SHENZHEN BIG TREE TECHNOLOGY CO.,LTD .

BIGTREETECH

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TMC5160 PRO-V1.1

User Manual

1.Introduction

TMC5160 is a control chip of high-power stepper motor with MOS power expansion, 20A maximum current and low heat generation.

StealthChop2 mode for TRINAMICs eliminates motor noise by reducing resonance. StallGuard2 filament blockage detection enables stepper motor torque control or back to zero without a sensor, which is a safe detection of motor stopping and the replacement of mechanical stop switch. DcStep allows the motor to run near its load limit and speed limit, achieving 10x or higher range without any pulse loss. SpreadCycle is high precision chopping algorithm for highly dynamic motor motion and generating absolutely clean current waves. Low noise, low resonance and low vibration chopper. CoolStep current control optimizes driver performance and energy efficiency, enables smooth and silent drive, balances speed and motor torque, reduces energy consumption by 75 %.

TMC5160 is an upgrade of TMC2100, TMC2130 and TMC5130 series, with higher voltage and motor currents.

2.Product Parameters

Driver Chip: TMC5160-WA;

Product Size: 15.3mm*20.4mm;

Supply Voltage: 8V---56V;

Maximum Current: 3A

(maximum current of 2.54 single-row pins-3A)

Maximum Segmentation: 256;

