SPECIFICATION FOR APPROVAL

MULTILAYER CERAMIC CHIP CAPACITOR

☐ **STANDARD TYPE MLCC**
☐ **ARRAY TYPE MLCC**
☐ **HIGH VOLTAGE TYPE MLCC**

CONTENTS

MULTILAYER CERAMIC CHIP CAPACITOR

********** STANDARD TYPE MLCC **********

FEATURES

- Nickel barrier end terminations to improve solderability.
- Multilayer block structure provides higher reliability.
- A wide range of capacitance values available in standard case sizes.

APPLICATIONS

. General electronic devices.

1. Product Identification

M	0603	N	101	J	050	T	A	X
1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9

1-1. **M** **UWA Standard Type MLCC**

1-2. **0603** **Size**

Code	EIA Code	Length * Width mm / (inch)
0201	0201	0.60 * 0.30 / (0.024 * 0.012)
0402	0402	1.00 * 0.50 / (0.04 * 0.02)
0603	0603	1.60 * 0.80 / (0.06 * 0.03)
0805	0805	2.00 * 1.25 / (0.08 * 0.05)
1206	1206	3.20 * 1.60 / (0.12 * 0.06)
1210	1210	3.20 * 2.50 / (0.12 * 0.10)
1812	1812	4.50 * 3.20 / (0.18 * 0.12)
2220	2220	5.70 * 5.00 / (0.22 * 0.20)

1-3. **N** **Temperature Characteristic**

Code	Temperature Characteristic	Capacitance Change	Operation Temperature Range
N	NPO	±30 ppm	-55℃ ~ +125℃
X	X7R	±15 %	-55℃ ~ +125℃
Y	Y5V	+22 ~ -82 %	-30℃ ~ + 85℃
B	X5R	±15 %	-55℃ ~ + 85℃
S	X6S	±22 %	-55℃ ~ + 105℃
R	X5S	±22 %	-55℃ ~ + 85℃
E	Y5U	+22 ~ -56 %	-30℃ ~ + 85℃
Z	Z5U	+22 ~ -56 %	+10℃ ~ + 85℃

1-4. **101** **Capacitance**

Code	Capacitance (pF)	Code	Capacitance (pF)
0R5	0.5	101	100
010	1	104	100,000 (100nF)
100	10	106	10,000,000 (10uF)

1-5. **J** **Capacitance Tolerance**

Code	Tolerance	Nominal Capacitance
B	± 0.1 pF	≦ 10 pF
C	± 0.25 pF	
D	± 0.5 pF	
F	± 1 %	≧ 10 pF
G	± 2 %	
H	± 3 %	
J	± 5 %	
K	± 10 %	
M	± 20 %	
Z	- 20 % ~ + 80 %	

1-6. **050** **Rated Voltage**

Code	Rated Voltage	Code	Rated Voltage
006	6.3V	025	25V
010	10V	050	50V
016	16V		

1-7. **T** **Quantity** (Unit : pcs)

Code	A	B	T	U	V	W	X	Y	Z			
7〃	15K	10K	4K	3K	2.5K	2K	1K	700	500			
Code	F	G	H	I	J	Code	L	M	N	R	P	Q
13〃	50K	15K	10K	4K	2K	Bulk	5K	10K	20K	50K	100K	200K

1-8. **A** **Thickness** (Unit : mm)

Code	P	K	V	T	A	D	E	F
Thickness	0.3±0.03	0.45±0.05	0.5±0.05	0.7±0.1	0.8±0.1	0.85±0.1	1.0±0.1	1.15±0.1
Code	G	H	L	N	Y	M	U	
Thickness	1.25±0.2	1.5±0.2	1.6±0.2	1.9±0.2	2.0±0.2	2.5±0.2	3.2±0.3	

1-9. **N** **Material Option**

Code	Description Of The Code
N	Sn – Pb Plating (Sn 90% , Pb 10%)
X	Pb – Free Plating (Sn 100%)

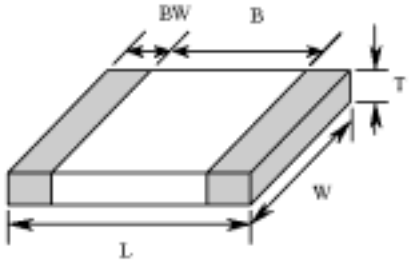
2.Standard Combination of Nominal Capacitance and Tolerance

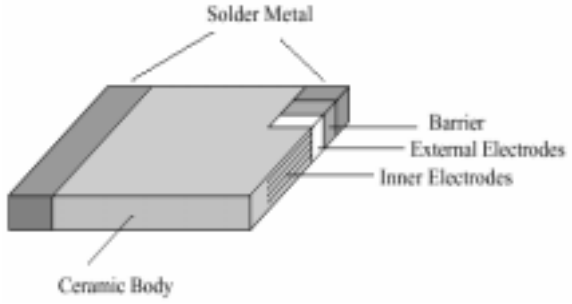
Class	Temperature Characteristic	Tolerance		Nominal Capacitance
Class I	NPO	Less Than 10pF	B(±0.10 pF)	0.5,1,1.5,2,2.5,3
			C(±0.25 pF)	0.5,1,1.5,2,2.5,3,3.5,4,4.5,5
			D(±0.50 pF)	5,6,7,8,9,10
			F(±1.00 pF)	6,7,8,9,10
		More Than 10pF	J(±5%)	E-24 series
			B(±10%)	
Class II	X7R / X5R X5S / X6S	K(±10%) , M(±20%)		E-12 series
	Y5V	M(±20%) , Z(-20 ~ +80%)		E- 6 series
	Y5U			
	Z5U			

	Application Capacitance											
E-3	1.0				2.2				4.7			
E-6	1.0		1.5		2.2		3.3		4.7		6.8	
E-12	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
E-24	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
	1.1	1.3	1.6	2.0	2.4	3.0	3.6	4.3	5.1	6.2	7.5	9.1

3. Dimension & Structure (Unit : mm)

Code	L	W	T(max)	Bw
0201	0.60±0.03	0.30±0.03	0.33	0.15±0.05
0402	1.00±0.05	0.50±0.05	0.55	0.25±0.10
0603	1.60±0.10	0.80±0.10	0.95	0.35±0.15
0805	2.00±0.20	1.25±0.20	1.40	0.45±0.25
1206	3.20±0.30	1.60±0.20	1.80	0.50±0.20
1210	3.20±0.30	2.50±0.20	2.70	0.60±0.30
1812	4.50±0.40	3.20±0.30	3.30	0.80±0.40
2220	5.70±0.40	5.00±0.40	3.00	1.00±0.50



