

GUANGDONG VIIYONG ELECTRONIC
TECHNOLOGY CO., LTD.

V226M0402X5R6R3NCT
(0402, X5R, 22 μ F, \pm 20%, 6.3V)

**Multi-layer Ceramic Chip Capacitor
Product Specification for General Purpose**

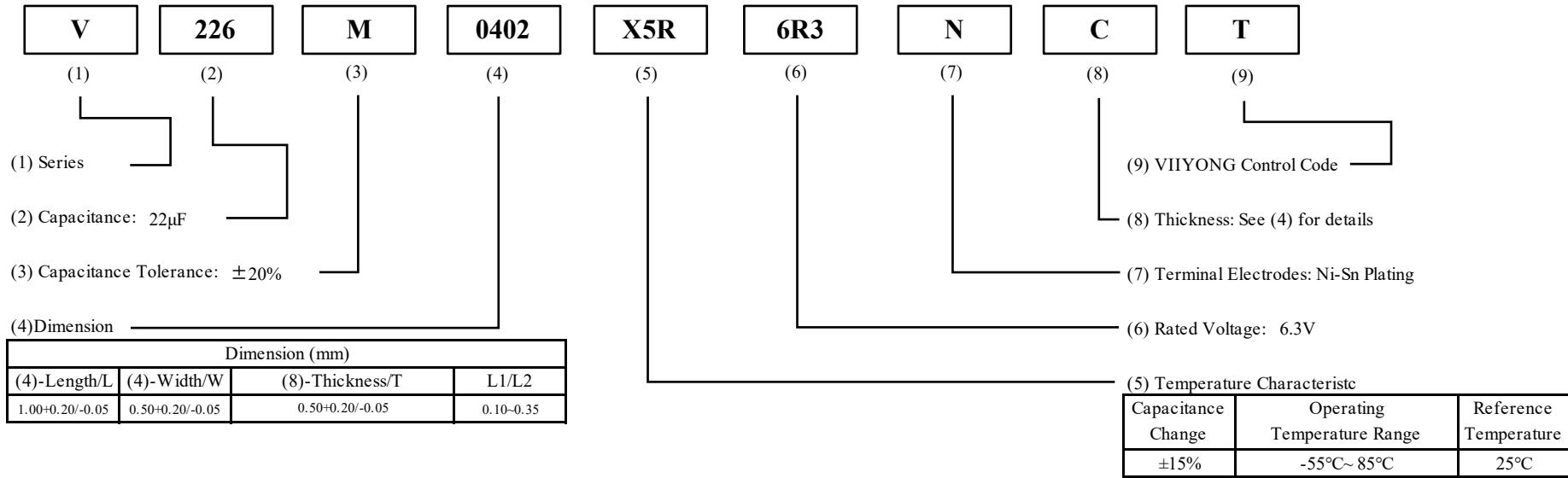
(Reference Sheet)

The product informations contained in this specification are as of November 10th, 2023, and this specification may be revised or abolished as necessary without notice. Therefore, you need to confirm accurate product information before ordering.

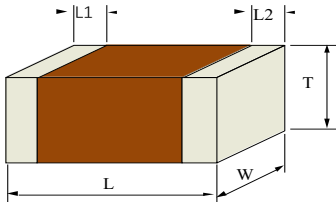
1.Scope

This specification is applied to Multi Layer Ceramic Capacitor used for General Electronic equipment.

2.Part Number System



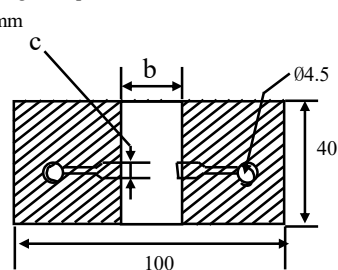
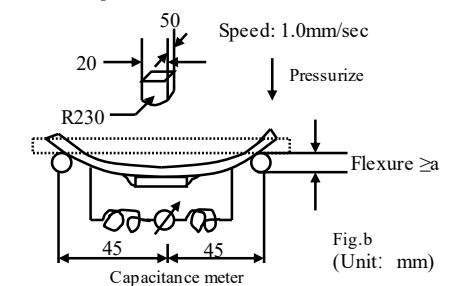
3.Structure

