



Makerbase

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Guangzhou Qianhui Information Technology Co.,Ltd.

MKS Gen V1.4 Motherboard Manual

MAKER BASE

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Firmware version update

Firmware version	Modified Time	Modify Content	Note
V1.4	2016.11.12	1. Increase the hot bed terminal and connect to a larger power hot bed; 2. Change to color terminal.	

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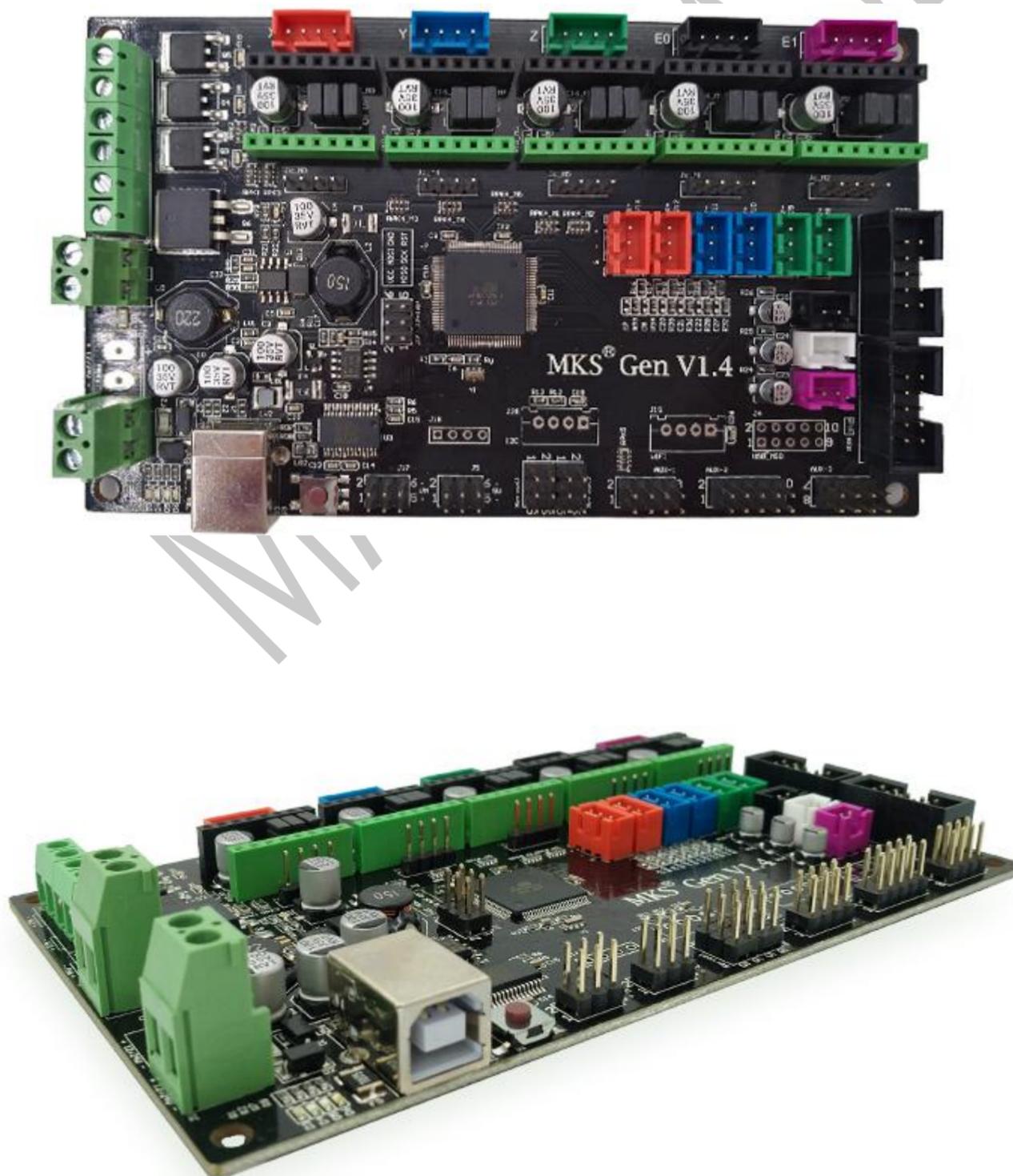
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I Overview

MKS Gen is a product developed by MKS .For the problems of the ramps1.4 open source motherboard, especially optimized R & D.Suitable for mass production of 3D printer manufacturers as the main control board, replaceable motor drive, support 4988 drive and 8825 drive and support TB6600, LV8727, LV8729-OC and other external large drives to meet your needs.Reserve the motor pulse and direction output port to facilitate the external storage of large electrical motor drive circuit, retain the Ramps 1.4 Servos, AUX-1, AUX-2 interface, provide three 5V interfaces and three 12V interface, provide flexible and diverse options.