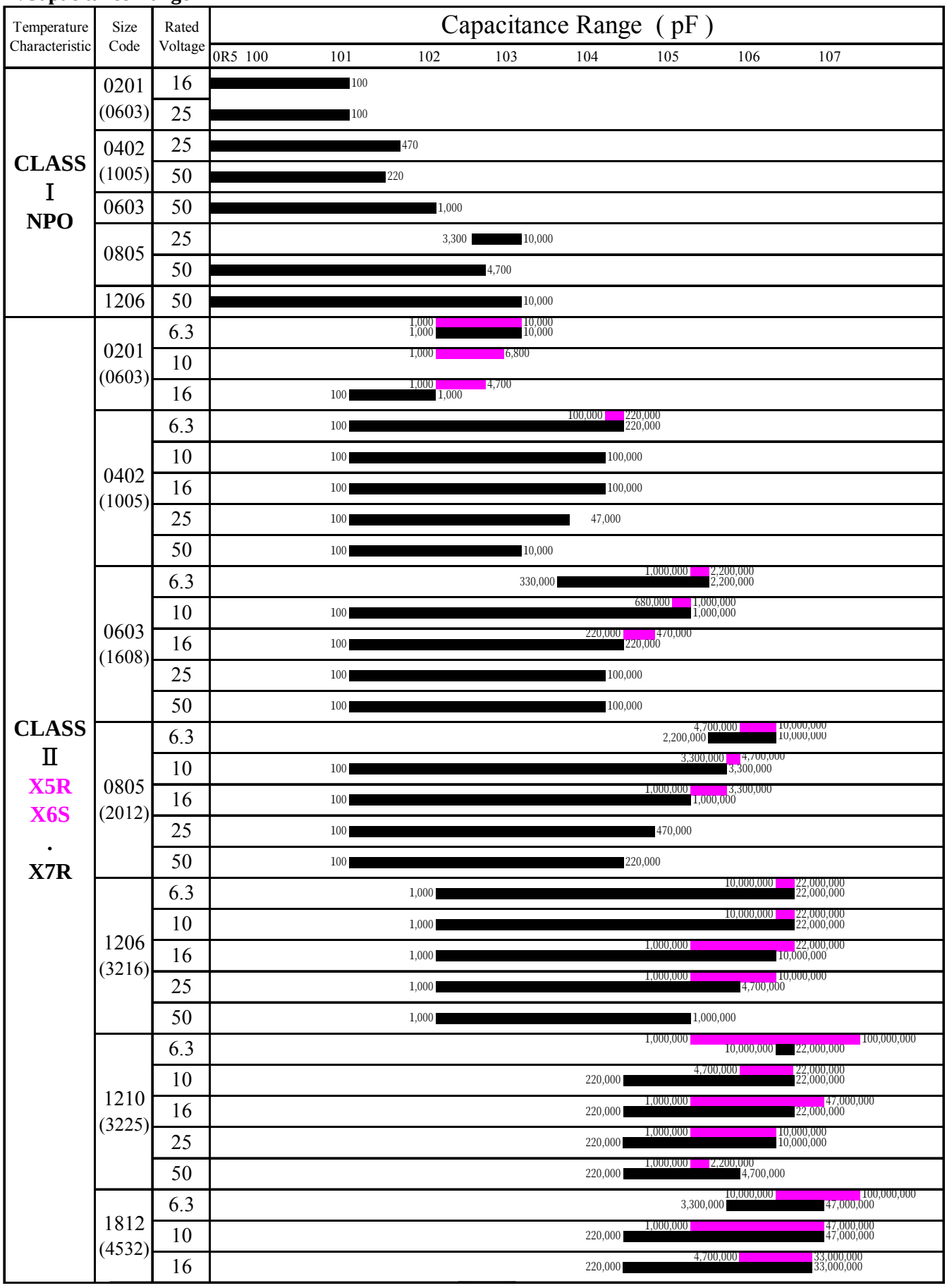


MULTILAYER CERAMIC CHIP CAPACITOR

Low Profile MLCC Thickness

Cap	Code	0603			0805										1206							1210					
uF	T.C.	X5R		Y5V	X7R				X5R			Y5V			X7R	X5R				Y5V		X7R		X5R		Y5U	X5S
	VDC	6.3	4	6.3	50	25	16	10	16	10	6.3	50	10	6.3	10	25	16	10	6.3	10	6.3	25	10	10	6.3	6.3	6.3
0.022	223				D																						
0.033	333				D																						
0.047	473					D																					
0.068	683					D																					
0.082	823																										
0.10	104																										
0.15	154														D												
0.22	224									K		D															
0.33	334																										
0.47	474	K					D																				
0.68	684						D																				
1	105	K		K				D	D							D							D				
1.5	155								D								D										
2.2	225								D	D			D		D		D										
3.3	335		V															D						D			
4.7	475									D	D			D				D		D				D			
6.8	685																								D		
10	106										D							D	D		D		D	D			
22	226																								N		
47	476																										
82	826																									N	
100	107																										N

4.Capacitance Range



MULTILAYER CERAMIC CHIP CAPACITOR

Temperature Characteristic	Size Code	Rated Voltage	Capacitance Range (pF)
			0R5 100 101 102 103 104 105 106 107
CLASS Ⅱ X5R X7R	1812 (4532)	25	220,000 – 22,000,000 (1,000,000)
		50	220,000 – 4,700,000 (1,000,000)
	2220 (5755)	6.3	10,000,000 – 100,000,000 (47,000,000)
		10	10,000,000 – 47,000,000 (100,000,000)
		16	10,000,000 – 22,000,000 (33,000,000)
		25	4,700,000 – 10,000,000 (22,000,000)
		50	100,000 – 4,700,000
CLASS Ⅱ Y5V	0402 (1005)	16	2,200 – 220,000
		25	2,200 – 47,000
		50	2,200 – 10,000
	0603 (1608)	6.3	1,000,000 – 2,200,000
		10	2,200 – 1,000,000
		16	2,200 – 1,000,000
		25	2,200 – 330,000
		50	2,200 – 100,000
	0805 (2012)	6.3	4,700,000 – 10,000,000
		10	4,700,000 – 10,000,000
		16	10,000 – 4,700,000
		25	10,000 – 2,200,000
		50	10,000 – 1,000,000
	1206 (3216)	10	100,000 – 22,000,000
		16	10,000 – 10,000,000
		25	10,000 – 4,700,000
		50	10,000 – 1,000,000
	1210 (3225)	6.3	22,000,000 – 47,000,000
		10	10,000,000 – 22,000,000
		16	220,000 – 22,000,000
		25	220,000 – 10,000,000
		50	220,000 – 4,700,000
	1812 (4532)	6.3	47,000,000 – 100,000,000
		10	10,000,000 – 47,000,000
		16	10,000,000 – 22,000,000
		25	4,700,000 – 10,000,000
	2220 (5755)	10	100,000,000 – 100,000,000
		16	10,000,000 – 47,000,000
		25	10,000,000 – 33,000,000
		50	4,700,000 – 10,000,000

MULTILAYER CERAMIC CHIP CAPACITOR

********** ARRAY TYPE MLCC **********

FEATURES

. Reduction in required real estate (more than 50%).
. Reduced Cost,Space and Time for placement on PCB ,reduction in number of solder joints..
. Easier PCB design , reduced waste from tape and reel packaging process.
. It protect EMI bypassing digital signal line noise..

APPLICATIONS

. Mother board , Notebook , Electronic device etc…..

1.Product Identification

MA	6	N	1H	100	K	T	A	X
1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9

1-1. **MA** **UWA Capacitor Array Type MLCC**

1-2. **6** **Size**

Code	EIA Code	Length * Width mm / (inch)
5	0805	2.00 * 1.20 / (0.08 * 0.05)
6	1206	3.20 * 1.60 / (0.12 * 0.06)

1-3. **N** **Temperature Characteristic**

Code	Temperature Characteristic	Operation Temperature Range
N	NPO	-55℃ ~ +125℃
X	X7R	-55℃ ~ +125℃
Y	Y5V	-30℃ ~ + 85℃

1-4. **1H** **Rated Voltage**

Code	Rated Voltage
1C	16V
1E	25V
1H	50V

1-5. **100** **Capacitance**

Code	Capacitance (pF)	Code	Capacitance (pF)
0R5	0.5	101	100
010	1	102	1,000 (1nF)
100	10	104	100,000 (100nF)

1-6. **K** **Capacitance Tolerance**

Code	Tolerance
K	± 10 %
M	± 20 %
Z	- 20 % ~ + 80 %

1-7. **T** **Quantity** (Unit : pcs)

Code	A	B	T	U	V	W	X	Y	Z
7〃	15K	10K	4K	3K	2.5K	2K	1K	700	500

1-8. **A** **Thickness** (Unit : mm)

Code	T	D	E	F	G	L
Thickness	0.7±0.1	0.85±0.1	1.0±0.1	1.15±0.1	1.25±0.2	1.6±0.2

1-9. **N** **Material Option**

Code	Description Of The Code
N	Sn – Pb Plating (Sn 90% , Pb 10%)
X	Pb – Free Plating (Sn 100%)

2.Standard Combination of Nominal Capacitance and Tolerance

Class	Temperature Characteristic	Tolerance		Nominal Capacitance
Class I	NPO	More Than 10pF	J(±5 %)	E-24 series
			K(±10 %)	
Class II	X7R	K(±10.0 %) , M(±20 %)		E-12 series
	Y5V	M(±20.0 %) , Z(-20 ~ +80%)		E- 6 series

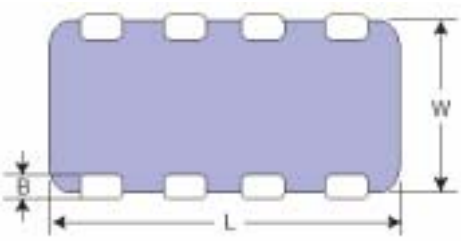
Application Capacitance

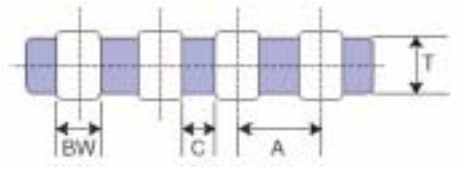
	Application Capacitance											
E-3	1.0				2.2				4.7			
E-6	1.0		1.5		2.2		3.3		4.7		6.8	
E-12	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
E-24	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
	1.1	1.3	1.6	2.0	2.4	3.0	3.6	4.3	5.1	6.2	7.5	9.1

3.Dimension & Structure

(Unit : mm)

Code	L	W	T)	B	Bw	A	C
0805	2.00±0.15	1.25±0.15	1.0 max	0.25±0.1	0.25±0.1	0.5±0.1	0.25±0.1
1206	3.20±0.20	1.60±0.20	1.35 max	0.3±0.2	0.40±0.2	0.8±0.1	0.40±0.2





4.Capacitance Range

Temperature Characteristic	Size Code	Rated Voltage	Capacitance Range (pF)
			0R5 100 101 102 103 104 105 106 107
NPO	**(0805) 1206 4 CAP**	50V	470
X7R		16V	470 100,000
		25V	470 47,000
		50V	470 22,000
Y5V		16V	10,000 220,000
		25V	10,000 220,000
		50V	10,000 47,000

MULTILAYER CERAMIC CHIP CAPACITOR

********** HIGH VOLTAGE TYPE MLCC **********

FEATURES

. Small case size with high rated voltage , ranging voltage from 100V to 6000V.
. These device are compliant with TUV.

APPLICATIONS

. General telephone exechange.
. Wireless and telecommunication.
. Power device.

1.Product Identification

MH	1812	X	102	K	302	X	G	X
1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9

1-1. **MH** **UWA High Voltage Type MLCC**

1-2. **1812** **Size**

Code	EIA Code	Length * Width mm / (inch)
0603	0603	1.60 * 0.80 / (0.06 * 0.03)
0805	0805	2.00 * 1.25 / (0.08 * 0.05)
1206	1206	3.20 * 1.60 / (0.12 * 0.06)
1210	1210	3.20 * 2.50 / (0.12 * 0.10)
1808	1808	4.50 * 2.00 / (0.18 * 0.08)
1812	1812	4.50 * 3.20 / (0.18 * 0.12)
2220	2220	5.70 * 5.00 / (0.22 * 0.20)

1-3. **X** **Temperature Characteristic**

Code	Temperature Characteristic	Operation Temperature Range
N	NPO	-55℃ ~ +125℃
X	X7R	-55℃ ~ +125℃
Y	Y5V	-30℃ ~ + 85℃
B	X5R	-55℃ ~ + 85℃
E	Y5U	-30℃ ~ + 85℃
Z	Z5U	+10℃ ~ + 85℃

1-4. **102** **Capacitance**

Code	Capacitance (pF)	Code	Capacitance (pF)
0R5	0.5	101	100
010	1	102	1,000 (1nF)
100	10	103	10,000 (10nF)

1-5. **K** **Capacitance Tolerance**

Code	Tolerance	Nominal Capacitance
B	± 0.1 pF	≦ 10 pF
C	± 0.25 pF	
D	± 0.5 pF	
F	± 1 %	≧ 10 pF
G	± 2 %	
H	± 3 %	
J	± 5 %	
K	± 10 %	
M	± 20 %	
Z	- 20% ~ + 80 %	