Working Mode: SPI Mode, SD Mode

3. Advantages

1、External power MOS tube, for higher current

2、Ultra-silent mode

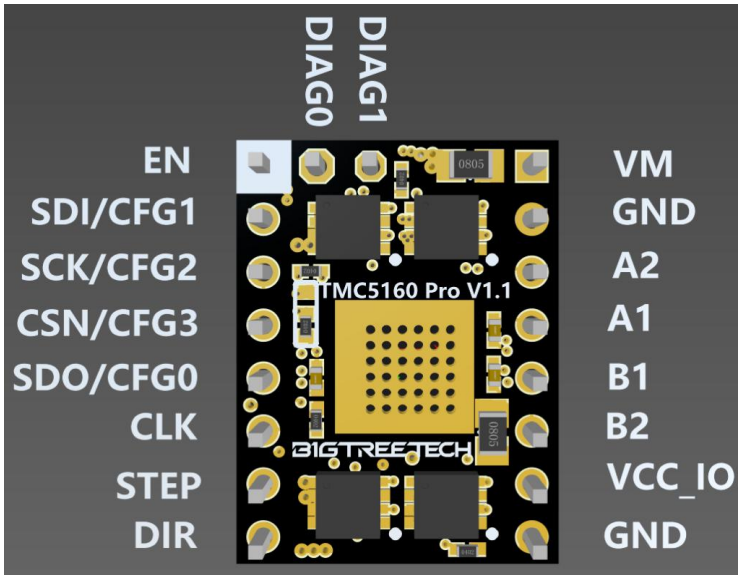
3、Less motor jittering

4、less pulse loss

5、It is able to drive 57 stepper motor

4.Pins Instruction

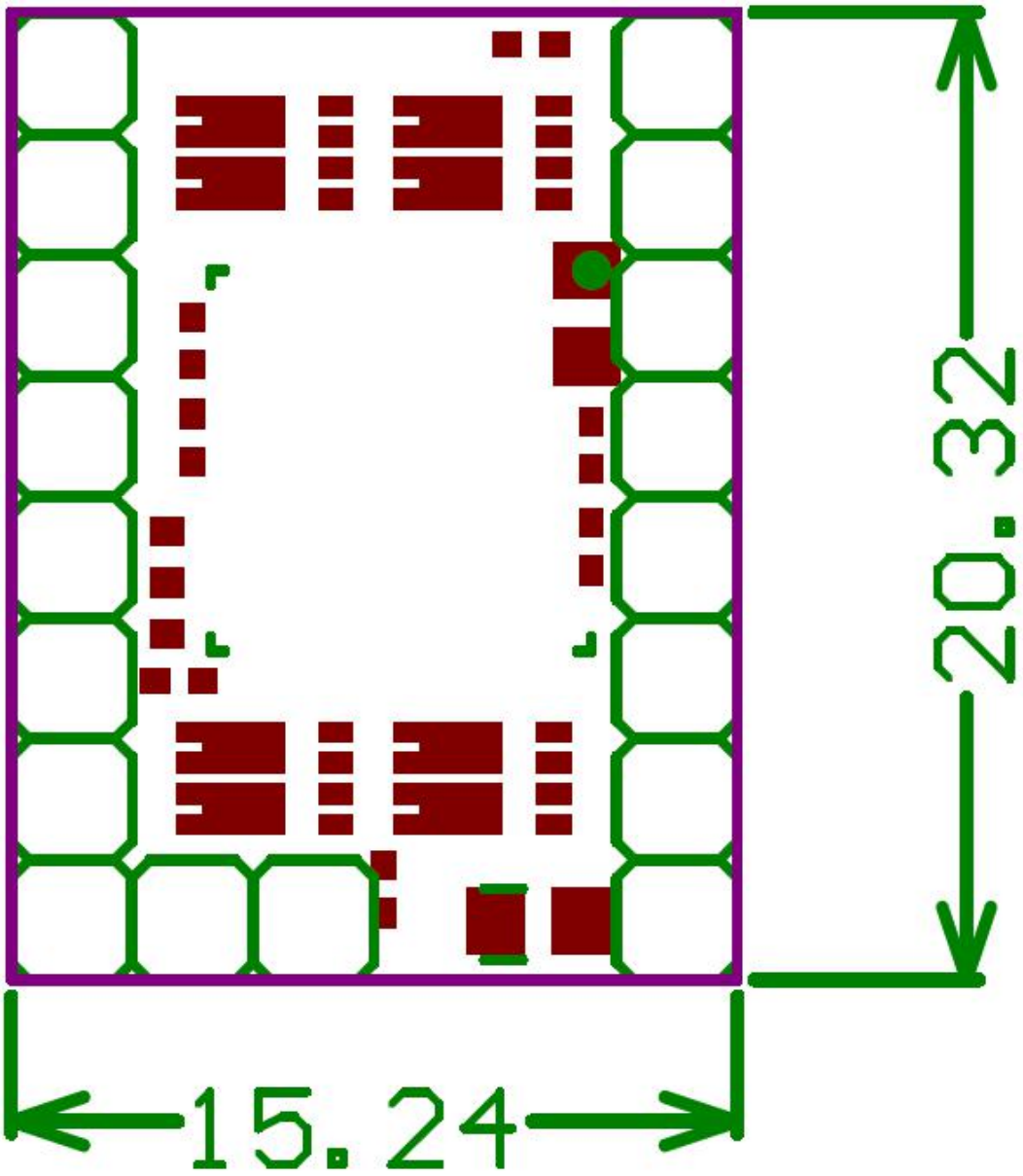
4.1、Names of pins



4.2、Functions of pins

