



USER MANUAL

(Supporting the use of SD card, please Read Before Use)



APPLICABLE MODEL: TM220A & TM240A pick and place machines

VERSION : V 1.03

Technical Parameters

Version	TM220A
Applicable PCB	20mm*20mm~220mm*200mm
Placement head quantity	2
Applicable Components	0402-5050, SOP, QFN, etc
Component height	=< 3mm
Components supply configuration	Tape reel, bulk package (IC)
Tape width	8mm, 12mm, 16mm
Feeders	16 (8mm=12, 12mm=2, 16mm=1, bulk IC=1)
External Dimension	L 830mm×W 455mm×H 285mm
Vacuum pump	-92KPA (Mute type pump)
Power supply	220V, 50Hz (Convertible to 110V)
Average working power	100W
Weight	G.W: 45KG (N.W: 25KG)

Version	TM240A
Applicable PCB	20mm*20mm~400mm*360mm
Placement head quantity	2
Applicable Components	0402-5050, SOP, QFN, etc
Component height	=< 3mm
Components supply configuration	Tape reel, bulk package (IC)
Tape width	8mm, 12mm, 16mm
Feeders	28 (8mm=21, 12mm=4, 16mm=2, bulk IC=1)
External Dimension	L 980mm×W 655mm×H 285mm
Vacuum pump	-92KPA (Mute type pump)
Power supply	220V, 50Hz (Convertible to 110V)
Average working power	100W
Weight	G.W: 65KG (N.W: 35KG)

1. Safety

1.1 Working Environment

- Normal Operation Temperature 10C ~ 35C. Humidity 50%~70%
- Keep working environment air clean to prevent vacuum valve get clogged from air dust.
- Keep machine level horizontally with stable surface to reduce the working vibration.

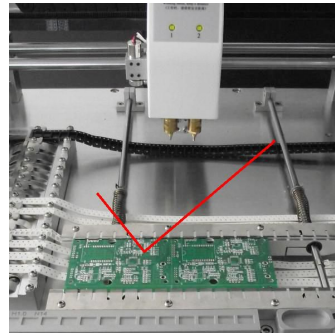
1.2 Power Source

- Standard working power is 50Hz 220 AC. (or 110V if specified)
- Maximum power is 100W.
- To prevent the static discharge, please make sure the machine is well grounded.
- Please turn off machine when not in use.

1.3 Operation Safety



Wrong operation

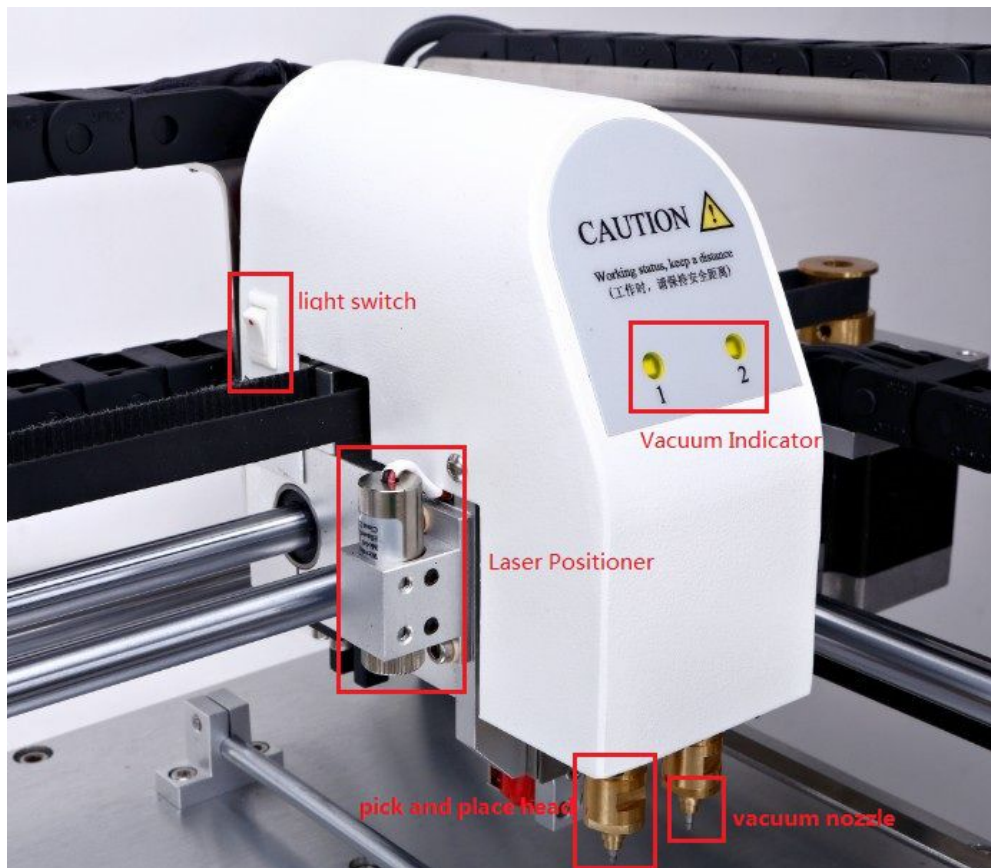


Correct operation

- Keep working area clean with no obstacle. Machine will automatic homing and calibration procedure when turn on.
- Please turn off power before change vacuum nozzle. Machine will readapt new nozzle on next restart.
- Keep hands off from motion area since the machine will have rapid movement during working and calibration.
- Do not operate the task that exceed the working envelope, otherwise machine will self lock for protection.
- Do not modify/remove power outlet, operation panel, head cover and other sensor. Warranty will void for those operation.
- Do not add any liquid lubrication in anywhere on the machine. Working head sensor may break for wrong type of lubrication.
- **Remove all transportation zip tie before turn on the machine.**

2. Module

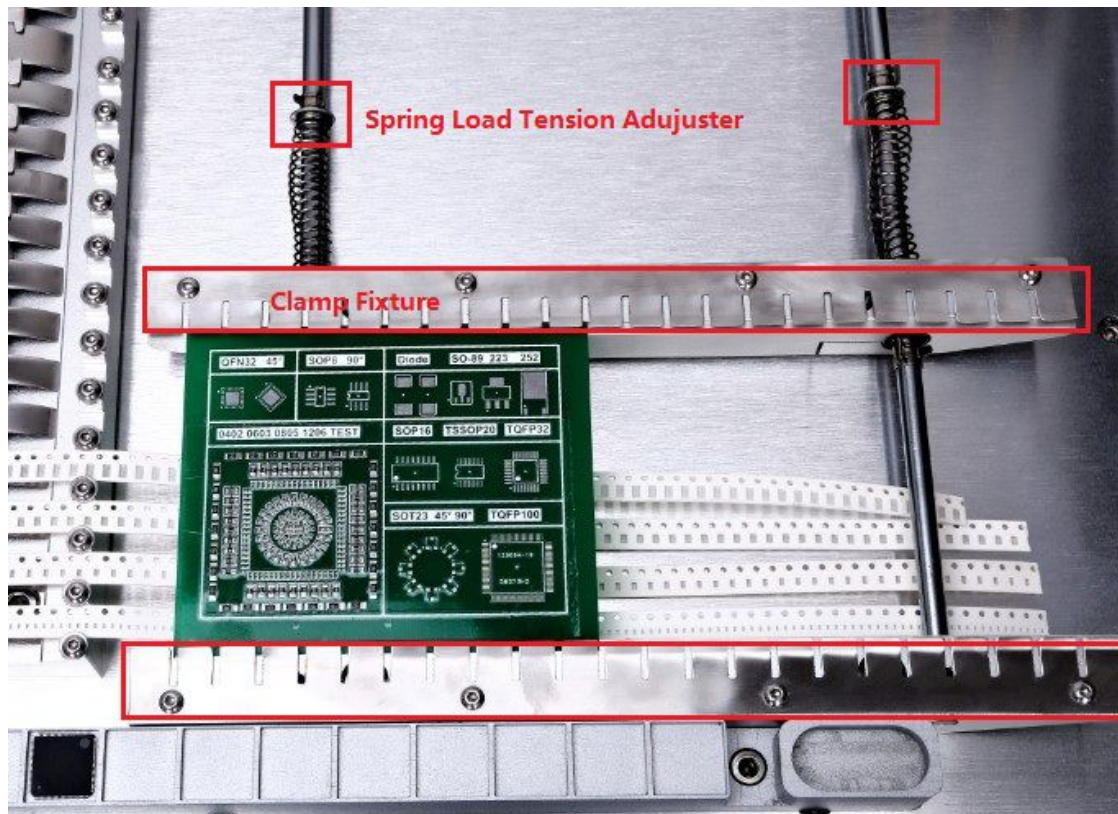
2.1 Working Head



- Pick and Place head
 - Using vacuum control to perform pick and drop task. It can work with 4 type size of nozzle
 - Dual Pick and Place head design helps increase throughput. It can be configure as different size of nozzle for both passive component and IC pick and place at same time.
- Vacuum Indicator
 - Build in with sensitive air pressure sensor to visualize the current working status for easy tuning job.
 - With vacuum detection, working head will automatically dispose the chip if picking fail or pick misaligned. Then the machine will perform the make up pick and place so no manual finishing is required afterward.
- Laser Positioner
 - With calibrated laser position indicator, easy for manual editing the component coordinates.

