

SHENZHEN BIGTREE TECHNOLOGY CO.,LTD .  
BIG TREE TECH

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# **BIGTREETECH**

## **GTR V1.0**

# **Operating Instruction**

**【 Please read this manual carefully before using to avoid damage to the board 】**

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## A. Product introduction

BIGTREETECH GTR V1.0 motherboard is a high-performance 3D printer main control board with the core controller STM32F407IGT6, which was launched by the 3D printing team of ShenZhen BigTree Technology CO.,LTD ., aiming at solving some problems existing in the motherboard market. The BIGTREETECH GTR V1.0 is the motherboard, and the BIGTREETECH M5 V1.0 is the expansion board.

## B. Characteristic

- 1) The motherboard uses a 32-bit 168MHz ARM-grade Cortex-M4 series STM32F407IGT6 chip, which greatly improves its performance;
- 2) Equipped with highly modular open source firmware Marlin 2.0, which is convenient for users to DIY and secondary development, eliminating the worries of being unable to master the core code
- 3) Marlin 2.0 uses powerful development tools and Visual Studio Code integrated development environment: supports online debugging, which is more helpful for product development and performance optimization, and uses C / C ++ language development;
- 4) PCB board wiring is rigorous and beautiful, and specially optimized for heat dissipation;
- 5) Adopt special power supply chip, support 12-24V power input, output current is 3A;
- 6) It can accept 24V input and reduce the hot bed current to 1/4 under the same power, effectively solving the heating problem of hot bed MOS tube;
- 7) Support all BIGTREETECH TFT touch screens, support LCD2004 screen, LCD12864 screen;
- 8) The system supports Chinese Simplified, English and other languages,

which can be switched on your own;

9) Upgrade and configure firmware via SD card, simple and efficient operation;

10) Support serial WIFI printing;

11) 11 motor drivers:

BIGTREETECH GTR V1.0: 6 motor drivers, 3 extruders, 3 CNC fans

BIGTREETECH M5 V1.0: 5 motor drivers, 5 extruders, 5 CNC fans

12) Supports functions such as resume printing while power off, filament detection, automatic shutdown after power off;

13) Adopt high-performance MOSFET tube for better heat dissipation effect;

14) Using pluggable fuses, making the replacement process easier;

15) Reserved the expansion ports of BL Touch, PWM, ADC, UART, I2C, CAN;

16) Use the power supply selection design to separate the USB power supply from the switching power supply, avoiding the situation where the computer's USB port is burned due to short circuit;

17) The special function interface uses conspicuous pin headers, which greatly reduces the error rate of wiring.

18) Support offline printing and online printing;

19) Support dual Z-axis printers (tandem dual Z)

20) BIGTREETECH GTR V1.0: 1 K-type thermocouple

BIGTREETECH M5 V1.0: 1 K-type thermocouple

21) Support on-board SD card printing function

22) On-board EEPROM

23) Support Raspberry Pi and GTR motherboard online to realize WEB (webpage) side control printing

24) Signal isolation processing for PWM, STEP, DIR and master

25) Add TVS to the power input for protection

## C. Motherboard parameters

1) Appearance size: 165\*103mm

2) Installation size: 157\*95mm

- 3) Microprocessor: ARM 32-bit Cortex™-M4 CPU
- 4) Input voltage: DC12V--DC24V
- 5) Motor driver: Support TMC5160、TMC2208、TMC2209、TMC2130、ST820、LV8729、DRV8825、A4988 etc.
- 6) Driver working mode support: TMC2130SPI、TMC5160SPI、TMC2208 UART
- 7) Motor driver interface:
  - BIGTREETECH GTR V1.0: X、Y、Z、E0、E1、E2, 6 way;
  - BIGTREETECH M5 V1.0: M1、M2、M3、M4、M5, 5 way;
- 8) Temperature sensor interface:
  - Motherboard: BED、T0、T1、T2, 4 way. 100K NTC (Thermal resistance) K type thermocouple 1 way;
  - Expansion board: T1、T2、T3、T4、T5 5 way 100K NTC Thermal resistance) K type thermocouple 1 way;
- 9) Display: Support all BIGTREETECH TFT touch screens, LCD2004、LCD12864.
- 10) PC communication interface: Square USB, easy to plug, communication baud rate of 115200
- 11) Expand the interface function support: Resume Printing While Power Off, Filament Break Detection, Automatic Shutdown After Printing, Automatic leveling, BL Touch、WIFI、PWM 、ADC、UART、I2C and CAN etc.
- 12) Support file format: G code
- 13) Supported machine architecture: XYZ 、 delta 、 kossel 、 Ultimaker 、 corexy
- 14) Recommended software: Cura 、 Simplify3D 、 pronterface 、 Repetier host 、 Makerware
- 15) Multi-power interface power supply, sharing the pressure of a single power line.

## D. Power Options

- 1、Power jumper cap selection

## ①USB power-up↓ (Figure 1)

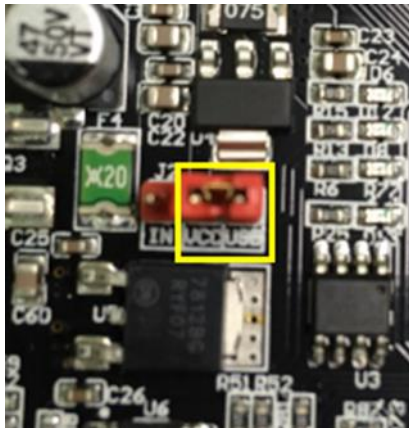
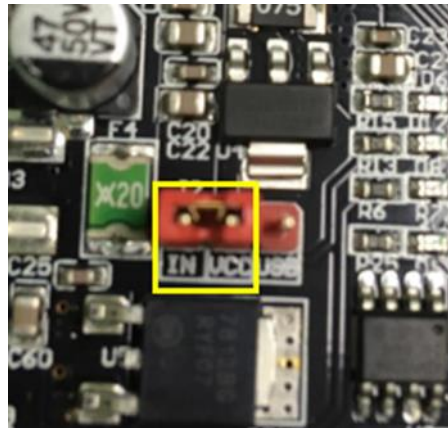


Figure 1

## ②12/24V power-up↓ (Figure 2)



(Figure 2)

## 1)、As shown in the red box:

When the jumper cap is connected to USB and VCC, the motherboard will use USB power supply;