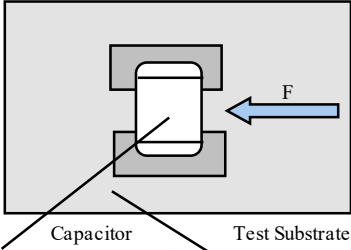


4.Packaging

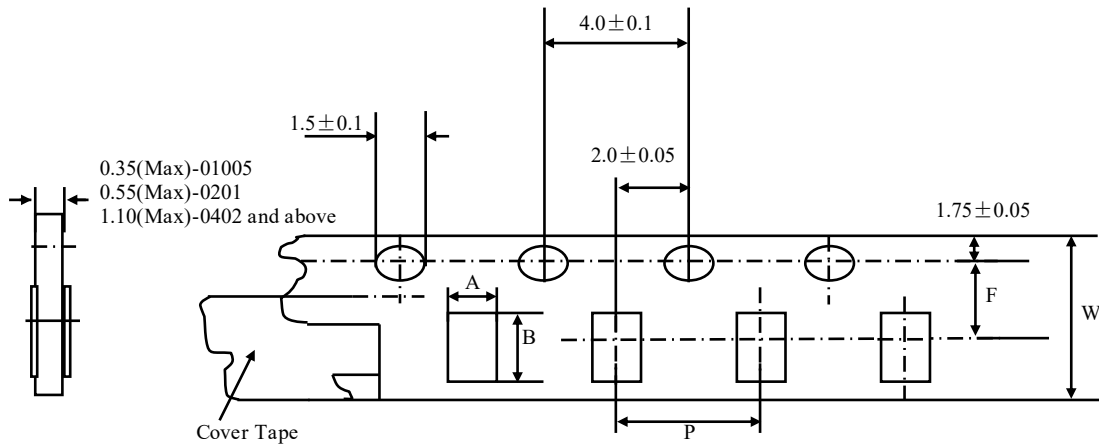
Code	Packaging	Quantity
T	7" Reel Paper Tape (W8P2)	10000 pcs./Reel

5. Specifications and Test Methods

NO.	Item	Specifications	Test Methods												
1	Heat treatment	Perform a heat treatment at 150+0/-5°C for 1h+/-10min and then let sit for 24+/-2hours at room temperature, then measure.													
2	Capacitance (C)	Within the specified tolerance	Temperature: 18~28°C Humidity: ≤RH80%												
3	Tangent of Loss Angle (DF)	$tg\delta \leq 2000 \times 10^{-4}$	Test Frequency: 120Hz ± 10% Test Voltage: 0.5 ± 0.2Vrms *Pre-treatment: perform the heat treatment for the sample before test.												
4	Insulation Resistances (Ri)	$Ri \times C \geq 100\Omega \cdot F$	Temperature: 18~28°C Humidity: ≤RH80% Apply rated voltage for 60±5s.												
5	Withstanding Voltage	No breakdown or flashover during test.	Test Voltage: 2.5 × UR Applied Time: 60s Charge/discharge current not exceeds 50mA.												
6	Temperature Characteristics of Capacitance	$\Delta C/C \leq \pm 15\%$	Capacitance should be measured after sit at the temperature for 5 minutes. The reference capacitance is that of Step3 in the following table. Test voltage: ≤1.0Vrms (Refer to the individual data sheet) <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temp.(°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>25</td> </tr> <tr> <td>2</td> <td>-55</td> </tr> <tr> <td>3</td> <td>25</td> </tr> <tr> <td>4</td> <td>85</td> </tr> <tr> <td>5</td> <td>25</td> </tr> </tbody> </table> *Pre-treatment: perform the heat treatment for the sample before test.	Step	Temp.(°C)	1	25	2	-55	3	25	4	85	5	25
Step	Temp.(°C)														
1	25														
2	-55														
3	25														
4	85														
5	25														
7	Resistance to Soldering Heat	Appearance: No visible damage. Capacitance Change: ≤±15% DF and Ri: Meet the initial specification.	Preheat the capacitor at 110 to 140°C for 30~60s. Immerse the capacitor in an eutectic solder solution at 260±5°C for 10±1s. The depth of immersion is 10mm. Recover it, let sit at room temperature for 24±2hrs, then measure. *Pre-treatment: perform the heat treatment for the sample before test.												
8	Solderability	95% min. coverage of both terminal electrodes is soldered evenly and continuously.	Immerse the test capacitor into a methanol solution containing rosin for 3 to 5s, preheat it at 80 to 140°C for 30~60s and immerse it into molten solder of 245±5°C for 2±0.2s. The depth of immersion is 10mm.												
9	Bond Strength of Termination	Appearance: No visible damage. Capacitance Change: ≤±12.5%	Solder the capacitor to the test jig (glass epoxy boards) shown in Fig. a. Apply a force in the direction shown in Fig. b. Bending at a speed of 1mm/sec and hold for 5±1s, then measure the capacitance. a=1mm <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Fig.a t: 0.8mm</p> </div> <div style="text-align: center;">  <p>Fig.b (Unit: mm)</p> </div> </div>												

