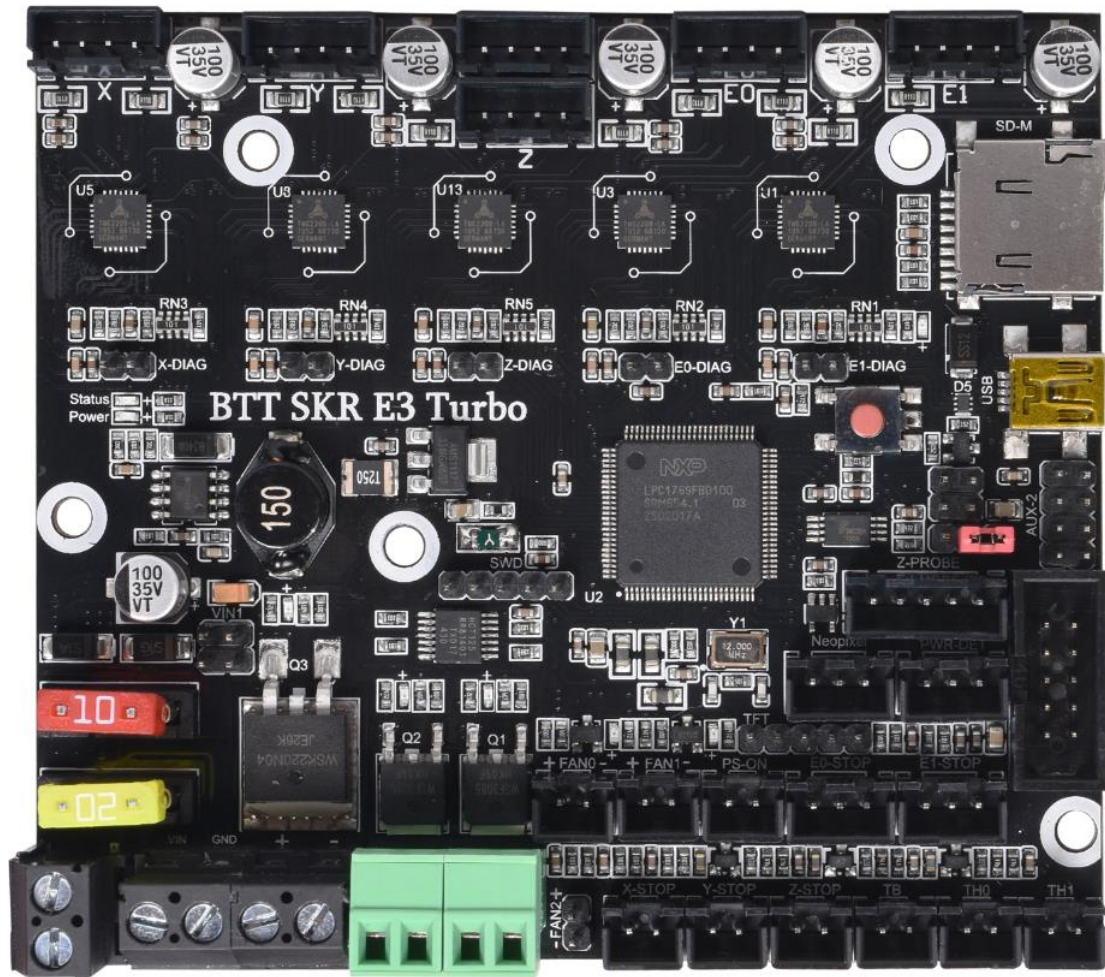# BIGTREETECH

SKR E3 Turbo

Operation Manual of the Motherboard

一、主板简介

BTT SKR E3 Turbois a customized motherboard for Ender3 printer launched by the 3D printing team of Shenzhen BIGTREE technology co., LTD., which can perfectly replace the motherboard of the original Ender3 printer.

