

# APPROVAL SHEET

Customer Name : \_\_\_\_\_  
 Customer P/N : \_\_\_\_\_  
 Frequency : 27.000000 MHz  
 Aker Approved P/N : SMAF-027000-2-D4-01  
 Aker MPN : SMAF-027000-2-D4-01  
 Rev. : 1  
 ISSUE DATE : Apr.10.2023

| APPROVED             | CHECKED | PREPARED    |
|----------------------|---------|-------------|
| <i>Leaf</i>          |         | <i>Kika</i> |
| APPROVED BY CUSTOMER |         |             |
|                      |         |             |

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**MSL:Level 1**

**RoHS Compliant**

**IATF 16949 Certified**

**AEC-Q200 Qualified**





|                     |                     |                |  |
|---------------------|---------------------|----------------|--|
| Aker Approved P/N : | SMAF-027000-2-D4-01 |                |  |
| APPROVED :          | Xtal                | SHEET : 2 of 9 |  |
| PREPARED :          | Kiku                | REV. : 1       |  |
| Confidential        |                     |                |  |

## 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±5°C

Relative humidity : 40%~70%

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

Ambient temperature : 25±3°C

Relative humidity : 40%~70%

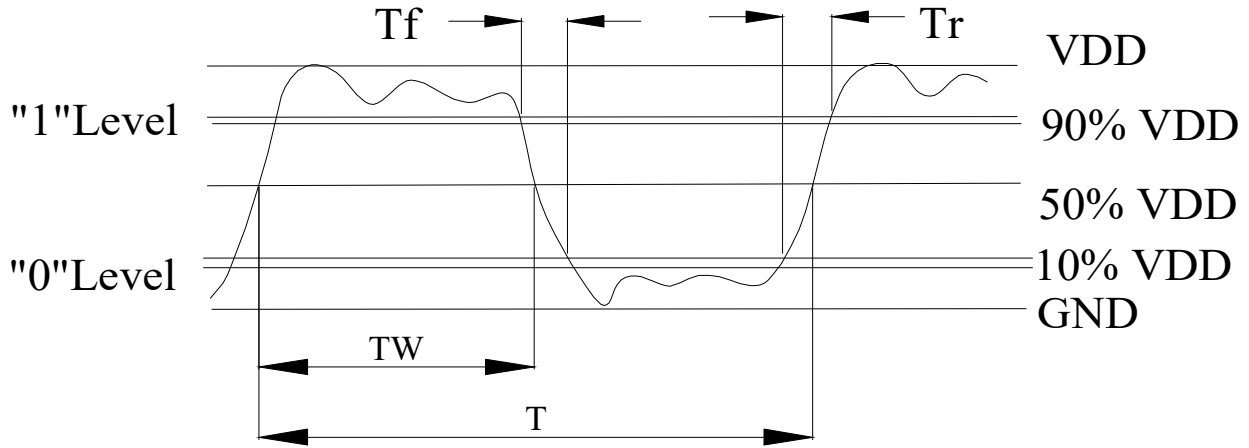
■ AKER Model : SMAF-221

■ Cutting Mode : AT CUT

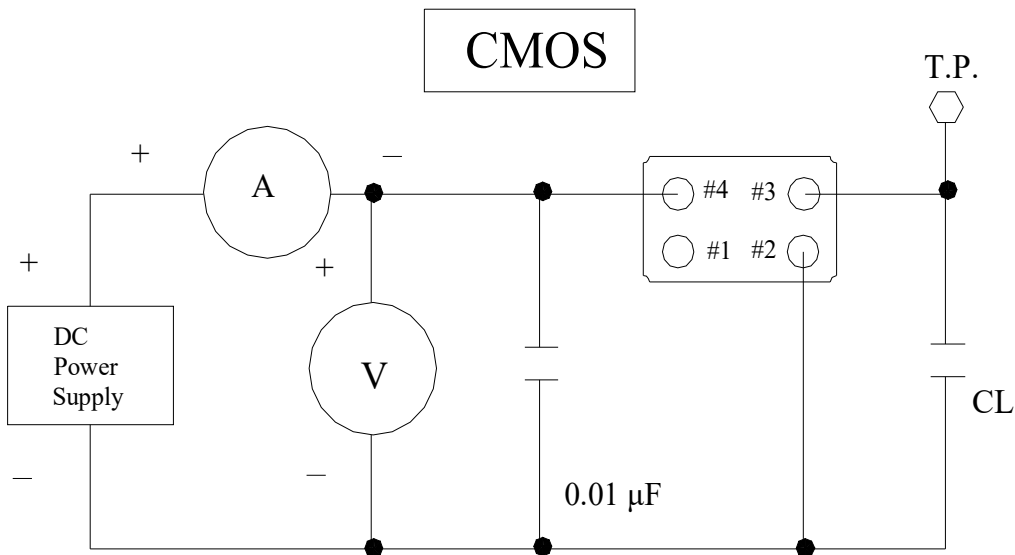
| Parameters                | Symbol           | Electrical Spec    |      |                    |        | Notes                        |
|---------------------------|------------------|--------------------|------|--------------------|--------|------------------------------|
|                           |                  | Min.               | Typ. | Max.               | Units. |                              |
| Nominal Frequency         |                  | 27.000000          |      |                    | MHz    |                              |
