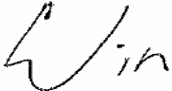



# APPROVAL SHEET

Customer Name : \_\_\_\_\_  
Customer P/N : \_\_\_\_\_  
Frequency : 20.000000 MHz  
Aker Approved P/N : SMF-020000-5BC6T0  
Aker MPN : SMF-020000-5BC6T0  
Rev. : 1  
ISSUE DATE : Oct.20.2017

APPROVED	CHECKED	PREPARED
		
APPROVED BY CUSTOMER		

## AKER TECHNOLOGY CO., LTD.

ADDRESS : NO 11-3, Jianguo Rd., T.E.P.Z ,Tanzi Dist., Taichung City 427, Taiwan.

TEL : 886-4-25335978 FAX : 886-4-25336011

Web: [www.aker.com.tw](http://www.aker.com.tw)

**RoHS Compliant**  
**TS-16949 Certified**  
**AEC-Q200 Qualified**





CUST. P/N	:		
Aker Approved P/N	:	SMF-020000-5BC6T0	
APPROVED	:	Win	SHEET : 2 of 9
PREPARED	:	Kiku	REV. : 1

## 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%

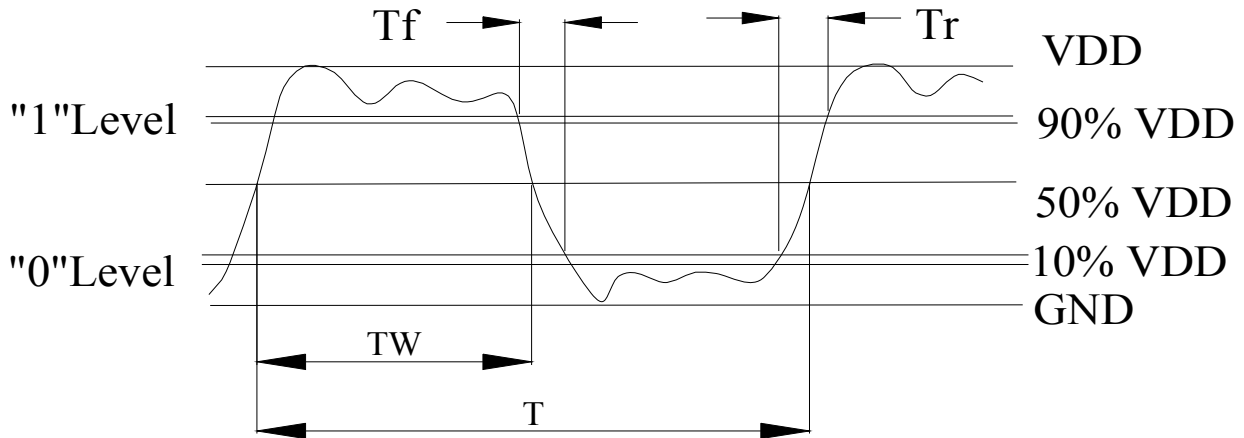
■ AKER Model : SMF-531

■ Cutting Model : AT CUT

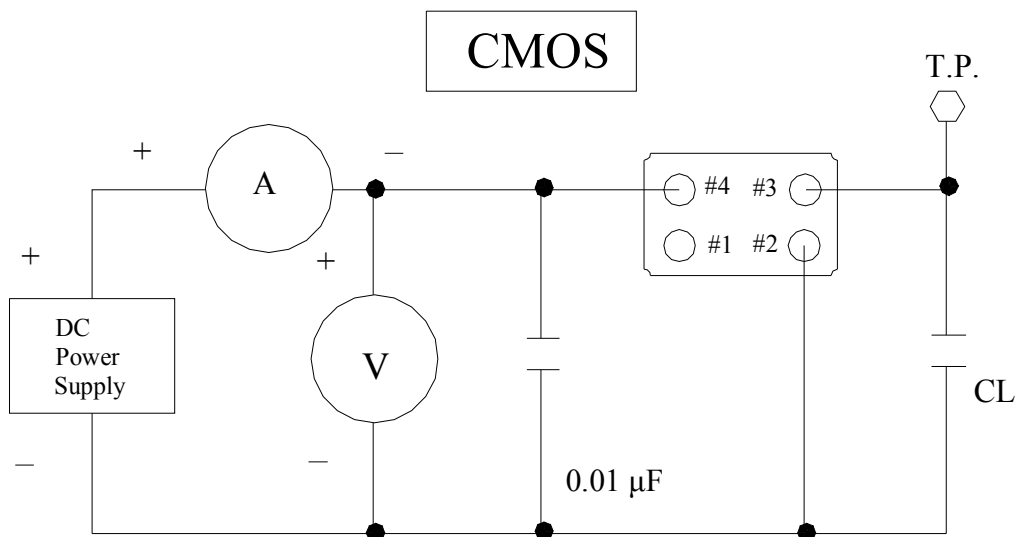
Parameters	Symbol	Electrical Spec				Notes
		Min.	Typ.	Max.	Units.	
Nominal Frequency		20.000000			MHz	
Frequency Stability		±50			ppm	
Supply Voltage	V <sub>DD</sub>	5.0±10%			V	
Output Load CMOS	CL	15			pF	
Aging		±3			ppm	Year at 25°C
Enable Control		Yes				Pad 1
Operating Temperature		-40	25	125	°C	
Storage Temperature Range		-55	~	125	°C	
Output Voltage High	VoH	4.5			V	
Output Voltage Low	VoL			0.5	V	
Input Current	I <sub>cc</sub>			25	mA	
Standby Current	I <sub>st</sub>			20	μA	
Rise Time	T <sub>r</sub>			10	ns	10%~90%V <sub>DD</sub> Level
Fall Time	T <sub>f</sub>			10	ns	10%~90%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

