : Q≥ 200 Capacitance <30pF : Q≥ 100 + 10/3×C (C: Capacitance)		
		Tan δ (Class Ⅱ)	1. Characteristic : A(X5R), B(X7R) 0.05max (16V and over) 0.075max (10V) 0.075max (6.3V except Table 1) 0.125max* (refer to Table 1)	2. Characteristic : F(Y5V) 0.075max (25V and over) 0.1max (16V, C<1.0μF) 0.125max(16V, C≥1.0μF) 0.15max (10V) 0.195max (6.3V)	
			X(X6S) 0.11max (6.3V and below)		
		Insulation Resistance	500 MΩ or 25MΩ·μF whichever is smaller.		

测试条件

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th colspan="3">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="8">15</td><td rowspan="8">High Temperature Resistance</td><td>Appearance</td><td colspan="3">No mechanical damage shall occur.</td><td rowspan="8">Applied Voltage : 200%* of the rated voltage
Temperature : max. operating temperature
Duration Time : 1000 +48/-0 Hr.
Charge/Discharge Current : 50㎃ max.

* refer to table(3) : 150%/100% of the rated voltage

Perform the initial measurement according to Note1 for Class Ⅱ

Perform the final measurement according to Note2.</td></tr>
<tr><td rowspan="5">Capacitance</td><td colspan="2">Characteristics</td><td>Capacitance Change</td></tr>
<tr><td colspan="2">Class Ⅰ</td><td>Within ±3% or ±0.3pF, Whichever is larger</td></tr>
<tr><td rowspan="3">Class Ⅱ</td><td>A(X5R)/ B(X7R)</td><td>Within ±12.5%</td></tr>
<tr><td>X(X6S)</td><td>Within ±25%</td></tr>
<tr><td>F(Y5V)</td><td>Within ±30%
Within +30~ −40%
* In case of Table 2</td></tr>
<tr><td>Q
(Class Ⅰ)</td><td colspan="3">Capacitance ≥30pF : Q ≥ 350
10≤ Capacitance <30 pF : Q ≥ 275 + 2.5×C
Capacitance < 10pF :Q ≥200 +10×C (C: Capacitance)</td></tr>
<tr><td>Tan δ
(Class Ⅱ)</td><td colspan="3">1. Characteristic : A(X5R), B(X7R)
0.05max (16V and over)
0.075max (10V)
0.075max (6.3V except Table 1)
0.125max* (refer to Table 1)

2. Characteristic : F(Y5V)
0.075max (25V and over)
0.1max(16V, C<1.0μF)
0.125max(16V, C≥1.0μF)
0.15max (10V)
0.195max (6.3V)

X(X6S) 0.11max (6.3V and below)</td></tr>
<tr><td>Insulation Resistance</td><td colspan="3">1,000 MΩ or 50MΩ·μF whichever is smaller.</td></tr>
<tr><td rowspan="8">16</td><td rowspan="8">Temperature Cycle</td><td>Appearance</td><td colspan="3">No mechanical damage shall occur.</td><td rowspan="8">Capacitor shall be subjected to 5 cycles.
Condition for 1 cycle :
<table><tr><th>Step</th><th>Temp.(℃)</th><th>Time(min.)</th></tr><tr><td>1</td><td>Min. operating temp.+0/-3</td><td>30</td></tr><tr><td>2</td><td>25</td><td>2~3</td></tr><tr><td>3</td><td>Max. operating temp.+3/-0</td><td>30</td></tr><tr><td>4</td><td>25</td><td>2~3</td></tr></table>Leave the capacitor in ambient condition for specified time* before measurement
* 24 ± 2 hours (Class Ⅰ)
48 ± 4 hours (Class Ⅱ)</td></tr>
<tr><td rowspan="4">Capacitance</td><td colspan="2">Characteristics</td><td>Capacitance Change</td></tr>
<tr><td colspan="2">Class Ⅰ</td><td>Within ±2.5% or ±0.25pF Whichever is larger</td></tr>
<tr><td rowspan="3">Class Ⅱ</td><td>A(X5R)/ B(X7R)/</td><td>Within ±7.5%</td></tr>
<tr><td>X(X6S)</td><td>Within ±15%</td></tr>
<tr><td>F(Y5V)</td><td>Within ±20%</td></tr>
<tr><td>Q
(Class Ⅰ)</td><td colspan="3">Within the specified initial value</td></tr>
<tr><td>Tan δ
(Class Ⅱ)</td><td colspan="3">Within the specified initial value</td></tr>
<tr><td>Insulation Resistance</td><td colspan="3">Within the specified initial value</td></tr>
</table>

