



SUBJECT	PRODUCT ENGINEERING SPECIFICATION	MODEL NAME	Ack-9401	VER.	1.1
		FILE NO	Ack-9401	PAGE	1 OF10

1. PRODUCT OVERVIEW

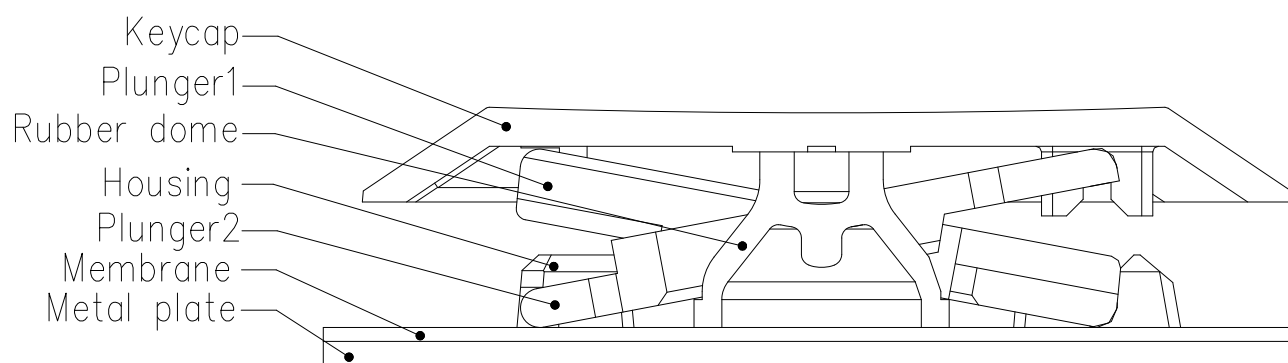
This specification defines the mechanical, electrical and functional specification of the Ack-9401 membrane switch notebook PC keyboard, the keyboard outputs the particular signal when the particular keycap is pressed that available for input device of the notebook computer.

2. CONFIGURATION**2.1 APPEARANCE DRAWING**

US :Please refer to attached drawing **K0C0870xxx01**

2.2 KEY TOP PRINTING LAYOUT

US :Please refer to attached drawing **KPN8B09**

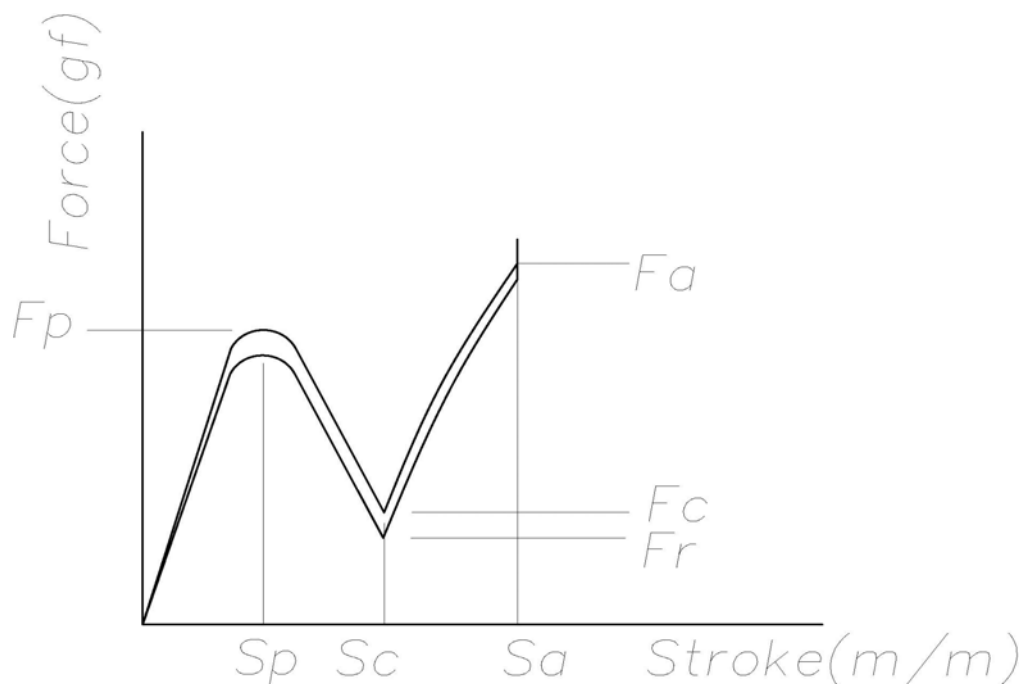
2.3 KEY SWITCH STRUCTURE**2.4 MATERIAL SPECIFICATION**

Parts name	Material	UL grade	UL file NO.
Keycap	ABS	94HB	E88637
Membrane	PET	94VTM-2	E172830
Rubber	Silicone	94HB	E174951
Plunger	POM	94HB	E45034
Housing	ABS	94HB	E88637
Metal Plate	AL t0.5mm		

3. MECHANICAL SPECIFICATIONS**3.1 TACTILE CURVE GRAPH**



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Point	Position (mm) Initial	Position (mm) After 5 millions	Force	Force (g) Initial	Force (g) After 5 millions
1	$S_p = 0.6 \pm 0.30$	$S_p = 0.6 \pm 0.50$	F_p	60 ± 15 g	$60 +20/-30$ g
2	$S_c = 1.2 \pm 0.30$	$S_c = 1.2 \pm 0.50$	F_c	$F_p - F_c \geq 20$ g	N/A
3	$S_a = 2.00 \pm 0.30$	$S_a = 2.0 \pm 0.40$	T_m	Max 150 g	N/A
4	$S_r = S_c \pm 0.20$	$S_r = S_c \pm 0.40$	F_r	Min 15 g	Min 5 g

mark statement:

F_p =Peak force, F_c =Click feeling, T_m =Travel to make, F_r =Return force

3.2 TRAVEL

Full travel : $2.00 + 0.30 / - 0.30$ mm (force at 150g)

3.3 KEYCAP PULL OFF FORCE

500gf minimums with equal load applied to all 4 corners of the keycap

150gf minimums at any one corner or side of a given keycap

3.4 KEYBOARD HEIGHT

$4.70\text{mm} + 0.20 / - 0.20\text{mm}$

3.5 CURVE OF KEYBOARD

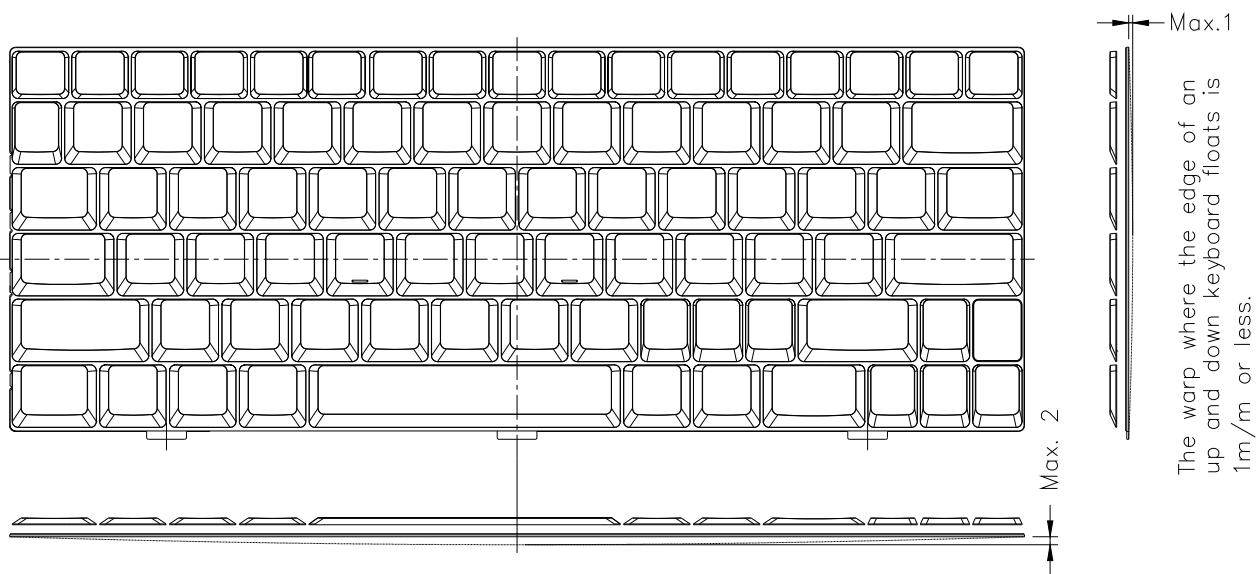
The keyboard has no float at the center area on the flat surface.



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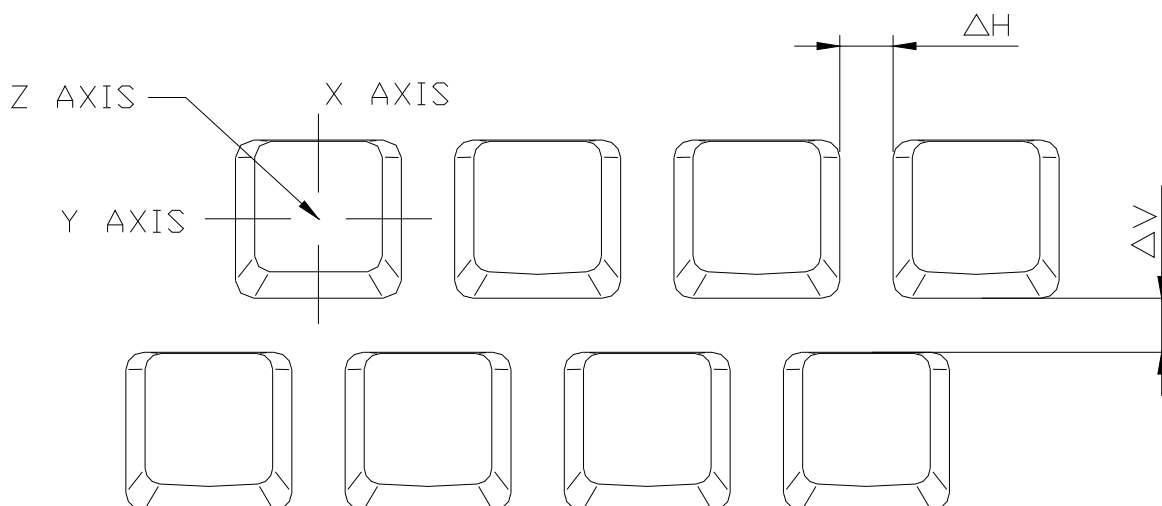
The warp where the edge of a right and left keyboard floats is 2.00mm or less.
(at self weight).

