Makerbase

广州谦辉信息科技有限公司

Guangzhou Qianhui Information Technology Co.,Ltd.

MKS Gen_L Motherboard Manual

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Firmware version update

Firmware version	Modified Time	Modify Content	Note
V1.0	2016.12	1.Initial version	

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Directory

Ⅰ   Overview

MKS Gen-L 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 other drivers, 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 a 5V interface, provide flexible and diverse options.
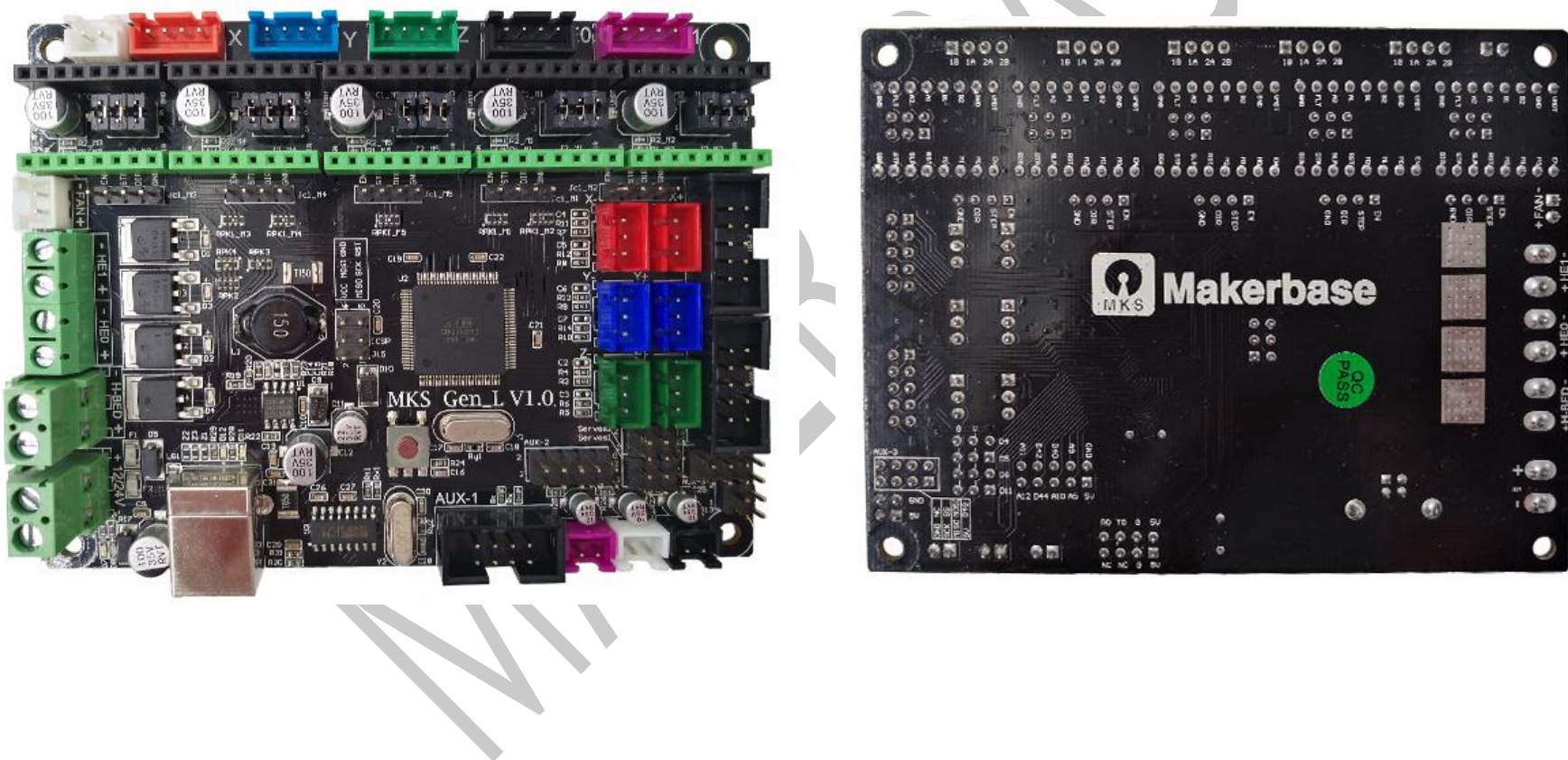
Ⅱ　Features

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. Users can replace the motor drive by themselves, support 4988 drive and 8825 drive, TMC2100 drive, 8729 drive;

3. The external drive signal is reserved, and the 57 and 86 motors can be driven by a large external drive.

4. The high quality MOSFET tube has better heat dissipation effect and ensures stable work for a long time.

5. Using dedicated power chip , support 12V-24V power input;Solve the problem of heat and power shortage of Ramps voltage conversion chip.

6. The stable and reliable filter circuit greatly reduces the possibility of interference, and the most likely to avoid the phenomenon of crashes and runaways during the printing process.

7. The use of CH340 serial chip, under the premise of ensuring stability and reliability, reduce costs, but also solve the problem of the previous 16U2 hard-to-install drive.

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 directly connect 2004LCD display and 12864LCD display and MINI12864 display to support TFT28 and TFT32 touch screen developed by Maker.

11. The XYZ axes use different color terminals to correspond to the motor and limit switches for easy wiring.

12. User-friendly design, use different color terminals to distinguish the driving direction, reduce the probability of insertion and reverse, and prevent the motherboard from being damaged due to the drive insertion.