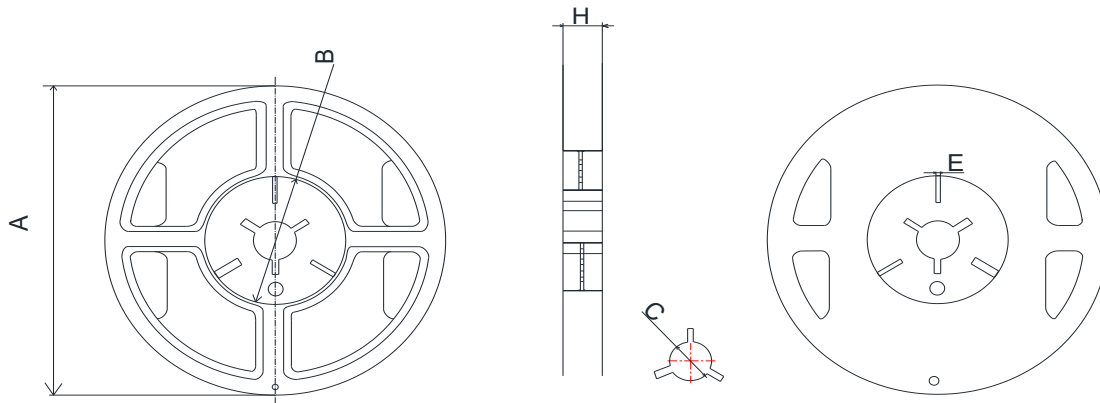
NO.	Item	Specifications	Test Methods															
10	Adhesion	Appearance: No visible damage.	<p>Solder the capacitor to the test substrate (glass epoxy boards) shown in Fig. c. Apply a pushing force F for 10±1s. F=5N</p>  <p style="text-align: right;">Fig.c</p>															
11	Vibration	Appearance: No visible damage. Capacitance Change: $\leq \pm 7.5\%$ DF and Ri: Meet the initial specification.	<p>Solder the capacitor to the test substrate (glass epoxy boards) shown in Fig. c. Amplitude: 1.5mm Frequencies: from 10 to 55Hz, and back to 10 Hz in about 1 min. Repeat this for 2hrs each in 3 perpendicular directions X, Y, Z, total 6hrs.</p>															
12	Rapid change of temperature	Appearance: No visible damage. Capacitance Change: $\leq \pm 15\%$ DF and Ri: Meet the initial specification.	<p>Solder the capacitor to the test substrate (glass epoxy boards) shown in Fig. c. Follow steps 1 to 4 to do a rapid temperature change test. Cycles: 5 Recover it, let sit at room temperature for 24±2hrs, then measure.</p> <table border="1" data-bbox="1151 676 1644 810"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55</td> <td>30</td> </tr> <tr> <td>2</td> <td>25</td> <td>2~5</td> </tr> <tr> <td>3</td> <td>85</td> <td>30</td> </tr> <tr> <td>4</td> <td>25</td> <td>2~5</td> </tr> </tbody> </table> <p>*Pre-treatment: perform the heat treatment for the sample before test.</p>	Step	Temperature (°C)	Time (minutes)	1	-55	30	2	25	2~5	3	85	30	4	25	2~5
Step	Temperature (°C)	Time (minutes)																
1	-55	30																
2	25	2~5																
3	85	30																
4	25	2~5																
13	Damp heat with load	Appearance: No visible damage. Capacitance Change: $\leq \pm 15\%$ DF: $\text{tg}\delta \leq 4000 \times 10^{-4}$ Ri: $R_i \times C \geq 5\Omega \cdot F$	<p>Solder the capacitor to the test substrate (glass epoxy boards) shown in Fig. c. Charge/discharge current not exceeds 50mA. Recover it, let sit at room temperature for 24±2hrs, then measure. Temperature: $40 \pm 2^\circ\text{C}$ Humidity: RH 90~95% Test Voltage: $1.0 \times \text{UR}$ Duration: 500hrs *Pre/ post-treatment: perform the heat treatment for the sample before and after test.</p>															
14	Endurance	Appearance: No visible damage. Capacitance Change: $\leq \pm 15\%$ DF: $\text{tg}\delta \leq 4000 \times 10^{-4}$ Ri: $R_i \times C \geq 10\Omega \cdot F$	<p>Solder the capacitor to the test substrate (glass epoxy boards) shown in Fig. c. Charge/discharge current not exceeds 50mA. Recover it, let sit at room temperature for 24±2hrs, then measure. Temperature: 85°C Test Voltage: $1.0 \times \text{UR}$ Duration: 1000hrs *Pre/ post-treatment: perform the heat treatment for the sample before and after test.</p>															