测试条件

	Recommended Soldering Method					
		Size inch (mm)	Temperature Characteristic	Capacitance	Condition	
					Flow	Reflow
17	Recommended Soldering Method By Size & Capacitance	0201 (0603)	-	-	-	○
		0402 (1005)				
		0603 (1608)	Class Ⅰ	-	○	○
			Class Ⅱ	C ＜ 1μF	○	○
				C ≥ 1μF	-	○
		0805 (2012)	Class Ⅰ	-	○	○
			Class Ⅱ	C ＜ 4.7μF	○	○
				C ≥ 4.7μF	-	○
			Array	-	-	○
		1206 (3216)	Class Ⅰ	-	○	○
			Class Ⅱ	C ＜ 10μF	○	○
				C ≥ 10μF	-	○
			Array	-	-	○
		1210 (3225)	-	-	-	○
		1808 (4520)				○
		1812 (4532)				○
		2220 (5750)				○

Note1. Initial Measurement For Class Ⅱ

Perform the heat treatment at 150℃+0/-10℃ for 1 hour. Then Leave the capacitor in ambient condition for 48±4 hours before measurement. Then perform the measurement.

Note2. Latter Measurement

1. CLASS Ⅰ

Leave the capacitor in ambient condition for 24±2 hours before measurement

Then perform the measurement.

2. Class Ⅱ

Perform the heat treatment at 150℃+0/-10℃ for 1 hour. Then Leave the capacitor in ambient condition for 48±4 hours before measurement. Then perform the measurement.

*Table1.

Tan δ	0.125max*
Class Ⅱ A(X5R), B(X7R)	0201 C ≥0.022μF 0402 C ≥0.22μF 0603 C ≥2.2μF 0805 C ≥4.7μF 1206 C ≥10.0μF 1210 C ≥22.0μF 1812 C ≥47.0μF 2220 C ≥100.0μF All Low Profile Capacitors (P.16).

*Table2.

High Temperature Resistance test	
ΔC (Y5V)	+30~－40%
Class Ⅱ F(Y5V)	0402 C ≥0.47μF 0603 C ≥2.2μF 0805 C ≥4.7μF 1206 C ≥10.0μF 1210 C ≥22.0μF 1812 C ≥47.0μF 2220 C ≥100.0μF

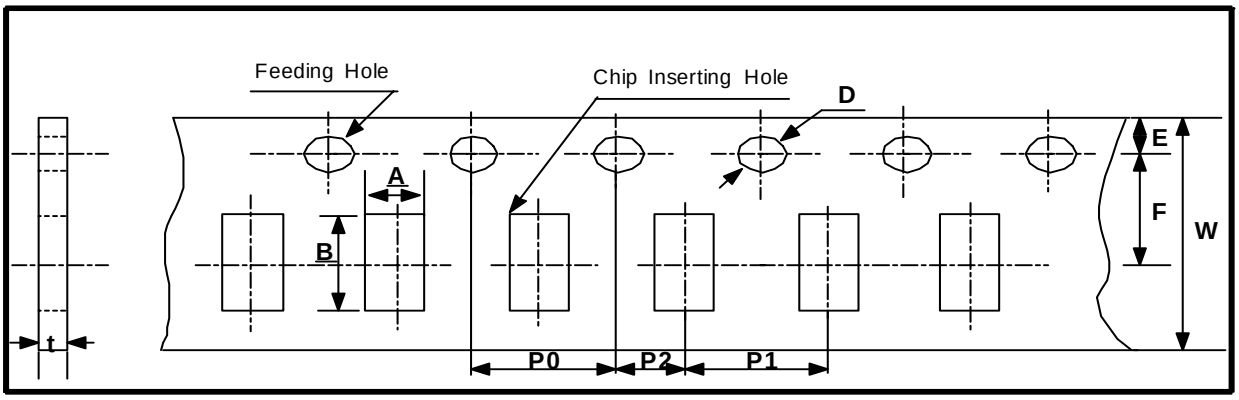
*Table3.

