

# SPECIFICATION FOR APPROVAL

## 1. Application Field:

Application for coupling, wave filtering, resonant in high voltage circuits, such as switch power supplier, AC-DC power charger, DC-DC power charger, networking/Communication interface, LCD backlight unit power supplier, amperite of energy saving lamps, etc. (Medium and High voltage MLCC).

## 2. Testing condition:

2.1 Normal condition: (No special requirements)

(a) Temperature: 15~35℃ (b) Humidity: 45~75%RH (c) Normal atmosphere: 86~106kPa

2.2 Relative condition: Any testing data does not match testing specification, please test it base on below relative condition.

(a) Temperature: 25±2℃ (b) Humidity: 60~70%RH (c) Atmosphere: 86~106kPa

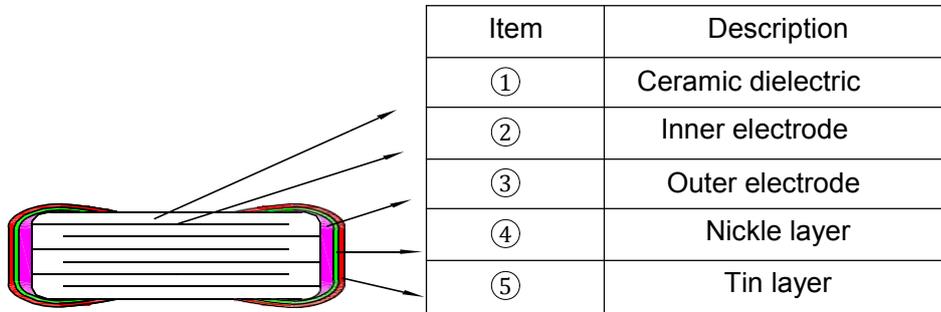
## 3. Part number description:

Example : 1812   X7R   684   M   251   N   T  
                   ①       ②       ③       ④       ⑤       ⑥       ⑦

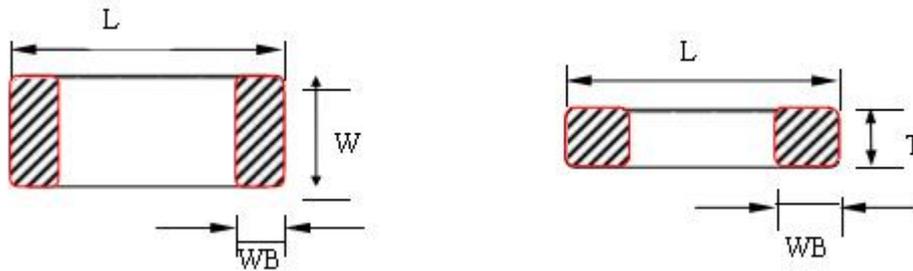
Item	Description					
①	Dimension	Code	0201	0402	0603	0805
		L*W (inch)	0.02*0.01	0.04*0.02	0.06*0.03	0.08*0.05
		L*W (mm)	0.50*0.25	1.00*0.50	1.60*0.80	2.00*1.25
		Code	1206	1210	1808	1812
		L*W (inch)	0.12*0.06	0.12*0.10	0.18*0.08	0.18*0.12
		L*W (mm)	3.20*1.60	3.20*2.50	4.50*2.00	4.50*3.20
		Code	1825	2211	2225	
		L*W (inch)	0.18*0.25	0.22*0.11	0.22*0.25	
		L*W (mm)	4.50*6.30	5.70*2.8	5.70*6.30	
②	Temperature characteristic: C0G (0±30 PPM/℃), X7R (±15%), X5R (±15%)					
③	Nominal electrostatic capacity: 8R0—8.0, 100—10, 101—100(pF)					
④	Tolerance of electrostatic capacity: B: ±0.1pF, C: ±0.25pF, D: ±0.5pF, F: ±1%, G: ±2%, J: ±5%, K: ±10%, M: ±20%, Z: +80%/-20%					
⑤	Rated voltage(DC): 250 — 25, 251 — 250, 252 — 2500 (V)					
⑥	Terminal composition: Au/Ag-Ni-Sn (From the inside out)					
⑦	Packing:	T	Tape/Reel			
		P	Bag packing(PE),			

## 4. Construction and Dimension:

☆ Construction:



☆ Dimension:



Part number		Dimension (mm)			
British system	Metric system	L	W	T	WB
0201	0603	0.60±0.10	0.30±0.05	0.30±0.05	0.10±0.05
0402	1005	1.00±0.15	0.50±0.15	0.50±0.10	0.20±0.10
0603	1608	1.60±0.20	0.80±0.15	0.80±0.15	0.30±0.10
0805	2012	2.00±0.20	1.25±0.20	0.60±0.10 0.80±0.20 1.00±0.20 1.25±0.20	0.50±0.20
1206	3216	3.20±0.30	1.60±0.30	0.80±0.20 1.00±0.20 1.25±0.20 1.60±0.30	0.60±0.30
1210	3225	3.20±0.30	2.50±0.30	≤2.70	0.80±0.30
1808	4520	4.50±0.40	2.00±0.20	≤2.70	0.80±0.30
1812	4532	4.50±0.40	3.20±0.30	≤3.50	0.80±0.30
1825	4563	4.50±0.40	6.30±0.50	≤3.50	0.80±0.30
2220	5750	5.70±0.50	5.00±0.50	≤3.50	1.00±0.40
2225	5763	5.70±0.50	6.30±0.50	≤6.20	1.00±0.40

