Confidential

APPROVAL SHEET

Customer Name	:	
Customer P/N	:	
Frequency	:	20.000000 MHz
Aker Approved P/N	:	SMAF-020000-5-D4-02
Aker MPN	:	SMAF-020000-5-D4-02
Rev.	:	1
ISSUE DATE	:	Feb.9.2023

APPROVED	CHECKED	PREPARED
Tin		Marco
APPROVED BY CUSTOMER		

AKER TECHNOLOGY CO., LTD.

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Web: www.aker.com.tw

MSL:Level 1

RoHS Compliant

IATF 16949 Certified

AEC-Q200 Qualified

Rev.	Date	Reviser	Revise contents
1	2023/2/9	Marco	Initial Released

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℃

Relative humidity : 40%~70%

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

Ambient temperature : 25±3℃

Relative humidity : 40%~70%

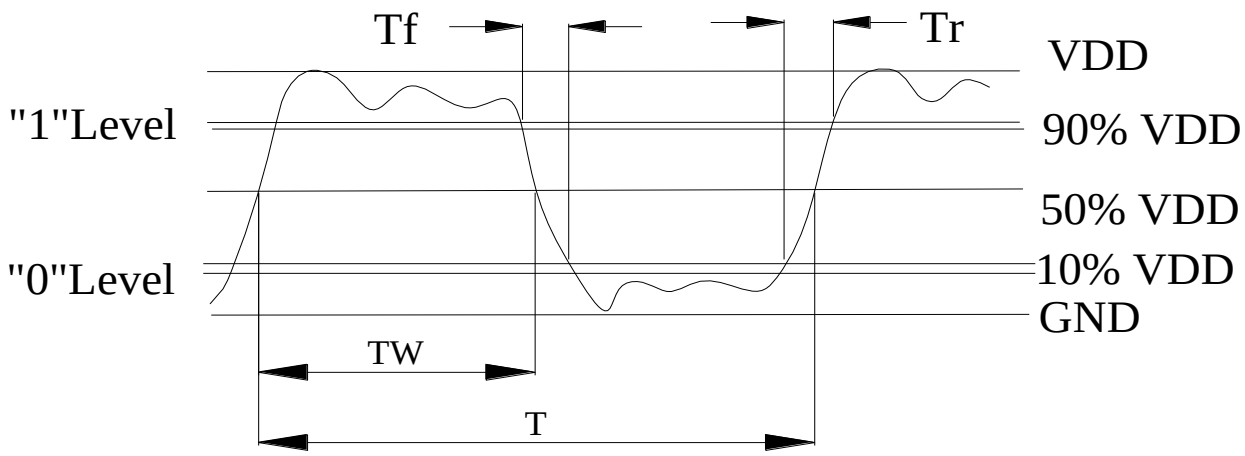
■ AKER Model : SMAF-531

■ Cutting Mode : AT CUT

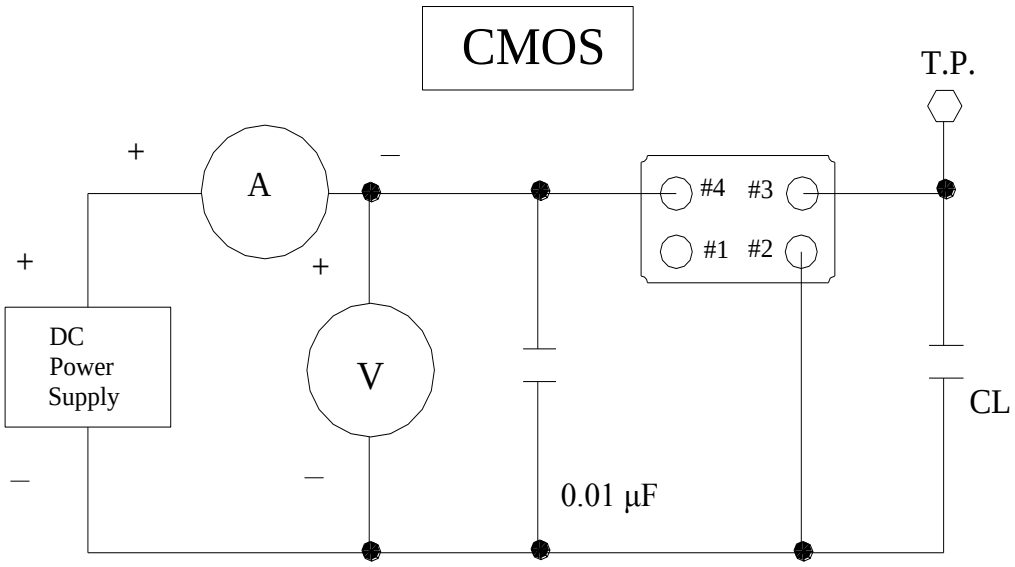
Parameters	Symbol	Electrical Spec				Notes
		Min.	Typ.	Max.	Units.	
Nominal Frequency			20.000000		MHz	
Frequency Stability			±50		ppm	
Supply Voltage	V_{CC}		5.0±10%		V	
Output Load CMOS	CL			15	pF	