High Temperature Resistance test		
Applied Voltage	100% of the rated voltage	150% of the rated voltage
Class Ⅱ A(X5R), B(X7R), X(X6S), F(Y5V)	0201 C ≥0.1μF 0402 C ≥1.0μF 0603 C ≥4.7μF 0805 C ≥22.0μF 1206 C ≥47.0μF 1210 C ≥100.0μF All Low Profile Capacitors (P.16).	0201 C ≥0.022μF 0402 C ≥0.47μF 0603 C ≥2.2μF 0805 C ≥4.7μF 1206 C ≥10.0μF 1210 C ≥22.0μF 1812 C ≥47.0μF 2220 C ≥100.0μF

Note3. All Size In Reliability Test Condition Section is "inch"

包装

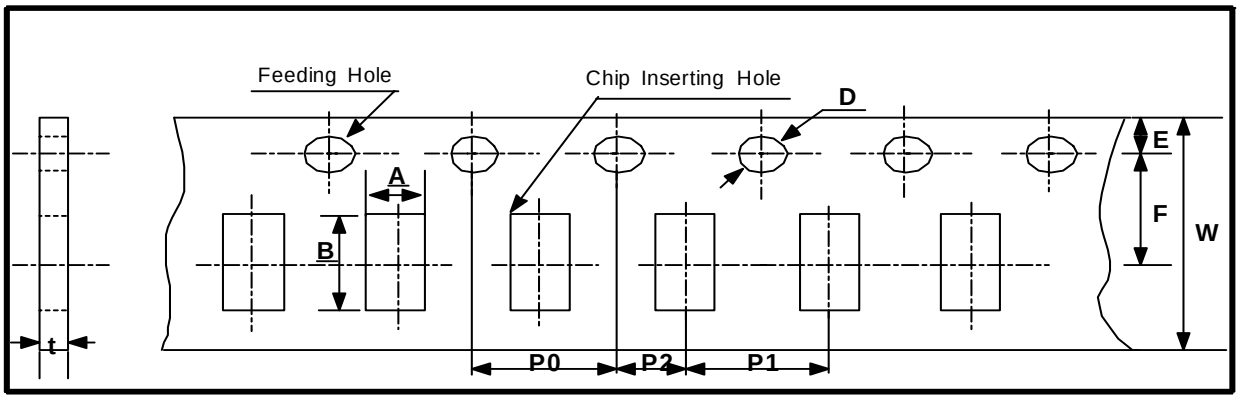
● 纸板纸胶带（4毫米）



unit : mm

Symbol / Type		A	B	W	F	E	P1	P2	P0	D	t
Dimension	0603 (1608)	1.1 ±0.2	1.9 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	Φ1.5 +0.1/-0	1.1 Below
	0805 (2012)	1.6 ±0.2	2.4 ±0.2								
	1206 (3216)	2.0 ±0.2	3.6 ±0.2								