Ⅲ   The connection description and size chart
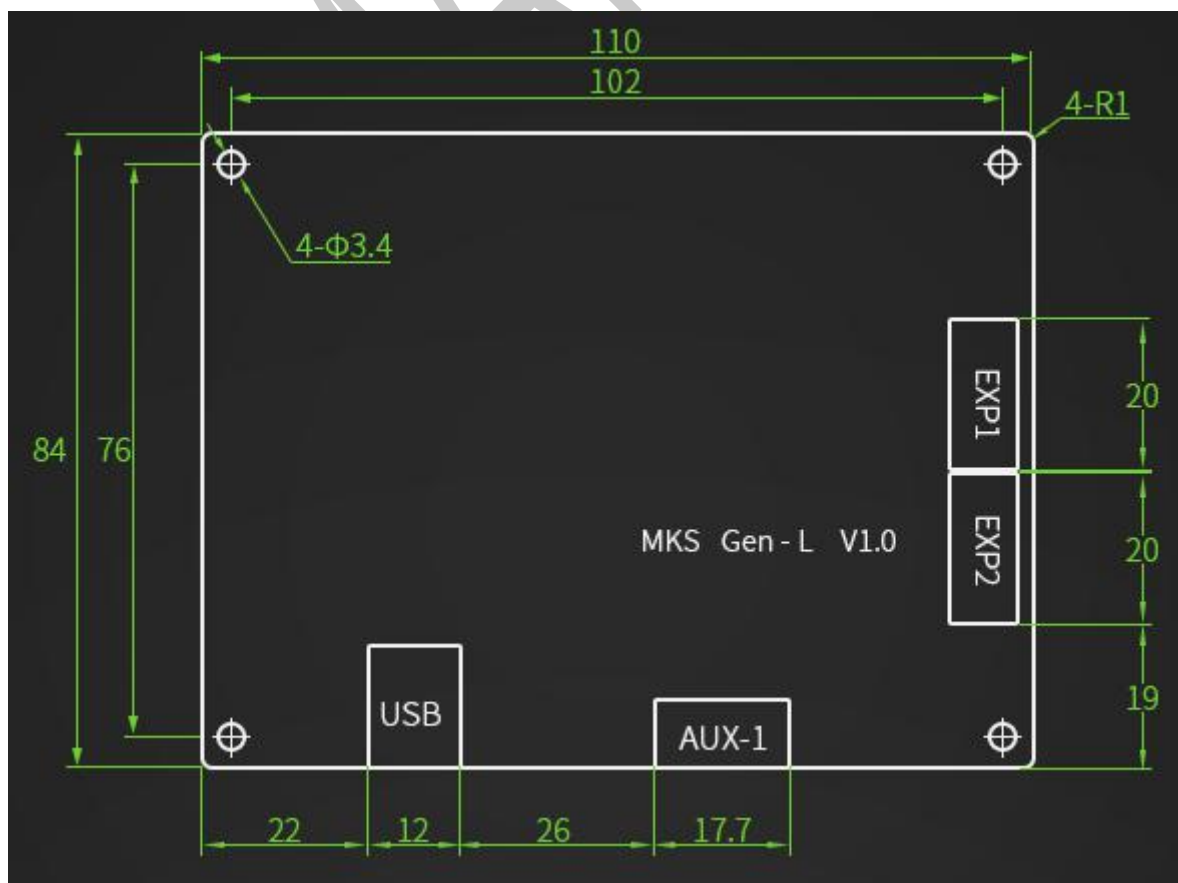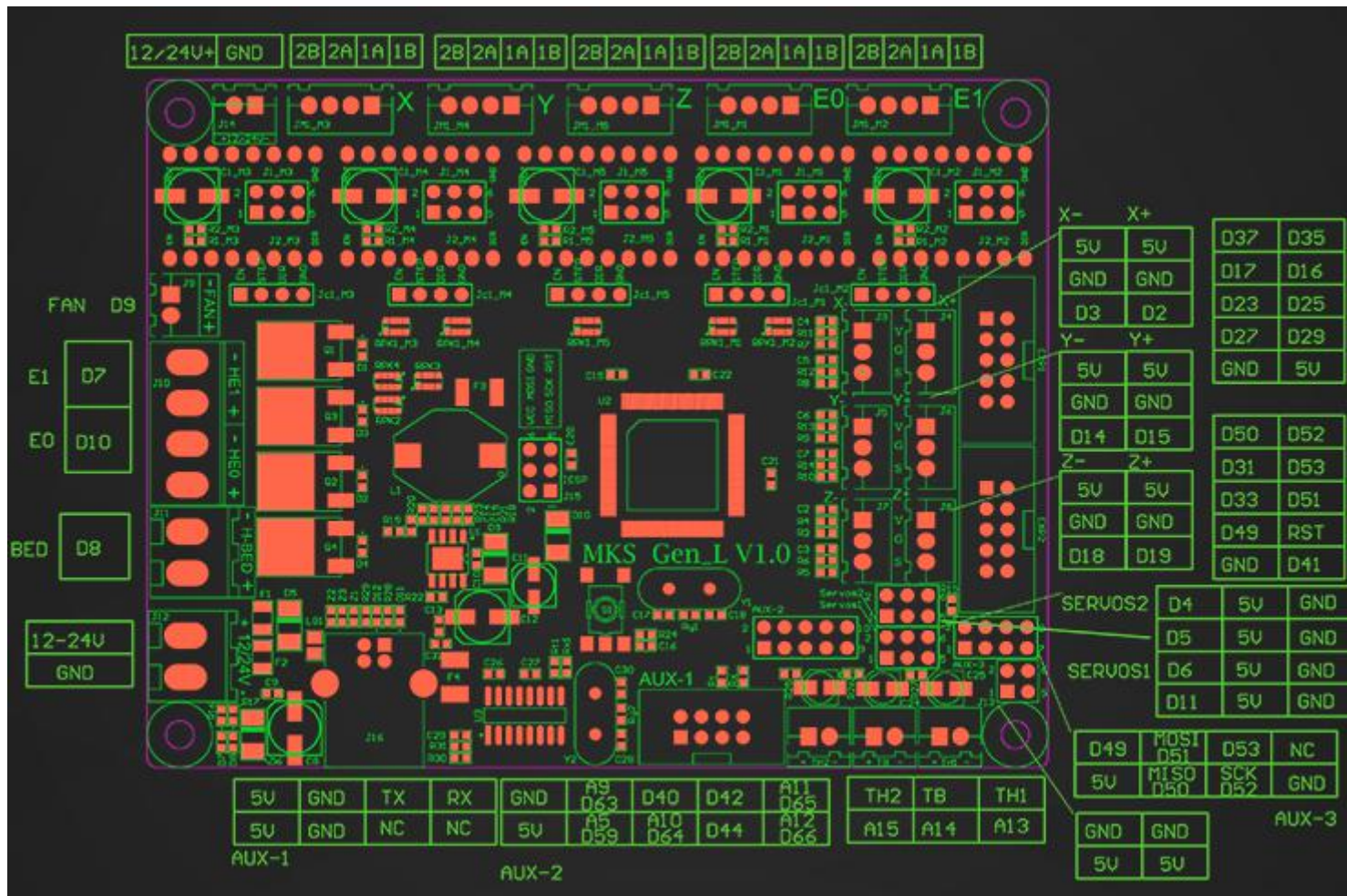