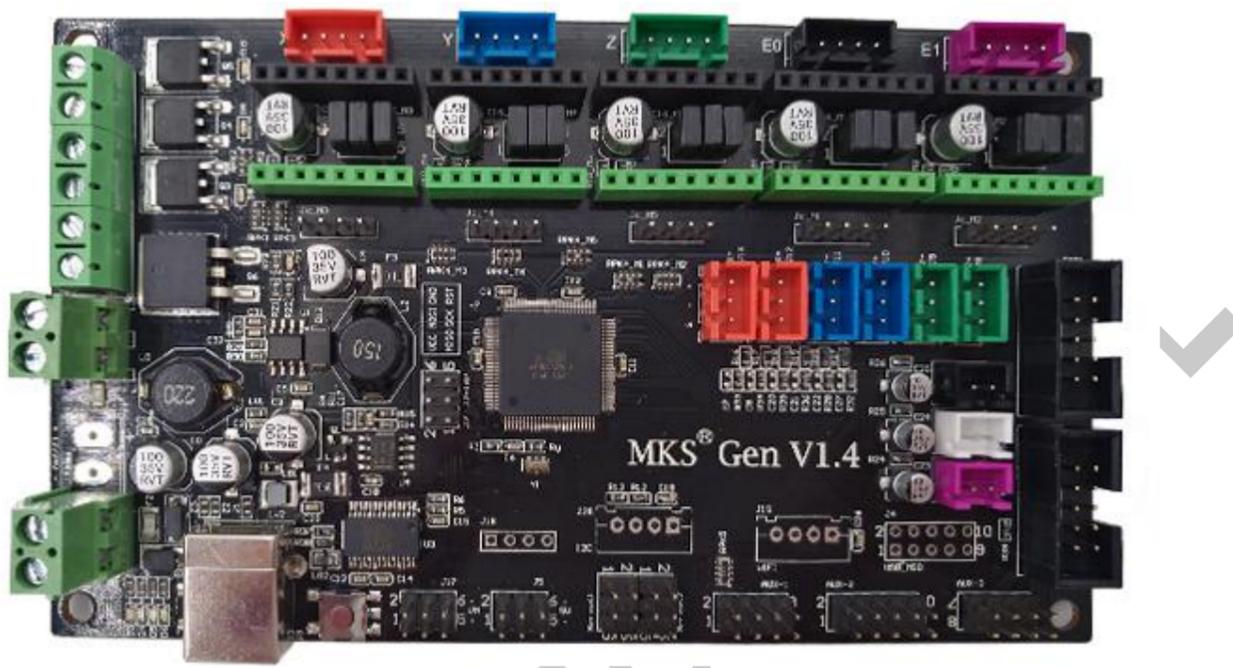


II Features

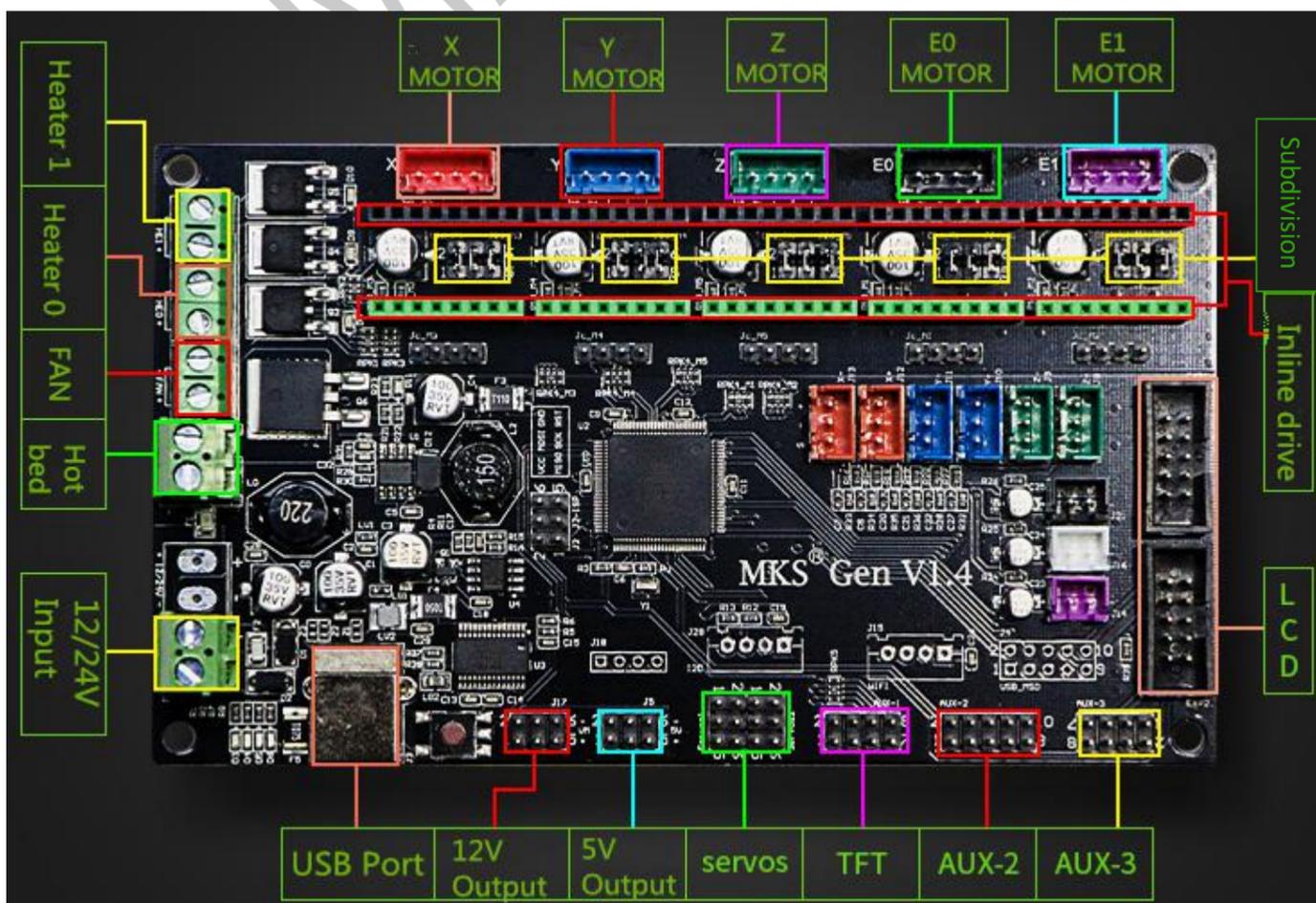
1. The 2560 and ramps1.4 are assembled on one board, which solves the cumbersome and troublesome problem of the Ramps1.4 combination interface.
2. Using the international FT232 high-end USB to serial communication scheme, the data transmission is stable.
3. Users can replace the motor drive by themselves, support 4988 drive and 8825 drive, TMC2100 drive, 8729 drive;
4. Can be connected to large drives, such as TB6600, LV8729, etc.;
5. The board uses a high-quality 4-layer board and is specifically optimized for heat dissipation; the ramp is a 2-layer board.
6. The high quality MOSFET tube has better heat dissipation effect and ensures stable work for a long time.
7. Using dedicated power chip , support 12V-24V power input;Solve the problem of heat and power
8. Can accept 24V input, the same system power can reduce the hot bed current to 1/4, effectively solve the hot bed MOS tube heating problem;
9. Using open source firmware Marlin, the configuration is exactly the same as ramps1.4, which can directly replace Ramps1.4 and is more stable.
10. It can be directly connected to Ramps1.4, 2004LCD control panel and 12864LCD control panel.
11. Fully consider stability, heat dissipation, and ease of use issues, and pass continuous printing reliability testing.
12. The motor pulse and direction output port are reserved, which is convenient for external high current to be connected to a large current (such as 2A, 5A) motor drive circuit.
13. The Servos, AUX-1, and AUX-2 interfaces on the Ramps 1.4 are reserved, and three 5V outputs and three 12V output interfaces are provided.
14. TFT24, TFT28, TFT32, TFT35, and TFT70 touch screens can be connected.
15. MKS PAD7 can be connected.

