

**BIGTREETECH**

# EBB SB2209 USB V1.0

## User Manual



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## Revision Log

Version	Date	Revisions
v1.00	June 26th, 2024	Initial Version
v1.01	September 14, 2024	Revise the explanation of errors at the power interface

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## 1. Product Profile

The BIGTREETECH EBB SB2209 USB V1.0 is a tool board designed for the Voron StealthBurner. It features convenient, user-friendly USB communication via a dual XT30 shielded cable for stable and high communication. It also includes an TMC2209 driver and LIS2DW accelerometer.

### 1.1. Feature Highlights

- Utilizes a high-performance MCU: RP2040 133MHz.
- The reserved BOOT and RESET buttons on the board allow users to enter DFU mode via USB to update the firmware.
- A specially designed circuit on the board protects the signal coming back from the thermistor, preventing MCU damage from shorted heater cartridge connections.
- The heater cartridge utilizes high-performance MOSFETs to increase the output capacity of this interface while reducing heat generation.
- Onboard HUB chip, reserved 3 USB ports to support multiple USB devices.
- The USB ports are equipped with ESD protection chips to prevent the MCU from being damaged by static electricity at the USB ports.
- Utilizes a high-speed signal conditioner to improve USB signal transmission and reduce disconnection risks.
- Comes with a dual XT30 interface shielded and grounded cable to minimize external interference.
- Utilizes more stable pin headers, increasing output capacity while avoiding poor contact risks.
- PH2.0 spacing sockets make DIY wiring terminals easier.
- DIY components, including connector housings, crimp terminals, and screws, are included for your convenience.

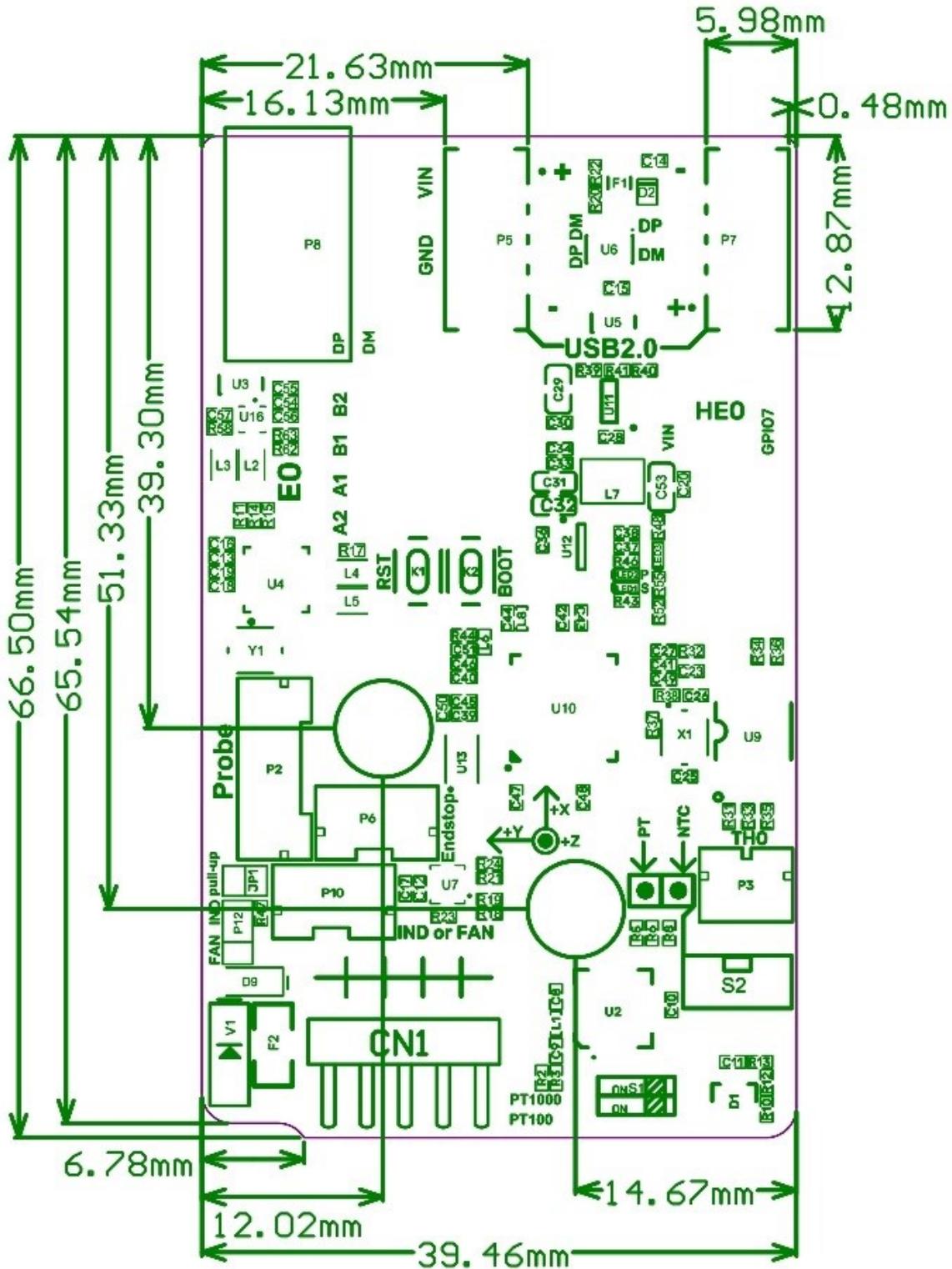
## 1.2. Specifications

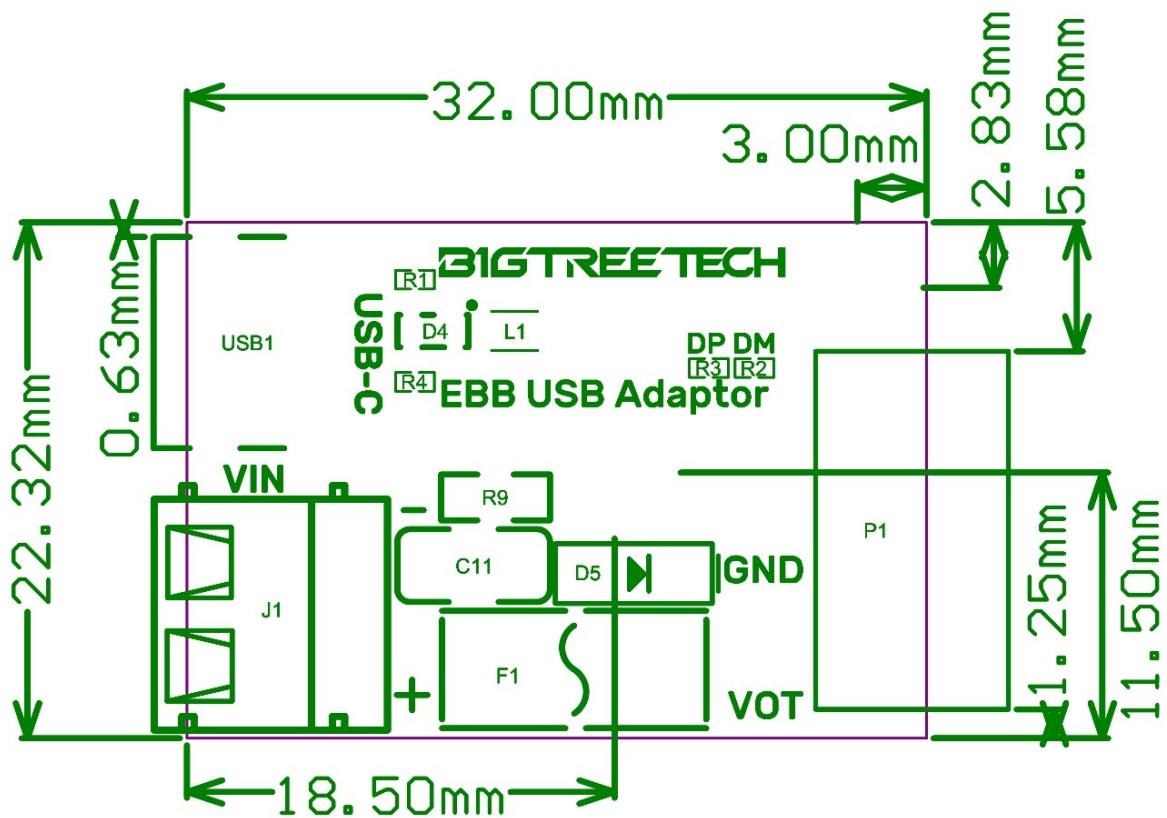
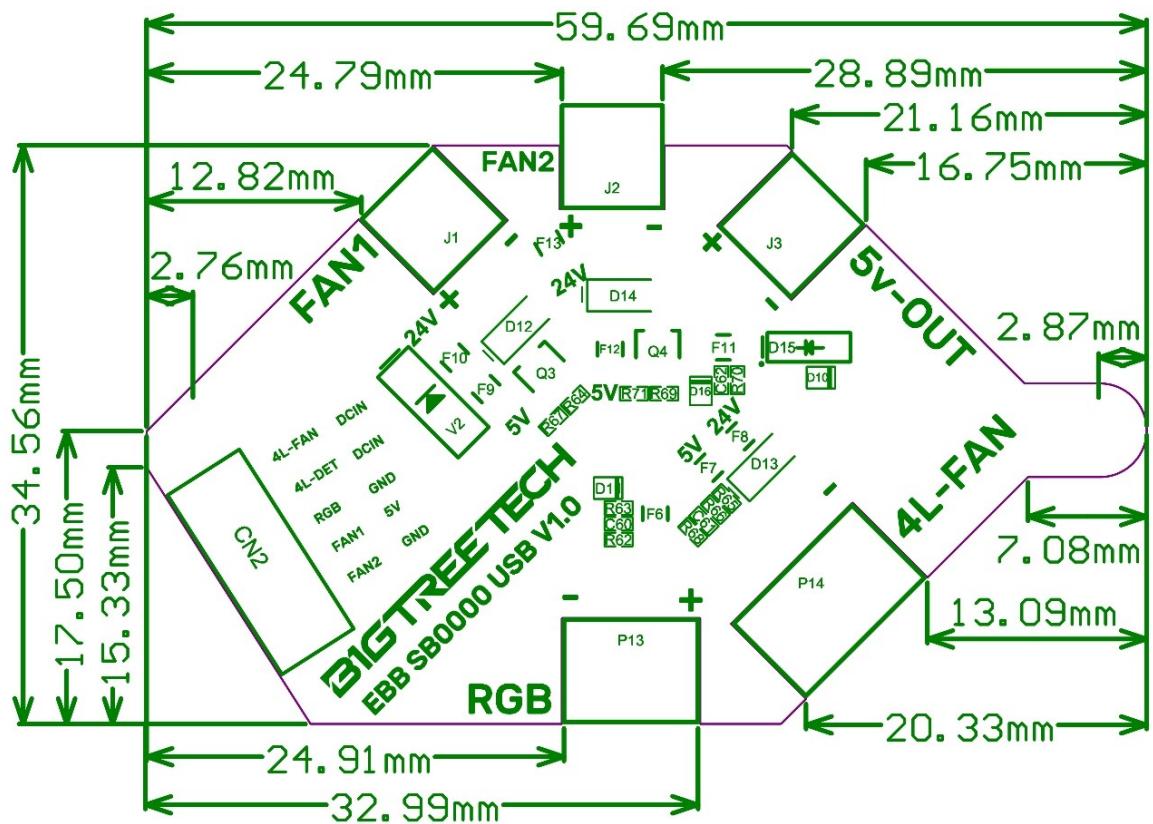
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MCU	RP2040 Dual ARM Cortex-M0+ @ 133MHz
Input Voltage	DC12V-DC24V 9A
Logic Voltage	DC3.3V
Heating Interface	Heater Cartridge (HE0), max output current: 6A
Onboard Accelerometer	LIS2DW
Fan Ports	2x PWM Fan Ports (FAN1, FAN2), 1x 4-pin Fan Port (4L-FAN)
Max Fan Output Current	1A, peak 1.5A
Expansion Interfaces	Probe, RGB, USB2.0 x 3, I <sup>2</sup> C, Endstop, IND or FAN
Motor Driver	Onboard TMC2209
Driver Mode	UART
Stepper Motor Interface	E0
Temperature Sensor Interface	1x 100K NTC (pull-up resistor is 2.2K), supports PT1000
USB Communication Input Interface	XT30 2+2Pin
DCDC 5V Max Output Current	1A