1   MKS GEN_L motherboard product
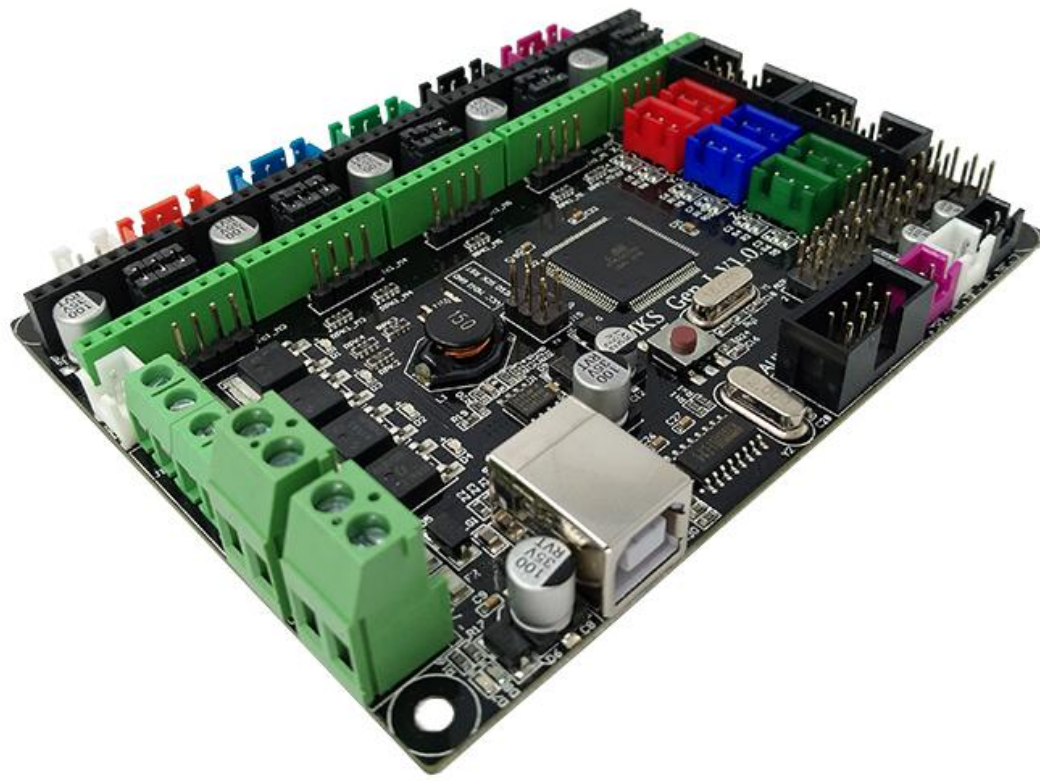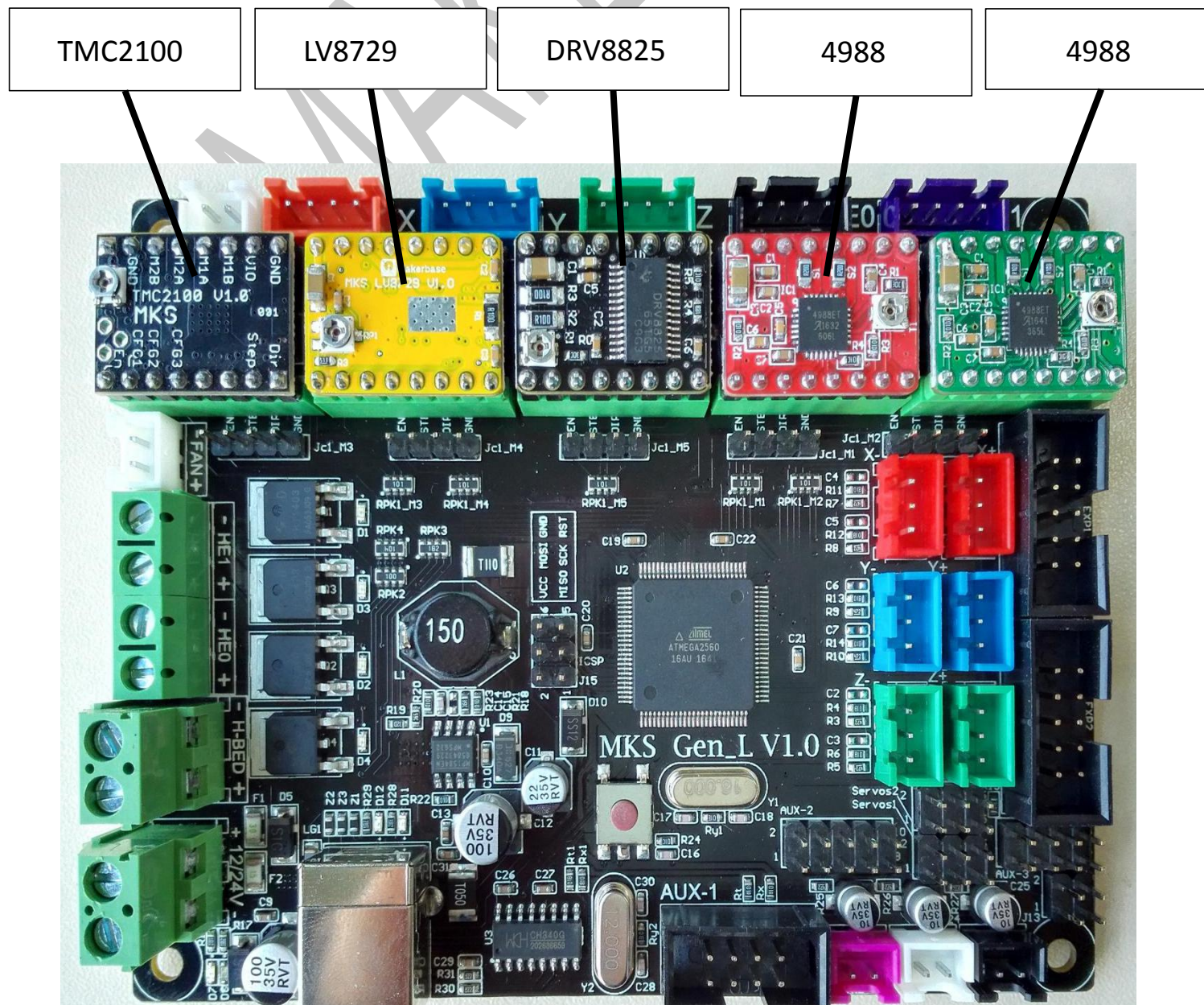