## 5. Specification and testing method:

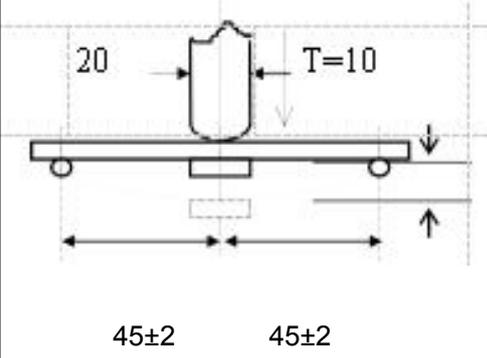
No	Item	Specification/Requirement	Testing method																		
1	Temperature	-55~+125℃																			
2	Visual/ Dimension	1, No Damage 2, Dimension meet Spec	Naked eye (Visual inspection) Digital calliper																		
3	Static capacity	Meet standard specification and tolerance	① NPO characteristic : <table border="1" data-bbox="849 645 1375 824"> <thead> <tr> <th>Capacity</th> <th>Frequency</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>≤1000pF</td> <td>1MHz±10%</td> <td>1.0±0.2Vrms</td> </tr> <tr> <td>&gt; 1000 pF</td> <td>1KHz±10%</td> <td></td> </tr> </tbody> </table> ② X7R/X7T/X7P characteristic: <table border="1" data-bbox="849 904 1385 1111"> <thead> <tr> <th>Capacity</th> <th>Frequency</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>≤10uF</td> <td>1KHz±10%</td> <td>1.0±0.2Vrms</td> </tr> <tr> <td>&gt; 10uF</td> <td>120Hz±24</td> <td>0.5±0.1Vrms</td> </tr> </tbody> </table>	Capacity	Frequency	Voltage	≤1000pF	1MHz±10%	1.0±0.2Vrms	> 1000 pF	1KHz±10%		Capacity	Frequency	Voltage	≤10uF	1KHz±10%	1.0±0.2Vrms	> 10uF	120Hz±24	0.5±0.1Vrms
Capacity	Frequency	Voltage																			
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> 1000 pF	1KHz±10%																				
Capacity	Frequency	Voltage																			
≤10uF	1KHz±10%	1.0±0.2Vrms																			
> 10uF	120Hz±24	0.5±0.1Vrms																			
4	Dissipation factor (DF)	NPO Characteristic: $DF \leq 0.56$ , $Cr < 5 \text{ pF}$ $DF \leq 1.5[(150/Cr)+7] \times 10^{-4}$ $(5 \text{ pF} \leq Cr < 50 \text{ pF})$ $DF \leq 0.15\%$ , $(50 \text{ pF} \leq Cr)$	$Cr \leq 1000 \text{ pF}$ , Testing frequency $1 \pm 10\% \text{ MHz}$ , Testing voltage $1 \text{ V} \pm 0.2 \text{ rms}$  $Cr > 1000 \text{ pF}$ , Testing frequency $1 \pm 10\% \text{ KHz}$ , Testing voltage $1 \text{ V} \pm 0.2 \text{ rms}$ .																		
		X7R/X7T/X7P characteristic: see Note 1	$Cr \leq 10 \text{ uF}$ , Test frequency $1 \pm 10\% \text{ KHz}$ , Voltage $1 \text{ V} \pm 0.1 \text{ rms}$ . $Cr > 10 \text{ uF}$ , Frequency $120 \pm 24 \text{ Hz}$ , Voltage $0.5 \text{ V} \pm 0.1 \text{ rms}$																		
5	IR Insulation Resistance	NPO Characteristic: $IR \geq 50000 \text{ M}\Omega$ , $C \leq 10 \text{ nF}$ $IR * Cr \geq 500 \text{ S}$ , $C > 10 \text{ nF}$  X7R/X7T/X7P Characteristic : $IR \geq 10000 \text{ M}\Omega$ , $C \leq 25 \text{ nF}$ $IR * Cr \geq 100 \text{ S}$ , $C > 25 \text{ nF}$	Testing condition : Rated voltage Time: $60 \pm 5 \text{ s}$ Humidity: $\leq 75\%$ Temperature: $25 \pm 5^\circ \text{ C}$ Current : $\leq 50 \text{ mA}$																		
6	Hi-pot (DC)	No dielectric breakdown or damage	$Ur = 100 \text{ V}$ , ..... 2.5 x rated voltage $Ur = 200 \text{ V} / 250 \text{ V}$ , ..... 2.0 x rated voltage $Ur = 450 / 500 / 630 \text{ V}$ , 1.5 x rated voltage $1 \text{ KV} \leq Ur \leq 2 \text{ KV}$ , ..... 1.2 x rated voltage $2 \text{ KV} < Ur$ , ..... 1.1 x rated voltage Voltage Raising time: 1~10S, Voltage maintaining time: 2S																		

Note1: X7R/X5R/X6S/X7S

Rated vol.	DF	Exception of D.F. $\leq$	
$\geq 100V$	$\leq 2.5\%$	$\leq 3\%$	1206 $\geq 0.47\mu F$
		$\leq 5\%$	0805 $> 0.1\mu F$ ; 0603 $\geq 0.068\mu F$ ; 1206 $> 1\mu F$ ; 1210 $\geq 2.2\mu F$ ;
		$\leq 10\%$	0805 $> 0.22\mu F$ ; 1210 $\geq 3.3\mu F$
50V	$\leq 2.5\%$	$\leq 3\%$	0201 (50V); 0603 $\geq 0.047\mu F$ ; 0805 $\geq 0.18\mu F$ ; 1206 $\geq 0.47\mu F$
		$\leq 5\%$	0201 $\geq 0.01\mu F$ ; 1210 $\geq 4.7\mu F$
		$\leq 10\%$	0402 $\geq 0.012\mu F$ ; 0603 $> 0.1\mu F$ ; 0805 $\geq 1\mu F$ ; 1206 $\geq 2.2\mu F$ ; 1210 $\geq 10\mu F$ ;
35V	$\leq 3.5\%$	$\leq 10\%$	0603 $\geq 1\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 2.2\mu F$ ; 1210 $\geq 10\mu F$
25V	$\leq 3.5\%$	$\leq 5\%$	0201 $\geq 0.01\mu F$ ; 0805 $\geq 1\mu F$ ; 1210 $\geq 10\mu F$
		$\leq 7\%$	0603 $\geq 0.33\mu F$ ; 1206 $\geq 4.7\mu F$
		$\leq 10\%$	0201 $\geq 0.1\mu F$ ; 0402 $\geq 0.10\mu F$ ; 0603 $\geq 0.47\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 6.8\mu F$ ; 1210 $\geq 22\mu F$ ;
		$\leq 12.5\%$	0402 $\geq 0.47\mu F$
16V	$\leq 3.5\%$	$\leq 5\%$	0201 $\geq 0.01\mu F$ ; 0402 $\geq 0.033\mu F$ ; 0603 $\geq 0.15\mu F$ ; 0805 $\geq 0.68\mu F$ ; 1206 $\geq 2.2\mu F$ ; 1210 $\geq 4.7\mu F$
		$\leq 10\%$	0201 $\geq 0.1\mu F$ (0201/X7R $\geq 0.022\mu F$ ); 0402 $\geq 0.22\mu F$ ; 0603 $\geq 1206 \geq 4.7\mu F$ ; 1210 $\geq 22\mu F$ ;
10V	$\leq 5\%$	$\leq 10\%$	0201 $\geq 0.012\mu F$ ; 0402 $\geq 0.33\mu F$ (0402/X7R $\geq 0.22\mu F$ ); 0603 $\geq 0.33\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 2.2\mu F$ ; 1210 $\geq 22\mu F$
		$\leq 15\%$	0201 $\geq 0.1\mu F$ ; 0402 $\geq 1\mu F$
6.3V	$\leq 10\%$	$\leq 15\%$	0201 $\geq 0.1\mu F$ ; 0402 $\geq 1\mu F$ ; 0603 $\geq 10\mu F$ ; 0805 $\geq 4.7\mu F$ ; 1206 $\geq 47\mu F$ ; 1210 $\geq 100\mu F$ ;
		$\leq 20\%$	0402 $\geq 2.2\mu F$
4V	$\leq 15\%$	---	---