Aging			±3		ppm	First Year
Enable Control			Yes			Pad 1
Operating Temperature		-40	25	85	℃	
Storage Temperature Range		-55	~	150	℃	
Output Voltage High	VoH	90%V_{DD}			V	
Output Voltage Low	VoL			10%V_{DD}	V	
Input Current	Icc			25	mA	
Standby Current	I_{ST}			20	μA	
Rise Time	Tr			10	ns	10%~90%V_{DD} Level
Fall Time	Tf			10	ns	90%~10%V_{DD} Level
Symmetry (Duty ratio)	TH/T	45	~	55	%	
Start-up Time	Tosc			10	ms	
Enable Voltage High	Vhi	70%V_{DD}			V	
Disable Voltage Low	Vlo			30%V_{DD}	V	
Output Enable Delay Time	T on			10	ms	
Output Disable Delay Time	T off			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

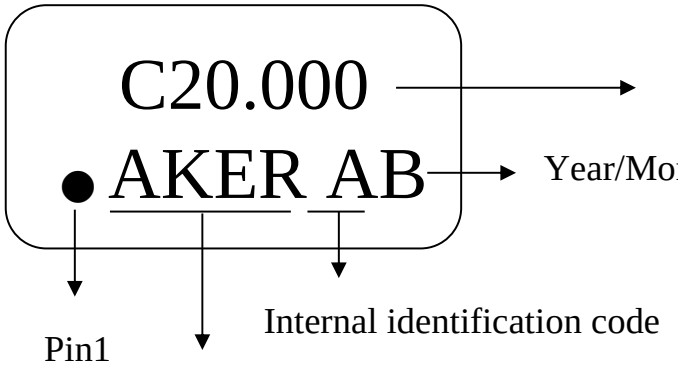


3 . C - MOS LOAD TEST CIRCUIT



***Because SMA series has no by pass capacitor.
So,we recommend our customer to use capacitor 0.01 µF
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 / Month	2021 2025 (4N+1)	2022 2026 (4N+2)	2023 2027 (4N+3)	2024 2028 (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

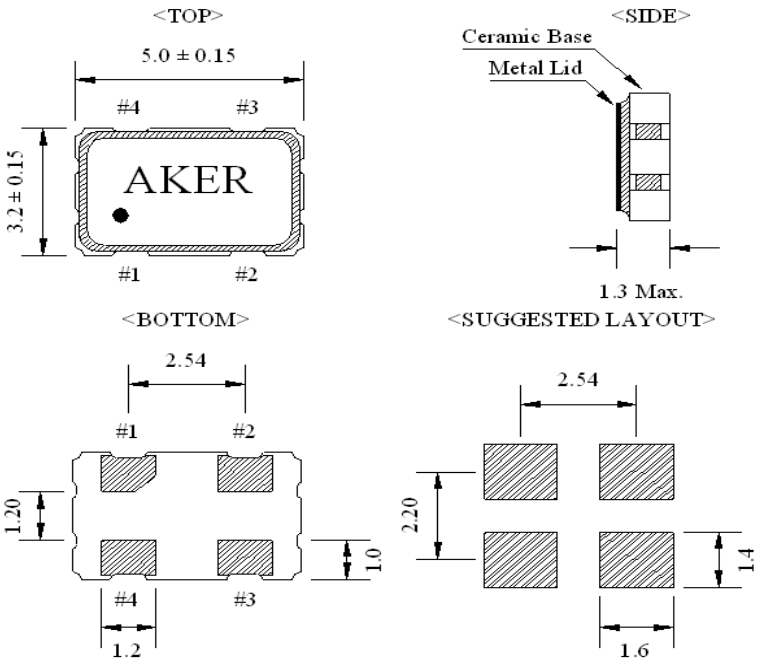
5 . DIMENSION :

