■ MLCC with Flexiterm

◆ Feature

* There is high reliability on monolithic structure of laminated layers.
* And its character of excellent soldering ability and
  soldering resistance ability is suitable for reflow soldering and peak soldering.
* It includes high and stable capacitance.
* High mechanical performance able to withstand, 3mm bend test.
* Flexible termination system.
* Reduction in circuit board flex failures.

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

◆ Application

* High Flexure Stress Circuit Boards.
* Variable Temperature Applications.

◆ How To Order

0805	B	102	K	500	A	T

Size Code		
Size Code	(L×W) inch	(L×W) mm
0402	0.04×0.02	1.00×0.50
0603	0.06×0.03	1.60×0.80
0805	0.08×0.05	2.00×1.25
1206	0.12×0.06	3.20×1.60
1210	0.12×0.10	3.20×2.50
1808	0.18×0.08	4.50×2.00
1812	0.18×0.12	4.50×3.20
2211	0.22×0.11	5.70×0.28
2220	0.22×0.20	5.70×5.00
2225	0.22×0.25	5.70×6.30

Nominl Capacitance	
Express Method	Actual Value
0R5	0.5
1R0	1.0
102	10×10^2
Note: the first two digits are significant; third digit denotes number of zeros; R=decimal point.	

Rated Voltage (unit)：V	
Express Method	Actual Value
6R3	6.3
500	50×10^0
201	20×10^1
Note: the first two digitsare significant; third digit denotes number of zeros; R=decimal point.	

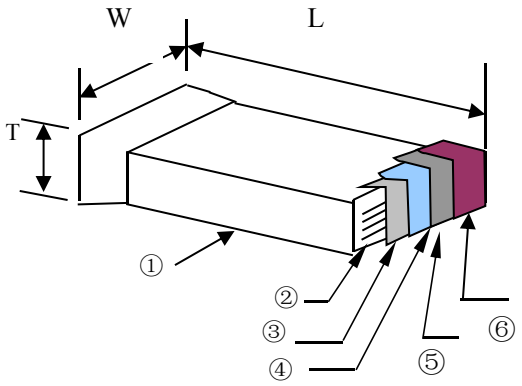
Package Styles	
Express Method	Package Styles
B	Bulk Bag
T	Taping Package

Dielectric Code	
Dielectric Code	Dielectric
B	X7R

Capacitance Tolerance	
Code	Tolerance
J	±5%
K	±10%
M	±20%

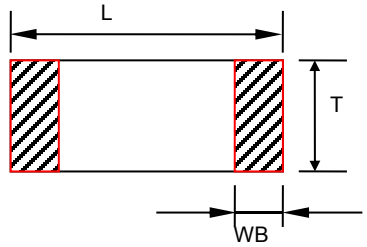
Terminal Material Styles	
Termination Styles	Express Method
MLCC with Flexiterm Solderable Termination	A

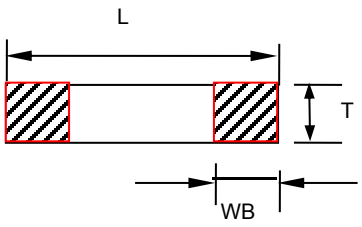
◆ Product Structure



NO	Name	NO	Name
①	Ceramic dielectric	④	Conductive Resin
②	Inner electrode	⑤	Nickel Layer
③	Substrate electrode	⑥	Tin Layer

◆ Products Size





Type		Dimensions (mm)				
British expression	Metric expression	L	W	T	WB	Special Instructions
0402	1005	1.00±0.05	0.50±0.05	0.50±0.05	0.25±0.05	All
0603	1608	1.60±0.10	0.80±0.10	0.80±0.10	0.35±0.20	All
0805	2012	2.00±0.20	1.25±0.20	0.80±0.20	0.50±0.20	C＜1μF
		2.00±0.20	1.25±0.20	1.25±0.20	0.50±0.20	1μF≤C≤4.7μF
1206	3216	3.20±0.30	1.60±0.30	0.80±0.20	0.60±0.30	C≤330nF
		3.20±0.30	1.60±0.30	1.00±0.20	0.60±0.30	330nF＜C＜470nF
		3.20±0.30	1.60±0.30	1.25±0.20	0.60±0.30	470nF＜C＜2.2μF
		3.20±0.30	1.60±0.30	1.60±0.30	0.60±0.30	C≥2.2μF
1210	3225	3.20±0.30	2.50±0.30	≤2.80	0.60±0.30	All
1808	4520	4.50±0.40	2.00±0.20	≤2.20	0.60±0.30	All
1812	4532	4.50±0.40	3.20±0.30	≤3.50	0.60±0.30	All
2211	5728	5.70±0.40	2.80±0.40	≤3.50	0.60±0.30	All
2220	5750	5.70±0.40	5.00±0.40	≤3.50	0.60±0.30	All
2225	5763	5.70±0.50	6.30±0.50	≤6.20	0.60±0.30	All

Note：1、The specific thickness of the product can read "capacity range and voltage "in this approval sheet.
2、We can design according to customer special requirements

◆ Capacitance Range and Operating Voltage

*Conventional voltage （Ur≤50V） products

Dielectric	X7R														
Dimension	0402 (1.0mm*0.5mm)					0603 (1.6mm*0.8mm)					0805 (2.0mm*1.25mm)				
Voltage	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
330pF	0.50±0.05					0.8±0.1					0.8±0.2				
470pF															
560pF															
680pF															
1nF															
2.2nF															
3.9nF															
4.7nF															
5.6nF															
6.8nF															
10nF															
15nF															
18nF															
22nF															
33nF															
47nF															
56nF															
68nF															
100nF															
220nF	0.50±0.05														
330nF	0.50±0.05														
470nF											1.25±0.2				
680nF	0.50±0.05														
1μF											1.25±0.2				
2.2μF						0.8±0.2									
3.3μF						0.8±0.2					1.25±0.2				
4.7μF															
6.8μF											1.25±0.2				
10μF															

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

Dielectric	X7R																		
Dimensions	1206 (3.2mm*1.6mm)					1210 (3.2mm*2.5mm)					1808 (4.5mm*2.0mm)					1812		
Voltage	6.3 V	10 V	16 V	25 V	50 V	6.3 V	10 V	16 V	25 V	50 V	6.3 V	10 V	16 V	25 V	50 V	16V	25 V	50 V
330pF	0.8±0.2					1.25±0.15					1.6±0.3					1.60±0.20		
470pF																		
560pF																		
680pF																		
1nF																		
2.2nF																		
3.9nF																		
4.7nF																		
5.6nF																		
6.8nF																		
10nF																		
15nF																		
18nF																		
22nF																		
33nF																		
47nF																		
56nF																		
68nF																		
100nF																		
220nF						1.4±0.2													
330nF	1.25±0.2					1.6±0.3												
470nF																		
680nF																		
1μF	1.6±0.3																	
2.2μF											1.6±0.3					2.0±0.20		
3.3μF																		
4.7μF																		
6.8μF																		
10μF																		
15μF																		
22μF																		
47μF																		
100μF																		

Note：1、【】General thickness corresponds to the capacity，unit：mm

2、We can design according to the customer requirements.