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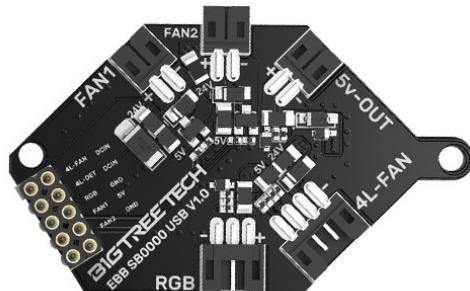
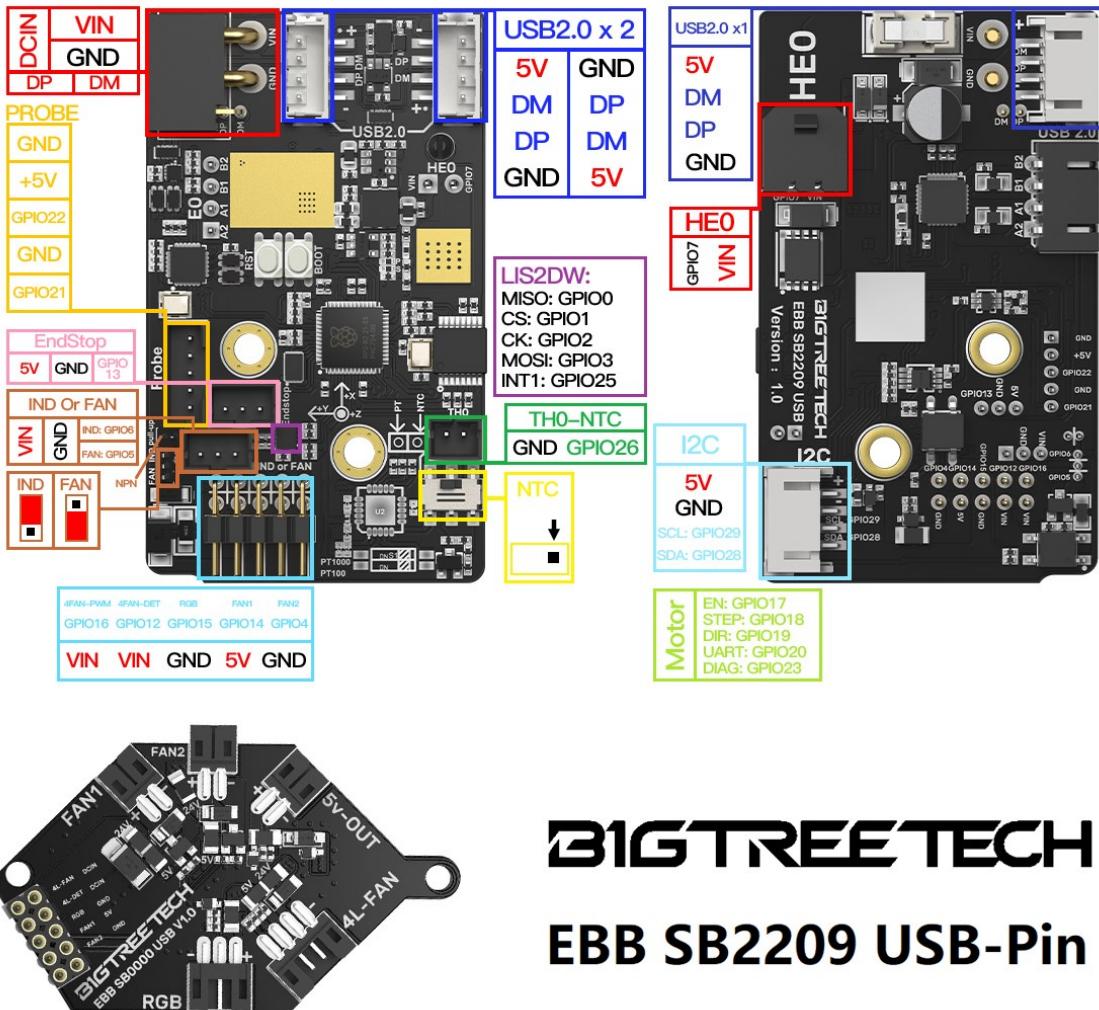
### 1.3. Dimensions





## 2. Peripheral Interface

### 2.1. Pin Description



**BIGTREETECH**  
**EBB SB2209 USB-Pin**

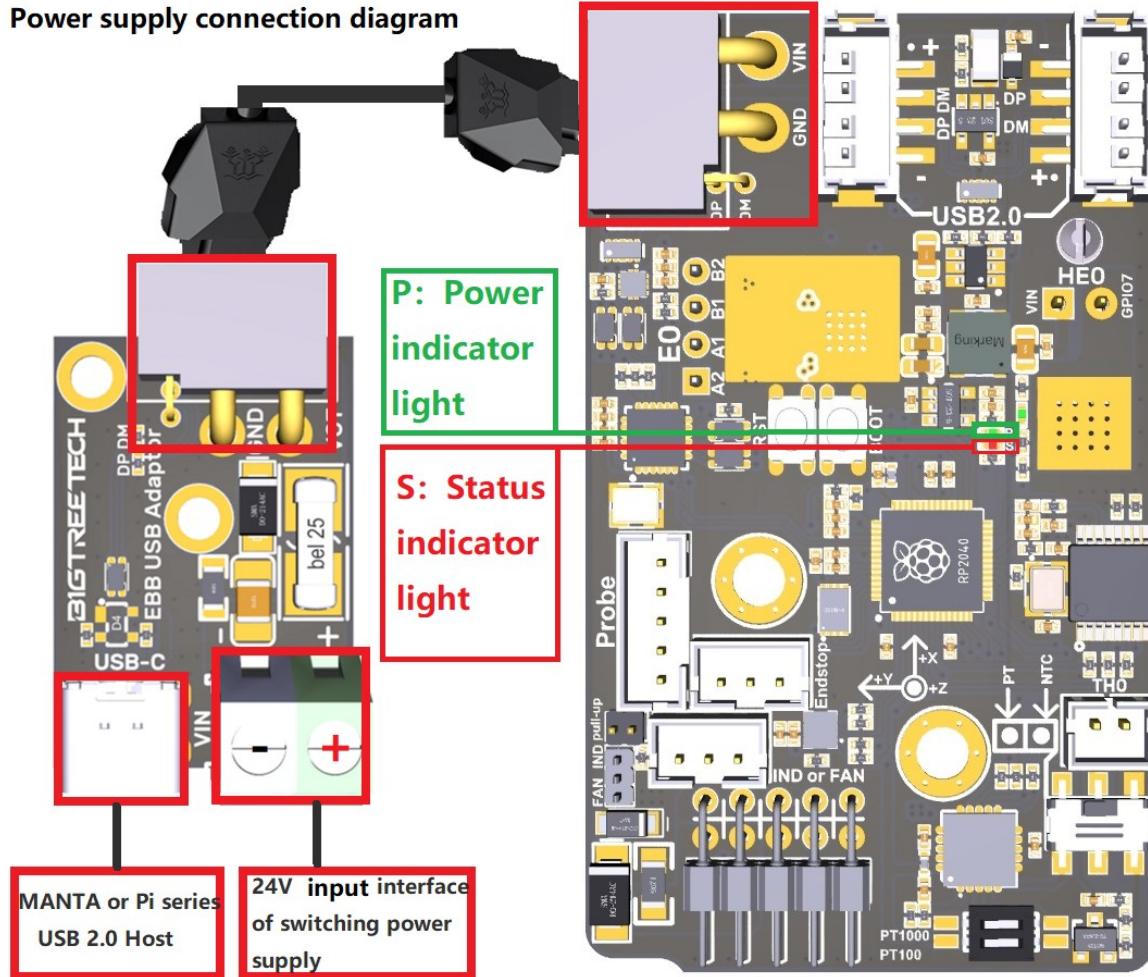
For details, please refer to **BIGTREETECH EBB SB2209 USB-Pin**.