The warp where the edge of an up and down keyboard floats is 1.00mm or less.
(at self weight)



The warp where the edge of a right and left keyboard floats is 2m/m or less.

3.6 KEYCAP SPACING AND ALIGNMENT



Clearance between keycaps(standard keycaps): $\Delta H (\Delta V) \text{ -- } \pm 0.30 \text{ mm}$

Alignment (keycap to keycap): Neighbor 0.4 mm max

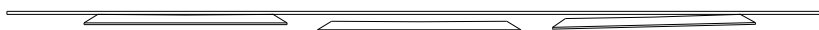
In a row 0.8 mm max



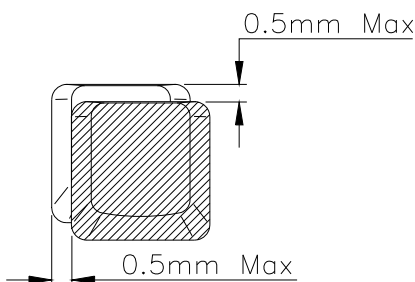
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Height alignment (keycap to keycap): Neighbor 0.4 mm max
 In a row 0.8 mm max

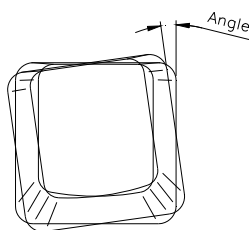
Key slant (keycap to keycap): 0.6 mm max



Key X,Y Movement : Shall be $\leq 0.5\text{mm}$ for full amplitude on both X and y directions.



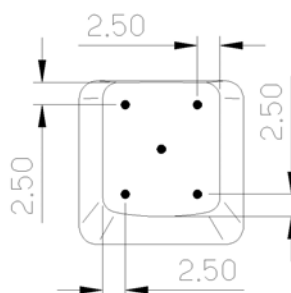
Key twisting: Normal key $\pm 2.0^\circ$
 Fn Key $\pm 1.5^\circ$
 Space key $\pm 1.0^\circ$



3.7 KEY_IN TEST SPEC ON THE 4 CORNERS OF THE KEYCAP

A. NORMAL KEY

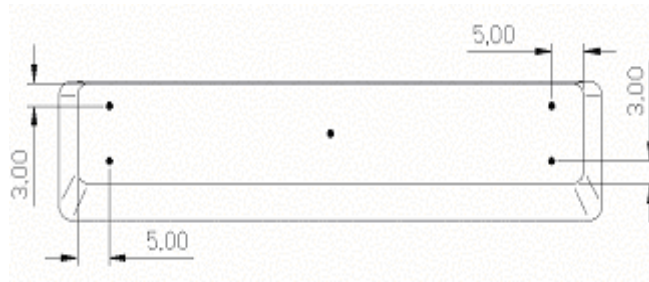
UNIT: mm (ALL TYPES)



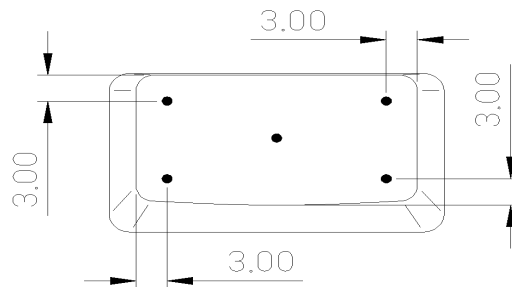


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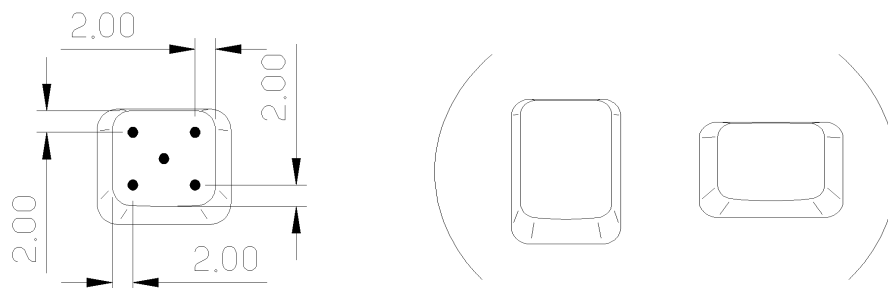
B.SPACE KEY



C. OTHER KEY BIGGER THAN NORMAL KEY EXCEPT SPACE BAR



D. ALL THE KEYS SMALLER THAN NORMAL KEY



NOTE:

It is not permissible under any circumstances for adjacent keys to touch during normal operation.

4. ELECTRICAL SPECIFICATION

4.1 KEY MATRIX

US :Please refer to attached drawing **KMTXC0811001**

4.2 POWER REQUIREMENT

The key switch shall required DC 5V at 0.3mA maximum.