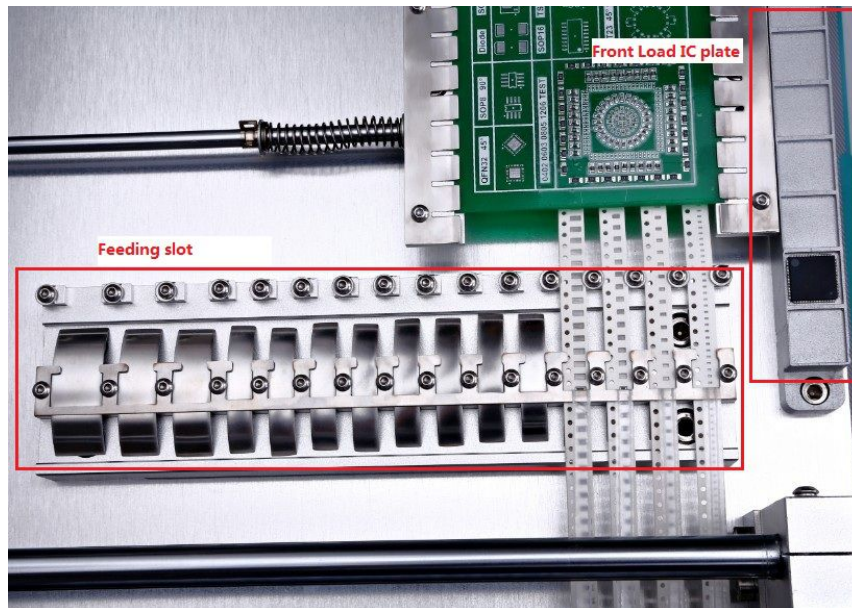
- Working Light
 - High bright light. Easy for tuning and editing.

2.2 Working Zone



- PCB Holder
 - Using for hold the PCB and should always keep it flat and clean. Distortion caused by wrong movement and dirt will affect machine accuracy.
- Clamp Fixture
 - To assist hold down the PCB. Please make sure no residual chips stuck in the gap when install new board.
- Spring Load Tension Adjuster
 - By moving the spring clamp to adjust the tension of holder. Keep it light when working with thin board.

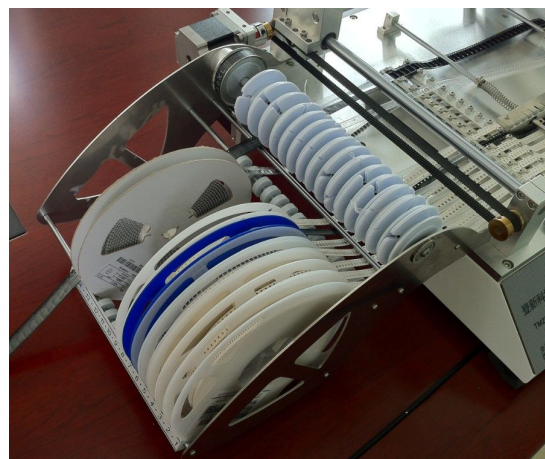
2.3 Feeding Zone



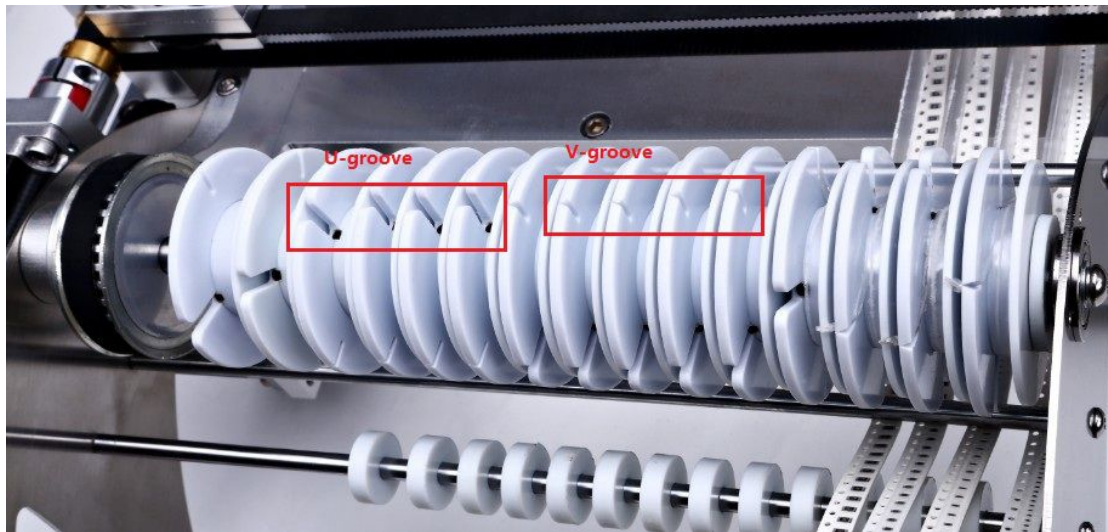
- Feeding slot
 - Fixture for different size of reel tape.
 - TM220A has total 16 tape feeders. Default is 8mm feeder x 12, 12mm feeder x 2, 16mm feeder x1. Front Load IC Plate x1. Keep clean to prevent stuck.
 - TM240A has total 28 tape feeders. Default is 8mm feeder x 21, 12mm feeder x 4, 16mm feeder x2. Front Load IC Plate x1. Keep clean to prevent stuck.
- Front Load IC Plate
 - For large size component or not reel tape package. For example, TSSOP, QFN, and 0.5mm pitch IC. The loading area is in absolute coordinate and can be custom made depend on the package.

2.4 Reel Rack

- To hold up to 15 reels for TM220A
- To hold up to 27 reels for TM240A



2.5 Nylon Spool Wheel



- To collect the nylon string on top of tape. Total of 15/27 spool correspond to the reel. Spool needs clean up every 20M. There are two type of groove on the wheel. V-groove is use for secure the nylon string head. U-groove is used for adjust the peel tension of nylon string.

2.6 Operation Panel



- SD Card slot
 - Use standard SD card for CSV working file storage, support hot plug.
- LCD
 - 320x240 TTF Touch Screen for interface input/output.
 - Touch supported GUI can be easy finish jobs when use with real buttons.
- Button
 - Long life contact switch.

3. Operation Guide

3.1 Boot

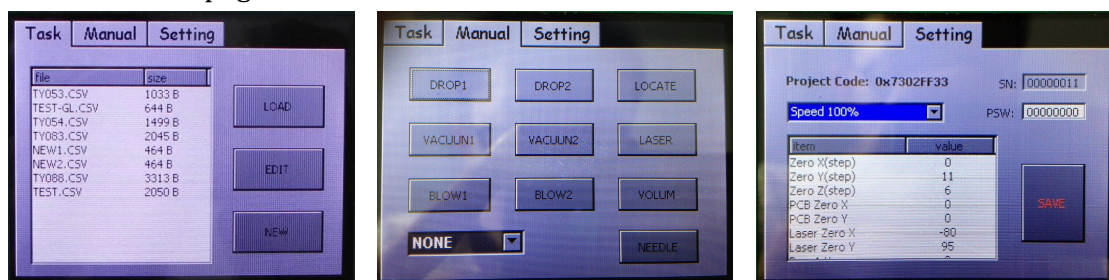


- Plug the power and turn on switch will finish the boot.
- The system starts to initialize itself and show the boot interface including unique OEM SN number. After initialization, the machine will perform self-checking which include adapt new size of vacuum nozzle and working head homing. After self-checking succeeded, working head will move to top right corner and beep once. If error occurred during self-checking, the machine will pause and keep beeping. Please turn off the machine and check working head if happened.

(P.S. During booting process or manual control mode, the machine is in a special self checking mode. So it's normal that machine movement sound is louder)

3.2 Interface

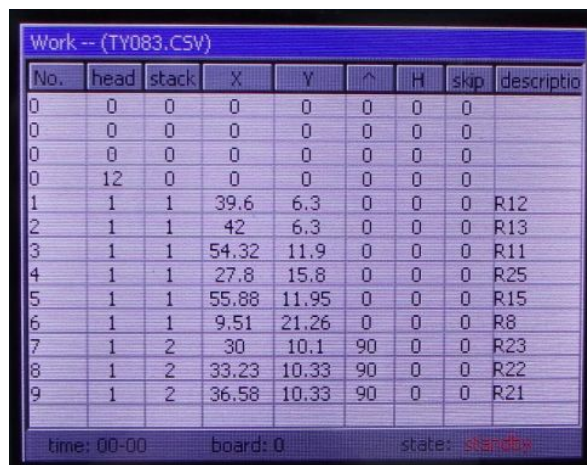
- Home page



Enter the home page after the self-checking of machine. You can see three labels on the home screen: Task, Manual and Setting.

- Using Task screen to navigate, mount, edit. It displays all files with suffix “.csv” in the SD card on the left side, you can use the touch screen or the direction keys on the front panel to select the file which is needed. The operation buttons on the right side “LOAD” , “EDIT” , “NEW” are respectively used to import and edit the selected file, or create a new working file.
- Using Manual screen to test the working status of each module manually.
 - ✧ DROP1, DROP2: movements and angle of pick and place head
 - ✧ LOCATE: fixed position of working head
 - ✧ VACUUM1, VACUUM2: vacuum control of each pick and place head
 - ✧ BLOW1, BLOW2: test air flush of each head
 - ✧ LASER: calibrated laser position indicator
 - ✧ VOLUM: rotation of spool
 - ✧ NEEDLE: check the position of needle with selecting the drop-down box of each stack.
- Using Settings screen to set some basic parameters of the machine and factory settings.
 - ✧ The basic parameters including the working speed of machine and vacuum detection switch. The working speed refers to the default speed of each mount work (from 10%-150%, defaults set is 100%). The vacuum detection switch is used to control the open/close the baroceptor which can determine to Do/Do not perform feeding and dropping the material (default set is ON, You can turn off when necessary.)
 - ✧ Factory settings: language (English or Chinese), calibration, etc. You'll need a manufacturer password to save any of these setting permanently.