1.Motherboard features:

1）Use SGM6130 power chip, support 12-24V power input, power conversion rate up to 94%, maximum output current up to 2.5A;

2）The hot bed MOS tube uses WSK220N04, low on-resistance, larger heat dissipation area, and reduce heat generation;

3）Onboard Sensorless homing function, which can be used by plugging in the jump cap;

4）Optimize the plate and frame to avoid the phenomenon of screw hole gap and screws hitting components;

5）Support BLtouch, filament detection, power-off resume, automatic shutdown, etc

6）Onboard EEPROM: AT24C32;

7）Add parallel double Z-axis interface;

8）Increase the board layer: 4 layer board;

9）Increase the heat dissipation area of the back driver and strengthen the heat dissipation capacity;

10）Two CNC fan interfaces;

11）Increase the distance between the driving chip and the components to avoid the trouble caused by the heat sink;

12）Add protection device to the thermistor interface;

13）5V power supply with BLtouch, TFT and RGB interfaces is optional;

14）The USB port adopts the ESD protector USBLC6-2, which effectively protects the USB port from damage;

15）The main control adopts LPC1769 chip, the main frequency is up to 120MHz, and the ARM-level Cortex-M3;

16）5 TMC2209 drivers on board, supporting dual extruders;

17）Onboard NTC100K thermistor, real-time monitoring of motherboard temperature;

18）Adding the Standby function of TMC2209, customers can change the firmware according to their personal needs,Set the Standby function. In this mode, the drive chip will automatically cut off

the power supply to the motor. Its own power consumption will also be reduced to a minimum, effectively reducing printer power consumption and saving power consumption;

19）The heater interface adopts pluggable wiring terminals, which makes the user's wiring process more convenient and quick;

20）Add one I2C bus expansion interface and one UART expansion interface for customer DIY use;

2. **Motherboard parameters:**

Appearance size: 102mm*90.25mm
Installation size: check BTT SKR E3 Turbo-SIZE.pdf for details
Layer: 4 layers
MCU： ARM Cortex-M3 LPC1769
Power input: DC 12/24V
Logic voltage: 3.3V
Motor driver: UART mode of onboard TMC2209;
Motor drive interface: XM、 YM、ZAM、ZBM、E0M、E1M
Temperature sensor interface: TH0、 TH1、THB，3 channels 100K NTC interface
Display: 2.4 inch TFT, 3.5 inch TFT, Ender3 original LCD12864 screen, etc.
PC communication interface: mini-USB-B type, easy to plug and unplug, communication baud rate 115200
Support file format: G-code
Recommended software: Cura、 Simplify3D、 pronterface、 Repetier-host、 Makerware

Ⅱ.Description of motherboard indicators

After power on the motherboard:

3.3v red light is power indicator: the red light is on, indicating normal power supply.

Status red light is the Status indicator: when updating the firmware, it will flicker.

D12green light is the HB status indicator for the hot bed: it is always on when heated, and it goes out when not heated.

D11green light is the indicator light of E0 status of the heating tube: it is

always on when heating, and it will go out when not heating.

D9 green light is heating rod E0 status indicator: it is always on when

heating and off when not heating

D14 green light for CNC fan FAN0 status indicator: it lights up when

turned on, and goes out when turned off.

D13 green light for CNC fan FAN1 status indicator: it lights up when

turned on, and goes out when turned off.

D10 green light is SD detection indicator. It is on when SD is inserted

and off when it is not inserted.

Ⅲ. Communication between motherboard and PC

The motherboard communicates with the PC (Windows system) through

the [USB] interface. Before communication, the driver needs to be

installed to be used normally. Driver acquisition method:

Website: https://github.com/bigtreetech Download the file named:

mapleDrv to install it.