1-6. **302** **Rated Voltage**

Code	Rated Voltage	Code	Rated Voltage
101	100V	202	2000V
201	200V	302	3000V
251	250V	402	4000V
501	500V	502	5000V
102	1000V	602	6000V

1-7. **X** **Quantity** (Unit : pcs)

Code	A	B	T	U	V	W	X	Y	Z			
7〃	15K	10K	4K	3K	2.5K	2K	1K	700	500			
Code	F	G	H	I	J	Code	L	M	N	R	P	Q
13〃	50K	15K	10K	4K	2K	Bulk	5K	10K	20K	50K	100K	200K

1-8. **G** **Thickness** (Unit : mm)

Code	T	A	D	E	F	G
Thickness	0.7±0.1	0.8±0.1	0.85±0.1	1.0±0.1	1.15±0.1	1.25±0.2
Code	H	L	N	Y	M	U
Thickness	1.5±0.2	1.6±0.2	1.9±0.2	2.0±0.2	2.5±0.2	3.2±0.3

1-9. **N** **Material Option**

Code	Description Of The Code
N	Sn – Pb Plating (Sn 90% , Pb 10%)
X	Pb – Free Plating (Sn 100%)

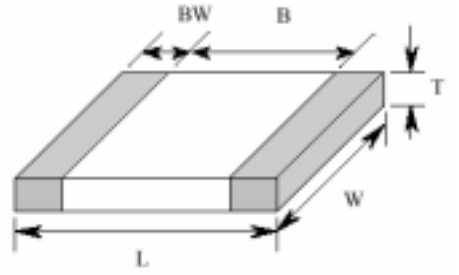
2.Standard Combination of Nominal Capacitance and Tolerance

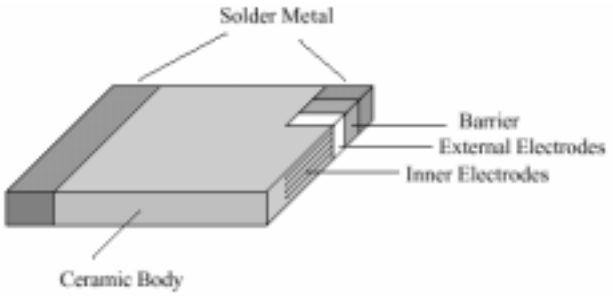
Class	Temperature Characteristic	Tolerance		Nominal Capacitance
Class I	NPO	Less Than 10pF	B(±0.10 pF)	0.5,1,1.5,2,2.5,3
			C(±0.25 pF)	0.5,1,1.5,2,2.5,3,3.5,4,4.5,5
			D(±0.50 pF)	5,6,7,8,9,10
			F(±1.00 pF)	6,7,8,9,10
		More Than 10pF	J(±5%)	E-24 series
			B(±10%)	
Class II	X7R / X5R	K(±10%) , M(±20%)		E-12 series
	Y5V	M(±20%) , Z(-20 ~ +80%)		E- 6 series
	Y5U			
	Z5U			

	Application Capacitance											
E-3	1.0				2.2				4.7			
E-6	1.0		1.5		2.2		3.3		4.7		6.8	
E-12	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
E-24	1.0	1.2	1.5	1.8	2.2	2.7	3.3	3.9	4.7	5.6	6.8	8.2
	1.1	1.3	1.6	2.0	2.4	3.0	3.6	4.3	5.1	6.2	7.5	9.1

3. Dimension & Structure (Unit : mm)

Code	L	W	T(max)	Bw
0603	1.60±0.10	0.80±0.10	0.95	0.35±0.15
0805	2.00±0.20	1.25±0.20	1.40	0.45±0.25
1206	3.20±0.30	1.60±0.20	1.80	0.50±0.20
1210	3.20±0.30	2.50±0.20	2.70	0.60±0.30
1808	4.50±0.40	2.00±0.30	2.20	0.80±0.40
1812	4.50±0.40	3.20±0.30	3.30	0.80±0.40
2220	5.70±0.40	5.00±0.40	3.00	1.00±0.50

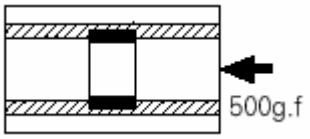


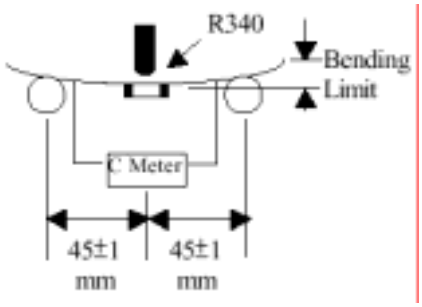


4.Capacitance Range

Temperature Characteristic	Size Code	Rated Voltage	Capacitance Range (pF) 0R5 050 100 101 102 103 104 105 106 107
CLASS I NPO	0603	100	680
	0805 (2012)	100	1,200
		250	1,000
		500	470
	1206 (3216)	250	22 – 4,700
		500	22 – 2,200
		1000	10 – 560
		2000	10 – 470
		3000	56
	1210 (3225)	250	470 – 6,800
		500	330 – 2,700
		1000	100 – 1,000
		2000	33 – 470
		3000	33 – 100
	1808 (4520)	1000	5 – 2,200
		2000	5 – 1,000
		3000	5 – 330
		4000	5 – 220
	1812 (4532)	1000	5 – 4,700
		2000	5 – 3,300
		3000	5 – 1,500
		4000	5 – 220
	2220	6000	33
CLASS II X7R	0603	100	100 – 4,700
	0805 (2012)	100	100 – 33,000
		250	100 – 22,000
		500	100 – 7,500
	1206 (3216)	100	680 – 220,000
		250	680 – 100,000
		500	680 – 47,000
		1000	680 – 10,000
		2000	180 – 4,700
		3000	680 – 2,200
	1210 (3225)	100	1,000 – 470,000
		250	1,000 – 220,000
		500	1,000 – 100,000
		1000	680 – 10,000
		2000	680 – 6,800
	1808 (4520)	500	2,200 – 680,000
		1000	2,700 – 22,000
		2000	120 – 6,200
		3000	120 – 3,300
		4000	120 – 3,300
	1812 (4532)	100V	10,000 – 1,000,000
		250V	10,000 – 470,000
		500V	5,600 – 160,000
		1000V	470 – 47,000
		2000V	470 – 22,000
		3000V	150 – 4,700
	2220 (5750)	1000V	3,300 – 82,000
		2000V	2,200 – 47,000
		3000V	1,200 – 9,100

5.Reliability And Test Conditions

<table>
<tr><th>No</th><th>Test Item</th><th>Specifications</th><th>Test Conditions</th></tr>
<tr><td rowspan="5">1</td><td rowspan="5">Capacitance
Class I
NPO</td><td rowspan="5">Within The Specified Tolerance</td><td>Capacitance | Frequency | Signal Voltage</td></tr>
<tr><td>C≦1000 pF | 1MHz ± 10% | 1.0 ± 0.2Vrms</td></tr>
<tr><td>C＞1000 pF | 1KHz ± 10% | 1.0 ± 0.2Vrms</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="5">Capacitance
Class II</td><td rowspan="5">Within The Specified Tolerance</td><td>Capacitance | Temp.Char. | Frequency | Rated Voltage</td></tr>
<tr><td>C≦22uF | X7R / X5R X6S / X5S | 1KHz ± 10% | 1.0 ± 0.2Vrms</td></tr>
<tr><td>C≦22uF | X7R / X5R X6S / X5S | 1KHz ± 10% | 1.0 ± 0.2Vrms</td></tr>
<tr><td>C≦22uF | Y5V | 1KHz ± 10% | 0.5 ± 0.2Vrms</td></tr>
<tr><td>C＞22uF | 120HZ ± 20% | 0.5 ± 0.1Vrms</td></tr>
<tr><td rowspan="20">2</td><td rowspan="3">Q
Class I
NPO</td><td rowspan="3">C＞30 pF : Q≧1000
C≦30 pF : Q≧400+20×C
(C:Capacitance , pF)</td><td>Capacitance | Frequency | Signal Voltage</td></tr>
<tr><td>C≦1000 pF | 1MHz ± 10% | 1.0 ± 0.2Vrms</td></tr>
<tr><td>C＞1000 pF | 1KHz ± 10% | 1.0 ± 0.2Vrms</td></tr>
<tr><td rowspan="20">Tan δ
(D.F.)
Class II</td><td colspan="2">Temp.Char. | HI-V | 50V | 25V | 16V | 10V | 6.3V</td><td>Capacitance | Temp.Char. | Frequency | Signal Voltage</td></tr>
<tr><td colspan="2">X7R / X5R X6S / X5S | 2.5% | 2.5% | 3.5% | 3.5% | 5% | 5%</td><td>C≦22uF | X7R / X5R X6S / X5S | 1KHz ± 10% | 1.0 ± 0.2Vrms</td></tr>
<tr><td colspan="2">Y5V | 5% | 5% | 5% | 9% | 12.5% | 16%</td><td>Y5V | 1KHz ± 10% | 1.0 ± 0.2Vrms</td></tr>
<tr><td colspan="2">ALL</td><td>C＞22uF | 120Hz ± 10% | 0.5 ± 0.1Vrms</td></tr>
<tr><td colspan="3">Special Parts</td></tr>
<tr><td colspan="3">X7R / X5R / X6S / X5S</td><td>Y5V</td></tr>
<tr><td>Size | Rated Voltage | Capacitance | Tan δ</td><td>Size | Rated Voltage | Capacitance | Tan δ</td></tr>
<tr><td>0402 | 6.3V | C≧0.22uF | 10% max</td><td>0402 | 16V | C≧220uF | 12.5% max</td></tr>
<tr><td>0603 | | C≧2.2uF | | 0603 | 25~50V | C≧100nF | 7% max</td></tr>
<tr><td>0805 | | C≧4.7uF | | 0805 | 25~50V | C≧330nF | 7% max</td></tr>
<tr><td>1206 | | C≧10uF | | 1206 | 25~50V | C≧1uF | 7% max</td></tr>
<tr><td>1210 | | C≧22uF | | 1210 | 25V | C≧6.8uF | 9% max</td></tr>
<tr><td>1812 | | C≧47uF | | 1812 | 10V | C≧10uF | 16% max</td></tr>
<tr><td>2220 | | C≧100uF | | 2220 | - | - | -</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>(I.R.)
Insulation Resistance</td><td>Rated Voltage≧25V 10,000 MΩ or 500MΩ ÷ uF
Rated Voltage≦16V 10,000 MΩ or 100 MΩ ÷ uF
Product Whichever Is Smaller</td><td>Vr≦500V Applied Voltage:Rated Voltage
Vr≧500V Applied Voltage:500V
Applied Voltage:Rated Voltage
Charge Time : 60 sec.</td></tr>
<tr><td>4</td><td>Withstanding Voltage</td><td>No Dielectric Breakdown or Mechanical Breakdown</td><td>Vr＜100V Class I:300% of The Rated Voltage
Class II:250% of The Rated Voltage
Vr=100V 250% of The Rated Voltage
250V≦Vr＜500V 200% of The Rated Voltage
500V≦Vr＜1KV 150% of The Rated Voltage
Vr≧1KV 120% of The Rated Voltage
For 1~5 sec. Is Applied Less Than 50mA Current</td></tr>
<tr><td>5</td><td>Adhesive Strength Of Termination</td><td>No Indication Of Peeling Shall Occur On The Terminal Electrode.</td><td>A 500g..f Push or Pull Force Shall Be Applied For 10 ± 1 Seconds
 
