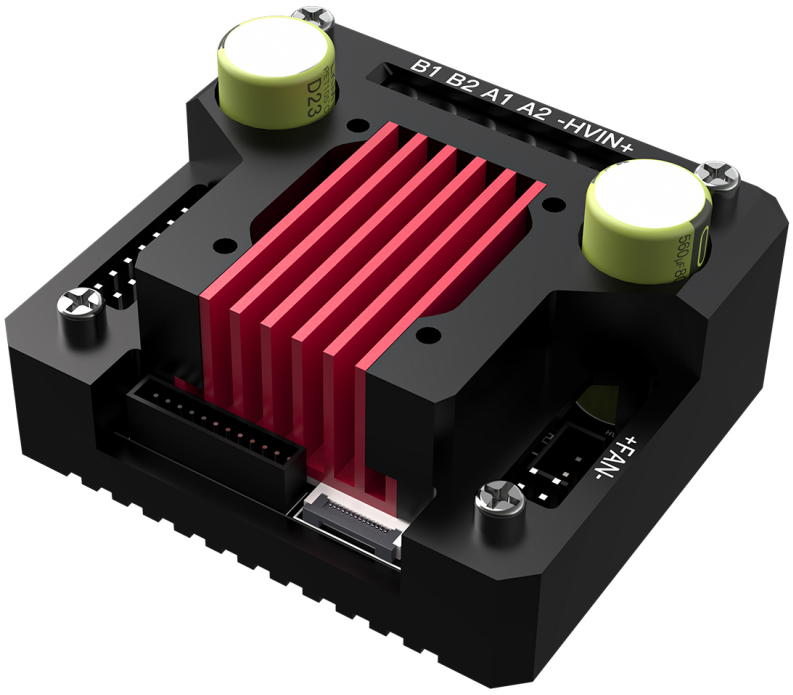
BIGTREETECH

TMC5160T Plus

User Manual



Revision Log

Version	Date	Revisions
v1.00	15th April 2023	Initial Version

CONTENTS

Product Profile

TMC5160T Plus is a high-power stepper motor driver control module, featuring 8 high-power MOSFETs separately mounted on the board with a maximum voltage of 60V. This supports a wider range of stepper motors and offers greater adaptability.

Features Highlights

- 8 high-power MOSFETs separately mounted on the board with 100V voltage resistance, 93A current resistance, and equivalent resistance as low as 6mΩ, significantly enhancing the drive's performance;
- Supports a maximum voltage of 60V, a maximum effective current (IRMS) of 10.6A, and a sine wave peak current of up to 15A;
- StealthChop™ mode and SpreadCycle™ mode selectable, with standalone mode, UART mode, and SPI mode selectable;
- Generates significantly less heat compared to other drives with the same chip model, and outperforms others on the market;
- Can prevent motor jitter and avoid losing steps;
- Tested to drive 36, 42, 57, 86, etc., stepper motors;
- ESD protection on the drive power, logic power, etc., to prevent damage due to power fluctuations and static electricity;
- On-board 24V always-on fan interface facilitates active cooling;
- Encoder interface reserved for DIY usage;
- Integrated heat sink design, providing high heat dissipation while enhancing structural integrity and aesthetics;
- Supplied with adapters and wires for both standard drives and EZ drive, for user convenience;
- Heat sink pre-designed with fan mounting holes for DIY fan installation.