(UNIT : mm)

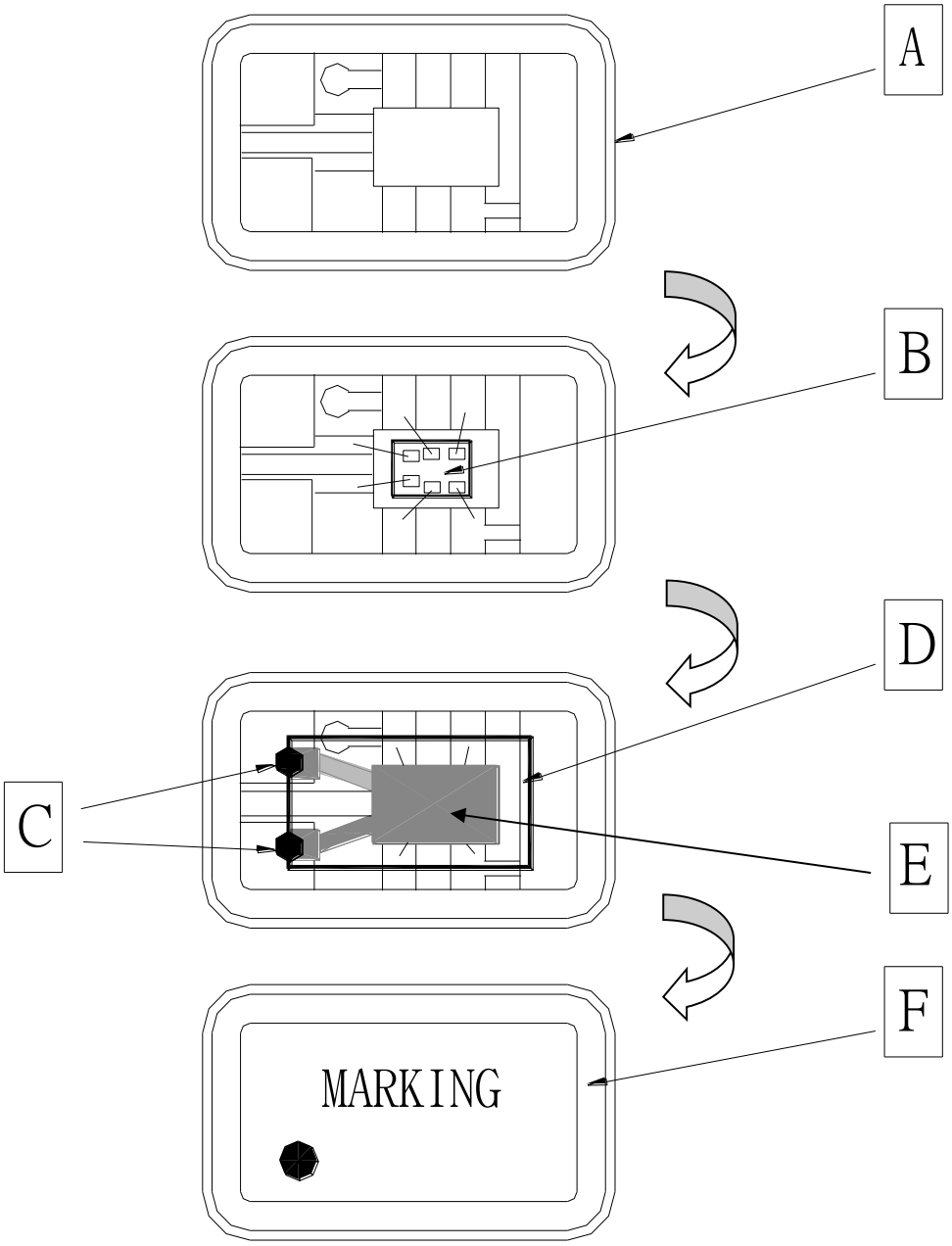
Enable / Disable Function

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

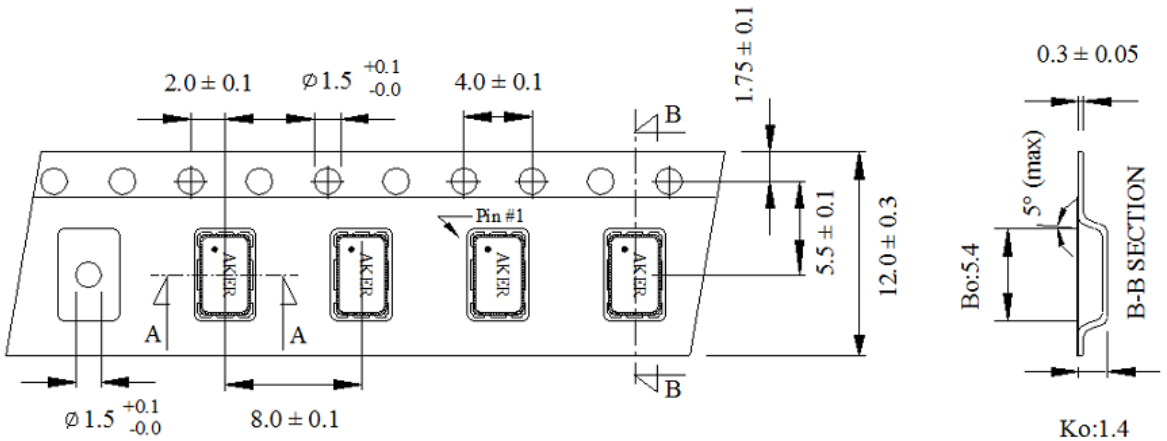


COMPONENTS		MATERIALS	COMPONENTS		MATERIALS