### 3. Interface Introduction/Connection

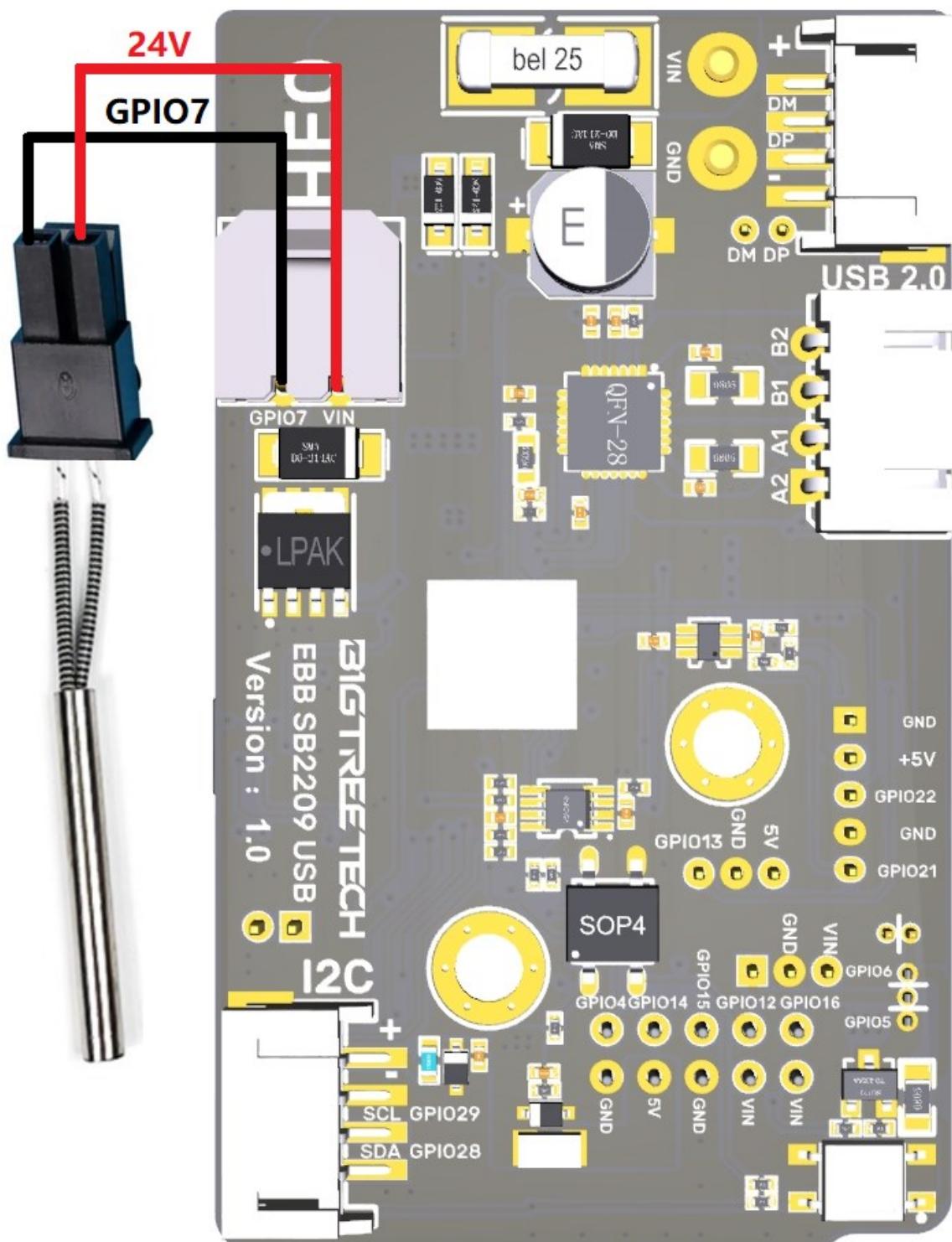
#### 3.1. Power and USB Input Interface

When powered normally, the power indicator "P" stays on, and the status indicator "S" lights up when the program starts.

