

SHENZHEN BIG TREE TECHNOLOGY CO., LTD
BIGTREETECH

BIGTREETECH

MAX31865 V1.0

Manual

【Please read this manual carefully before use】

1, BIGTREETECH MAX31865 V1.0 Module introduction

The module use MAX31865 chip, support two-wire, three-wire, four-wire PT1000 and PT100 temperature sensor, 5V power input, Support multiple modules in series.

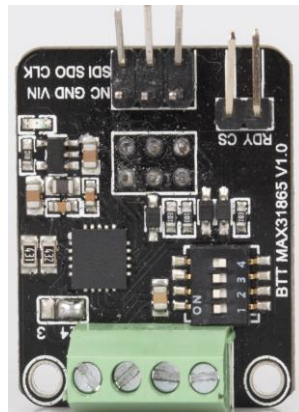
1, Pin introduction

VIN—Power positive (5V) SDI--data input SDO--Data output
 CLK--Clock line CS--Chip Select GND—Power negative

2, DIP switch configuration

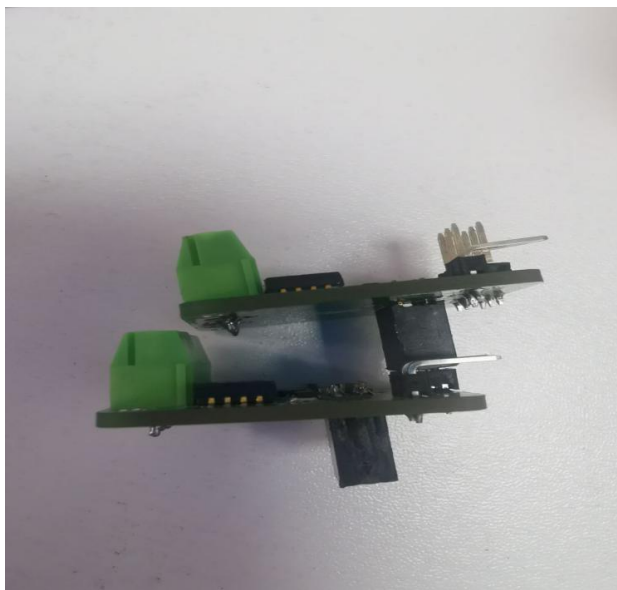
1	2	3	4	Sensor model
ON	ON	ON	OFF	Two-wire PT100
ON	ON	OFF	ON	Two-wire PT1000
OFF	ON	ON	OFF	Three-wire PT100
OFF	ON	OFF	ON	Three-wire PT1000
OFF	OFF	ON	OFF	Four-wire PT100
OFF	OFF	OFF	ON	Four-wire PT1000

When using a three-wire PT100 or PT1000 sensor, the solder joints in the red box need to be re-welded as shown below:



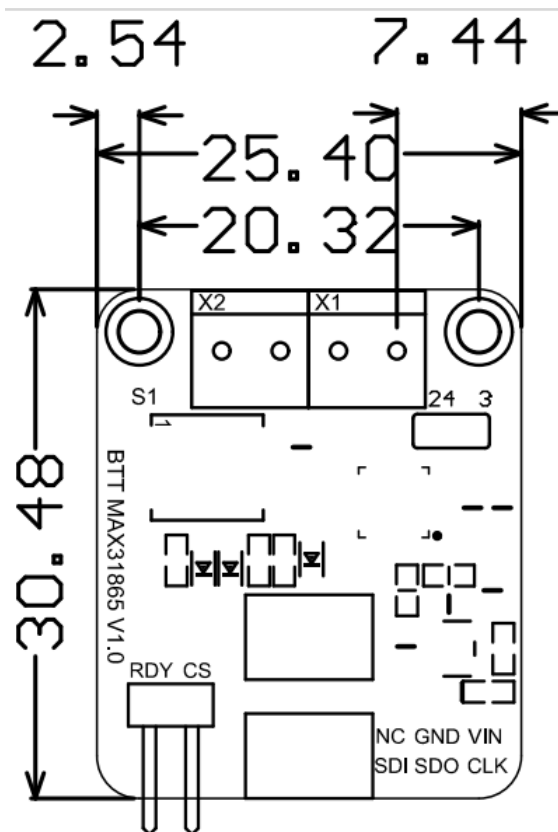
Among them, the two-wire or 4-wire PT100/PT1000 is used to short the middle pad and the two sides close to the terminal. The 3-wire PT100/PT1000 is used to short the middle pad and the edge of the board. The factory default is 2/4 wires. 3 wires can also use 2 wires, but the accuracy is slightly reduced (same as 2 wires)

3, Connecting the modules in series



As shown in the figure above, two BTT MAX31865 V1.0 can be connected in parallel (or even multiple in parallel), and by selecting different CS signals (CS signals must be connected to the main board separately), the readings of different modules can be read.