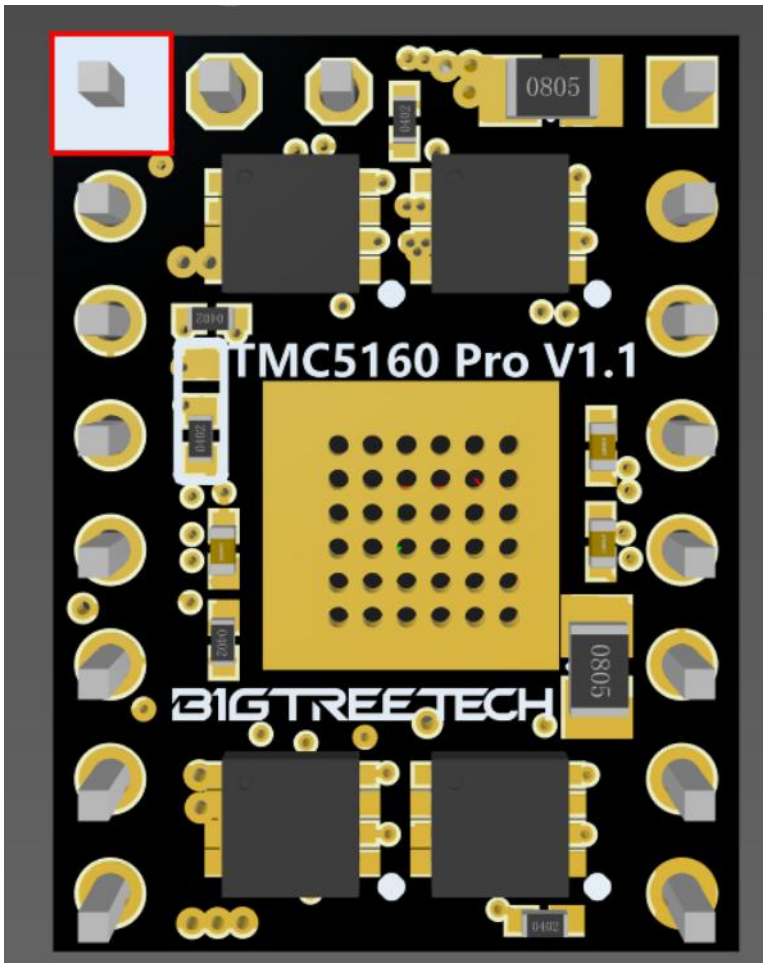
J1	Functions	J2	Functions
1	EN	1	VM
2	SDI/CFG1	2	GND
3	SCK/CFG2	3	A2
4	CSN/CFG3	4	A1
5	SDO/CFG0	5	B1
6	CLK	6	B2
7	STEP	7	VCC_IO
8	DIR	8	GND

4.3、Product Size



5.Driver installation

The pins with white boxes on the driver are enable (EN) pins:



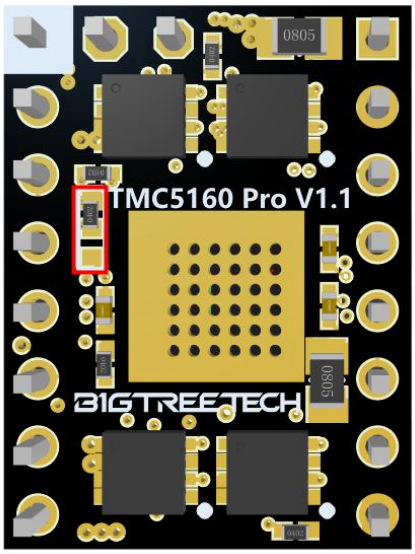
6.SD_MODE