4.3 CONTACT RESISTANCE AND INSULATION RESISTANCE

The contact resistance is 300 OHM maximum at 200g force



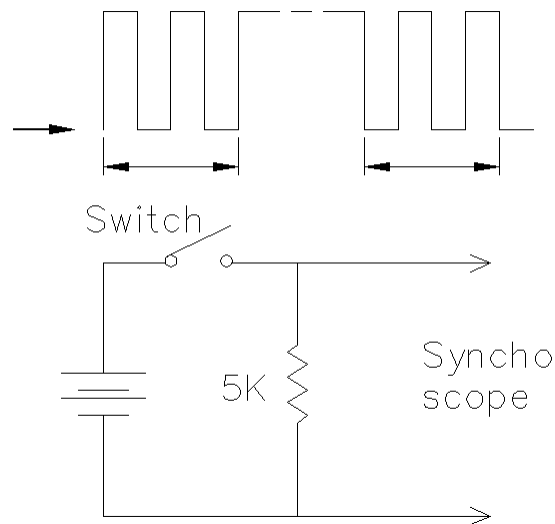
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4.4 MEMBRANE CONTACT CARBON DURABILITY

The contact carbon on membrane's tail should be able to stand for at least 5 times' Insert – lock- unlock – pull out process to perform keyboard function when assembling keyboard's tail into connector of system.

KEY SWITCH BOUNCE

Shall be 20 ms or less at " ON " and " OFF " when measured at a rate encountered in normal use. (3 to 4 operations per sec).



5. ENVIRONMENTAL

5.1 low Temperature Test

Test Condition :

- A. Test temperature : -20 +/- 3°C
- B. Test humidity : 0 % RH
- C. Test time : 240 +/- 8hr

5.2 high Temperature and humidity Test

Test condition :

- A. Test temperature : 60 +/- 2°C
- B. Test humidity : 95% RH
- C. Test time : 240 +/- 8hr

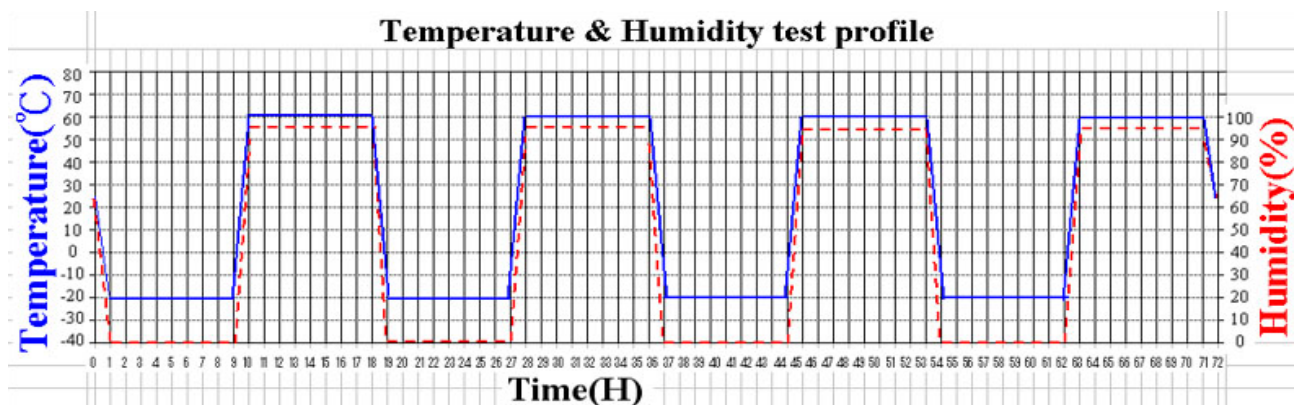
5.3 high-low Temperature humidity cycle Test



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The purpose of the test is to realize that temperature and humidity whether might affect plastic components dimension such variations of ink's color on keycap, taking measurements to improve problem if any.

Test condition:



The samples should be placed for 24 hours under normal temperature, the function as below should be passed after all above temperature test:

1. On position all strokes measurement—use computer tester
2. Operation touch, hanging check—press the keys in center and edge with fingers to check
3. Contact resistance—under 500 Ω
4. Check printed characters, texture, and color glitter—more than 2/3 of the character's surface remained after the test.

6. DROP TEST

This test is executed for one corner and three edges and all six sides from the height specification after the drop test with standard packing there shall be no physical or functional damage.

WEIGH (KG)	DROP HEIGHT (CM)
10 – 30	75
30 – 40	60
40 – 60	45

7. VIBRATION

The purpose of the test is to simulate the keyboard are transported, and realize whether mechanical or electrical functions might be damaged by vibration.

Non-Operating Vibration:

Frequency: 10-55-10 HZ



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Cycle time: 5 minutes

Amplitude: 1.5 mm

Sweep: Logarithmic Frequency

Vibration Direction: XYZ directions, one hour for each direction, 3 hours in total

8. KEYBOARD KEY SWITCH LIFE

Throughout the duration of the test, the keyboard will have no failure or deviation from the force displacement specification. The table below outlines the switching life test.

Keyboard Switch Life Test Requirements

Item	Requirement
Cycle Rate	3-5 times/sec
Keys	20 keys minimum/keyboard
Force	150 g
Stress cycles	5 million cycles for all test keys
Time between intervals	24 hours

Force displacement measurements and keyboard functionality will be tested at the following intervals: **0, 1.0, 2.0,3.0,4.0**and **5** million cycles. The keyboards will be tested 24 hours after the end of each interval.

9. KEYCAP PRINT WEAR PROOF

A. Rubber eraser

i. Test condition :

Eraser : Hinodewashi 502# or 510#.

Test speed:50 times/min

Loading :0.5kg force for 250 times.

B. Tear test

i. Test condition :

Cross cut printed character of a keycap. And put an adhesive tape on a cut character.

Surface and the label must be tightly stuck together, without any bobbles existing in between. And pull off the tape at a stretch to the vertical direction after 1 minute.