材料	C0G														
尺寸	0603 (1.6mm*0.8mm)			0805 (2.0mm*1.25mm)			1206 (3.2mm*1.6mm)			1210 (3.2mm*2.5mm)			1812 (4.5mm*3.2mm)		
电压 Voltage	≤16V	25V	50V	≤16V	25V	50V	≤16V	25V	50V	≤16V	25V	50V	≤16V	25V	50V
0.1pF	0.80±0.10			0.8±0.02			0.8±0.02			1.25±0.20			1.25±0.20		
0.2pF															
0.5pF															
1pF															
1.5pF															
1.8pF															
2.0pF															
2.2pF															
2.7pF															
3.0pF															
3.3pF															
4.7pF															
5.6pF															
6.8pF															
8.2pF															
10pF															
12pF															
15pF															
18pF															
22pF															
27pF															
33pF															
39pF															
47pF															
56pF															
68pF															
100pF															
120pF															
150pF															
180pF															
220pF															
270pF															
330pF															
390pF															
470pF															
560pF															
680pF															
1nF															
1.5nF															
1.8nF															
2.2nF															
2.7nF															
3.3nF															
4.7nF															
5.6nF															
6.8nF															
8.2nF															
10nF							1.25±0.20			1.25±0.20					
12nF							1.60±0.30								
15nF													1.25±0.20		
18nF															
22nF															
33nF															

Note：1、【】General thickness corresponds to the capacity，unit：mm

2、We can design according to the customer requirements.

* Medium and high voltage products

Dielectric	X7R										
Dimension	0402 (1.0mm*0.5mm)	0603 (1.6mm*0.8mm)			0805 (2.0mm*1.2mm)						
Voltage	100V	100V	200V	250V	100V	200V	250V	500V	630V	1000V	2000V
100pF		0.8±0.10					1.25±0.20	1.25±0.20			
120pF											
150pF											
180pF											
220pF					0.8±0.20						
270pF											
330pF			0.8±0.10								
390pF											
470pF											
560pF											
680pF											
1nF	0.5±0.05								1.25±0.20	1.25±0.20	1.25±0.20
1.5nF											
1.8nF											
2.2nF											
2.7nF											
3.3nF				0.8±0.10							
4.7nF											
5.6nF											
10nF						0.8±0.20					
15nF						1.25±0.20					
18nF											
22nF											
33nF					1.25±0.20						
47nF											
56nF											
68nF											
100nF											
220nF											
330nF											
470nF											
680nF											
1μF											
2.2μF											
3.3μF											
4.7μF											
6.8μF											
10μF											

Note：1、【】General thickness corresponds to the capacity，unit：mm

2、We can design according to the customer requirements.

Dielectric	X7R							
Dimension	1206 (3.2mm*1.6mm)							
Voltage	100V	200V	250V	500V	630V	1000V	2000V	2500V
100pF	0.80±0.20	0.80±0.20		0.80±0.20	1.25±0.20	1.60±0.30	1.25±0.20	
120pF								
150pF								
180pF								
220pF								
270pF								
330pF			0.80±0.20					
390pF								
470pF								
560pF								

680pF								
1nF								1.25±0.20
1.5nF								
1.8nF								
2.2nF								
2.7nF								
3.3nF								
4.7nF								
5.6nF								
6.8nF							1.60±0.30	
10nF				1.25±0.20	1.25±0.20			
15nF								
18nF								
22nF								
33nF					1.60±0.30			
47nF								
56nF		1.25±0.20	1.25±0.20					
68nF				1.60±0.30				
100nF	1.25±0.20							
220nF		1.60±0.30	1.60±0.30					
330nF								
470nF								
680nF	1.60±0.30							
1μF								
2.2μF								
3.3μF								
4.7μF								
6.8μF								
10μF								

Note：1、【】General thickness corresponds to the capacity，unit：mm

2、We can design according to the customer requirements.

Dielectric	X7R														
Dimension	1210 (3.2mm*2.5mm)							1808 (4.2mm*5.0mm)							
Voltage	100V	200V	250V	500V	630V	1KV	2KV	100V	250V	500V	1KV	2KV	3KV	4KV	5KV
100pF															
120pF															
150pF															
180pF															
220pF						1.25±0.20	1.25±0.20								
270pF															
330pF															
390pF															1.60±0.30
470pF								1.60±0.30							
560pF							1.60±0.30					1.60±0.30	1.60±0.30		
680pF					1.25±0.20										
1nF			1.60±0.30			1.60±0.30			1.60±0.30		1.60±0.30			1.60±0.30	
1.5nF															
1.8nF															
2.2nF															
2.7nF															
3.3nF				1.25±0.20			1.25±0.20								
4.7nF	1.25±0.20														
5.6nF															
6.8nF							1.60±0.30								
10nF															

15nF															
18nF															
22nF															
33nF															
47nF		1.25 ± 0.20		1.60 ± 0.30	2.0± 0.30					1.60 ± 0.30					
56nF					1.60 ± 0.30										
68nF															
100nF															
220nF	1.60 ± 0.30		2.5 ± 0.30												
330nF															
470nF															
680nF															
1μF															
2.2μF	2.5± 0.30														
3.3μF															
4.7μF															
6.8μF															
10μF															

Note：1、【】General thickness corresponds to the capacity，unit：mm

2、We can design according to the customer requirements.

Dielectric	X7R									
Dimension	1812 (4.5mm*3.2mm)									
Voltage	100V	200V	250V	500V	630V	1KV	2KV	3KV	4KV	5KV
100pF										
120pF										
150pF										
180pF										
220pF										
270pF										
330pF										
390pF										
470pF										
560pF										
680pF										
1nF										
1.5nF										
1.8nF										
2.2nF										
2.7nF										
3.3nF										
4.7nF										
5.6nF										
6.8nF										
10nF										
15nF										
18nF										
22nF										
33nF										
47nF										
56nF										
68nF										
100nF										

220nF			2.0±0.30	2.0±0.30						
330nF		2.0±0.30								
470nF			2.5±0.30							
680nF	2.0±0.30		2.0±0.30							
1μF										
2.2μF	2.5±0.30									
3.3μF										
4.7μF										
6.8μF										
10μF										

Note：1、【】General thickness corresponds to the capacity，unit：mm

2、We can design according to the customer requirements.

Dielectric	X7R								
Dimension	1825 (4.5mm*6.3mm)							2211 (5.7mm*2.8mm)	
Voltage	200V	250V	500V	630V	1000V	2000V	3000V	3000V	5000V
100pF									
120pF									
150pF									1.6±0.30
180pF									
220pF									
270pF									
330pF									
390pF									
470pF									
560pF									
680pF									
1nF						1.6±0.30			
1.5nF									
1.8nF									
2.2nF								1.6±0.30	
2.7nF									
3.3nF									
3.9nF									
4.7nF							1.8±0.30		
5.6nF									
6.8nF							2.0±0.30		
10nF					1.6±0.30				
15nF									
18nF									
22nF									
33nF			1.6±0.30						
47nF									
56nF									
68nF									
100nF	1.6±0.30				2.0±0.30				
120nF									
150nF				1.6±0.30					
220nF									
330nF									
470nF									
680nF									
1μF									
2.2μF									

3.3μF									
4.7μF									
6.8μF									
10μF		2.0±0.30							

Note：1、【】General thickness corresponds to the capacity，unit：mm

2、We can design according to the customer requirements.