The factory default mode SD_MODE = 1 , the STEP / DIR input pins control the driver as shown:

To use SD_MODE =0,

step signal is made by internal ramp generator

the resistor is welded to the other side as shown:



7.Heat dissipation

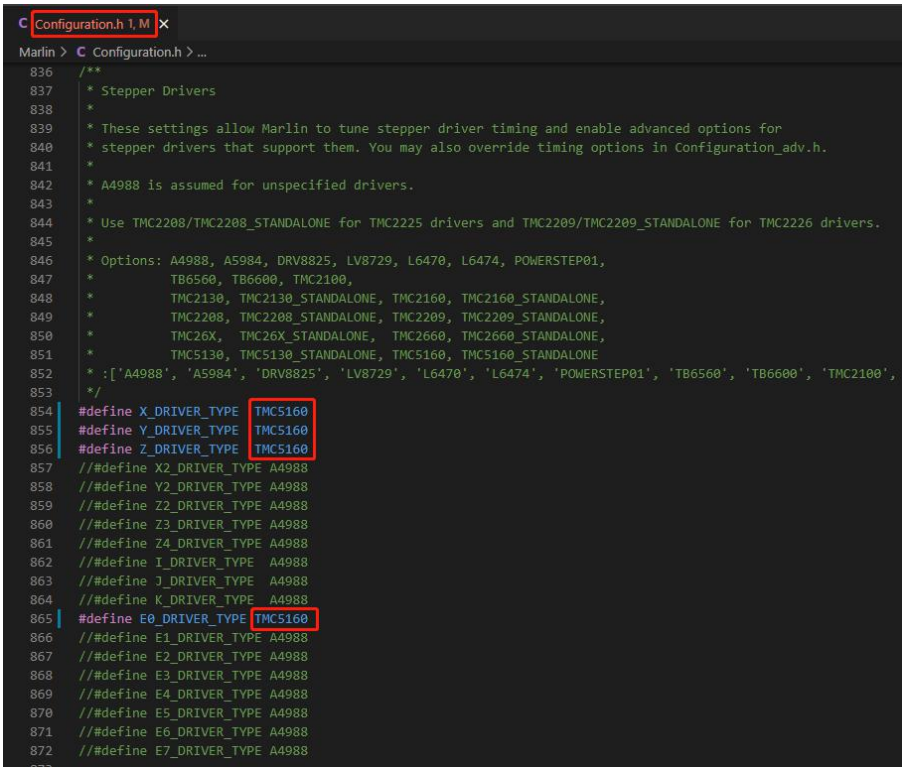
It is recommended to add active heat dissipation to the TMC5160 Pro When the current is over 1A.