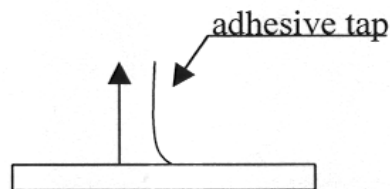
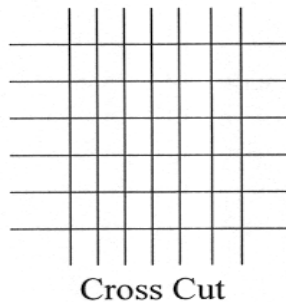
Pitch of cut: 1 mm



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Tape material: 3M NO: 610 –1PK

Tape width: 18 mm



10. FLEXIBLE TAIL DURABILITY

To perform on the flat cable or other portion need winding shall withstand winding test on a mandrel 1 m/m diameter of 180 angle ending 5 cycles with tension to get adhesion between the surfaces, after the test the resistance shall be within 150% of initial value.

11. PRECAUTION FOR HANDLING

11.1 CONNECTION TO THE CONNECTOR.

11.1.1 RECOMMENDED CONNECTOR IS “ ZERO FORCE TYPE ”

Please be sure to avoid the connectors that scratch on the surface of flexible pattern.

11.1.2 EXCESS FORCE TO THE FLEXIBLE PATTERN SHALL BE PROHIBITED AT THE TIME OF INSERTION.

11.1.3 ALLOCATION OF CONNECTOR IS RECOMMENDED TO BE AS CLOSE TO THE EDGE AS POSSIBLE. IF IMPOSSIBLE, LEASE BE SURE TO KEEP IT APART FROM HOT COMPONENTS.

11.1.4 PLEASE CONSIDER THE ALLOCATION OF CONNECTOR NOT TO BE AS BELOW IF UNAVOIDABLE, PLEASE BE SURE TO KEEP R3 Min.

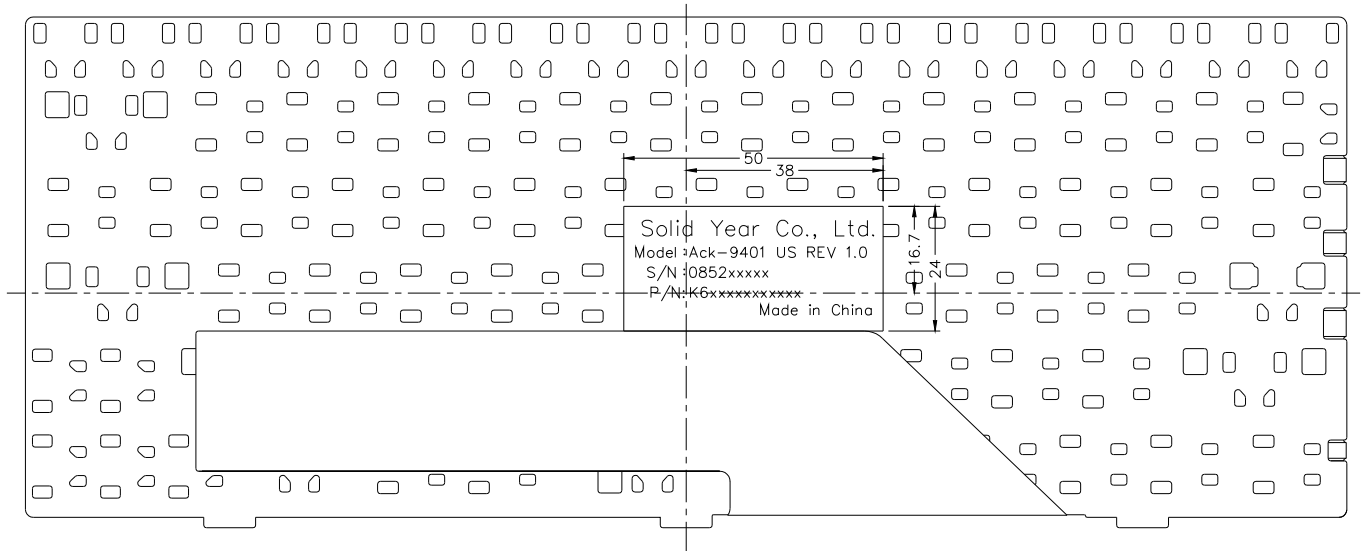
12. FLEXURE RESISTANCE

Support the keyboard at 2 ends and put 1kg weight at the center of keyboard, the difference of flatness (before and after 1kg weight) should be 5mm maximum.



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13. STICKUP PLACE



13.1 Stickup Spec.

12.1.1 Keyboard Backside stickup Spec. 50.00mm*24.00mm , reference for identification in SolidYear



Mass production REV: 1.0,2.0,3.0,4.0.....