III The connection description and size chart

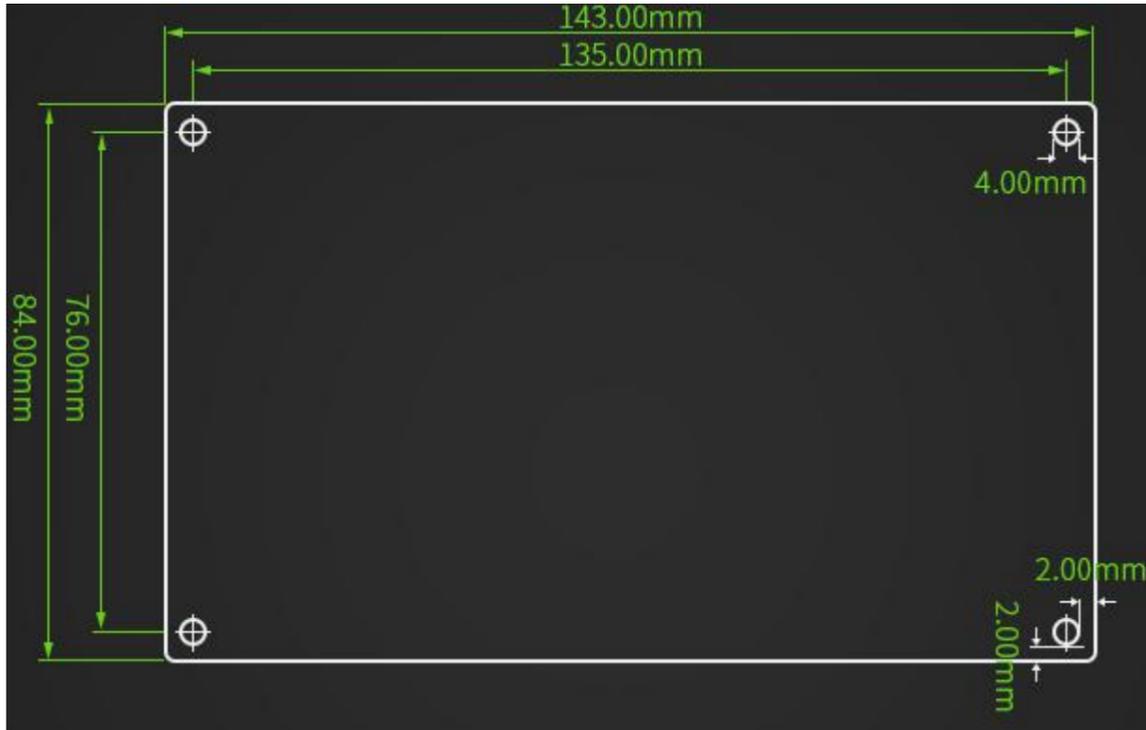
1 MKS GEN V1.4 motherboard product



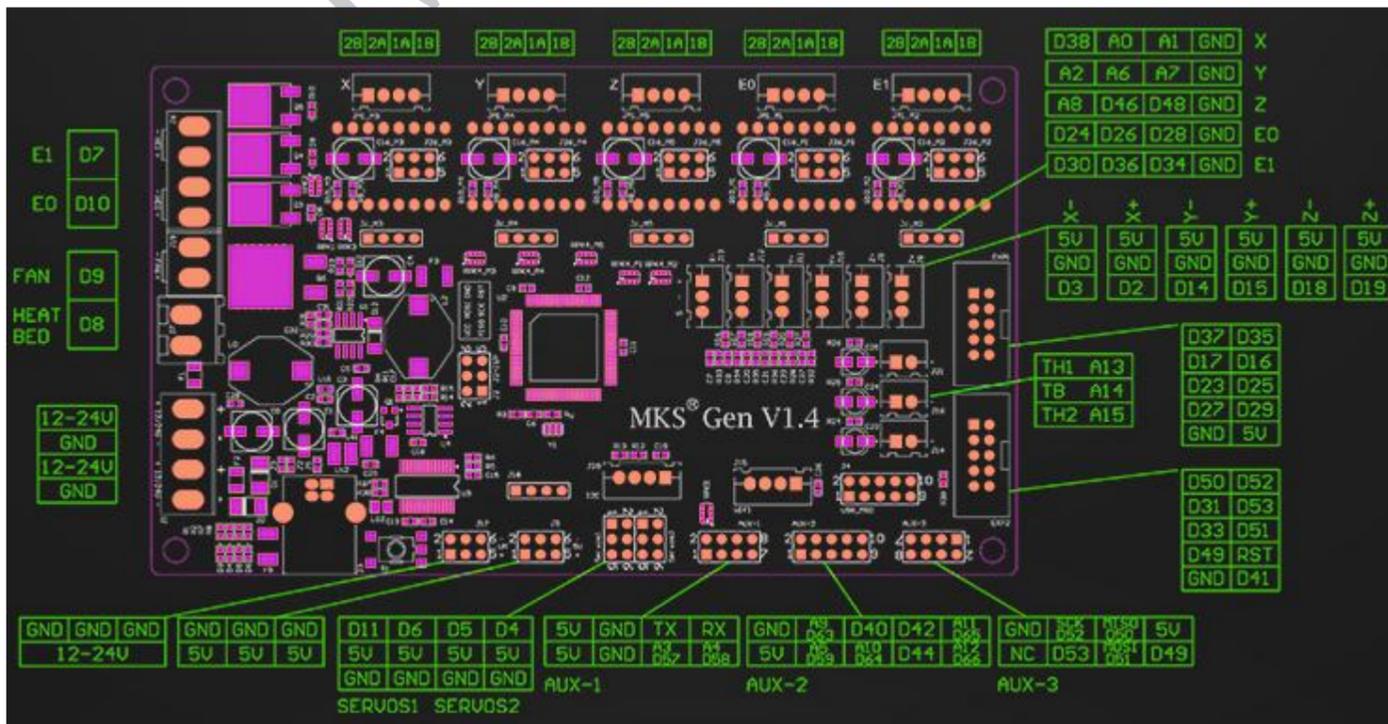
2 System connection diagram



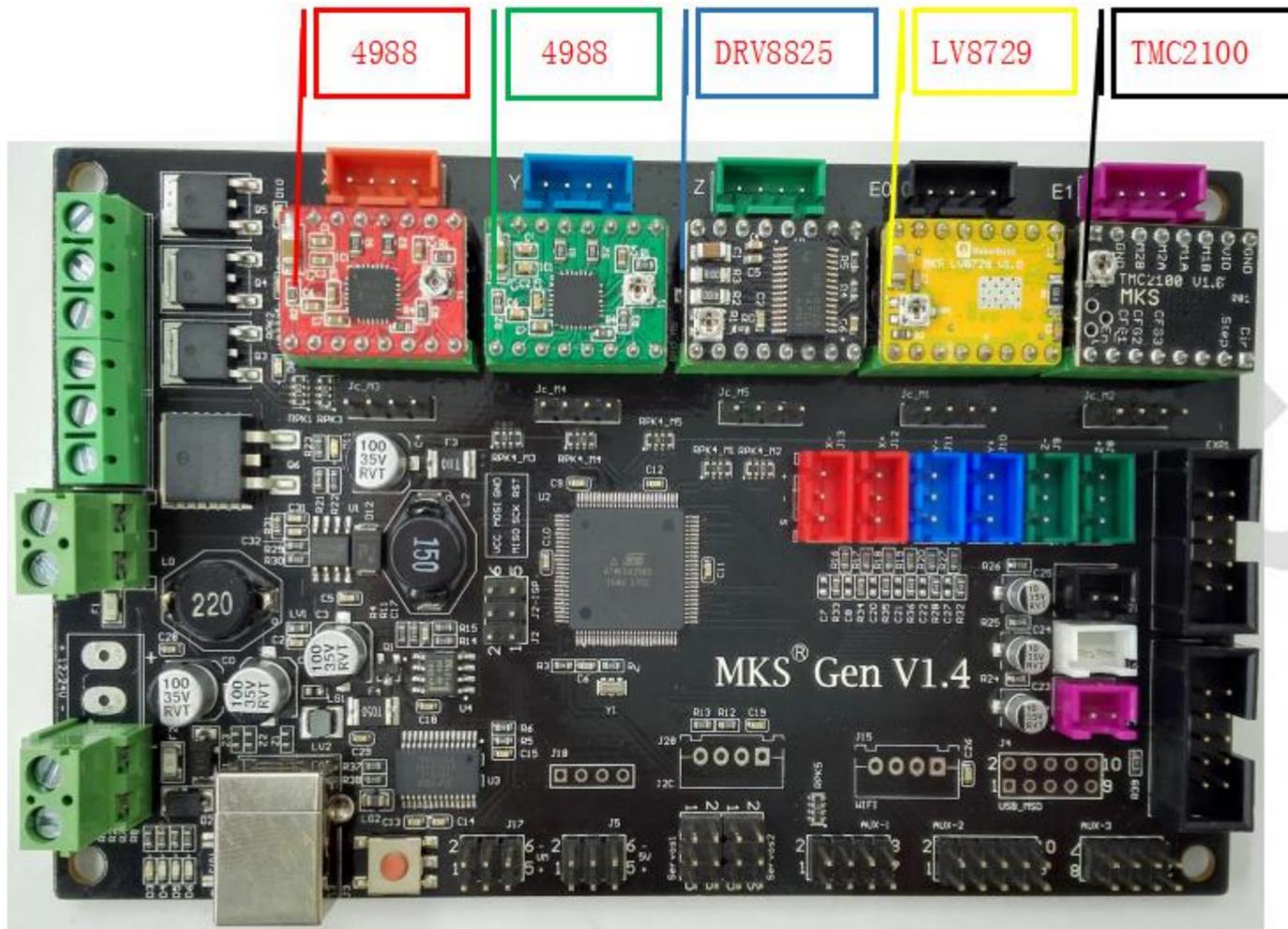
3 MKS Gen V1.4 Installation Dimensional Drawing



4 MKS GEN V1.4 PIN Port



5. each driver is connected to the MKS Gen V1.4 motherboard: (attention to drive, do not plug in!!)



Drive subdivision table: (Motherboard subdivision jumper caps are M1, M2, M3 from left to right, where jumper cap is inserted High, jumper cap is removed to Low)

4988 Drive subdivision				8825 Drive subdivision				8729 Drive subdivision			
M1	M2	M3	subdivision	M1	M2	M3	subdivision	M1	M2	M3	subdivision
Low	Low	Low	Full Step	Low	Low	Low	Full Step	Low	Low	Low	Full Step
High	Low	Low	1/2 Step	High	Low	Low	1/2 Step	High	Low	Low	1/2 Step
Low	High	Low	1/4 Step	Low	High	Low	1/4 Step	Low	High	Low	1/4 Step
High	High	Low	1/8 Step	High	High	Low	1/8 Step	High	High	Low	1/8 Step
High	High	High	1/16 Step	Low	Low	High	1/16 Step	Low	Low	High	1/16 Step
				High	Low	High	1/32 Step	High	Low	High	1/32 Step

				Low	High	High	1/32 Step	Low	High	High	1/64 Step
				High	High	High	1/32 Step	High	High	High	1/128 Step

The TMC2100 driver chip internally uses a differential algorithm to extend the 16 subdivisions to 256 subdivisions, and the step values are calculated in 16 subdivisions.

