

# APPROVAL SHEET

Customer Name : \_\_\_\_\_  
Customer P/N : \_\_\_\_\_  
Frequency : 48.000000 MHz  
Aker Approved P/N : SMBF-048000-7-D2-00  
Aker MPN : SMBF-048000-7-D2-00  
Rev. : 1  
ISSUE DATE : Feb.13.2023

| APPROVED             | CHECKED | PREPARED     |
|----------------------|---------|--------------|
| <i>Tin</i>           |         | <i>X Tin</i> |
| APPROVED BY CUSTOMER |         |              |
|                      |         |              |

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**MSL:Level 1**

**RoHS Compliant**

**IATF 16949 Certified**

**AEC-Q200 Qualified**



Confidential

[illegible]

## SMD CRYSTAL OSCILLATOR

### 1. ELECTRICAL CHARACTERISTICS

#### ■ Standard atmospheric conditions

Unless otherwise specified , the standard range of atmospheric conditions for making measurement and tests are as follow :

Ambient temperature :  $25 \pm 5^{\circ}\text{C}$

Relative humidity : 40%~70%

If there is any doubt about the results , measurement shall be made within the following limits :

Ambient temperature :  $25 \pm 3^{\circ}\text{C}$

Relative humidity : 40%~70%

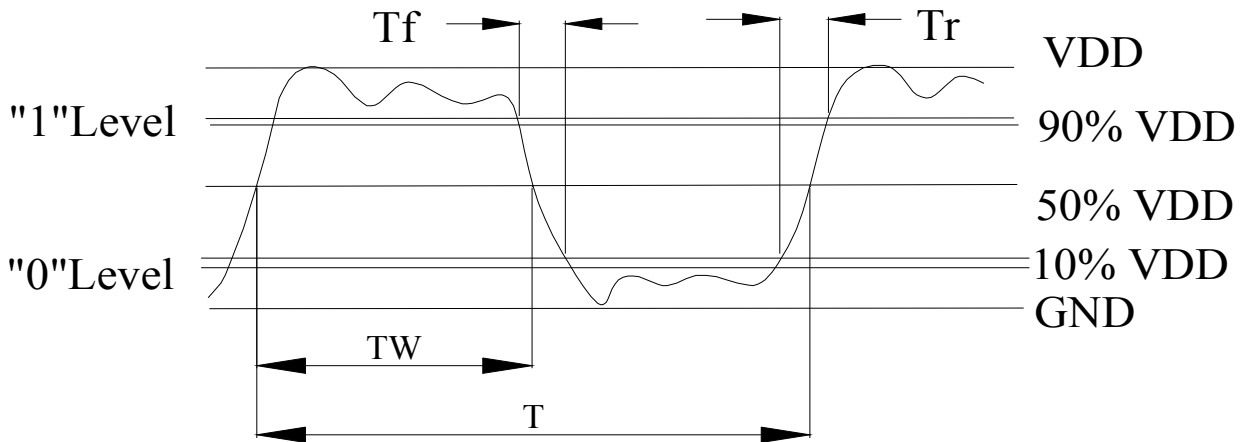
#### ■ AKER Model : SMBF-751

#### ■ Cutting Mode : AT CUT

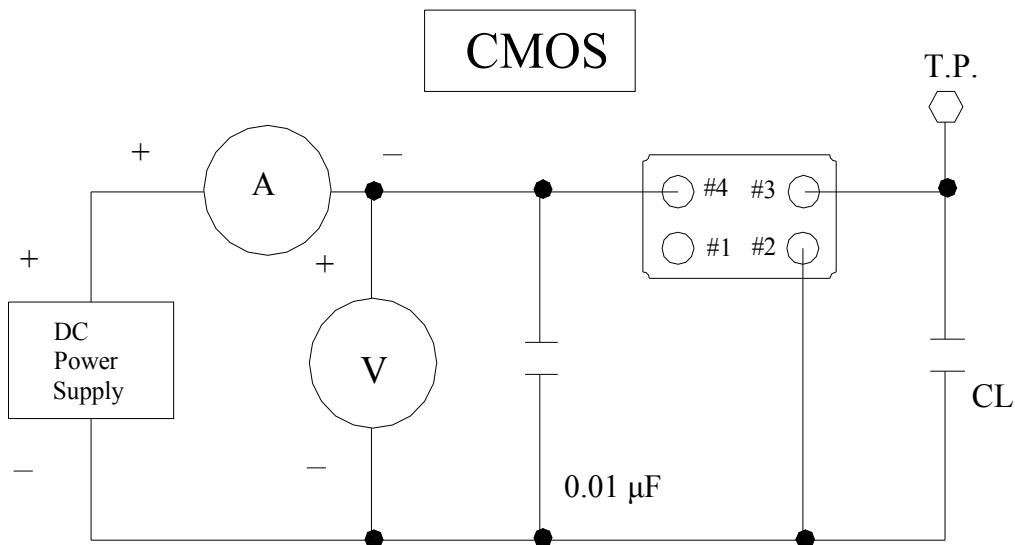
| Parameters                | Symbol           | Electrical Spec    |      |                    |                    | Notes                        |
|---------------------------|------------------|--------------------|------|--------------------|--------------------|------------------------------|
|                           |                  | Min.               | Typ. | Max.               | Units.             |                              |
| Nominal Frequency         |                  | 48.000000          |      |                    | MHz                |                              |
| Frequency Stability       |                  | $\pm 100$          |      |                    | ppm                |                              |
| Supply Voltage            | V <sub>CC</sub>  | 1.62               | ~    | 3.63               | V                  |                              |
| Output Load CMOS          | CL               |                    |      | 15                 | pF                 |                              |
| Aging                     |                  | $\pm 3$            |      |                    | ppm                | First Year                   |