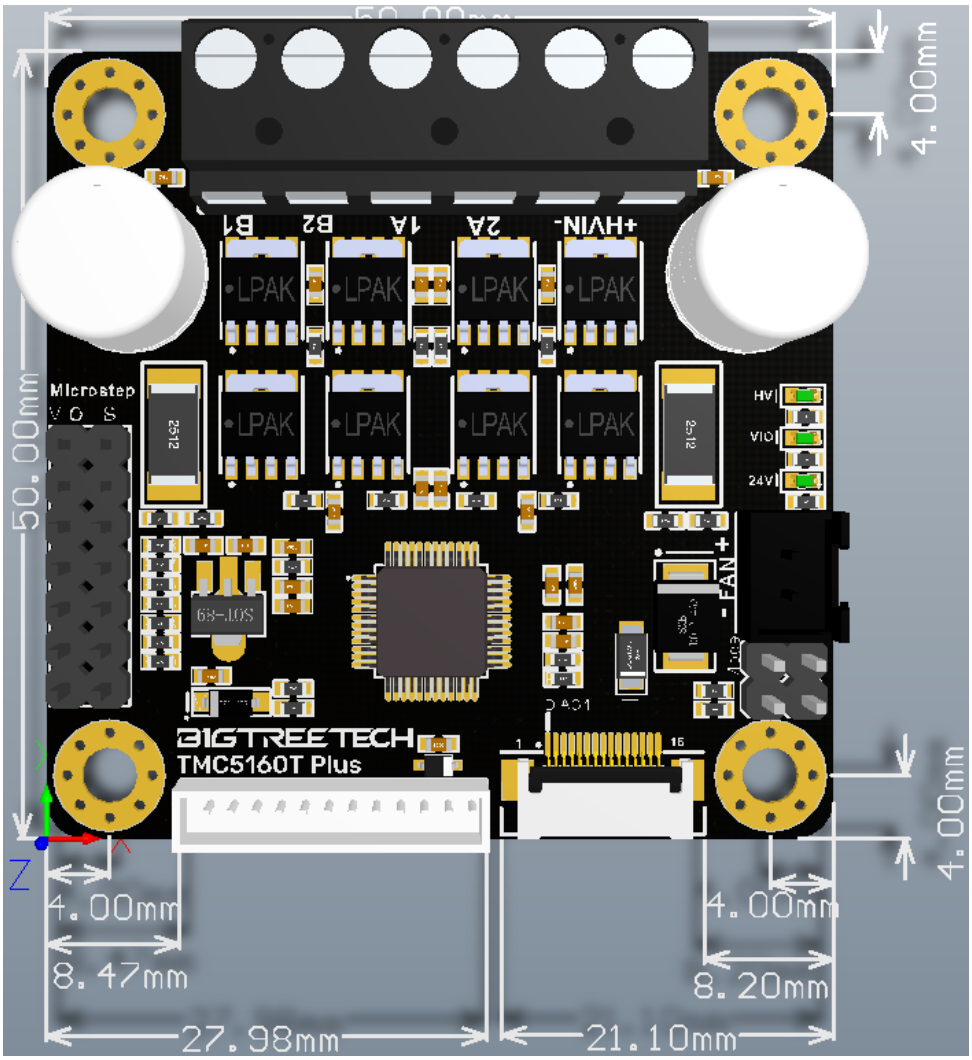
Specifications

Dimensions	TMC5160T Plus: 64 x 56 x 32.55mm
	TMC5160T Plus(W/o case): 58 x 50 x 28mm
Drive Chip	TMC5160-TA