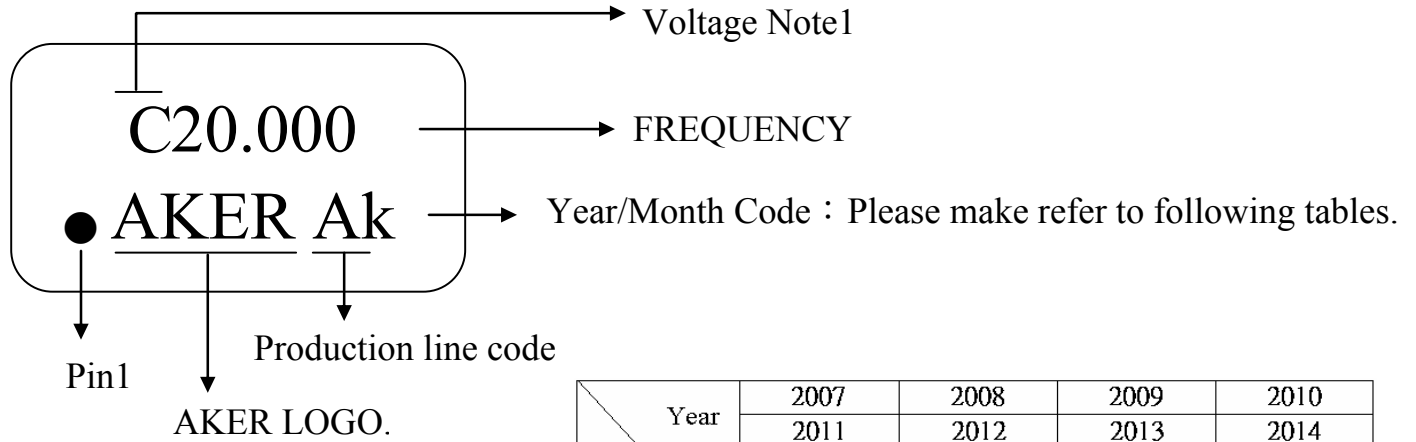


## 3. C - MOS LOAD TEST CIRCUIT



\*\*\*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

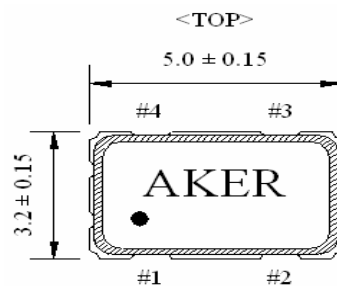
Year	2007	2008	2009	2010								
	2011	2012	2013	2014								
2015	2016	2017	2018									
2019	2020	2021	2022									
2023	2024	2025	2026									
Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	A	B	C	D	E	F	G	H	J	K	L	M
	N	P	Q	R	S	T	U	V	W	X	Y	Z
	a	b	c	d	e	f	g	h	j	k	l	m
	n	p	q	r	s	t	u	v	w	x	y	z

#### 5. DIMENSION :

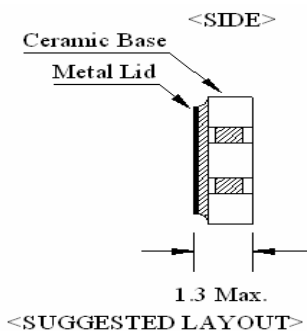
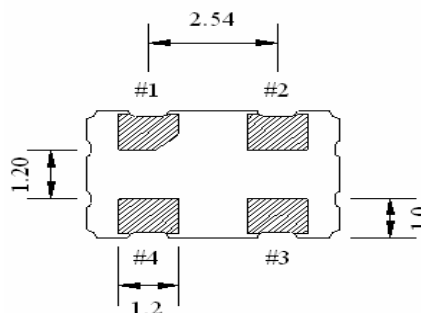
( UNIT : mm )

#### Enable / Disable Function

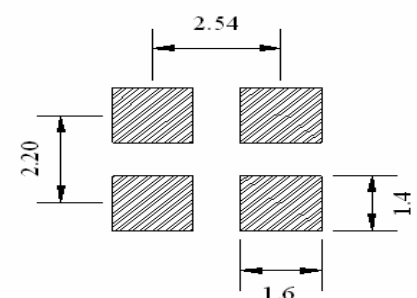
E/D (#1)	OUTPUT (#3)
HIGH (Open)	Operating
LOW	High impedance