2   System connection diagram
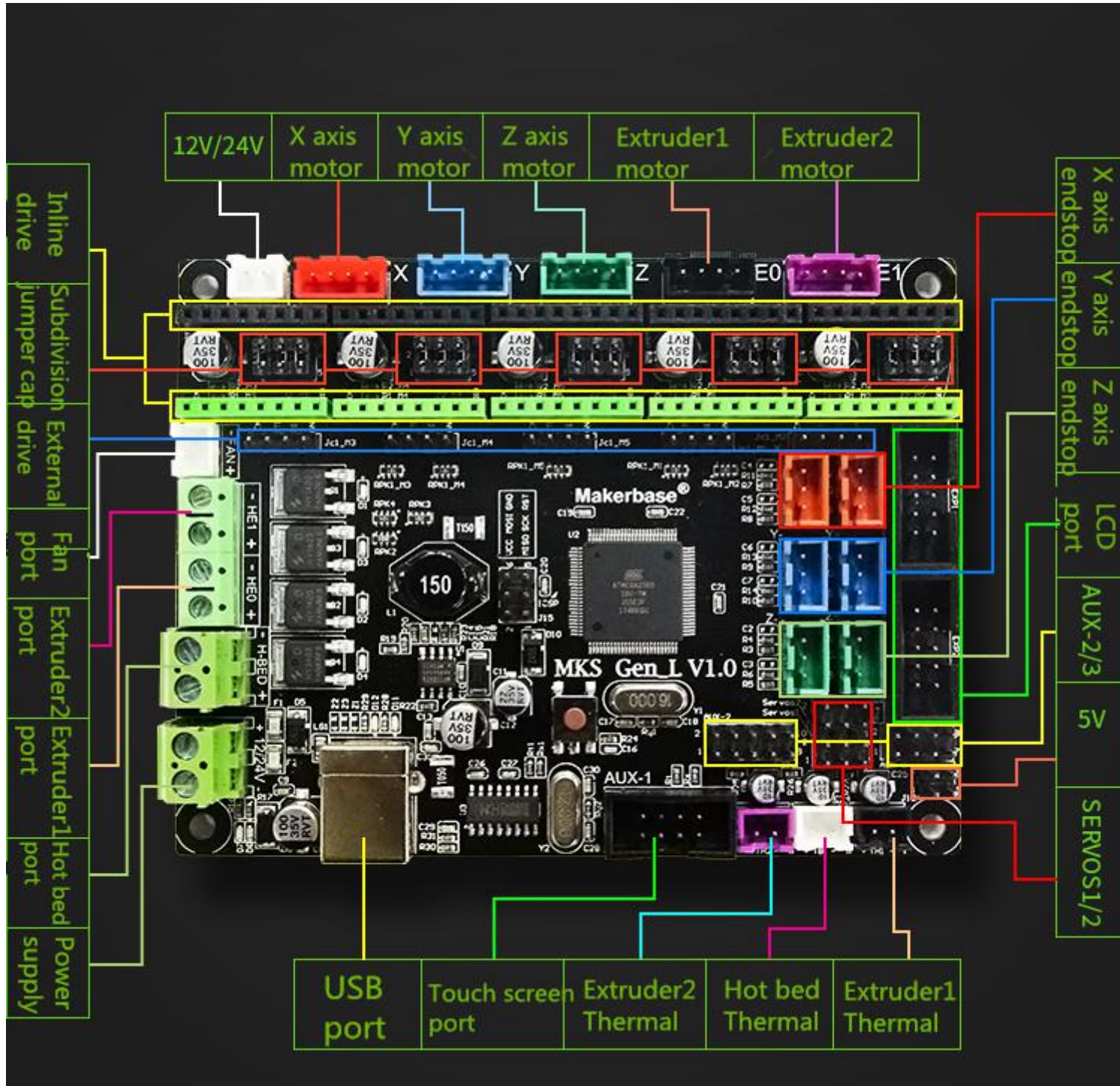
3　MKS Gen_L　Installation Dimensional Drawing

4　MKS GEN_L PIN Port

5. each driver is connected to the MKS Gen-L 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)

4988Drive subdivision				8825Drive subdivision				8729Drive 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.

Ⅳ　Instructions

1　The ways to get the MKS GEN-L 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
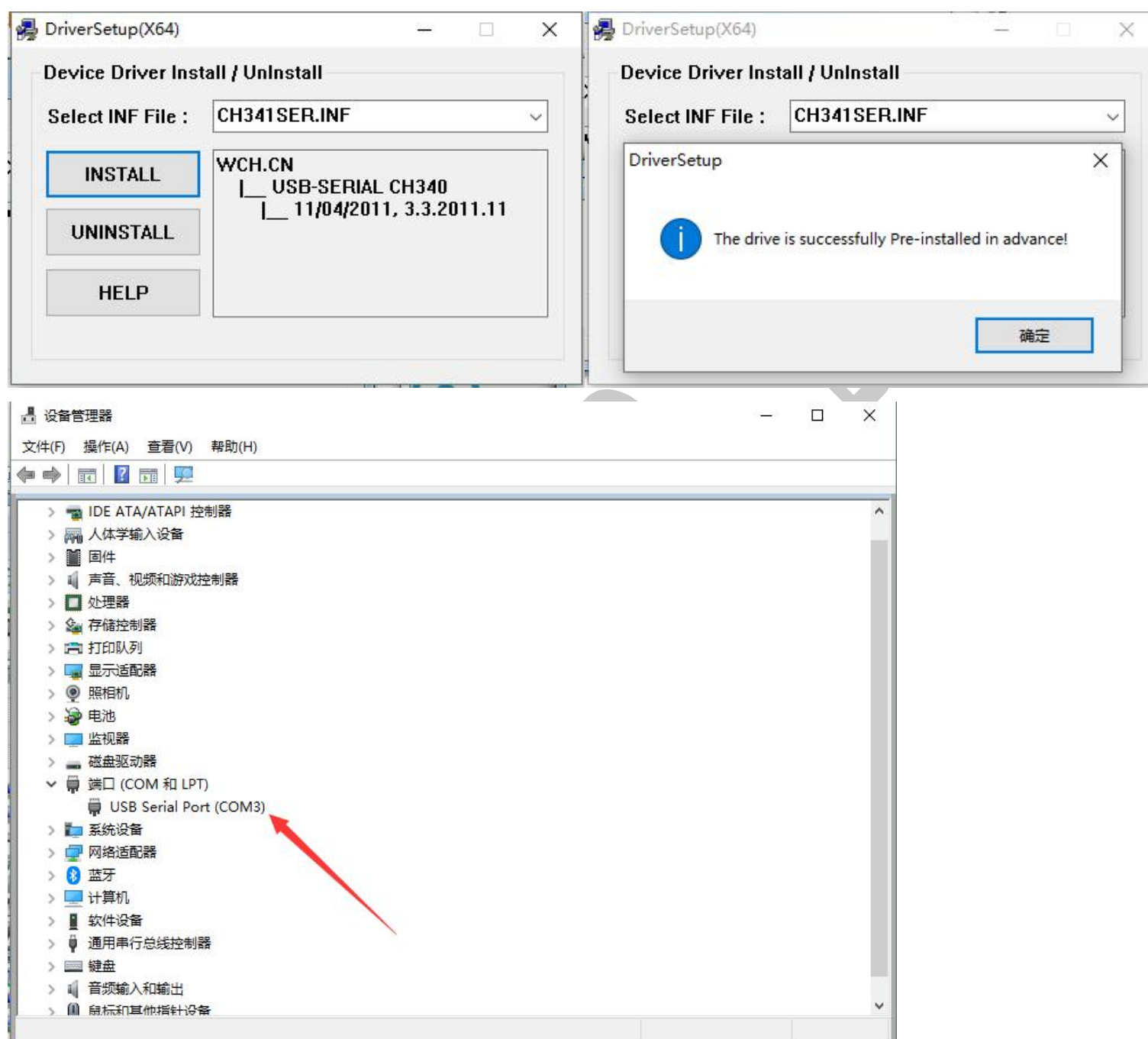
3　Upload the marlin firmware