6. Carrier Tape size



Size Code	Dimension (mm)				
	Width of the square hole /A	Length of the square hole /B	Center distance between positioning hole and square hole /F	Square hole spacing /P	Width of carrier /W
0402	0.79 (Typ.)	1.32 (Typ.)	3.50 ± 0.05	2.00 ± 0.10	8.00 ± 0.20

7. Disc size



Disc size	Dimension (mm)				
	A	B	C	E	H
7"	$\Phi 178 \pm 2.0$	$\Phi 60 \pm 2.0$	$\Phi 13 \pm 1.0$	4 ± 1.0	9.5 ± 1.0

Application of Technical Requirements and Precautions

■ Storage

1. Storage period: 12 months, otherwise, its solderability must be inspected again.
2. Storage conditions:
 - a. Temperature: lower than 35 °C
 - b. Relative humidity: lower than RH70 %

■ Environmental requirements

All products in this specification comply with the EU RoHS/REACH directive and the relevant requirements of the "VIYONG Management Guidelines for Restriction of Hazardous Substances".

■ Application

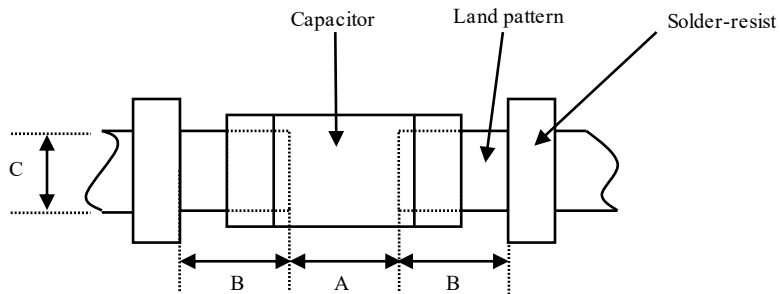
1. Operating Temperature
 - a. Do not use capacitor above the maximum allowable operating temperature.
 - b. Surface temperature including self-heating should be below maximum operating temperature.
2. Operating Voltage

The operating voltage for capacitors must always be lower than their rated voltage.

■ PCB Design

1. Design of Land-patterns

When the capacitors are mounted on a PCB, the amount of solder at the terminations has a direct effect on the performance of the capacitors. The greater the amount of solder, the higher the stress on the capacitor. Therefore, when designing land-patterns, it is necessary to consider the appropriate size and configuration of the solder pads.



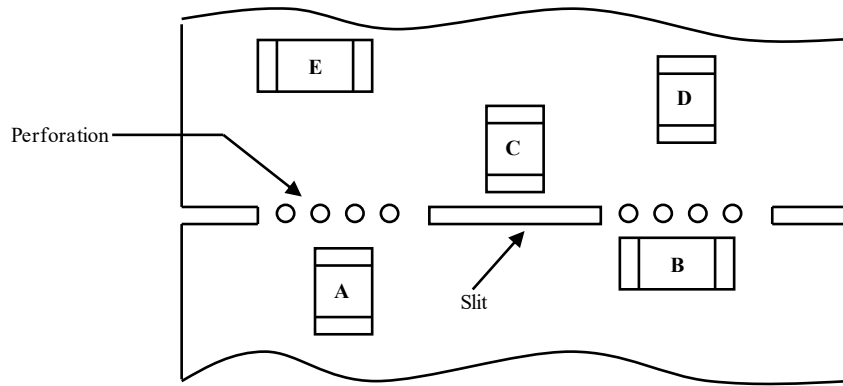
Size and recommended land dimensions for reflow-soldering are shown in the following figure and table.