| Enable Control            |                  | Yes                |      |                    |                    | Pad 1                        |
| Operating Temperature     |                  | -40                | 25   | 105                | $^{\circ}\text{C}$ |                              |
| Storage Temperature Range |                  | -55                | ~    | 150                | $^{\circ}\text{C}$ |                              |
| Output Voltage High       | VoH              | 90%V <sub>DD</sub> |      |                    | V                  |                              |
| Output Voltage Low        | VoL              |                    |      | 10%V <sub>DD</sub> | V                  |                              |
| Input Current             | I <sub>CC</sub>  |                    |      | 20                 | mA                 |                              |
| Standby Current           | I <sub>ST</sub>  |                    |      | 20                 | $\mu\text{A}$      |                              |
| Rise Time                 | T <sub>r</sub>   |                    |      | 10                 | ns                 | 10%~90%V <sub>DD</sub> Level |
| Fall Time                 | T <sub>f</sub>   |                    |      | 10                 | ns                 | 90%~10%V <sub>DD</sub> Level |
| Symmetry (Duty ratio)     | TH/T             | 45                 | ~    | 55                 | %                  |                              |
| Start-up Time             | T <sub>OSC</sub> |                    |      | 10                 | ms                 |                              |
| Enable Voltage High       | V <sub>HI</sub>  | 70%V <sub>DD</sub> |      |                    | V                  |                              |
| Disable Voltage Low       | V <sub>LO</sub>  |                    |      | 30%V <sub>DD</sub> | V                  |                              |
| Output Enable Delay Time  | T <sub>ON</sub>  |                    |      | 10                 | ms                 |                              |
| Output Disable Delay Time | T <sub>OFF</sub> |                    |      | 200                | ns                 |                              |
| Phase Jitter RMS          |                  |                    |      | 1                  | ps                 | 12KHz~20MHz                  |

Please kindly be noted that AKER DO NOT guarantee parts quality which involves human security application.