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
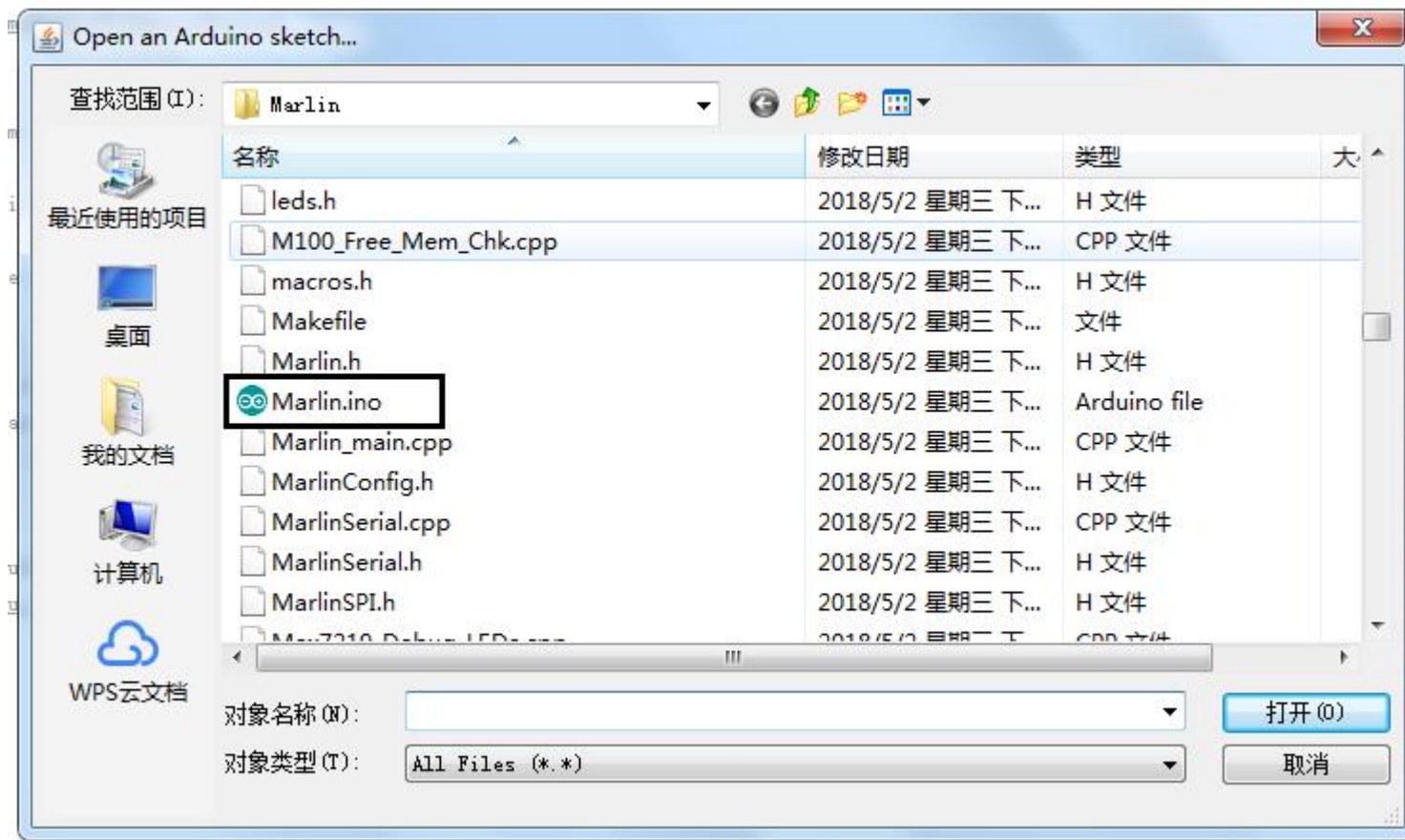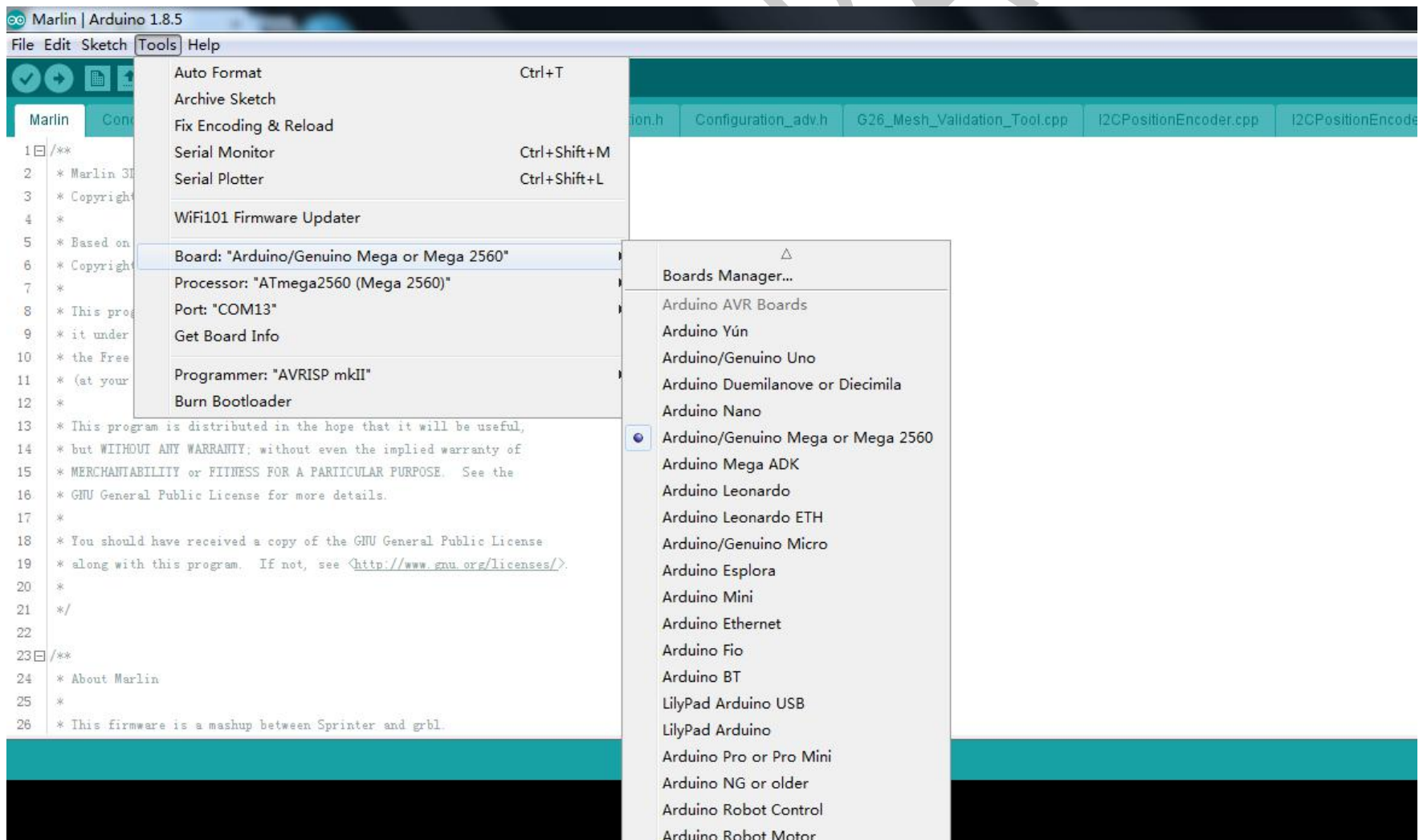