| Frequency Stability       |                  | ±70                |      |                    | ppm    |                              |
| Supply Voltage            | V <sub>CC</sub>  | 2.8±5%             |      |                    | V      |                              |
| Output Load CMOS          | CL               |                    |      | 15                 | pF     |                              |
| Aging                     |                  | ±3                 |      |                    | ppm    | First Year                   |
| Enable Control            |                  | Yes                |      |                    |        | Pad 1                        |
| Operating Temperature     |                  | -40                | 25   | 125                | °C     |                              |
| Storage Temperature Range |                  | -55                | ~    | 150                | °C     |                              |
| Output Voltage High       | V <sub>OH</sub>  | 90%V <sub>DD</sub> |      |                    | V      |                              |
| Output Voltage Low        | V <sub>OL</sub>  |                    |      | 10%V <sub>DD</sub> | V      |                              |
| Input Current             | I <sub>CC</sub>  |                    |      | 8                  | mA     |                              |
| Standby Current           | I <sub>ST</sub>  |                    |      | 20                 | μA     |                              |
| Rise Time                 | T <sub>r</sub>   |                    |      | 6                  | ns     | 10%~90%V <sub>DD</sub> Level |
| Fall Time                 | T <sub>f</sub>   |                    |      | 6                  | ns     | 90%~10%V <sub>DD</sub> Level |
| Symmetry (Duty ratio)     | TH/T             | 40                 | ~    | 60                 | %      |                              |
| 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~5MHz                   |