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IV Instructions

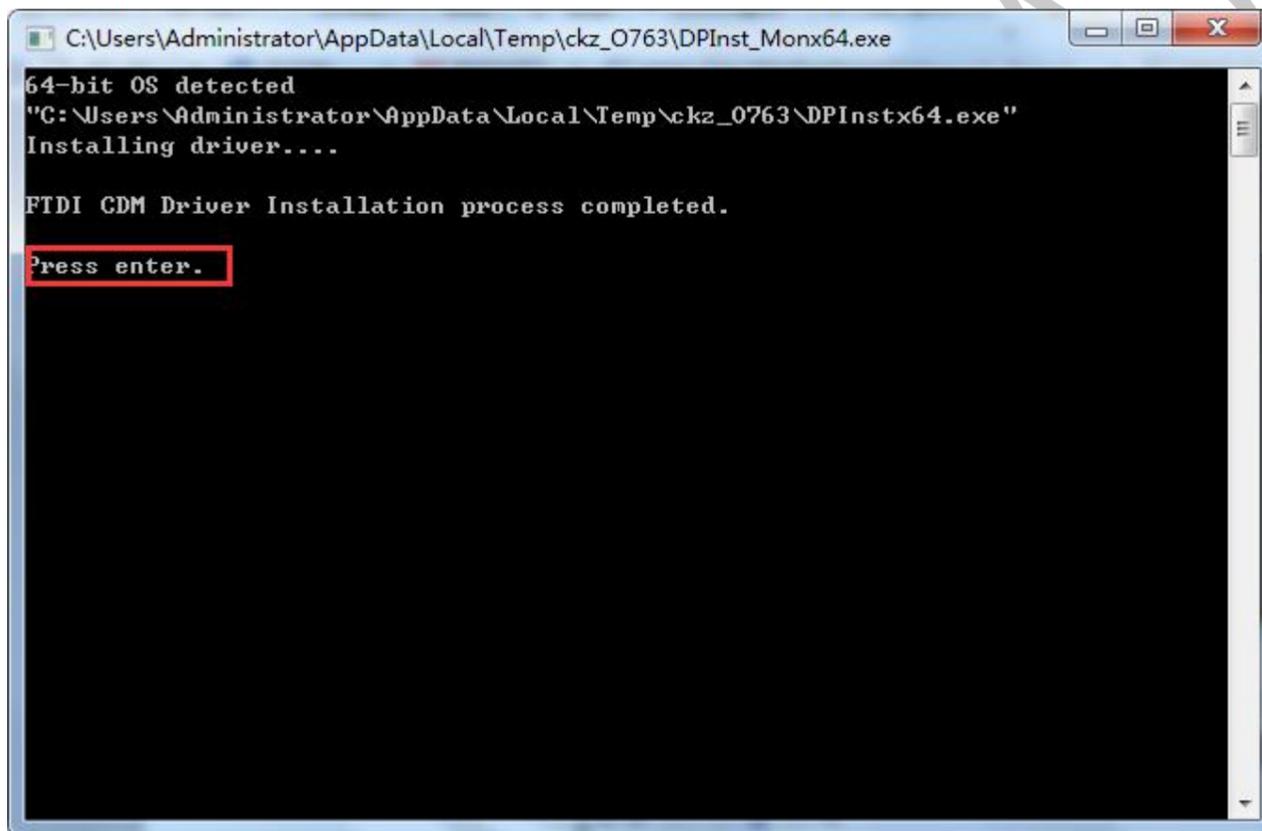
1 The ways to get the MKS gen V1.4 Latest Firmware.

- Get firmware from customer service or technician
- Download the firmware from the makerbase discussion group.
- Download on Web:

<https://github.com/makerbase-mks?tab=repositories>

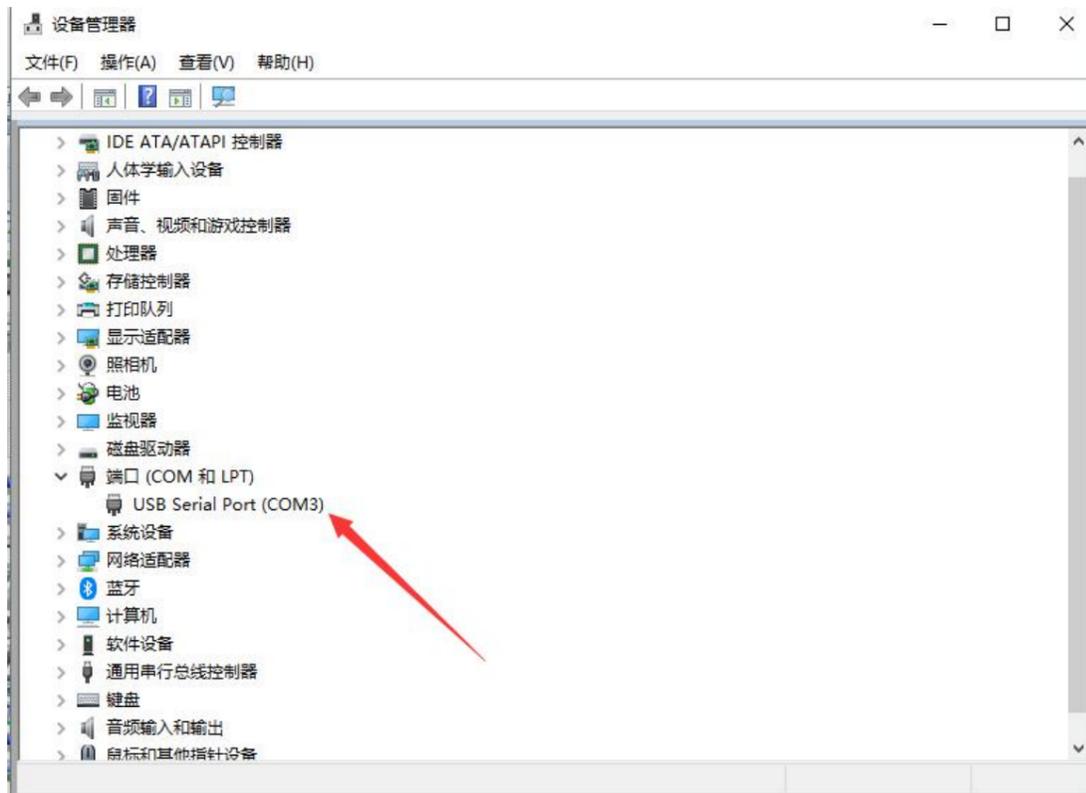
2 USB driver Installation

2.1 First find the driver installation file on the computer, click ftdi_ft232_drive.exe to install the driver



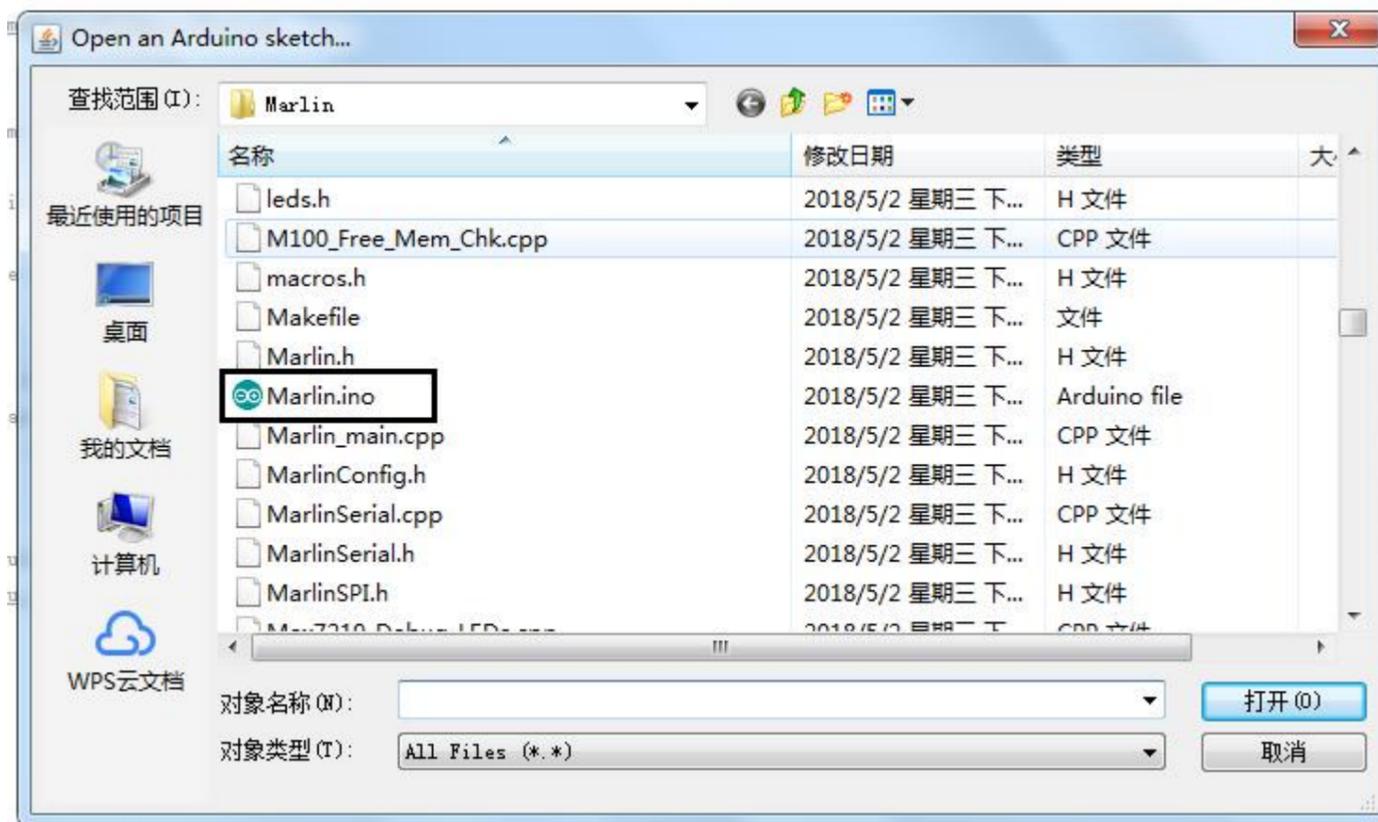
```
C:\Users\Administrator\AppData\Local\Temp\ckz_0763\DPInst_Monx64.exe
64-bit OS detected
"C:\Users\Administrator\AppData\Local\Temp\ckz_0763\DPInstx64.exe"
Installing driver....
FTDI CDM Driver Installation process completed.
press enter.
```

2.2 After the motherboard is connected to the computer, the installation driver prompt will appear. If the installation is successful, you can also view the COM port on the device manager.

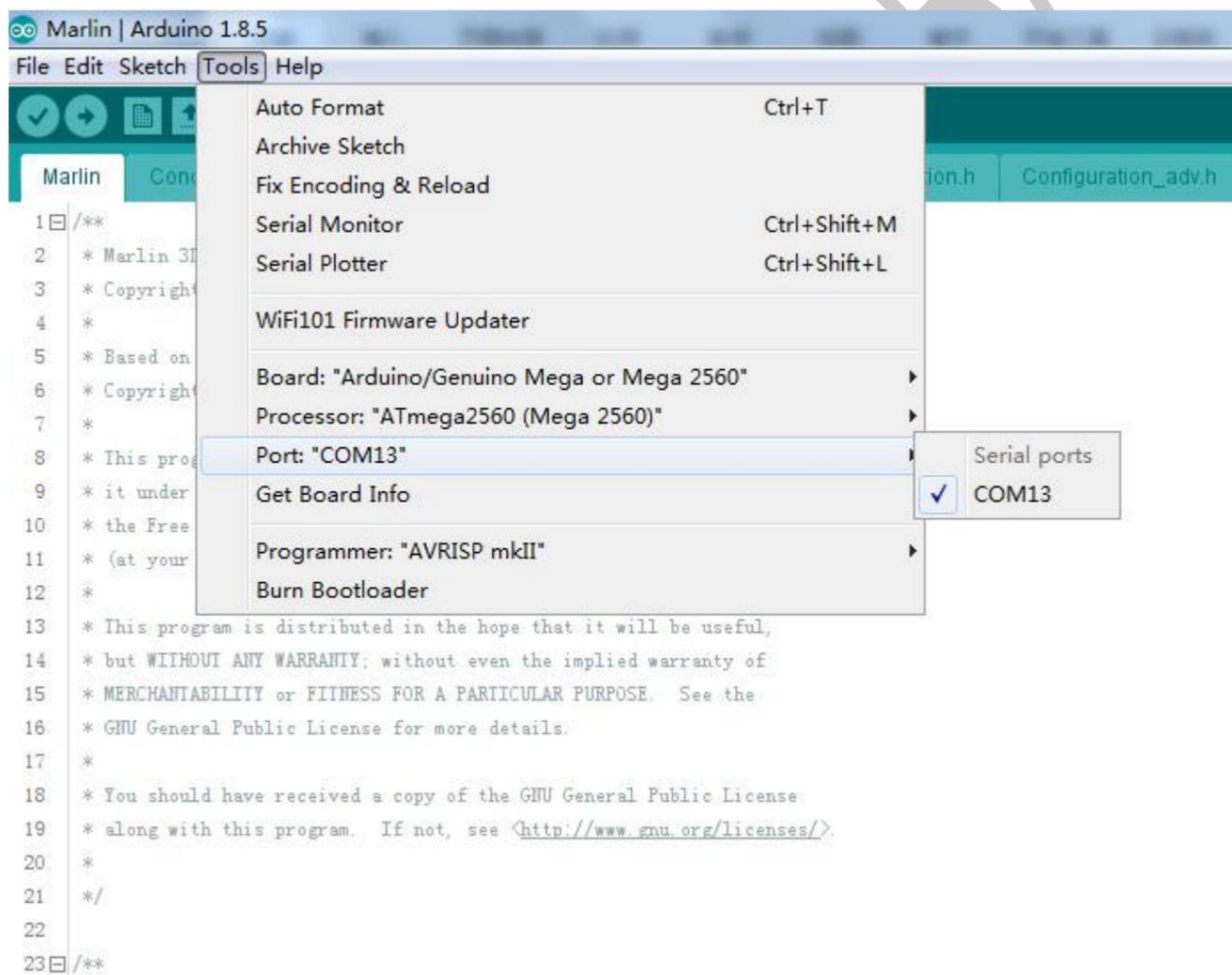
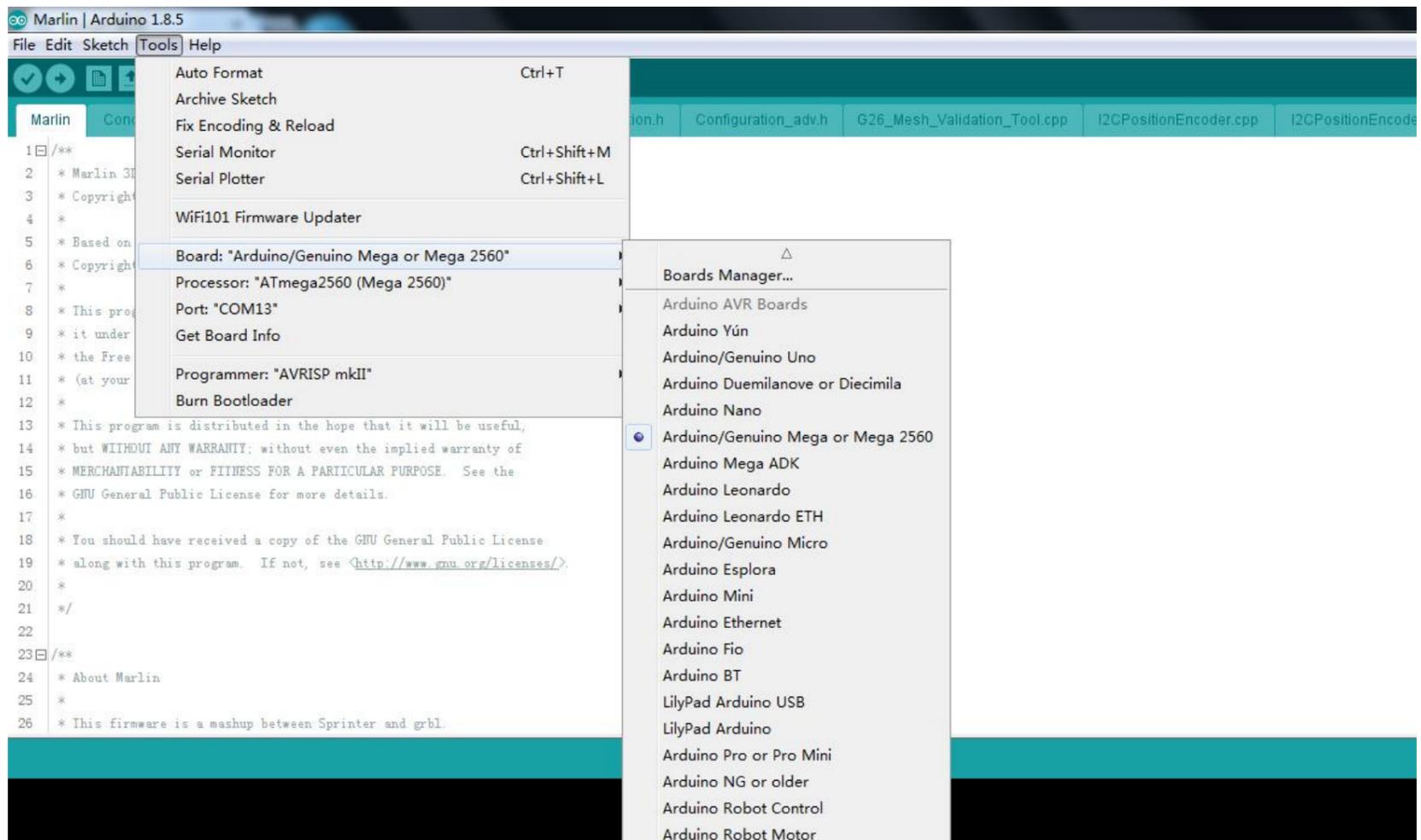