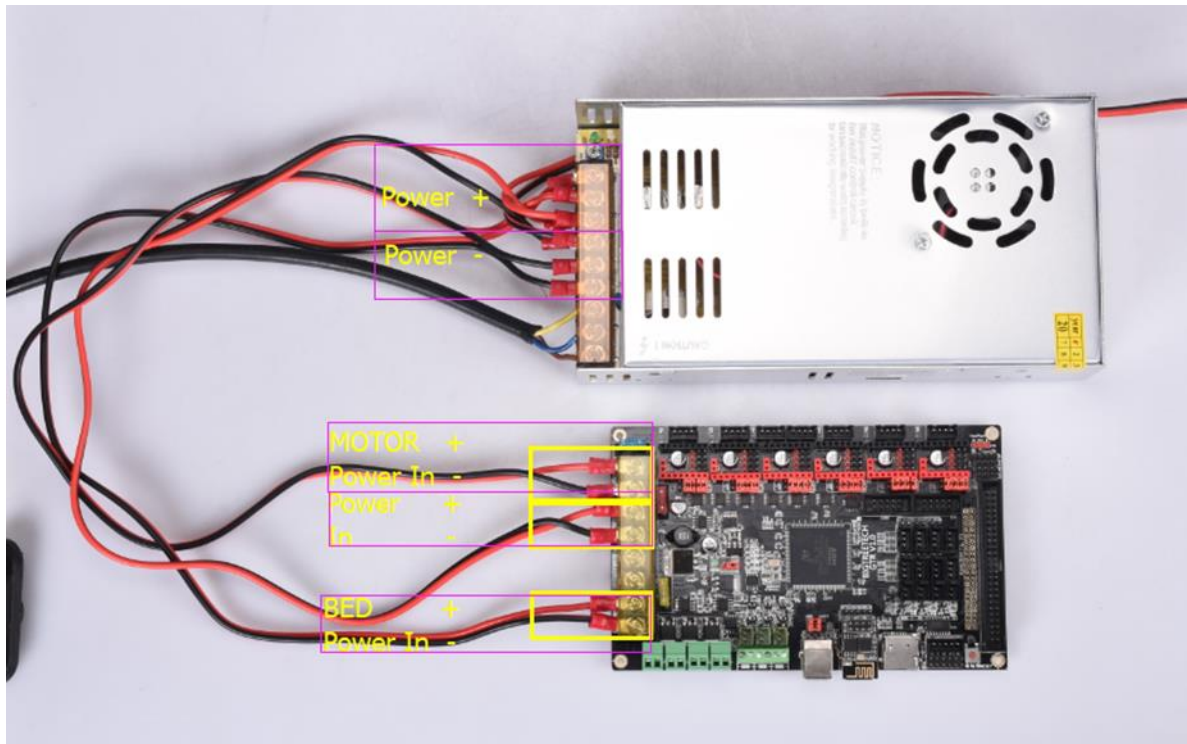
When the jumper cap is connected to IN and VCC, 12/24v power supply is selected for the motherboard.

2)、When using USB power supply, the D4 on the right side of USB will be lit, indicating normal power supply; If USB power is selected for the jumper cap, the indicator lights of 5V and 3.3v will also be lit.

3)、When selecting 12V/24V power supply, the 12V indicator light will be lit. If the jumper cap selects 12V/24V power supply, the 3.3v, 5V and 12V indicator lights will be lit.

## E. Power wiring method

### 1、Switching power supply three groups power supply method (Figure 3):



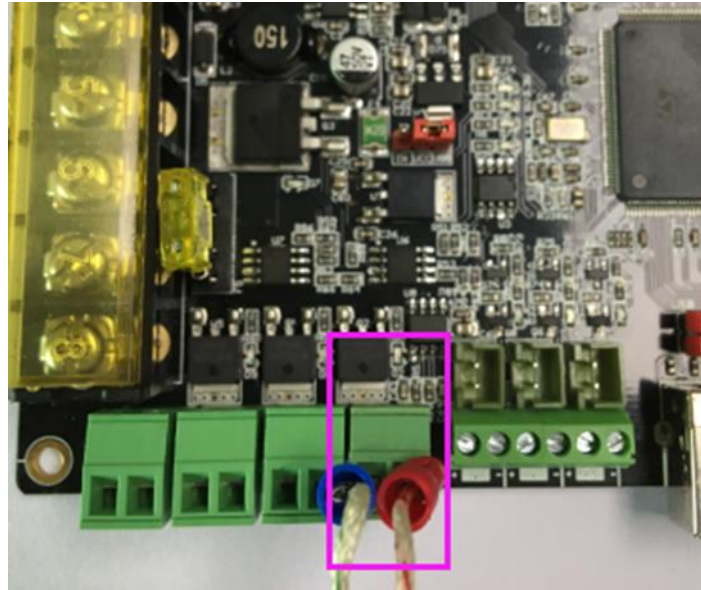
(Figure 3)

As shown in Figure 3, three sets of power cables need to be connected to supply power to the motherboard, which are the motor power supply, the hot bed power supply, and the motherboard power supply. The extra one is the hot bed interface.

**Note:** When wiring, be sure to disconnect the 220V / 110V power supply, and distinguish the positive and negative poles to avoid burning the motion control card.

## F. Type K thermocouple wiring method

1、K type thermocouple wiring diagram is as follows (Figure 4):



(Figure 4)

**Note:**

A). The positive and negative terminal wiring shall be strictly followed, and the k-type thermocouple metal shielding wire shall not touch the board to avoid short circuit!

B) in case of k-type thermocouple alarm, two questions should be checked first:

- \* whether the K thermocouple is connected well, and guarantee not to loose
- \* K thermocouple positive and negative is correct.
- \* If a K-type thermocouple is used, an alarm occurs, that is, the positive and negative poles are reversed.

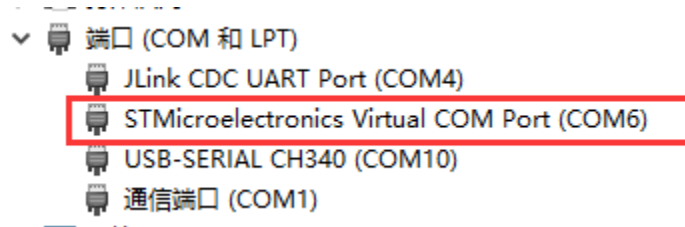


## G. Communication between motherboard and computer

After the motherboard is connected to the computer through a USB cable, the computer will automatically install the driver. After the driver is installed, the motherboard can be identified for data transmission. If the installation fails, you can find the corresponding motherboard to download the driver from our open source website :

<https://github.com/bigtreetech?tab=repositories>

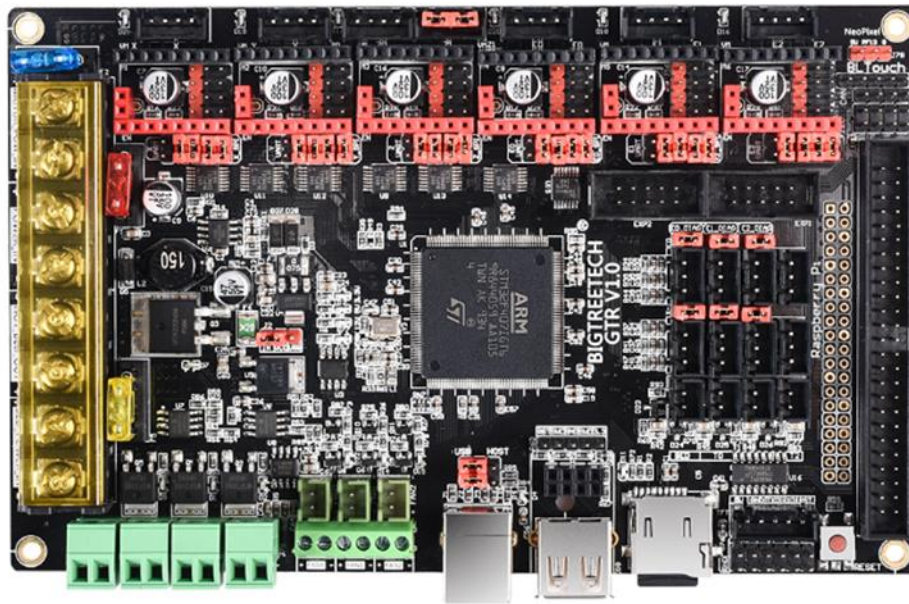
After the installation of the driver is completed, open the device manager to see the port shown in figure 5, indicating that the motherboard is connected to the computer normally.