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

## 2. C - MOS LOAD OUTPUT WAVEFORM

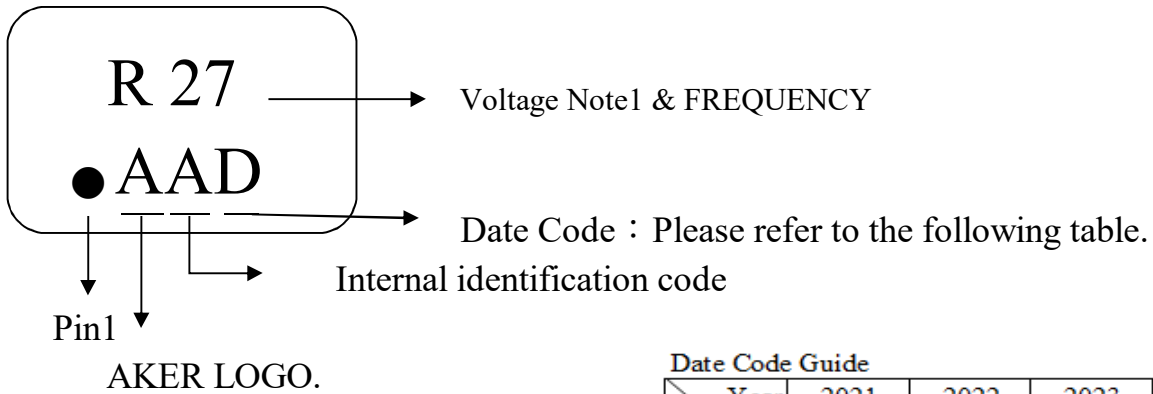


## 3. C - MOS LOAD TEST CIRCUIT



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

#### 4. MARKING :



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      |

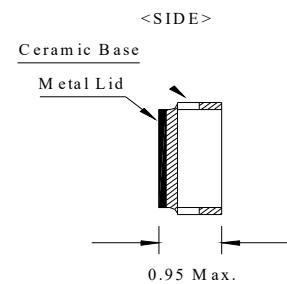
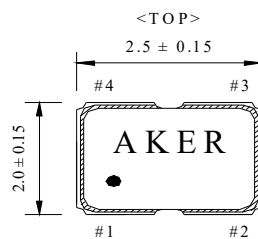
A cycle every four years

#### 5. DIMENSION :

( UNIT : mm )

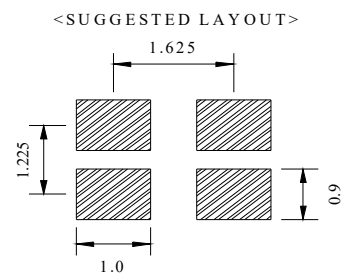
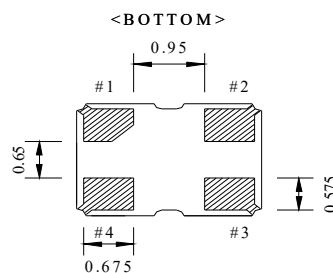
##### Enable / Disable Function