#### <BOTTOM>



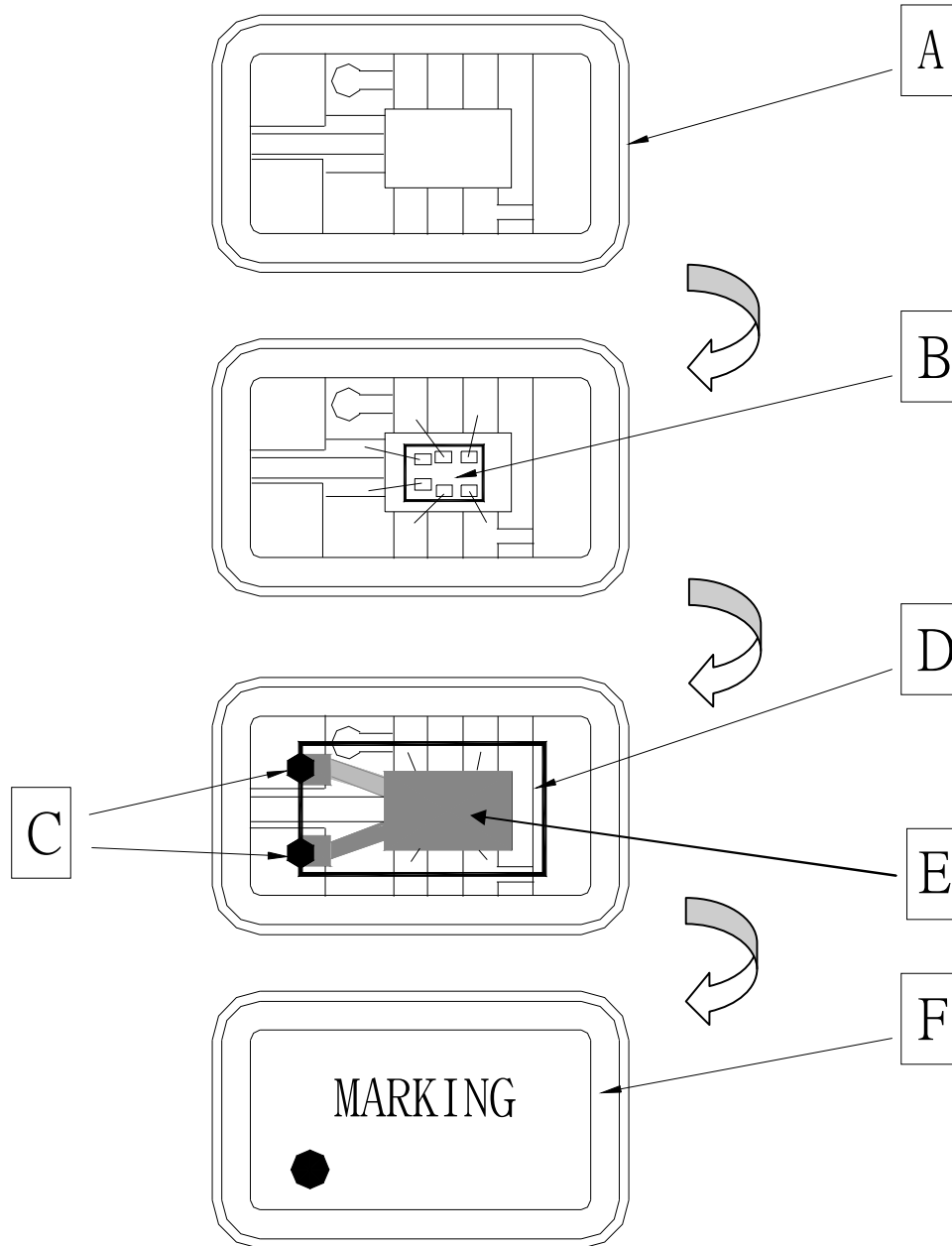
#### <SUGGESTED LAYOUT>



#### PIN FUNCTION

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

## 6 . STRUCTURE ILLUSTRATION



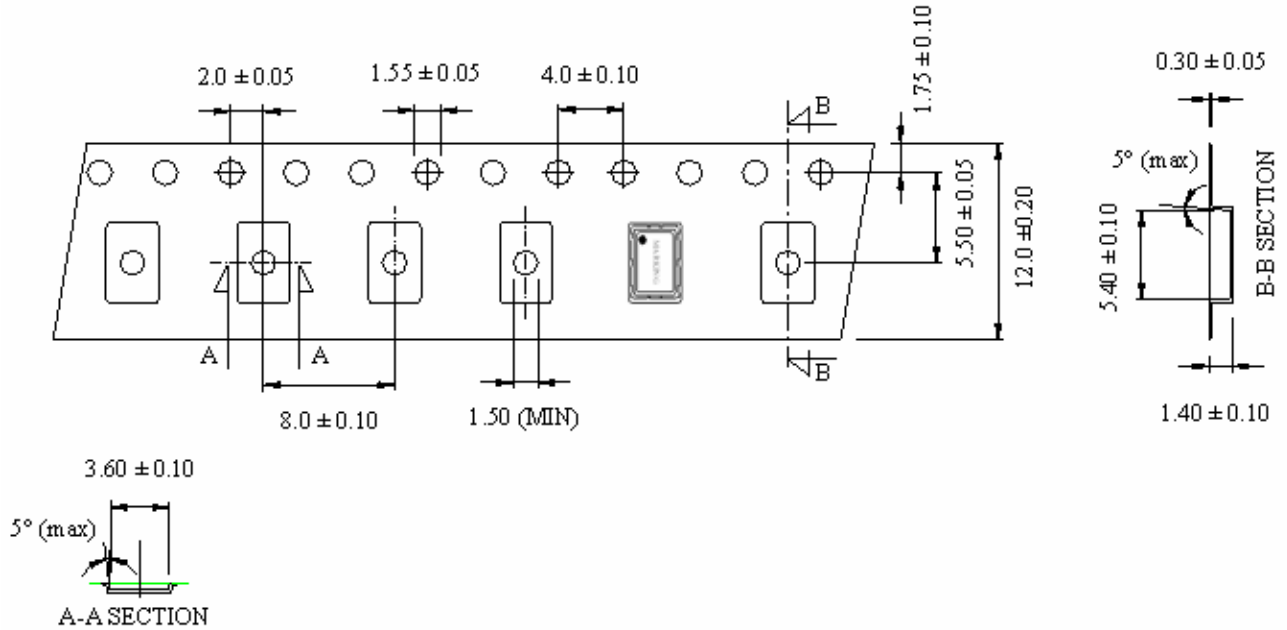
COMPONENTS		MATERIALS	COMPONENTS		MATERIALS
A	Base (Package)	Ceramic (Al <sub>2</sub> O <sub>3</sub> )+Kovar (Fe/Co/Ni)	D	Crystal blank	SiO <sub>2</sub>
B	IC chip	.	E	Electrode	Cr / Ag
C	Conductive adhesive	Ag / Silicon resin	F	Lid	Fe/Co/Ni