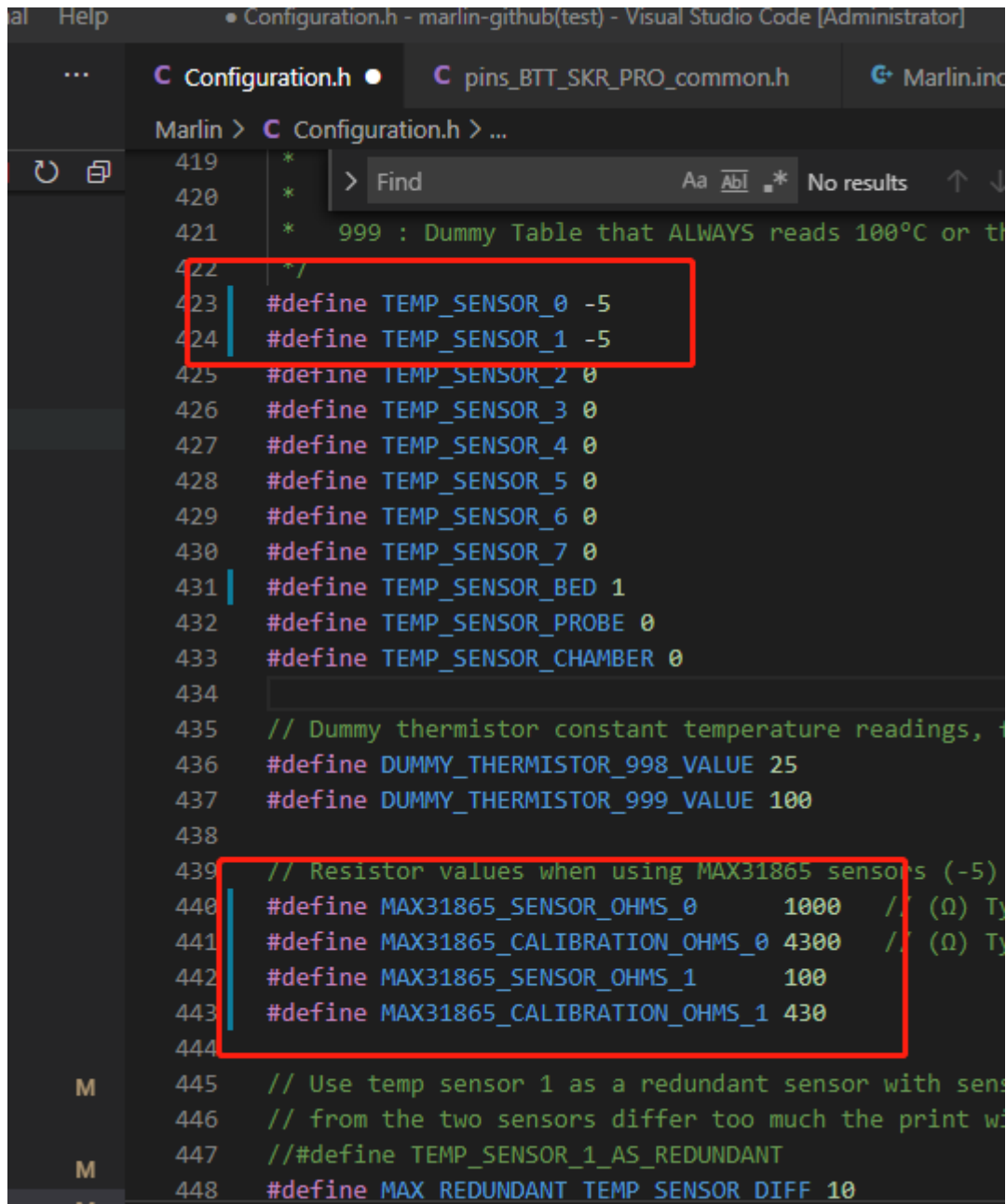
2, Installation size:



3, Marlin Firmware configuration:

Marlin firmware supports the connection of up to two BIGTREETECH MAX31865 V1.0 modules. The default is two-wire and four-wire universal, through the Configuration.h and Configuration_adv.h files. The BTT PT1000&PT100 module can be a PT100 or PT1000 sensor, and different parameters need to be configured.

1, Configuration.h:



```
419 *
420 *
421 * 999 : Dummy Table that ALWAYS reads 100°C or t
422 */
423 #define TEMP_SENSOR_0 -5
424 #define TEMP_SENSOR_1 -5
425 #define TEMP_SENSOR_2 0
426 #define TEMP_SENSOR_3 0
427 #define TEMP_SENSOR_4 0
428 #define TEMP_SENSOR_5 0
429 #define TEMP_SENSOR_6 0
430 #define TEMP_SENSOR_7 0
431 #define TEMP_SENSOR_BED 1
432 #define TEMP_SENSOR_PROBE 0
433 #define TEMP_SENSOR_CHAMBER 0
434
435 // Dummy thermistor constant temperature readings, t
436 #define DUMMY_THERMISTOR_998_VALUE 25
437 #define DUMMY_THERMISTOR_999_VALUE 100
438
439 // Resistor values when using MAX31865 sensors (-5)
440 #define MAX31865_SENSOR_OHMS_0 1000 // (Ω) Ty
441 #define MAX31865_CALIBRATION_OHMS_0 4300 // (Ω) Ty
442 #define MAX31865_SENSOR_OHMS_1 100
443 #define MAX31865_CALIBRATION_OHMS_1 430
444
M 445 // Use temp sensor 1 as a redundant sensor with sens
446 // from the two sensors differ too much the print w
M 447 // #define TEMP_SENSOR_1_AS_REDUNDANT
M 448 #define MAX_REDUNDANT_TEMP_SENSOR_DIFF 10
```