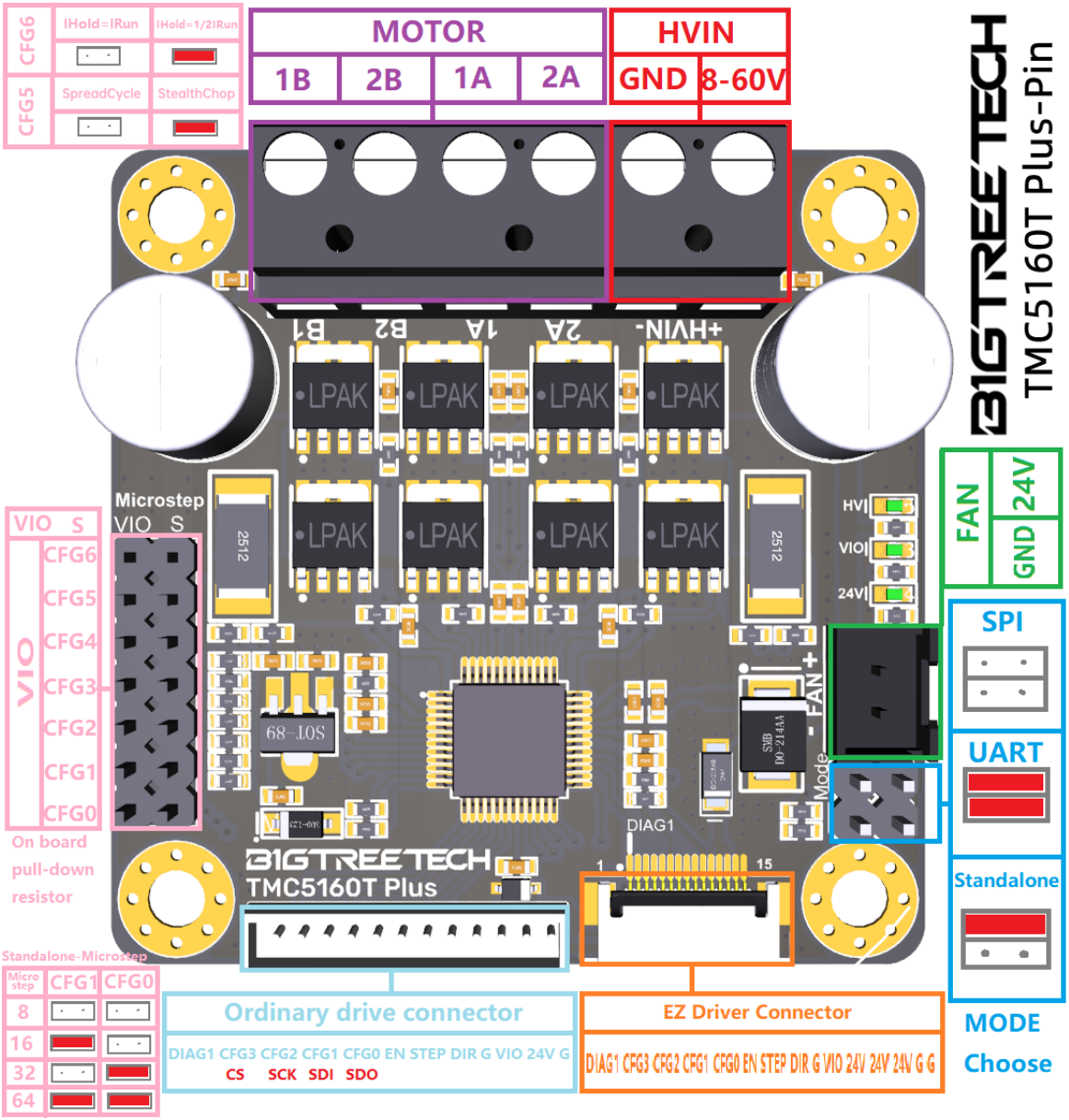
Input Voltage (HVIN)	8V-60V
Maximum Effective Current	10.6A, Sine Wave Peak Current 15A
Capacitor	2 x 560uF
Maximum Subdivision	256
Operating Mode	SPI, SD
Sampling Resistor	22mΩ