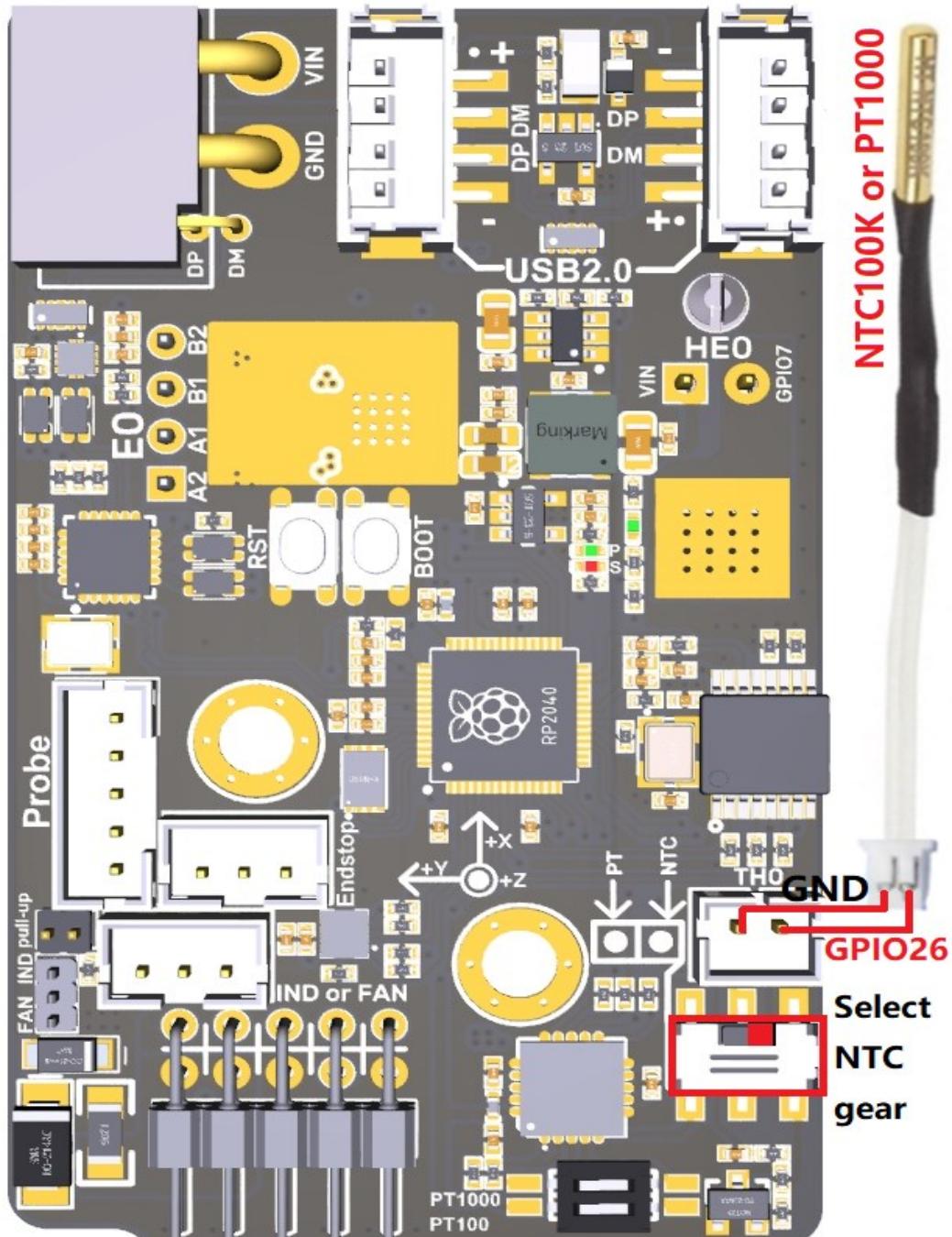
**Power supply connection diagram**



### 3.2. Heater Cartridge



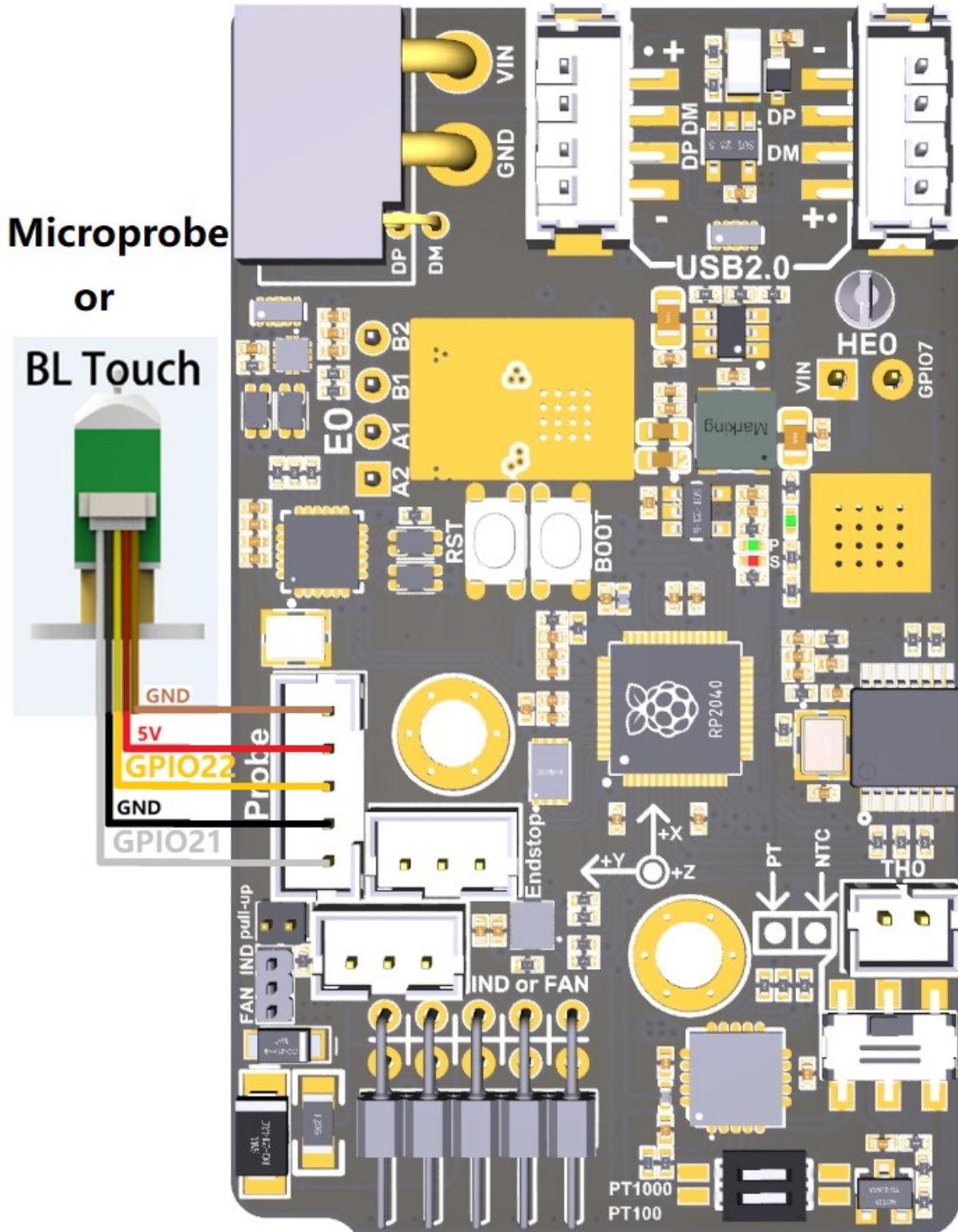
### 3.3. 100K NTC or PT1000



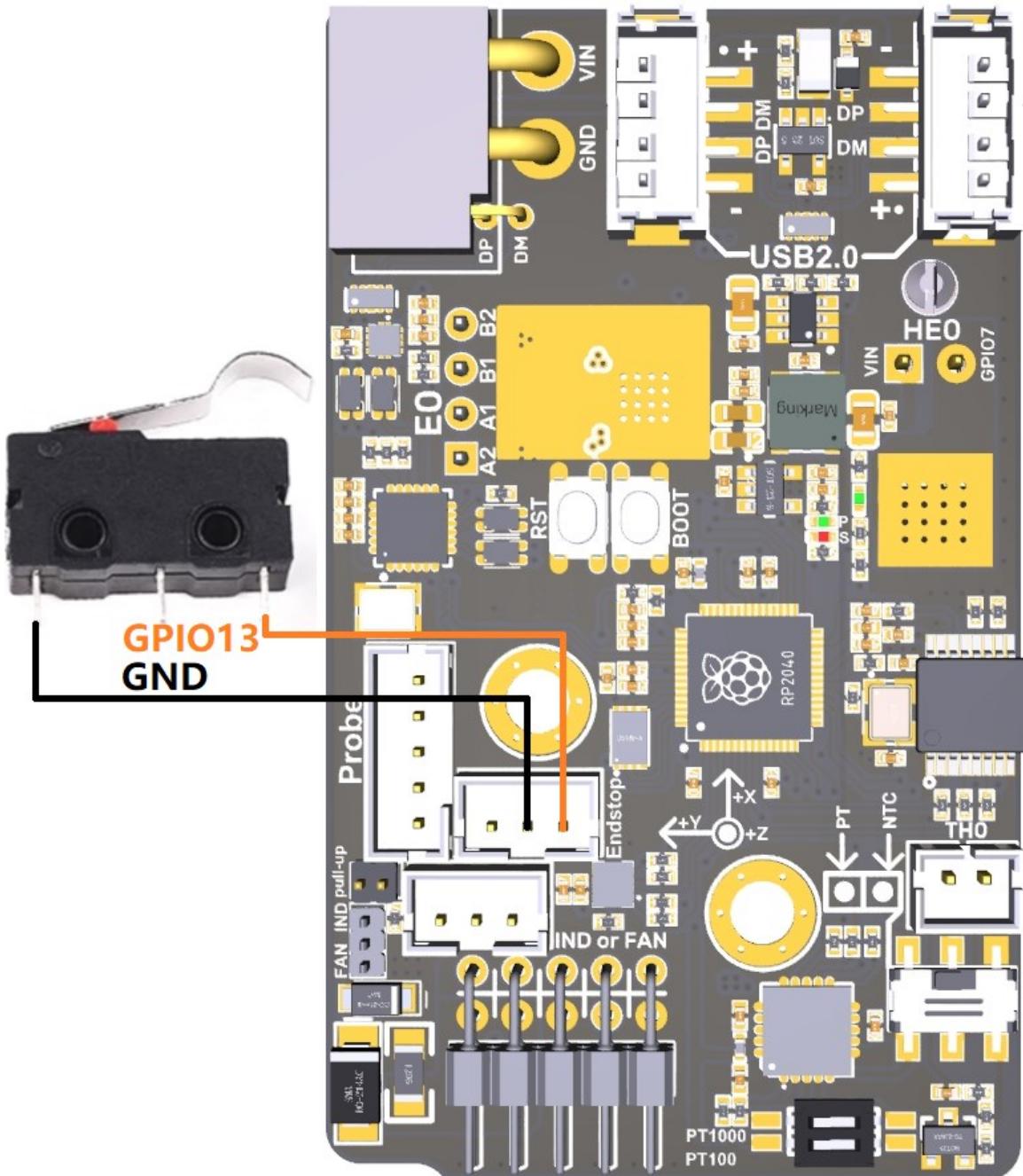
#### Note:

1. The factory default does not include the MAX31865 and related components.
2. The pull-up resistance value is 2.2K. When debugging the firmware, be careful not to incorrectly write it as 4.7K, as this can cause inaccurate temperature readings.