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

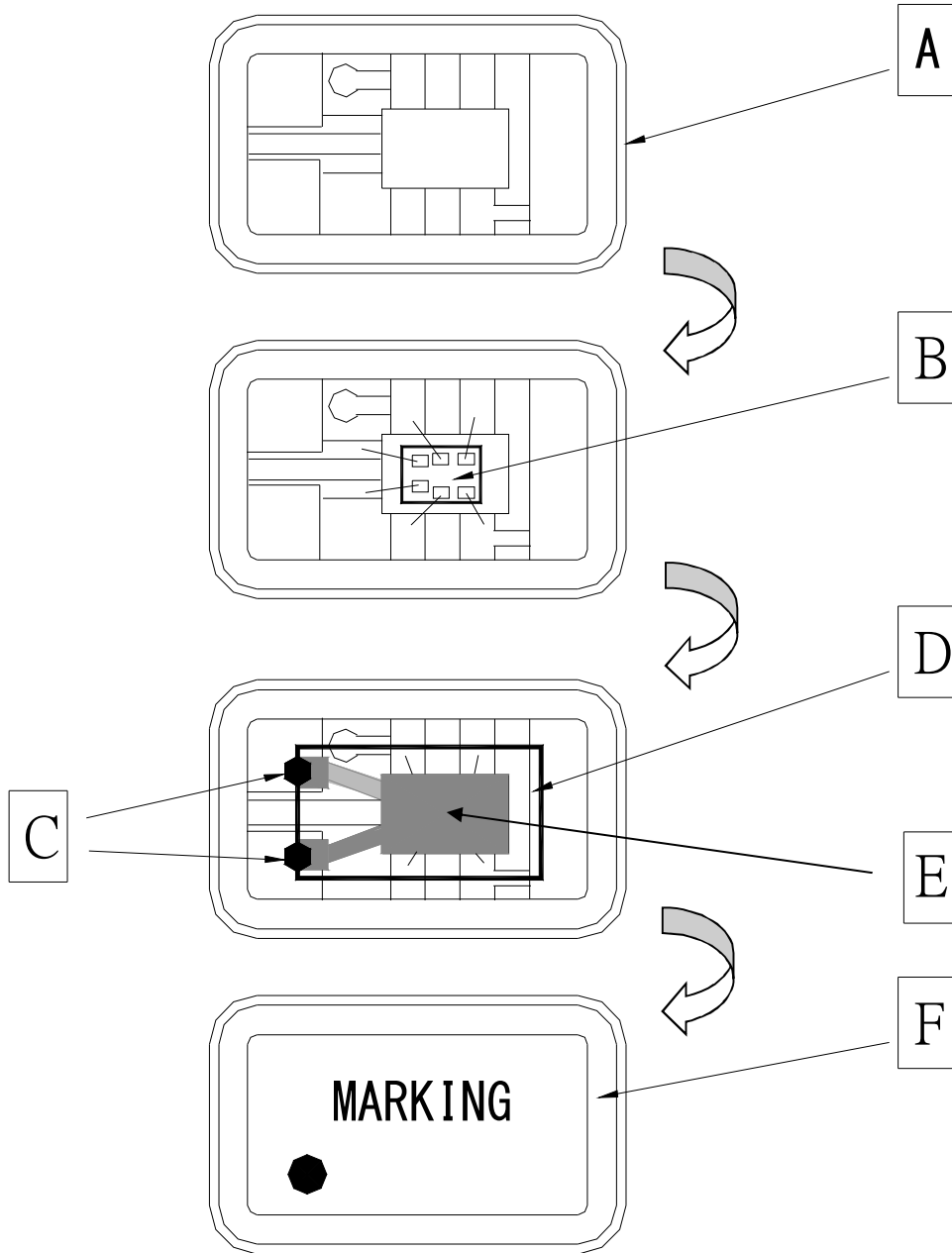


##### PIN FUNCTION

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



## 6 . STRUCTURE ILLUSTRATION

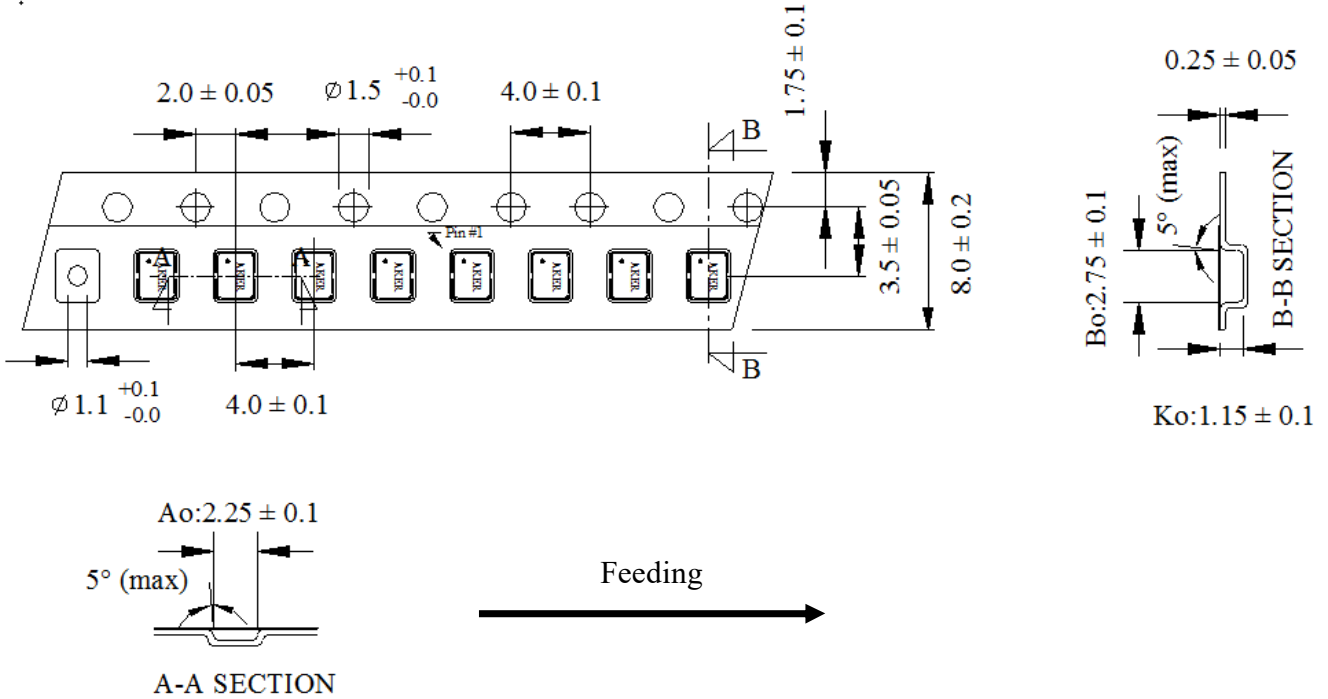


| COMPONENTS |                     | MATERIALS  |  | COMPONENTS |               | MATERIALS        |  |