➤ Working Page



Work -- (TY083.CSV)									
No.	head	stack	X	Y	↑	H	skip	descriptio	
0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0		
0	12	0	0	0	0	0	0		
1	1	1	39.6	6.3	0	0	0		R12
2	1	1	42	6.3	0	0	0		R13
3	1	1	54.32	11.9	0	0	0		R11
4	1	1	27.8	15.8	0	0	0		R25
5	1	1	55.88	11.95	0	0	0		R15
6	1	1	9.51	21.26	0	0	0		R8
7	1	2	30	10.1	90	0	0		R23
8	1	2	33.23	10.33	90	0	0		R22
9	1	2	36.58	10.33	90	0	0		R21

time: 00:00 board: 0 state: standby

- Introduction : enter the working page via using button “LOAD” in the home page. Working page consists of title bar, component list and status information block.
- The blue window field is the title bar, which indicates the working file selected currently.

- Component list shows the information of component item in the working file, they are No. of component, No. of head, No. of stack, X-coordinate, Y-coordinate, angle of placement, height of component, skip and description by sequentially.
- Status information block is in the bottom of the page which shows the work accumulated time, the number of finished board, working condition currently.
- There are corresponding physical buttons in the front panel to control the placement process. ESC (back to front page), STEP (enter the step by step operating mode), Hspeed (to switch between the speed setting value of machine and the highest speed setting), START/PAUSE.

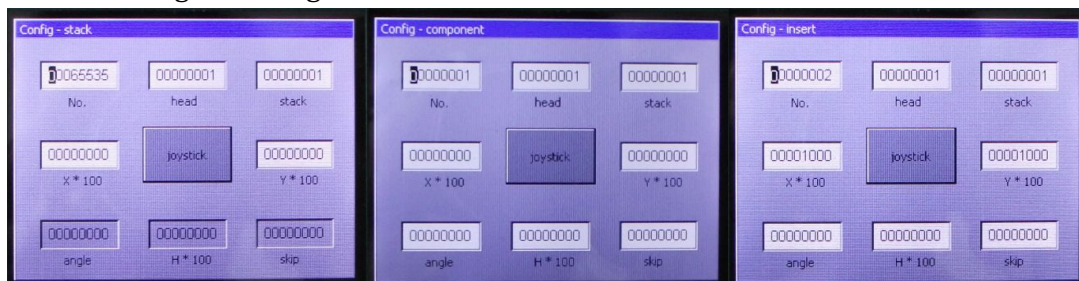
➤ Edit Page



No.	head	stack	X	Y	^	H	skip
65535	1	11	0	0	%		
65535	1	12	0	0	%		
65535	1	13	3.1	0	%		
65535	1	14	4.1	0	%		
65535	1	15	4.5	0	%		
% 送料設定 送料号 送料量							
65535	2	1	4				
65535	2	2	4				
65535	2	13	8				
65535	2	14	8				
65535	2	15	8				
% 拼板 X Y							

- Introduction: Enter the Edit page via using button “Edit” in the home page OR via using button “New” to create a new page. Edit page can do almost all the editing operations of work file, which can set configuration items, modify, insert, create and delete the component.
- The corresponding item of Edit page can be selected via the touch screen or the direction keys. Many operations also need to meet the physical button on the operation panel. ESC (back to the front page), Del (delete the selection currently), F1 (insert a new item), F2 (add a new item at the end of file), UP/DOWN (select the previous/next item), LEFT/ RIGHT (page turning).

➤ Configure dialog box



Config - stack

No. 0065535 head 00000001 stack 00000001

X * 100 00000000 joystick Y * 100 00000000

angle 00000000 H * 100 00000000 skip 00000000

Config - component

No. 00000001 head 00000001 stack 00000001

X * 100 00000000 joystick Y * 100 00000000

angle 00000000 H * 100 00000000 skip 00000000

Config - insert

No. 00000002 head 00000001 stack 00000001

X * 100 00001000 joystick Y * 100 00001000

angle 00000000 H * 100 00000000 skip 00000000

- Introduction: Enter the corresponding dialog box when modify, insert, create at the edit page.

- All the effective edit-box in the configure dialog box correspond to relevant parameter of this item, which can be set via the touch screen of direction key.
- The button "joystick" is valid only in config-stack and config-component. When press the button in config-stack, the head will locate the corresponding material stack and align the position of the reclamer. When press the button in config-component, it will open the laser locator and navigate to the location specified by the X and Y coordinates. While "Joystick" pressed, the direction key will be able to increase or decrease the X and Y coordinates and control the position of the head in real time. Real-time changes and feedback proofreading function of the "joystick" button has high practicability while editing.
- The corresponding physical buttons in the front panel: ESC (back to the previous page without saving), ENTER (back to the previous page with saving), Direction Key (modify the parameter value or other auxiliary operations).

3.3 Working File

➤ Format

- The device uses file format as CSV file, which can be directly edited by almost all the file editor, (such as NOTE, UltraEdit etc.). Also you can open it by Excel. We recommend that derive the CSV file via editing software like Protel and PCB by using the special Excel tool from our company.

➤ Grammar

- Data line: each line of the CSV file means a data collection.
- Keyword-comma: the data items of each data line are separated by keyword comma",". We can insert a space or TAB character before or after comma. Each comma in the data line must to trail behind an effective data item. Separate meaningless comma will be treated as a grammar error.
- Keyword- percent: The data line with the beginning of percent sign"%" will be treated as a comment line. It means that the line has no real meaning, which is just a description of the line.
- The type of data line: configuration line, component line, speed line, comment line.
 - ✧ The configuration line generally appear in the beginning of the file, and the first data item must be "65535", the second data item is configuration type and subsequently the data for the corresponding configuration parameters. For example:

65535,0,0.08,-0.42,	(type 1, Origin Offset)
65535,1,1,0,0	(type 2, Stack Offset)
65535,2,1,4,	(type 3, Feed Rate set)
65535,3,45,0,	(type 4, Panelized boards)
 - ✧ Component line is the main body of the working file, and each component match with one component line. There are 8 or 9 data items in one component line. No. of component (1-65534),

No. of head (1 or 2), Stack (0-15 or 0-27), X-coordinate (0-200 or 0-360), Y-coordinate (0-220 or 0-400), Angle (-180 -180), H (0-3.00), Skip (0 or 1), Description (any character).

- ✧ Speed line is a fictitious component. It will directly change the currently speed, thus the machine can pick and place different components at different speed. Speed line is comprised of two data items, the first item no. must be "0", the second speed item is an integer which from 1 to 15, the data items behind generally do not require but can not be empty.
- ✧ Comment line exists for the easy understanding of the line.

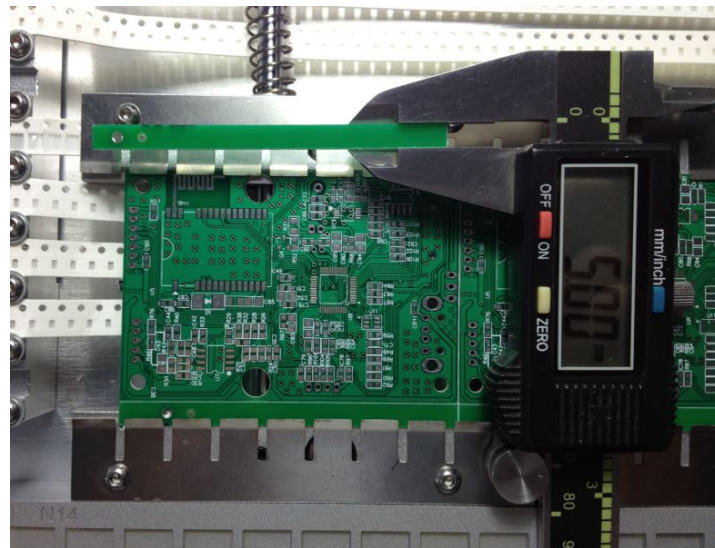
➤ Detailed introduction of working file

● Part 1: Origin offset (65535, 0)

%	Origin Offset	X	Y
65535	0	0	0

➤ Need to set Origin Offset in the following condition generally.

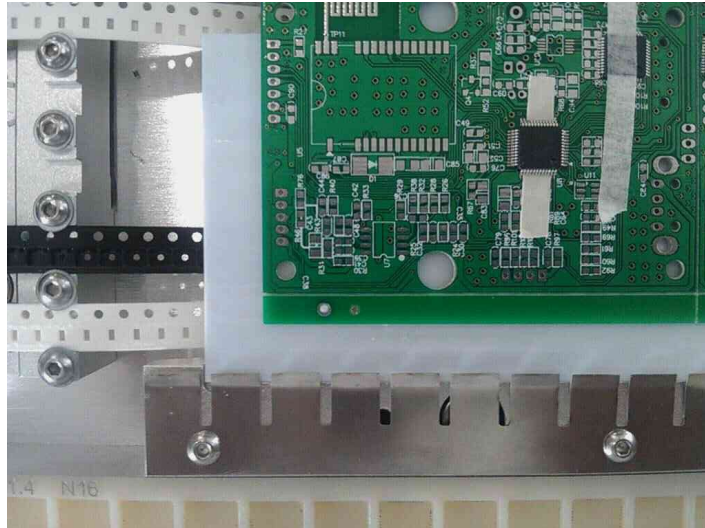
- ◆ PCB manufacture offset. As figure below, the margin is 5mm so Y-axis offset of 5mm.



Rounded PCB board, irregular PCB board which will generally add margin when doing PCB production.

If the margin in X and Y direction are both 5mm, please fill the X and Y origin offset value with both 5mm, leave it as 0 when there's no margin.

- ◆ Mounting Plate offset: Depend on the mounting location.



◆ PCB manufacture Outline offset: Usually this error is very small. It is caused by actual manufacture draft. Shift origin accordingly.