### 3.4. Probe

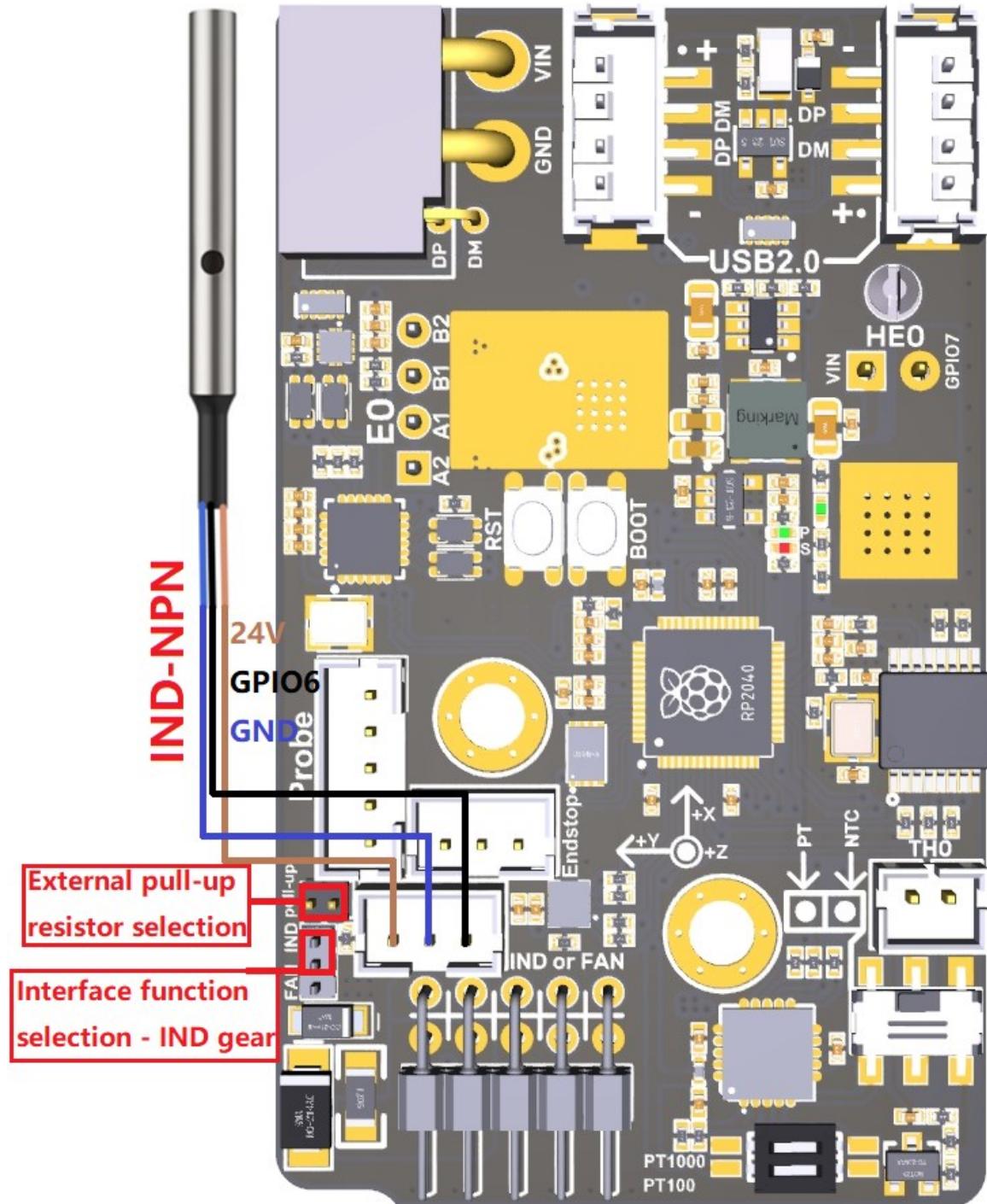


### 3.5. Endstop

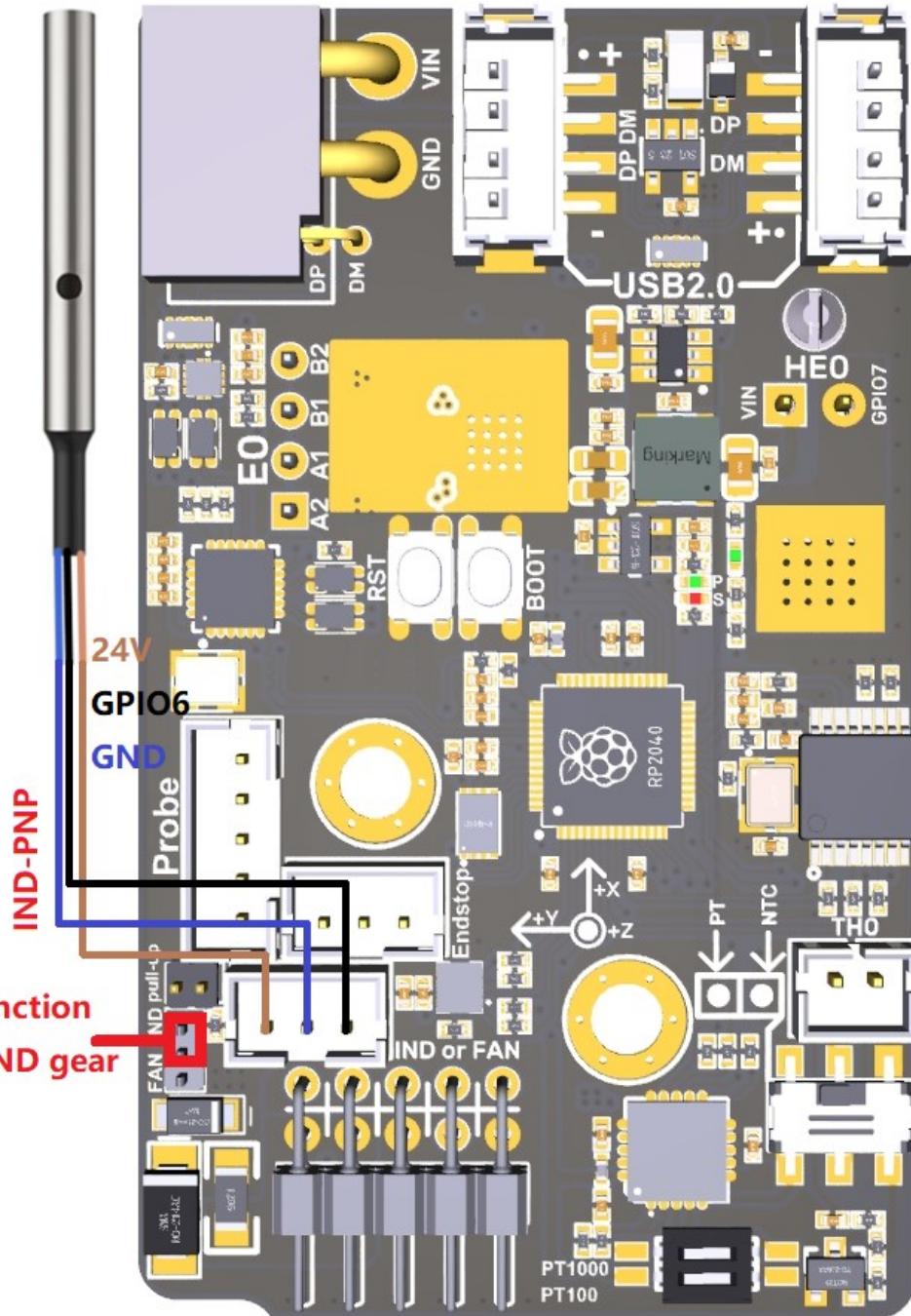


### 3.6. Proximity Switch

#### 3.6.1. Connecting the NPN Type Proximity Switch



### 3.6.2. Connecting the PNP Type Proximity Switch