|------------|---------------------|--|--|------------|---------------|------------------|--|
| A          | Base (Package)      | Ceramic (Al <sub>2</sub> O <sub>3</sub> )+Kovar (Fe/Co/Ni) |  | D          | 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 :

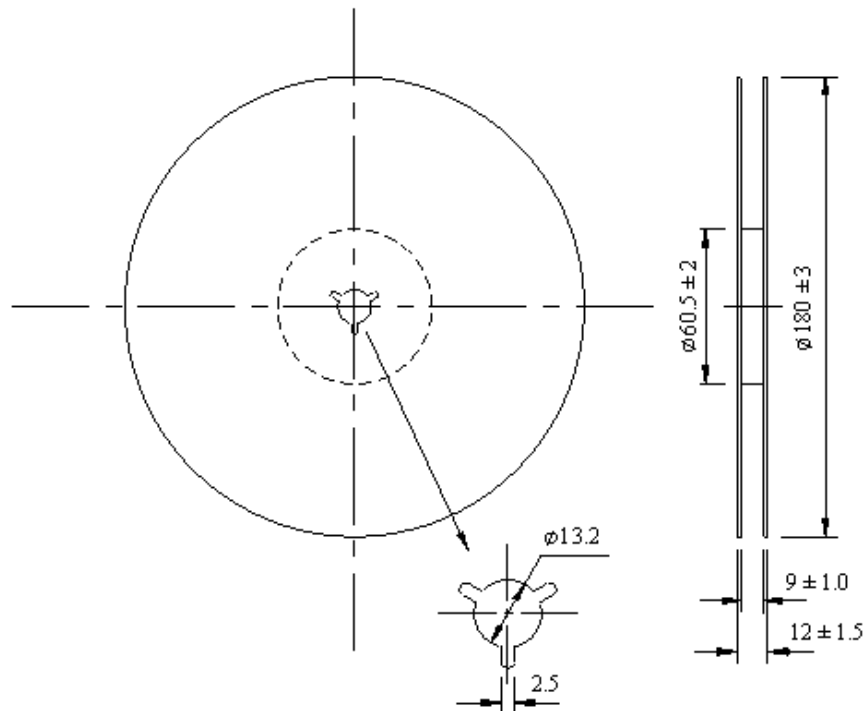
### TAPE SPECIFICATION

( Unit : mm )