With an 12V/5V LDO inside, excessive differential pressure brings more heat. It is recommended to add active heat dissipation to the TMC5160 Pro to ensure the stability of the printing system when the voltage is higher than 40V.

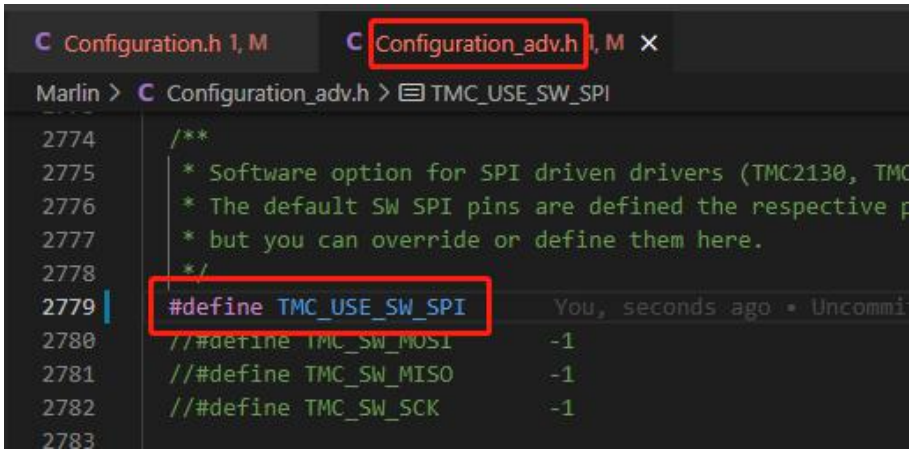
8.Firmware Configuration

1. Marlin

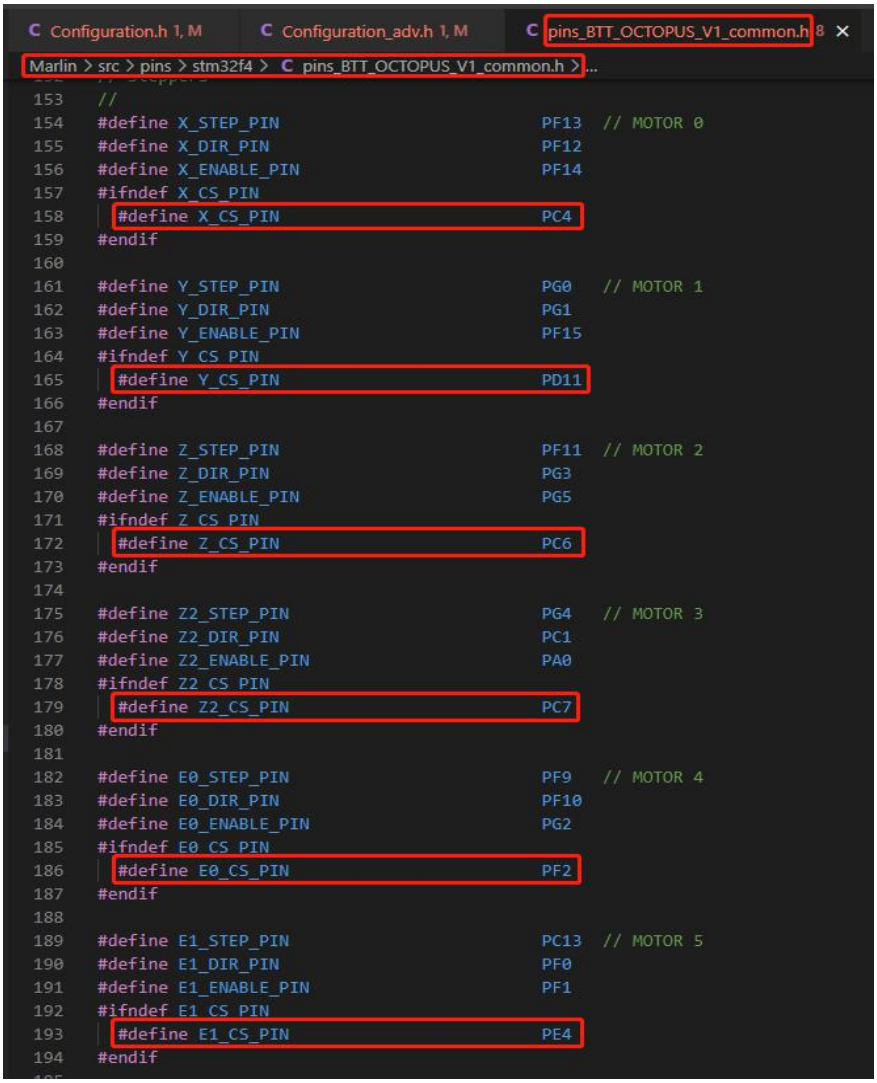
a. Set the driver as TMC5160 in Configuration.h