</td></tr>
</table>

<table>
<tr><td>6</td><td>Resistance To Flexure Of Substrate</td><td colspan="3">No Mechanical Damage Shall Occur.</td><td colspan="2" rowspan="2">Bending Shall Be Applied To The 1.0 mm
With 1.0 mm / sec
 
</td></tr>
<tr><td></td><td></td><td>C-Meter</td><td>Temp. Char.</td><td>Cap. Change.</td></tr>
<tr><td></td><td></td><td></td><td>NPO</td><td>≦± 5 %</td></tr>
<tr><td></td><td></td><td></td><td>X7R / X5R
X6S / X5S</td><td>≦± 12.5 %</td></tr>
<tr><td></td><td></td><td></td><td>Y5V</td><td rowspan="3">≦± 30 %</td></tr>
<tr><td></td><td></td><td></td><td>Y5U</td></tr>
<tr><td></td><td></td><td></td><td>Z5U</td></tr>
<tr><td></td><td></td><td></td><td colspan="2">Chip Array Capacitor</td></tr>
<tr><td></td><td></td><td></td><td>NPO</td><td>≦± 1 %</td></tr>
<tr><td></td><td></td><td></td><td>X7R</td><td rowspan="2">≦± 10 %</td></tr>
<tr><td></td><td></td><td></td><td>Y5V</td></tr>
<tr><td>7</td><td>Vibration</td><td colspan="4">No Mechanical Damage Shall Be Occur</td><td rowspan="5">Vibrate The Capacitor With Amplitude Of 1.5mm P-P Changing The Frequencies From 10Hz to 55Hz And Back To 10Hz In About 1 min.</td></tr>
<tr><td></td><td></td><td>Capacitance</td><td colspan="2">Temp. Char.</td><td>Cap. Change</td></tr>
<tr><td></td><td></td><td></td><td>Class Ⅰ</td><td>NPO</td><td>Within±2.5%Or±0.25pF
Whichever
Is Larger</td></tr>
<tr><td></td><td></td><td></td><td rowspan="2">Class Ⅱ</td><td>X7R / X5R
X6S / X5S</td><td>Within ± 7.5 %</td></tr>
<tr><td></td><td></td><td></td><td>Y5V/Y5U/Z5U</td><td>Within ± 20 %</td></tr>
<tr><td></td><td></td><td>Q
Class Ⅰ</td><td colspan="3">C＞30 pF : Q ≧1000
C≦30 pF : Q ≧400＋20×C</td></tr>
<tr><td></td><td></td><td>Tan δ
Class Ⅱ</td><td colspan="3">To Satisfy The Specified Initial Value</td></tr>
<tr><td></td><td></td><td>Insulation Resistance</td><td colspan="3">To Satisfy The Specified Initial Value</td></tr>
<tr><td>8</td><td>Capacitance Temperatrue Coefficient</td><td>Class I</td><td>Temp.Char.</td><td>Temp. Range</td><td>Cap. Change</td><td rowspan="11">Class I:
$\frac{C2-C1}{C1(T2-T1)} \times 100\%$
Class II :
$\frac{C2-C1}{C1} \times 100\%$
T1:Standard Temperatrue (25°C)
T2:Test Temperature
C1:Capacitance At Standard Temperatrue (25°C)
C2:Capacitance At Test Temperature (T2)</td></tr>
<tr><td></td><td></td><td></td><td>NPO</td><td>-55°C~+125°C</td><td>± 30 ppm / °C</td></tr>
<tr><td></td><td></td><td>Class II</td><td>Temp.Char.</td><td>Temp. Range</td><td>Cap. Change</td></tr>
<tr><td></td><td></td><td></td><td>X7R</td><td>-55°C~+125°C</td><td>± 15 %</td></tr>
<tr><td></td><td></td><td></td><td>X5R</td><td>-55°C~+85°C</td><td>± 15 %</td></tr>
<tr><td></td><td></td><td></td><td>X5S</td><td>-55°C~+85°C</td><td>± 22 %</td></tr>
<tr><td></td><td></td><td></td><td>X6S</td><td>-55°C~+105°C</td><td>± 22 %</td></tr>
<tr><td></td><td></td><td></td><td>Y5V</td><td>-30°C~+85°C</td><td>+ 22 % ~ - 82 %</td></tr>
<tr><td></td><td></td><td></td><td>Y5U</td><td>-30°C~+85°C</td><td>+ 22 % ~ - 56 %</td></tr>
<tr><td></td><td></td><td></td><td>Z5U</td><td>+10°C~+85°C</td><td>+ 22 % ~ - 56 %</td></tr>
</table>

<table>
<tr><td>9</td><td>Solderability</td><td colspan="4">More Than 75% of The Terminal
Surface Is To Be Soldered Newly,
So Metal Part Does Not Come Out Or Dissolve</td><td>Sn / Pb :
Solder Temperature : 230 ± 5 °C
Dip Time : 3 ± 1 sec.
Solder : H63A
Flux : RMA Type
Preheat : At 80~120 °C For 10~30 sec.
Pb Free :
Solder Temperature : 250 ± 5 °C
Dip Time : 3 ±1 sec.
Solder : H63A
Flux : RMA Type
Preheat : At 80~120 °C For 10~30 sec.
Hand Soldering :
Solder Temperature : Sn/Pb 230 ~ 280 °C .
Pb Free 250 ~ 300°C
Use a 20W Soldering Iron And The Soldering Irom Should Not Directly Touch Capacitor.</td></tr>
<tr><td>10</td><td>Resistance To Soldering Heat</td><td colspan="4">No Mechanical Damage Shall Be Occur</td><td rowspan="7">Class II capacitor shall be set for 48 ± 4 hours at room temperature after one hour heat treatment at 150+0/-10 °C
before initial measure.

Preheat : At 150±10°C For 60~120sec.
Dip : Solder Temperatrue of 270±5°C
Dip Time : 10±1sec.
Solder : H63A
Flux : Rosin

Measure At Room Temp. After Cooling For:
Class I : 24 ± 2 Hours
Class II : 48 ± 4 Hours</td></tr>
<tr><td rowspan="4">Capacitance</td><td colspan="2">Temp. Char.</td><td>Cap. Change</td></tr>
<tr><td>Class I</td><td>NPO</td><td>Within±2.5%Or±2.5pF Whichever Is Larger</td></tr>
<tr><td rowspan="2">Class II</td><td>X7R / X5R
X6S / X5S</td><td>Within ± 10 %</td></tr>
<tr><td>Y5V/Y5U/Z5U</td><td>Within ± 20 %</td></tr>
<tr><td>Q
Class I</td><td colspan="3">C＞30 pF : Q≧1000
C≦30 pF : Q≧400+20×C</td></tr>
<tr><td>Tanδ
Class II</td><td colspan="3">To Satisfy The Specified Initial Value</td></tr>
<tr><td>Insulation Resistance</td><td colspan="3">To Satisfy The Specified Initial Value</td></tr>
<tr><td>Withstand Voltage</td><td colspan="3">To Satisfy The Specified Initial Value</td></tr>
<tr><td rowspan="8">11</td><td rowspan="8">Temperature Cycle</td><td></td><td colspan="3">No Mechanical Damage Shall Be Occur</td><td rowspan="8">Class II capacitor shall be set for 48 ± 4 hours at room temperature after one hour heat treatment at 150+0/-10 ℃ before initial measure.
Capacitor Shall Be Subjected To Five Cycles Of The Temperature Cycle As Following:
<table><tr><th>Step</th><th>Temp (°C)</th><th>Time(min)</th></tr><tr><td>1</td><td>Min Rated Temp +0/-3</td><td>30</td></tr><tr><td>2</td><td>25</td><td>3</td></tr><tr><td>3</td><td>Max Rated Temp +0/-3</td><td>30</td></tr><tr><td>4</td><td>25</td><td>3</td></tr></table>Measure At Room Temp. After Cooling For:
Class I : 24 ± 2 Hours
Class II : 48 ± 4 Hours</td></tr>
<tr><td rowspan="4">Capacitance</td><td colspan="2">Temp. Char.</td><td>Cap. Change</td></tr>
<tr><td>Class I</td><td>NPO</td><td>Within±2.5%Or±0.25 pF Whichever Is Larger</td></tr>
<tr><td rowspan="2">Class II</td><td>X7R / X5R
X6S / X5S</td><td>Within ± 7.5 %</td></tr>
<tr><td>Y5V/Y5U/Z5U</td><td>Within ± 20 %</td></tr>
<tr><td>Q
Class I</td><td colspan="3">C＞30 pF : Q≧1000
C≦30 pF : Q≧400+20×C</td></tr>
<tr><td>Tan δ
Class II</td><td colspan="3">To Satisfy The Specified Initial Value</td></tr>
<tr><td>Insulation Resistance</td><td colspan="3">To Satisfy The Specified Initial Value</td></tr>
</table>

<table>
<tr><td rowspan="5">12</td><td rowspan="5">High Temperature</td><td colspan="8">No Mechanical Damage Shall Be Occur</td><td rowspan="5">Class II capacitors applied DC voltage is applied for one hour at maximum operation temperature ±3°C then shall be set for 48 ± 4 hours at room temperature and the initial measurement shall be conducted.