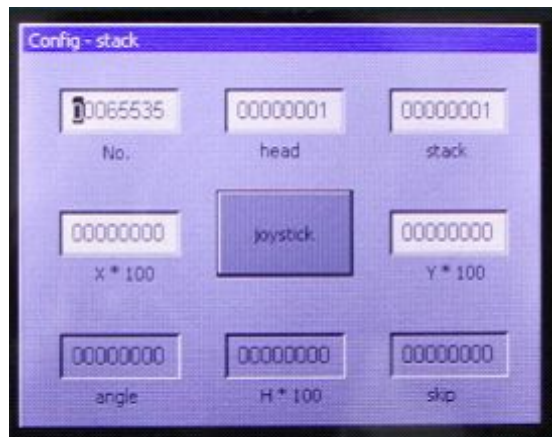
● **Part 2: Stack offset (65535, 1)**

%	Stack Offset	Stack	X	Y	
65535	1	0	0	0	STM8S
65535	1	1	0	0	H4
65535	1	2	0	0	9013
65535	1	3	0	0	1N
65535	1	4	0	0	1K
65535	1	5	0	0	3K
65535	1	6	0	0	4K
65535	1	7	0	0	2K
65535	1	8	0	0	5551
65535	1	9	0	0	5K
65535	1	10	0	0	10N
65535	1	11	0	0	
65535	1	12	0	0	
65535	1	13	0	0	
65535	1	14	0	0	
65535	1	15	0	0	

%	Command	Stack number	X	Y	Comment
65535	1	0	0	0	Front IC tray
65535	1	1	0	0	First reel in stack
...	Reels 2-14
65535	1	15	0	0	Last reel in stack

Note: The example is from TM220A machine

TM220A totally have 16 feeders (0 – 15), TM240A totally have 28 feeders (0 – 27). Stack offset is to setup the pickup point for each stack. The defaulted X and Y value for each stack is 0, user could online check and adjust the value based on each component type, to make sure component is picked up in the middle point.



- Please press "joystick", the pick and place head will move to the current location of stack automatically. Please hold down the joystick key, and using the direction keys to trimming if the location of stack is not exact.
- All the feeders from 0-15, 0-27 are same way to adjust it.

● Part 3: Feeding set (65535, 2)

%	Feeding Set	Stack	Feed Rate
65535	2	0	18
65535	2	1	4
65535	2	2	4
65535	2	3	4
65535	2	4	4
65535	2	5	4
65535	2	6	4
65535	2	7	4
65535	2	8	4
65535	2	9	4
65535	2	10	4
65535	2	11	4
65535	2	12	4
65535	2	13	8
65535	2	14	8
65535	2	15	8

Note: The example is from TM220A machine

Feeding set is to set the feeding rate for each specified component in respective stack.

For example, 0402 tape reel component, placed to stack 1 on the machine. In this case, the feeding rate should be 2mm for stack 1, thus the instruction will be 65535, 2, 1, 2.

To explain more, 2mm is the distance between two 0402 components in tape reel. Once you setup with the correct feeding rate for each stack, the feeder will

automatically present the next component after the preceding one has been collected.

The feeding rate for normal tape reel component will be an integer; normally will be 2mm, 4mm, 8mm, 12mm, 16mm. For stack 0 (front load IC plate), the standard feed rate should be 18mm.



No.	head	stack	X	Y	^	H	skip
65535	1	11	0	0	%		
65535	1	12	0	0	%		
65535	1	13	3.1	0	%		
65535	1	14	4.1	0	%		
65535	1	15	4.5	0	%		
%	进给设定	料栈号	进给量				
65535	2	1	4				
65535	2	2	4				
65535	2	13	8				
65535	2	14	8				
65535	2	15	8				
%	拼板	X	Y				

- Feed rate=4mm, for the component: 0603,0805,1206,1210.etc
- Feed rate=2mm, for the component: 0402.
- For stack with 12mm or 16mm tape width, set in accordance with the actual situation, in general, under the 8mm.
- The feed rate according to the default settings if not been set.

● Part 4: Panelized board (65535, 3)

%	Panelized boards	X	Y	
65535	3	50	0	
65535	3	100	0	1
65535	3	0	40	
65535	3	50	40	
65535	3	100	40	

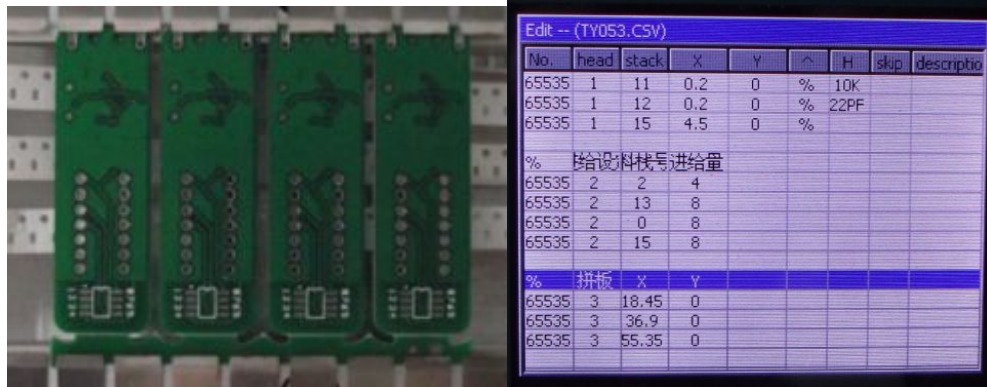
The machine could accept any quantity of panelized board as long as the total size of PCB board does not exceed the Max applicable PCB size (TM22A: 220mm X 200mm, TM240A: 400mm X 360mm).

The programming file for panelized board is quite simple for TM220A and TM240A. Using the above case for an example, the length and width of one single PCB board is 50mm (X-axis) and 40mm (Y-axis) respectively, and it have 3 panelized boards in the direction of X axis, 2 panelized boards in Y axis, totally 6 boards. For such panelized board, totally we need 5 instructions (no need for the first board), and enter the X and Y value for each panelized board.

To skip the mounting for a certain panelized board, you just need to add “1” behind the panelized instruction, refer to the second line above for your reference.

◆ Note: Sometimes, user will concern about the accuracy of X and Y value due to PCB production discrepancy. In this case, instead of using the length and width of one single PCB board to enter the X and Y value, user could choose the same component in each panelized PCB board to get the coordinate value online, the X and Y difference between panelized board and the first PCB board will be the panelized X and Y value.

Real example of panelized boards:



- It is in common mode if there is no information in panelized boards.
- Please enter the x & y of every board. The information of Default board is not show in the panelized boards settings.

● Part 5: Component part (1 - 65534) and speed lines

%	Head	Stack	X	Y	Angle	H	Skip	Description	Comment
0	10	0	0	0	0	0	0		
1	1	0	37.59	11.68	-180	1	0	U1	STM8S
2	1	1	34.42	26.04	-90	1	0	H1	H4
3	1	1	15.75	25.78	-90	1	0	H	H4
0	5	0	0	0	0	0	0		
4	1	2	33.27	18.67	-90	1	0	Q1	9013
5	1	2	39.37	18.67	90	1	0	Q2	9013
0	10	0	0	0	0	0	0		
6	1	3	25.15	17.65	-180	1	0	C1	1N
7	1	3	26.29	12.95	-90	1	0	C2	1N
8	1	4	6.6	19.43	-90	1	0	R1	1K
9	1	4	6.6	14.86	-90	1	0	R2	1K
10	1	5	6.73	2.54	-90	1	0	R5	3K
11	1	5	6.22	22.1	90	1	0	R12	3K
12	1	5	6.48	17.02	90	1	0	R13	3K
13	2	5	6.22	12.7	90	1	0	R14	3K
14	1	5	6.99	8.38	90	1	0	R15	3K
15	2	5	18.54	20.83	-180	1	0	R16	3K
16	1	5	23.75	20.95	-180	1	0	R17	3K
17	2	5	23.62	15.24	-180	1	0	R18	3K
18	1	5	18.41	14.22	-180	1	0	R19	3K
19	2	5	23.37	8.76	-180	1	0	R20	3K
20	1	5	18.54	7.87	-180	1	0	R21	3K
21	2	5	14.99	20.19	90	1	0	R6	3K
22	1	6	13.46	15.62	0	1	0	R7	4K
23	2	6	17.65	10.92	-90	1	0	R8	4K
24	1	7	6.73	10.73	-90	1	0	R3	2K
25	2	7	6.6	6.6	-90	1	0	R4	2K

The last part of the programming file consists of component line and speed line, which is the main body of the working file. Each component on PCB board match with one component line, it contains below information (see above example).

1) No. of component (range: 1 – 65534)

- 2) No. of head (1 or 2)
- 3) Stack (TM220A: 0 – 15, TM240A: 0 – 27)
- 4) X-coordinate (TM220A: 0 – 200mm, TM240A: 0 – 360mm)
- 5) Y-coordinate (TM220A: 0 – 220mm, TM240A: 0 – 400mm)
- 6) Angle ((-180) – 180)
- 7) H (height: 0 – 3mm))
- 8) Skip (0 or 1, 0 for mount, 1 for skip)
- 9) Description (Item information, such as C1, C2, C3)
- 10) Comment (Parameter values of component, such as 1K, 2K, 3K)

The instruction with green color (see above example) is the method to make head 1 and head 2 working together. To explain more, for a certain type of component that you want to mount by two heads, put head 1 and head 2 by rotation for each component line.

Speed line is a fictitious component. It will directly change the current speed, thus the machine can pick and place different components at different speed. Speed line is comprised of two data items, the first item no. must be 0, the second speed item is an integer which from 1 to 15 (1 for 10% speed, 15 for the max speed 150%), the data items behind generally do not require but can not empty.