Unit: mm

Capacitor dimensions		Land dimensions		
Size code	Thickness Code	A	B	C
0402	C	0.40~0.60	0.40~0.50	0.50~0.70

2. Capacitor Layout on PC Board

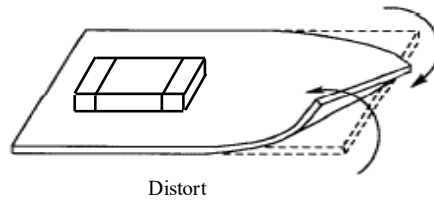
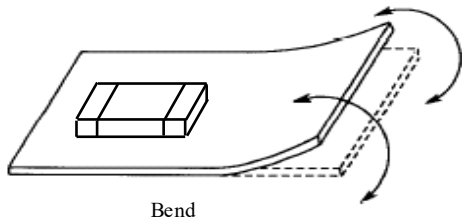
Mechanical stress varies according to the location of capacitors on PC board. The recommendation for better design is as follows:



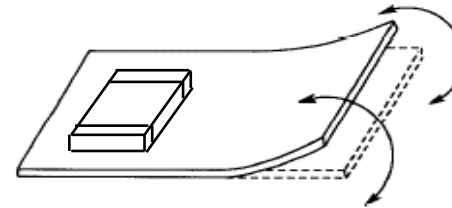
The stress in capacitors is in the following order: $A > B = C > D > E$

Pay attention not to bend or distort the PC board otherwise the capacitor may crack. Please refer to the following examples of good and bad capacitor layout.

a. Not recommended

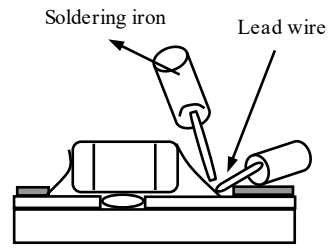
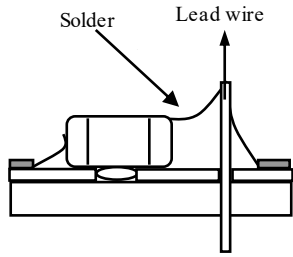
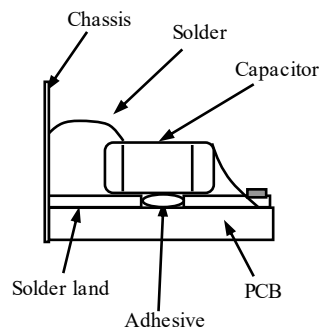


b. Recommended

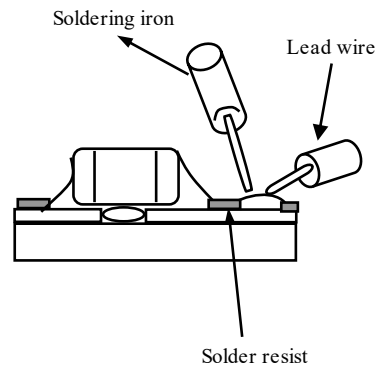
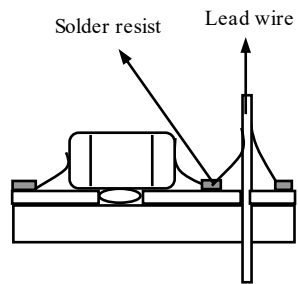
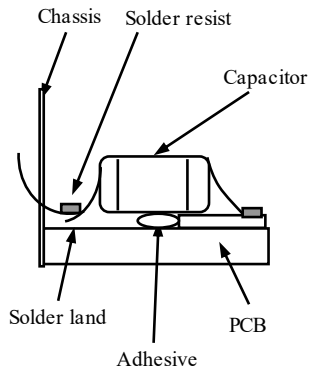