Applied Voltage :
Vr≦200V : 200% Of Rated Voltage
Vr≧250V : 120% Of Rated Voltage
Temperature :Maximum Operation Temperature
Test Time : 1000 ＋48/－0 Hour
Current Applied : 50mA Max.
Measurement Room Temperature
After Cooling For :
Class Ⅰ : 24 ± 2 Hour
Class Ⅱ : 48 ± 4 Hour</td></tr>
<tr><td rowspan="3">Capacitance</td><td colspan="2">Temp. Char.</td><td colspan="4">Cap. Change</td></tr>
<tr><td>Class Ⅰ</td><td>NPO</td><td colspan="4">Within±3.0% Or ±0.3pF Whichever Is Larger</td></tr>
<tr><td rowspan="2">Class Ⅱ</td><td>X7R / X5R
X6S / X5S</td><td colspan="4">Within ± 15 %</td></tr>
<tr><td>Y5V/Y5U/Z5U</td><td colspan="4">Within ± 30 ~ 40 %</td></tr>
<tr><td>Q
Class Ⅰ</td><td colspan="7">C＞30pF : Q ≧350
10 pF＜C≦30 pF : Q ≧275＋2.5×C
C≦10 pF : Q ≧200＋10×C</td></tr>
<tr><td>Tan δ
Class Ⅱ</td><td>Temp. Char.</td><td>HI-V</td><td>50V</td><td>25V</td><td>16V</td><td>10V</td><td>6.3V</td></tr>
<tr><td>X7R / X5R
X6S / X5S</td><td>5%</td><td>5%</td><td>7%</td><td>7%</td><td>10%</td><td>12.5%</td></tr>
<tr><td>Y5V</td><td>7.5%</td><td>7.5%</td><td>10.5%</td><td>12.5%</td><td>15%</td><td>20%</td></tr>
<tr><td>Y5U / Z5U</td><td>5%</td><td>6%</td><td>10.5%</td><td>10.5%</td><td>-</td><td>-</td></tr>
<tr><td rowspan="5">13</td><td rowspan="5">Humidity</td><td colspan="8">No Mechanical Damage Shall Be Occur</td><td rowspan="5">Class II capacitor shall be set for 48 ± 4 hours at room temperature after one hour heat treatment at 150+0/-10 °C
before initial measure.

Temperature : 40 ± 2 °C
Relative Humidity : 90 ~ 95 % RH
Test Time : 500+12/-0 Hour
Current Applied : 50mA Max.
Measurement Room Temperature
After Cooling For:
Class I : 24 ± 2 Hours
Class II : 48 ± 4 Hours</td></tr>
<tr><td rowspan="3">Capacitance</td><td colspan="2">Temp. Char.</td><td colspan="4">Cap. Change</td></tr>
<tr><td>Class I</td><td>(NPO)</td><td colspan="4">Within±5%Or±0.5pF Whichever Is Larger</td></tr>
<tr><td rowspan="2">Class II</td><td>X7R / X5R</td><td colspan="4">Within ± 15 %</td></tr>
<tr><td>Y5V/Y5U/Z5U</td><td colspan="4">Within ± 30 %</td></tr>
<tr><td>Q
Class I</td><td colspan="7">C＞30 pF : Q≧350
10 pF＜C≦30pF : Q≧275+2.5×C
C≦10 pF : Q≧200+10×C</td></tr>
<tr><td>Tan δ
Class II</td><td>Temp. Char.</td><td>HI-V</td><td>50V</td><td>25V</td><td>16V</td><td>10V</td><td>6.3V</td></tr>
<tr><td>X7R / X5R
X6S / X5S</td><td>2.5%</td><td>5%</td><td>7%</td><td>7%</td><td>10%</td><td>12.5%</td></tr>
<tr><td>Y5V</td><td>7..5%</td><td>7..5%</td><td>10.5%</td><td>12.5%</td><td>15%</td><td>20%</td></tr>
<tr><td>Y5U / Z5U</td><td>5%</td><td>6%</td><td>6%</td><td>6%</td><td>-</td><td>-</td></tr>
<tr><td>Insulation Resistance</td><td colspan="7">Minimum Insulation Resistance : 1000 MΩ or
50 MΩ ÷uF product whichever is smaller</td></tr>
</table>

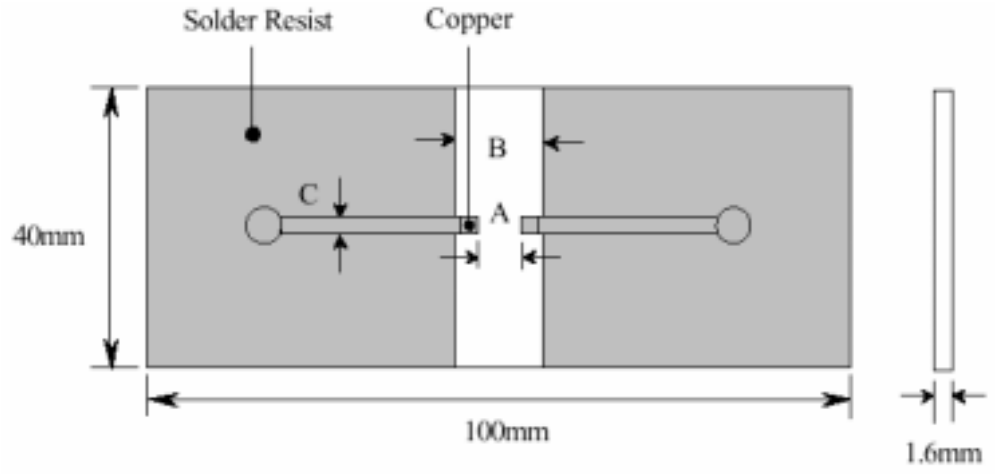
<table>
<tr><td rowspan="8">14</td><td rowspan="8">Humidity Load</td><td colspan="8">No Mechanical Damage Shall Be Occur</td><td rowspan="8">Class II capacitors applied DC voltage of the rated voltage is applied for one hour at maximum operation temperature ±3 ℃ then shall be set for 48 ± 4 hours at room temperature and the initial measurement shall be conducted

Applied Voltage : Rated Voltage
Temperature : 40 ± 2 ℃
Relative Humidity : 90 ~ 95% RH
Test Time : 500＋12/－0 Hour
Current Applied : 50mA Max.
Measurement Room Temperature After Cooling For :
Class Ⅰ : 24 ± 2 Hour
Class Ⅱ : 48 ± 4Hour
s</td></tr>
<tr><td rowspan="3">Capacitance</td><td colspan="2">Temp. Char.</td><td colspan="5">Cap. Change</td></tr>
<tr><td>Class Ⅰ</td><td>NPO</td><td colspan="5">Within±7.5%Or ±0.75pF Whichever Is Larger</td></tr>
<tr><td rowspan="2">Class Ⅱ</td><td>X7R / X5R X6S / X5S</td><td colspan="5">Within ± 12.5 %</td></tr>
<tr><td>Y5V/Y5U/Z5U</td><td colspan="5">Within ± 30 ~ 40 %</td></tr>
<tr><td>Q Class Ⅰ</td><td colspan="7">C＞30 pF : Q≧350
10 pF＜C≦30 pF : Q≧275＋2.5×C
C≦10 pF : Q≧200＋10×C

Chip Array Capaitor
C＞30 pF : Q≧200
C≦30 pF : Q≧200+10 / 3×C</td></tr>
<tr><td rowspan="4">Tan δ Class Ⅱ</td><td>Temp. Char.</td><td>HI-V</td><td>50V</td><td>25V</td><td>16V</td><td>10V</td><td>6.3V</td></tr>
<tr><td>X7R/X5R X6S / X5S</td><td>2.5%</td><td>5%</td><td>7%</td><td>7%</td><td>10%</td><td>12.5%</td></tr>
<tr><td>Y5V</td><td>7.5%</td><td>7.5%</td><td>10.5%</td><td>12.5%</td><td>15%</td><td>20%</td></tr>
<tr><td>Y5U / Z5U</td><td>5%</td><td>6%</td><td>6%</td><td>6%</td><td>-</td><td>-</td></tr>
<tr><td>Insulation Resistance</td><td colspan="7">Minimum Insulation Resistance:
500MΩ or 25MΩ÷μF
Product Whichever Is Smaller.</td></tr>
</table>

15	Soldering Reference List	Size	Char. Temp	Capacitance	Condition	
					Reflow	Flow
		0201	All	All	○	X
		0402	All	All	○	X
		0603	NP0 / X5R / X7R X6S / X5S	All	○	○
			Y5V	C＜1uF	○	○
				C≧1uF	○	X
		0805	NP0 / X5R / X7R X6S / X5S	All	○	○
			Y5V	C＜4.7uF	○	○
				C≧4.7uF	○	X
		1206	NP0 / X5R / X7R X6S / X5S	All	○	○
			Y5V	C＜10uF	○	○
				C≧10uF	○	X
		1210 1808 1812 2220	All	All	○	X