( Figure 5 )

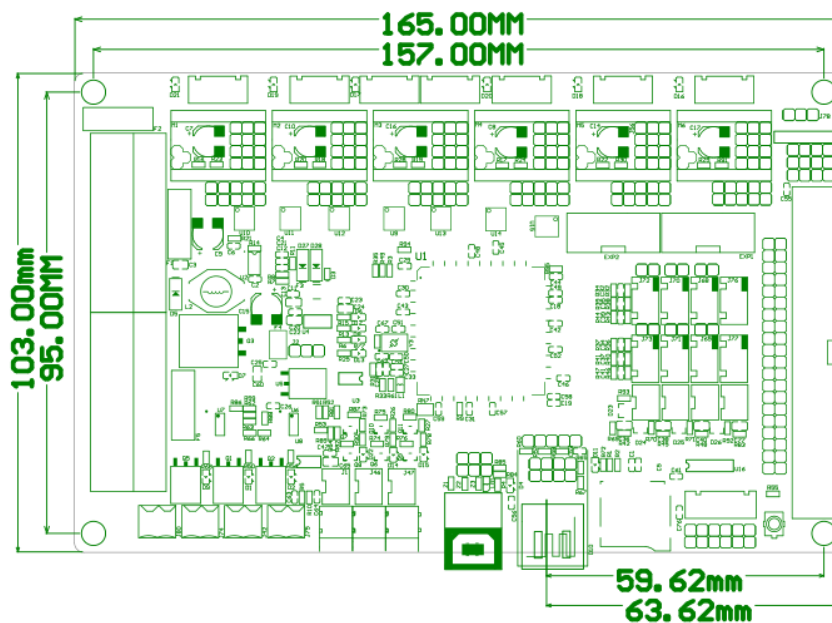
## H. Motherboard interface description

### 1、 Display of product (figure 6)



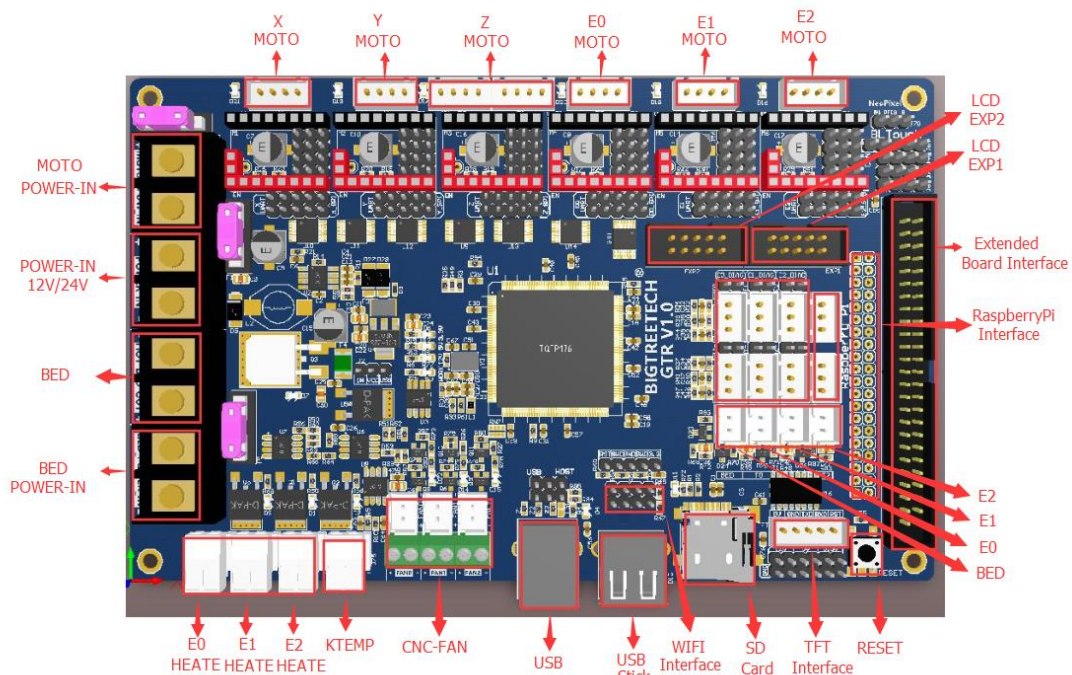
(Figure 6)

2、Motherboard size diagram (figure 7) :



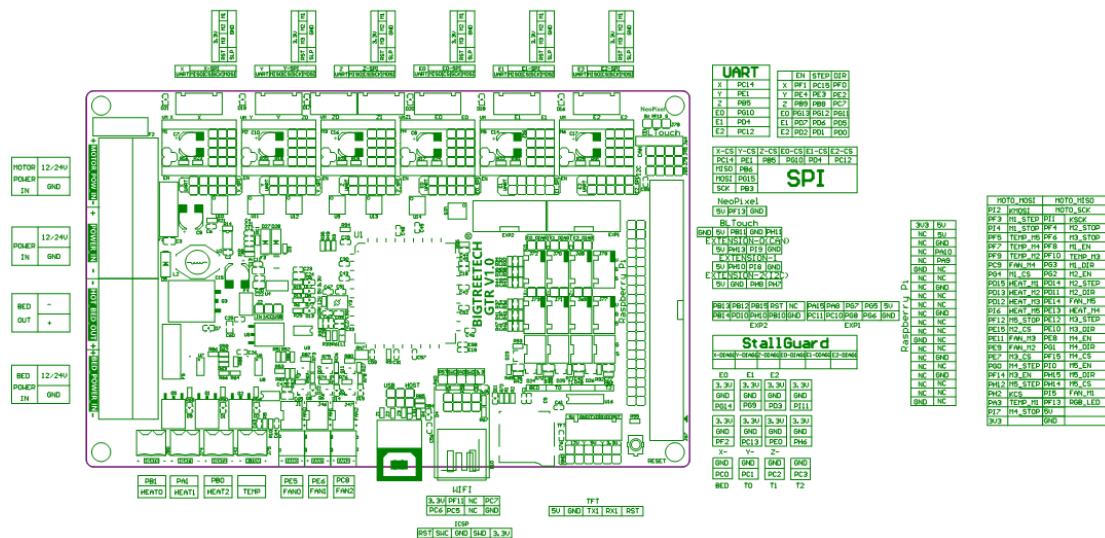
(Figure 7)

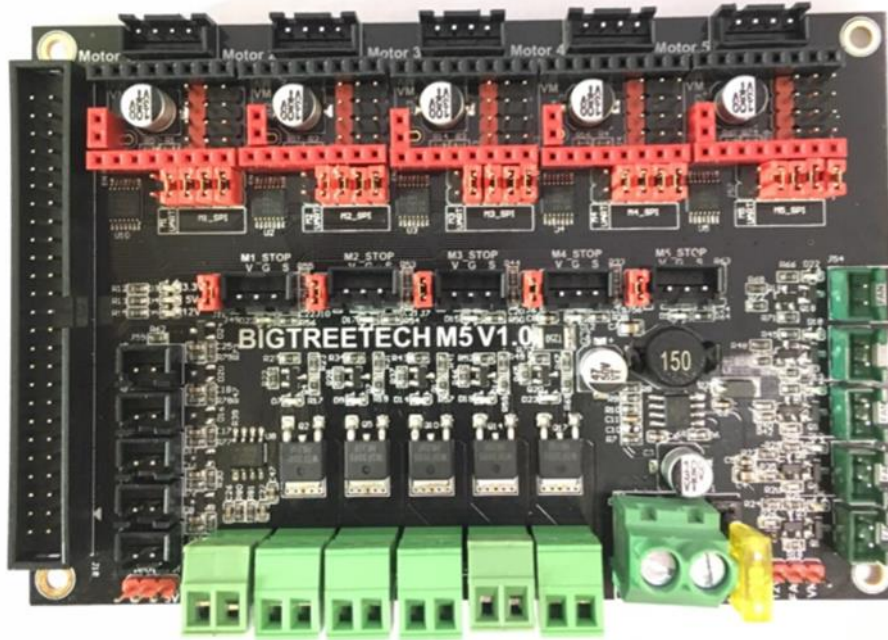
3、Wiring diagram of motherboard (figure 8)