A	Base (Package)	Ceramic (Al_2O_3)+Kovar (Fe/Co/Ni)	D	Crystal blank	SiO_2
B	IC chip	-	E	Electrode	Cr / Ag
C	Conductive adhesive	Ag / Silicon resin	F	Lid	Fe/Co/Ni

7 . PACKING :

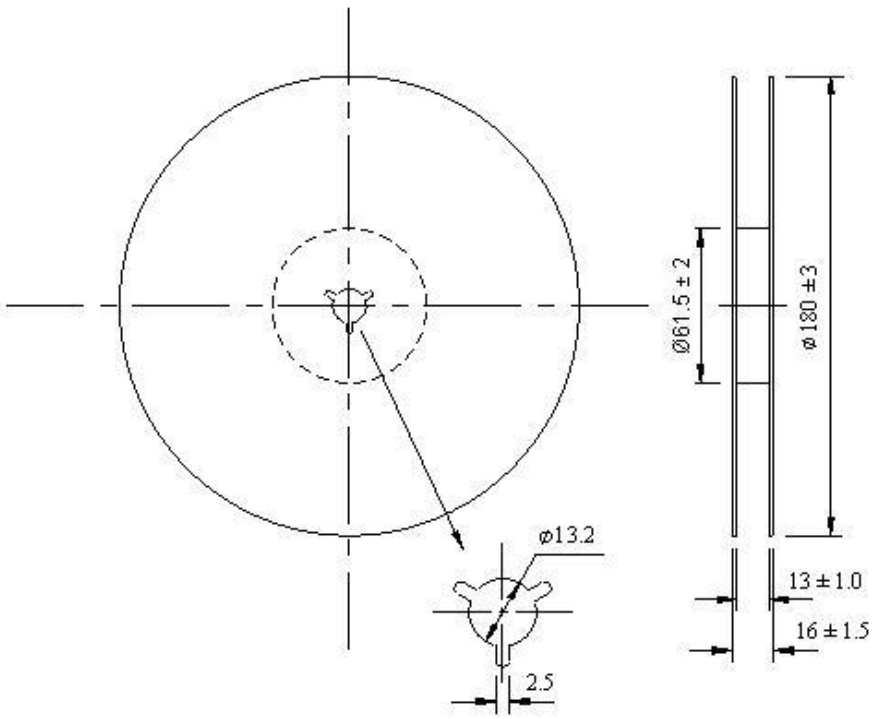
TAPE SPECIFICATION

(Unit : mm)