6. P.C. Board for Bending Strength Test



Unit : mm

Code	A	B	C
0201	0.2	1.0	0.3
0402	0.4	1.4	0.5
0603	1.0	3.0	1.0
0805	1.2	4.0	1.6
1206	2.2	5.0	2.0
1210	2.2	5.0	2.9
1808	3.5	7.0	2.5
1812	3.5	7.0	3.7
2220	4.5	8.0	5.6

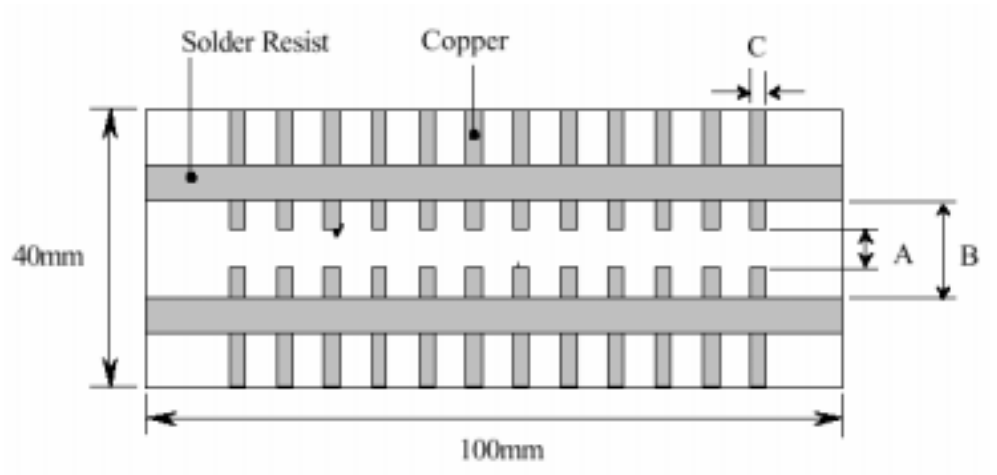
7.Test Substrate

Material: Glass Epoxy Substrate

■ : Copper (Thickness : 0.035mm)

■ : Solder Resist

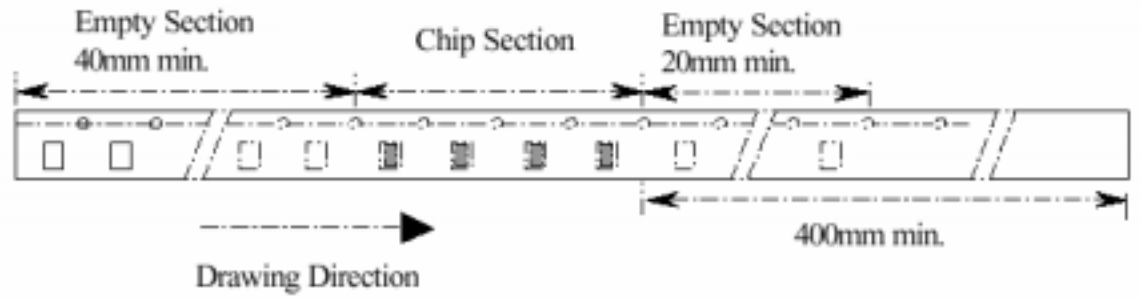
Test Substrate



Unit: mm

Code	A	B	C
0201	0.2	1.0	0.3
0402	0.4	1.4	0.5
0603	1.0	3.0	1.0
0805	1.2	4.0	1.6
1206	2.2	5.0	2.0
1210	2.2	5.0	2.9
1808	3.5	7.0	2.5
1812	3.5	7.0	3.7
2220	4.5	8.0	5.6

8. Packaging

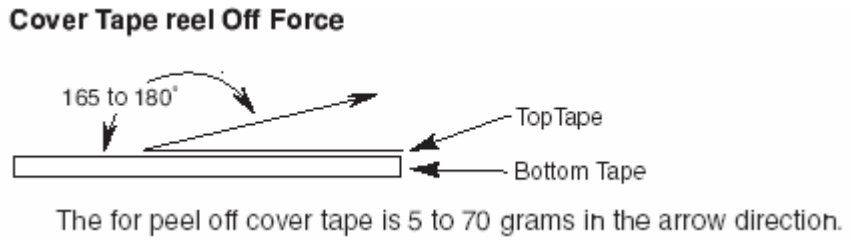


8-3. Material And Quantity

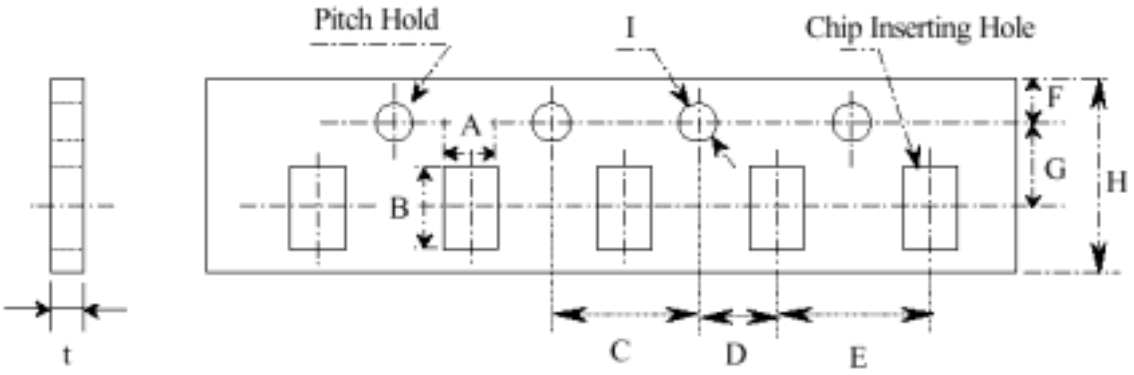
		7〃Reel		13〃Reel
Size	Thickness (mm)	Paper Tape	Plastic Tape	Paper / Plastic
0201	T≦0.33	10K pcs / Reel	-	-
0402	T≦0.55	10K pcs / Reel	-	50K pcs / Reel
0603	T≦0.95	4K pcs / Reel	-	10K / 15K pcs / Reel
0805	T≦0.95	4K pcs / Reel	-	10K / 15K pcs / Reel
	0.95＜T≦1.45	-	3K / 2K pcs / Reel	-
1206	T≦0.95	4K pcs / Reel	-	10K pcs / Reel
	0.95＜T≦1.45	-	3K / 2K pcs / Reel	-
	T＞1.45	-	2K pcs / Reel	-
1210	T≦1.45	-	3K pcs / Reel	10K pcs / Reel
	T＞1.45	-	2K pcs / Reel	4K pcs / Reel
1808	T≦1.45	-	3K pcs / Reel	10K pcs / Reel
	T＞1.45	-	2K pcs / Reel	4K pcs / Reel
1812	T≦2.22	-	1K pcs / Reel	4K pcs / Reel
	T＞2.22	-	500 pcs / Reel	4K pcs / Reel
2220	T≦2.22	-	1K pcs / Reel	2K pcs / Reel
	T＞2.22	-	500 pcs / Reel	2K pcs / Reel

8-1. Cover Tape Reel Off Force

Peel-Off Force : 5 g. f ≦ Peel-Off Force ≦ 70 g. f



8-2. Paper Tape

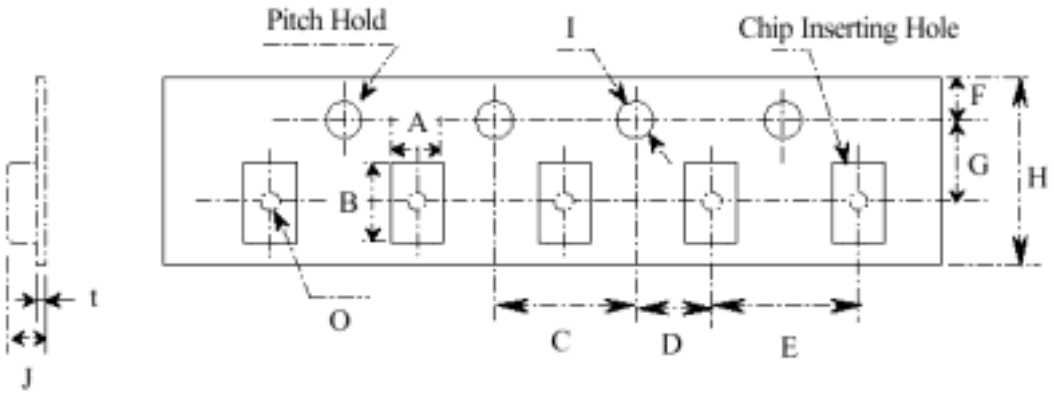


Unit: mm

Code	A	B	C	D	E
0201	0.37±0.03	0.67±0.03	2.0±0.1	1.0±0.05	2.0±0.1
0402	0.61±0.10	1.2±0.1			
0603	1.10±0.20	1.9±0.2	4.0±0.1	2.0±0.05	4.0±0.1
0805	1.50±0.20	2.3±0.2			
1206	1.90±0.20	3.5±0.2			
1210	2.90±0.20	3.6±0.2			

Code	F	G	H	I	J
0201	1.75±0.1	3.5±0.05	8.0±0.3	φ1.5+0.1/−0	1.1max
0402					
0603					
0805					
1206					
1210					

8-3. Plastic Tape



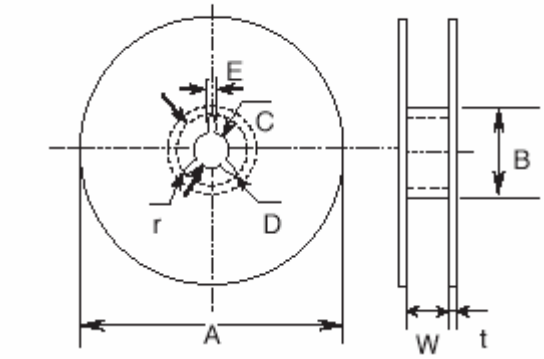
Unit: mm

Code	A	B	C	D	E	F
0805	1.5±0.2	2.3±0.2	4.0±0.1	2.0±0.05	4.0±0.1	1.75±0.1
1206	1.9±0.2	3.5±0.2				
1210	2.9±0.2	3.6±0.2				
1808	2.5±0.2	4.9±0.2			8.0±0.1	
1812	3.6±0.2	4.9±0.2				
2220	5.4±0.2	6.1±0.2				