(figure 8)

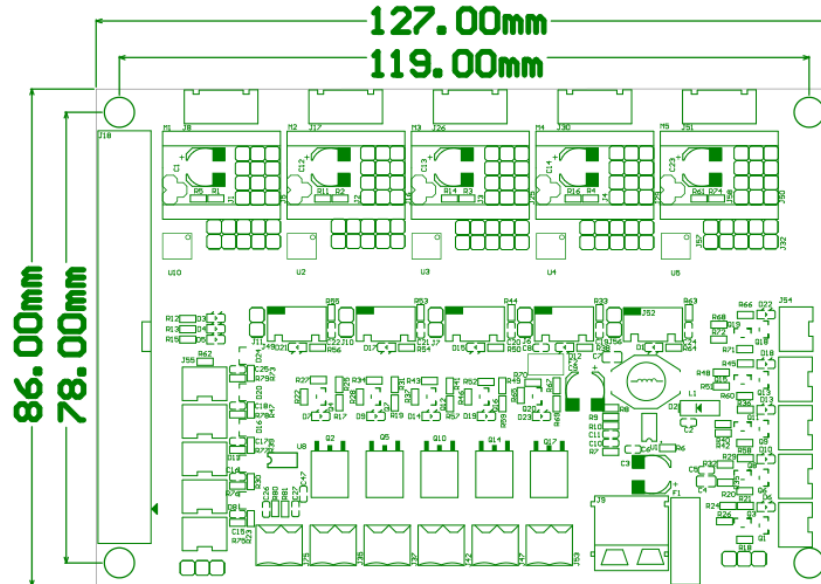
#### 4、Motherboard Pin diagram (figure 9)





(图 10)

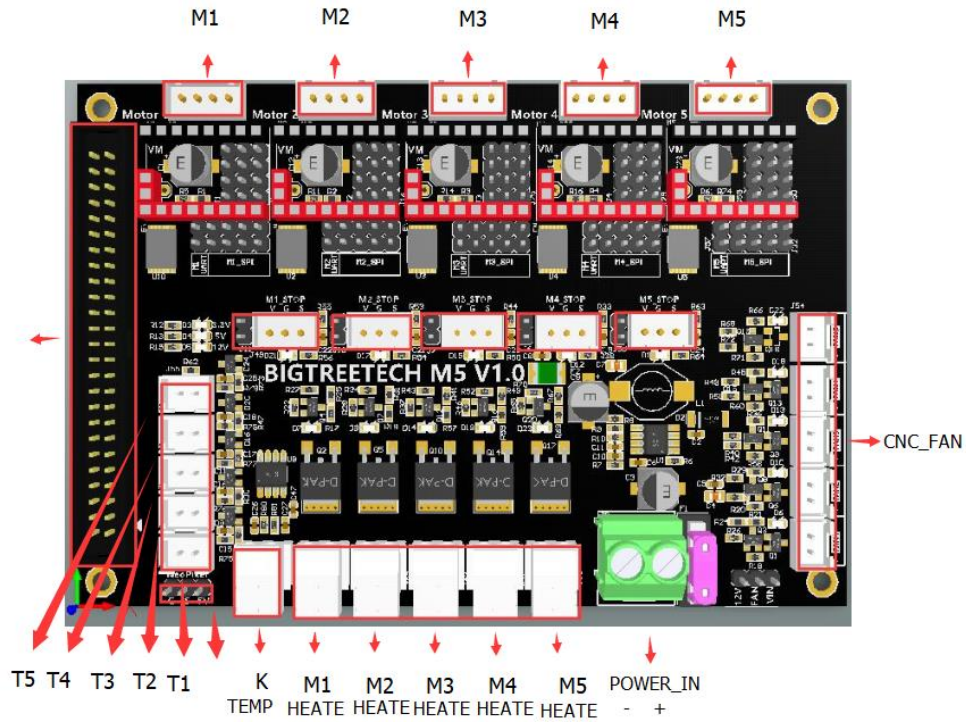
1、M5 size diagram (figure 11) :



(figure 11)

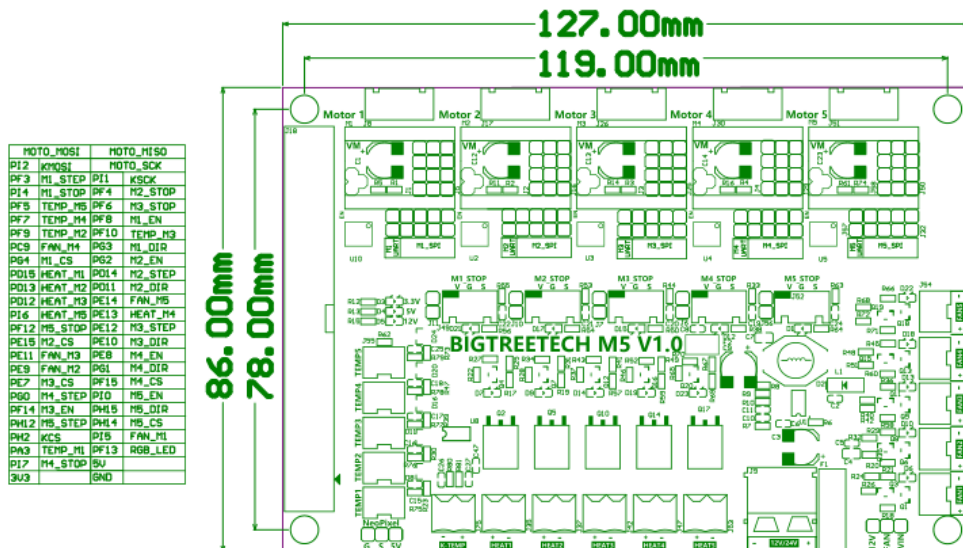
2、Wiring diagram of M5 (figure 12)





( figure 12 )