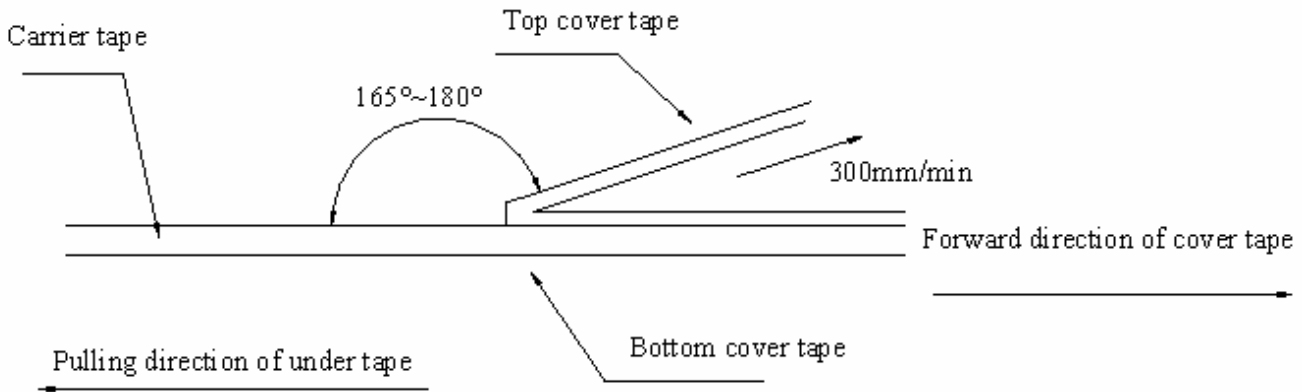


### OUTLINE DIMENSION

( Unit : mm )



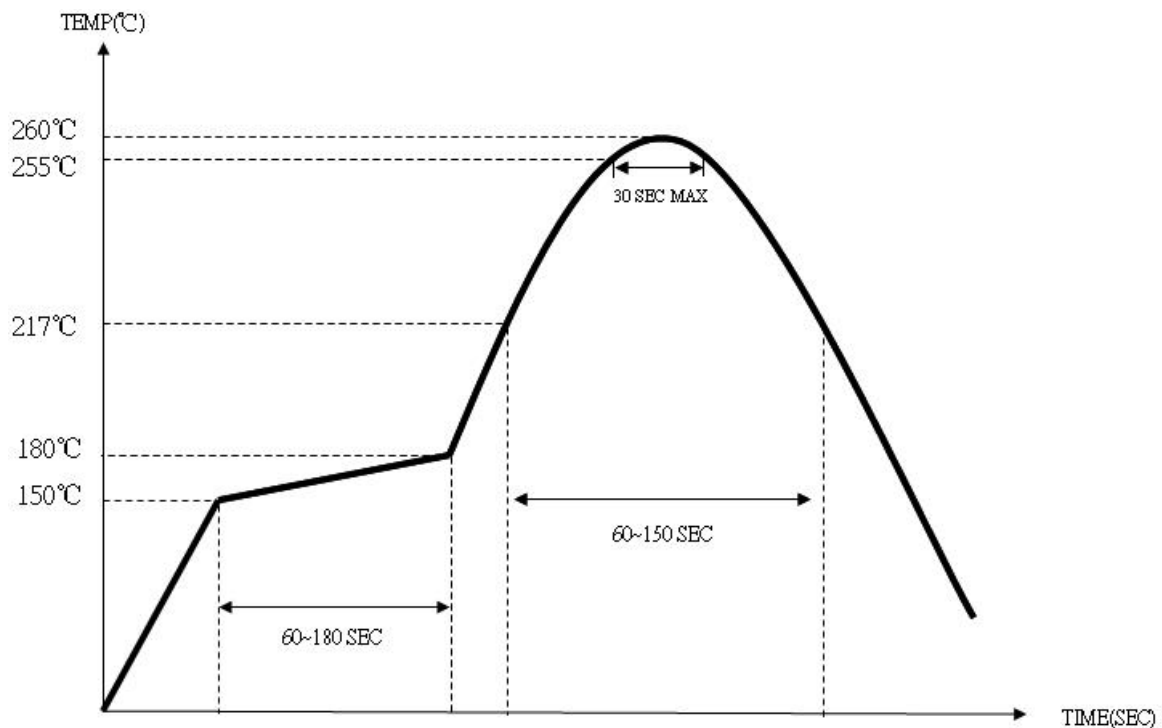
### 8. COVER TAPE ADHESION STRENGTH :