Dielectric	X7R										
Dimension	2220 (5.7mm*6.3mm)										
Voltage	100V	200V	250V	500V	630V	1000V	2000V	2500V	3000V	4000V	50000V
100pF											
120pF											
150pF											
180pF											
220pF											
270pF											
330pF											
390pF											
470pF											
560pF											
680pF											
1nF											
1.5nF											1.60 ±0.30
1.8nF											
2.2nF											
2.7nF											
3.3nF										1.60 ±0.30	2.0 ±0.30
3.9nF									1.60 ±0.30		
4.7nF											
5.6nF							1.60 ±0.30				
6.8nF											
8.2nF				1.60 ±0.30							
10nF						1.60 ±0.30		1.60 ±0.30			
15nF											
18nF			1.60 ±0.30								
22nF											
33nF											
47nF		1.60 ±0.30									
56nF						2.0 ±0.30					
68nF											
100nF											
120nF											
150nF					1.60 ±0.30						
220nF											
330nF											
470nF	1.60 ±										
680nF											

1μF	0.30										
2.2μF	1.80 ± 0.30		2.0 ±0.30								
3.3μF	2.0 ± 0.30										
4.7μF											
6.8μF											
10μF											

Note：1、【】General thickness corresponds to the capacity，unit：mm

2、We can design according to the customer requirements.

Dielectric	X7R									
Dimension	2225 (5.7mm*5.0mm)									
Voltage	100V	200V	250V	500V	1000V	1500V	2000V	3000V	4000V	5000V
100pF										
120pF										
150pF										
180pF										
220pF										
270pF										
330pF										
390pF										
470pF										
560pF										
680pF										
1nF										
1.5nF										
1.8nF										
2.2nF										
2.7nF										
3.3nF										
3.9nF										
4.7nF										
5.6nF										
6.8nF										
10nF										
15nF										
18nF										
22nF										
33nF										
47nF										
56nF										
68nF										
100nF										
120nF										
150nF										

220nF										
330nF										
470nF		1.60 ±0.30								
680nF				2.0± 0.30						
1μF			2.0± 0.30	3.2± 0.30						
2.2μF										
3.3μF										
4.7μF										
6.8μF										
10μF										

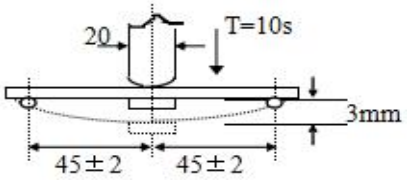
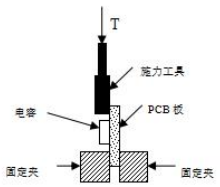
Note：1、【】General thickness corresponds to the capacity，unit：mm

2、We can design according to the customer requirements.

◆ Reliability Test

<table>
<tr><th>Item</th><th colspan="2">Technical Specification</th><th colspan="3">Test Method and Remarks</th></tr>
<tr><td rowspan="3">Capacitance</td><td rowspan="2">Class Ⅰ</td><td rowspan="2">Should be within the specified tolerance.</td><td>Capacitance</td><td>Measuring Frequency</td><td>Measuring Voltage</td></tr>
<tr><td>≤1000pF</td><td>1MHz±10%</td><td rowspan="2">1.0±0.2Vrms</td></tr>
<tr><td></td><td></td><td>＞1000 pF</td><td>1KHz±10%</td></tr>
<tr><td>Class Ⅱ</td><td>Should be within the specified tolerance.</td><td colspan="3">Test Temperature: 25℃±3℃
Test Frequency: 1KHz±10%　Test Voltage: 1.0±0.2Vrms
Test Frequency: 120±24 Hz　Test Voltage: 0.5±0.1Vrms</td></tr>
<tr><td rowspan="2">Insulation Resistance</td><td>Class Ⅰ</td><td>C≤10 nF, Ri≥50000MΩ
C＞10 nF, Ri•C_R≥500S</td><td colspan="3" rowspan="2">Measuring Voltage: Rated Voltage（Max 500V）
Duration: 60±5s　Test Humidity: ≤75%
Test Temperature: 25℃±3℃　Test Current: ≤50mA</td></tr>
<tr><td>Class Ⅱ</td><td>C≤25 nF, Ri≥10000MΩ
C＞25 nF, Ri•C_R＞100S</td></tr>
<tr><td>(DF, tanδ) Dissipation Factor</td><td colspan="2">
<table>
<tr><th>Voltage</th><th>DF(×10^{-4})</th><th>0402</th><th>0603</th><th>0805</th><th>1206 and above</th></tr>
<tr><td rowspan="5">50V</td><td>≤250</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>≤47nF</td><td>＜470nF</td><td>≤1uF</td><td>≤2.2uF</td></tr>
<tr><td>≤500</td><td>≤0.1μF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>——</td><td>——</td><td>≤2.2uF</td><td>≤4.7uF</td></tr>
<tr><td>≤1000</td><td>——</td><td>≤1μF</td><td>≤1μF</td><td>≤10μF</td></tr>
<tr><td rowspan="5">25V</td><td>≤250</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>≤47nF</td><td>＜470nF</td><td>≤1uF</td><td>——</td></tr>
<tr><td>≤500</td><td>0.22μF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>——</td><td>——</td><td>≤2.2μF</td><td>≤10μF</td></tr>
<tr><td>≤1000</td><td>——</td><td>≤2.2μF</td><td>≤4.7μF</td><td>——</td></tr>
<tr><td rowspan="5">16V</td><td>250</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>≤47nF</td><td>＜470nF</td><td>≤1uF</td><td>——</td></tr>
<tr><td>≤500</td><td>≤220nF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>——</td><td>——</td><td>≤4.7μF</td><td>≤10μF</td></tr>
<tr><td>≤1000</td><td>≤470nF</td><td>≤2.2μF</td><td>≤4.7μF</td><td>——</td></tr>
<tr><td rowspan="5">10V</td><td>≤250</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>≤47nF</td><td>＜470nF</td><td>≤1uF</td><td>——</td></tr>
<tr><td>≤500</td><td>≤220nF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>——</td><td>——</td><td>≤2.2μF</td><td>≤10μF</td></tr>
<tr><td>≤1000</td><td>≤1μF</td><td>≤2.2μF</td><td>≤4.7μF</td><td>——</td></tr>
<tr><td rowspan="5">≤6.3V</td><td>≤250</td><td>≤10nF</td><td>＜100nF</td><td>——</td><td>≤680nF</td></tr>
<tr><td>≤350</td><td>47nF</td><td>＜470nF</td><td>≤1uF</td><td>——</td></tr>
<tr><td>≤500</td><td>≤220nF</td><td>——</td><td>——</td><td>——</td></tr>
<tr><td>≤750</td><td>——</td><td>——</td><td>≤2.2uF</td><td>≤10μF</td></tr>
<tr><td>≤1000</td><td>≤1μF</td><td>≤4.7μF</td><td>≤10μF</td><td>——</td></tr>
</table>
</td><td>C≤10μF
Test Frequency: 1KHz±10%
Test Voltage: 1.0±0.2Vrms
C＞10μF
Test Frequency: 120±24 Hz
Test Voltage: 0.5±0.1Vrms</td></tr>
</table>

<table>
<tr><th>Item</th><th>Technical Specification</th><th>Test Method and Remarks</th></tr>
<tr><td>Resistance to Soldering Heat</td><td>
<table>
<tr><td>Item</td><td>I类</td><td>II类</td></tr>
<tr><td>ΔC/C</td><td>≤ ± 2.5% or ± 0.25PF，whichever is larger</td><td>±15%</td></tr>
<tr><td>DF</td><td colspan="2">Same to initial value.</td></tr>
<tr><td>IR</td><td colspan="2">Same to initial value.</td></tr>
</table>
Appearance：No visible damage.At least 95% of the terminal electrode is covered by new solder.</td><td>Preheating conditions: 100 to 200℃; 60-120s.
Solder Temperature: 265±5℃ Duration: 10±1s
Clean the capacitor with solvent and examine it with a 10X(min.) microscope.
Recovery Time: 24±2h.
Recovery condition: Room temperature</td></tr>
<tr><td>Resistance to Flexure of Substrate (Bending Strength)</td><td>Appearance: No visible damage.