TEMP_SENSOR_0 set to Minus 5: Use MAX31865 module on heater 0

TEMP_SENSOR_1 set to Minus 5: Use MAX31865 module on heater 1

Currently, only sensors 0 and 1 are configured as MAX31865 modules, others are not supported

If use PT100:

MAX31865_SENSOR_OHMS set to 100

MAX31865_CALIBRATION_OHMS set to 430

If use PT1000:

MAX31865_SENSOR_OHMS set to 1000

MAX31865_CALIBRATION_OHMS set to 4300

Above: Temperature sensor 0 is configured as PT1000 MAX31865 module Temperature sensor 1 is configured as a PT100 MAX31865 module. The number of heater is 2 (#define **EXTRUDERS** 2)

2, Configuration_adv.h:

```
#define THERMOCOUPLE_MAX_ERRORS 20
#define MAX_CONSECUTIVE_LOW_TEMPERATURE_ERROR_ALLOWED 10
#define SHOW_TEMP_ADC_VALUES
#define M115_GEOMETRY_REPORT
```

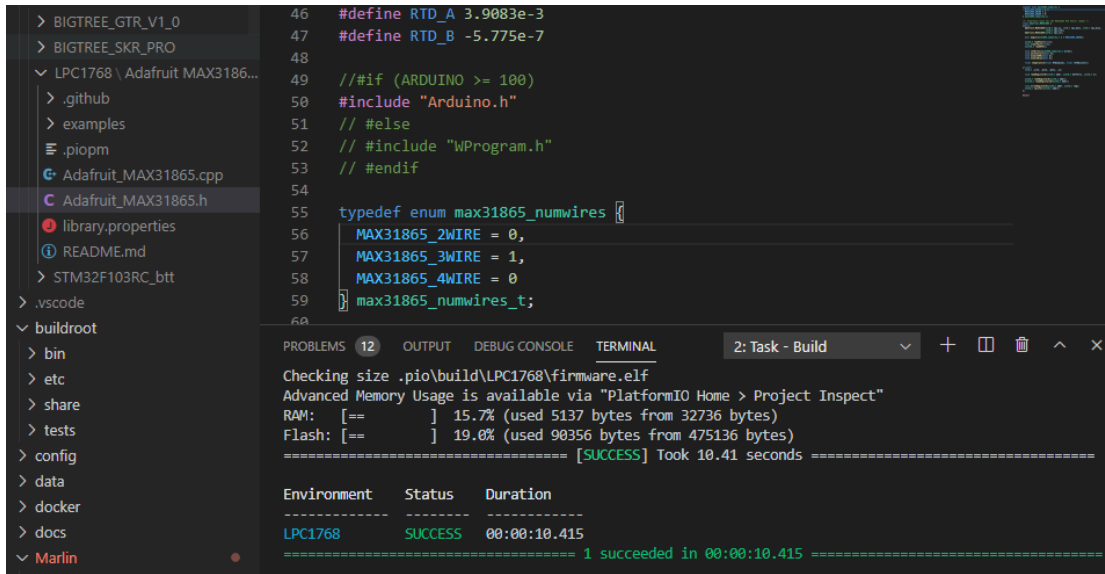
```
*/
#define THERMOCOUPLE_MAX_ERRORS 20
```

```
*
* If you want to enable this feature for your hotend thermis
* uncomment and set values > 0 in the constants below
*/
// The number of consecutive low temperature errors that can
// before a min_temp_error is triggered. (Shouldn't be more t
#define MAX_CONSECUTIVE_LOW_TEMPERATURE_ERROR_ALLOWED 10
// The number of milliseconds a hotend will preheat before st
```

```
// Show Temperature ADC value
// Enable for M105 to include ADC values read from temperatur
#define SHOW_TEMP_ADC_VALUES
```

```
*/
#define EXTENDED_CAPABILITIES_REPORT
#if ENABLED(EXTENDED_CAPABILITIES_REPORT)
  #define M115_GEOMETRY_REPORT
#endif
/**
* Expected Printer Check
```