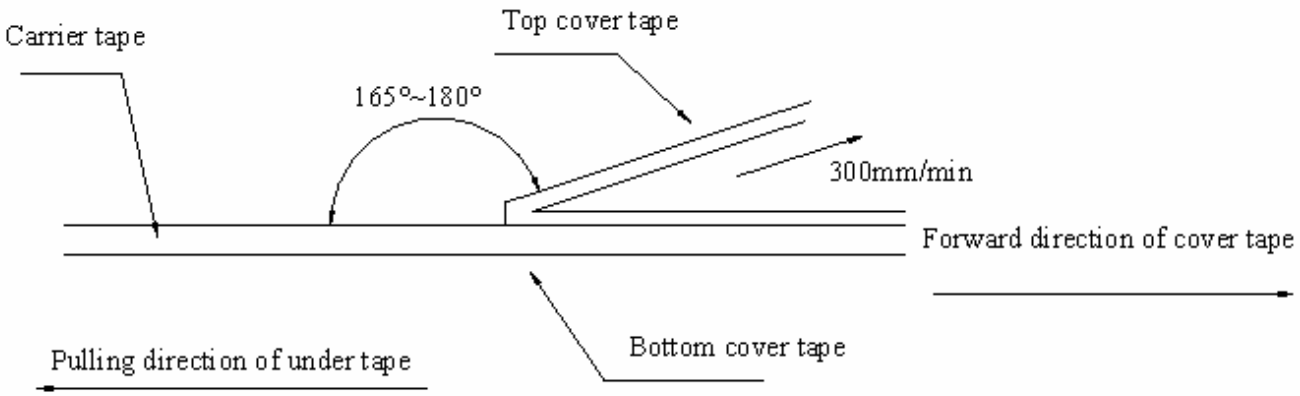


OUTLINE DIMENSION

(Unit : mm)