ΔC/C:
Class Ⅱ: ≤±10%</td><td>Test Board: PCB Warp: 3mm
Speed: 1mm/sec. Unit: mm
The measurement should be made with the board in the bending position.
 
</td></tr>
<tr><td>Termination Adhesion</td><td>No visible damage.</td><td>As shown in the picture ,Slowly apply a T force to the porcelain body on the side of the capacitor and hold for 60+1 seconds.
<table>
<tr><td>size</td><td>Apply Force T</td></tr>
<tr><td>≤0402</td><td>2N</td></tr>
<tr><td>≥0603</td><td>5N</td></tr>
</table>

</td></tr>
<tr><td>Temperature Cycle</td><td>
<table>
<tr><td>Item</td><td>I类</td><td>II类</td></tr>
<tr><td>ΔC/C</td><td>≤±1% or ±1pF，whichever is larger</td><td>-15% ~+15%</td></tr>
</table>
No visible damage.</td><td>Preheating conditions: up-category temperature, 1h
Recovery time: 24±1h
Initial Measurement
Cycling Times: 5 times, 1 cycle, 4 steps:
<table>
<tr><th>Step</th><th>（Temperature）（℃）</th><th>(Time)</th></tr>
<tr><td>1</td><td>(Low- category temp.):-55</td><td>30min</td></tr>
<tr><td>2</td><td>(Normal temp.)：+20℃</td><td>2～3min</td></tr>
<tr><td>3</td><td>(Up- category temp.)：+125</td><td>30min</td></tr>
<tr><td>4</td><td>(Normal temp.)：+20℃</td><td>2～3min</td></tr>
</table>
Recovery time after test:24±2h</td></tr>
<tr><td>Solderability</td><td>At least 95% of the terminal electrode is covered by new solder.Visual Appearance: No visible damage.</td><td colspan="2">Preheating conditions:80 to 120℃; 10~30s.
<table>
<tr><td>Pb-Sn soldering
Solder Temperature: 235±5℃
Duration: 2±0.5s</td><td>Lead-free soldering
Solder Temperature:235±5℃
Duration: 2±0.5s</td></tr>
</table></td></tr>
</table>

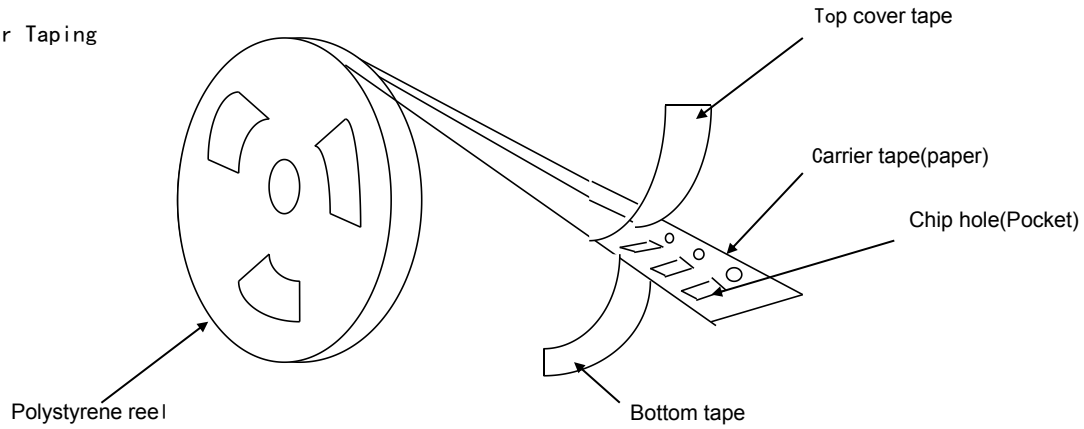
<table>
<tr><th>Item</th><th>Technical Specification</th><th>Test Method and Remarks</th></tr>
<tr><td>Humidity load</td><td>
<table>
<tr><td>ΔC/C</td><td colspan="2">Class Ⅰ: ±7.5% or ±0.75pF, whichever is larger.
Class Ⅱ: ≤±12.5%</td></tr>
<tr><td>DF</td><td colspan="2">Not more than twice of initial value.</td></tr>
<tr><td rowspan="2">IR</td><td>Class Ⅰ</td><td>Ri≥5000MΩ或 Ri•C_R≥50S whichever is smaller.</td></tr>
<tr><td>Class Ⅱ</td><td>Ri≥1000MΩ或 Ri•C_R≥10S whichever is smaller.</td></tr>
<tr><td colspan="3">Appearance: No visible damage.</td></tr>
</table>
</td><td>※ Pretreatment (Class II) : After preheating at 140℃~150℃ for 1h±10min, place at room temperature for 24±2h.
Temperature: 40±2℃
Humidity: 90~95%RH
Voltage: Rated Voltage
Duration: 500h
Recovery conditions: Room temperature
Recovery Time: 24h±2h
Class 2：0201≥47nF、0402≥33nF、0603≥1μF、0805≥4.7μF、1206≥10μF product need to keep in 150℃、1h after the test，and measurement to be made after being kept at room temperature for 24±2h.</td></tr>
<tr><td>Life Test</td><td>
<table>
<tr><td rowspan="2">ΔC/C</td><td>Class Ⅰ</td><td>≤±3%或±0.3pF, whichever is larger.</td></tr>
<tr><td>Class Ⅱ</td><td>-20% ~ +20%</td></tr>
<tr><td>DF</td><td colspan="2">Not more than twice of initial value.</td></tr>
<tr><td rowspan="2">IR</td><td>Class Ⅰ</td><td>Ri≥4000MΩ或 Ri•C_R≥40S whichever is smaller.</td></tr>
<tr><td>Class Ⅱ</td><td>Ri≥2000MΩ或 Ri•C_R≥50S whichever is smaller.</td></tr>
<tr><td colspan="3">Appearance: No visible damage.</td></tr>
</table>
</td><td>※ Pretreatment (ClassII) :After preheating at 140℃~150℃ for 1h±10min, place at room temperature for 24±2h.
Temperature:125℃(X7R)
Charge/Discharge Current:50mA max. Time:1000h.
Applied Voltage:1.Low voltage products (< 100V) 2 times rated operating voltage, except Table 1.
2. Medium and high pressure products:
100V≤Rated Voltage≤200V： 1.5 Multiple
200V＜Rated Voltage≤500V： 1.3 Multiple
500V＜Rated Voltage： 1.2 Multiple
Recovery Conditions: Room Temperature
Recovery Time: 24h±2h
Class 2：0201≥47nF、0402≥33nF、0603≥1μF、0805≥4.7μF、1206≥10μF product need to keep in 150℃、1h after the test，and measurement to be made after being kept at room temperature for 24±2h.
<table>
<tr><td colspan="4">(table 1)</td></tr>
<tr><td>Capacity</td><td>Test voltage</td><td>Capacity</td><td>Test voltage</td></tr>
<tr><td>0201≥10nF</td><td rowspan="3">1.5Ur</td><td>0805≥0.47uF</td><td rowspan="3">1.5Ur</td></tr>
<tr><td>0402≥47nF</td><td>1206≥1uF</td></tr>
<tr><td>0603≥220nF</td><td>1210≥1uF</td></tr>
</table>
</td></tr>
</table>