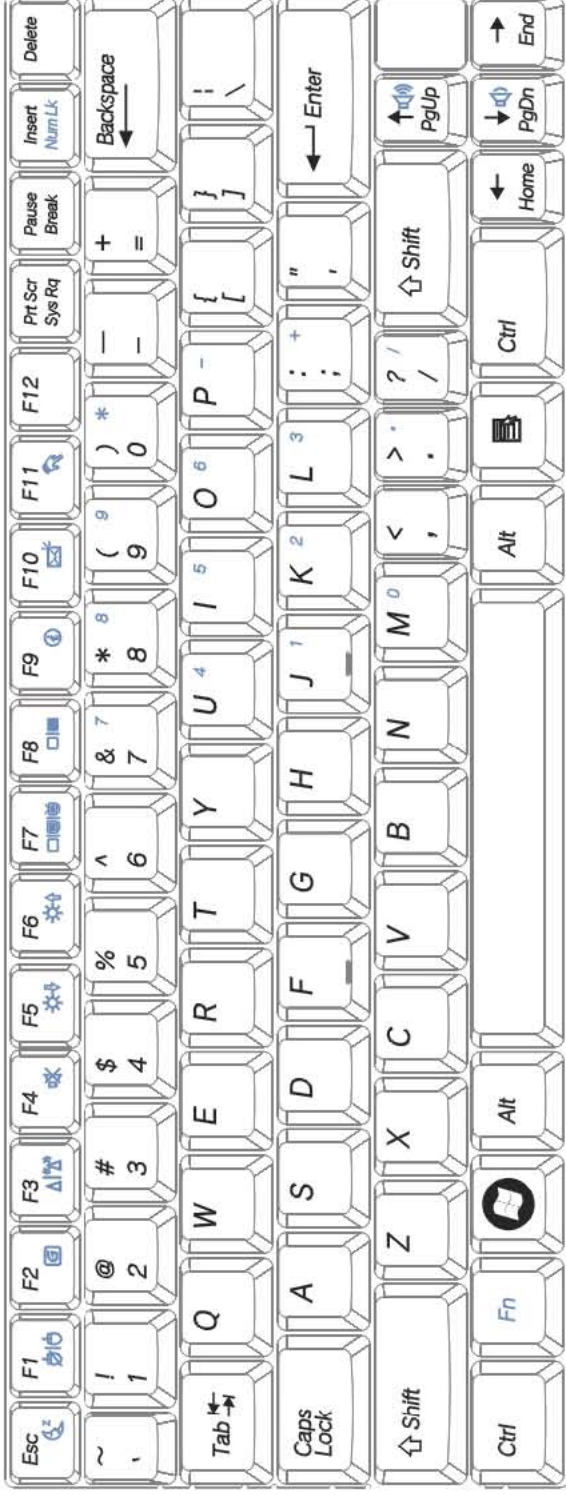
Serial number: First 2 digits: Year("08" mean 2008), The coming 2 digit is week("52" means 52nd week of that year). The last 5 digits is serial number from 00001 to 99999)

Must the remark make the location?

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No. | DESCRIPTION/ECN No: | DR: | DATA

ACK-9401 印刷US(依客人檔案)



Note:

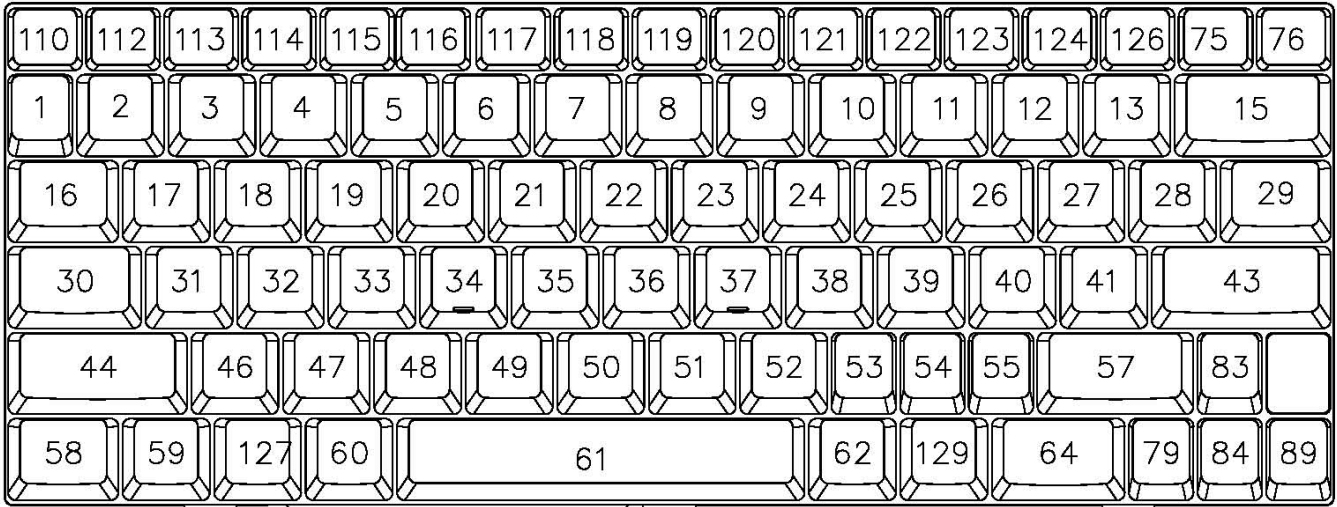
1. Module Color: White.
2. Print other blue graphics in Pantone 659C
3. Print all other graphics in Pantone CoolGray 11C.