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APPROVED	:	Win
PREPARED	:	Kiku
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		REV . : 1

## 7. PACKING :

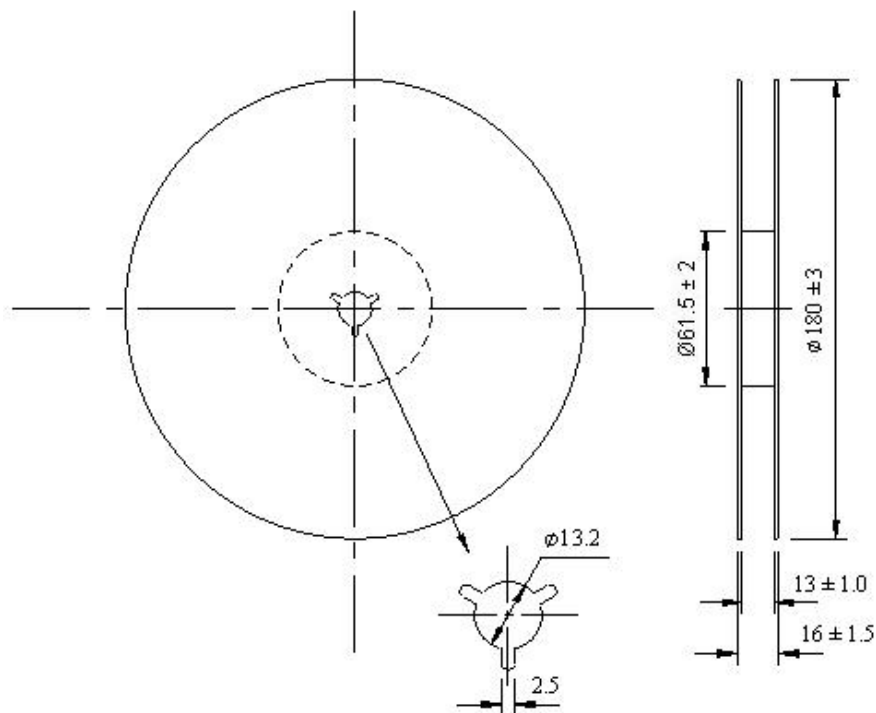
### TAPE SPECIFICATION

( Unit : mm )