Note：
Pretreatment (only for class2 capacitor)Pretreatment (only for class2 capacitor) is a method to treat the capacitor before measurement. First, place the capacitor in the up-category temperature or other specified higher temperature environment for 1hour. Then recovery the capacitor at standard pressure conditions for 24±1hours。

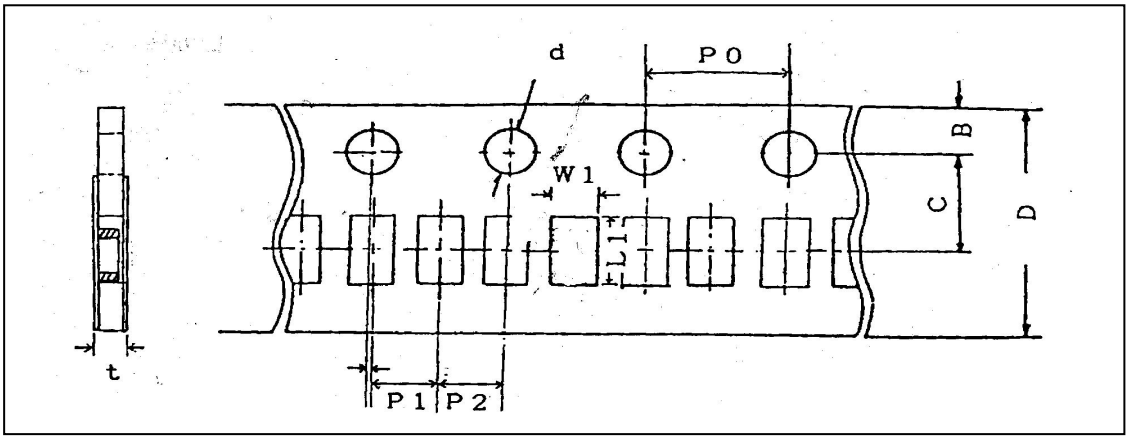
<table>
<tr><th>Item</th><th>Technical Specification</th><th>Test Method and Remarks</th></tr>
<tr><td>Dielectric Withstanding Voltage</td><td>No breakdown or damage.</td><td>
<table>
<tr><td>Ur＜100V</td><td>Measuring Voltage:
I class:300% Ur　　II class :250% Ur
Duration: 1~5s　　Charge/ Discharge Current: 50mA max.</td></tr>
<tr><td>100V≤Ur ＜500V</td><td>Force 200%Rated voltage for 5 second. Max..current should not exceed 50 mA.</td></tr>
<tr><td>500V≤Ur ≤1000V</td><td>Force 150%Rated voltage for 5 second. Max..current should not exceed 50 mA.</td></tr>
<tr><td>1000V＜Ur ≤2000V</td><td>Force 120%Rated voltage for 5 seconds. Max..current should not exceed 50 mA.</td></tr>
<tr><td>2000V＜Ur ≤5000V</td><td>Force 120%Rated voltage for 5 seconds. Max..current should not exceed 10 mA.</td></tr>
</table>
</td></tr>
</table>

◆ Package

＊ Paper Taping

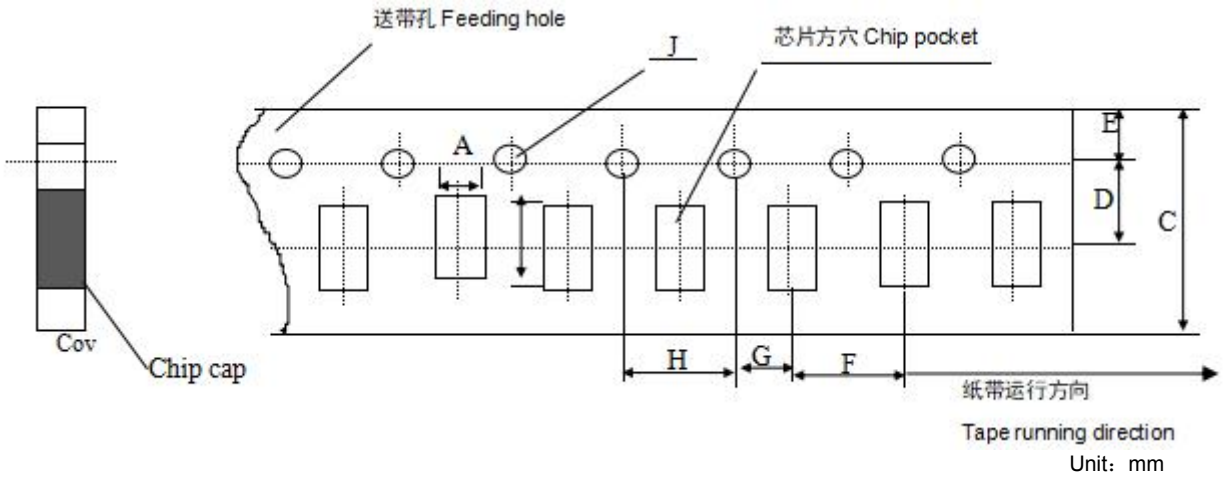


＊ Dimensions of paper taping for 0402 type



Code	W1	L1	D	C	B	P1	P2	P0	d	t
0402	0.65± 0.10	1.15± 0.10	8.00± 0.10	3.50± 0.05	1.75± 0.10	2.00± 0.05	2.00± 0.05	4.00±0 .10	1.50 -0/+0.10	0.80 Below