### 3、M5 Pin diagram (figure 13)



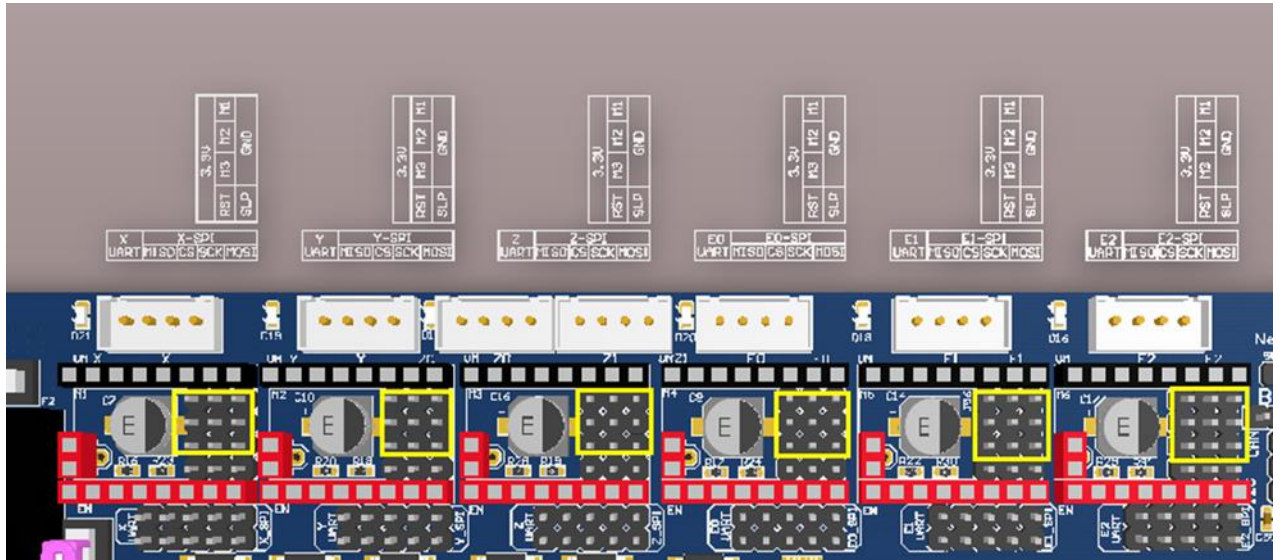
( figure 13 )

More details, please refer to the pin information file of M5.

## J. Mode and interface description

### 1、STEP/DIR mode

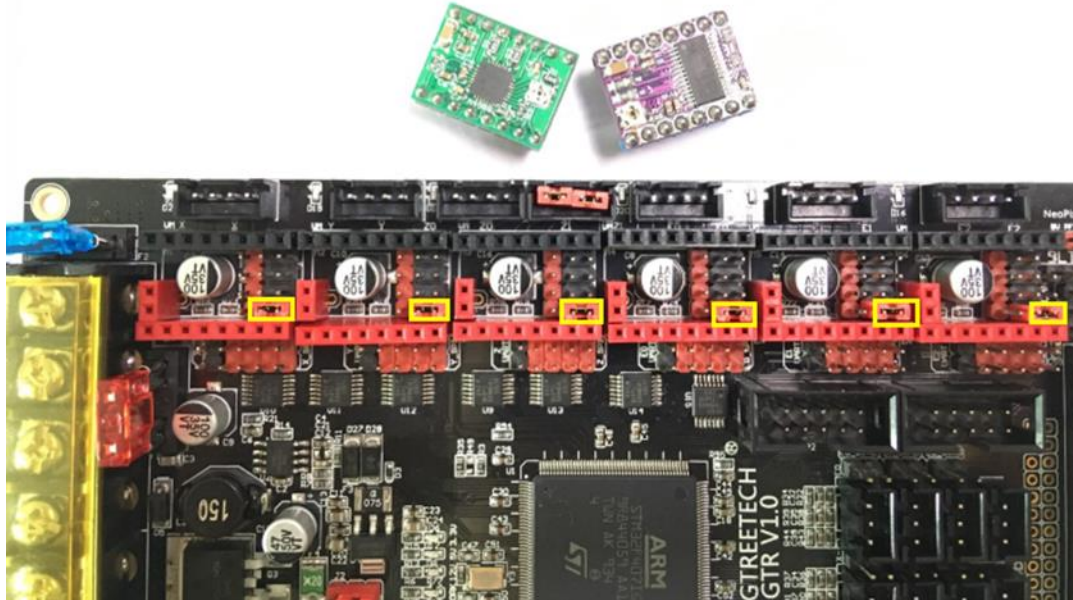
According to the driver you use, corresponding to the subdivision table, use a jumper cap to select the subdivision. As shown in Figure 14:



(Figure 14)

### 2、A4988 and 8825 driver instruction manual

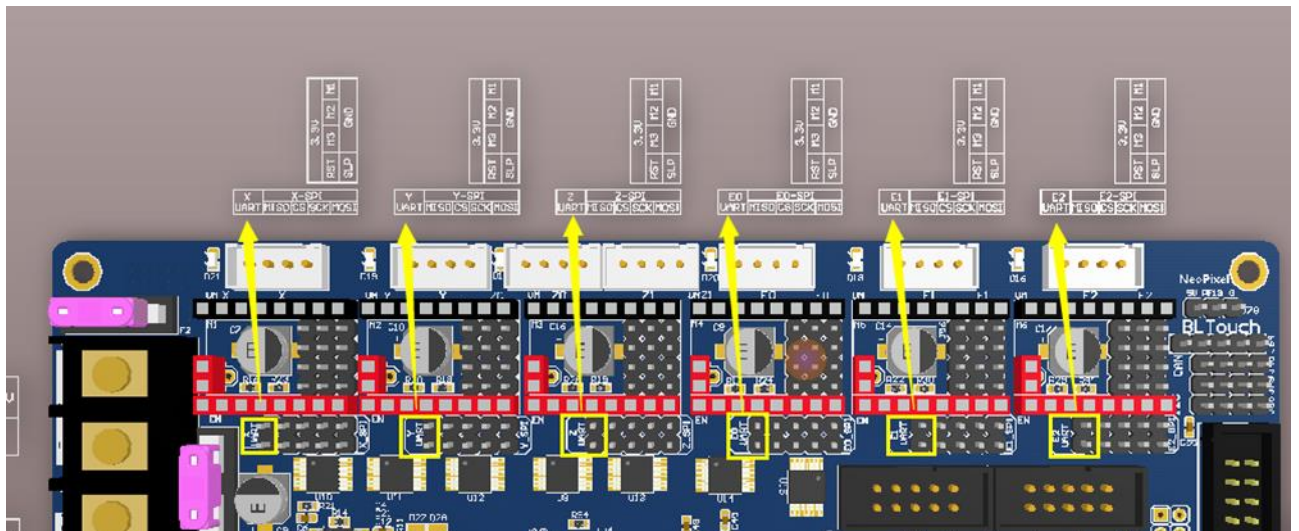
If the driver uses A4988 or DRV8825, you need to connect the two pins in the yellow box with a jumper cap (as shown in Figure 15). If it is not A4988 or DRV8825, you need to pull out the jumper cap inside the box.