- ◆ The instruction with yellow color (see above example) is the single line speed command. The machine will mount with the speed provided in the instruction even the speed setup in setting screen is different, and apply to the whole PCB board.
- ◆ The two instructions with blue color (see above example) is the Double speed command (beginning and ending speed command). You could slow down or speed up mounting for one certain type of component without affect the other components.

➤ NOTE

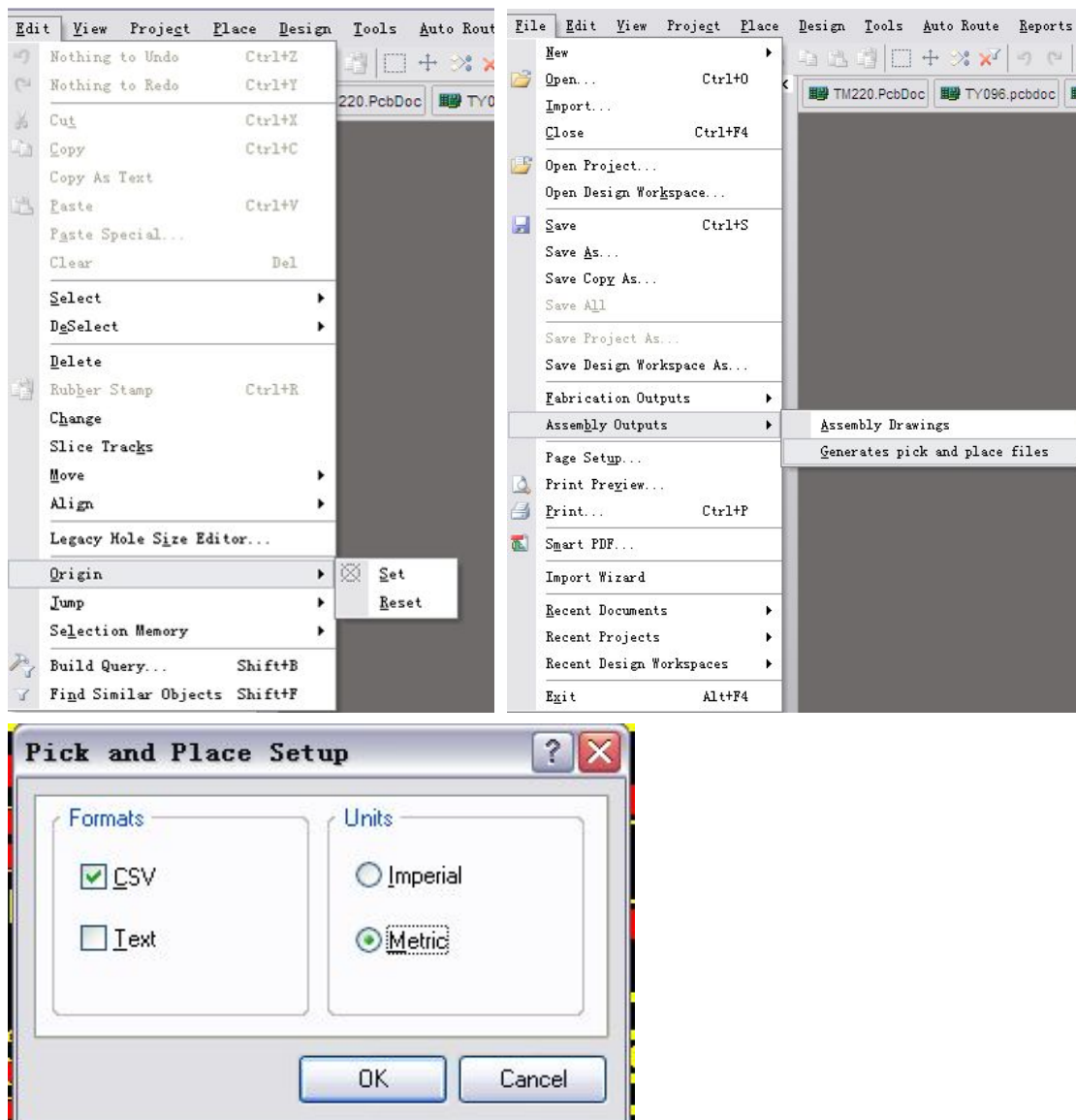
- The system will check the grammar of file while entering working interface. If failed it will pop up a warning dialog box and prompt the line number where grammar error occurred, so the user can find where the problem lies.
- The blank line without any character is permitted in grammar. It's easy to produce blank line only with a comma via software processing, which will case a grammar error result that can not be resolved. We recommend that user generally do not produce the blank line .If there is a grammar error in a blank line while input, please delete the blank line under edit interface.
- Parameters for scale, distance, and attributes are in millimeter with two decimal places at most. Other parameters are integers.
- More details on the file format and usage can refer to the working file of our company SMTDEMO.CSV



4. Usage Example

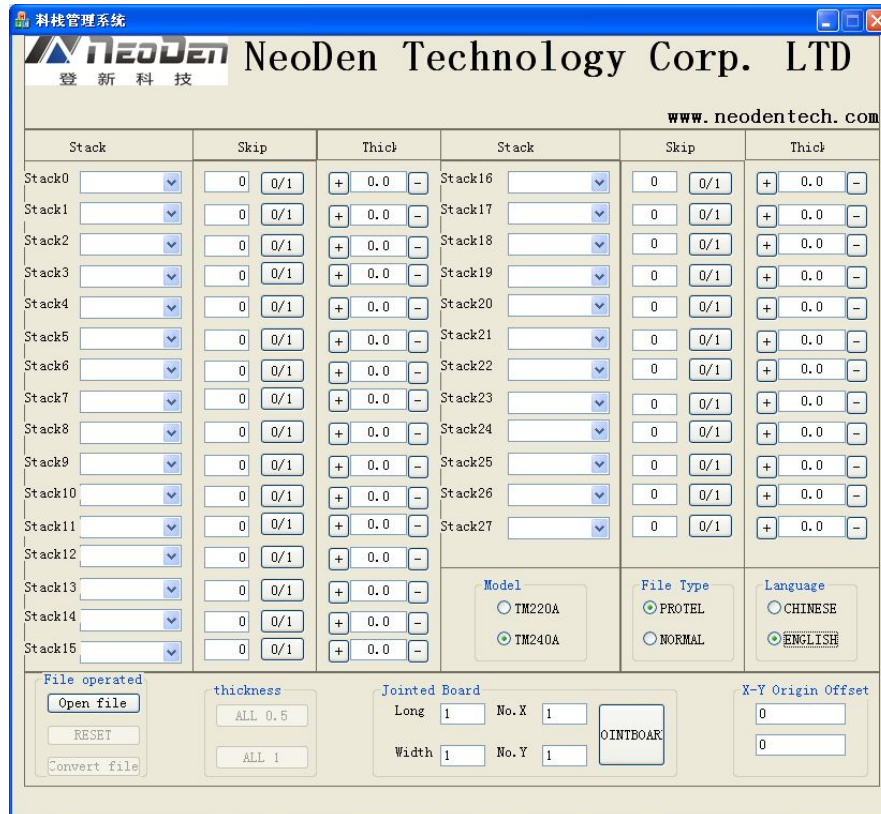
4.1 Create PnP file (using Protel Altium Designer 6.9)

- Open the PCB file in Altium.
- Edit→Origin→Set (click on bottom left of board)
- Pick and Place Setup
 - Formats → CSV
 - Units→Metric
 - Create working file using Excel Script



4.2 Generate a PnP file by using stack management tool

- Operation interface:



English interface

- Step 1: Choose the model of equipment
Choose TM220A or TM240A according to the actual situation
- Step 2: Choose the file type.

(1) Protel

You can open DXP, 99SE, and PCB suffix documents with Altium Designer software, generate coordinate file, format ".CSV". (Refer to the video 99SE.mpg; AD(Top).mpg; AD(Bottom).mpg)

◆ Following is the detailed description of the document

A	B	C	D	E	F	G	H	I	J	K
Designator	Footprint	Mid X	Mid Y	Ref X	Ref Y	Pad X	Pad Y	Layer	Rotation	Comment
C1	C1206	36.79	57.78	2.5022m	1.6648m	1.542m	1.6648m	T	90	226
C2	C0603	159.8	28.68	2.4818m	1.7598m	1.3.442m	2.7598m	T	90	105P
C3	C0603	159.8	31.88	2.5606m	1.8782m	3.5208m	1.8782m	T	90	106

Designator: Item information, such like C1, C2, C3 in the table. (Required item)

Footprint: Package information, such like C1206, C0603. (Required item)

Mid X, Mid Y: Coordinate information of each component. (Required item)

Rotation: Angle information of each component. (Required item)

Comment: Parameter values of component. (Required item)

Ref X, Ref Y, Pad X, Pad Y: Those information are useless.

Layer: Top or Bottom layer, useful when programming double-sided PCB file.

Attention: The required items must be filled by corresponding values. If any of required information missed, please make sure complete the data before using stack management tool. Otherwise, it will affect the data accuracy when perform file conversion.

(2) Normal

Aim at Pads, Cadence allegro and other Cad software.

For these software, firstly generate the corresponding coordinate file after setting up units (Metric), then delete the connector, inline elements and components that not suitable for mounting. At last, copy all necessary information to the Normal file template. (Refer to the video Editing Normal file.mpg)

A	B	C	D	E	F
Designator	Footprint	Mid X	Mid Y	Rotation	Comment
C1	C1206	36.79	57.78	90	226
C2	C0603	159.8	28.68	90	105P
C3	C0603	159.8	31.88	90	106

Designator: Item information, such as C1, C2, C3 in the table. (Required item)

Footprint: Package information, such as C1206, C0603. (Required item)

Mid X, Mid Y: Coordinate information of each component. (Required item)

Rotation: Angle information of each component. (Required item)

Comment: Parameter values of component. (Required item)

● Step 3: Origin Offset Setting

The setting applies for PCB board with margin, e.g. rounded PCB board, irregular PCB board that will generally add margin when doing PCB production. If the margin in X and Y direction are both 5mm, please fill the X and Y origin offset value with both 5mm, leave it as 0 when there's no margin.