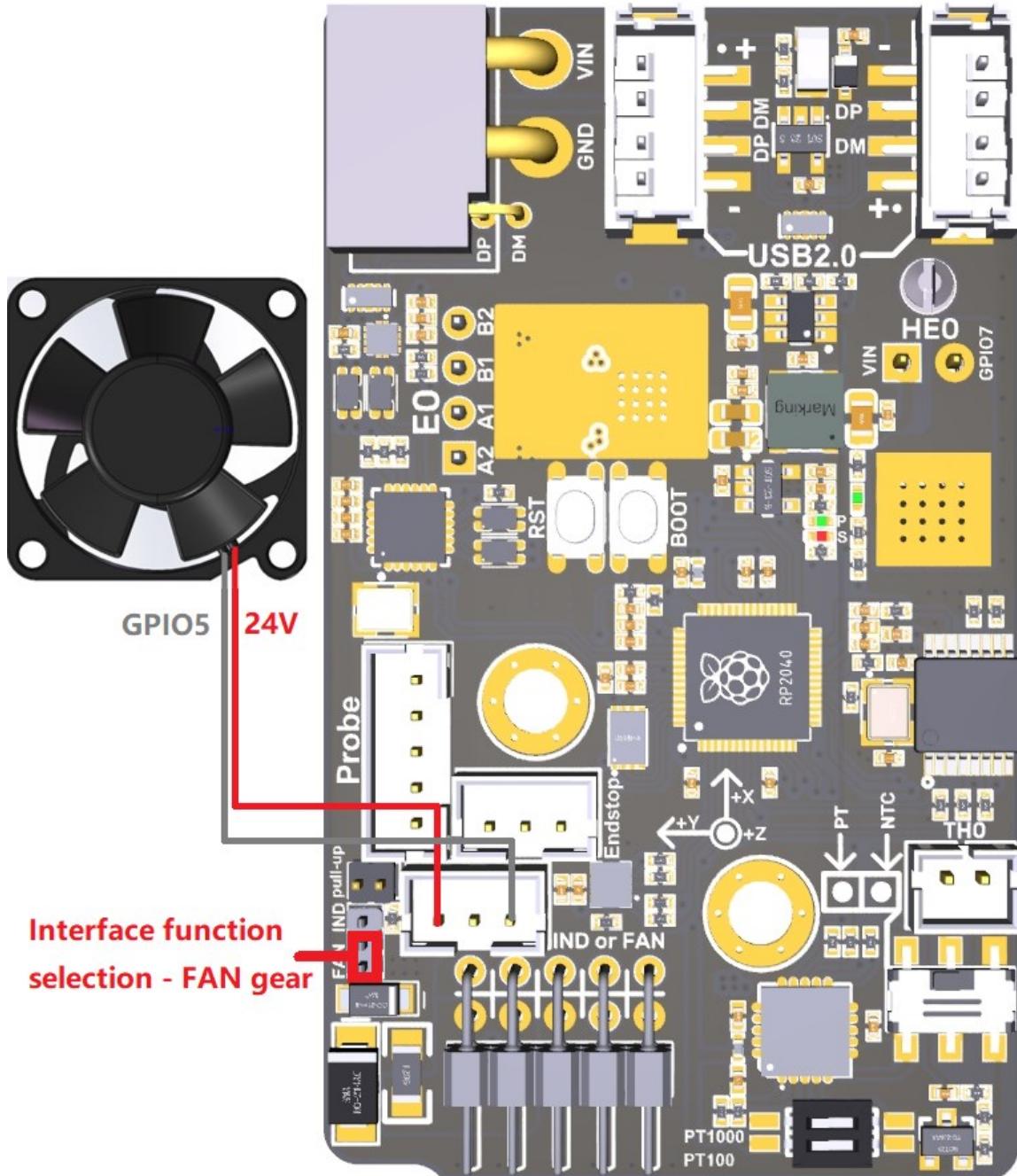


#### Note:

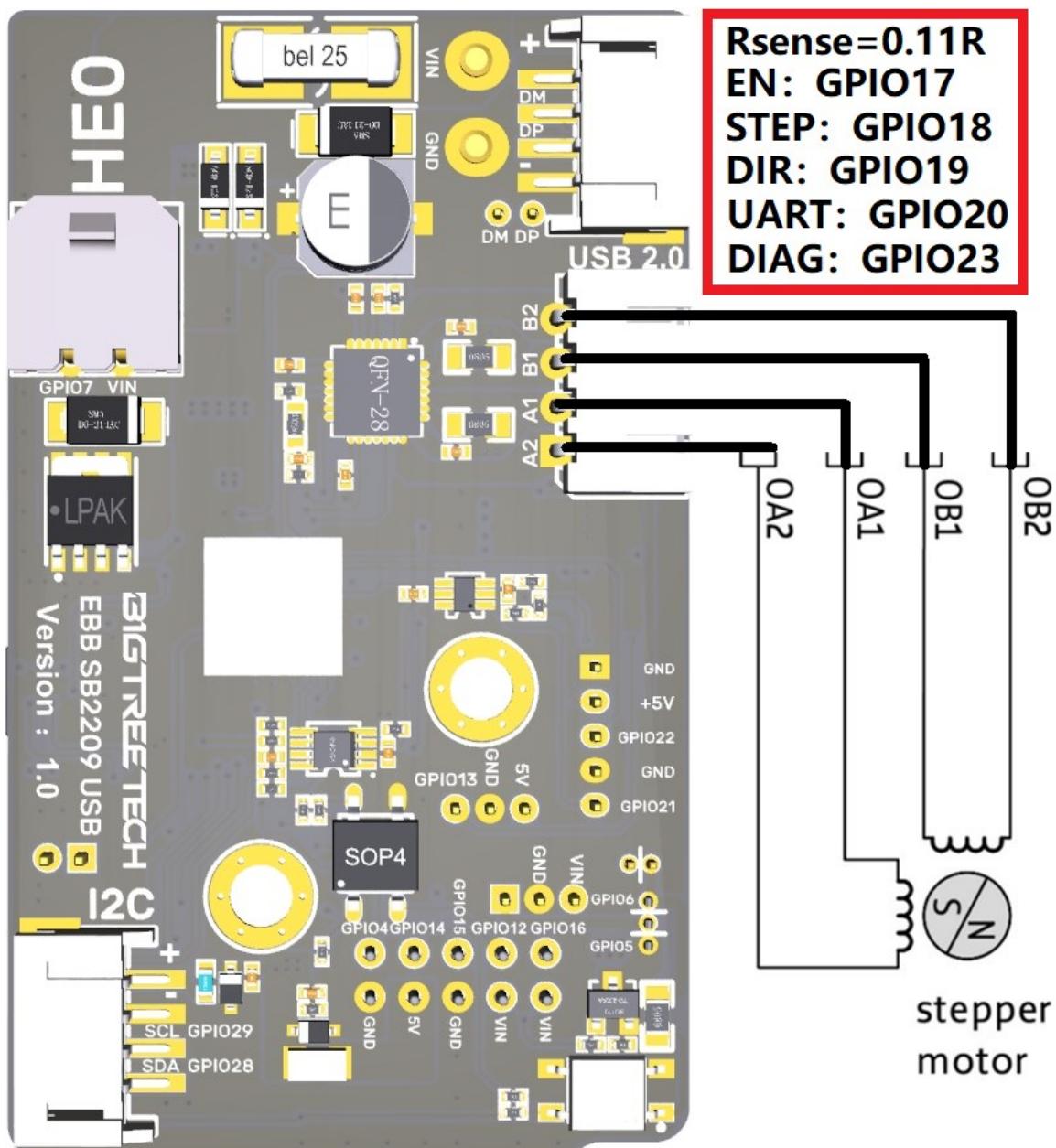
The interface only supports 24V proximity switches.

If using an NPN type proximity switch, use a jumper to short the two pins at the "pull-up" position.