■ Solder Buildup and Soldering Methods

a. Examples of soldering method not recommended



b. Examples of soldering method recommended

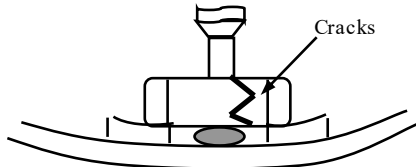
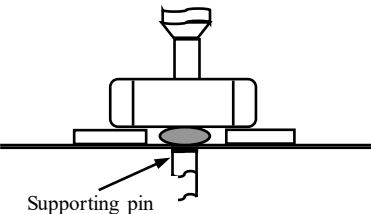
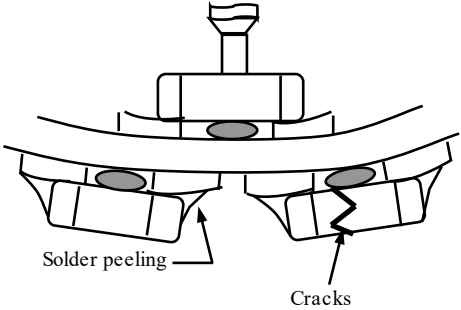
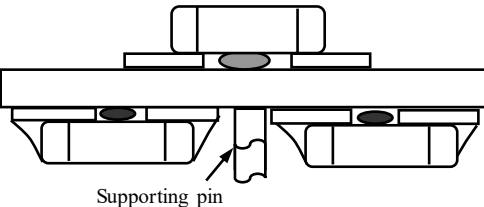


■ Consideration for Automatic Placement

If the mounting head is adjusted too low, it may induce excessive stress in the chip capacitor to result in cracking. Please take following precautions.

- Adjust the bottom dead center of the mounting head to reach on the PC board surface and not press it.
- Adjust the mounting head pressure to be 1 to 3N of static weight .
- To minimize the impact energy from mounting head, it is important to provide support from the bottom side of the PC board.

Please refer to the following samples

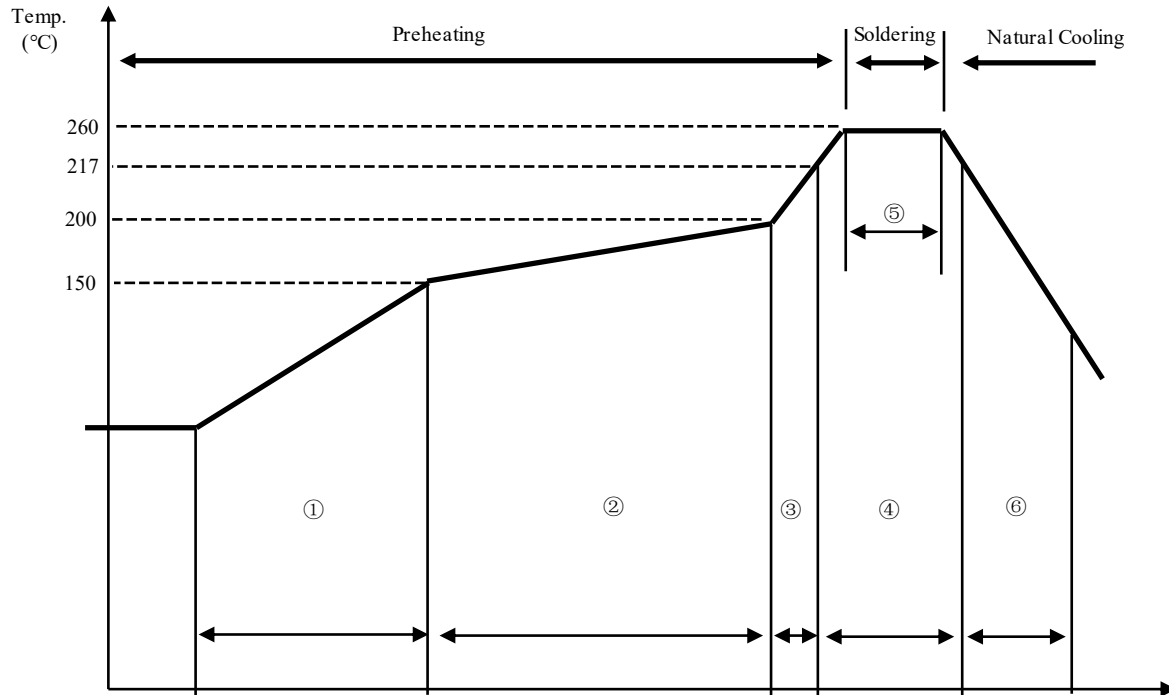
	Not recommended	Recommended
Single-sided Mounting	 <p>The diagram shows a cross-section of a chip capacitor being placed on a curved PCB surface. A mounting head is positioned above the capacitor. A jagged line labeled 'Cracks' indicates damage to the capacitor's internal structure.</p>	 <p>The diagram shows a cross-section of a chip capacitor being placed on a flat PCB surface. A mounting head is positioned above the capacitor. A 'Supporting pin' is shown from the bottom, supporting the PCB and preventing the mounting head from pressing down on the capacitor.</p>
Double-sided Mounting	 <p>The diagram shows a cross-section of a chip capacitor being placed on a curved PCB surface. A mounting head is positioned above the capacitor. The bottom of the capacitor is attached to a second PCB layer. Labels 'Solder peeling' and 'Cracks' indicate damage to the solder joints and the capacitor's internal structure.</p>	 <p>The diagram shows a cross-section of a chip capacitor being placed on a flat PCB surface. A mounting head is positioned above the capacitor. A 'Supporting pin' is shown from the bottom, supporting the PCB and preventing the mounting head from pressing down on the capacitor.</p>