IV. Interface Instruction

1. Motherboard Size Diagram
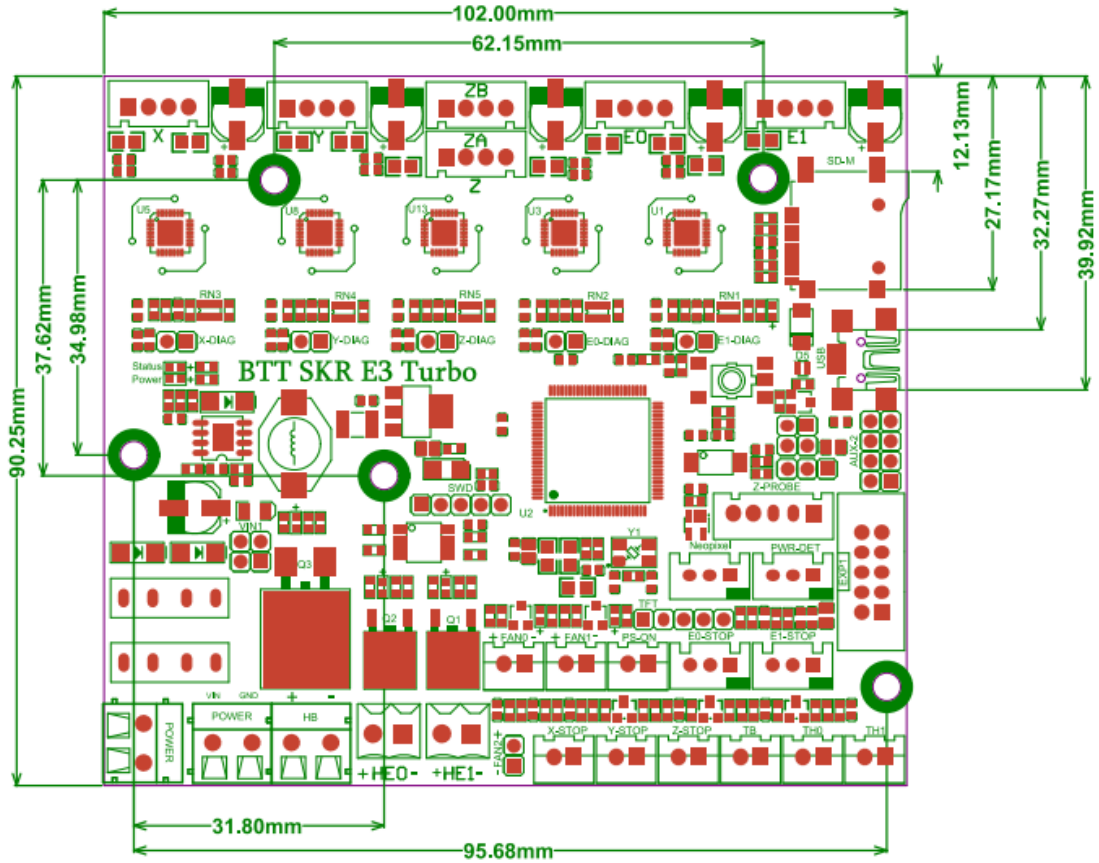
2. Motherboard Wiring Diagram
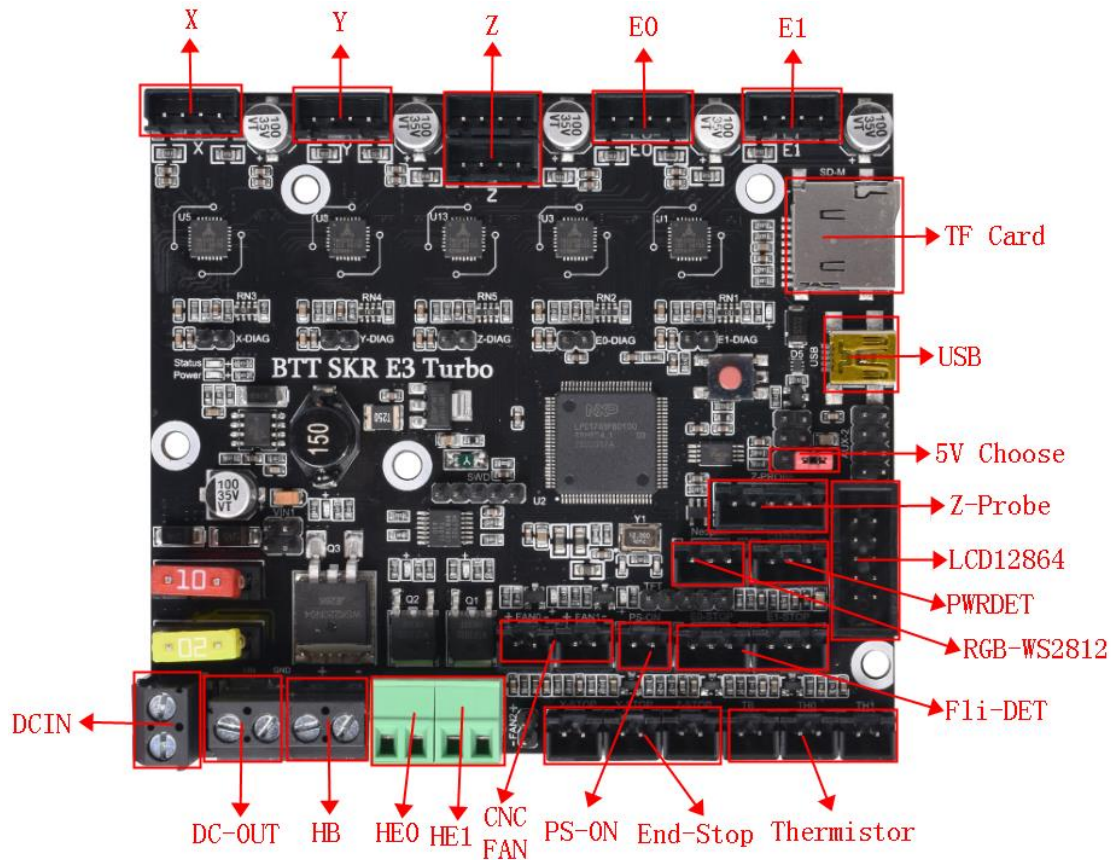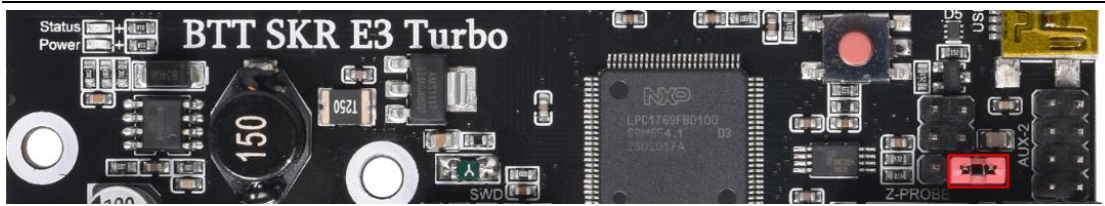