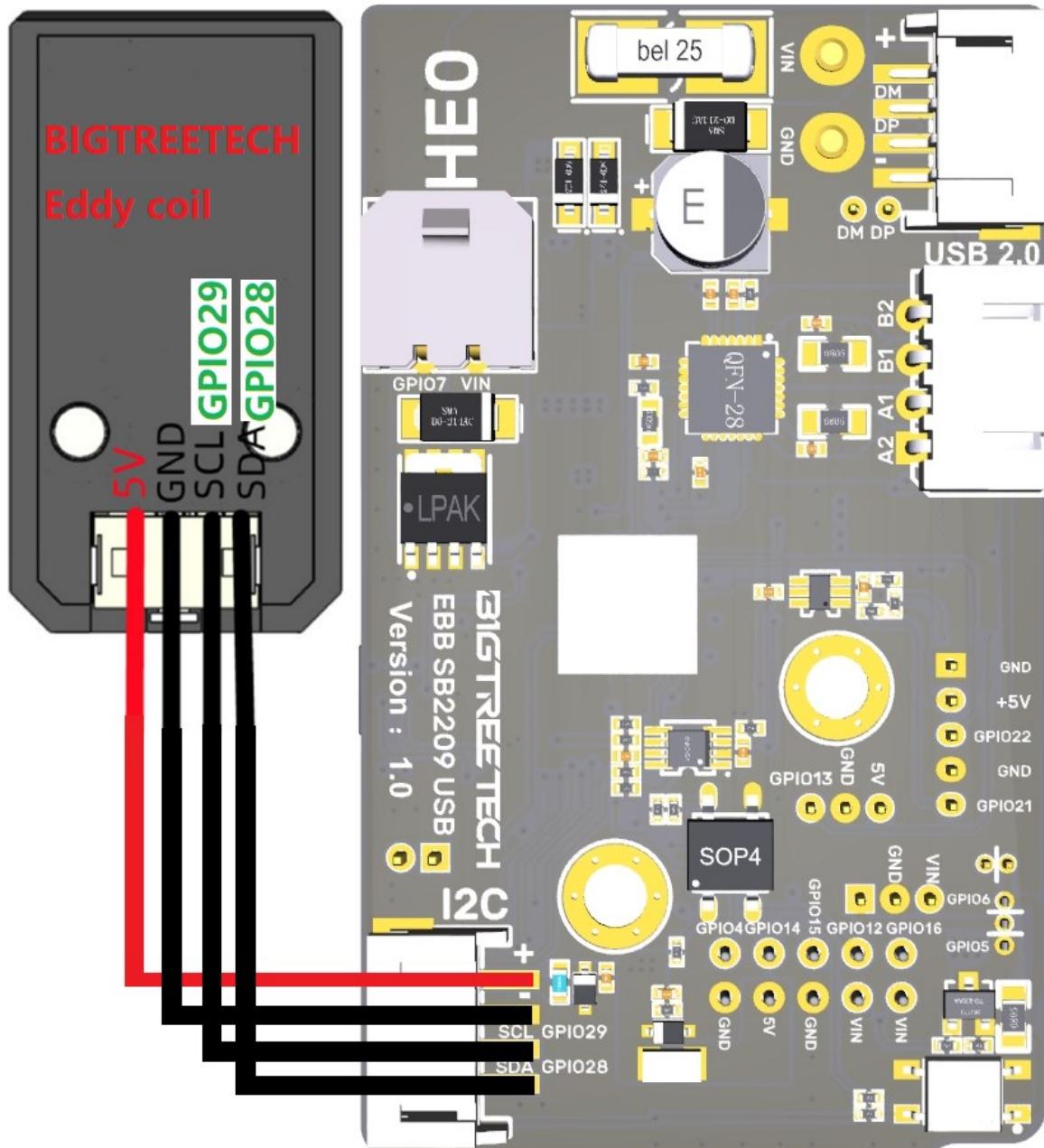
### 3.6.3. Connecting a Fan



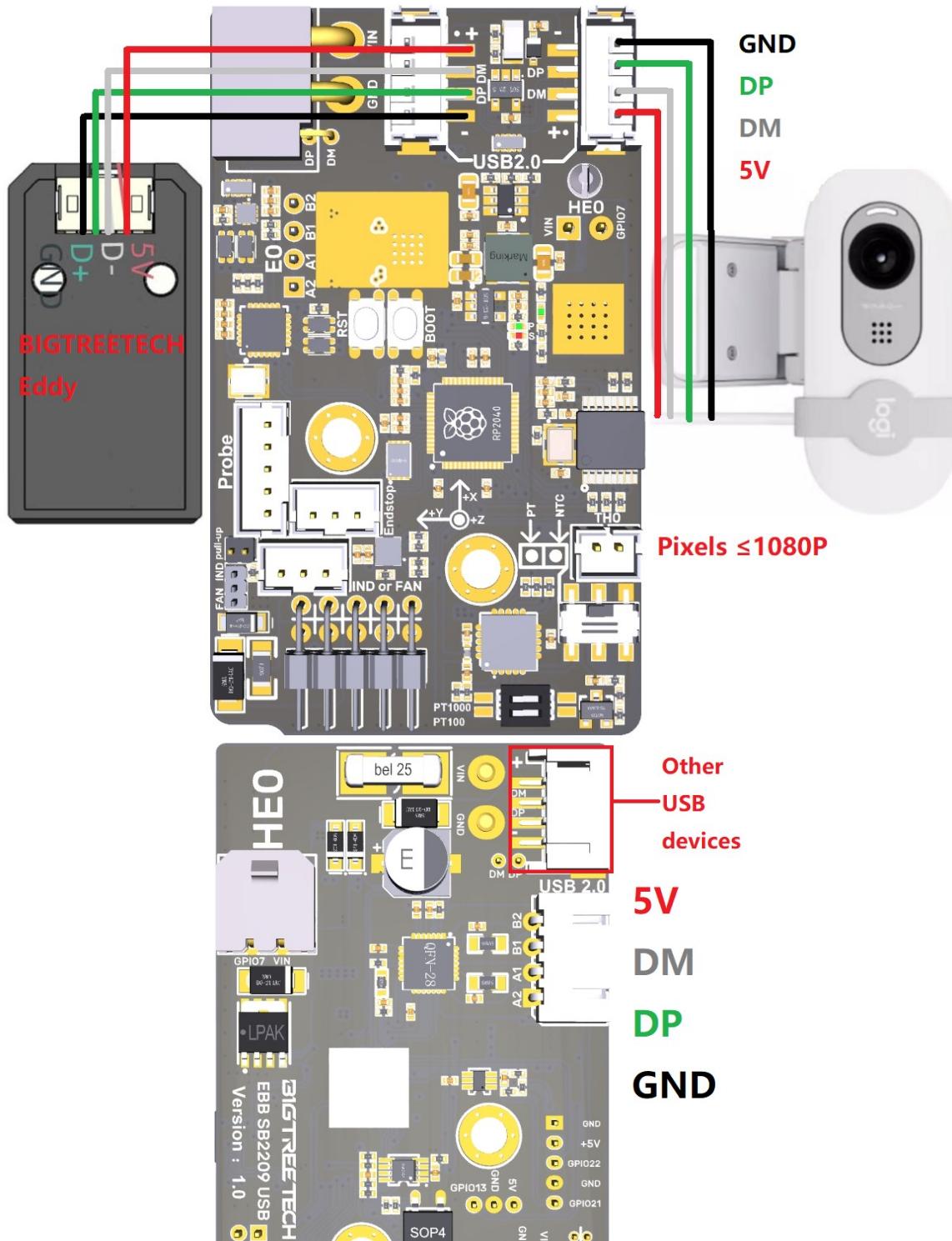
### 3.7. Stepper Motor



### 3.8. I<sup>2</sup>C

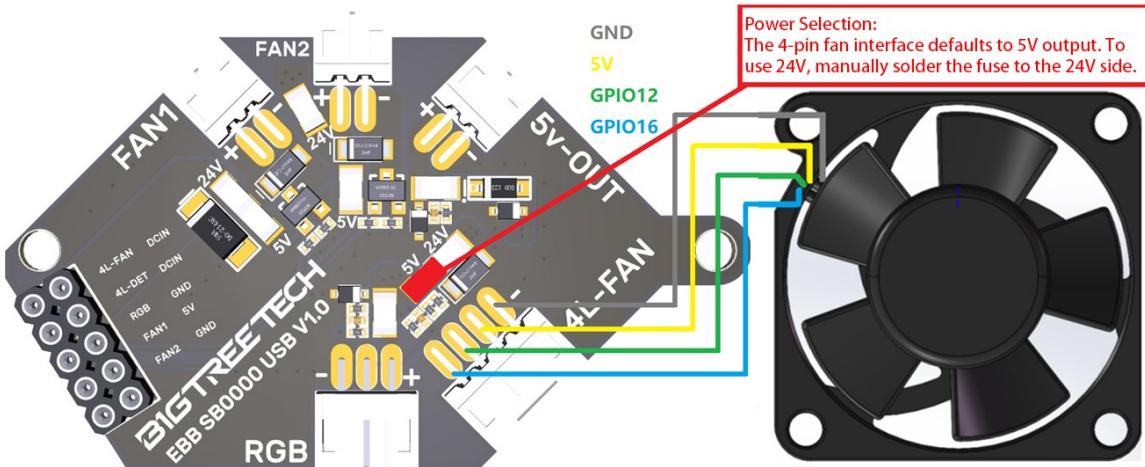


### 3.9. USB2.0



### 3.10. Fan Connection and Voltage Selection

#### 3.10.1. 4-pin Fan



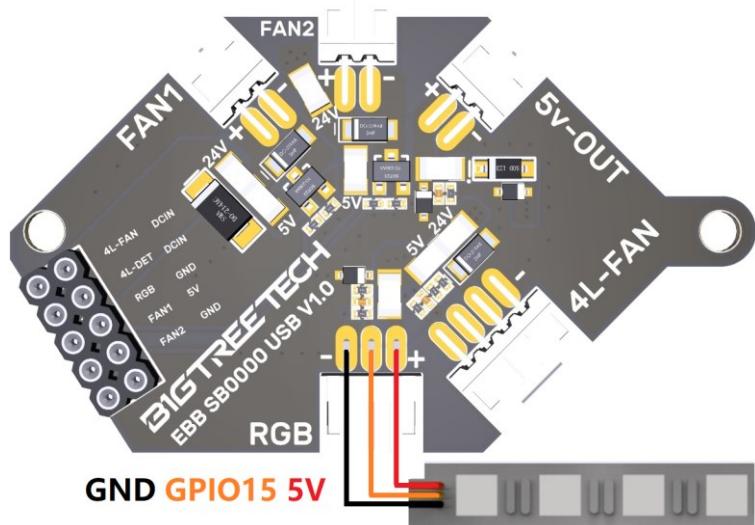
**Note:** The 4-pin fan interface defaults to 5V output at the factory. You will need to manually solder the fuse to the 24V side if you want to use 24V.

#### 3.10.2. 2-pin Fan



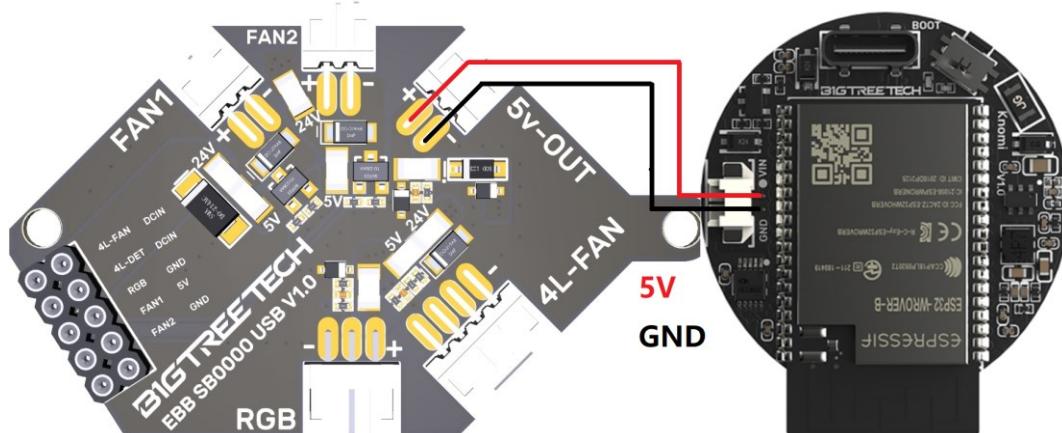
**Note:** The 2-pin fan interface defaults to 24V output at the factory. You will need to manually solder the fuse to the 5V side if they want to use 5V.

### 3.11. RGB

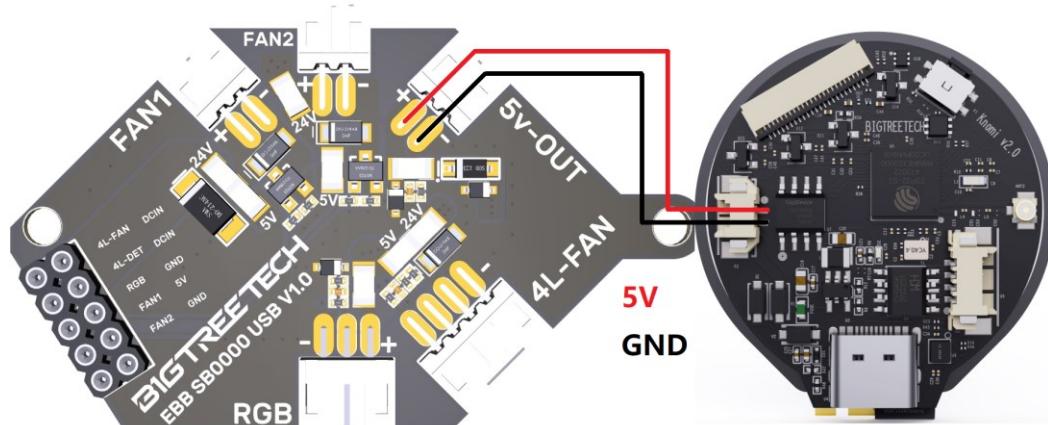


### 3.12. 5V-OUT

KNOMI:



KNOMI 2:



## 4. Klipper

### 4.1. Compiling Firmware

1. After SSH connects to Raspberry Pi, enter the following in the command line:

```
cd ~/klipper/
```

```
make menuconfig
```

Compile the firmware using the configuration below (if these options are not available, update the Klipper firmware source code to the latest version).