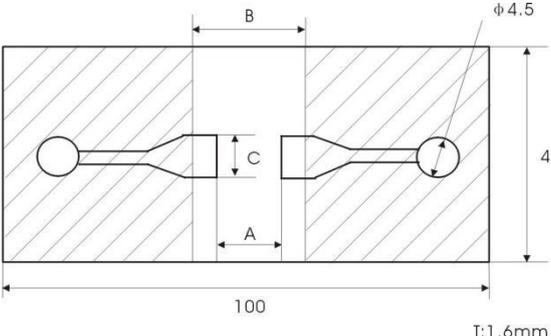
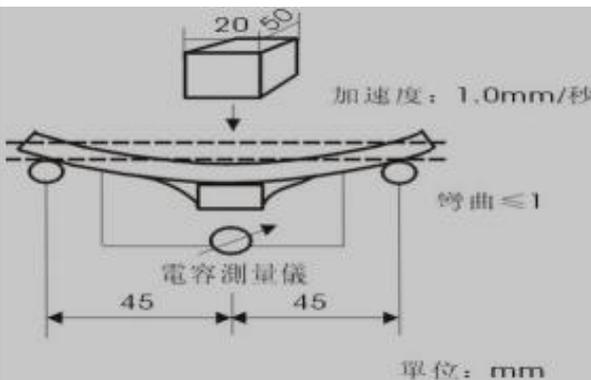
Y5V

Rated vol.	DF	Exception of D.F. $\leq$	
$\geq 50V$	$\leq 5\%$	$\leq 7\%$	0603 $\geq 0.1\mu F$ ; 0805 $\geq 0.47\mu F$ ; 1206 $\geq 4.7\mu F$ ;
		$\leq 12.5\%$	1210 $\geq 6.8\mu F$
35V	$\leq 7\%$	---	---
25V	$\leq 5\%$	$\leq 7\%$	0402 $\geq 0.047\mu F$ ; 0603 $\geq 0.1\mu F$ ; 0805 $\geq 0.33\mu F$ ; 1206 $\geq 1\mu F$ ; 1210 $\geq 4.7\mu F$
		$\leq 9\%$	0402 $\geq 0.068\mu F$ ; 0603 $\geq 0.47\mu F$ ; 1206 $\geq 4.7\mu F$ ; 1210 $\geq 22\mu F$ ;
16V (C $< 1.0\mu F$ )	$\leq 7\%$	$\leq 9\%$	0402 $\geq 0.068\mu F$ ; 0603 $\geq 0.68\mu F$
		$\leq 12.5\%$	0402 $\geq 0.22\mu F$
16V (C $\geq 1.0\mu F$ )	$\leq 9\%$	$\leq 12.5\%$	0603 $\geq 2.2\mu F$ ; 0805 $\geq 3.3\mu F$ ; 1206 $\geq 10\mu F$ ; 1210 $\geq 22\mu F$ ; 1812 $\geq 47\mu F$ ;
10V	$\leq 12.5\%$	$\leq 20\%$	0402 $\geq 0.47\mu F$
6.3V	$\leq 20\%$	---	---

No	Item	Specification	Testing method	
7	Solderability	<ul style="list-style-type: none"> <li>■ soldering area≥90%</li> <li>■ Visual-No damage</li> </ul>	Pre-heating temperature 80-120℃, time 10-30s, lead free solder, flux	
			Soldering temperature	245±5℃
			Solder time	2±0.5s
8	Resistance to the heat of soldering	Visual	Visual-No damage, soldering area≥90%	
		Electrostatic capacity change rate	NPO Characteristic: $ \Delta C/C  \leq 0.5\%$ or $\pm 0.5\text{pF}$ larger reading X7R : $ \Delta C/C  \leq 15\%$ X7T : -33% $\leq \Delta C/C \leq 22\%$ X7P : $ \Delta C/C  \leq 10\%$	
		DF	Refer to NO#4	
		IR	Refer to NO#5	
9	Flexural strength	Visual	No damage	
		Electrostatic capacity change rate	$ \Delta C/C  \leq 10\%$  	
10	Terminal bonding strength	No visual damage	Applied Force: 5N Duration: 10±1S	