3, While Using BTT-SKR motherboard V1.1 V1.3 V1.4 BTT-SKR V1.4



BTT-SKR E3 Turbo modified the Adafruit_MAX31865.h file under the LPC1769 file

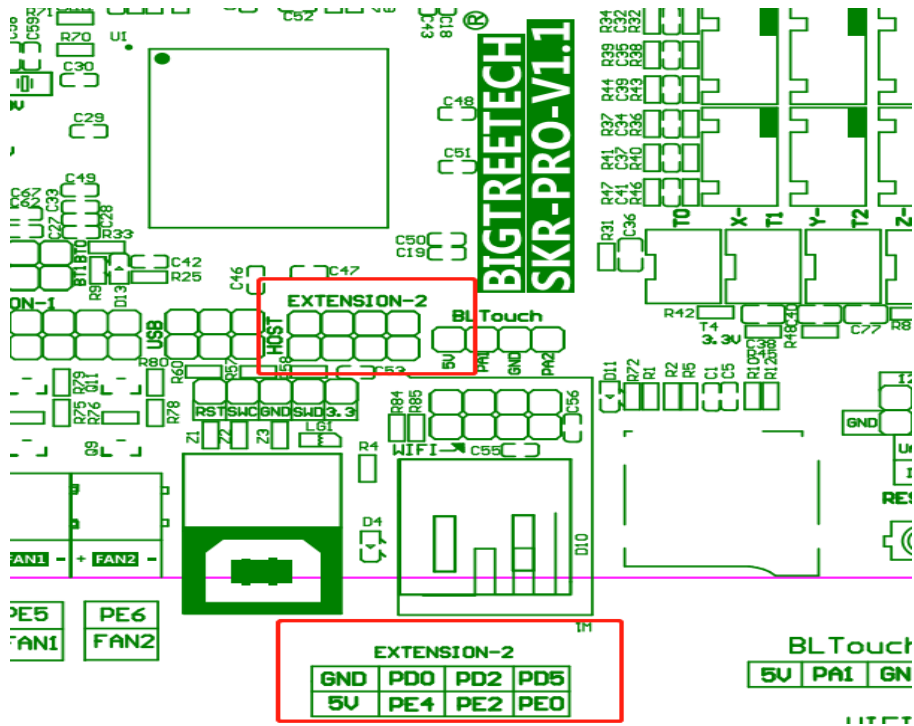
4, BIGTREETECH motherboard and BIGTREETECH MAX31865 V1.0 module connection configuration:

Model	SDI	SDO	CLK	CS1	CS2	Pin location
SKR-PRO	PD5	PD0	PD2	PE0	PE2	EXTENSION2
GTRV1.0	PH10	PH8	PH7	PH13	PI9	EXTENSION
SKR-MINI_E3	PB9	PB8	PA10	PA9	-	EXP1
SKR-MINI-V1.1	PB6	PC11	PC10	PC12		EXP1
SKR-E3-DIP	PB9	PB8	PB7	PA10		EXP1
BTT-SKR	P1.19	P0.28	P1.30	P1.18	P1.21	EXP1
BTT-SKR E3	P0.15	P0.18	P0.17	P0.20	P0.19	EXP1

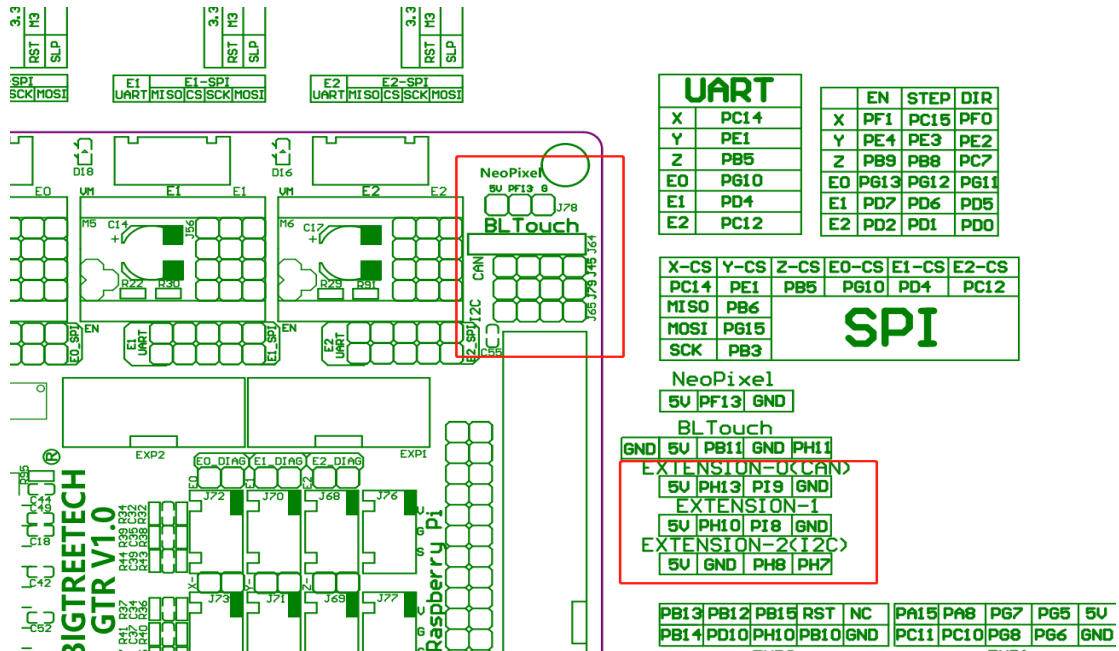
Power cable : Vin-----5V GND-----GND

When using two modules at the same time, the two modules need to be plugged together and the signal wires are connected in series. When using EXP1, the MAX31865 V1.0 module and CR10 display cannot be used at the same time

1, SKR-PRO monthboard (V1.1 and V1.2)