(Figure 15)

### 3、UART mode:

When using UART mode, you need to connect the pins in the yellow box with a jumper cap. As shown in Figure 16:

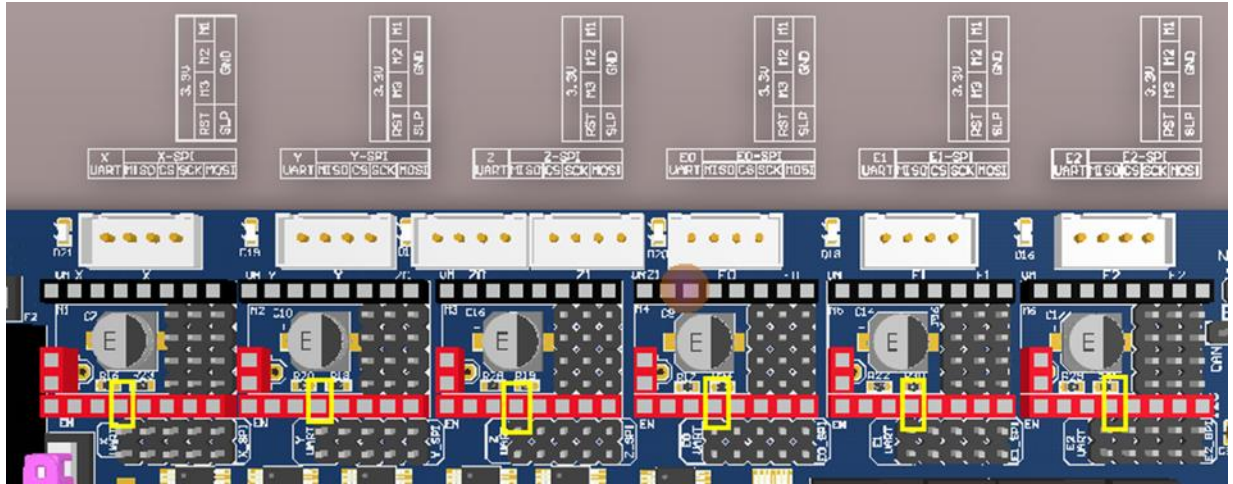


(Figure 16)

The pin corresponding to the TMC2208 UART mode is the pin selected by the yellow box, that is, the red slot. The fourth pin is counted



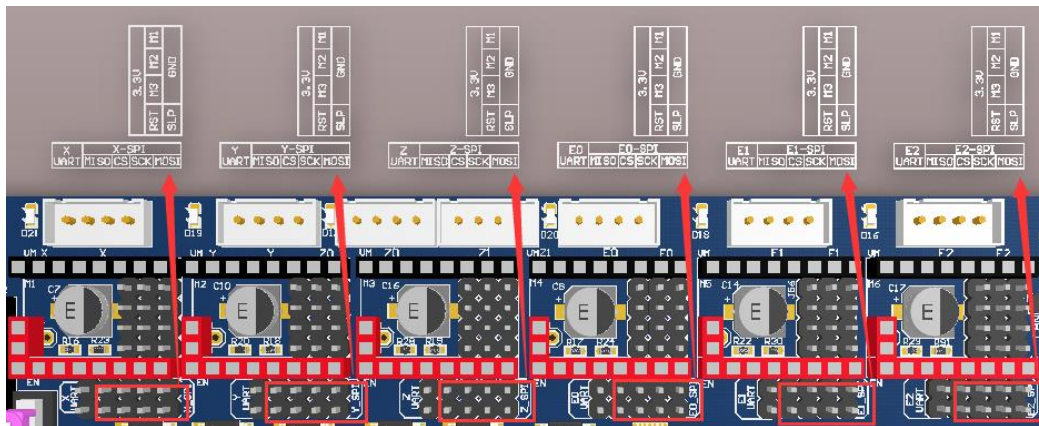
from left to right, as shown in Figure 17:



(figure 17)

#### 4、SPI mode:

When using SPI mode, you need to connect the pin in the red box with a jumper cap, as shown in Figure 18:

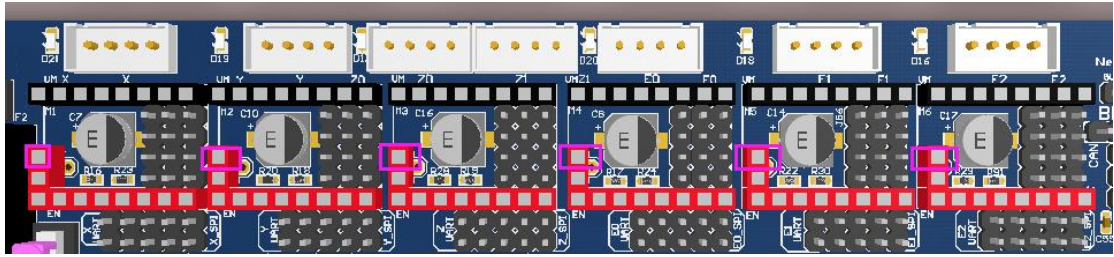


(figure 18)

#### 5、Filament plug detection pin description

As shown in Figure 18, the purple box is the corresponding Pin for blocking filament detection;



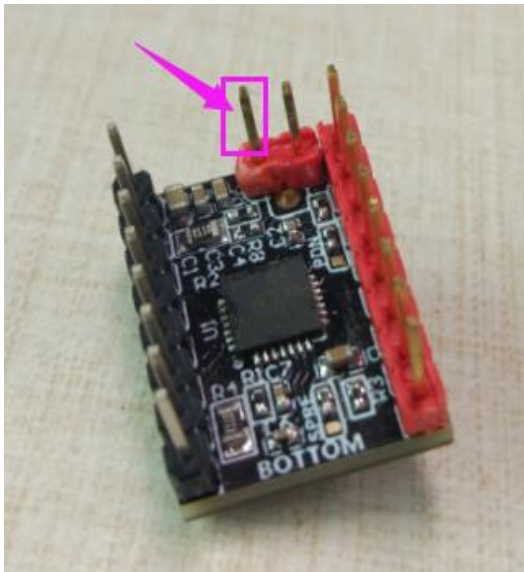


(figure 19)

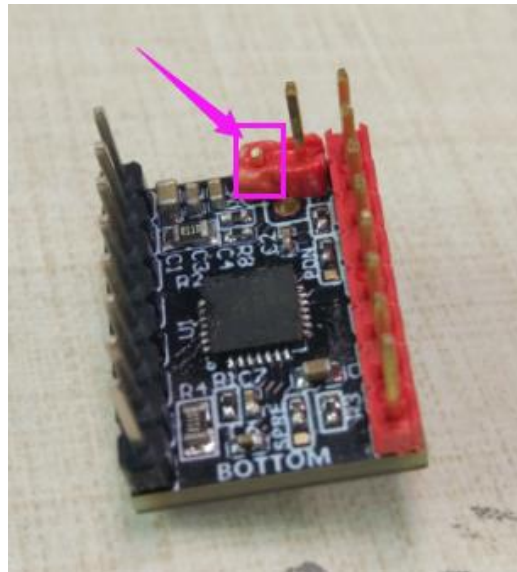
Take the TMC2209 as an example. When the stallguard function is not used, the stallguard pin of the TMC2209 needs to be cut off so that the mechanical switch can work normally.

The operation method is as shown below:

①Before cutting↓



②After cutting↓



This function pin needs to be trimmed only when the stallguard function is not used.