3. Sensorless Homing Function Selection：
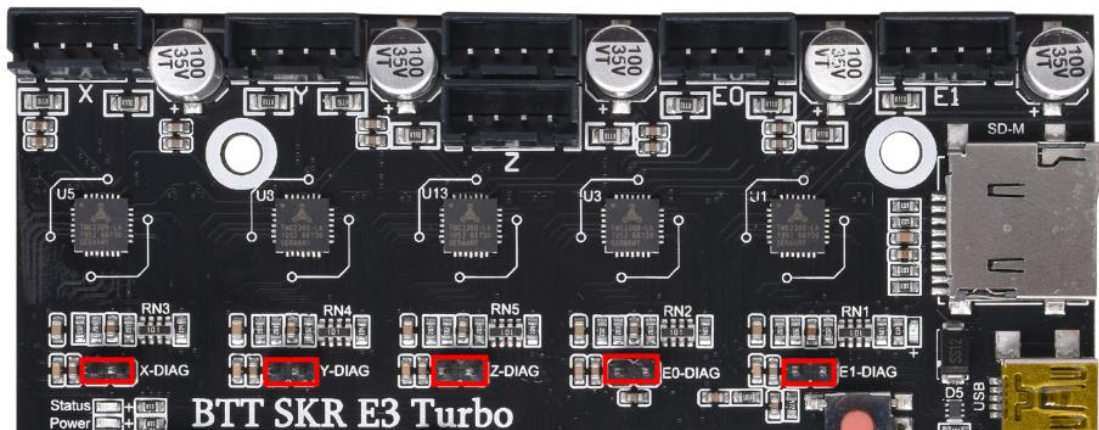
As shown in the figure, the Sensorless homing function can be used to connect the corresponding axis with the jumper cap.