● 纸板纸胶带（2毫米）

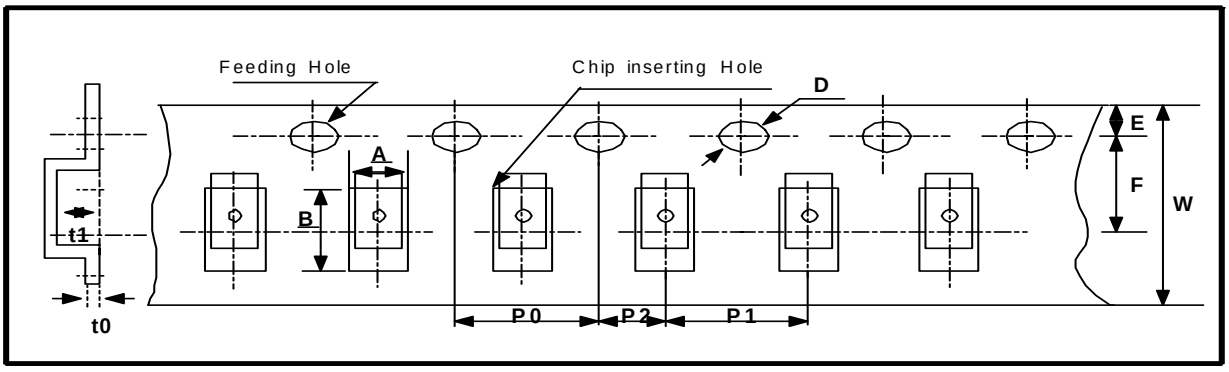


unit : mm

Symbol / Type		A	B	W	F	E	P1	P2	P0	D	t
Dimension	0201 (0603)	0.38 ±0.03	0.68 ±0.03	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	2.0 ±0.05	2.0 ±0.05	4.0 ±0.1	Φ1.5 +0.1/-0.03	0.37 ±0.03
	0402 (1005)	0.62 ±0.04	1.12 ±0.04								0.6 ±0.05

包装

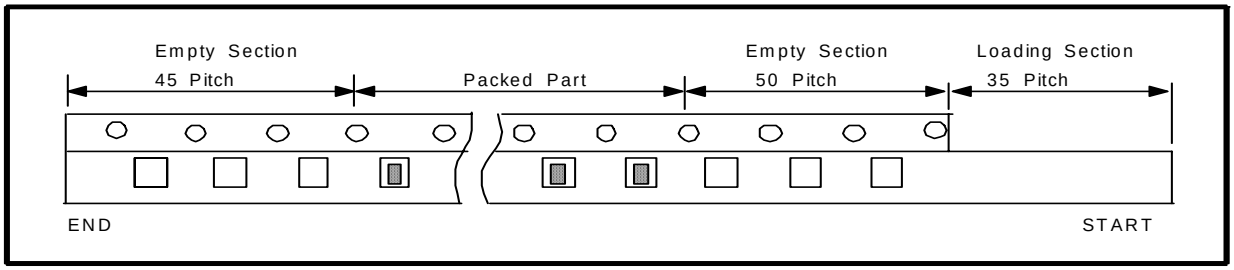
● 压花塑料胶带



unit : mm

Symbol / Type		A	B	W	F	E	P1	P2	P0	D	t1	t0
Dimension	0805 (2012)	1.45 ±0.2	2.3 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	Φ1.5 +0.1/-0	2.5 max	0.6 Below
	1206 (3216)	1.9 ±0.2	3.5 ±0.2									
	1210 (3225)	2.9 ±0.2	3.7 ±0.2									
	1808 (4520)	2.3 ±0.2	4.9 ±0.2	12.0 ±0.3	5.60 ±0.05		8.0 ±0.1				3.8 max	
	1812 (4532)	3.6 ±0.2	4.9 ±0.2									
	2220 (5750)	5.5 ±0.2	6.2 ±0.2									