## 2 . C - MOS LOAD OUTPUT WAVEFORM

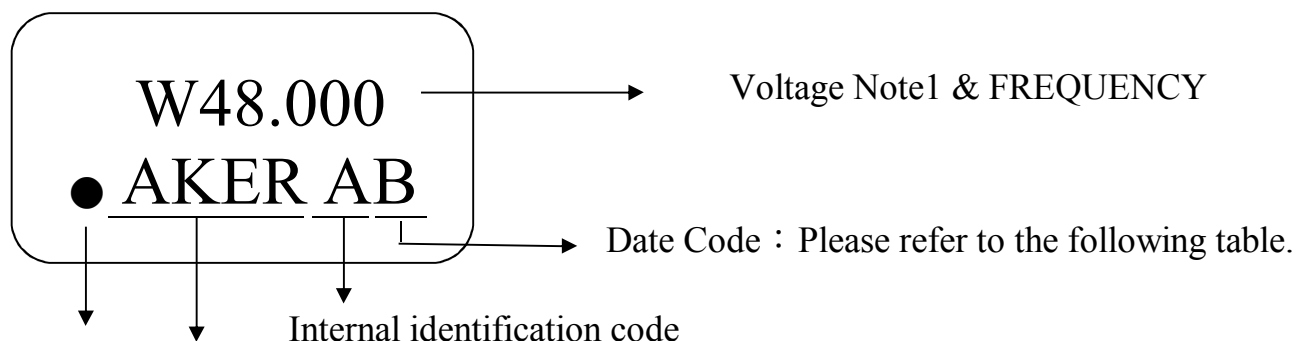


## 3 . C - MOS LOAD TEST CIRCUIT



\*\*\*Because SMA series has no by pass capacitor.  
So, we recommend our customer to use capacitor 0.01  $\mu$ F  
in join Vcc and GND.

## 4. MARKING :



AKER LOGO.

NOTE1:

|   |                     |
|---|---------------------|
| T | 5.0V TTL            |
| C | 4.5~5.0V CMOS       |
| L | 2.97~3.63V TTL&CMOS |
| R | 2.8~3.0V CMOS       |
| S | 2.25~2.75V CMOS     |
| Y | 1.5~2.0V CMOS       |
| Z | 0.8~1.4V CMOS       |
| W | Voltage Range CMOS  |

Date Code Guide

| Year  | 2021   | 2022   | 2023   | 2024   |
|-------|--------|--------|--------|--------|
|       | 2025   | 2026   | 2027   | 2028   |
| Month | (4N+1) | (4N+2) | (4N+3) | (4N+0) |
| JAN   | a      | n      | A      | N      |
| FEB   | b      | p      | B      | P      |
| Mar   | c      | q      | C      | Q      |
| Apr   | d      | r      | D      | R      |
| May   | e      | s      | E      | S      |
| Jun   | f      | t      | F      | T      |
| Jul   | g      | u      | G      | U      |
| Aug   | h      | v      | H      | V      |
| Sep   | j      | w      | J      | W      |
| Oct   | k      | x      | K      | X      |
| Nov   | l      | y      | L      | Y      |
| Dec   | m      | z      | M      | Z      |

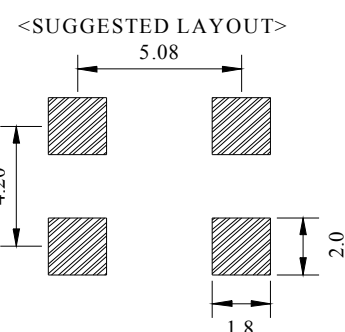
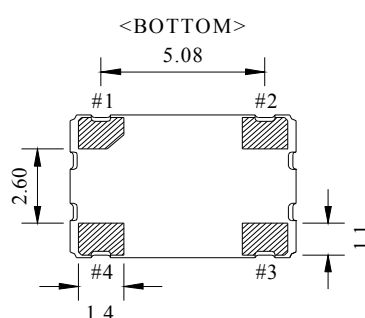
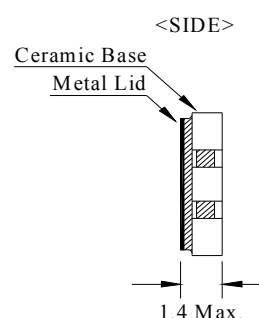
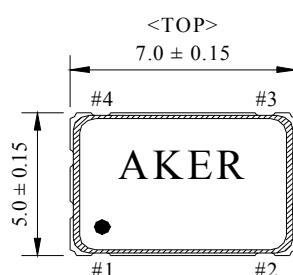
A cycle every four years