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

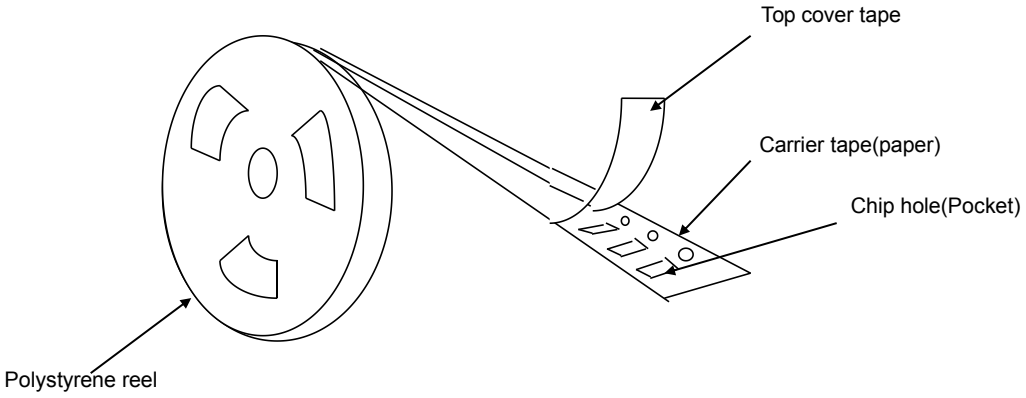


Unit：mm

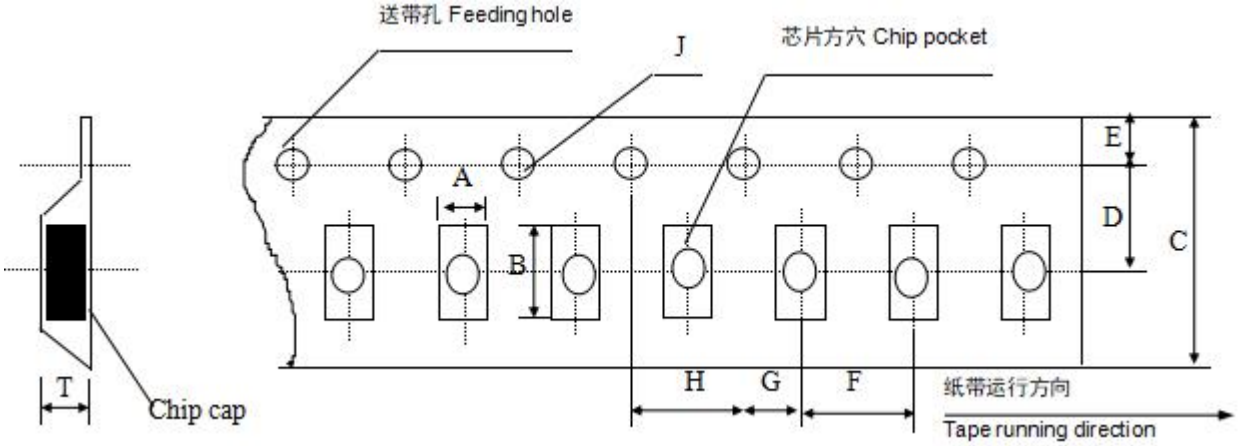
Code / paper size	A	B	C	D*	E	F	G*	H	J	T
0603	1.10 ±0.10	1.90 ±0.10	8.00 ±0.10	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max
0805	1.45 ±0.15	2.30 ±0.15	8.0 ±0.15	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max
1206	1.80 ±0.20	3.40 ±0.20	8.00 ±0.20	3.50 ±0.05	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.10	1.50 -0/+0.10	1.10 Max

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

* Embossed taping



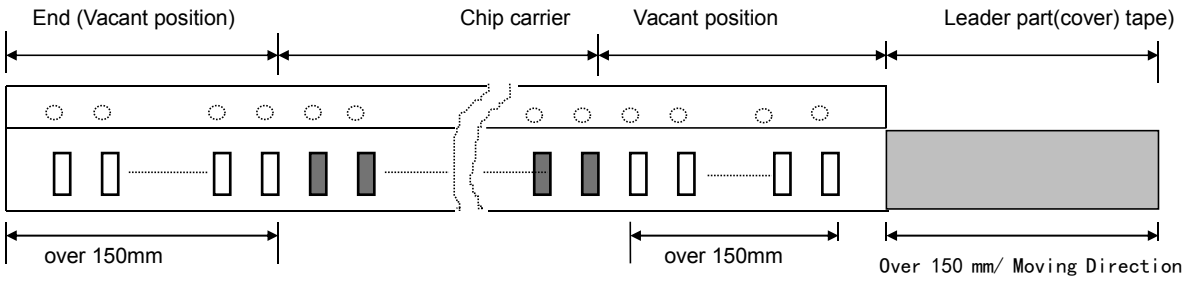
Dimensions of embossed taping for 0805~2225 type



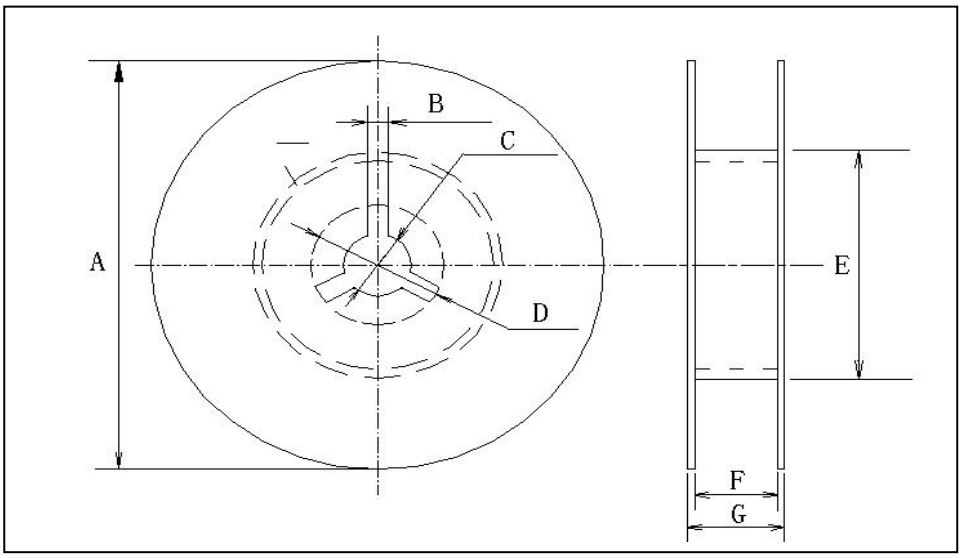
Code / Tape size	A	B	C	D*	E	F	G*	H	J	T
0805	1.55 ± 0.20	2.35 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	4.00 ± 0.10	1.50 -0/+0.10	1.50 Max
1206	1.95 ± 0.20	3.60 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.10	4.00 ± 0.1	1.50 -0/+0.10	1.85 Max
1210	2.70 ± 0.10	3.42 ± 0.10	8.00 ± 0.10	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.55 -0/+0.10	3.2 Max
1808	2.20 ± 0.10	4.95 ± 0.10	12.00 ± 0.10	5.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.50 -0/+0.10	3.0 Max
1812	3.66 ± 0.10	4.95 ± 0.10	12.00 ± 0.10	5.50 ± 0.05	1.75 ± 0.10	8.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.55 -0/+0.10	4.0 Max
2211/ 2220/2225	6.2 ±0.1	6.7 ±0.1	12.00 ± 0.10	5.50 ± 0.05	1.75 ± 0.10	8.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	1.55 -0/+0.10	2.4 ± 0.10