● Step 4: Jointed boards Setting

For jointed boards, please fill the information of length and width of one single board, number of jointed boards in both X-direction and Y-direction, then click the button "jointed board" to finish the setting. No action required if there's no jointed board.

● Step 5: Load the coordinate file

Open coordinate file that extracted from the software PCB tool, then select the corresponding stacks for each component according to user needs and the tape width. Unselected stack will be ignored automatically when convert the file.

● Step 6: Set the height of each component

If the thickness of PCB board is 1mm, the height of general resistance-capacitance components could be setup as 0.5mm; If the thickness of PCB board is 1.6mm, the height of general resistance-capacitance component set to 1mm; Other component according to the actual thickness.

Please note that reasonable height setup will extend the life span of nozzle.

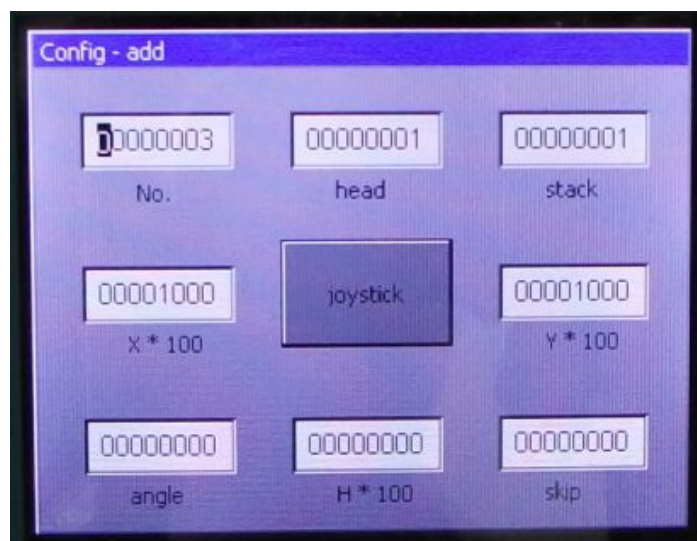
- Step 7: Generate the programming file
After setting all the parameters, please click the button of "Convert file", select save contents and name the file.
- Step 8 : Copy the programming file to SD card
Once the programming file generated from the stack management tool, user could adjust any of the value based on actual production, and then copy to SD card for use.

4.3 Create Manual Procedure

- Enter TASK →NEW to create a new PnP file which including the information of Origin Offset Setting (0, 0), Stack Offset Setting (0, 0), no panelized board. Please enter direction key to turn page.

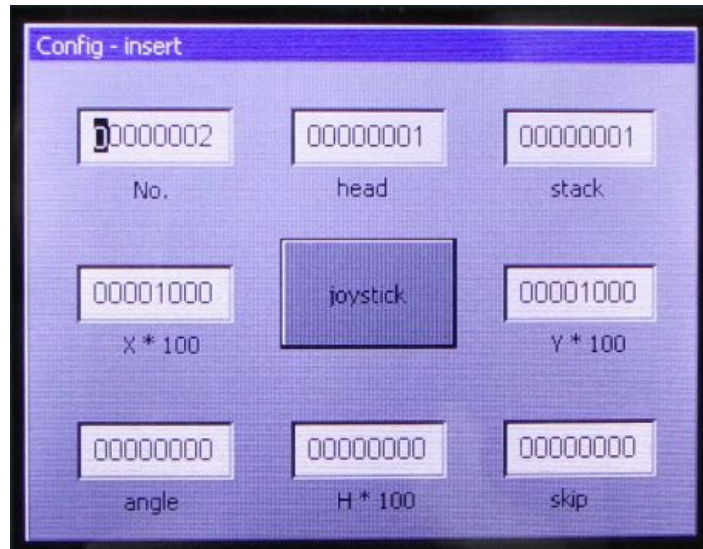


- ADD component: Press the button "F2" to add a component at the end of the file. It shows the Config-add.



- NO.: sequence number of the component
- Head: pick and place head (1 or 2)
- Stack: number of stack (1-15)
- X*100: modify X of component for precision 0.01mm
- Y*100: modify Y of component for precision 0.01mm
- Angle: the angle of component (-180 to 180)
- H *100: modify height of component for precision 0.01mm
- Skip: make sure if skip the component (1 for skip, 0 for pick and place)

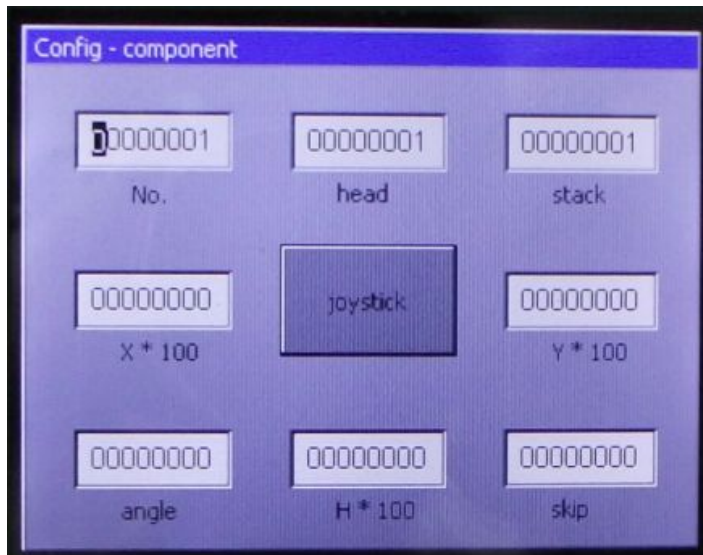
➤ Insert component: Press the button "F1" to insert a component before the currently component. It shows the Config-insert.



The 'Config - insert' screen displays a 3x3 grid of input fields for component configuration. The fields are labeled as follows:

No.	head	stack
00000002	00000001	00000001
X * 100	joystick	Y * 100
00001000		00001000
angle	H * 100	skip
00000000	00000000	00000000

➤ Modify component: Press " ENTER" to show the config-component.



The 'Config - component' screen displays a 3x3 grid of input fields for component configuration. The fields are labeled as follows:

No.	head	stack
00000001	00000001	00000001
X * 100	joystick	Y * 100
00000000		00000000
angle	H * 100	skip
00000000	00000000	00000000

- Press the joystick key, the laser will open and position the current coordinates, such as map (0, 0). Modify the coordinates where you need, then save it.

4.4 Advanced start function

During the mounting process, if there's halfway exit condition happen, and user would like to continue with the process instead of mounting from the beginning, please refer to the below method.

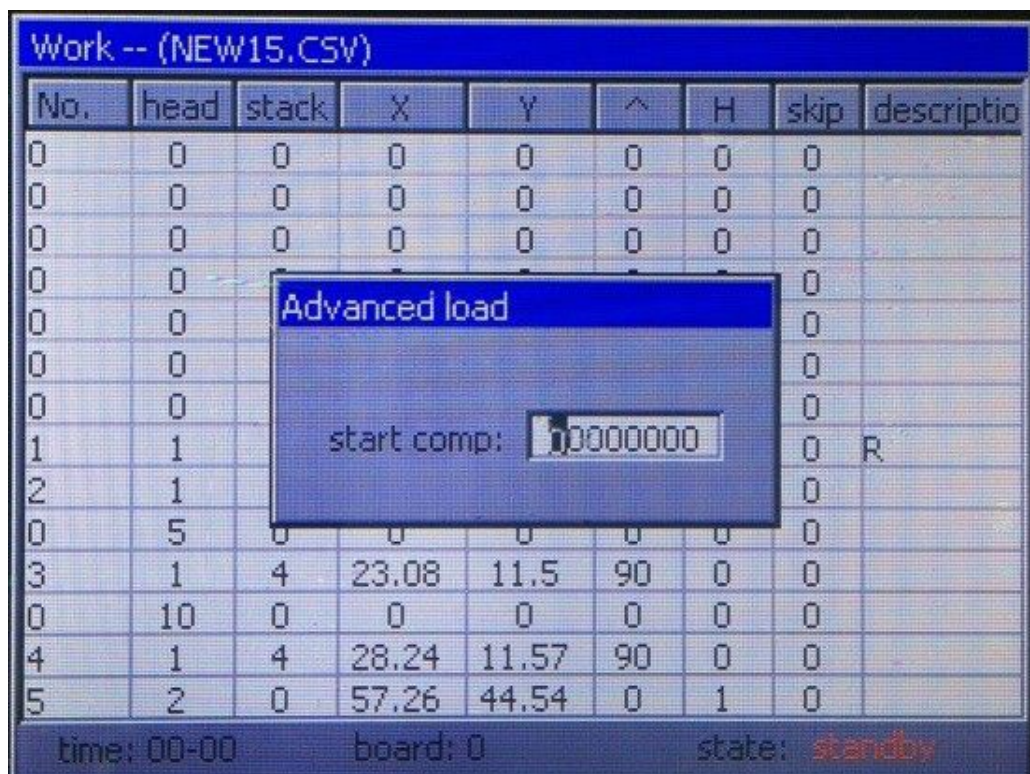
- Press "F1" after you re-load the pick and place working file, the following dialog box will pop up, input the start component no. to continue the mounting.