Part No. :

MODEL: ACK-9401			
UNIT: mm	MATERIAL :		
DRAW	TITLE: ACK-9401 依客人檔案印刷US(11)		
CHKD.	TOLERANCES: ±0.5mm	SCALE: 1:1	REV.
APPD.	Drawing NO. KPN8B09		1/1
			001

ITEM NO.	DESCRIPTION	DRAWN BY	DATE

KEY NUMBER: (配合MATRIX)



MATRIX:

1		62		131	150	49		151		52	50	133	61	44	89	58		
2			45	48	34	35	36	38	39	40	53	132	55		84			
4			46	47	19	21	23	37	26	27	41	51	42					
5			30	33	18	20	22	24	25			54	56		83			
6			31	17	3	5	7	9	11	12			28		43			
9			32	16	4	6	8	10			13	14			29			
10			59	2	112	114	116	118	120	122	126	75	79		15			
12	127	60		1	110	113	115	117	119	121	123	124	129	57	76	64		
			3	7	8	11	13	14	15	16	17	18	19	20	21	22	23	24

註 預留第25,26pin

TOL. #	GRADE 1	GRADE 2	GRADE 3	GRADE 4
0~5	0.03	0.05	0.10	0.20
6~20	0.05	0.10	0.20	0.30
21~30	0.10	0.20	0.30	0.40
31~100	0.20	0.30	0.40	0.50
101~	0.30	0.40	0.50	0.60
ANGULAR	0.01	0.05	0.10	0.20



3RD. ANGEL'S



UNITS

MM

DRAWN BY: Wolf Liu
 CHECKED BY: Max Lin
 APPROVED BY: David Huang

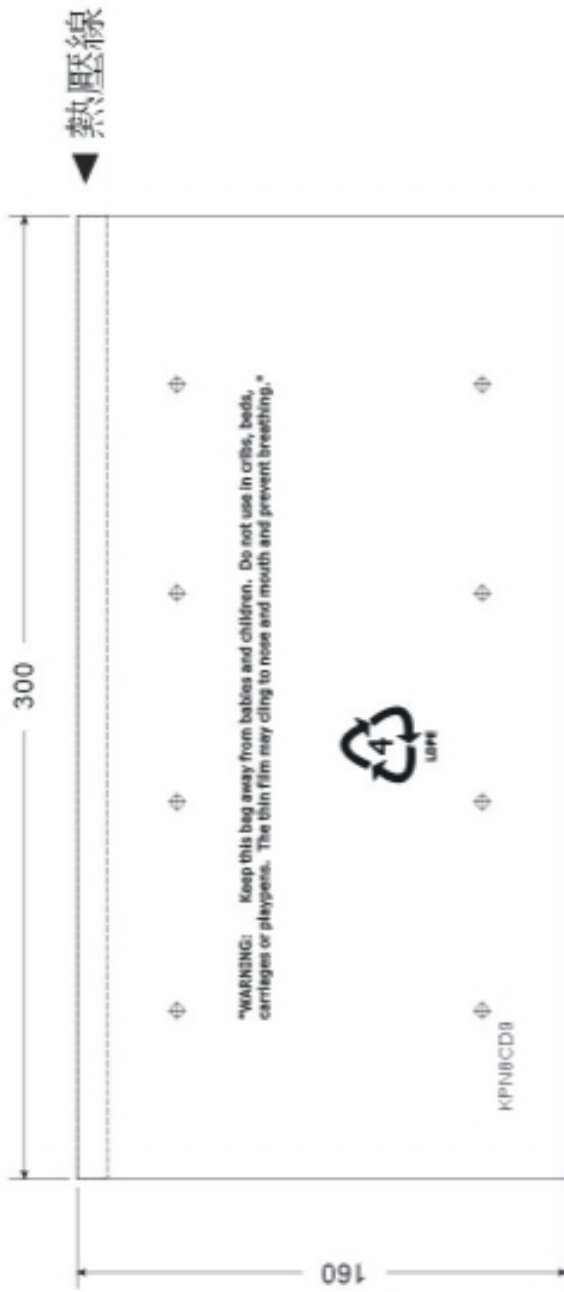
DATE: 2008.10.29
 DATE: 2008.10.30
 DATE: 2008.10.31

MATL
 FINISH
 SCALE
 SHEET NO. 1 OF 1

TITLE: Matrix (US)
 MODEL: ACK-9401
 DWG NO.: KMTXC0811001
 PART NO.
 A4
 VER.: 1.0

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No. | DESCRIPTION/ECN No: | DR: | DATA