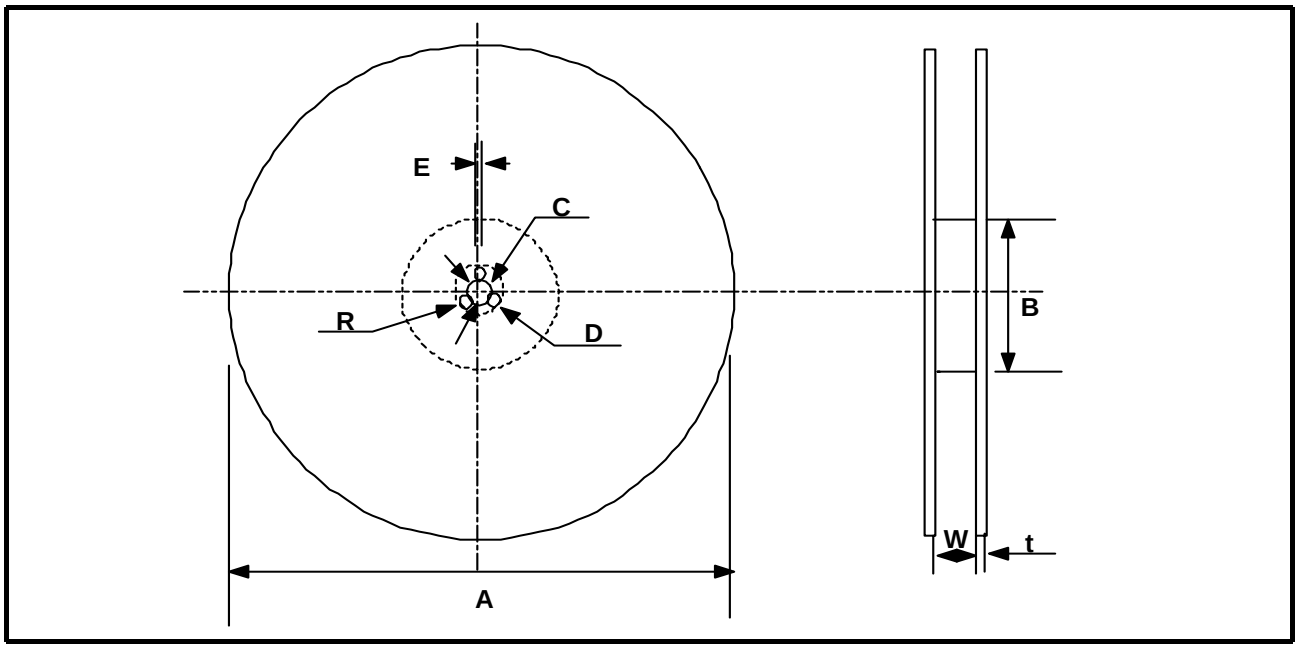
● 编带尺寸



Type	Symbol	Size	Cardboard Paper Tape	Symbol	Size	Embossed Plastic Tape
7" Reel	C	0201(0603)	10,000	E	All Size ≤3216 1210(3225),1808(4520) (t≤1.6mm)	2,000
		0402(1005)	10,000		1210(3225)(t≥2.0mm)	1,000
		OTHERS	4,000		1808(4520)(t≥2.0mm)	1,000
10" Reel	O	-	10,000	-	-	-
13" Reel	D	0402(1005)	50,000	F	All Size ≤3216 1210(3225),1808(4520) (t<1.6mm)	10,000
		OTHERS	10,000		1210(3225)(1.6≤t<2.0mm) 1206(3216)(1.6≤t)	8,000
	L	0603(1608)	10,000 or 15,000		1210(3225),1808(4520) (t≥2.0mm)	4,000
		0805(2012) (t≤0.85mm)	15,000 or 10,000(Option)		1812(4532)(t≤2.0mm)	4,000
		1206(3216) (t≤0.85mm)	10,000		1812(4532)(t>2.0mm) 5750(2220)	2,000