Example:

1) If halfway exit condition happen when mounting the first PCB board.
If before halfway exit component 1 – 10 has been placed, then input the start component no. as 11, the machine will continue the mounting start from the no. 11 component.

2) If halfway exit condition happens when mounting jointed boards, and the first board has been finished.

If there're totally 20 components on the first PCB board, input the start component no. as 21 to skip the whole first board and start the mounting again from the second jointed board.



- Press "ENTER" after start comp no. input, the machine will displays all the left components that needs to mount. Press "START".

5. Maintenance Guide

5.1 Maintenance Introduction

(1) Introduction

The aim of this manual is to provide the user with necessary Information and the guidance on machine maintenance to assure the perfect operation of the Pick and Place machine.

The pick and place machine is a Hi-tech product which needs the operator to be careful and ensure their safety as per the standard procedure mentioned below.

To avoid machine from faulty performance keep the machine area clean and do the daily and monthly maintenance properly.

It is very important that the operator knowledge on SMT to get the best performance of the machine.

If found the machine running in an abnormal way or any unusual sound, immediately stop the machine, and inform the concerned technical or maintenance staff for further action.

Common and usual troubles can be solved by the operator himself like reel tape not advancing, component pick up is not accurate, placement accuracy is not correct, IC position adjustment, DE taping of the reel is not proper etc.

When the machine is idle for a long period then clean the shaft with a clean cloth, especially the shaft areas, where the dirt and oil residue got accumulated.

(2) Safety regulations & Instructions

1. The machine operator should read the operation and safety instructions before using this machine.
2. Before powering on the machine should check and make sure that no foreign materials on the range of platform other than PCB.
3. The machine should be grounded to Earth, to protect from possible electrical shock and protect the machine from static discharges.
4. Ensure the power is off before doing any maintenance operation or nozzle changes.
5. Keep 20cm away from the machine head always, while doing the placement file setup using manual mode, offset setting of stack, manual test mode operation.
6. Manual programming for a long time should take necessary precaution for the eyes, as the naked eyes exposure to laser light for long term will not be good.
7. The operation of the machine should be restricted to one operator at a time to avoid the damage and errors and careless mistakes.

8. During the Operation and commissioning of the machine, please ensure that no body parts are in the range of the platform and the pickup head moving area.
9. Keep the machine away from the Dust and smoky area.
10. Keep the machine in an ideal temperature and Humidity Zone.
11. Install the machine on a solid platform /Table which can with stand the vibrations causing while the machine works. The safe altitude for the machine to be placed is 80-100 cm from the ground level.

(3) Working Procedure

To avoid errors during mounting process, make a procedure to do the job.

1. Make a BOM of the component to be mounted and cross check it with the machine loaded value for the component number selection on the stack and the mounting position is correct.
2. The ideal working time of the machine should not exceed 12Hours a day. Try to avoid overload operation.
3. After fixing the reels on the feeder check the stack number with the program to ensure that no miss- match of the stack numbers in the program.
4. After fixing the each reel, ensure the new reel value before fixing it and then load, to avoid mistakes.
5. After manual programming, try some few times for the mounting accuracy, rotation of head as well as the mounting location, before runs for complete production batch.
6. After finishing the placement of every batch, have an inspection can find some errors and can be rectified immediately.
7. While the component mounting process, if the component missing is happening, identify the problem, rectify and continue, will save the component wastage and time.
8. Keep an inspection setup at the finishing point of soldering, to ensure the quality of work, and correction if necessary.
9. Ensure the placement accuracy rather than speed to get better results. Human inspection is a must for a good quality product manufacturing.

(4) Daily check

- The Temperature and Humidity: ensure the machine working on a temperature zone between 10- 35 deg C and humidity between 50-70.
- Environment: ensure clean air, without corrosive gases and dust.
- Must ensure the transmission rail and head area is not having any foreign particles or Debris.
- Check for the nozzle placement, see that it is loose holding or not.

- Check for the nozzle cleanliness, deformation, keep the nozzle clean for better results.
- Ensure the feeding area to be clean, no loose parts or debris lie there which will obstruct the easy movement of the reels.

(5) Startup sequence checking

1. After switching on the machine, check the menu screen is displayed properly.
2. Run the manual test functions for laser positioner, needle, vacuum pressure, feeder reel movement, stack position, Head movement and rotation.
3. Clean the PCB holding area with a cloth and ensure that no residue is lying there.
4. Check for the head to be at the starting point.
5. Check for any abnormal sound, while head moves.

(6) Monthly checkup

1. Check for the Motors abnormal sound, while the head moves from one end to the other.
2. Check for the motor temperature.
3. Check the nozzle for any bend and the surface levelness.
4. Check the air passage duct below the head cover, ensure there is no breakage, wear and leaks.
5. Check the Timing belt tension and condition; also check for the Z-axis motor path obstruction if any.
6. Check for the Z-axis motor—check the head can move smoothly up and down, Push the nozzle with your finger to ensure the smooth movement.
7. Check for the vacuum and blow pressures through the nozzle, if not normal, clean the nozzle.
8. Clean and oil the X and Y-axis rods with white grease, don't apply too much grease on the shaft.
9. Check for the function switches on the front panel, ensure all working good.
10. Air duct connectors and pipes are to be checked for any leakage.
11. Verify the Tension and holding power of the PCB Holder and springs.

5.2 Nozzle Maintenance

(1) Nozzle version introduction



XS Nozzle



S Nozzle



M Nozzle



ML Nozzle

(2) Nozzle usage

- ① Use the original Nozzles only, provided by the company, don't reshape or polish the nozzle edges.
- ② Scalability of nozzle limits to a height of 3mm, should pay attention while setting the component height for pickup and mounting.
- ③ Size ML nozzles have a scalable range of 2 mm only as its head is of 1mm in bold size.
- ④ While replacing the nozzle, you must power off the machine.
- ⑤ If the machine is kept for a long time idle, you must remove the nozzles and keep in a clean and safe place.

(3) Nozzle cleanness and maintenance

Nozzle maintenance is divided into 3 parts:

- ① Using Needle to clean the nozzle XS.



- ② Use alcohol and pressurized air to clean other sizes like S, M and ML.
- ③ Lubricate the end head joint with oil.



Apply a small amount of liquid lubricants to maintain a good scalability of the nozzle. Then use a dry cloth to wipe off the lubricant.
(Recommended to do if the nozzle is kept for a long time idle)

5.3 Shaft Maintenance

1. Lubricate the Axis using the white grease, do not use any lubrication oils.
2. Clean the shaft surface with clean cotton cloth soaked with Industrial alcohol to remove any dirt and dusts.
3. Do not touch the shaft surface with your bare hands, which causes the sweat stains to rust the shaft surfaces.
4. Do not use water for cleaning the shaft.
5. Do not use alcohol solvent (such as acetone, amyl acetate, etc.) for cleaning, which causes the sensors and the LCD screen to melt off.

5.4 Nylon spool maintenance

(1) Reel version introduction



8mm Reel



12mm Reel



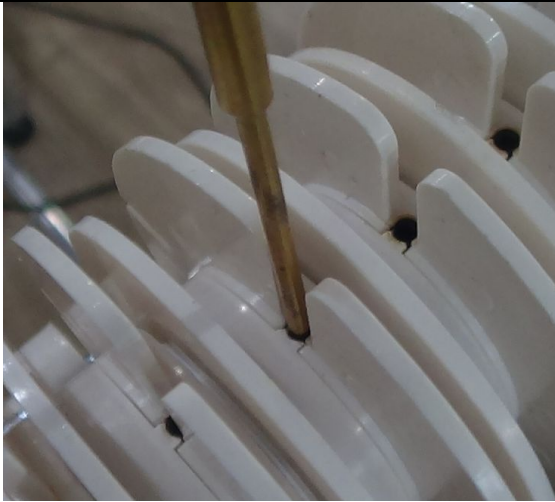
16mm Reel

(2) Nylon spool usage and maintenance

- ① Check the feeder position plate in good shape.
- ② Clean the Nylon spool area for any sticky tape residual using alcohol, don't use any water for cleaning.
- ③ Don't use any lubricating oil or grease for the reels.
- ④ Adjust the volume wheel using the tool provided along with the machine only.



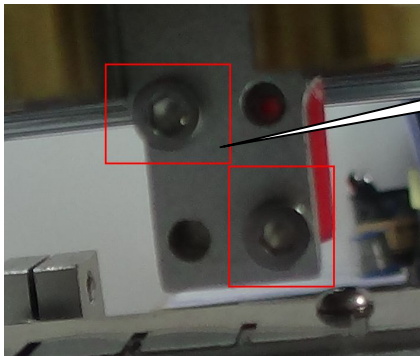
- ⑤ Follow the below mentioned procedure for adjusting the reel tensions.



1. Each reel has two screws that located on the upper and lower side of reel respectively.
2. Use the 1.5mm hex shank tool (the Nylon tension adjustment tool as above), averagely adjust the upper and lower two screws.
3. Clockwise twist, the theoretical value of an empty circle in front 4-6.
4. Do not tighten too much, feel the tension by hand rolling the reel.

5.5 Needle and Sensor maintenance

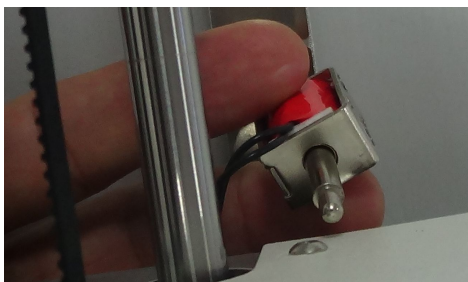
1. Power off the machine, unplug the power, and then clear up the needle.
2. Release the two hexagonal screws that used to fasten the electromagnet; The right hand unscrew the screw, meanwhile the left hand grip the red electromagnet with two fingers.