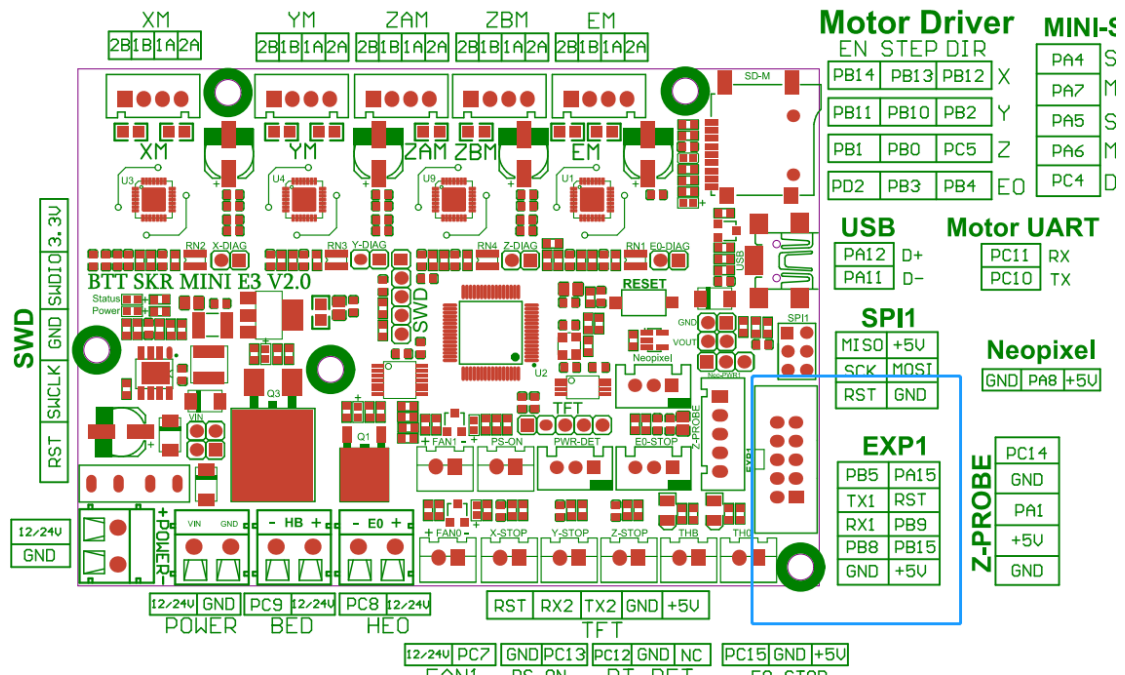
2, GTRV1.0 monthboard



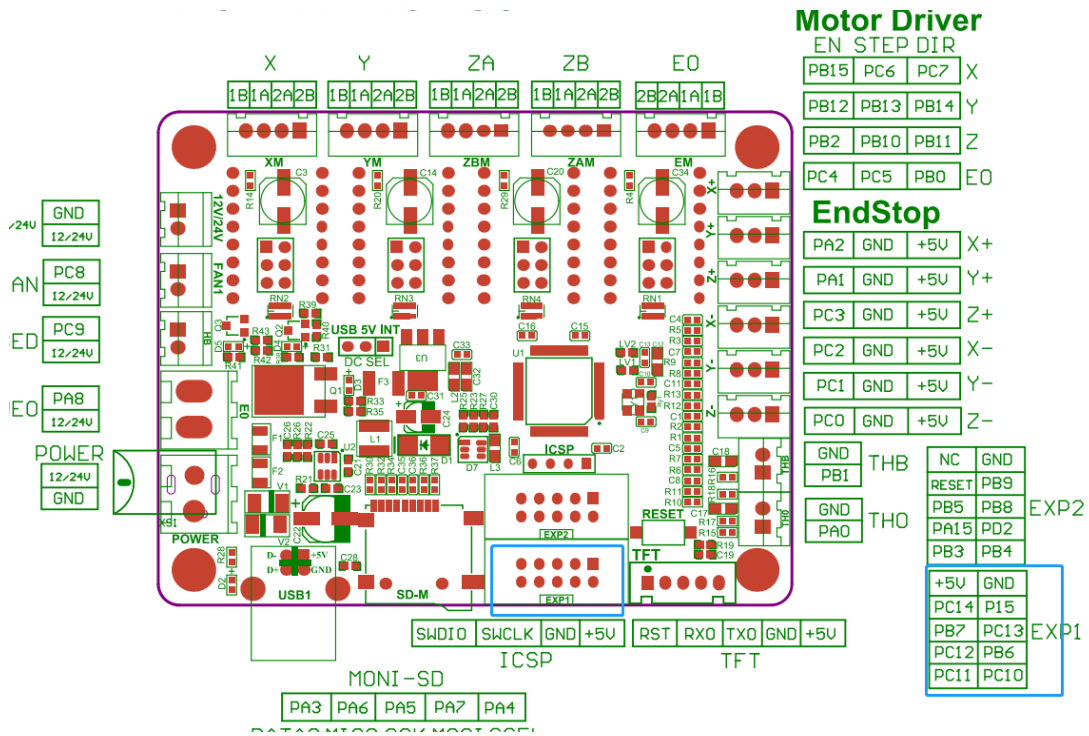
3, SKR-MINI_E3 (V1.0,V1.2,V2.0)