\*\*\* 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

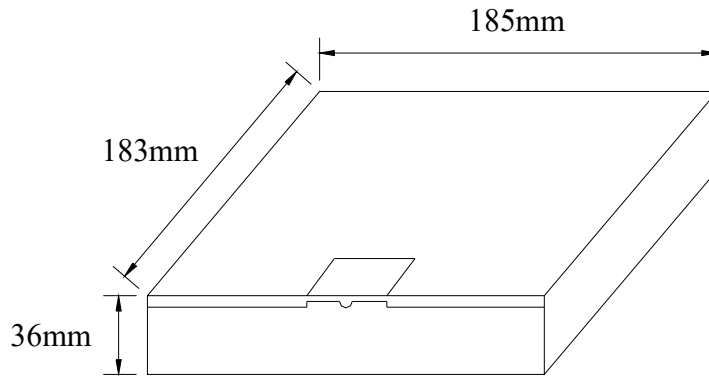
(Cover tape adhesion strength)

### 9. SOLDERING REFLOW PROFILE

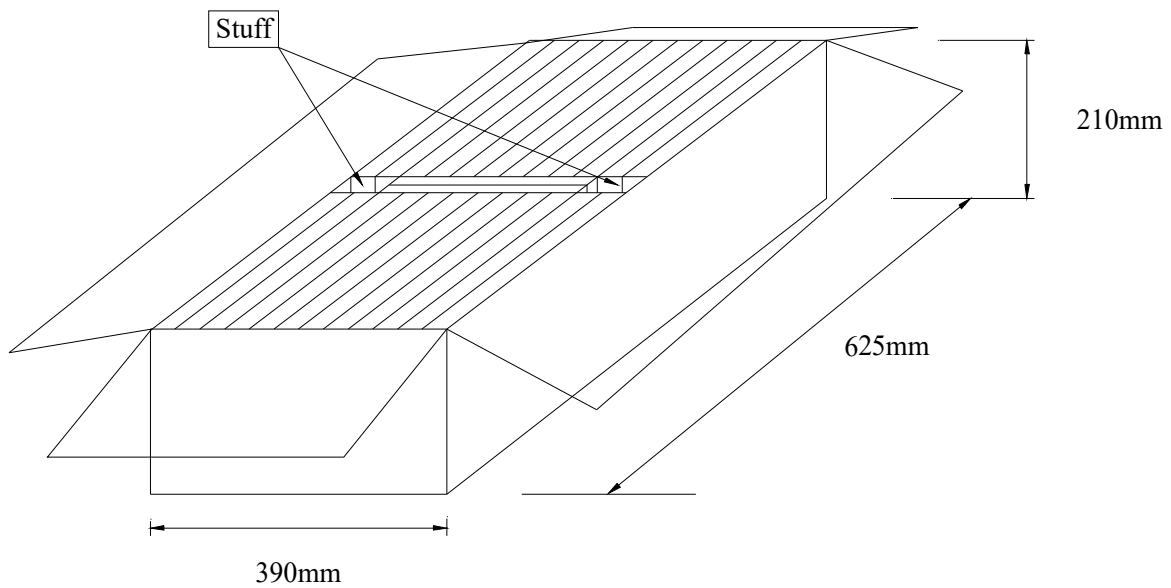




### 10. PACKING :



BOX = 3000 PCS / REEL(MAX)



SMD product packs 32 BOX=The outside box packs (3000 PCS \* 32 BOX = 96000 PCS)(MAX)



|                     |                     |                |
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## 11. MECHANICAL PERFORMANCE

| TEST ITEMS                             | TEST METHODS AND TEST CONDITION  | PERFORMANCE                             |
|--|--|---|
| 11.1 Temperature Cycling               | -55±3°C/30min maximum~+125±3°C/30min maximum , 1000cycles  | To satisfy the electrical performance . |
| 11.2 Operational Life                  | 125°C±3°C , 1000hrs±12hrs Rated VDD applied.   |   |
| 11.3 Biased Humidity                   | 85°C±5°C&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°C±3°C , 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°C , 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.   |   |