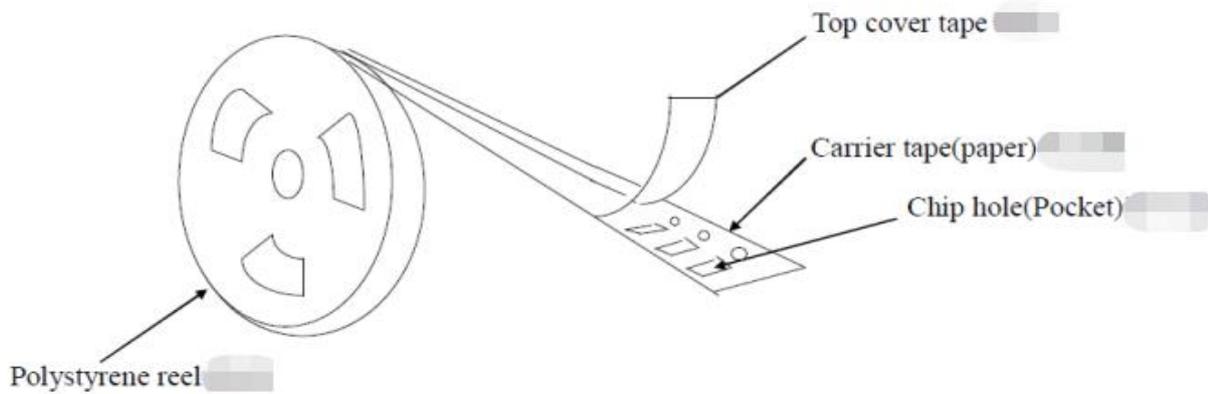
No	Testing item	Specification	Testing method																			
11	Thermal shock	NPO Characteristic;   $\Delta C/C$   $\leq 2.5\%$ 或 0.25pF (larger reading) X7R/X7P- characteristic:   $\Delta C/C$   $\leq 0.5\%$ X7T characteristic:   $\Delta C/C$   $\leq 10\%$	Pre-condition(X7R h characteristic):Upper limit temperature 1hour, place 24 $\pm$ 1 hours, start to testing. Run 5cycles Thermal shock. <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature<math>^{\circ}C</math></th> <th>time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Lower limit temperature</td> <td>30<math>\pm</math>3 m</td> </tr> <tr> <td>2</td> <td>Normal temp &amp; humidity</td> <td>2~3 m</td> </tr> <tr> <td>3</td> <td>Upper limit temperature</td> <td>30<math>\pm</math>3 m</td> </tr> <tr> <td>4</td> <td>Normal temp &amp; humidity</td> <td>2~3 m</td> </tr> </tbody> </table> Test it after place24 $\pm$ 2hours normal temp & humidity	Step	Temperature $^{\circ}C$	time	1	Lower limit temperature	30 $\pm$ 3 m	2	Normal temp & humidity	2~3 m	3	Upper limit temperature	30 $\pm$ 3 m	4	Normal temp & humidity	2~3 m				
Step	Temperature $^{\circ}C$	time																				
1	Lower limit temperature	30 $\pm$ 3 m																				
2	Normal temp & humidity	2~3 m																				
3	Upper limit temperature	30 $\pm$ 3 m																				
4	Normal temp & humidity	2~3 m																				
12	Temperature moisture exposure	<table border="1"> <tr> <td>Visual</td> <td>No visual damage</td> </tr> <tr> <td>electrostatic capacitance change rate</td> <td>NPO characteristic:   <math>\Delta C/C</math>   <math>\leq 2\%</math> or 1pF (larger reading ) X7R/X7T/X7P characteristic:   <math>\Delta C/C</math>   <math>\leq 10\%</math></td> </tr> <tr> <td>DF</td> <td><math>\leq 2</math> times initial standard</td> </tr> <tr> <td>IR</td> <td>NPO characteristic: IR<math>\geq 2500M\Omega</math> or IR*Cr<math>\geq 25S</math> (Lower reading) X7R/X7T/X7P : IR<math>\geq 1000M\Omega</math> or IR*Cr<math>\geq 25S</math> (Lower reading)</td> </tr> </table>	Visual	No visual damage	electrostatic capacitance change rate	NPO characteristic:   $\Delta C/C$   $\leq 2\%$ or 1pF (larger reading ) X7R/X7T/X7P characteristic:   $\Delta C/C$   $\leq 10\%$	DF	$\leq 2$ times initial standard	IR	NPO characteristic: IR $\geq 2500M\Omega$ or IR*Cr $\geq 25S$ (Lower reading) X7R/X7T/X7P : IR $\geq 1000M\Omega$ or IR*Cr $\geq 25S$ (Lower reading)	<table border="1"> <tr> <td>Temperature</td> <td>40<math>\pm 2^{\circ}C</math></td> </tr> <tr> <td>Humidity</td> <td>90~95%RH</td> </tr> <tr> <td>time</td> <td>500<math>\pm</math>24 hours</td> </tr> </table> Test it after place24 $\pm$ 2hours normal temp & humidity	Temperature	40 $\pm 2^{\circ}C$	Humidity	90~95%RH	time	500 $\pm$ 24 hours					
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Temperature	40 $\pm 2^{\circ}C$																					
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13	High temperature exposure	<table border="1"> <tr> <td>Visual</td> <td>No visual damage</td> </tr> <tr> <td>electrostatic capacitance change rate</td> <td>NPO :   <math>\Delta C/C</math>   <math>\leq 2\%</math> or 1pF (larger reading) X7R/X7T/X7P:   <math>\Delta C/C</math>   <math>\leq 20\%</math></td> </tr> <tr> <td>DF</td> <td><math>\leq 2</math> X initial standard</td> </tr> <tr> <td>IR</td> <td>NPO : IR<math>\geq 4000M\Omega</math> or IR*Cr<math>\geq 40S</math> (Lower reading) X7R/X7T/X7P : IR<math>\geq 2000M\Omega</math> or IR*Cr<math>\geq 50S</math> (Lower reading)</td> </tr> </table>	Visual	No visual damage	electrostatic capacitance change rate	NPO :   $\Delta C/C$   $\leq 2\%$ or 1pF (larger reading) X7R/X7T/X7P:   $\Delta C/C$   $\leq 20\%$	DF	$\leq 2$ X initial standard	IR	NPO : IR $\geq 4000M\Omega$ or IR*Cr $\geq 40S$ (Lower reading) X7R/X7T/X7P : IR $\geq 2000M\Omega$ or IR*Cr $\geq 50S$ (Lower reading)	Charging and discharging current 50mA Max. <table border="1"> <tr> <td>Temperature</td> <td>125<math>\pm 3^{\circ}C</math></td> </tr> <tr> <td>Time</td> <td>1000<math>\pm 48</math> hours</td> </tr> <tr> <td rowspan="3">Voltage</td> <td>100V<math>\leq V \leq 250V</math></td> <td>2x Rated voltage</td> </tr> <tr> <td>250V<math>&lt; V &lt; 1KV</math></td> <td>1.5x rated voltage</td> </tr> <tr> <td>1KV<math>\leq V</math></td> <td>1.2x rated voltage</td> </tr> </table> Test it after place 48hours under normal pressure & temperature	Temperature	125 $\pm 3^{\circ}C$	Time	1000 $\pm 48$ hours	Voltage	100V $\leq V \leq 250V$	2x Rated voltage	250V $< V < 1KV$	1.5x rated voltage	1KV $\leq V$	1.2x rated voltage
Visual	No visual damage																					
electrostatic capacitance change rate	NPO :   $\Delta C/C$   $\leq 2\%$ or 1pF (larger reading) X7R/X7T/X7P:   $\Delta C/C$   $\leq 20\%$																					
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Time	1000 $\pm 48$ hours																					
Voltage	100V $\leq V \leq 250V$	2x Rated voltage																				
	250V $< V < 1KV$	1.5x rated voltage																				
	1KV $\leq V$	1.2x rated voltage																				

Note: NO3, 11, 12, 13 initial capacitance testing: Pre-heating 150 $^{\circ}C$  1hour, then place 48hours under normal pressure & temperature .