Note: if you select this feature, you cannot use external ENDSTOP!!!

4. 5V power selection for BLtouch, TFT and RGB interfaces:
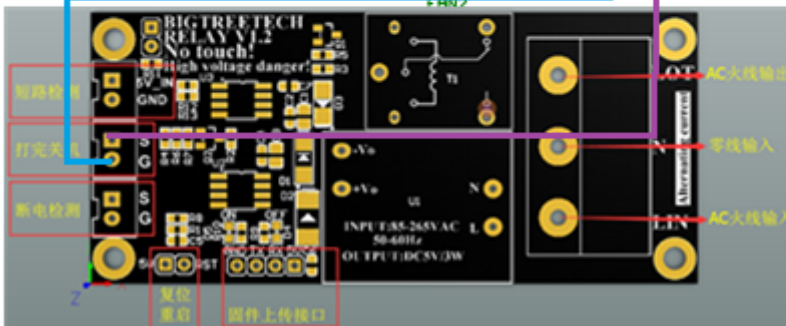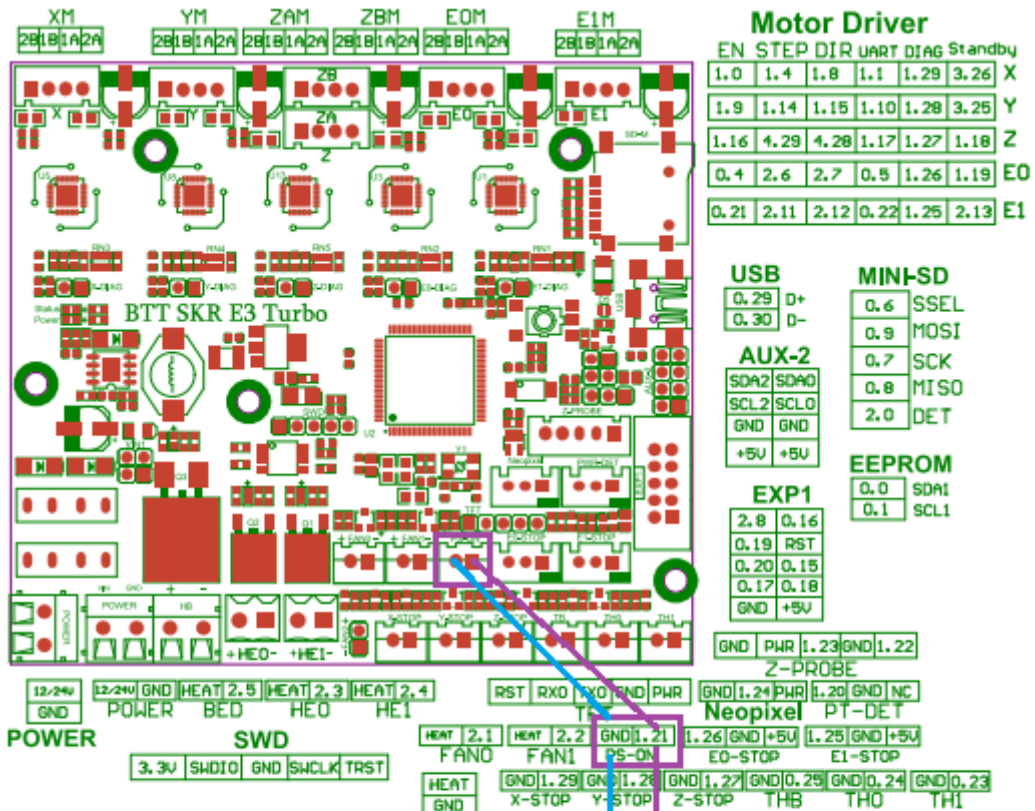
  1) onboard +5V power supply:

2)Use BIGTREETECH DCDC5V V1.0 module+5V power supply：

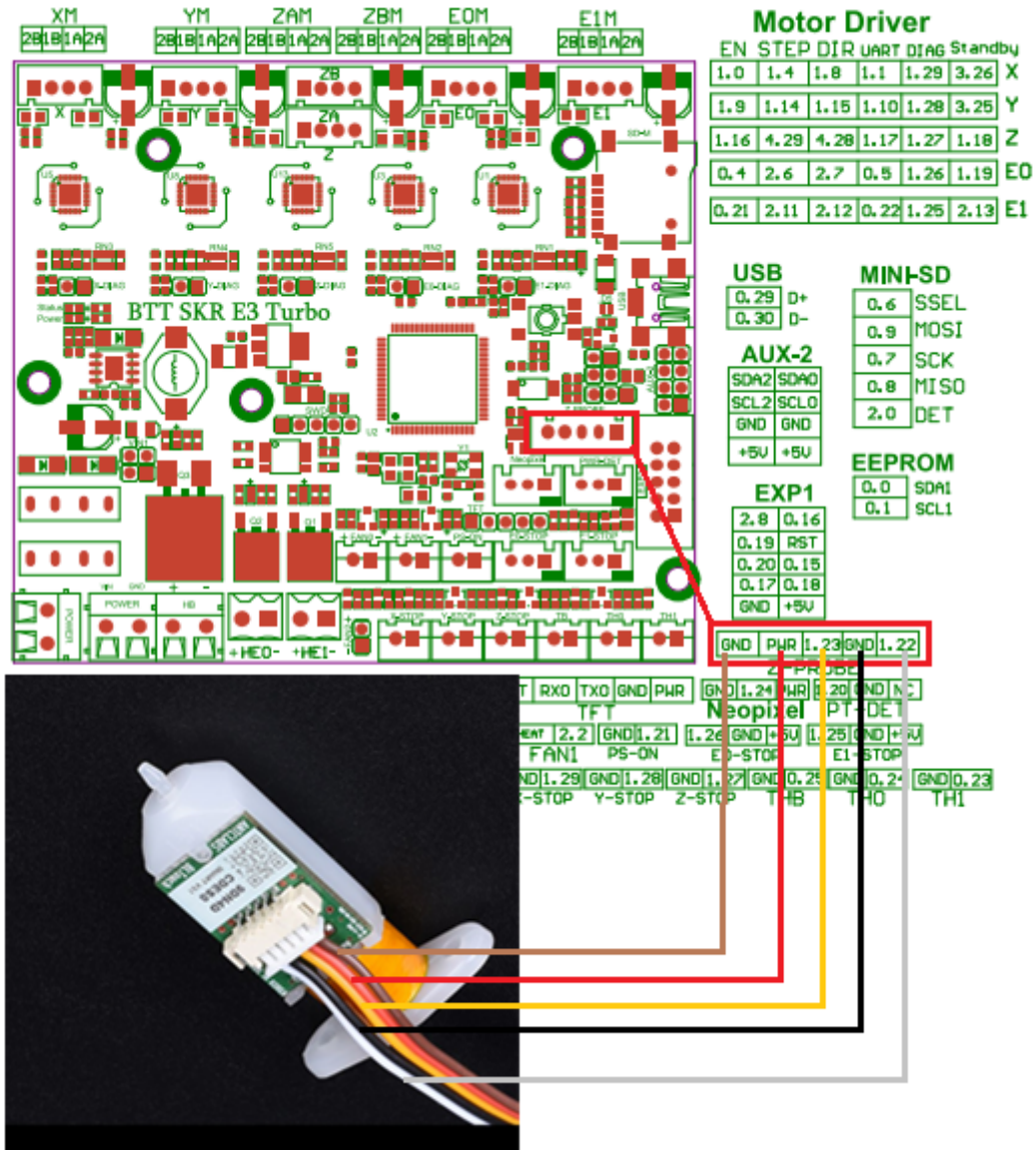5.Connection with BIGTREETECH Relay V1.2：