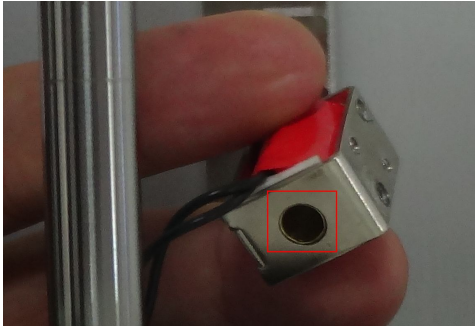
Screws

Can keep the screws on it without take down, will be more convenient to tighten when installation, which won't fall off.

3. Manually move the red electromagnet, and remove the needle, spring, and small washer all together.



4. Check whether there's any dirty in the pinhole, such as: solder paste, scrap, oil, etc., clean it with a cotton swab, do not use any cleaning products, such as alcohol, water or any other things, and do not clean up with a hard object directly.

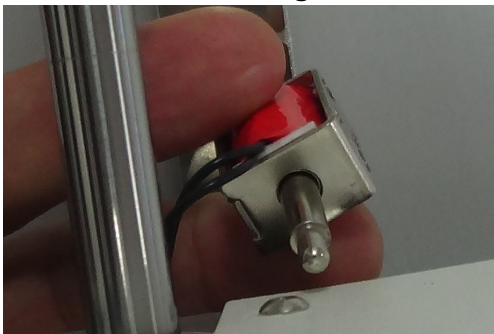


Note: do not pull two black wires, maintaining it as natural.

5. Clean the needle that just removed from the machine, and then wipe a little bit of liquid lubricants to the needle, just a little bit is sufficient. Install the small washer first, then install the spring, as showing on the below picture.



6. Then clean the needle sensor. Use a L-shaped small tool, wrapped with harm fabrics, and use alcohol to wipe the sensing area of needle sensor, back and forth a few times.
7. After clean up, install the new needle into the hole. Use your hand to push the needle for several times to feel whether it can move up and down smoothly, whether with a large friction.



8. Once needle installed, move and align the needle with the slot of needle sensor on the bottom.
9. Screw on the screws (note: not tightly screwed, leave some margin), adjust the position of needle and red electromagnet, keep it vertical, then tighten the two screws to complete the replacement.
10. If the machine alarms when power on, keep it as boot state and toggle the needle up and down for several times with tweezers. Then power off and on the machine again. If the machine continues to alarm, loosen the screw, move around, then tightening again.

6. Trouble Shooting

- Boot alarm: keep beeping, and no self-checking.
 - Please turn off power and check if the needle is stuck by feed belt or sundries. No self-checking if needle is not in original position.
- Stuck alarm: Keep beeping when the needle stuck.
 - Please check if the reel is stuck, and gently shake the reel to help the needle reset. Do not forcibly pull the reel or flip the working head, what will result in the needle deformation even break. (The needle is a sophisticated component .A slight deformation will directly affect the accuracy of feeder position and need to modify the factory settings to correct the discrepancies after replacing.)
 - The system will automatically go into PAUSE mode if the needle is reset successful, please press the “Start/Pause” button to continue the work.
- Material shortage alarm
 - The system will try to do again when pick failed, and it will confirm the stack is empty after three times try. The system will pause at the feeder location and keep beeping. Please find the cause. (For example, the stack is empty or the feeder position is not exact). Please press the “Start/Pause” button to continue the work after solving problem.
- Film on the component tape is not getting stripped properly
 - Check for the screws on the nylon reel for the proper tightness
- Needle doesn't pull the component reel, is found off-centered with the component reel
 - Adjust the stack offset setting for the particular stack
- Nozzle doesn't pickup the component properly-
 - Check the Nozzle size used for the particular component, find the correct size with the nozzle selection guide in the user manual
 - Check the z-axis movement of the particular head in manual test mode
 - Check whether nozzle is clogged by solder paste or something else.
 - Check for suction pressure by the vacuum pump at the mouth of the nozzle
- Inconsistent pickup of component from the tape/reel
 - Wrong feed rate- refer the user manual for setting of correct feed rate of the component reel/tape
- Nozzle is not placing the component on the PCB properly
 - Check for the blow pressure in manual mode
 - Check for the component type and stickiness
 - Check for the actual height set up for component

- Component is getting put on the reject bin besides stack 0
 - Check whether the component has picked up off-centered from the component reel
 - Check whether there's any problem with the nozzle
- While pulling the reel forward by needle, components get jumped out of the tape, any solutions to avoid this
 - Check the movement of needle in manual test mode for stack that have such issue. During the needle movement process, observe whether the needle hit the stainless steel shrapnel of the feeding slot, and squeeze shrapnel to avoid the needle hit the shrapnel.

7. Component & Nozzle Guide

This section of the manual refers to the proper selection of nozzles for the particular component package.



XS Nozzle



S Nozzle



M Nozzle



ML Nozzle

Nozzle selection Guide

Nozzle Type	Component Package
XS	Discrete :- 0402, 0603, LL34
S	Discrete :- 0805, 1206, 1210, 1812, 2010, 2512 Diodes :- SOT-23, SMA, SMB LEDs :- 3014, 3528
M	Voltage Regulators :- SOT-223, SOT-23, SOT-23-5, SOT-89, SOT-143, TO-252
	LEDs :- 5050, 5630, 5730
	ICs :- SOP-8
ML	ICs :- SOP-16 (wide and narrow body), SOP 20, TSSOP16, TSSOP-20, TSSOP-28, TQFP-32, TQFP-44, TQFP-48 For ICs overall size should be less than 16*16 mm, pitch above 0.5mm and Height should be within 3.5mm
Note: please don't reshape, modify or dismantle the nozzles, use the nozzle cleaning tool and alcohol to clean it before and after the operation to ensure the better performance	

Applicable component on TM220A and TM240A

(1) Common Resistance, Capacitance, Inductance and Diode (applicable ★★★★★)

British system (mil) Packages	Metrication (mm)	Length (mm)	Width (mm)	Highly (mm)	Normal Power (W)	Tape width (mm)
0402	1005	1.0	0.5	0.30	1/16	8
0603	1608	1.6	0.8	0.40	1/16	8
0805	2012	2.0	1.2	0.50	1/10	8
1206	3216	3.2	1.6	0.55	1/8	8
1210	3225	3.2	2.5	0.55	1/4	8
1812	4832	4.8	3.2	0.55	1/2	8
2010	5025	5.0	2.5	0.55	1/2	12
2512	6432	6.4	3.2	0.55	1	12

(2) Glass Diodes Package:- **LL34** (applicable ★★★★★)



Fig1

(3) ICS - Package:- **SOP** series (applicable ★★★★★)



SOP-8 (S08) narrow body



SOP-16 (S016) narrow body



SOP-20 (wide-bodied)

Fig-2

Note: The above IC with tape wide 12mm or 16mm, could directly loading to the tape reel feeder for Placement, or loading to front IC Plate if it's non-tape reel package.

(4) ICs -Package:- **SSOP、TSSOP** (applicable ★★★)



TSSOP-20

TSSOP-16

TSSOP-28

Fig-3

Note: most of the TSSOP IC are generally tubular package, could loading to front IC Plate for placement.

(5) ICs- Package:- **QFP、TQFP** (applicable ★★)



TQFP-32



TQFP-44



TQFP-48

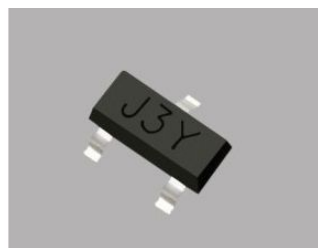
Fig-4

Note: Most TQFP is tray package, a few are reel tape package, both of them could only be loaded to the front IC Plate.

(6) Voltage Regulators (LDOs) - Package:- **SOT series** (applicable ★★★★★)



SOT-223



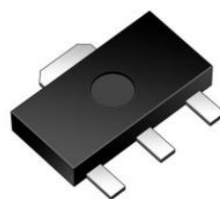
SOT-23



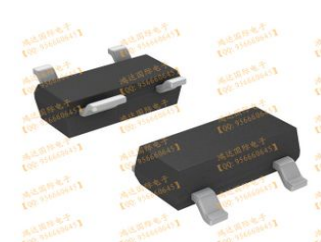
SOT-23-5



SOT-23-5



SOT-89



SOT-143

Fig-5

Note: SOT series are commonly with reel tape package, either 8mm or 12 mm, could directly loading to the tape reel feeder for placement.

(7) LDOs - Package:- **T0-252** (applicable ★★★★★)



Fig-6

Note:- commonly available in 16mm reel tape package, could directly loading to the tape reel feeder for placement.

(8) Diodes - Package:- **SMA** (applicable ★★★★★)



SMA



SMB

Fig-7

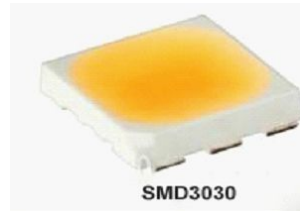
(9) **SMD LEDs** (applicable ★★★★★)



2635



3014



SMD3030



3528



5050



5630

Fig -8

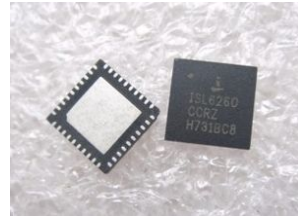
QFN (Not recommended)



QFN32



QFN32



QFN40

Fig-9

BGA (Not applicable)

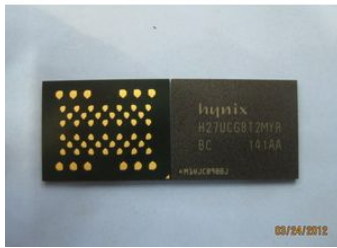


Fig-10