SKR-MINI_E3 MZ

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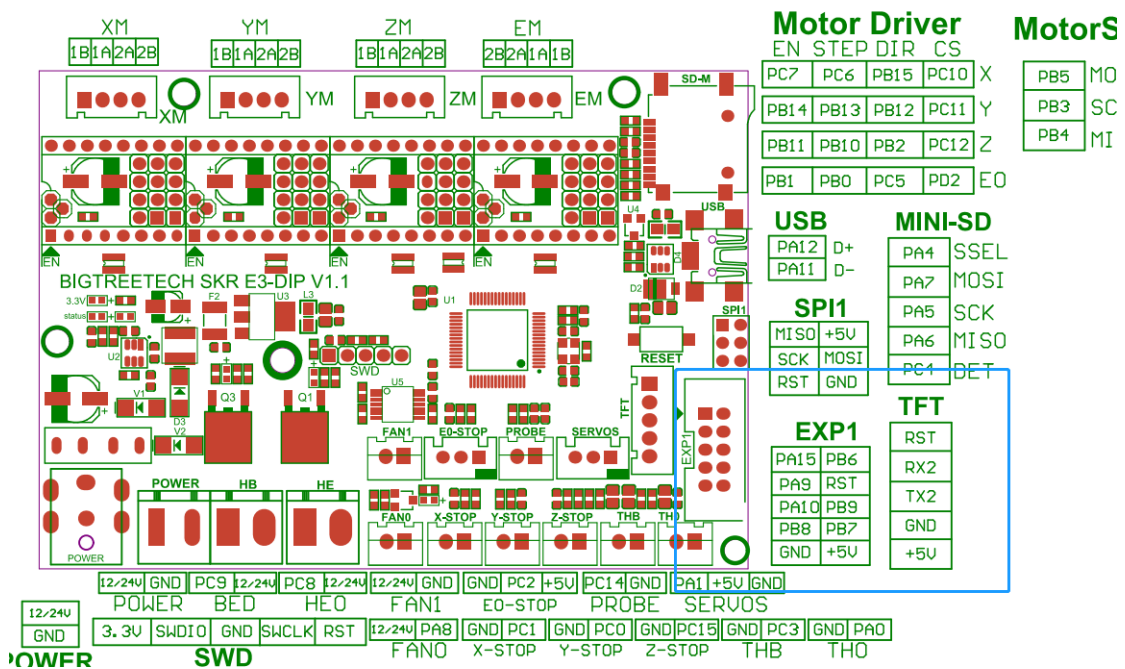


4, SKR-MINI-V1.1



5, BTT-SKR-E3-DIP V1.1

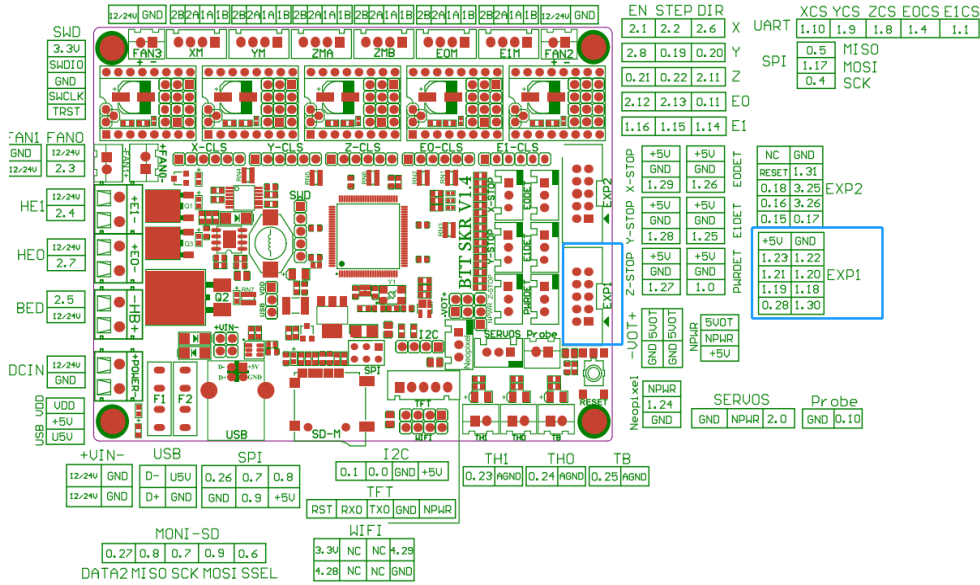
BIGTREETECH SKR-E3-DIP-V1.1-PIN
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6, BTT-SKR monthboard V1.1 V1.3 V1.4 (LPC1768)