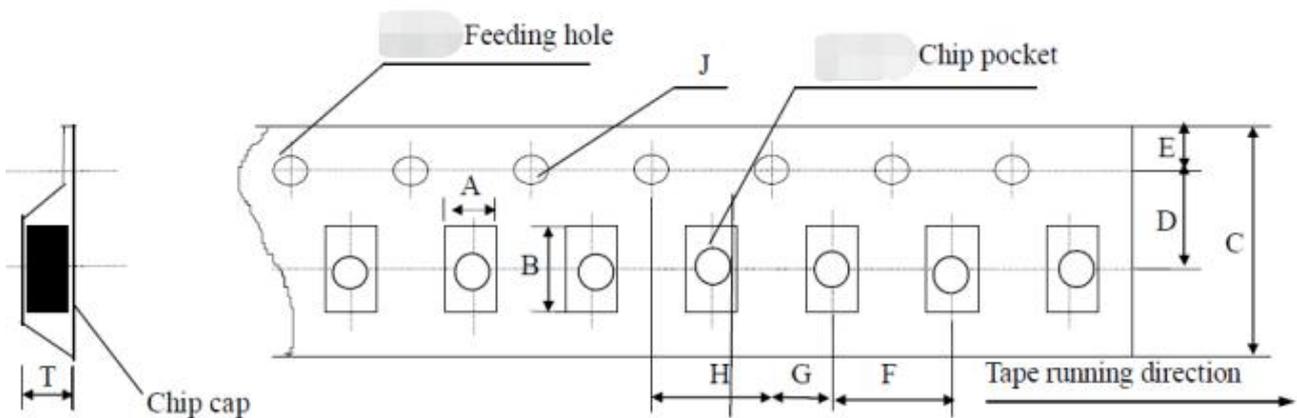
No	Item	Specification	Testing method																					
14	PCB flexural strength	No crack and other defect	<p>IR Soldering the MLCC on the PCB (Photo1), Then pressing direction base on the photo 2.</p>  <p>T:1.6mm</p>																					
			<table border="1"> <thead> <tr> <th>SIZE</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>0805(2012)</td> <td>1.2</td> <td>4</td> <td>1.65</td> </tr> <tr> <td>1206(3216)</td> <td>2.2</td> <td>5</td> <td>2</td> </tr> <tr> <td>1210(3225)</td> <td>2.2</td> <td>5</td> <td>2.9</td> </tr> <tr> <td>1812(4532)</td> <td>3.5</td> <td>7</td> <td>3.7</td> </tr> <tr> <td>2220(5750)</td> <td>4.5</td> <td>8</td> <td>5.6</td> </tr> </tbody> </table>	SIZE	A	B	C	0805(2012)	1.2	4	1.65	1206(3216)	2.2	5	2	1210(3225)	2.2	5	2.9	1812(4532)	3.5	7	3.7	2220(5750)
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1812(4532)	3.5	7	3.7																					
2220(5750)	4.5	8	5.6																					
			 <p>单位: mm</p>																					

## 6 EMBOSSED PLSATIC TAPING

### ☆EMBOSSSED TAPING



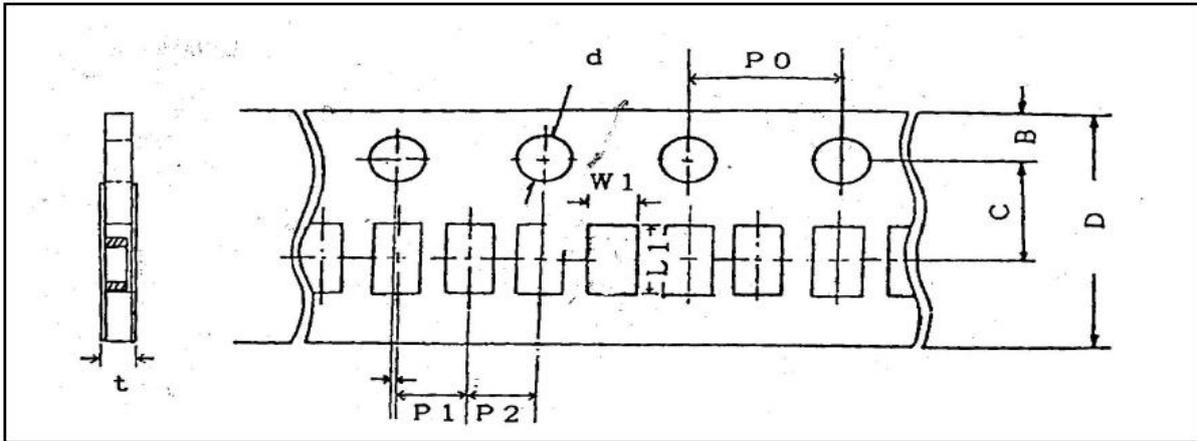
### ☆Embossed tape reel packing for 0805(2012)~1812(4532) type



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

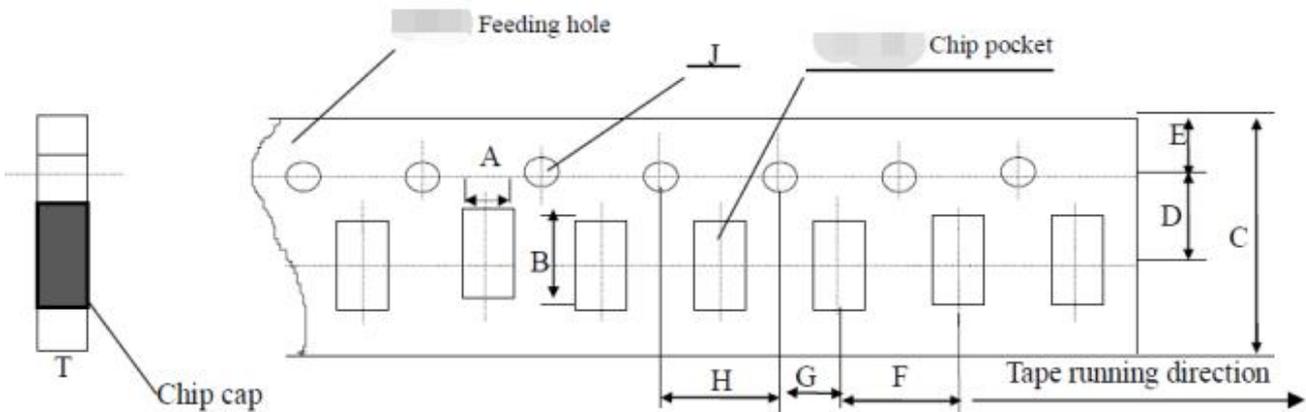
☆ Paper tape reel packing for 1005 (0402) ~1206 (3216)