## 5. DIMENSION :

( UNIT : mm )

### Enable / Disable Function

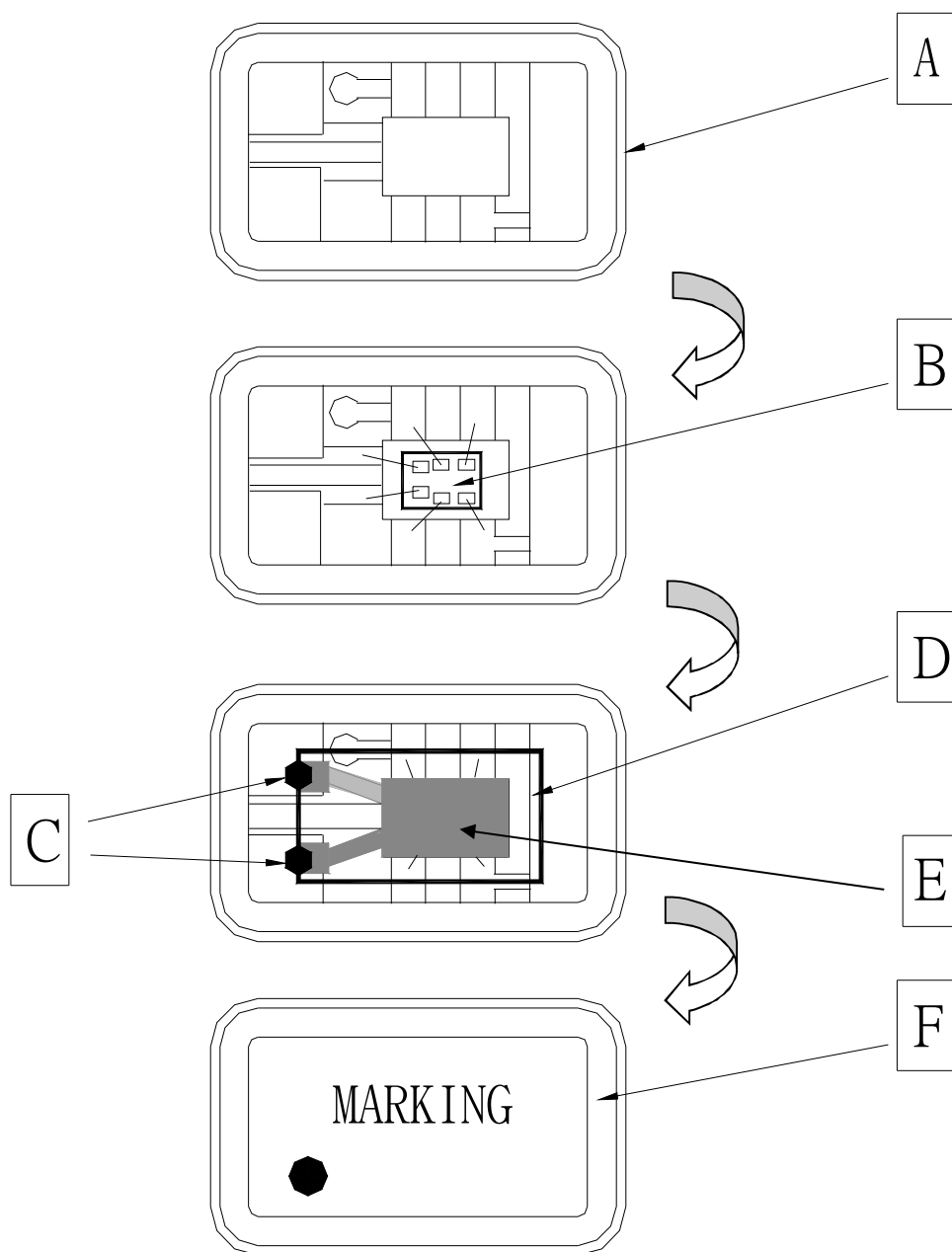
|             |                |
|-------------|----------------|
| E/D (#1)    | OUTPUT (#3)    |
| HIGH (Open) | Operating      |
| LOW         | High impedance |