包装

● 卷轴尺寸



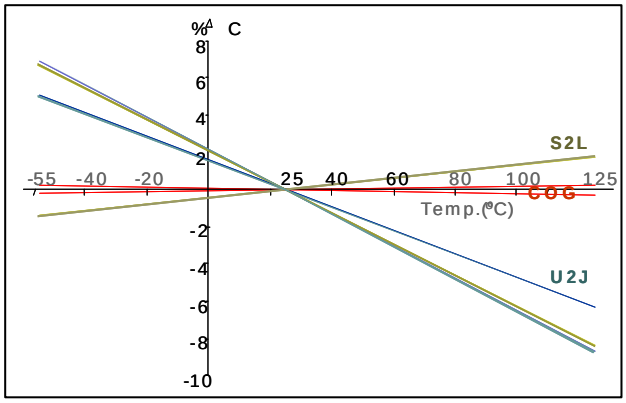
unit ： mm

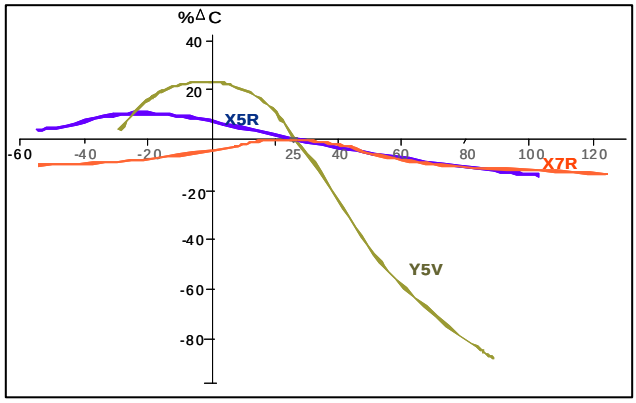
Symbol	A	B	C	D	E	W	t	R
7" Reel	ϕ180+0/ -3	ϕ60+1/ -3	ϕ13±0.3	25±0.5	2.0±0.5	9±1.5	1.2±0.2	1.0
13" Reel	ϕ330±2.0	ϕ80+1/ -3					2.2±0.2	

应用手册

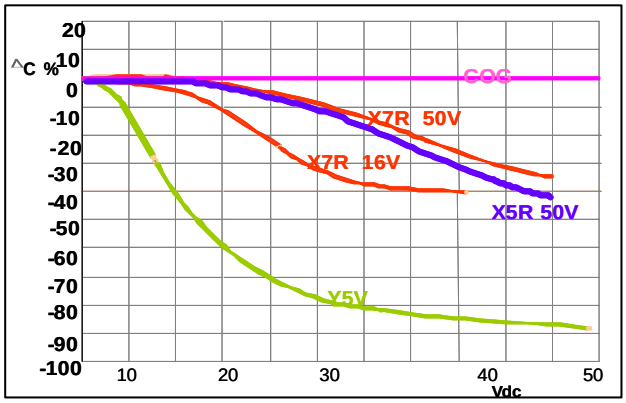
● 电气特性

▶电容温度特性

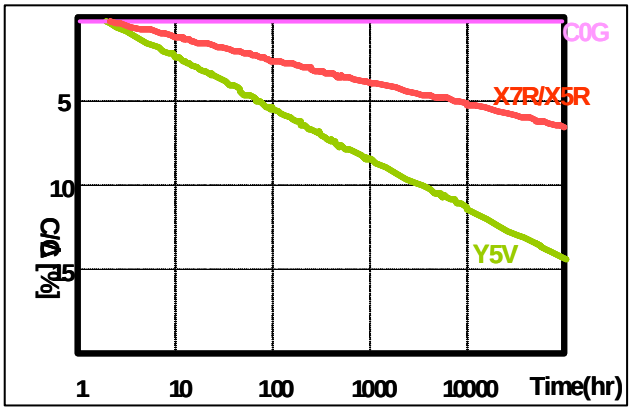




▶电容直流电压特性



▶电容变化老化



▶阻抗频率特性