3 Upload the marlin firmware

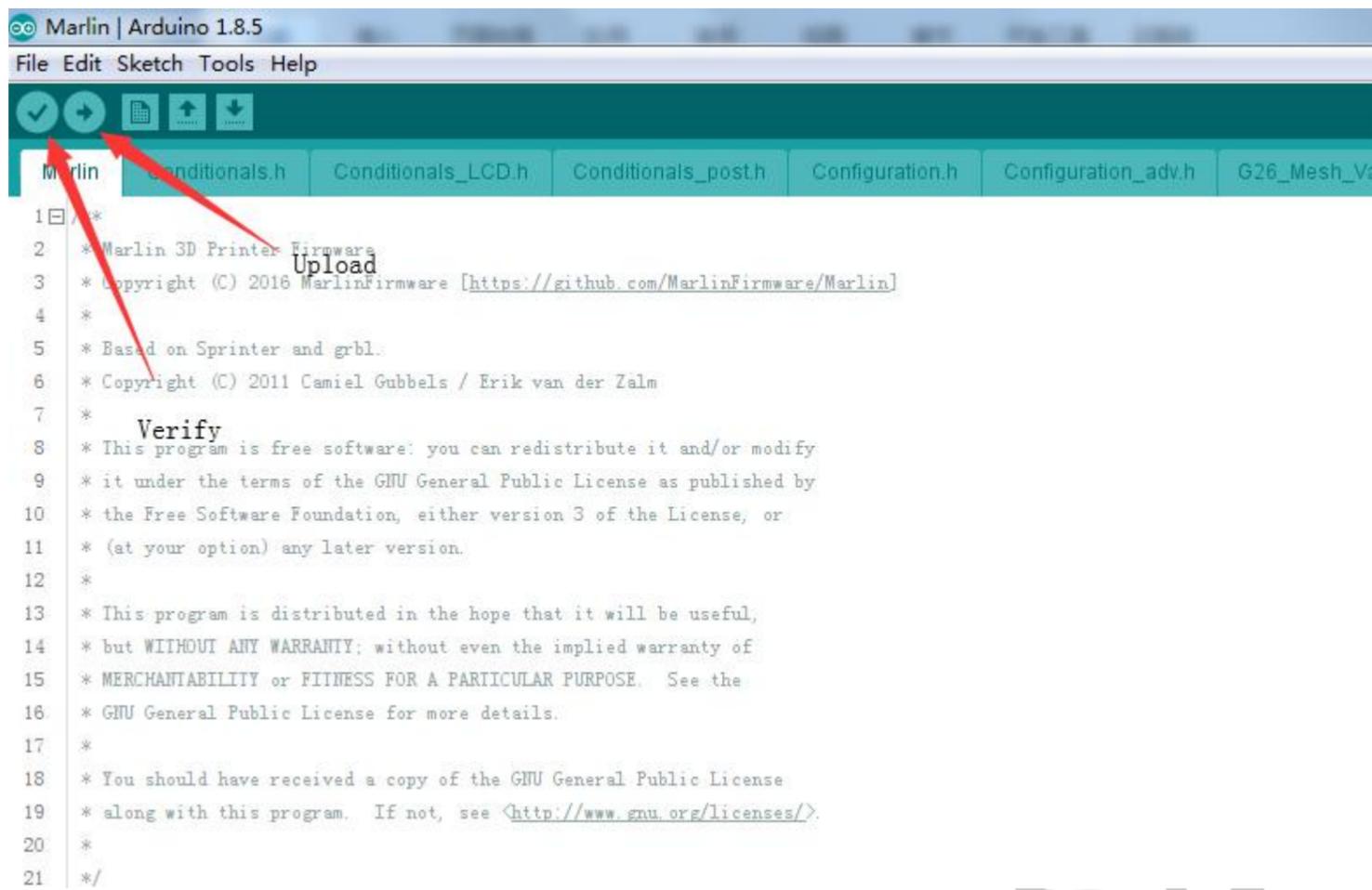
Start uploading the marlin firmware, open the Arduino, execute "File" "Open", select the marlin firmware to be uploaded, and select the file with the suffix `***.pde` or `***.ino` to open;



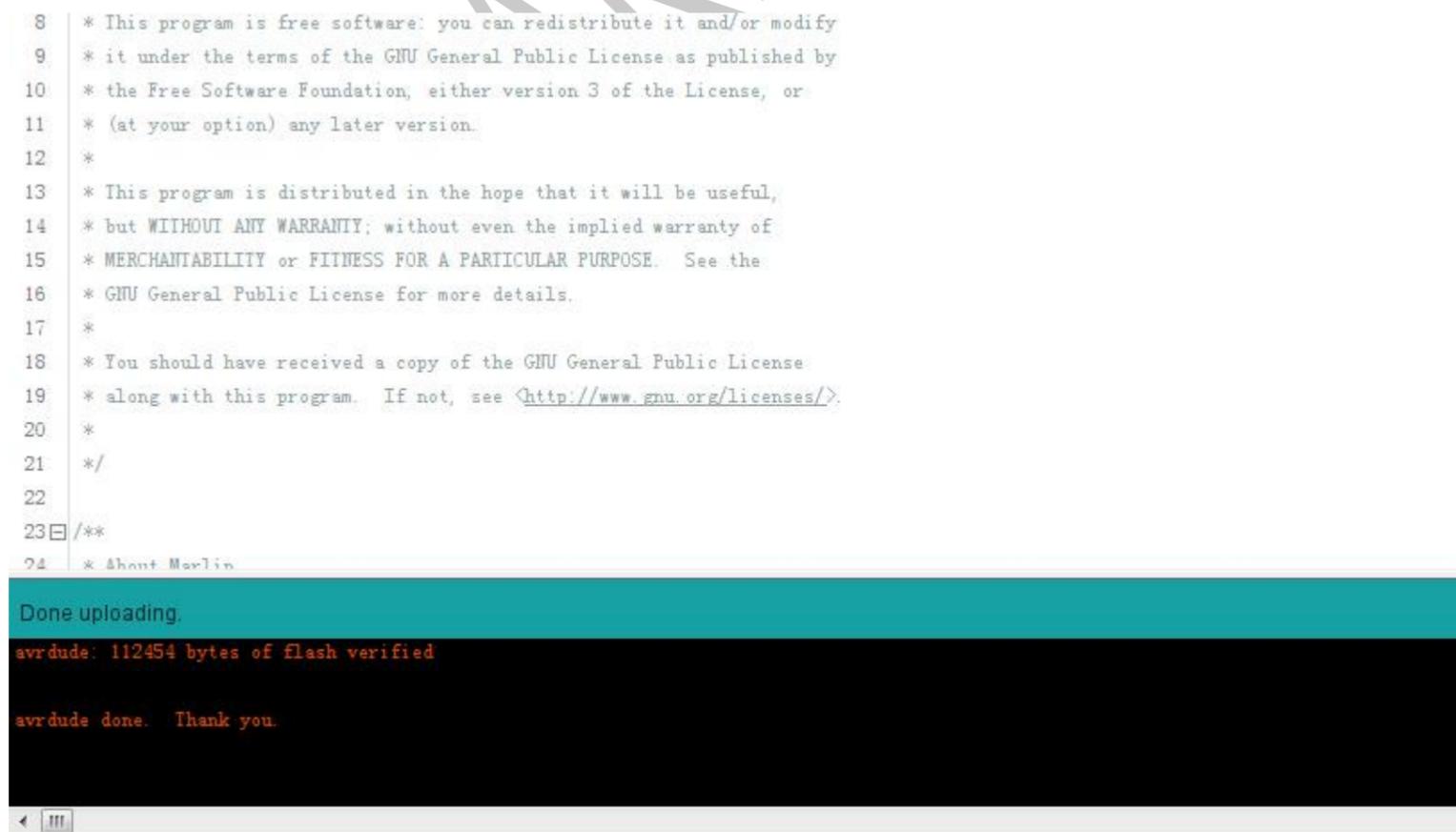
After opening, select the board type in the toolbar on the Arduino software and select the COM port of the port.