6.Connection with BTT UPS 24V V1.0：
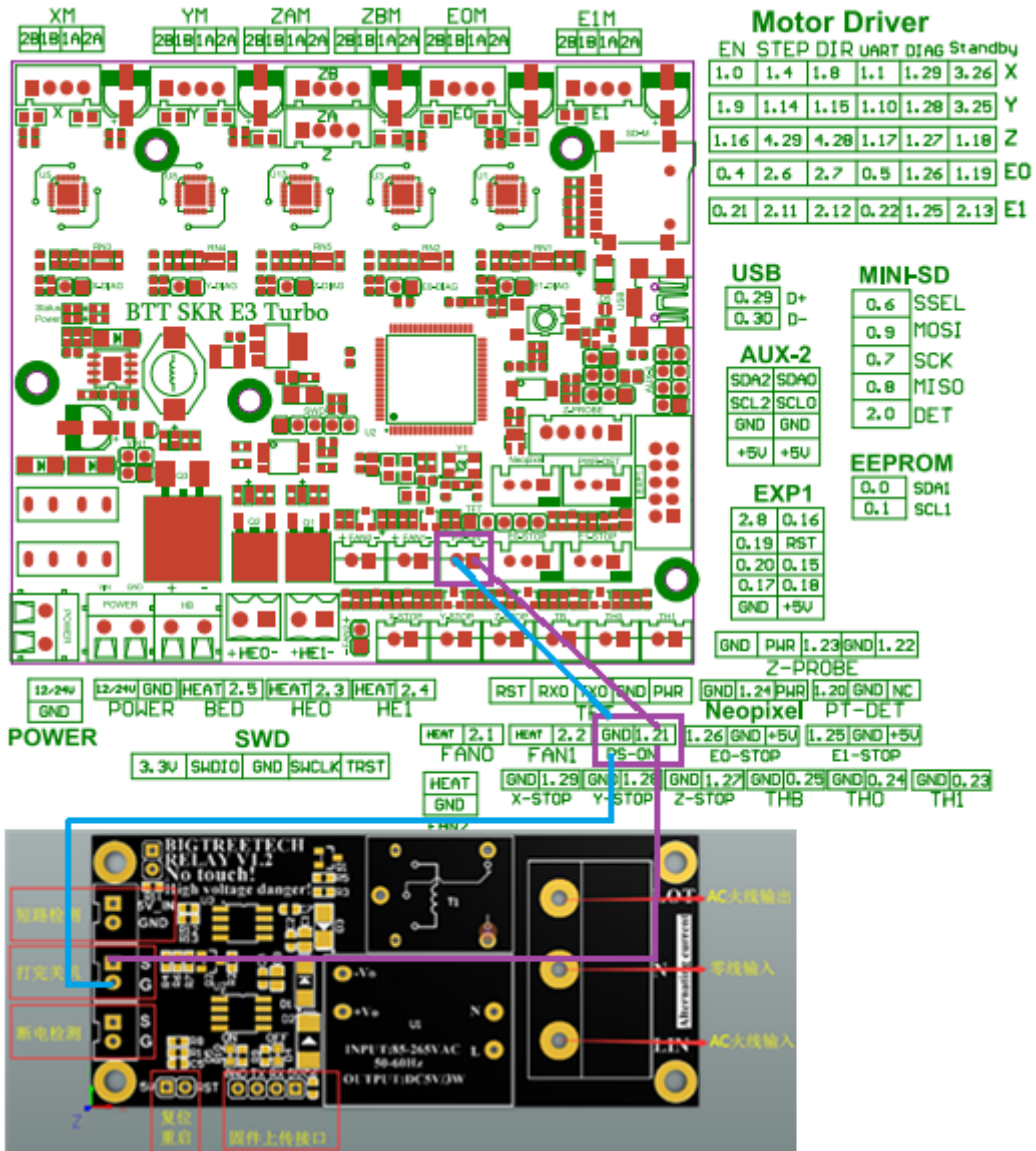
7.Connection with Neopixel lights:
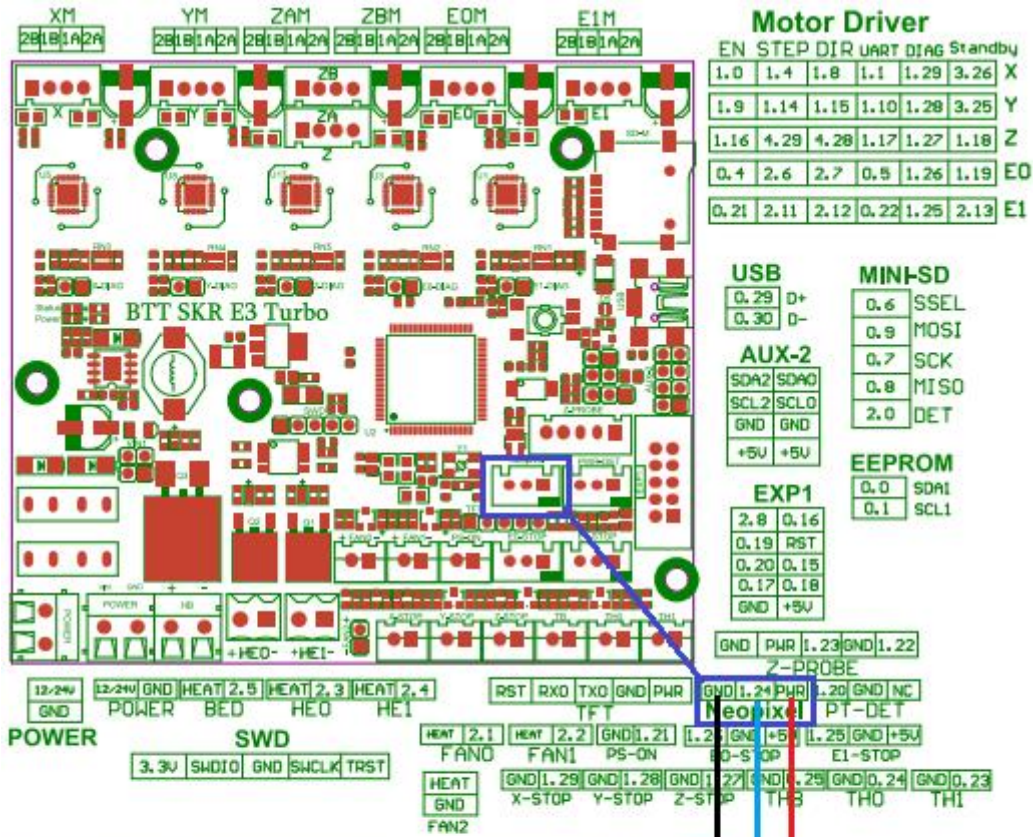
8.Connection with BLtouch:

V. The firmware description of motherboard

The factory motherboard is installed equipped with firmware for testing (model Ender3), which can be used directly or changed according to your own needs.

1.The Firmware Acquisition Method of Motherboard:

Obtain by Ask customer service or technical personnel;

Download at our Company Open source website: https://github.com/bigtreetech

2.Motherboard Firmware update method

Choose the file suitable for your model in the downloaded firmware package to copy to SD Card Root directory.

Note: File name cannot be changed, **firmware.bin** must be lowercase!

Insert SD card into the main board SD card slot, re-energize or press the reset key, wait for about 10S. After that, the update can be completed.

3. For DIY motherboard firmware, please refer to BTT SKR E3 Turbo-PIN.pdf data.

VI.Notes

1. Firmware file names in SD Card cannot be changed. (including both upper and lower case letters).

2. The wiring process and the plug-in drive process must be carried out under the premise of power off. The power on can be started after checking the correct connection of the line and the correct insertion of the drive, so as to prevent the wrong connection of the mainboard and drive from being burnt down and causing unnecessary losses.

3. The motherboard can support the LCD12864 screen with the interface CR10_STOCKDISPLAY.

If you encounter other problems, please contact us. We will definitely answer your questions patiently. If you have any good suggestions on our products, please give us feedback. We will consider them seriously. Thank you for choosing BIGTREETECH products!