(1) Paper tape reel packing for 1005、0201、0402 type



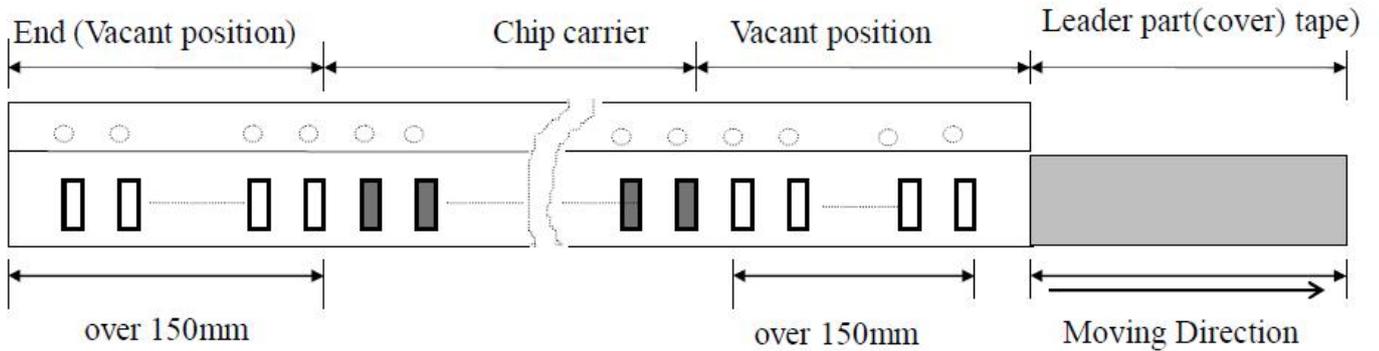
Code Papersize	W1	L1	D	C	B	P1	P2	P0	d	t
1005	0.24±	0.45±	8.00±	3.50±	1.75±	2.00±	2.00±	4.00±	1.50	0.30
	0.02	0.02	0.10	0.05	0.10	0.05	0.05	0.10	-0/+0.10	Below
0201	0.37±	0.67±	8.00±	3.50±	1.75±	2.00±	2.00±	4.00±	1.50	0.80
	0.10	0.10	0.10	0.05	0.10	0.05	0.05	0.10	-0/+0.10	Below
0402	0.65±	1.15±	8.00±	3.50±	1.75±	2.00±	2.00±	4.00±	1.50	0.80
	0.10	0.10	0.10	0.05	0.10	0.05	0.05	0.10	-0/+0.10	Below

(2) Paper tape reel packing for 0603, 0805, 1206 types

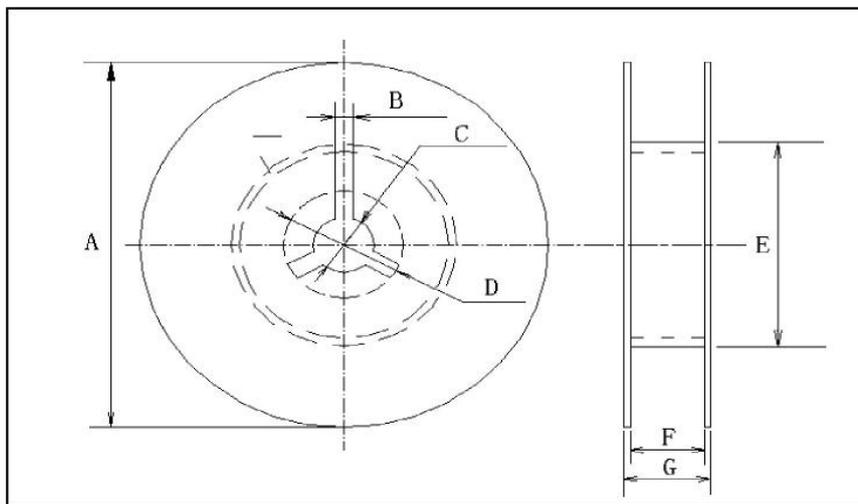


Code Papersize	A	B	C	D	E	F	G	H	J	T
0603	1.10	1.90	8.00	3.50	1.75	4.00	2.00	4.00	1.50	1.10
	±0.10	±0.10	±0.10	±0.05	±0.10	±0.10	±0.10	±0.10	-0/+0.10	Max
0805	1.45	2.30	8.00	3.50	1.75	4.00	2.00	4.00	1.50	1.10
	±0.15	±0.15	±0.15	±0.05	±0.10	±0.10	±0.10	±0.10	-0/+0.10	Max
1206	1.80	3.40	8.00	3.50	1.75	4.00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

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



☆ Reel Dimensions (unit: mm)



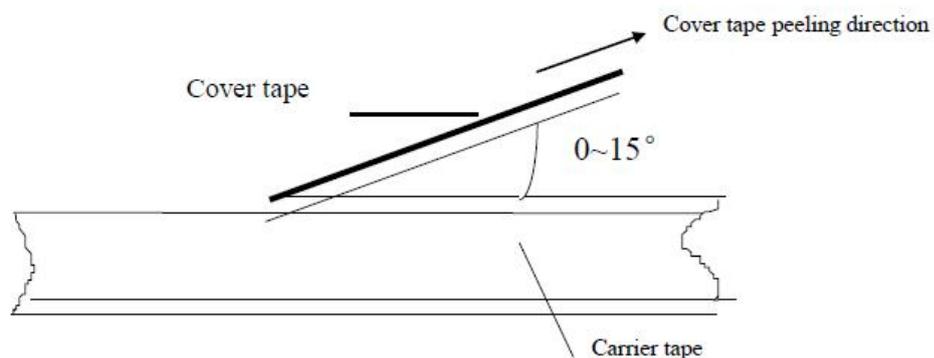
Unit:mm

Reel type	A	B	C	D	E	F	G
7' REEL	$\phi 178 \pm 2.0$	3.0	$\phi 13 \pm 0.5$	$\phi 21 \pm 0.5$	$\phi 21$ or Bigger	$\phi 10 \pm 10.5$	12max
13' REEL	$\phi 330 \pm 2.0$	3.0	$\phi 13 \pm 0.5$	$\phi 21 \pm 0.5$	$\phi 21$ or Bigger	$\phi 10 \pm 10.5$	12max