Click "Upload" (you can also verify first, then upload)



After clicking upload, it will compile and download again. When downloading, you can see that the indicator light of the motherboard will flash, indicating that the firmware is being uploaded. After the firmware upload is completed, the indicator light stops flashing, and Arduino shows that the upload is successful.



V modify the firmware

The basic configuration of Marlin firmware is generally carried out in the configuration.h file. I need to modify it to list it in the table. Download the corresponding firmware in the group file only need to modify the sensor type, motor direction, maximum stroke, pulse. That's it.

Number	Types	explanation
1	Baud rate	The baud rate must be consistent with the host computer to communicate.
2	Motherboard type	The type for mks is BOARD_RAMPS_14_EFB
3	Sensor type	Sensor type for temperature detection
4	End stop switch type	Set the switch type to normally open or normally closed
5	Motor direction	Set the direction in which each motor returns to zero
6	Maximum stroke of each axis	Set according to the size of the model itself
7	Pulse	Set the number of pulses per mm for each axis
8	LCD display type	The type of display used when printing offline (if the touch screen is defined by any one of them)

1. Select the baud rate, generally 115200 and 250,000, the baud rate should be consistent with the baud rate selected by the host computer to communicate.

```

File Edit Sketch Tools Help
Marlin Conditionals.h Conditionals_LCD.h Conditionals_post.h Configuration.h Configuration_adv.h
109 * you commonly experience drop-outs during host printing.
110 * You may try up to 1000000 to speed up SD file transfer.
111 *
112 * :[2400, 9600, 19200, 38400, 57600, 115200, 250000, 500000, 1000000]
113 */
114 #define BAUDRATE 250000
115
116 // Enable the Bluetooth serial interface on AT90USB devices
117 //#define BLUETOOTH
118
119 // The following define selects which electronics board you have.
120 // Please choose the name from boards.h that matches your setup
121 #ifndef MOTHERBOARD
122 #define MOTHERBOARD BOARD_MKS_BASE
123 #endif
124
  
```

2. Motherboard type, the motherboard of the maker base selects BOARD_RAMPS_14_EFB.

```

118
119 // The following define selects which electronics board you have.
120 // Please choose the name from boards.h that matches your setup
121 #ifndef MOTHERBOARD
122 #define MOTHERBOARD BOARD_RAMPS_14_EFB
123 #endif
124
125 // Optional custom name for your RepStrap or other custom machine
126 // Displayed in the LCD "Ready" message
127 //#define CUSTOM_MACHINE_NAME "3D Printer"
128
129 // Define this to set a unique identifier for this printer, (Used by some programs to differentiate between printers)
130 // You can use an online service to generate a random UUID. (eg http://www.uuidgenerator.net/version4)
131 //#define MACHINE_UUID "00000000-0000-0000-0000-000000000000"
132
133 // @section extruder
134

```

3. The sensor type is generally NTC 100K thermistor, PT100 thermocouple, AD597 thermocouple and so on. You can choose according to your own thermal type.

```

286 *
287 * :{ '0': "Not used", '1': "100k / 4.7k - EPCOS", '2': "200k / 4.7k - ATC Semitec 204GI-2", '3': "Mer
288 */
289 #define TEMP_SENSOR_0 1
290 #define TEMP_SENSOR_1 0
291 #define TEMP_SENSOR_2 0
292 #define TEMP_SENSOR_3 0
293 #define TEMP_SENSOR_4 0
294 #define TEMP_SENSOR_BED 1
295

```

If using a PT100 thermocouple, you need to modify the PIN port to be connected in pins_RAMPS.h, for example, the A9 pin of the MKS Gen-L motherboard. Modify as follows:

```

Marlin - Configuration.h | Arduino 1.8.5
File Edit Sketch Tools Help
Marlin Conditionals.h Conditionals_LCD.h Conditionals_post.h Configuration.h$ Configuration_adv.h G26_M
286 *
287 * : { '0': "Not used", '1': "100k / 4.7k - EPCOS", '2': "200k / 4.7k - ATC Semitec 204GI-2", '3': "Mendel-parts / 4.7k"
288 */
289 #define TEMP_SENSOR_0 20
290 #define TEMP_SENSOR_1 0
291 #define TEMP_SENSOR_2 0
292 #define TEMP_SENSOR_3 0
293 #define TEMP_SENSOR_4 0
294 #define TEMP_SENSOR_BED 1
295
pins_MKS_BASE.h
pins_MKS_GEN_L.h
pins_OMCA.h
pins_OMCA_A.h
pins_PRINTRBOARD.h
pins_PRINTRBOARD_REVF.h
pins_RAMBO.h
pins_RAMPS.h
pins_RAMPS_13.h
pins_RAMPS_OLD.h
pins_RAMPS_PLUS.h
pins_RIGIDBOARD.h
pins_RIGIDBOARD_V2.h
pins_RUMBA.h
pins_SAINSMART_2IN1.h
    
```

```

166
167 //
168 // Temperature Sensors
169 //
170 #define TEMP_0_PIN 9 // Analog Input
171 #define TEMP_1_PIN 15 // Analog Input
172 #define TEMP_BED_PIN 14 // Analog Input
173
    
```

4. The endstop switch type is divided into normally open and normally closed. If the endstop switch is mechanical and normally open, it is “true” here. If it is photoelectric switch (normally closed), it is “false” here.

```

Marlin Conditionals.h Conditionals_LCD.h Conditionals_post.h Configuration.h$ Configuration_adv.h G26_Mesh_Validation_Tool
// Mechanical endstop with COM to ground and NC to Signal uses "false" here (most common setup).
#define X_MIN_ENDSTOP_INVERTING false // set to true to invert the logic of the endstop.
#define Y_MIN_ENDSTOP_INVERTING false // set to true to invert the logic of the endstop.
#define Z_MIN_ENDSTOP_INVERTING false // set to true to invert the logic of the endstop.
#define X_MAX_ENDSTOP_INVERTING true // set to true to invert the logic of the endstop.
#define Y_MAX_ENDSTOP_INVERTING true // set to true to invert the logic of the endstop.
#define Z_MAX_ENDSTOP_INVERTING true // set to true to invert the logic of the endstop.
#define Z_MIN_PROBE_ENDSTOP_INVERTING false // set to true to invert the logic of the probe.
    
```

5. Motor movement direction control. Due to the different origin positions of each printer, the uncertainty of the motor's zero return direction. If the motor moves in the opposite direction, the following parameter values can be true or false, or the same group of stepper motors can be replaced. For example, 1A and 1B are swapped.

```

Marlin | Conditionals.h | Conditionals_LCD.h | Conditionals_post.h | Configuration.h $ | Configur
// Invert the stepper direction. Change (or reverse the motor connect
#define INVERT_X_DIR true
#define INVERT_Y_DIR false
#define INVERT_Z_DIR true
    
```