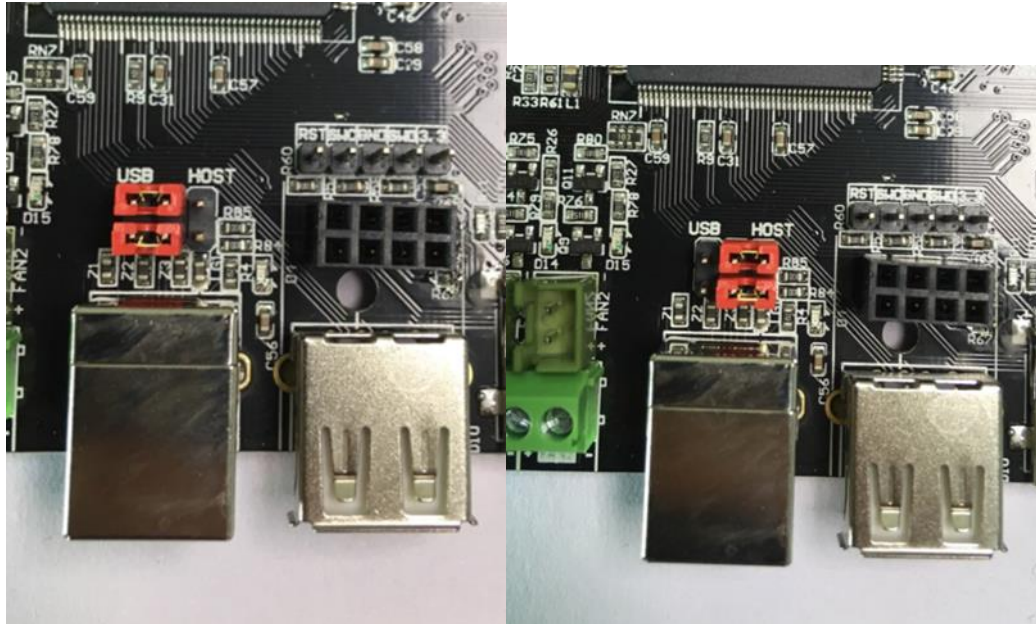
## 6、USB and U disk selection

The jumper cap jumps to the left to turn on the USB function and close the U disk function; the jumper cap jumps to the right to turn on the U disk

function and close the USB function, as shown in Figure 20:

Note: the usb flash drive is not supported in the firmware

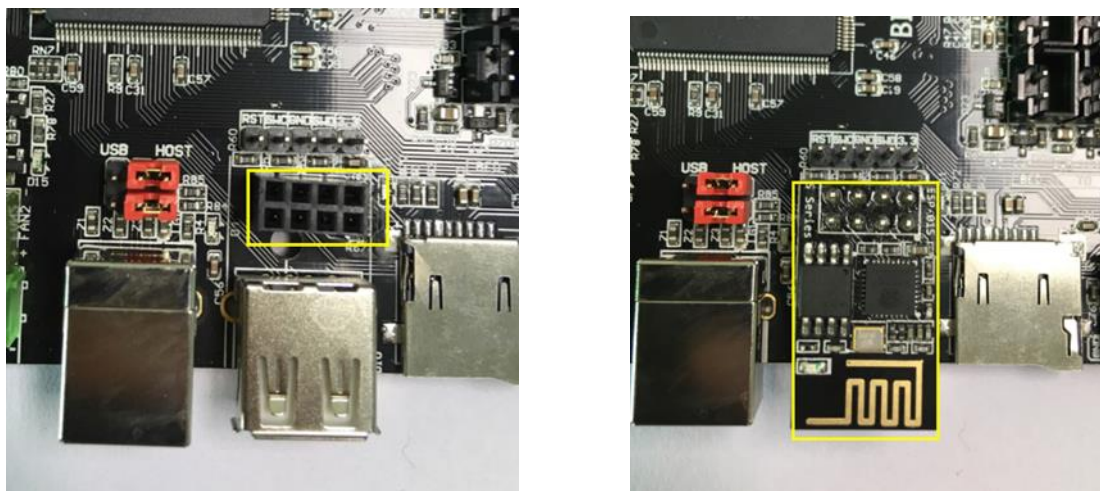
- ① USB online printing function ↓      ② U disk function ↓



(Figure 20)

## 7、WIFI interface

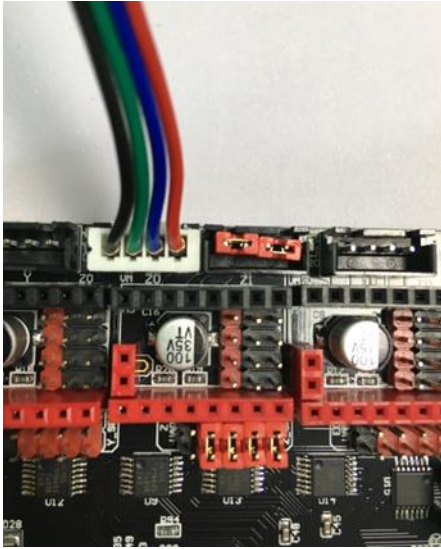
The WIFI interface is shown in Figure 21. When the WIFI is inserted, the side of the board shown by the yellow box on the right is facing outward and inserted vertically.



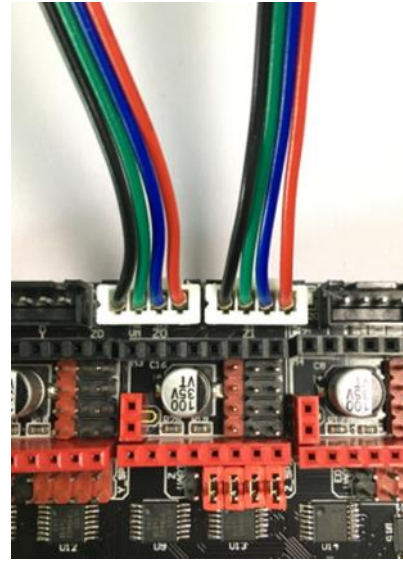
(Figure 21)

8、 Double Z-axis connection method, as shown in Figure 22:

①Single Z axis connection ↓



② Double Z-axis connection

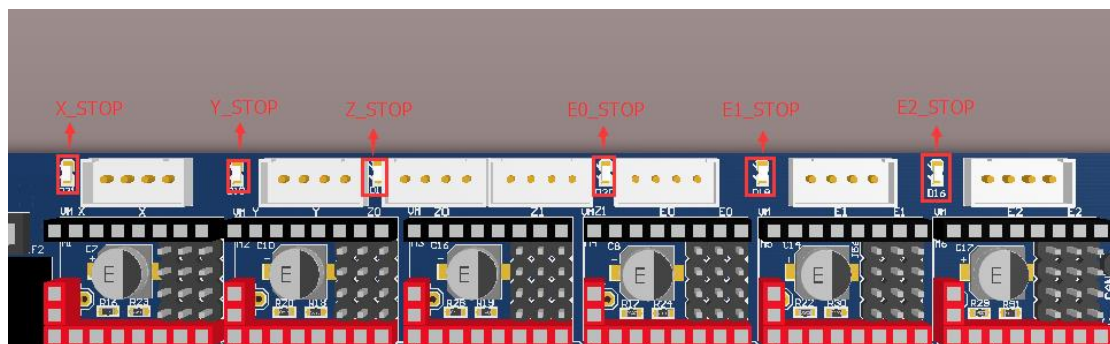


( figure 22 )

9、 Limit switch indicator description

As shown in Figure 23, the status indicator is a normally closed limit switch indicator:

- a) When the limit switch is not connected, the indicator light is always on;
- b) When the normally closed limit switch is connected, the indicator light is off, and when the limit switch is triggered, the indicator light is on;
- c) When the normally open limit switch is connected, the indicator light is always on, and when the limit switch is triggered, the indicator light is off.