Peripheral Interface

Dimensions



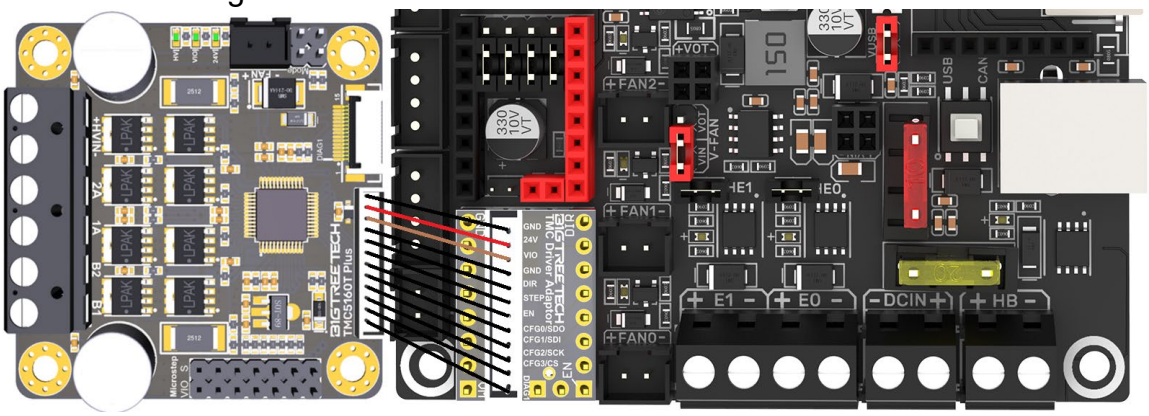
Pin Description



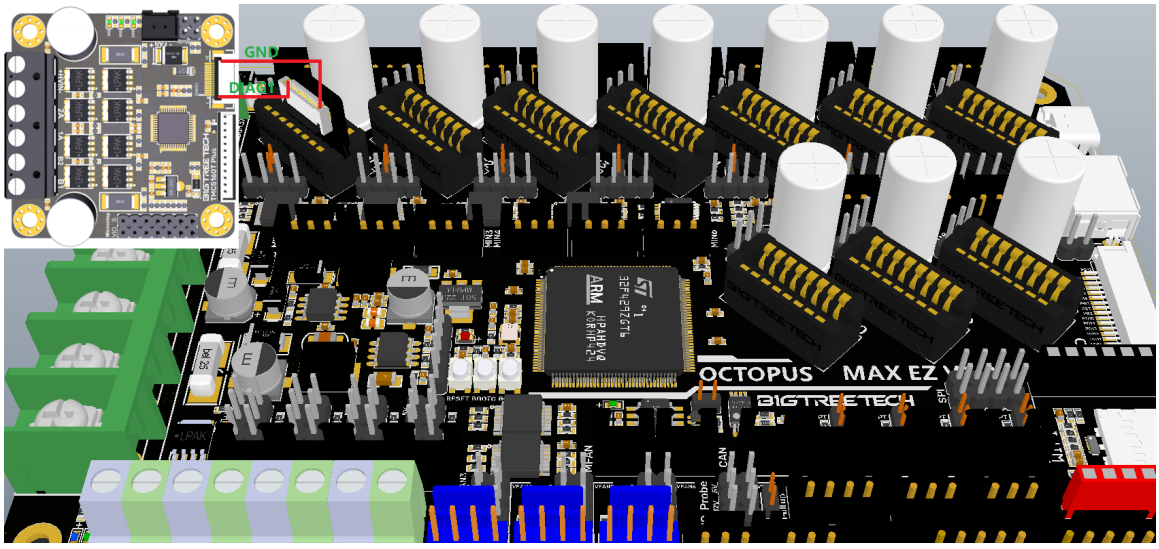
Interface Introduction

Installation and Interface

Connection methods for common motherboards (e.g., SKR3), use the supplied TMC Driver Adaptor and cables to connect the TMC5160T Plus with SKR3 as shown in the diagram:



For EZ series motherboards (e.g., Octopus MAX EZ), use the supplied EZ Driver Adaptor and cables to connect the TMC5160T Plus with Octopus MAX EZ as shown in the diagram:

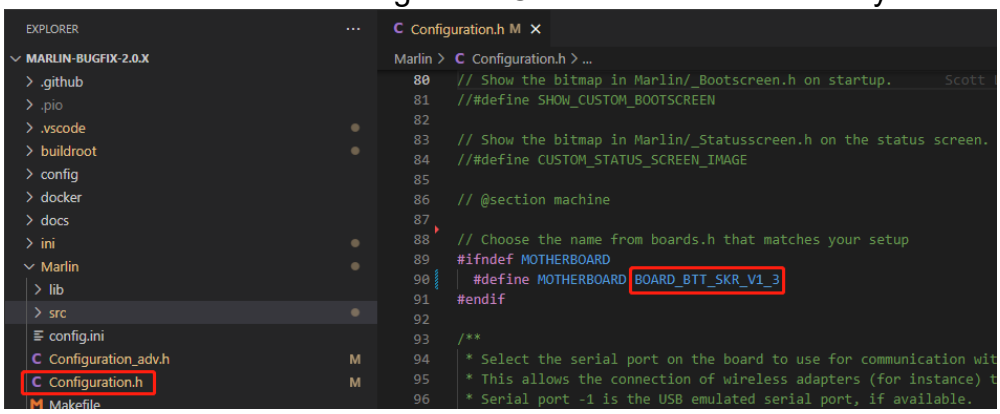


Firmware Settings

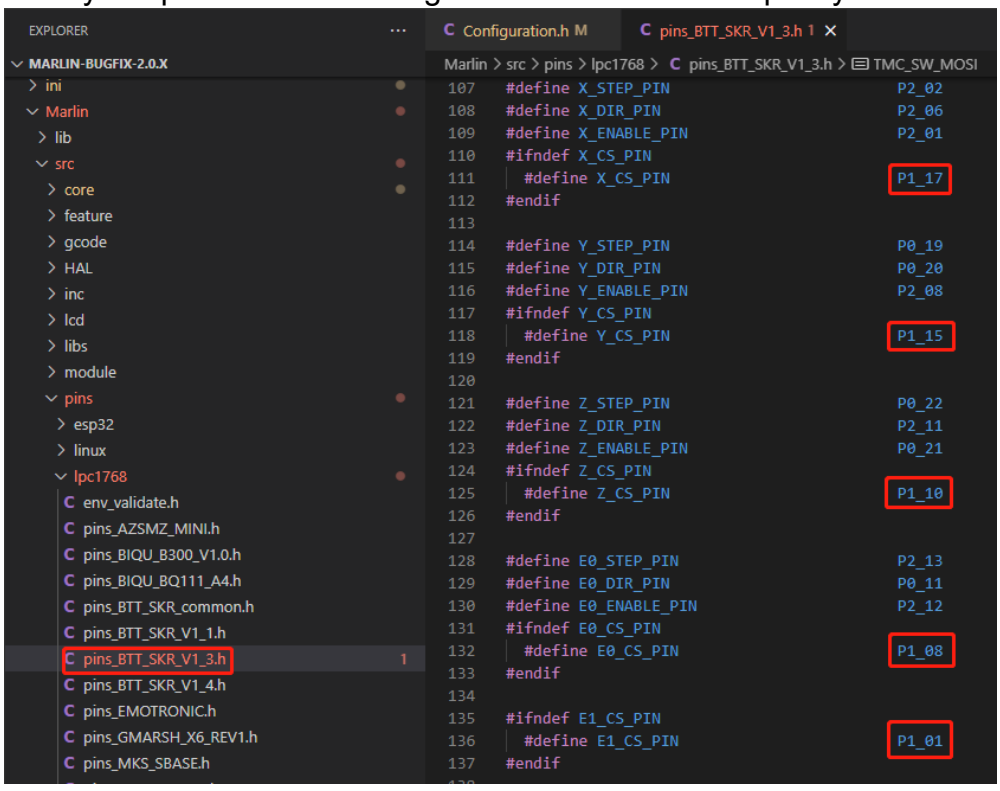
Marlin Firmware Settings

Important Note: Currently, only Marlin 2.0 and later firmware versions support TMC5160's SPI mode.

Step 1: In the Marlin 2.0 firmware, locate and open the "**Configuration.h**" file, then find the line "**#define MOTHERBOARD XXXXXX**". "**XXXXXX**" represents the model of the board being used. Confirm the motherboard you are using.