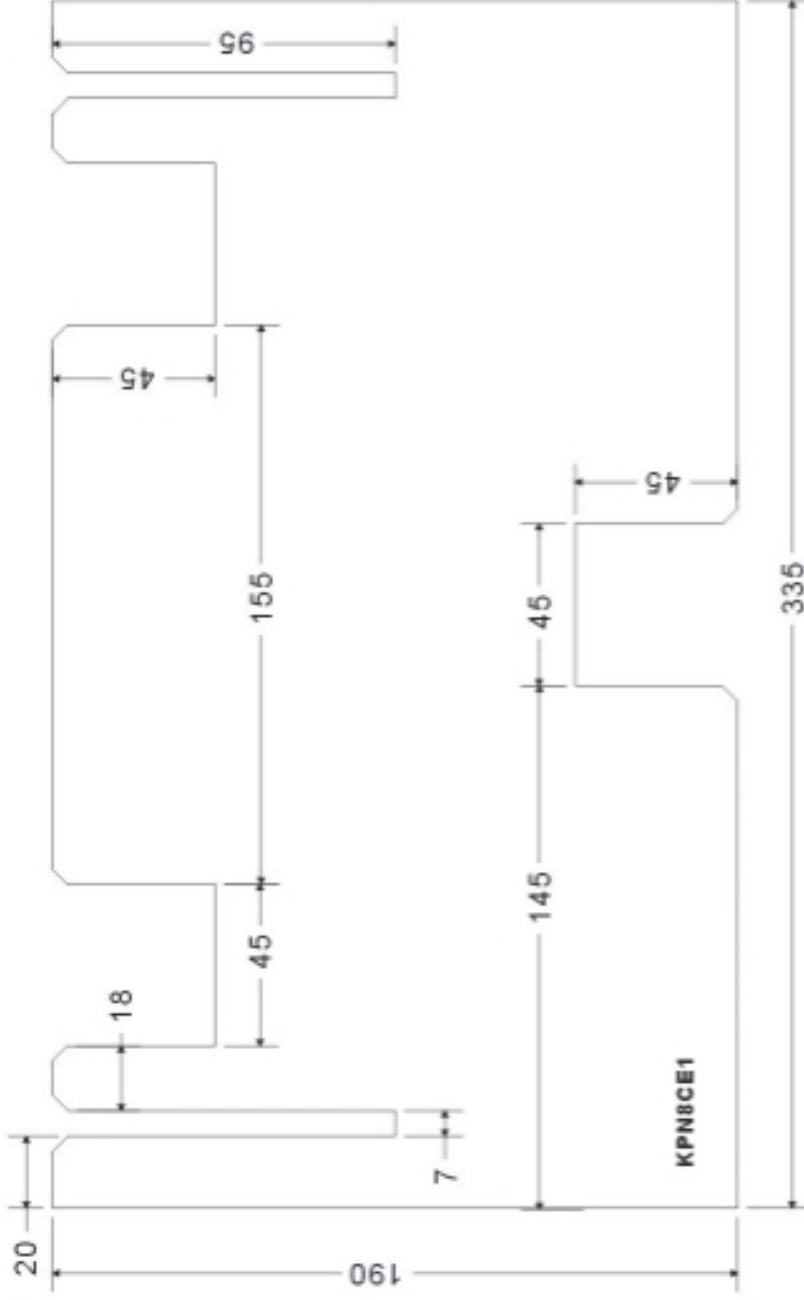
開口

※ PE袋厚度0.05MM
 請在熱壓線旁打穿8個直徑為4MM±1.5-0的圓形通氣孔
 印刷顏色為Black100左右居中
 請印上圖號

Part No. :		MODEL: ACK-9401			
UNIT:	mm	MATERIAL:	PE		
DRAW		TITLE:	ACK-9401 Pe袋	TOLERANCES:	-0+0.5mm
CHKD.		SCALE:	1:1	REV.:	
APPD.		Drawing NO.	KPN8CD9	1/1	001

REVISIONS

No.	DESCRIPTION/ECN No:	DR:	DATA
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Part No. :

MODEL: ACK-9401				TITLE: ACK-9401外箱側參隔板	
UNIT: mm	MATERIAL: A=B			TOLERANCES: $-0^{+3\text{mm}}$	SCALE: 1:1
DRAW				Drawing NO. KPN8CE1	1/1
CHKD.					001
APPD.					

REVISIONS		
No.	DESCRIPTION/ECN No:	DR: DATA











Part No. :		MODEL: ACK-9401		TITLE: ACK-9401外箱正參隔板	
UNIT: mm	MATERIAL: A=B			TOLERANCES: -0 +3 mm	SCALE: 1:1
DRAW				REV. 1/1	REV. 001
CHKD.				Drawing NO. KPN8CE2/E3	
APPD.					

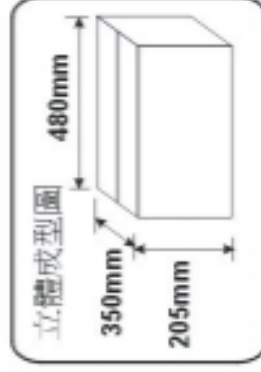
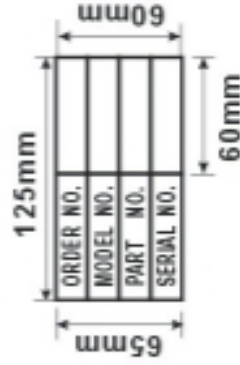


ACK-9401標準外箱

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No. | DESCRIPTION/ECN No: | DR: | DATA

 480	 350	 205	 C/NO.: MADE IN CHINA	 C/NO.: MADE IN CHINA	 KPN8CD8
 30 PCS./CARTON M.M.: 400 G.W.: 350 CARTON DIM: 480*350*205mm Units			 30 PCS./CARTON M.M.: 400 G.W.: 350 CARTON DIM: 480*350*205mm Units		



※破裂強度為12kg以上即可。

- ※ 1 印刷顏色為黑色 (色100)
- 2 材質 五層瓦楞紙正坑
- 3 印刷左右上下居中不可太接近折線
(Order No. Model No. Part No. Series No.)
- 各機種外箱需同大小
- 4 底部須加蓋圖形材質證明章

Part No. :

MODEL: ACK-9401			
UNIT :	mm	MATERIAL :	A=B 五層瓦楞紙
DRAW		TITLE :	ACK-9401標準外箱
CHKD.		TOLERANCES :	±0.0mm
APPD.		SCALE :	1:1
		Drawing NO.	KPN8CD8
		REV. :	1 / 1
			001