### PIN FUNCTION

|                               |
|-------------------------------|
| #1 : Enable / Disable Control |
| #2 : GND                      |
| #3 : OUTPUT                   |
| #4 : VDD                      |

## 6 . STRUCTURE ILLUSTRATION

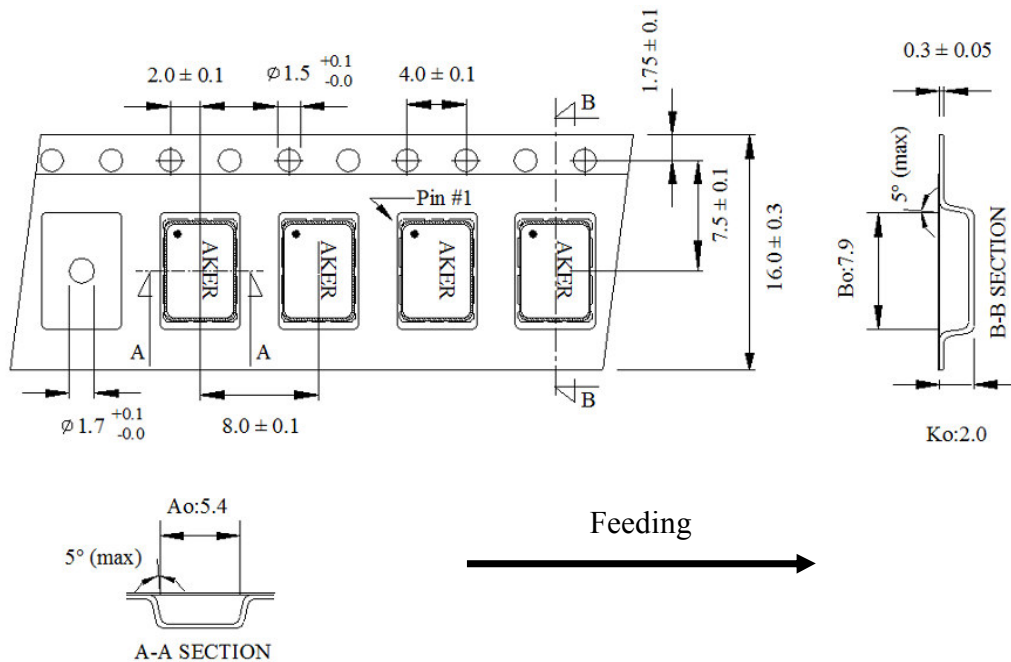


| COMPONENTS |                     | MATERIALS                                                  | COMPONENTS |               | MATERIALS        |
|------------|---------------------|------------------------------------------------------------|------------|---------------|------------------|
| A          | Base (Package)      | Ceramic (Al <sub>2</sub> O <sub>3</sub> )+Kovar (Fe/Co/Ni) | D          | Crystal blank | SiO <sub>2</sub> |
| B          | IC chip             | -                                                          | E          | Electrode     | Cr / Ag          |
| C          | Conductive adhesive | Ag / Silicon resin                                         | F          | Lid           | Fe/Co/Ni         |