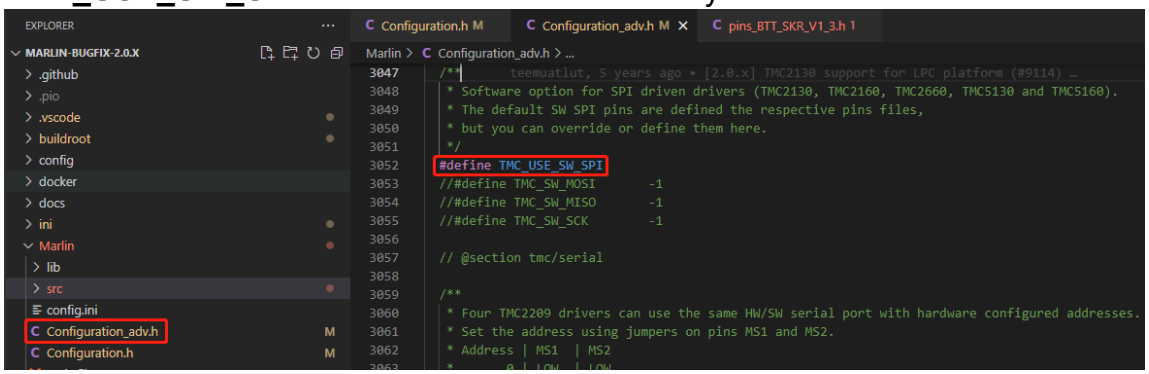
Step 2: In the **Marlin\src\pins** directory, find the "**pins_xxxxxx.h**" file corresponding to your board (xxxxxx represents the board model), and then locate "**X_CS_PIN**", "**Y_CS_PIN**", "**Z_CS_PIN**", and "**EO_CS_PIN**" within the file. Modify the pin names following these variables to the pins you are using.



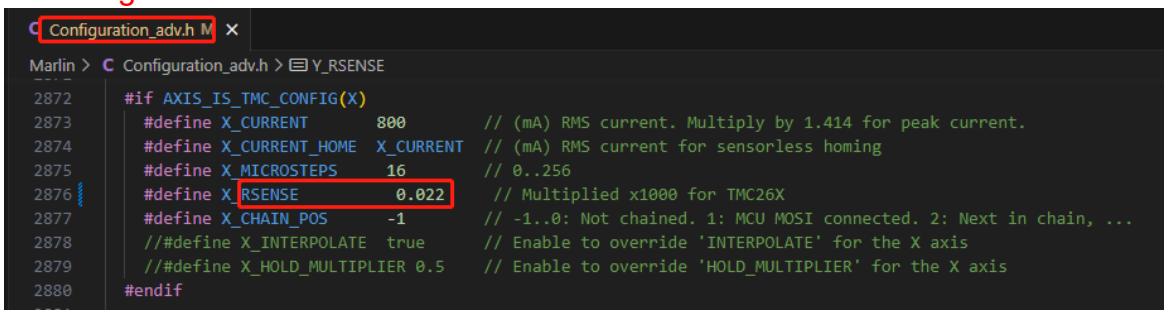
Step 3: In the file from Step 2, locate "**#define TMC_SW_MOSI XXX**", "**#define TMC_SW_MISO XXX**", and "**#define TMC_SW_SCK XXX**". Change "**XXX**" to the pins you want to use.

```
139   //
140   // Software SPI pins for TMC2130 stepper drivers
141   //
142   #if ENABLED(TMC_USE_SW_SPI)
143     #ifndef TMC_SW_MOSI
144       #define TMC_SW_MOSI                P4_28
145     #endif
146     #ifndef TMC_SW_MISO
147       #define TMC_SW_MISO                P0_05
148     #endif
149     #ifndef TMC_SW_SCK
150       #define TMC_SW_SCK                 P0_04
151     #endif
152   #endif
```