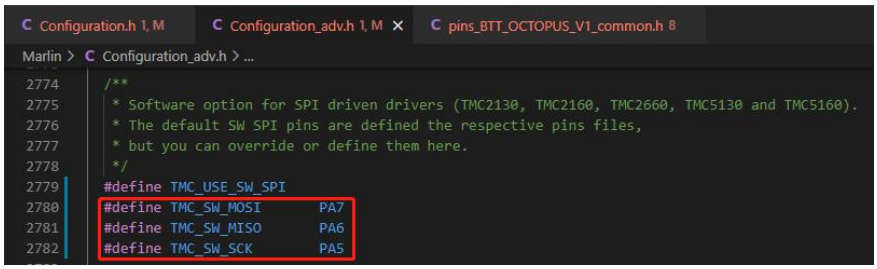


b. If there is independent SPI port, set TMC_USE_SW_SPI in Configuration_adv.h

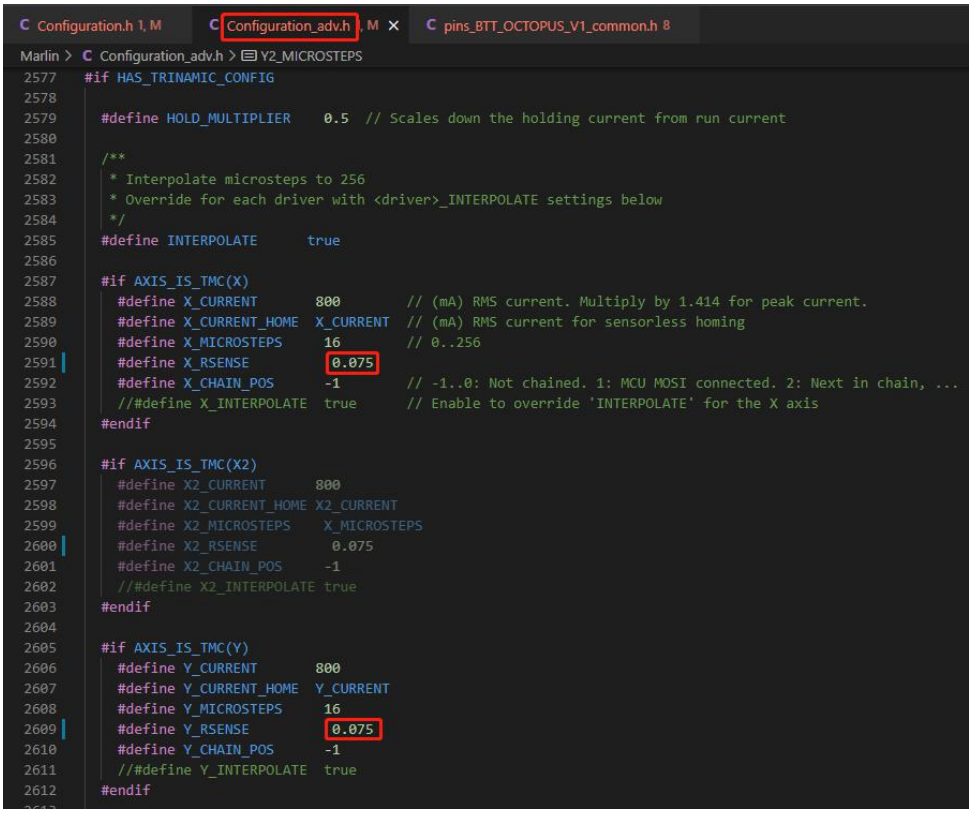


c. If the motherboard needs custom pins, customize the CS signal lines in the “pins_xxx.h” and the SPI signal lines in “Configuration_adv





d. Set the sampling resistance to 0.075 (the sampling resistance value of the driver is 0.075), and set the current and subdivision according to your own needs.



2. Klipper

Set the current and subdivision according.

For more details, please refer to

https://www.klipper3d.org/Config_Reference.html#tmc5160

printer.cfg

C: > Users > Administrator > Desktop > Canbus-Toolboard > printer.cfg

```
359
360 [tmc5160 stepper_x]
361 cs_pin: PC4
362 sense_resistor: 0.075
363 interpolate: True
364 run_current: 1.5
365 hold_current: 0.5
366 stealthchop_threshold: 0
367 spi_bus: spi1
368 #diag1_pin: !PG6 # Pin connected to TMC DIAG1 pin (or use diag0_pin / DIAG0 pin)
369 #driver_SGT: 2  # -64 is most sensitive value, 63 is least sensitive
370 #driver_TPFD: 0
371 #driver_TOFF: 4
372 #driver_HEND: 2
373 #driver_HSTRT: 1
374 #driver_DISS2G: 12
375 #driver_DISS2VS: 12
376
377
378 [tmc5160 stepper_y]
379 cs_pin: PD11
380 sense_resistor: 0.075
381 interpolate: True
382 run_current: 1.5
383 hold_current: 0.5
384 stealthchop_threshold: 0
385 spi_bus: spi1
386 #diag1_pin: ^!PG9 # Pin connected to TMC DIAG1 pin (or use diag0_pin / DIAG0 pin)
387 #driver_SGT: 3  # -64 is most sensitive value, 63 is least sensitive
388 #driver_TPFD: 0
389 #driver_TOFF: 4
390 #driver_HEND: 2
391 #driver_HSTRT: 1
392 #driver_DISS2G: 12
393 #driver_DISS2VS: 12
```

9.Caution

1、Disconnect the power supply before driver installation.

2、Confirm the direction of driver to avoid reverse insertion.

3、Do not plug and unplug the driver module when power is on to avoid damage.

4、Please note that the heat sink cannot contact with the pins to prevent the driver from short circuit.

5、TMC5160 is sensitive to static electricity, please be careful.

6、It is recommended to add the active heat dissipation when using higher current or higher voltage.

7、No touching after power on to avoid accident (especially when the power input is 36V or higher.)

10. Download link

https://github.com/bigtreetech/BIGTREETECH-Stepper-Motor-Driver