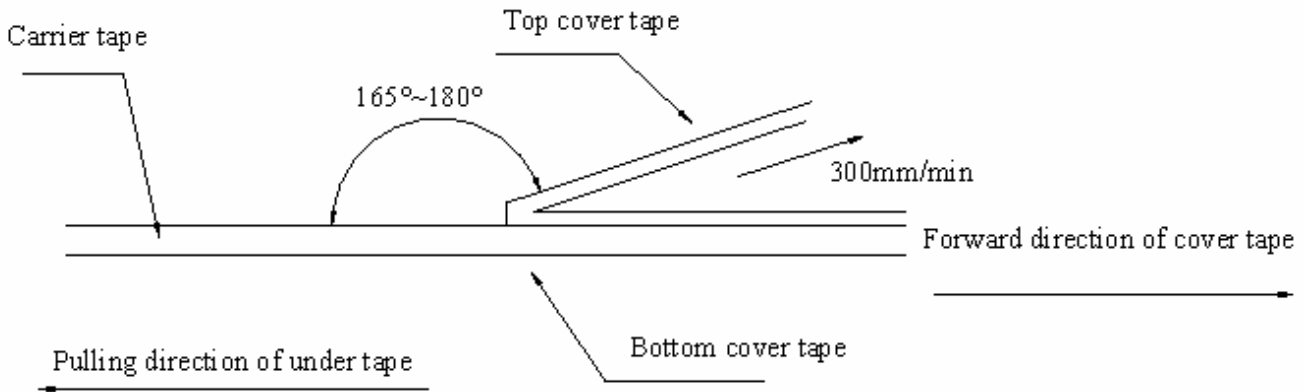
### OUTLINE DIMENSION

( Unit : mm )



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## 8. COVER TAPE ADHESION STRENGTH :

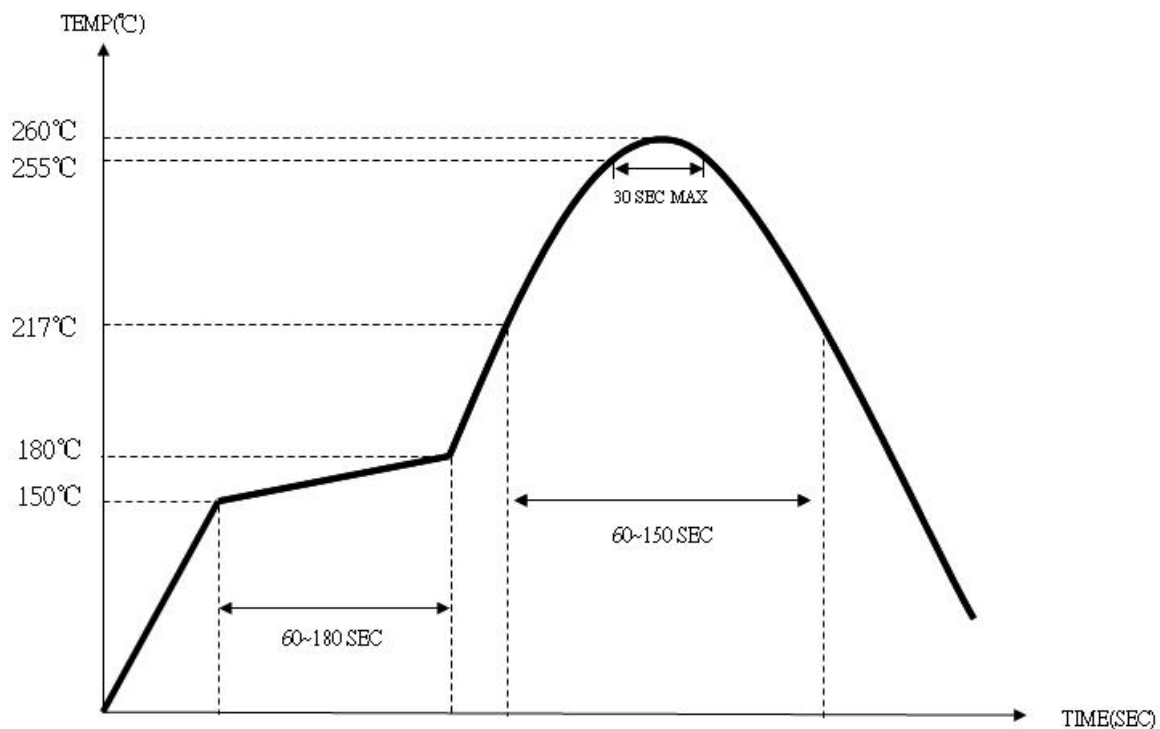


\*\*\* In the case, the cover tape is pulled off under the above conditions, the cover tape adhesion strength should be 10.2g~71.4g