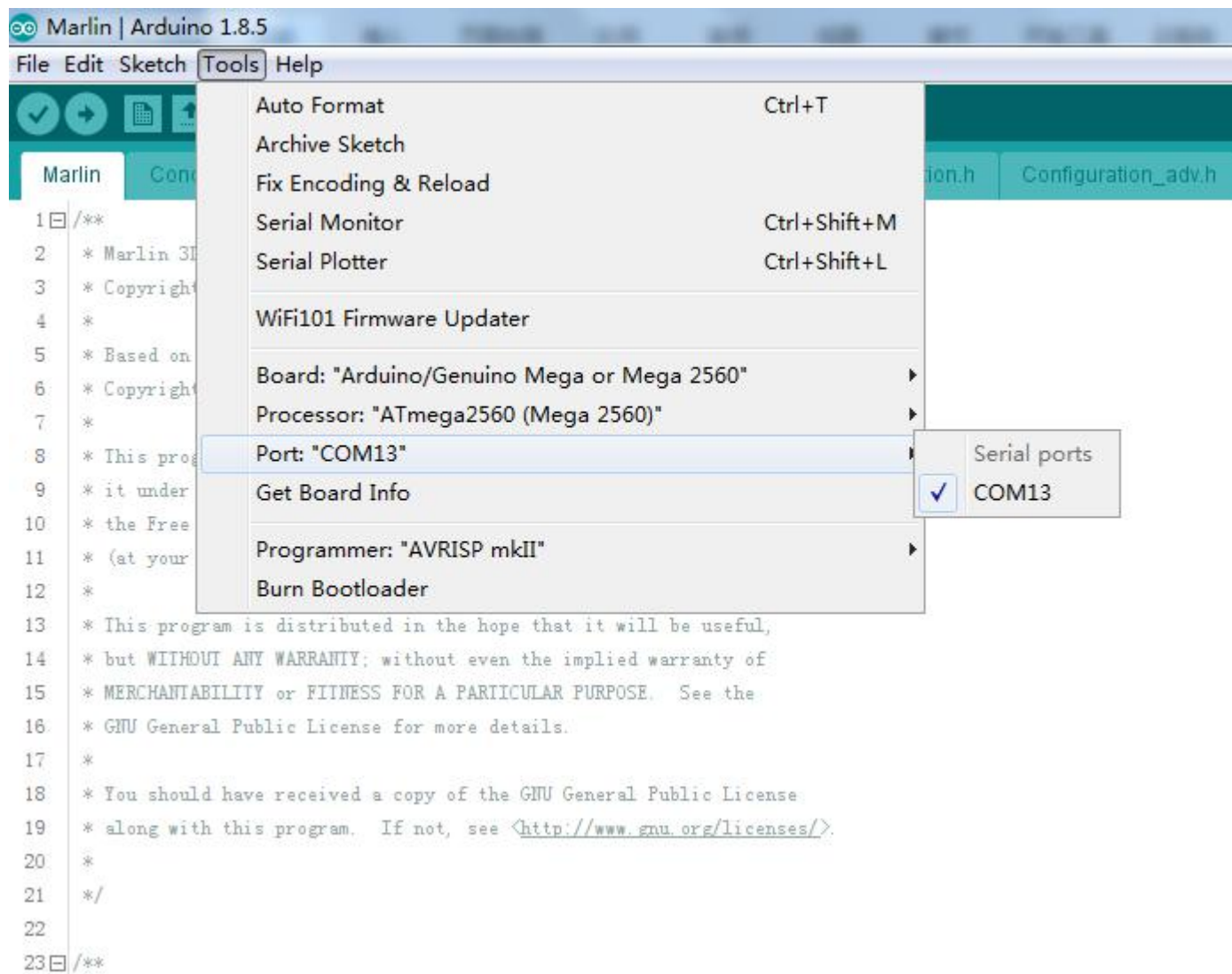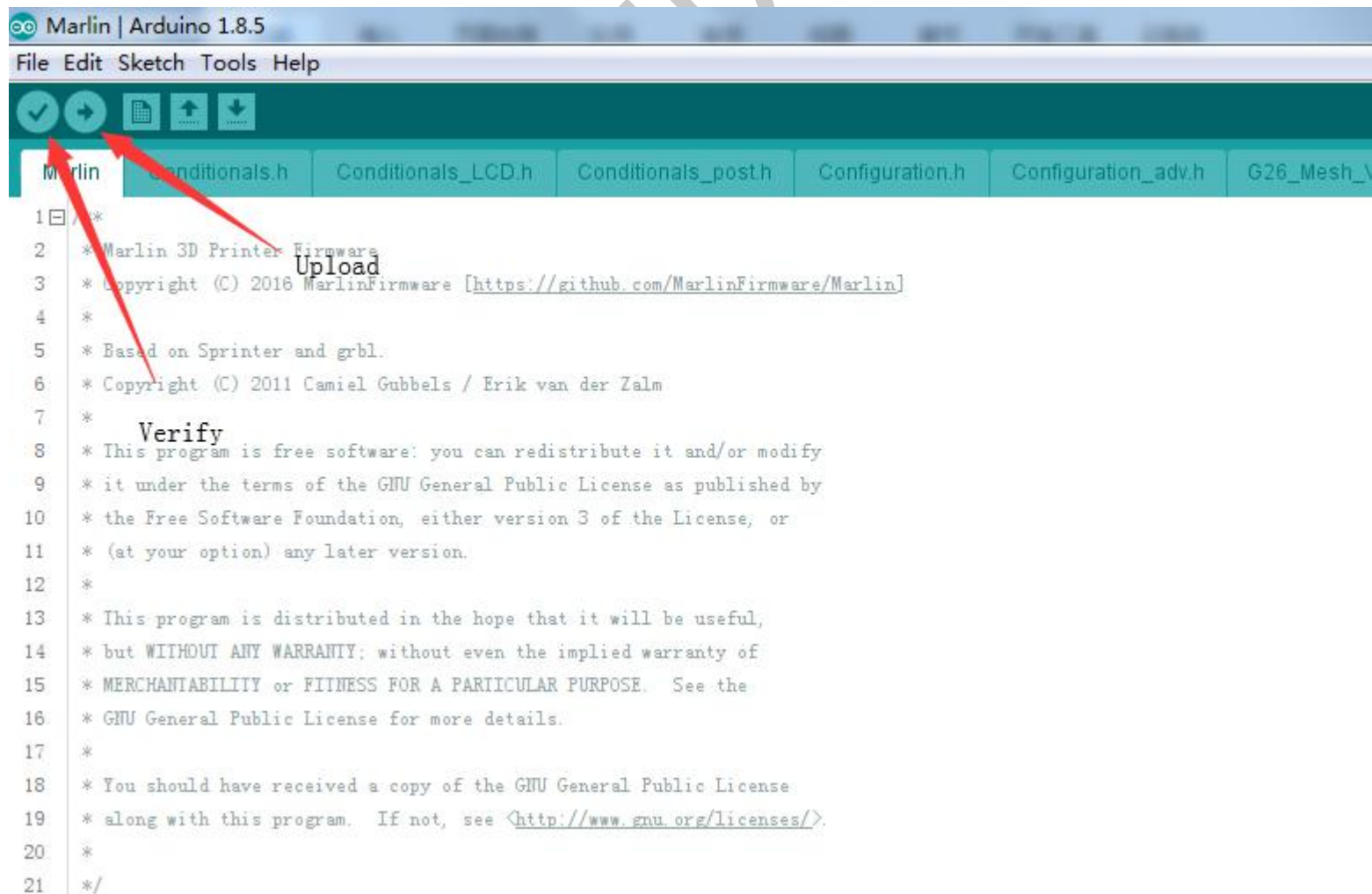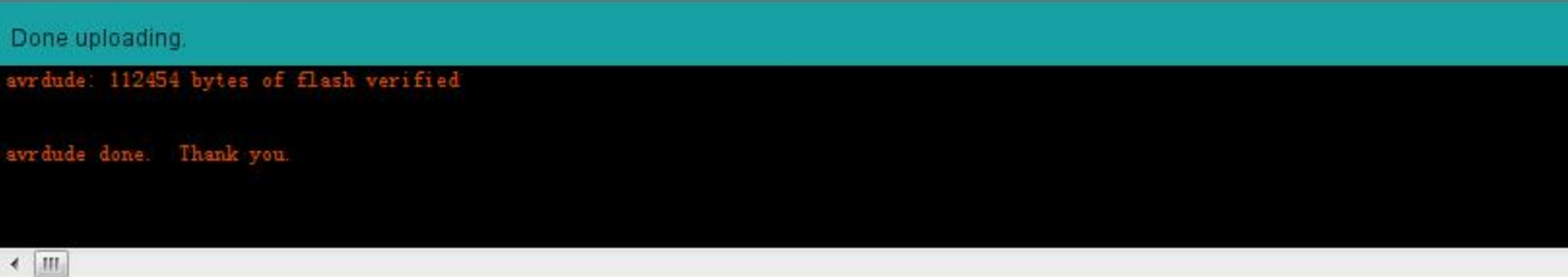
port.