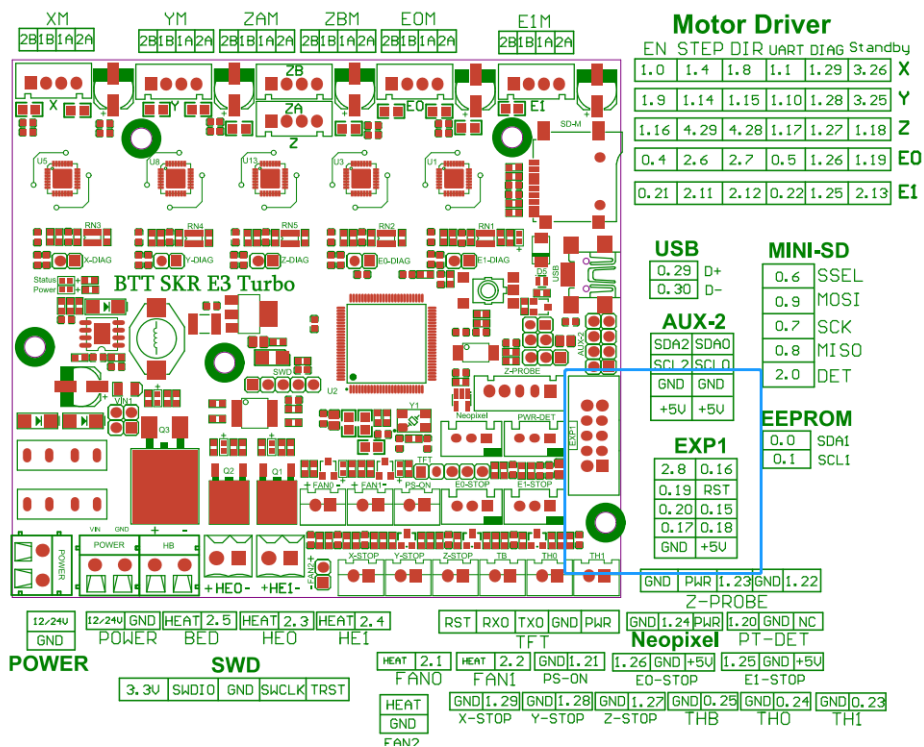
BTT-SKR V1.4 turbo monthboard (LPC1769)

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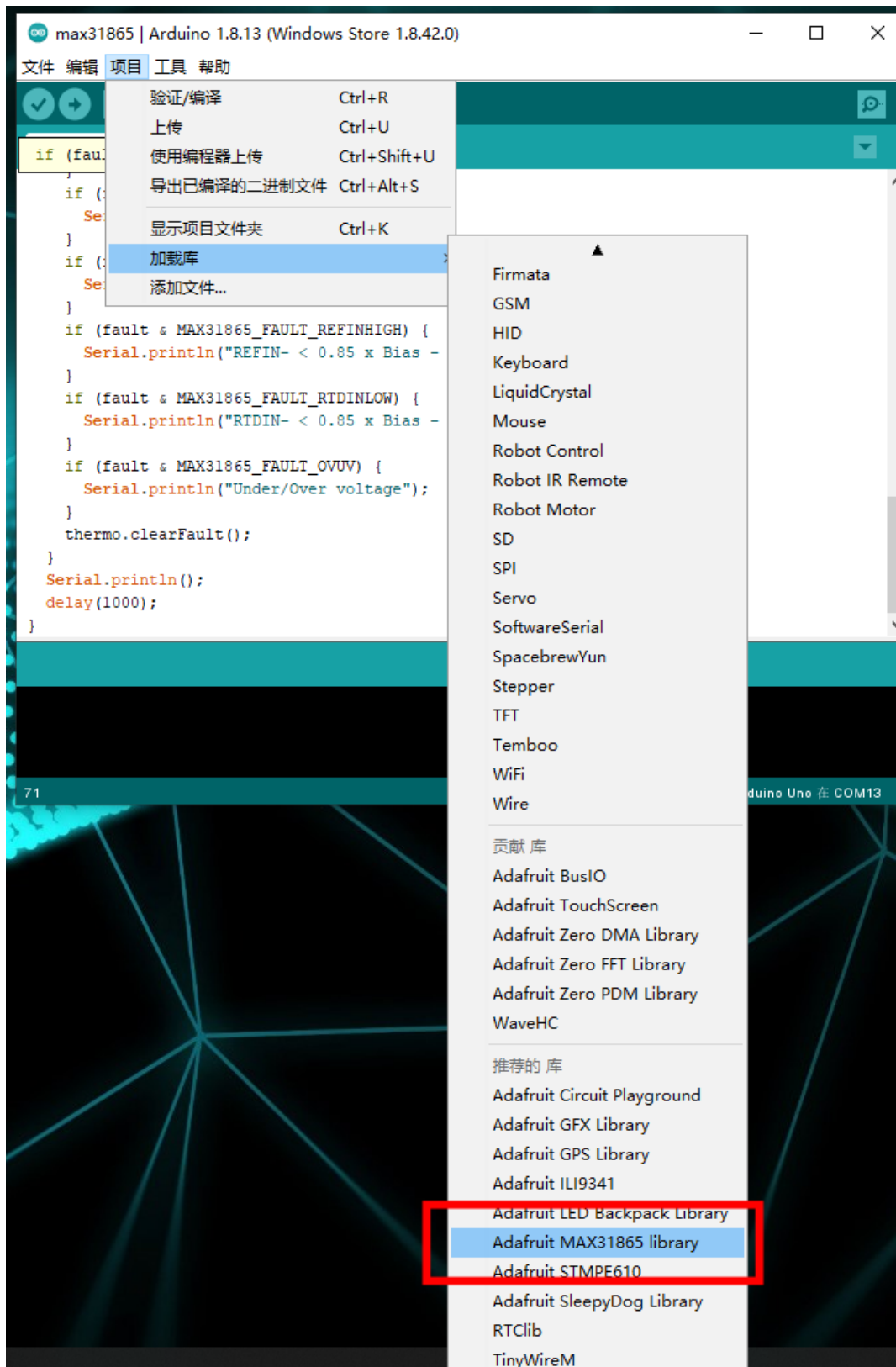
7, BTT-SKR E3 Turbo