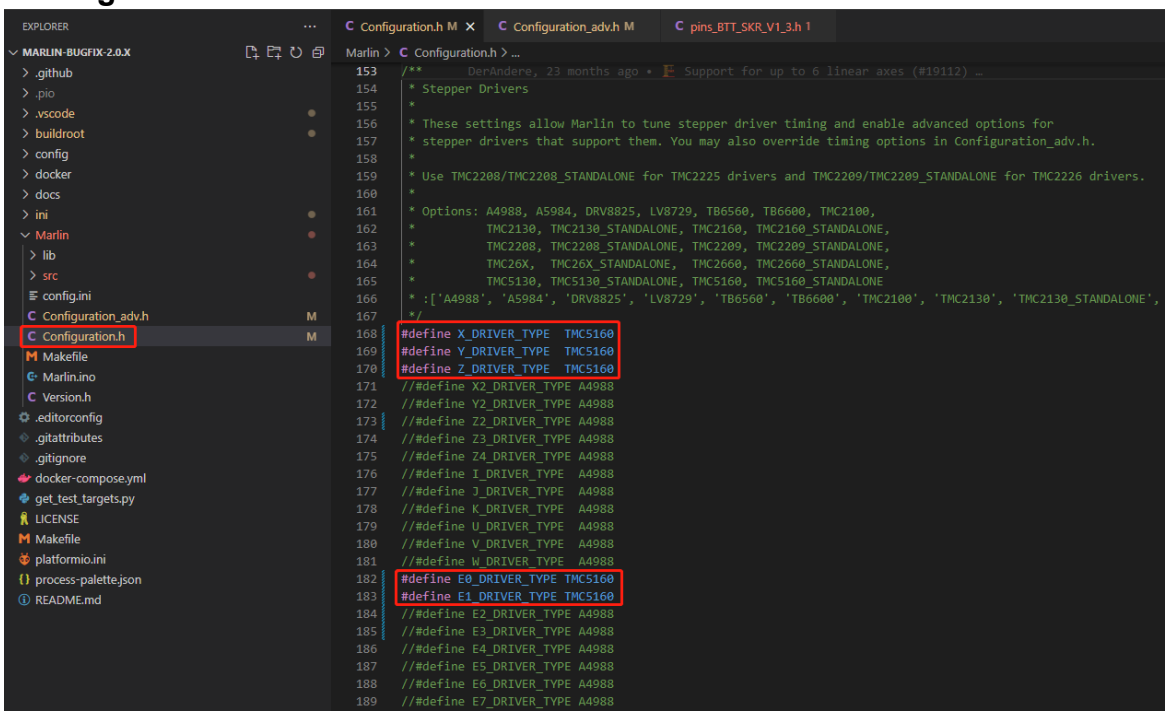
Step 4: Find and open "**Configuration_adv.h**", then locate **"#define TMC_USE_SW_SPI**" and remove the comment symbols "**//**".



Step 5: In the "**Configuration_adv.h**" file, find "**#define X_CURRENT**", "**#define X_MICROSTEPS**", and "**#define X_RSENSE**" and modify the parameters that follow (for each axis being used). The RSENSE value for each used axis should be changed to "0.022".



Step 6: Set the corresponding axis drive type to "TMC5160" in the "**Configuration.h**" file.



Klipper Firmware Settings

```
[tmc5160 stepper_x]
cs_pin: P1.17
spi_software_miso_pin: P0.5
spi_software_mosi_pin: P4.28
spi_software_sclk_pin: P0.4
sense_resistor: 0.022
#diag1_pin: P1.29
run_current: 0.800
stealthchop_threshold: 999999
```

Note: The default **sense_resistor** in Klipper is 0.075; it needs to be set to 0.022.

Safety Instructions

1. Turn off the power before installing the driver to prevent damage.
2. Do not plug or unplug the driver module with power on to avoid damage.
3. Be cautious of polarity when connecting; reversing can cause the driver to burn out.
4. The factory-installed heat sink should not be removed, as doing so will decrease heat dissipation in the absence of thermal interface material.
5. For large currents (greater than 3A), active cooling is required for normal operation.
6. This product uses a 0.022R sampling resistor, so the maximum effective driving current is 10.6A.
7. Pay attention to the power sequence; ensure the driver power is turned on before the logic power. That is, turn on the driver power first, then power on the motherboard.
8. Regardless of whether the driver uses high or low voltage power delivery, the output voltage from the main control board to the drive must not exceed 24V; exceeding this will damage the driver.

If you need further resources for this product, you can find them at [GitHub](https://github.com/bigtreetech/). 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.