■ Soldering

1. Flux Selection

- a. It is recommended to use a mildly activated rosin flux (less than 0.1wt% chlorine). Strong flux is not recommended.
- b. Please provide proper amount of flux. Excessive flux must be avoided.
- c. When water-soluble flux is used, enough washing is necessary.

2. Recommended Soldering Profile



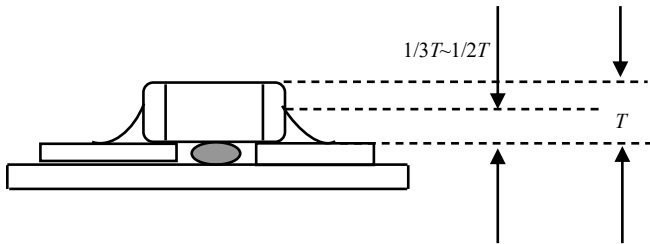
Reflow Soldering Profile

(1) Reflow Soldering Condition

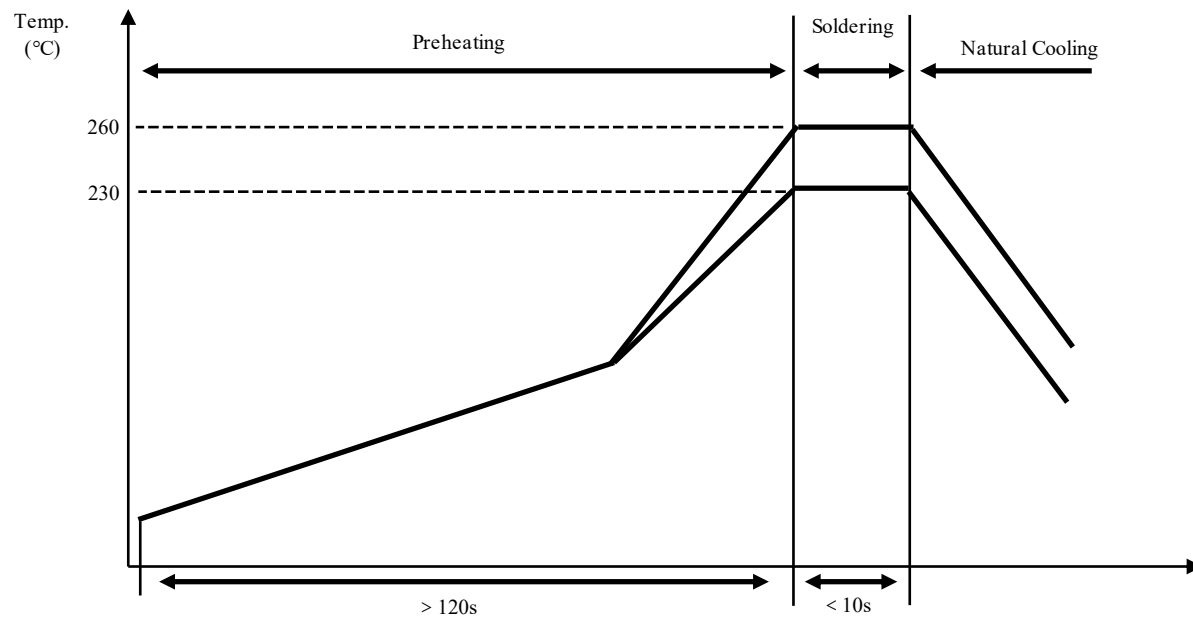
No.	Reflow Soldering zone	Reflow Soldering Condition
①	Preheating 1	Heating rate: $\leq 3^{\circ}\text{C/s}$; Durations: 60s
②	Constant temperature	Heating rate: $\leq 1^{\circ}\text{C/s}$; Durations at $150\sim 200^{\circ}\text{C}$: 60~120s
③	Preheating 2	Heating rate: $1\sim 5^{\circ}\text{C/s}$
④	Soldering 1	Durations at 217°C : 60~50s
⑤	Soldering 2	Durations at $255\sim 260^{\circ}\text{C}$: above 30s
⑥	Natural cooling	Cooling rate: $\leq 6^{\circ}\text{C/s}$