Code	G	H	I	J	t	O
0805	3.5±0.05	8.0±0.3	φ1.5+0.1/−0	2.7 max.	0.3 max.	1.5 min.
1206						
1210						
1808	5.5±0.05	12.0+3/−0		3.3 max.		
1812						
2220						

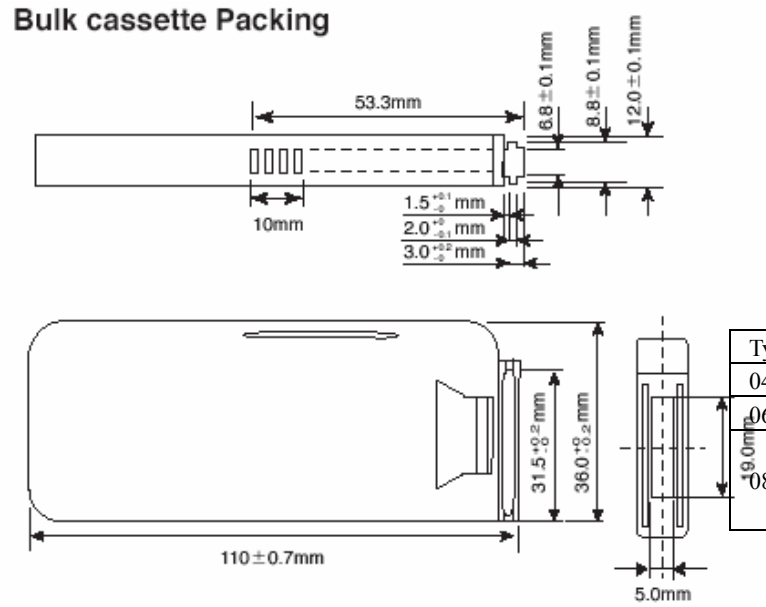
8-4. Reel Dimensions

Material:Paper,Plastic



	7〃Reel		13〃Reel	
Tape Size	8mm	12mm	8mm	12mm
A	178±2		330±2	
B	50±2		60±2	
C	13±0.5		13±0.5	
D	21±1		21±1	
E	2±0.5		2±0.5	
W	10±1.5	14±2	10±1.5	14±2
T	1.5±0.5		2±1	
r	1.0		1.0	

8-5. Bulk Cassette Quantity



Type	Thickness (mm)	Pcs / Case
0402	0.5	50K
0603	0.8	15K
0805	0.6	10K
	0.85	10K
	1.25	5K

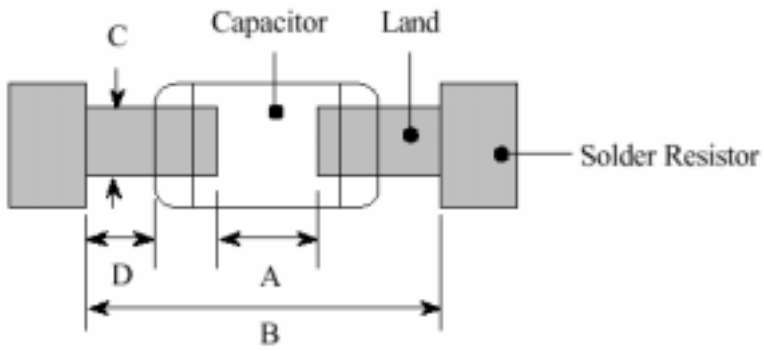
9. Precation Of Usage

9-1.Storage

Store the capacitors where the temperature and relative humidity don't exceed 40°C and 70°RH.

We recommend you use capacitors within 6 months from the manufactured date. In case of packaging, don't the last wrapped, polyethylene bag, till just before using. If it is opened, seal it as soon as possible or keep it in a desiccant with a desicantion agent.

9-2. Size and recommend land dimensions.



Unit : mm

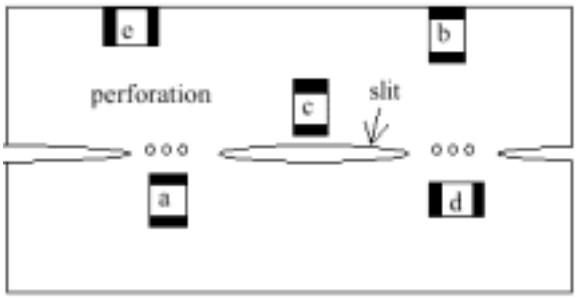
Code	Chip Capacitor		Land			
	L	W	A	B	C	D
0201	0.60	0.30	0.2~0.3	0.9~1.1	0.2~0.3	0.1~0.3
0402	1.00	0.05	0.3~0.5	1.3~1.5	0.3~0.5	0.1~0.3
0603	1.60	0.80	0.6~0.8	1.9~2.1	0.6~0.8	0.2~0.5
0805	2.00	1.25	0.8~1.2	2.4~3.2	0.9~1.2	0.2~0.6
1206	3.20	1.60	1.8~2.5	3.8~4.8	1.2~1.6	0.3~0.8
1210	3.20	2.5	1.9~2.6	3.9~4.9	1.9~2.5	0.3~0.8
1808	4.50	2.00	2.4~3.4	5.4~6.0	1.7~2.0	0.5~1.3
1812	4.50	3.20	2.5~3.5	5.5~6.1	2.3~3.2	0.5~1.3
2220	5.70	5.00	2.7~4.2	6.7~8.3	3.5~5.0	0.5~1.3

9-3..Mechanical strength varies according to location of chip capacitors the P.C. board.

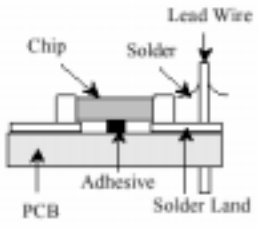
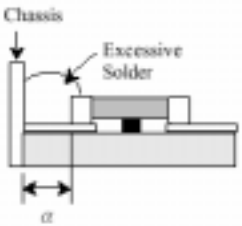
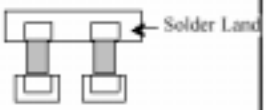
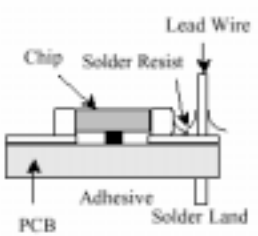
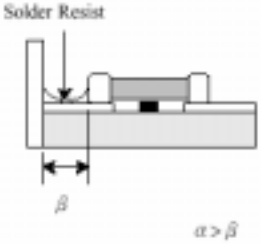
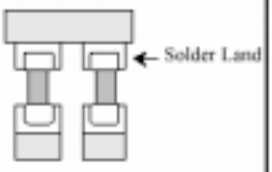
Design layout of components on the PC board to minimize the stress imposed on the wrap or flexure of the board.

Component layout close to board break

Susceptibility to stress is in the order of : a>b>c d>e



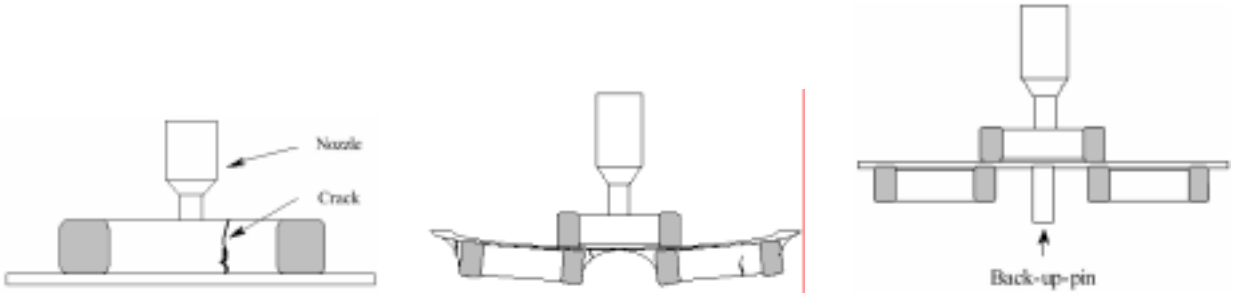
9-4.Layout Recommendation

Example	Use of Common Solder Land	Solder With Chassis	Use of Common Solder Land With Other SMD
Need to Avoid			
Recommendation			

9-5. Mounting

Crack is caused by impact load due to suction nozzle at the mounted.

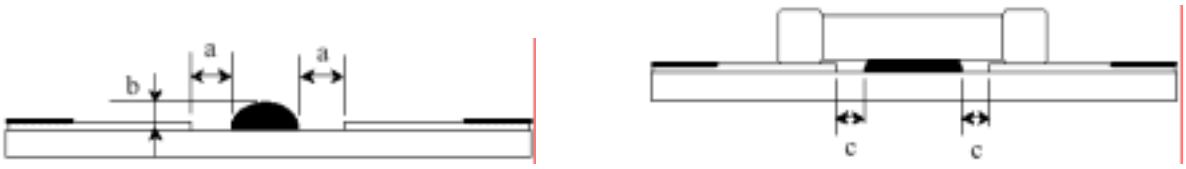
In mounting an element to board, If the low dead point is too low , excessive stress is applied to element. This will cause cracking. In this case, it is required to shift the low dead point of a suction nozzle to the upper surface of board so that warping of board is eliminated. Nozzle pressure is adjusted to 1N to 3N(static load)during mounting.



To Fix Board With Support Pin (OK)

If board is warped during mounting, crack or peeling of soldering will be caused. To avoid this, it is required to fix the board with back up pins or the like to avoid warping. Also, similar precautions are required when inserting a part with lead.