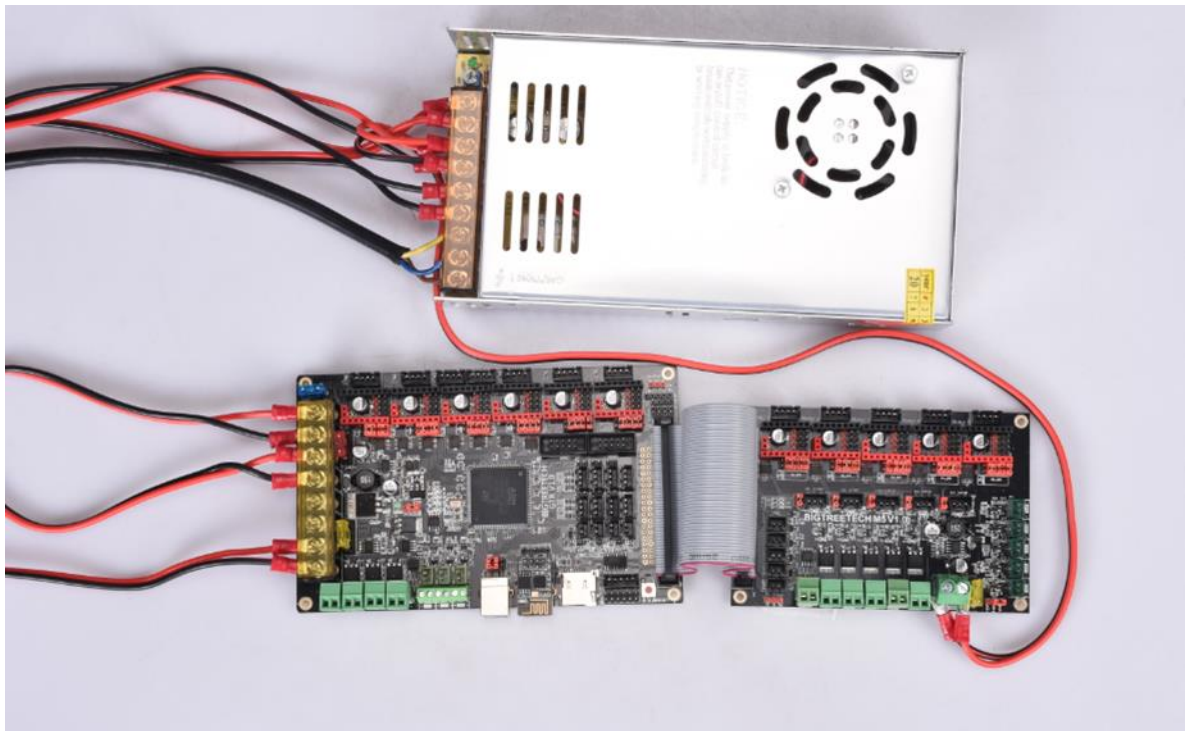




( figure 23 )

## K. Motherboard print with raspberry PI online

The motherboard and the expansion board are connected through a 50Pin cable (50Pin cable is an accessory to the expansion board), and the power can be printed when the power is properly connected, as shown in Figure 24:



( Figure 24 )

Note: The power connector of the expansion board needs to be connected to the power supply to use the function of the expansion board normally.

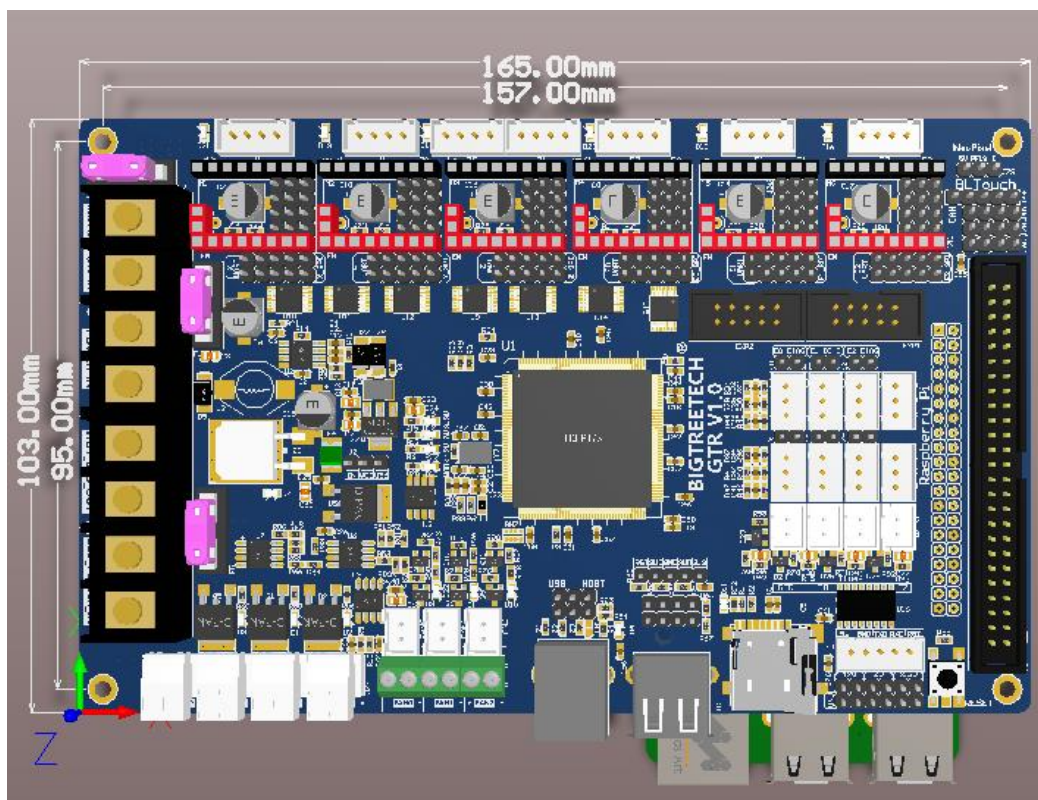
## L. Motherboard print with raspberry PI online

As shown in Figure 25, the 2 \* 20Pin double row slot with the

motherboard accessories (not soldered by default). The connection between the Raspberry Pi and the GTR motherboard is shown in Figure 26. Through the computer settings, you can realize online printing using the motherboard and the Raspberry Pi:



( Figure 25 )



( Figure 26 )

## M. Motherboard firmware specification

1)、Currently, only our open source Marlin2.0 firmware is supported.

Please visit our open source website:

<https://github.com/bigtreetech?tab=repositories>

2)、Marlin2.0 firmware update method:

After downloading our open source Marlin2.0 firmware, use Visual Studio Code to open the project for compilation, then find firmware. Bin file, copy to SD card, then reset the motherboard and wait for about 10 seconds. (you can also download firmware. bin directly)

For detailed steps, please refer to the tutorial:

<https://www.dropbox.com/s/ppjfflhf3j5yzh2/MarlinV2.0%20SKRV1.1%20instruction.docx?dl=0>

## N. Working environment

working environment	Operating temperature	0℃~50℃
	Storage temperature	-20℃~80℃
	Humidity	5~85%RH,Non-condensing

## Notes

1) Firmware only supports our open source Marlin2.0 firmware.

- 2) This motherboard does not support the U disk function, please wait!
- 3) the hot bed connected to the mainboard must be less than or equal to 180 w (that is, the hot bed resistance is greater than  $0.8\ \Omega$ ). if you want to use high power hot bed, you need to connect external thermal power expansion board;
- 4) When supplying 12V/24V power to the motherboard, be sure to pay attention to the positive and negative poles of the power supply.
- 5) The name of the firmware file in the SD card cannot be changed, including case.
- 6) Ensure that all wires, jumper caps and drives are connected and plugged correctly before power is turned on.
- 7) Do not plug and pull the driver module with power to avoid damage.
- 8) About the motherboard wiring, you must pay attention to the positive and negative of the power supply, driving direction, power selection, etc. If all are correct, it can be energized.
- 9) The product damage caused by human error is not included in the warranty regulations.