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

* Structure of leader part and end part of the carrier paper



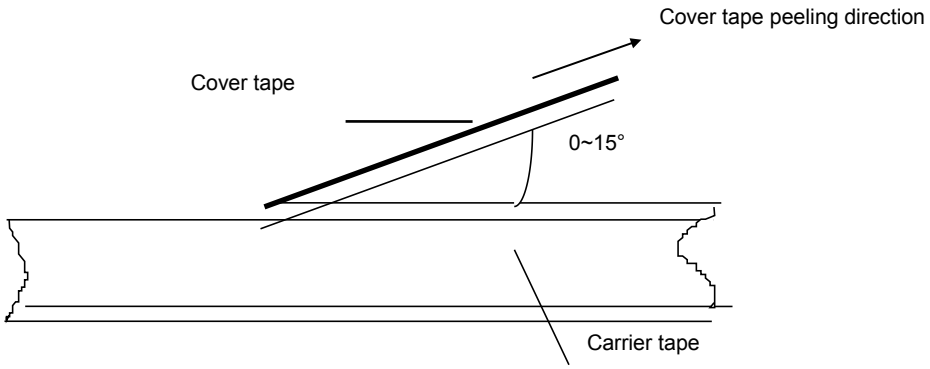
* Reel dimensions (unit: mm)



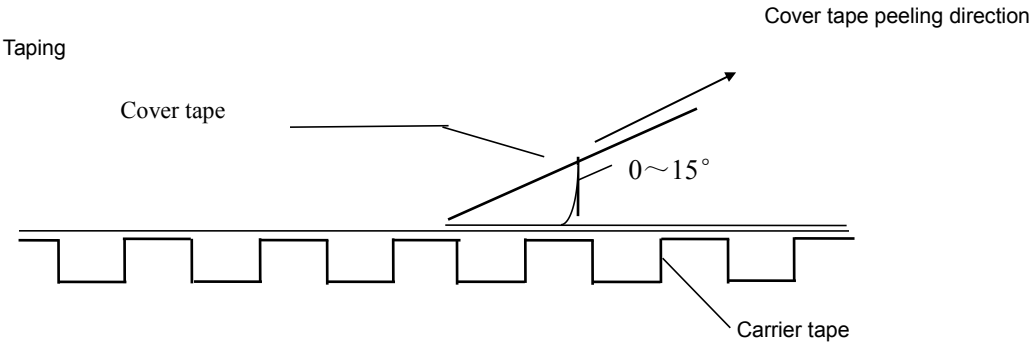
Reel type	A	B	C	D	E	F	G
7′REEL	φ178±2.0	3.0	φ13±0.5	φ21±0.8	φ50 or more	10.0±1.5	12max

* Taping specification：top tape peeling strength

* Paper Tapin



Embossed Taping



Standard: 0.1N < peeling strength < 0.7N
No paper dirty remains on the scotch when peeling, and sticks to top and bottom tape.

* Bulk Case Package

（unit）:mm

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

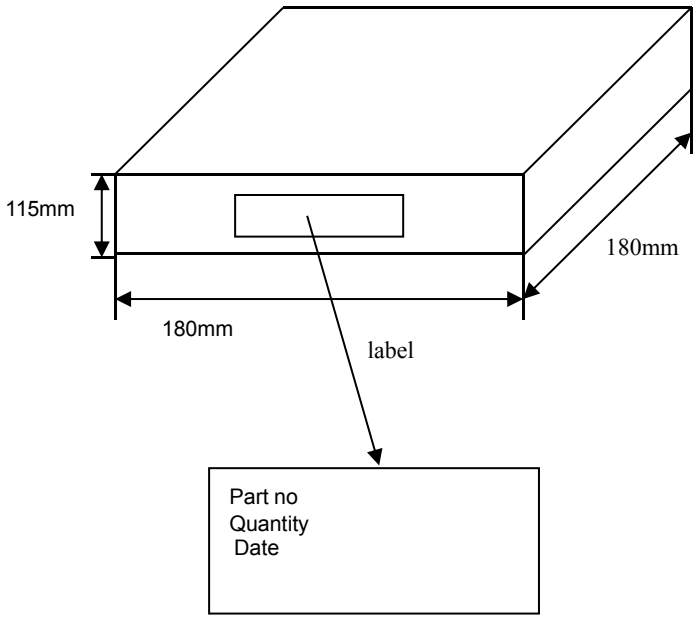
* Packing Quantity

(SIZE)	(Package Style & Quantity) unit: pcs				
	（EPT）	（PT）	（ET）	（BC）	（BP）
0402	------	10000	------	20000	5000
0603	------	4000	------	15000	5000
0805	------	4000	3000	10000	5000
1206	------	4000	T≤1.35mm 3000 T＞1.35mm 2000	5000	5000
1210	------	-------	T≤1.80mm 2000 T＞1.80mm 1000	-------	2000
1808	------	-------	2000	-------	2000
1812	------	--------	T≤1.85mm 1000 T＞1.85mm 500	-------	2000
2211、2220、2225	------	--------	500	-------	500

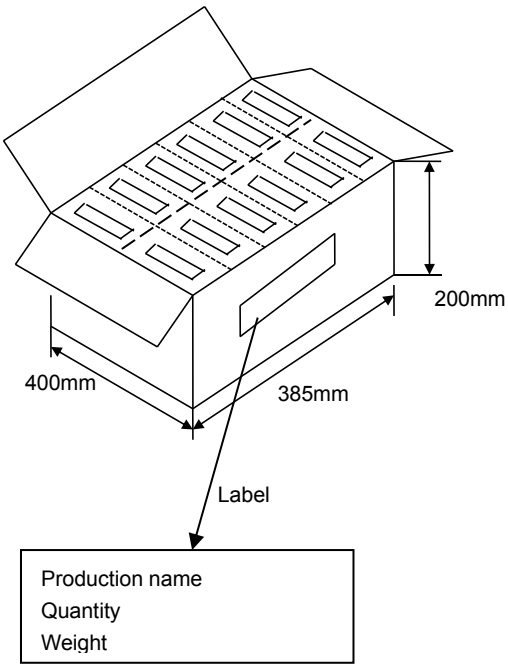
Note：We can choose packing style and quantity can be according to the customer’s requirement.

* **Outer packing**

The first package
Quantity: 10 reels



The second package
Quantity: 6 cases



◆ Storage Methods

* The guaranteed period for solderability is 12 months (Under deliver package condition).
* Storage conditions：
  Temperature 5~40℃ Relative Humidity 20~7

Precautions For Use

The Multi-layer Ceramic Capacitors (MLCC) may fail in a short circuit modern in an open circuit mode when subjected to severe conditions of electrical environment and / or mechanical stress beyond the specified “rating” and specified “conditions” in the specification, which will result in burn out, flaming or glowing in the worst case. Following “precautions for “safety” and Application Notes shall be taken in your major consideration. If you have a question about the precautions for handling, please contact our engineering section or factory.

* Soldering Profile

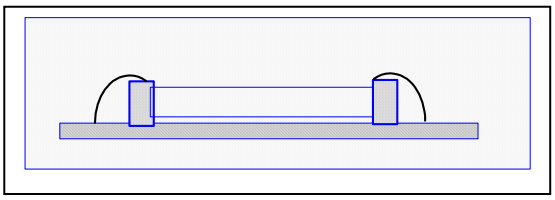
To avoid the crack problem by sudden temperature change, follow the temperature profile in the adjacent graph (refer to the graph in the enclosure page).