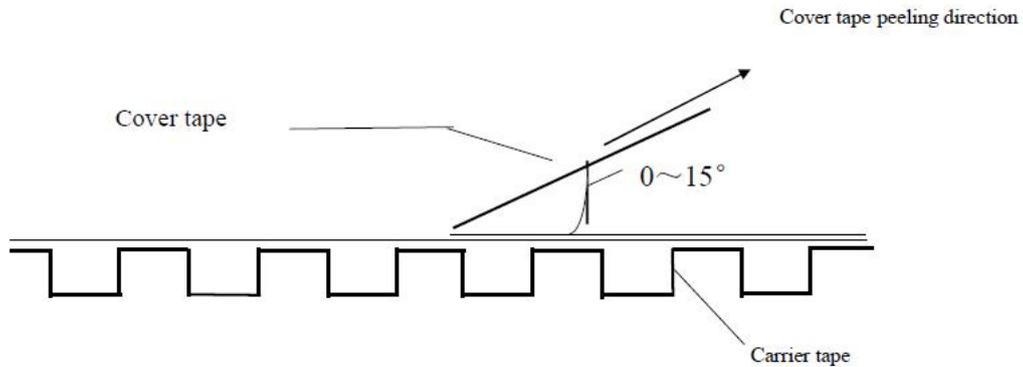
☆ Taping specification

※ Top tape peeling strength

(a) Paper Taping



(b) 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.

☆Packing quantity

Dimension	0603	0805	1206	1210	1808	1812	1812以上
Paper T/R (Pcs)	4000	4000	—	—	—	—	—
Plastic T/R (Pcs)	—	3000	T≤1.35mm 3000 T>1.35mm 2000	T≤1.60mm 3000 T>1.60mm 2000	1000	T≤1.85mm 1000 T>1.85mm 800	500

7、ROHS/REACH compliance:

7.1、RoHS : meet the standard

7.2、REACH : meet the standard

8 Precautions For Use

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

1. Soldering Profile

To avoid the crack problem by sudden temperature change, follow the temperature profile in

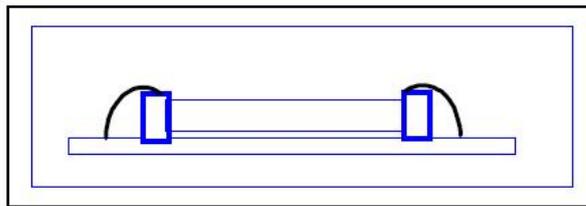
the adjacent graph (refer to the graph in the enclosure page).

## 2. 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.

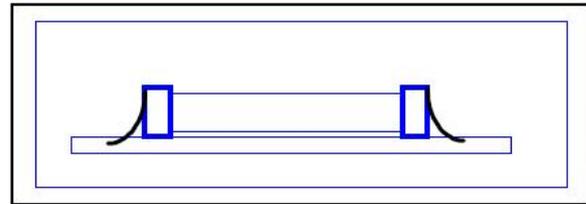
## 3. Optimum Solder Amount for Reflow Soldering

Too much solder



Cracks tend to occur due to large stress.

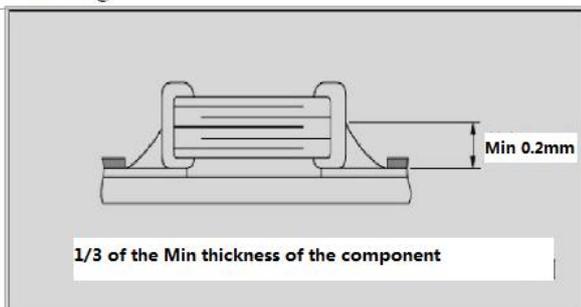
Not enough solder



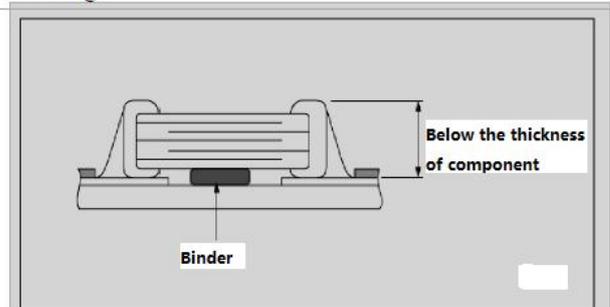
Weak holding force may cause bad connection between the capacitor and PCB.

## 4. Recommended Soldering amounts

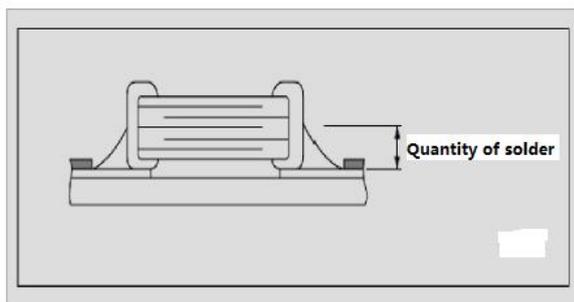
### 4.1 The optimal solder fillet amounts for re-flow soldering