[\*] Enable extra low-level configuration options

  Micro-controller Architecture (Raspberry Pi RP2040) --->

  Bootloader offset (No bootloader) --->

  Flash chip (W25Q080 with CLKDIV 2) --->

  Communication Interface (USBSERIAL) --->

(Top)

Klipper Firmware Configuration

[\*] Enable extra low-level configuration options

  Micro-controller Architecture (Raspberry Pi RP2040) --->

  Bootloader offset (No bootloader) --->

  Flash chip (W25Q080 with CLKDIV 2) --->

  Communication Interface (USBSERIAL) --->

  USB ids --->

( ) GPIO pins to set at micro-controller startup

2. After configuring, enter 'q' to exit the configuration interface. When asked to save configuration, select 'Yes'.
3. Enter **make** to compile the firmware. When make is completed, the required **klipper.uf2** firmware will be generated in the **home/biqu/klipper/out** folder.

### 4.2. Firmware Update

#### Raspberry Pi or CB1 firmware update through DFU

1. Use the adapter board to connect the BIGTREETECH EBB SB2209 USB V1.0 to Raspberry Pi/CB1, and ensure the power cable is also connected.
2. Hold down the Boot button, then press the Reset button once to enter DFU mode.
3. In the SSH terminal command line, enter **lsusb** to query the DFU device ID.

```
pi@fluidpi:~$ lsusb
Bus 001 Device 005: ID 2e8a:0003  Raspberry Pi RP2 Boot
Bus 001 Device 004: ID 1d50:6061  OpenMoko, Inc. Geschwister Schneider CAN adapter
Bus 001 Device 003: ID 0424:0c00  Microchip Technology, Inc. (formerly SMSC) SMC9512/9514 Fast Ethernet Adapter
Bus 001 Device 002: ID 0424:9514  Microchip Technology, Inc. (formerly SMSC) SMC9514 Hub
Bus 001 Device 001: ID 1d6b:0002  Linux Foundation 2.0 root hub
pi@fluidpi:~$
```

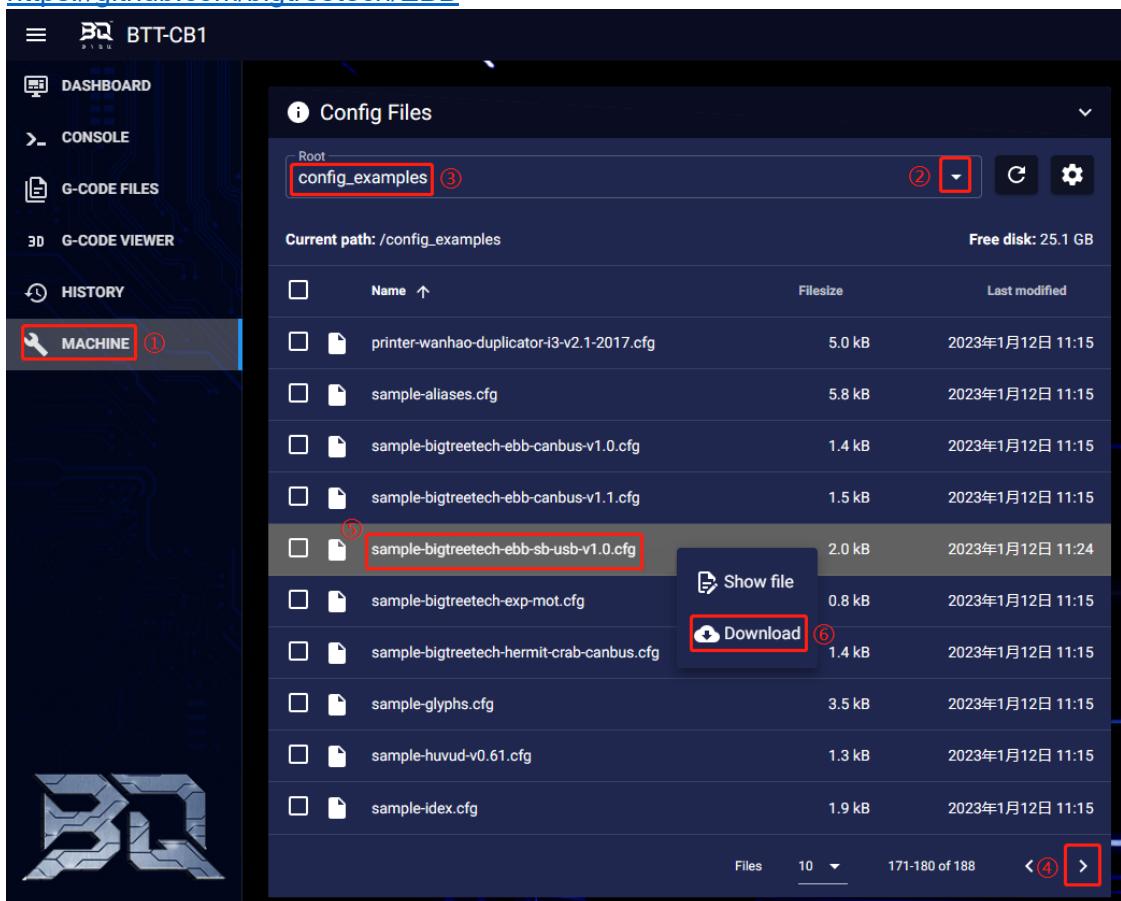
Enter **cd klipper** to navigate to the klipper directory, then enter  
**make flash FLASH\_DEVICE= 2e8a:0003**

to start flashing the firmware (note: replace 2e8a:0003 with the actual device ID obtained in the previous step).

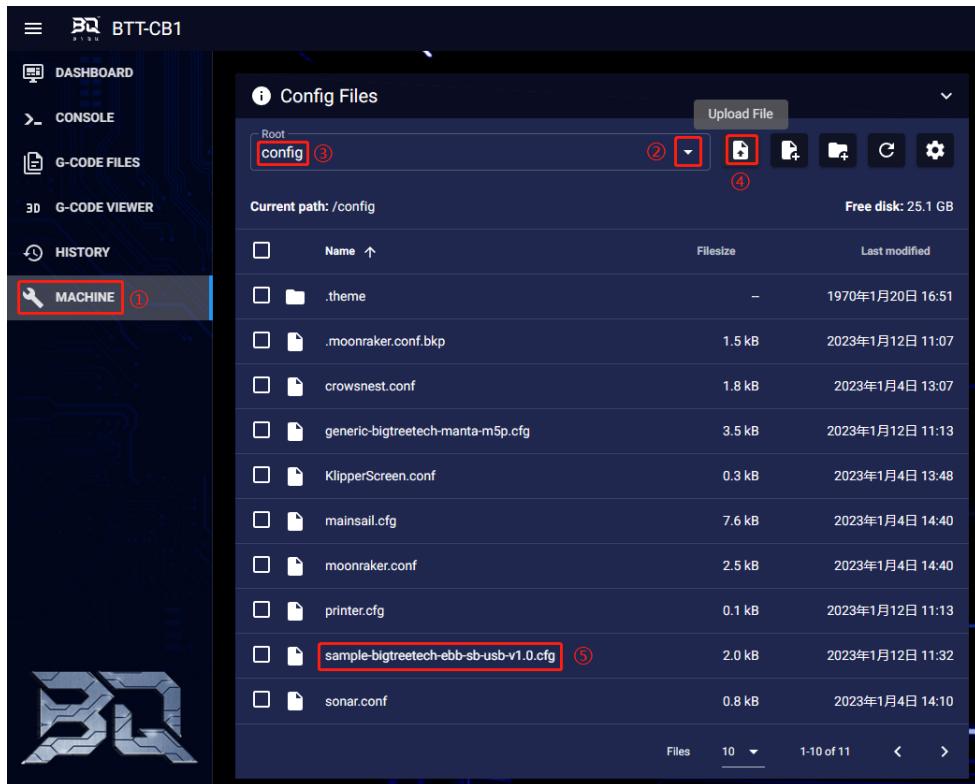
4. After flashing, enter  
`ls /dev/serial/by-id/`  
to query the device Serial ID.
5. There is no need to manually press the Boot button to enter DFU mode for subsequent updates after the first flashing is completed. Directly enter  
`make flash FLASH_DEVICE=/dev/serial/by-id/usb-Klipper_rp2040_4550357128922FC8-if00`  
to flash the firmware (note: replace `/dev/serial/by-id/xxx` with the actual ID obtained in the previous step).
6. After flashing, remove the VUSB jumper and Type-C data cable.

### 4.3. Configuring Klipper

1. Access the mainsail web UI by entering the IP address of the Raspberry Pi into your browser. Using the path shown in the image below, download the reference configuration named **sample-bigtreetech-ebb-sb-usb-v1.0.cfg**. If this file is not found, update the Klipper firmware source code to the latest version or use the link to download it from GitHub:  
<https://github.com/bigtreetech/EBB>



2. Upload the motherboard configuration file to **Configuration Files**.



- Add the mainboard configuration in the "printer.cfg" file:  
**[include sample-bigtreetech-ebb-sb-usb-v1.0.cfg]**

```
printer.cfg
11
12 [include sample-bigtreetech-ebb-sb-usb-v1.0.cfg]
13
```

- Change the USB serial within the configuration file to match the actual ID of the motherboard.

```
sample-bigtreetech-ebb-sb-usb-v1.0.cfg
7 [mcu EBB]
8 serial: /dev/serial/by-id/usb-Klipper_Klipper_firmware_12345-if00
9
10 [temperature_sensor EBB_NTC]
11 sensor_type: Generic 3950
12 sensor_pin: EBB:gpio27
```

- Configure the specific functions of the module according to the instructions in the following link: <https://www.klipper3d.org/Overview.html>

If you need further resources for this product, you can find them at [GitHub](<https://github.com/bigtreeetech/>). If you cannot find what you need, you may contact our after-sales support(service005@biqu3d.com).

If you encounter any other problems during use or have suggestions or feedback, please contact us. Thank you for choosing BIGTREETECH products.