Plastic tape: 10.2g~71.4g

(Cover tape adhesion strength)

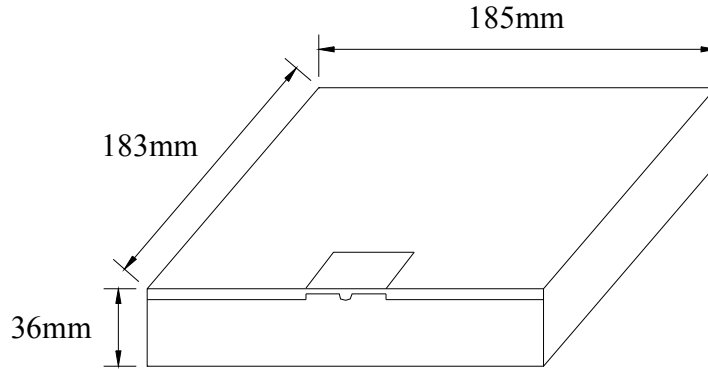
## 9. SOLDERING REFLOW PROFILE



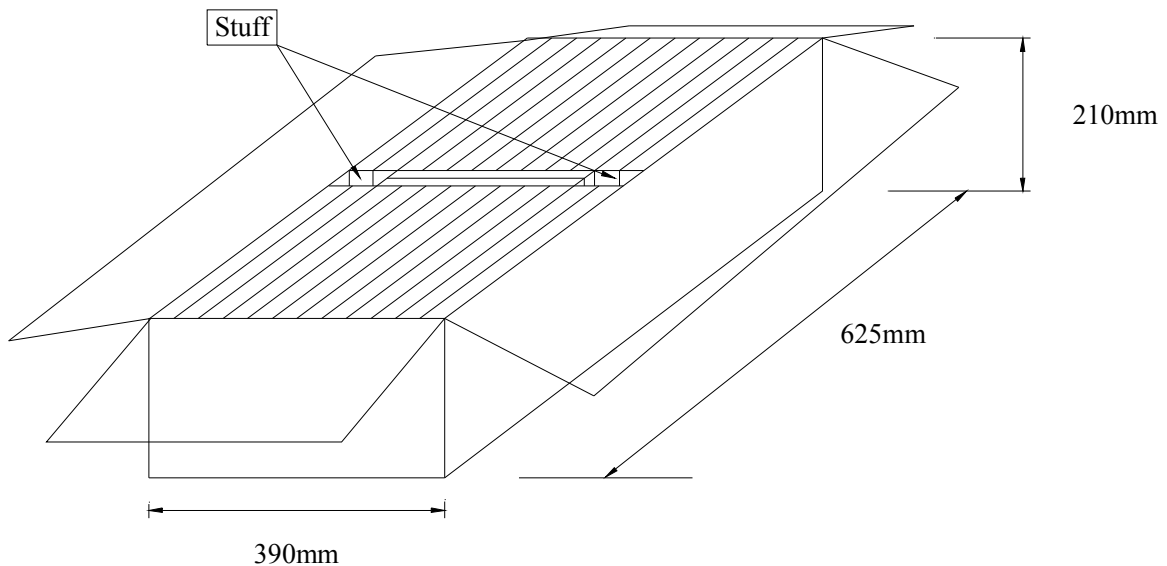


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APPROVED	:	Win
PREPARED	:	Kiku
		SHEET : 8 of 9
		REV . : 1

**10. PACKING :**



BOX = 1000 PCS / REEL



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



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APPROVED	:	Win
PREPARED	:	Kiku
		SHEET : 9 of 9
		REV . : 1

## 11 . MECHANICAL PERFORMANCE

TEST ITEMS	TEST METHODS AND TEST CONDITION	PERFORMANCE
11.1 Temperature Cycling	-40±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	125°C±3°C , 1000hrs±12hrs	
11.6 Vibration Test	Freq.range: 10~2000Hz , Peak to peak amplitude:1.52mm 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.	

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