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.

```
 8  * This program is free software: you can redistribute it and/or modify
 9  * it under the terms of the GNU General Public License as published by
10  * the Free Software Foundation, either version 3 of the License, or
11  * (at your option) any later version.
12  *
13  * This program is distributed in the hope that it will be useful,
14  * but WITHOUT ANY WARRANTY; without even the implied warranty of
15  * MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
16  * GNU General Public License for more details.
17  *
18  * You should have received a copy of the GNU General Public License
19  * along with this program.  If not, see <http://www.gnu.org/licenses/>.
20  *
21  */
22
23  /**
24   * About Marlin
```

```
Done uploading.
avrdude: 112454 bytes of flash verified

avrdude done.  Thank you.
```

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.
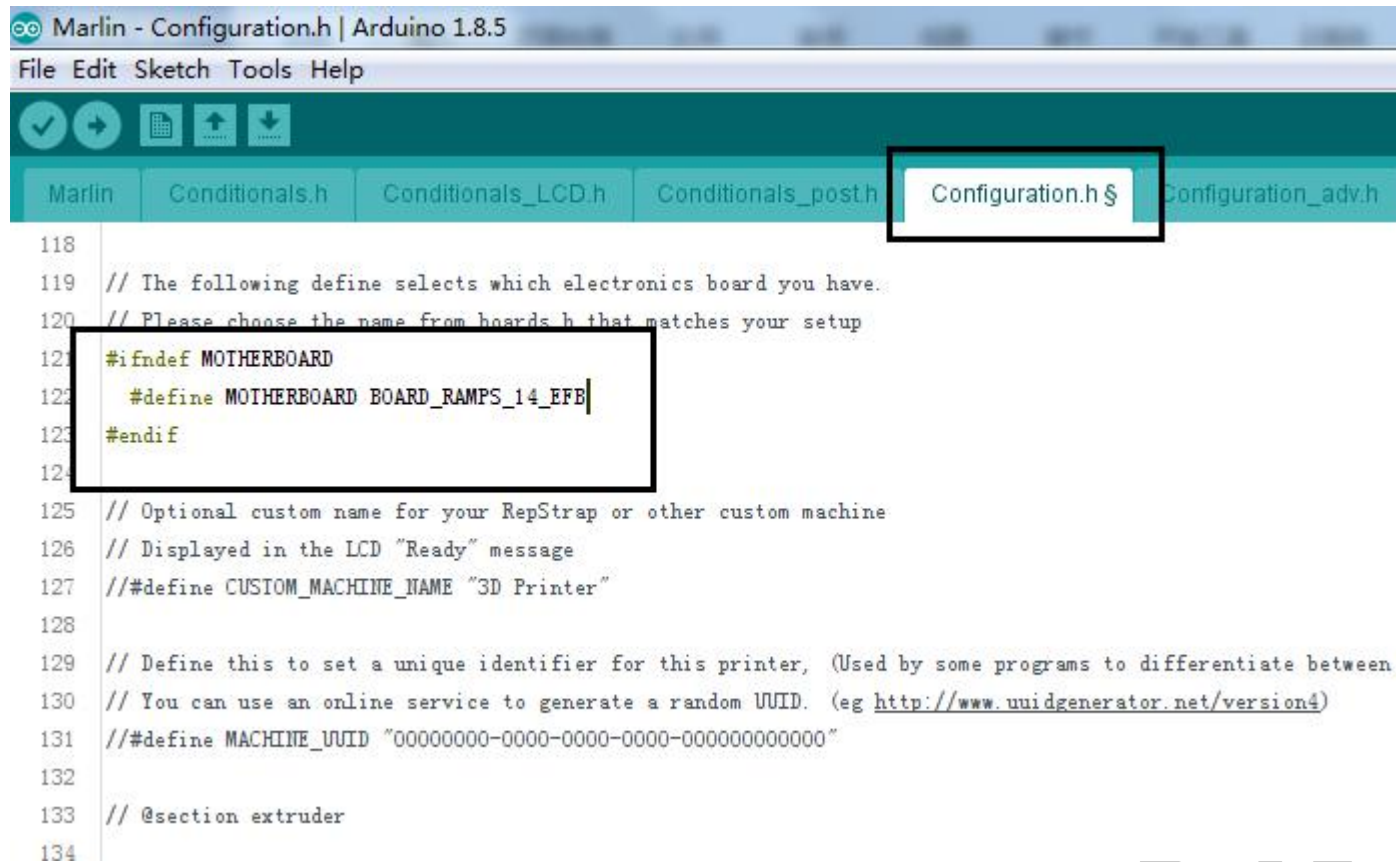
Number	Types	explanation
1	Baud rate	The baud rate must be consistent with the host computer to communicate.
2	Motherboard type	The type for mks is BOARD_RAMPS_14_EFB
3	Sensor type	Sensor type for temperature detection
4	End stop switch type	Set the switch type to normally open or normally closed
5	Motor 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.

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

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.