6. The maximum stroke of each axis, which is the maximum print size of the printer

```

Marlin | Conditionals.h | Conditionals_LCD.h | Conditionals_post.h | Configuration.h $ | Configur
// Travel limits after homing (units are in mm)
#define X_MIN_POS 0
#define Y_MIN_POS 0
#define Z_MIN_POS 0
#define X_MAX_POS 200
#define Y_MAX_POS 200
#define Z_MAX_POS 200
    
```

7. Set the number of pulses corresponding to each axis to move 1mm, and calculate the number of pulses for each axis motor as follows:

Formula of pulse number/mm of synchronous wheel motor: $(360 \div \text{step angle}) \times \text{Subdivision} \div (\text{Diameter} \times 3.14)$

The formula of the pulse number/mm of The screw rod Motor: $(360 \div \text{step angle}) \times \text{Subdivision} \div \text{lead}$

```

Marlin | Conditionals.h | Conditionals_LCD.h | Conditionals_post.h | Configuration.h $ | Configuration_adv.h
* Override with M92
* X, Y, Z, E0 [, E1[, E2[, E3[, E4]]]]
*/
#define DEFAULT_AXIS_STEPS_PER_UNIT { 80, 80, 400, 96 }
X Y Z E0
/**
    
```

8. The type setting of the display is also relatively easy to make mistakes, so it is recommended that you download the firmware of the corresponding display directly in the group to make some basic modifications. (Cannot be defined together with two LCD screen types, otherwise it will compile, but only one LCD can be defined.

Screen type, if it is a touch screen, define any one of them)

(1) Define LCD2004 display



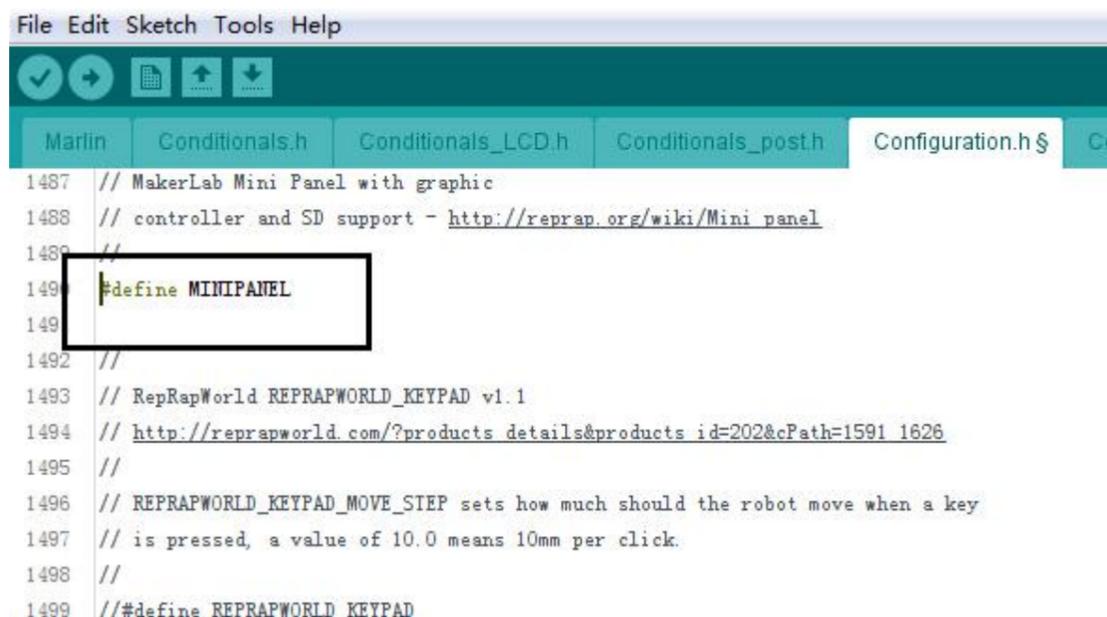
```
File Edit Sketch Tools Help
Marlin Conditionals.h Conditionals_LCD.h Conditionals_post.h Configuration.h$ Configuration_a
1466 // http://reprap.org/wiki/RepRapDiscount Smart Controller
1467 //
1468 // Note: Usually sold with a white PCB.
1469 //
1470 #define REPRAP_DISCOUNT_SMART_CONTROLLER
1471 //
1472 //
1473 // GADGETS3D G3D LCD/SD Controller
1474 // http://reprap.org/wiki/RAMPS 1.3/1.4 GADGETS3D Shield with Panel
1475 //
1476 // WARP MiniPanel LCD with SD card PCB
```

(2) Define LCD12864 display



```
File Edit Sketch Tools Help
Marlin Conditionals.h Conditionals_LCD.h Conditionals_post.h Configuration.h$ Configuration_
1478 //#define G3D_PANEL
1479 //
1480 //
1481 // RepRapDiscount FULL GRAPHIC Smart Controller
1482 // http://reprap.org/wiki/RepRapDiscount Full Graphic Smart Controller
1483 //
1484 #define REPRAP_DISCOUNT_FULL_GRAPHIC_SMART_CONTROLLER
1485 //
1486 //
```

(3) Define LCD mini12864 display



```
File Edit Sketch Tools Help
Marlin Conditionals.h Conditionals_LCD.h Conditionals_post.h Configuration.h$ Co
1487 // MakerLab Mini Panel with graphic
1488 // controller and SD support - http://reprap.org/wiki/Mini panel
1489 //
1490 #define MINIPANEL
1491 //
1492 //
1493 // RepRapWorld REPRAPWORLD_KEYPAD v1.1
1494 // http://reprapworld.com/?products\_details&products\_id=202&cPath=1591\_1626
1495 //
1496 // REPRAPWORLD_KEYPAD_MOVE_STEP sets how much should the robot move when a key
1497 // is pressed, a value of 10.0 means 10mm per click.
1498 //
1499 //#define REPRAPWORLD_KEYPAD
```

Define the type of display, just delete the "//" if you find the corresponding type.

VI the main matters before loading the machine

According to the connection diagram introduced by Taobao, all the lines are connected to debug the printer and test the printing. There are a few points to note after connecting the line:

1. Never reverse the power supply, drive and fan! ! !
2. The position of the endstop is to be inserted. Generally, the XYZ and I3 are connected to the minimum value, the delta is connected to the maximum value; the 2pin endstop switch is connected to the S and -, and the 3Pin limit switch is connected to the S, -, and + .
3. Must be connected to the thermal to operate, otherwise "Err: MINITEMP" will appear;
4. Before moving each axis, you must first return to zero.

VII Adjust the drive current

Connect the 12V power supply, measure the intermediate pin voltage of the corresponding drive potentiometer with a multimeter, and calculate the maximum load current according to the drive module;

- 1 4988 Green: Drive current algorithm: $i = v_{ref} / 0.8$, the default V_{ref} is about 0.8v, so the default current is 1.0A, the maximum current is 2.0A!
- 2 4988 red: drive current algorithm: $i = v_{ref} / 1.6$, the default V_{ref} is about 0.8v, so the default current is 0.5A, the maximum current is 1.0A!
- 3 8825: Drive current algorithm: $i = v_{ref} \times 2$, the default V_{ref} is about 0.65v, so the default current is 1.3A, the maximum current is 2.5A!
- 4 8729: Drive current algorithm: $i = v_{ref} / 0.5$, the default V_{ref} is about 0.4v, so the default current is 0.8A and the maximum current is 1.5A!



Note: Please do not plug or unplug the motor when the power is on, it is easy to cause the drive to burn out; do not adjust the current during the running of the motor. The correct way is to disconnect the power supply, unplug the motor, re-power it, adjust the potentiometer, and test the voltage of the potentiometer until the measured voltage is the same as expected!!

VIII. Technical support and protection

1. Power test will be done prior to shipment to ensure normal use of the product

2. Welcome friends to join the discussion group: [232237692](#).

3. Welcome to Blog Exchange : <http://flyway97.blog.163.com>.

4. 3D printer motherboard contact

Miss Zhong: [15521638375](tel:15521638375) Mr. Huang: [13148932315](tel:13148932315) Mr. Tan: [13640262556](tel:13640262556).

Mr.Peng: [13427595835](tel:13427595835)

5. If you have any questions you can contact our customer service or find technical support staff in the group, we will be happy to serve you.



MKS official website



MKS Taobao website