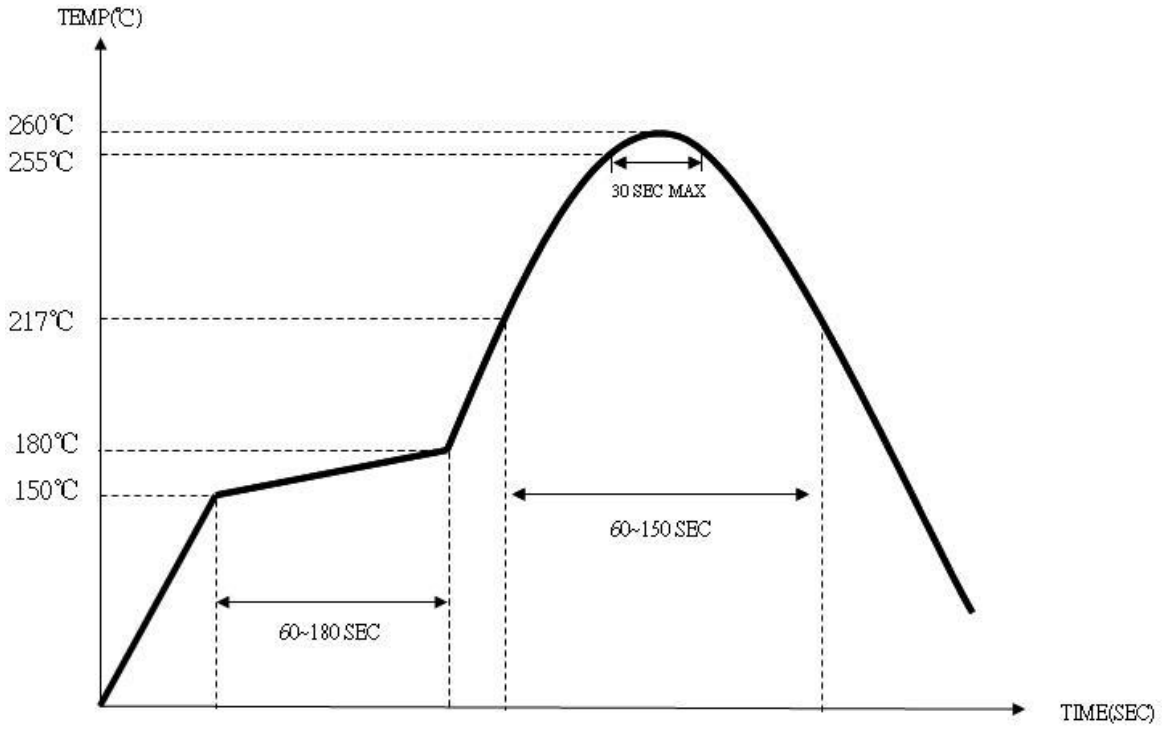
8. COVER TAPE ADHESION STRENGTH：



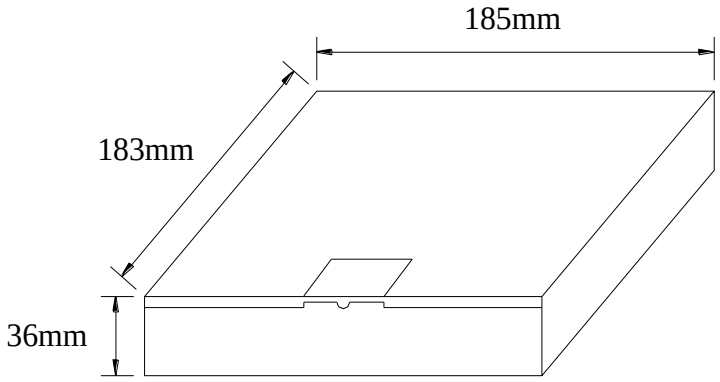
*** In the case, the cover tape is pulled off under the above conditions, the cover tape adhesion strength should be 10.2g~71.4g Plastic tape:10.2g~71.4g

(Cover tape adhesion strength)

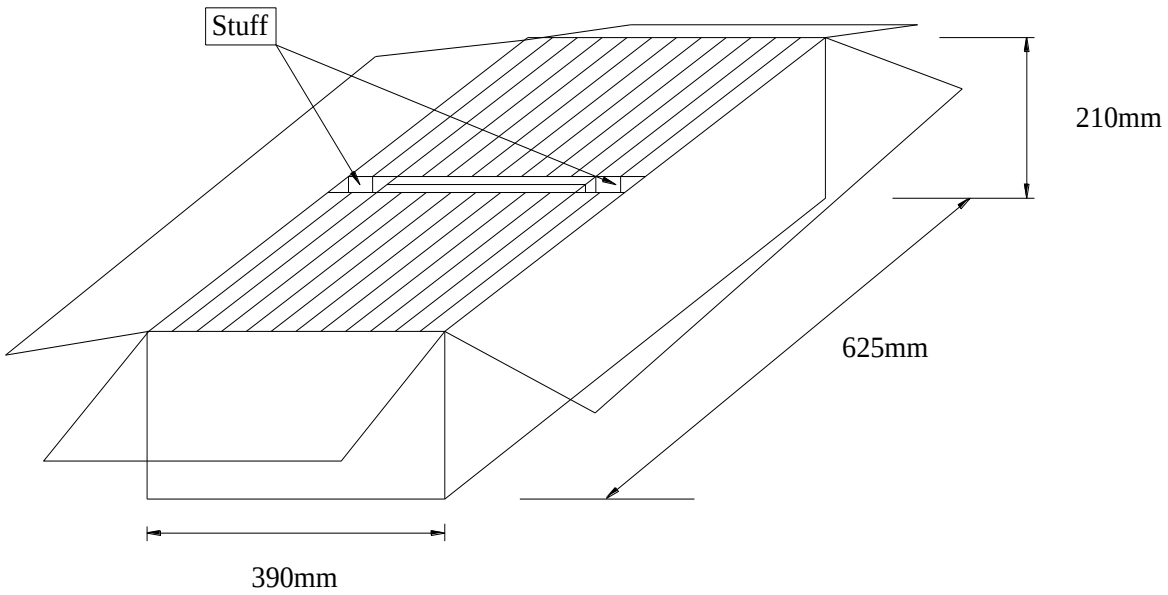
9 . SOLDERING REFLOW PROFILE



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°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℃±3°C，1000hrs±12hrs	
11.6 Vibration Test	Freq.range: 10~2000Hz，Peak to peak amplitude:1.52mm Peak acceleration:5G (49m/s2)，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.	