* Manual Soldering

Manual soldering can pose a great risk of creating thermal cracks in capacitors. The hot soldering iron tip comes into direct contact with the end terminations, and operator’s careless may cause the tip of the soldering iron to come into direct contact with the ceramic body of the capacitor. Therefore the soldering iron must be handled carefully, and pay much attention to the selection of the soldering iron tip and temperature contact of the tip.

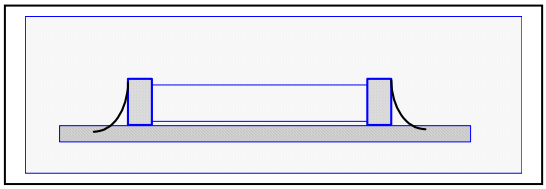
*Optimum Solder Amount for Reflow Soldering

Too much solder



Cracks tend to occur due to large stress.

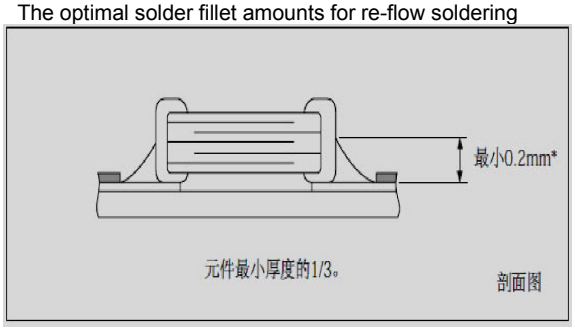
Not enough solder



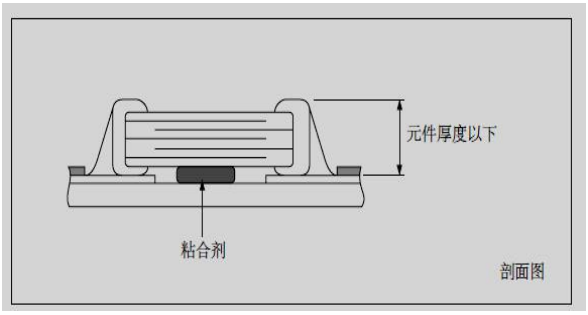
Weak holding force may cause badconnection between the capacitor and PCB.

* Recommended Soldering amounts

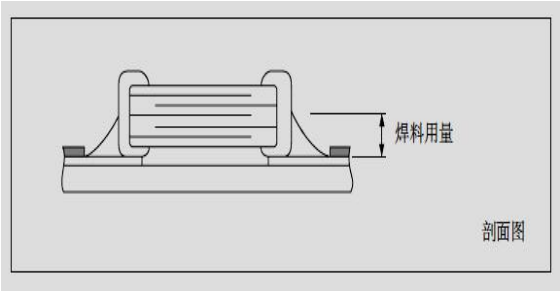
The optimal solder fillet amounts for re-flow soldering



The optimal solder fillet amounts for wave soldering



The optimal solder fillet amounts for reworking by using soldering iron



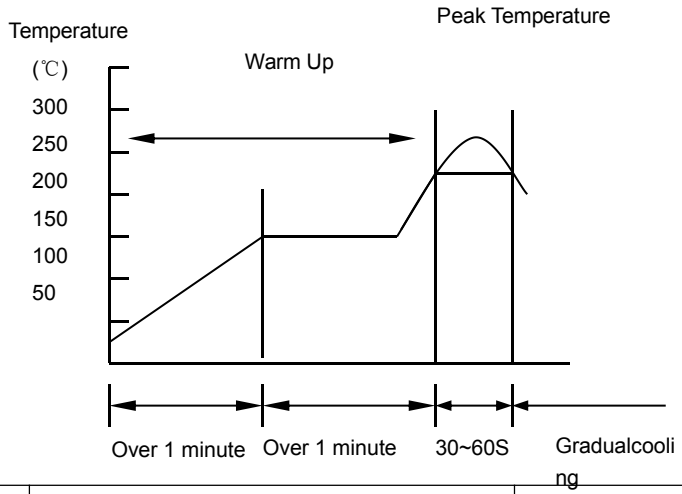
* Recommended Soldering Method

Size	Temperature Characteristics	RatedVoltage	Capacitance	Soldering Method
0402	X7R	/	/	R
0603	X7R	/	C≥1uf	R
		/	C＜1uf	R/W
0805	X7R	/	C≥4.7uf	R
		/	C＜4.7uf	R/W
1206	X7R	/	C≥10uf	R
			C＜10uf	R/W
≥1210	X7R	/	/	R

Soldering method： Reflow Solering Wave Soldering

◆ The temperature profile for soldering

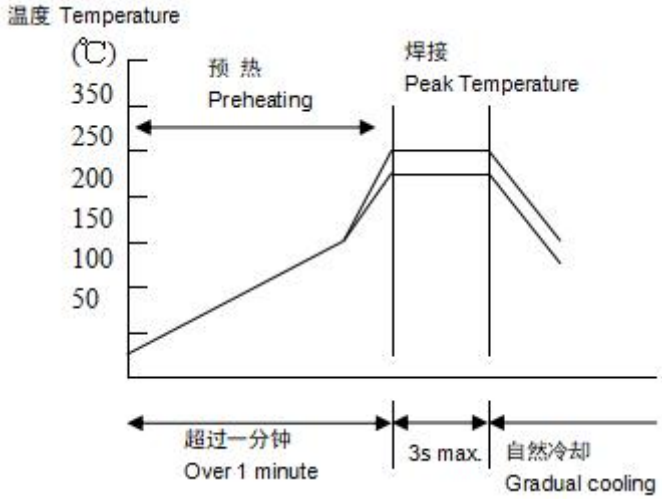
* （Re-flow soldering）



	Pb-Sn soldering	Lead-free soldering
Peak temperature	230℃～250℃	240℃～260℃

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

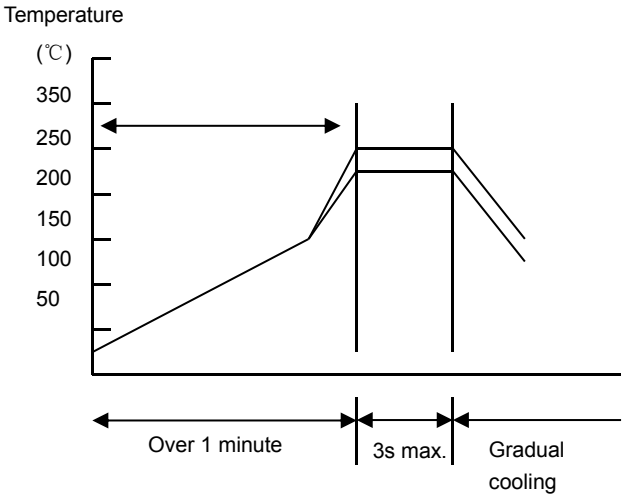
*（Wave soldering）



	Pb-Sn soldering	Lead-free soldering
Peak temperature	230℃～260℃	240℃～270℃

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

* Hand soldering



Conditions：

Preheating	Temperature of soldering iron head	Power of soldering iron	Diameter of soldering iron head	Soldering time	Solder paste amount	Restricted conditions
△≤130℃	Highest temperature:350℃	20W at the highest	1mm recommended	3s at the longest	≤1/2 chip thickness	Please avoid the derect contact between soldering iron head and ceramic components

*The contents of the latest version shall prevail