## 7. PACKING :

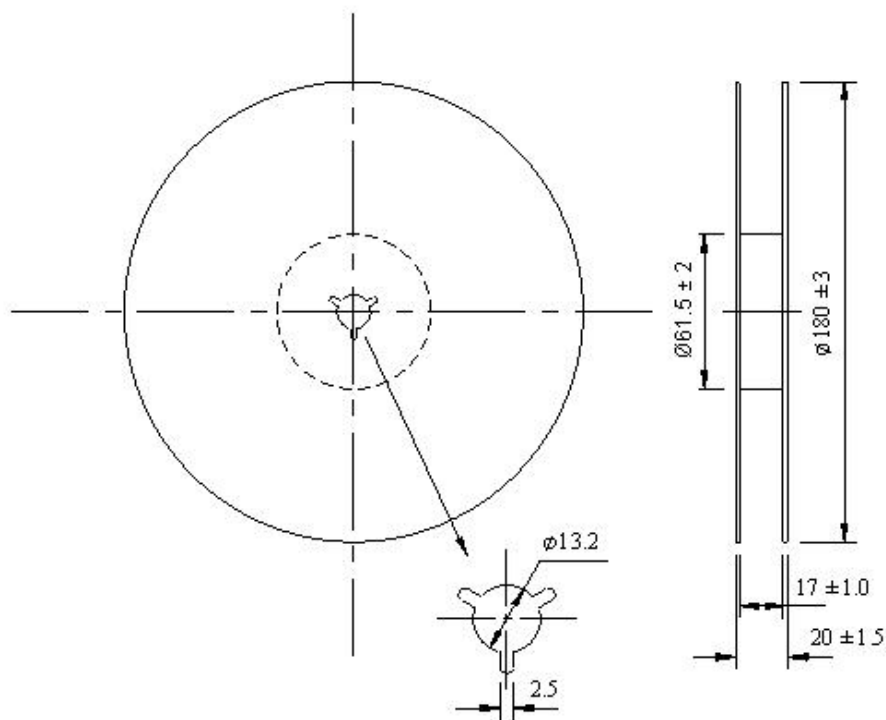
### TAPE SPECIFICATION

( Unit : mm )

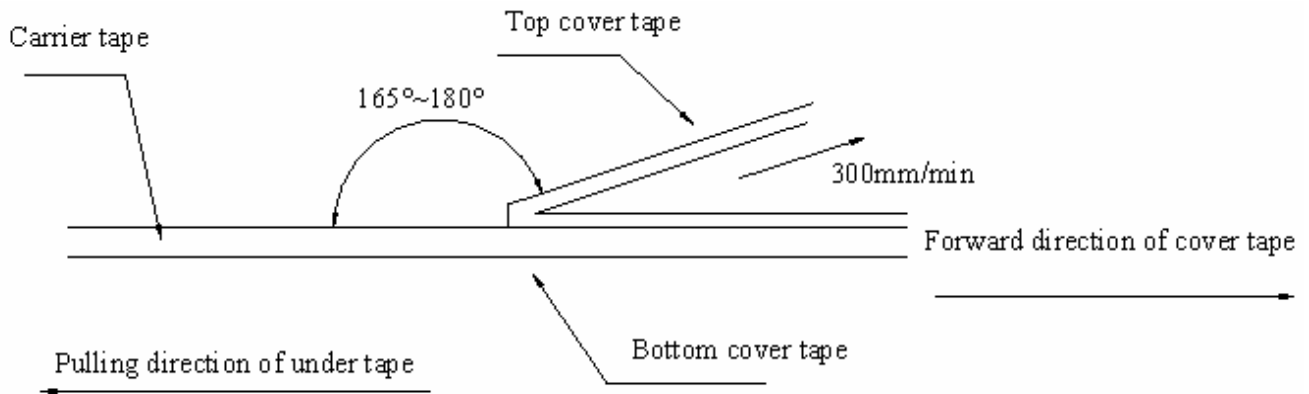


### OUTLINE DIMENSION

( Unit : mm )