BTT SKR E3 Turbo-PIN
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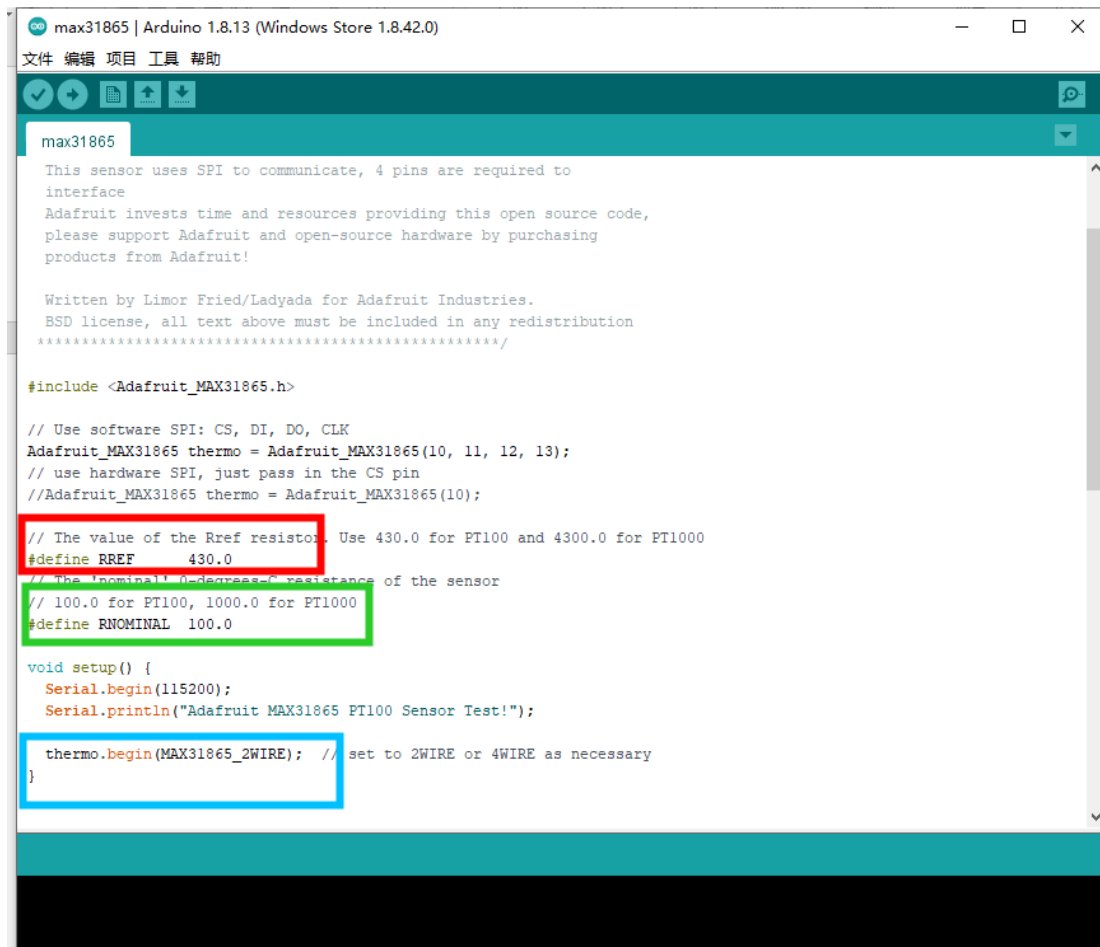


5, Arduino UNO Firmware configuration:

1, Load the MAX31865 library



2, Modify related configuration



```
max31865 | Arduino 1.8.13 (Windows Store 1.8.42.0)
文件 编辑 项目 工具 帮助

max31865
This sensor uses SPI to communicate, 4 pins are required to
interface
Adafruit invests time and resources providing this open source code,
please support Adafruit and open-source hardware by purchasing
products from Adafruit!

Written by Limor Fried/Ladyada for Adafruit Industries.
BSD license, all text above must be included in any redistribution
*****/

#include <Adafruit_MAX31865.h>

// Use software SPI: CS, DI, DO, CLK
Adafruit_MAX31865 thermo = Adafruit_MAX31865(10, 11, 12, 13);
// use hardware SPI, just pass in the CS pin
//Adafruit_MAX31865 thermo = Adafruit_MAX31865(10);

// The value of the Rref resistor. Use 430.0 for PT100 and 4300.0 for PT1000
#define RREF 430.0

// The nominal 0-degree-C resistance of the sensor
// 100.0 for PT100, 1000.0 for PT1000
#define RNOMINAL 100.0

void setup() {
  Serial.begin(115200);
  Serial.println("Adafruit MAX31865 PT100 Sensor Test!");

  thermo.begin(MAX31865_2WIRE); // set to 2WIRE or 4WIRE as necessary
}
```

As shown in the figure above, when using PT100, the red box is changed to 430 and the green box is changed to 100. When using PT1000, the red box is changed to 4300 and the green box is changed to PT1000. The position of the blue box is to modify the number of lines currently in use (2-wire, 3-wire or 4-wire)

3. Compile and upload, connect to serial port to print data

6, Precautions:

Please ensure that the power supply is disconnected when wiring or dialing the DIP switch