Caution:

- Excessive solder will induce higher tensile force in chip capacitor when temperature changes and result in cracking. Insufficient solder may detach the capacitor from the PC board. The ideal condition is to have solder mass controlled to $1/2$ to $1/3$ of the thickness of the capacitor.
- Soldering duration should be kept as close to recommended times as possible, because excessive duration can detrimentally affect solderability.



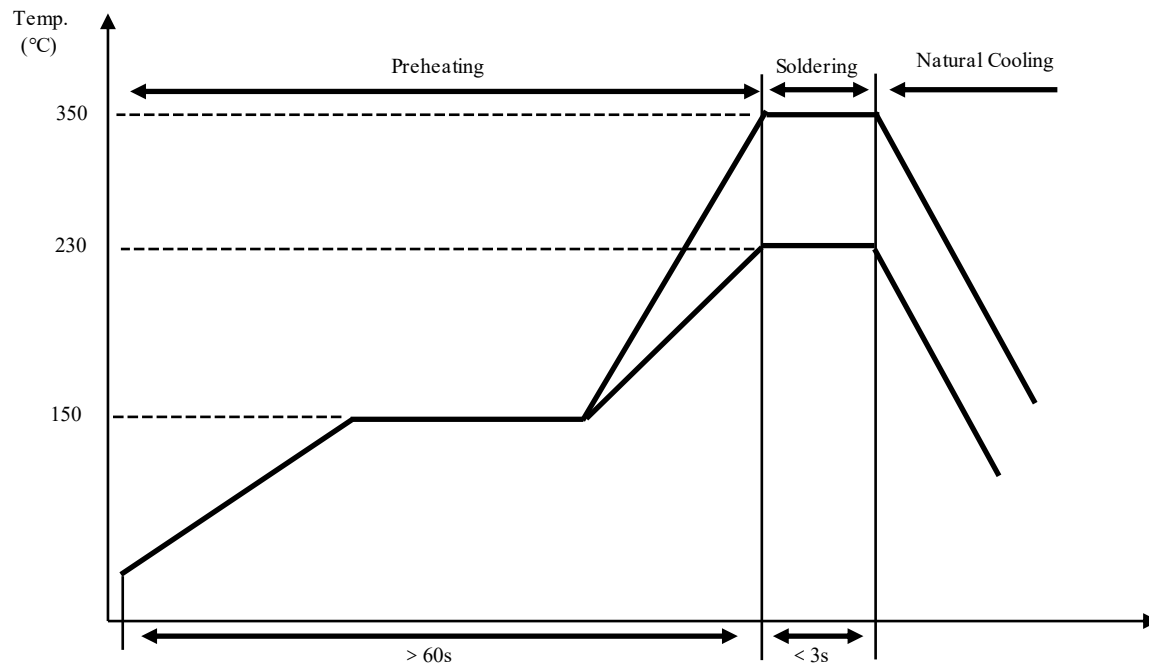
(2) Wave Soldering Condition



Caution :

- a. Make sure the capacitors are preheated sufficiently.
- b. The temperature difference between the capacitor and melted solder should not be greater than 100~130°C.
- c. Wave soldering must not be applied to the capacitors designated as for reflow soldering only.

(3) Hand Soldering Condition



Caution:

- Use a 20W soldering iron with a maximum tip diameter of 1.0mm.
- The soldering iron should not directly touch the capacitor.

单击下面可查看定价，库存，交付和生命周期等信息

[>>VIIYONG\(微容\)](#)