## 8. COVER TAPE ADHESION STRENGTH :

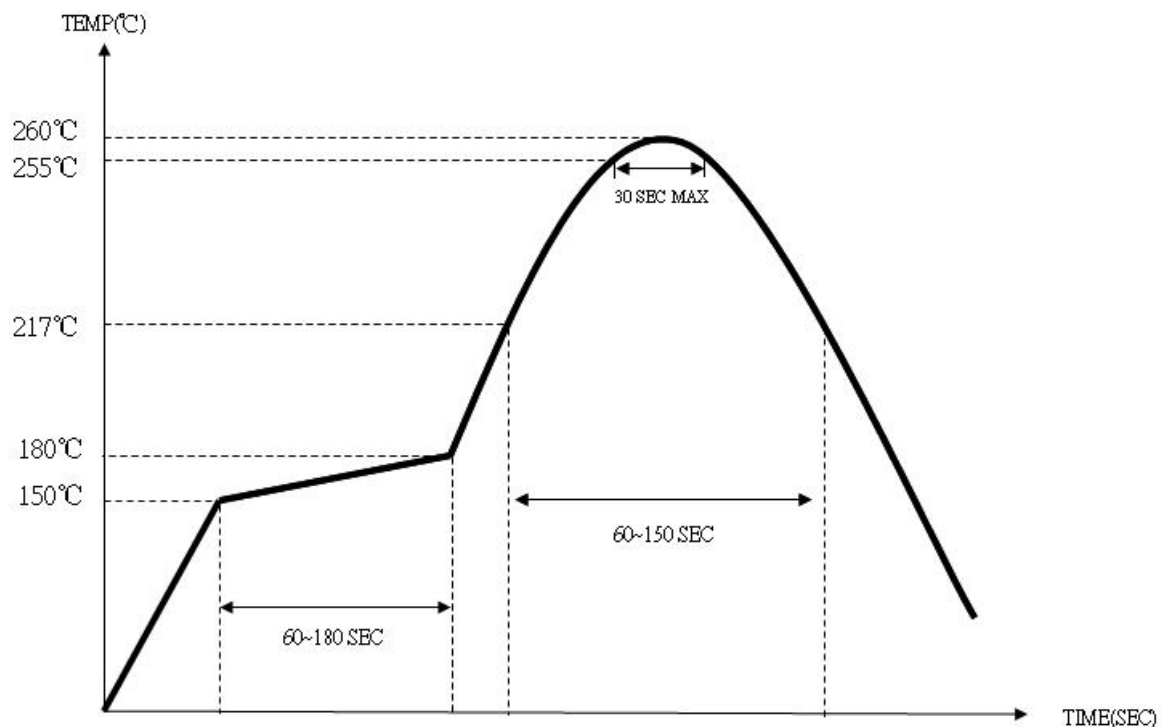


\*\*\* In the case, the cover tape is pulled off under the above conditions, the cover tape adhesion strength should be 10.2g~71.4g

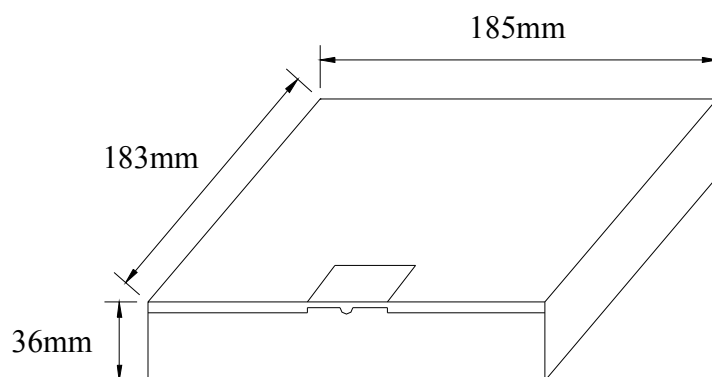
Plastic tape: 10.2g~71.4g

(Cover tape adhesion strength)