### 4.2 The optimal solder fillet amounts for wave soldering



### 4.3 The optimal solder fillet amounts for reworking by using soldering iron



## 9 Recommended Soldering Method

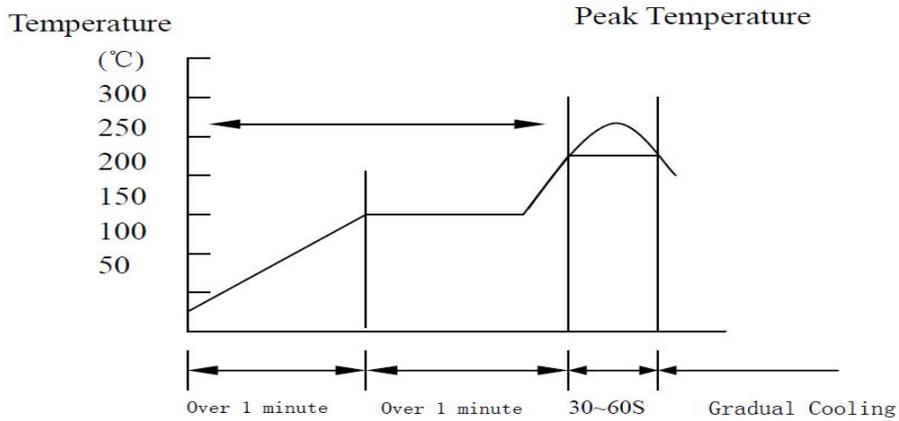
Size	Temperature Characteristics	Rated Voltage	Capacitance	Soldering Method
1005	NPO	/	/	R
	X7R/X5R/X7S/X6S	/	/	R
0201	NPO	/	/	R
	X7R/X5R/X7S/X6S	/	/	R
	Y5V	/	/	R
0402	NPO	/	/	R
	X7R/X5R/X7S/X6S	/	/	R
	Y5V	/	/	R
0603	NPO	/	/	R/W
	X7R/X5R/X7S/X6S	/	$C \geq 1\mu\text{f}$	R
			$C < 1\mu\text{f}$	R/W
	Y5V	/	$C \geq 1\mu\text{f}$	R
$C < 1\mu\text{f}$			R/W	
0805	NPO	/	/	R/W
	X7R/X5R/X7S/X6S	/	$C \geq 4.7\mu\text{f}$	R
			$C < 4.7\mu\text{f}$	R/W
	Y5V	/	$C \geq 1\mu\text{f}$	R
$C < 1\mu\text{f}$			R/W	
1206	NPO	/	/	R/W
	X7R/X5R/X7S/X6S	/	$C \geq 10\mu\text{f}$	R
			$C < 10\mu\text{f}$	R/W
	Y5V	/	$C \geq 10\mu\text{f}$	R
$C < 10\mu\text{f}$			R/W	
$\geq 1210$	NPO	/	/	R
	X7R/X5R/X7S/X6S	/	/	R
	Y5V	/	/	R

Soldering method: R—Reflow Soldering

W—Wave Soldering

## 10 The temperature profile for soldering

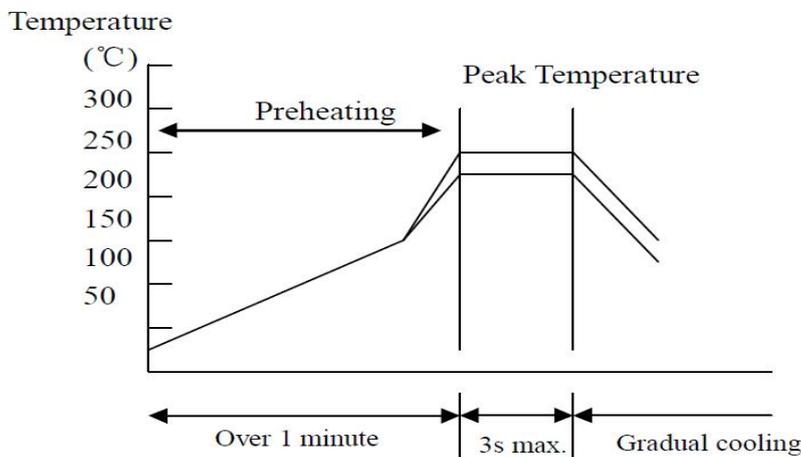
(Re-flow soldering )



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

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

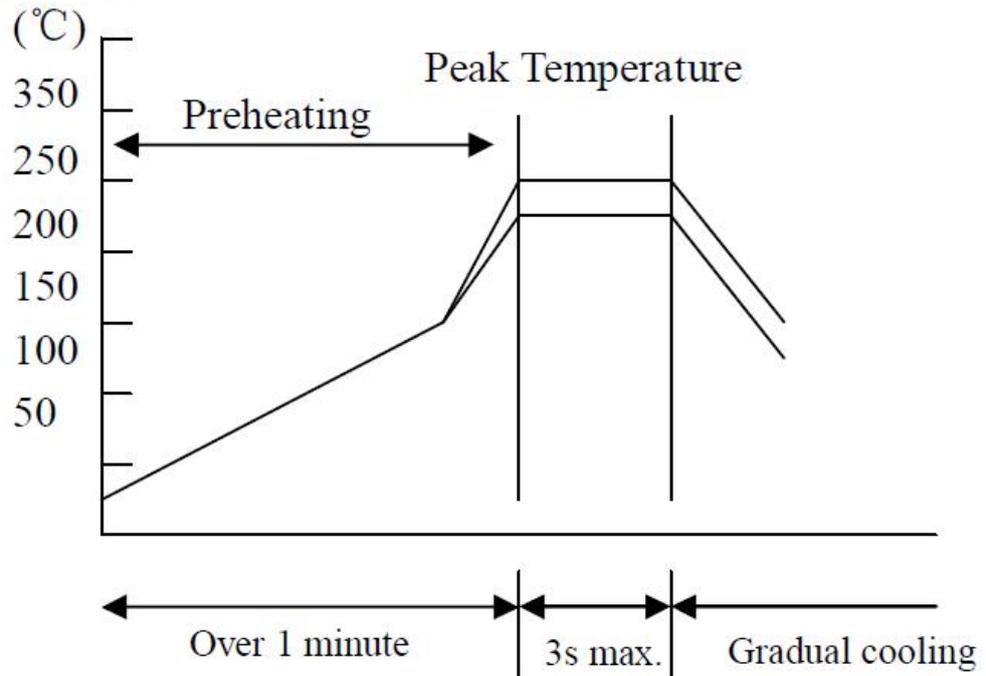
(Wave soldering)



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

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

**(Hand soldering)**  
Temperature



Conditions:

Preheating	Temperature of soldering iron head	Power of soldering iron	Diameter of soldering iron head	Soldering time	Solder paste amount	Restricted conditions
$\Delta \leq 130^{\circ}\text{C}$	Highest temperature: $350^{\circ}\text{C}$	20W at the highest	1mm recommended	3s at the longest	$\leq 1/2$ chip thickness	Please avoid the direct contact between soldering iron head and ceramic components