9-6. Amount of Adhesive



Example : 0805 & 1206 Size MLCC	
A	0.2mm (min)
B	70 ~ 100 uM
C	Do Not Touch The Solder Land

9-7.Soldering

9-7-1.Avoiding Thermal Shock

(a) preheat Condition

Carefully perform pre-heating so that the temperature difference (△T)between the solder and component surface should be in the follow range.

Soldering Method	3.2x1.6mm max.	3.2x1.6mm min.
Reflow method	△T≦190°C	△T≦190°C
Immersion method	△T≦150°C	△T≦100°C

(b) Colling Condition

Natural colling using air is recommended. If the chips ard dipped into a solvent for cleaning, the temperature difference (△T)must be less than 100°C

9-7-2. Recommend Soldering Profile By various Methods

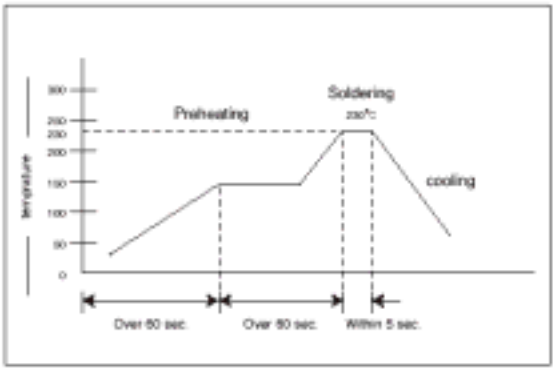
Infrared reflow soldering standard condition Iron/immersion soldering standard condition

9-7-3. Amout of Solder

Excessive solder will induce higher tensile force in chip capacitor when temperature change and it may result in chip cracking. In Sufficient solder may detach the capacitor from the P.C. board.

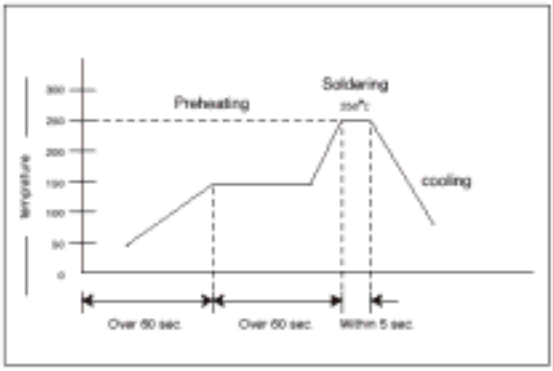
Sn/Pb Plating

Reflow

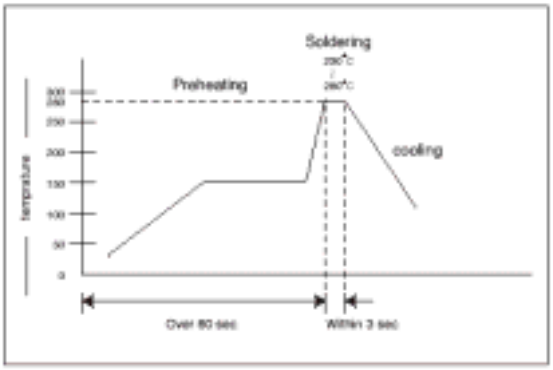


Pb-Free (Sn 100%) Plating

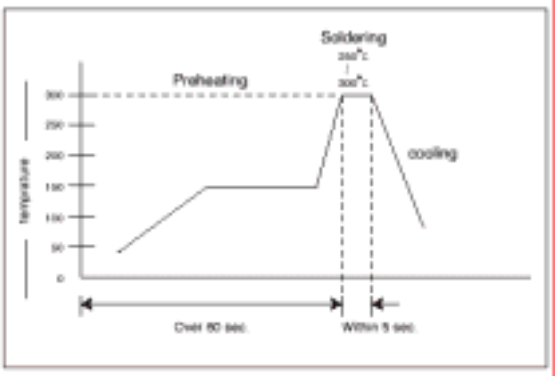
Reflow



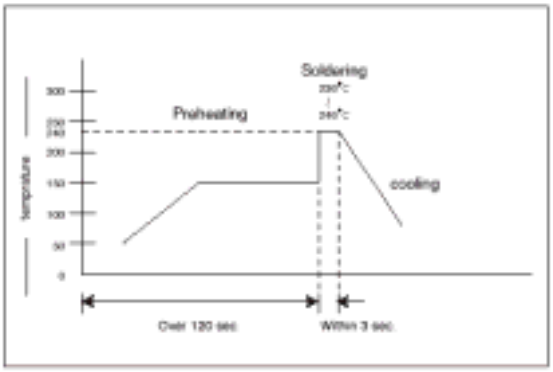
Solder Iron



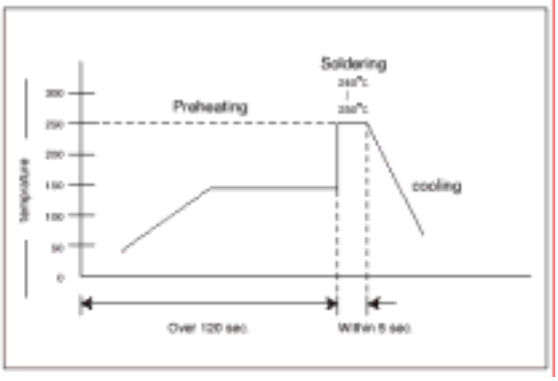
Solder Iron

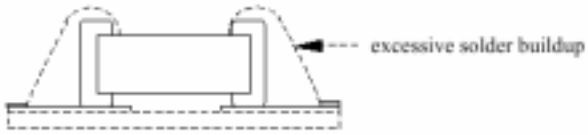
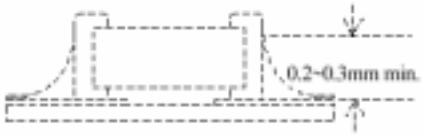


Flow



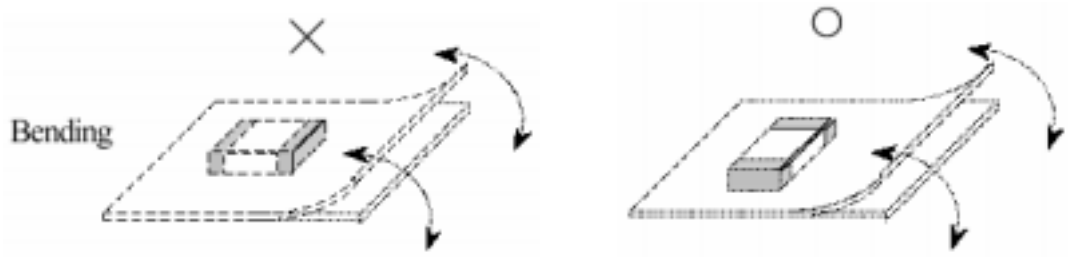
Flow



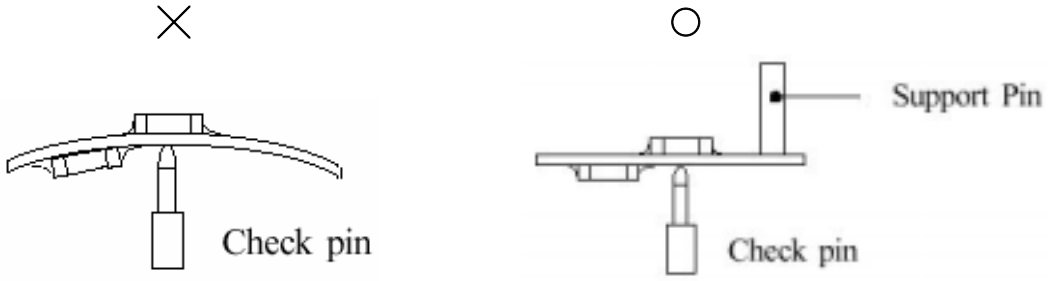
Excessive Solder	
Adequate	
Insufficient Solder	
Solder buildup by Reflow method	

10.Caution : Handing after chip mounted

10-1. Please pay attention put the component lateral to the direction in which stress acts.



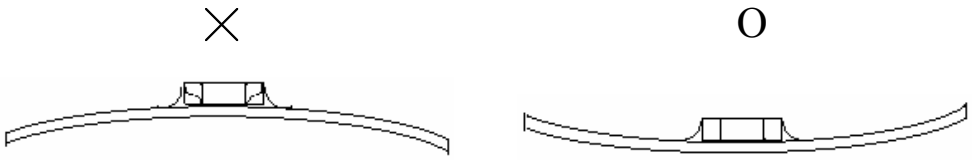
10-2. Crack Will be caused if board is warped due to excessive load by check pin.



10-3. Mechanical stress due to warping and torsion by dividing.

(a) Crack occurrence ratio will be increased by manual separation.

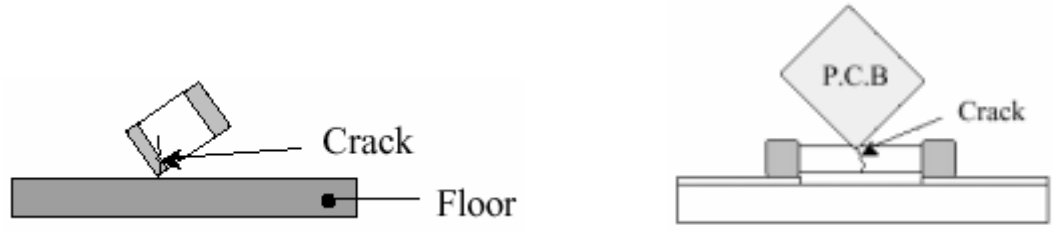
(b) Crack occurrence ratio will be increased by tensile force, rather than compressive force.



10-4. Handing to Loose Chip Capacitor

(a) IF dropped the chip capacitor may crack.

(b)Piling the P.C.board after mounting for storage or handling, the comer of the P.C. board may hit the chip capacitor of another of board to cause crack.



(a) (b)