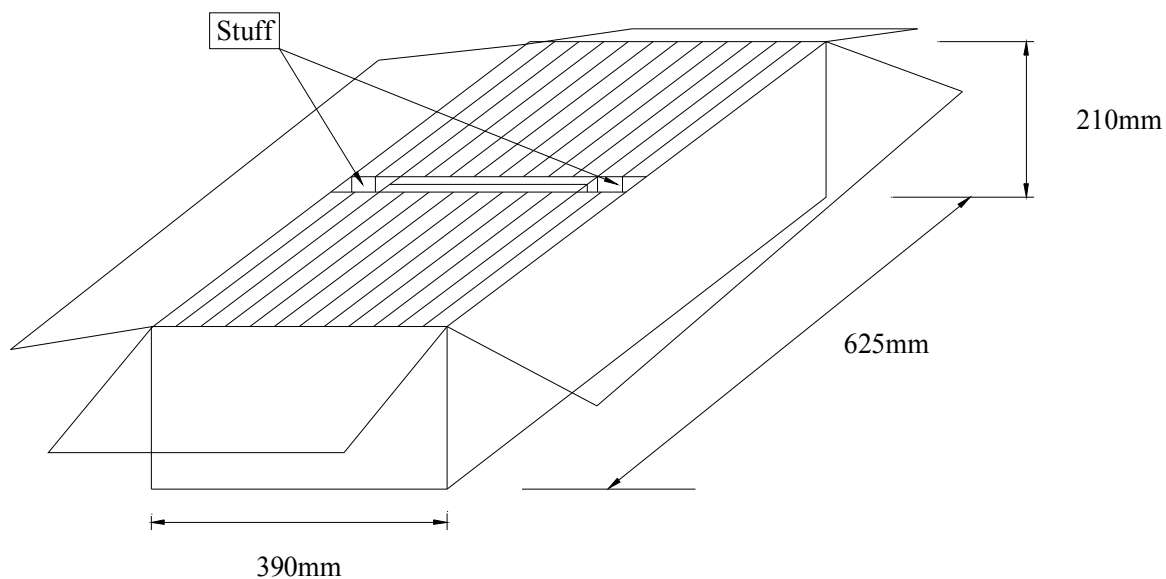
## 9. SOLDERING REFLOW PROFILE



## 10. PACKING :



BOX = 1000 PCS / REEL



SMD product packs 32 BOX = The outside box packs ( 1000 PCS \* 32 BOX = 32000 PCS )(MAX)

## 11 . MECHANICAL PERFORMANCE

| TEST ITEMS                             | TEST METHODS AND TEST CONDITION                                                                                                                                    | PERFORMANCE                             |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 11.1 Temperature Cycling               | -55±3℃ /30min maximum~+125±3℃ /30min maximum , 1000cycles                                                                                                          | To satisfy the electrical performance . |
| 11.2 Operational Life                  | 125℃±3℃ , 1000hrs±12hrs Rated VDD applied.                                                                                                                         |                                         |
| 11.3 Biased Humidity                   | 85℃±5℃&85%±5%R.H. , 1000±12hrs Rated VDD applied.                                                                                                                  |                                         |
| 11.4 Resistance To Soldering Heat Test | Reflow test 2 times.                                                                                                                                               |                                         |
| 11.5 High Temperature Exposure         | 150℃±3℃ , 1000hrs±12hrs                                                                                                                                            |                                         |
| 11.6 Vibration Test                    | Freq.range: 10~2000Hz , Peak to peak amplitude:1.52mm<br>Peak acceleration:5G (49m/s <sup>2</sup> ) , 3 direction(X, Y,Z) , 20min 12cycles each of 3 orientations. |                                         |
| 11.7 Mechanical Shock                  | 100G , 6mS , 3 times for each direction(X, Y, Z ) , 3 cycles                                                                                                       |                                         |
| 11.8 Physical Dimension                | Verify physical dimensions to the applicable device detail specification.                                                                                          |                                         |
| 11.9 Solderability                     | 260℃ , Coated > 95%                                                                                                                                                |                                         |
| 11.10 Board Flex                       | PCB=100*40(mm) , Bending=2 mm (min) , Duration=60+5/-0 sec                                                                                                         |                                         |
| 11.11 External Visual                  | Inspect device construction and marking.                                                                                                                           |                                         |
| 11.12 Terminal Strength                | A force of 17.7N for 60 seconds.                                                                                                                                   |                                         |