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:

```
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.
```
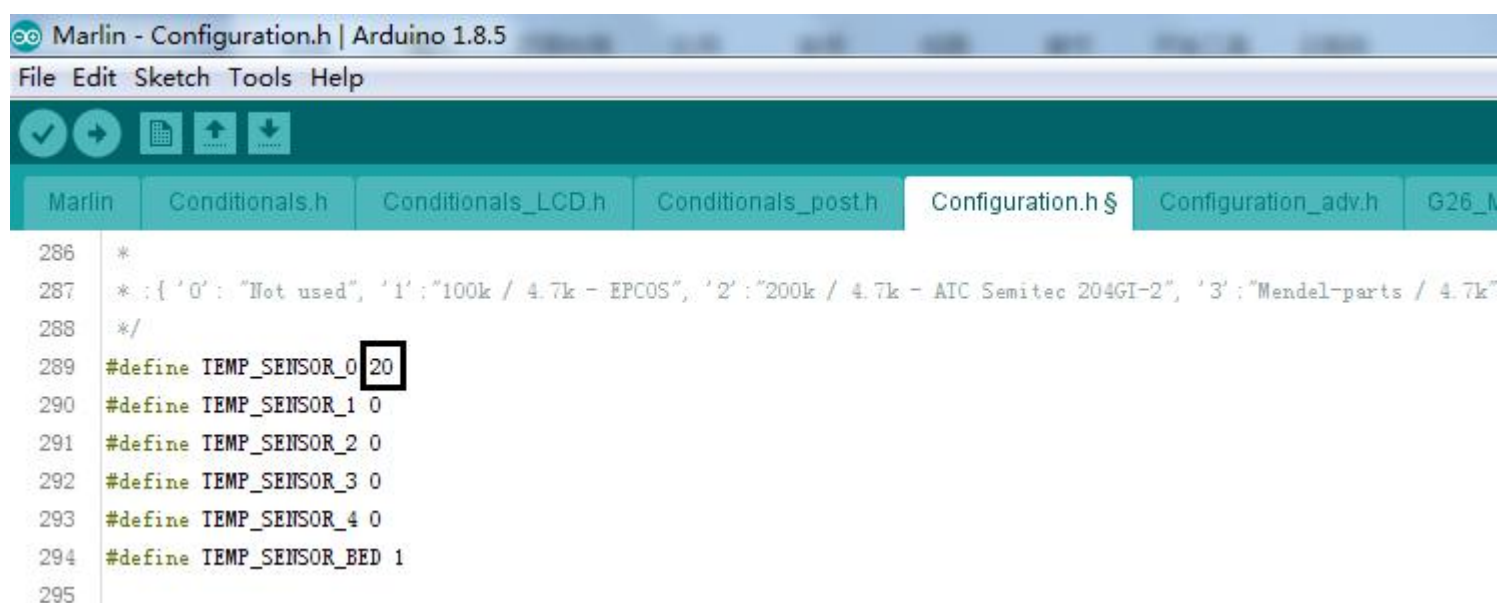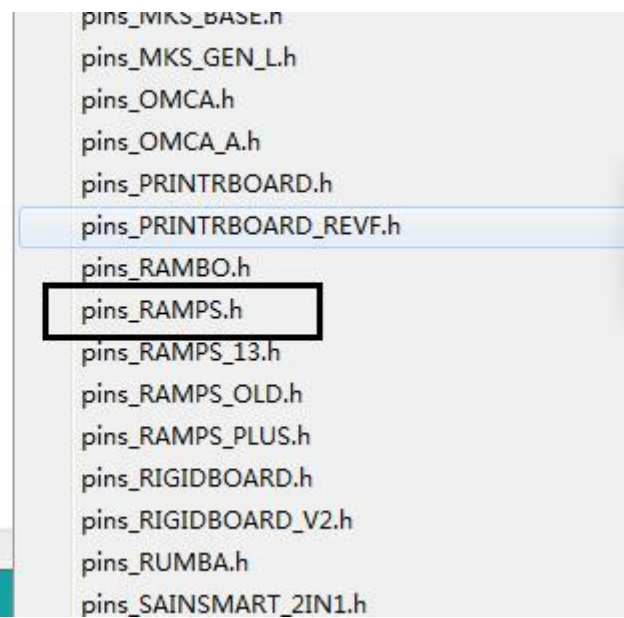
5. Motor movement direction control. Due to the different origin positions of each printer, the uncertainty of the motor's zero return direction. If the motor moves in the opposite direction, the following parameter values can be true or false, or the same group of stepper motors can be replaced. For 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 connec
#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÷step angle）×Subdivision÷（Diameter ×3.14）

The formula of the pulse number/mm of The screw rod Motor:（360÷step angle）×Subdivision÷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   // Note: Usually sold with a blue 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: $i = vref /0.8$, the default Vref is about 0.8v, so the default current is 1.0A, the maximum current is 2.0A!

2   4988 red: drive current algorithm: $i = vref /1.6$, the default Vref is about 0.8v, so the default current is 0.5A, the maximum current is 1.0A!

3   8825: Drive current algorithm: $i = vref \times 2$, the default Vref is about 0.65v, so the default current is 1.3A, the maximum current is 2.5A!

4   8729: Drive current algorithm: $i=Vref/0.5$, the default Vref is about 0.4v, so the default current is 0.8A and the maximum current is 1.5A!
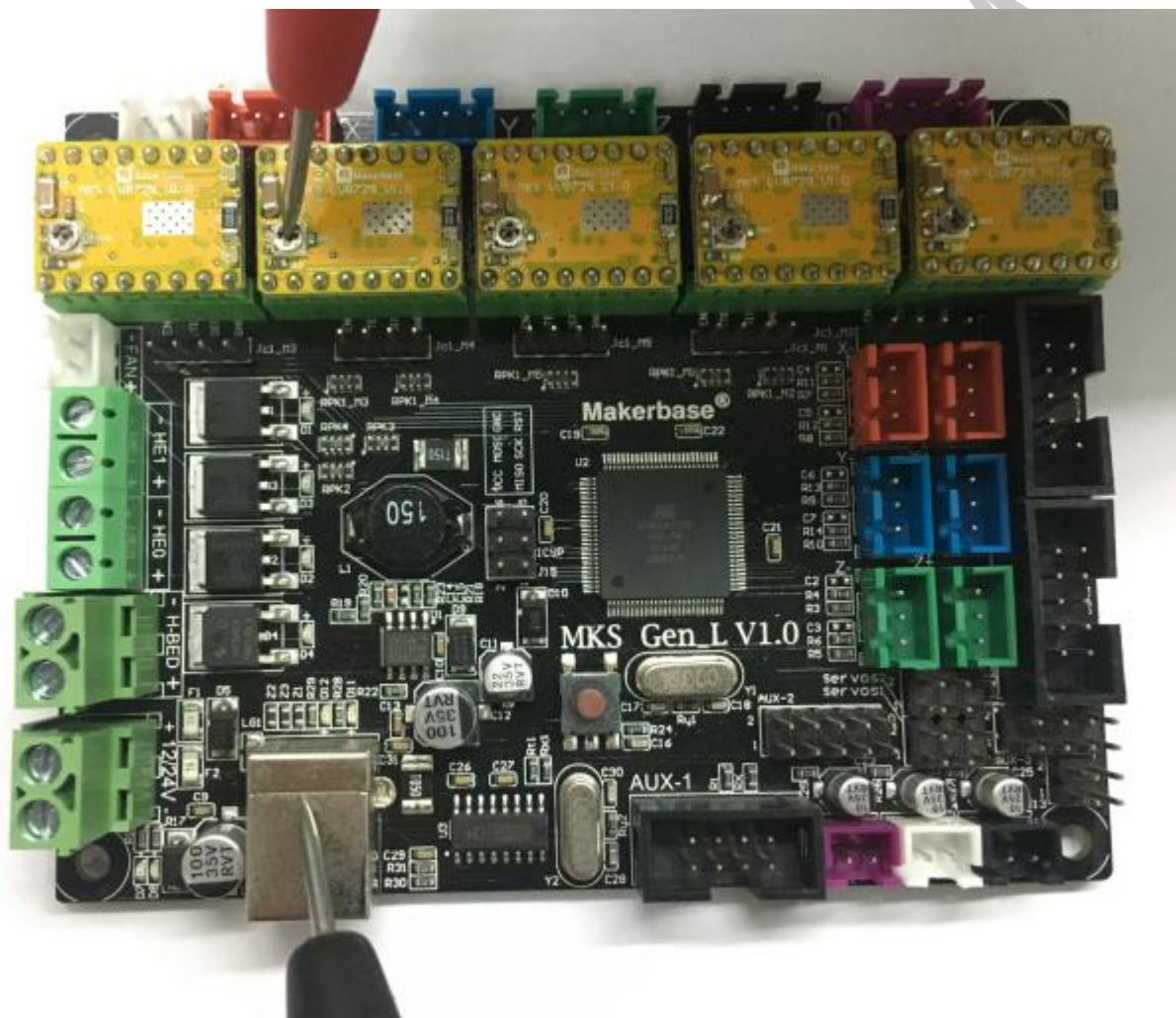
Note: Please do not plug or unplug the motor when the power is on, it is easy to cause the drive to burn out; do not adjust the current during the running of the motor. The correct way is to disconnect the power supply, unplug the motor, re-power it, adjust the potentiometer, and test the voltage of 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   Mr. Huang： 13148932315   Mr. Tan：13640262556.

Mr.Peng：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