

SHENZHEN BIQU TECHNOLOGY LIMITED COMPANY
BIGTREETECH

BIGTREETECH

EZ31865 V1.0

USER MANUAL

【Please read this manual carefully before use】

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Revision History

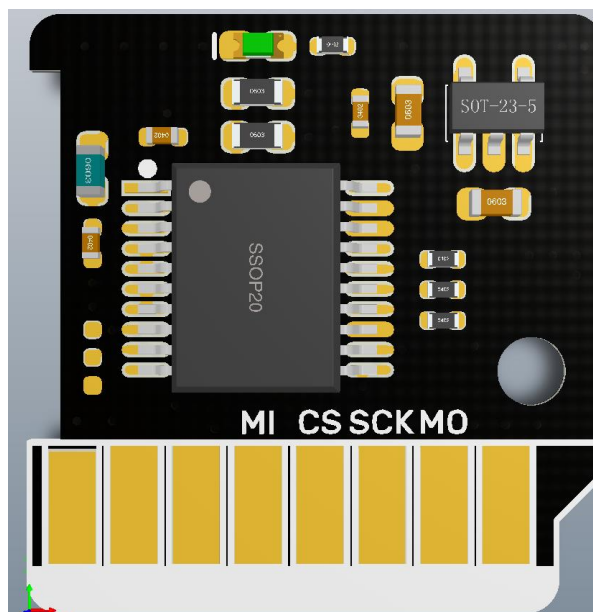
Version	Revisions	Date
01.00	Original	2022/11/08

BIGTREETECH MAX31865 V2.0 Module

Introduction

This module uses MAX31865 chip, supports two-wire, three-wire, four-wire PT1000 and PT100 temperature sensors, adopts the same package of motor drive module, easy to install, and uses VCCIO part of the power supply. Support 3.3V-5V power input.

1.Pin Introduction



VIO—Positive power supply (3.3V-5V)

GND—Power negative

MO--data input

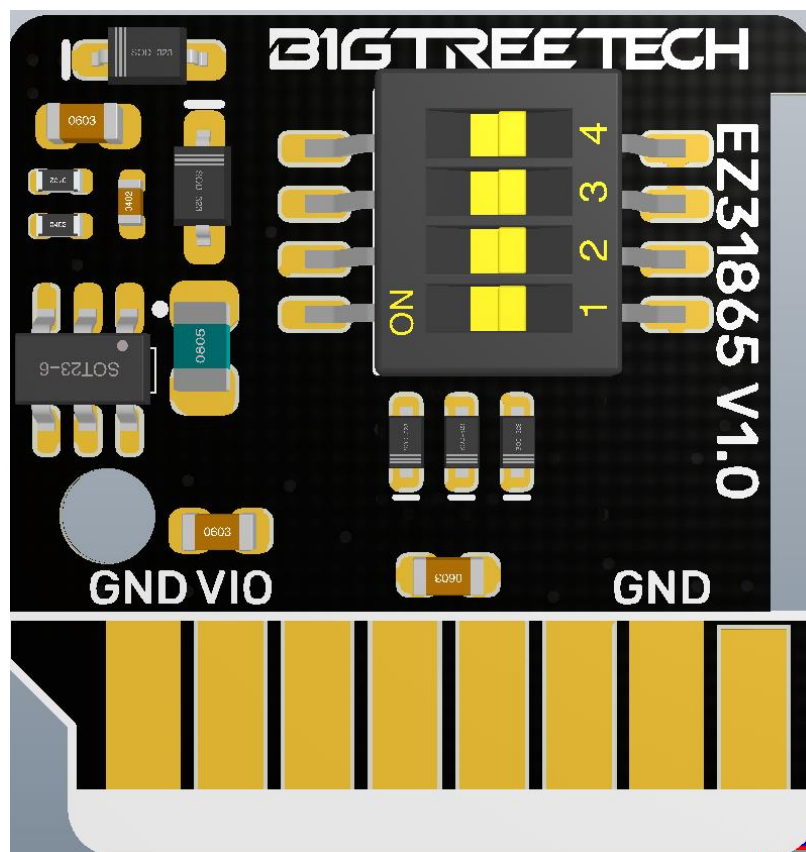
MI--Data output

SCK--Clock line

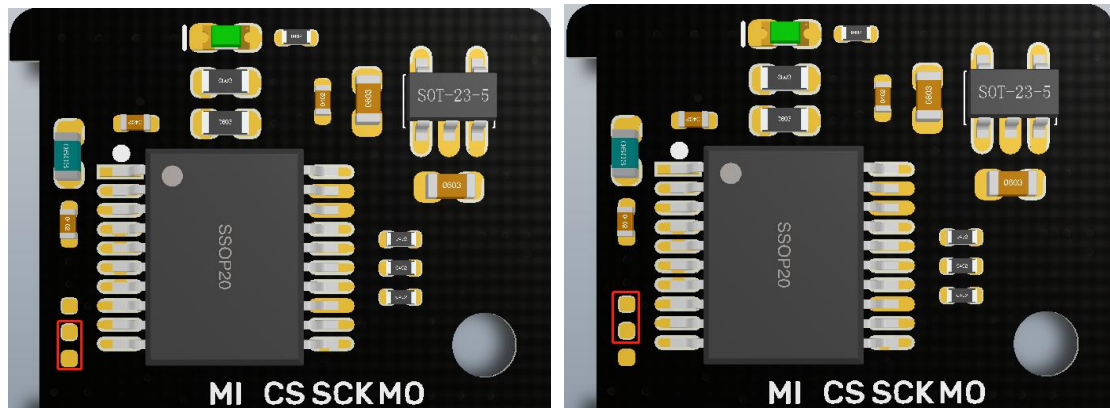
CS--Chip Select

2.DIP Switch Configuration

1	2	3	4	Sensor Model
ON	ON	ON	OFF	Two lines PT100
ON	ON	OFF	ON	Two linesPT1000
OFF	ON	ON	OFF	Three lines PT100
OFF	ON	OFF	ON	Three lines PT1000
OFF	OFF	ON	OFF	Four-wire PT100
OFF	OFF	OFF	ON	Four-wire PT1000



The 2/4 line is shown in the left figure. If the 3 line is used, it needs to be changed to the right figure (the factory default is 2/4 line)



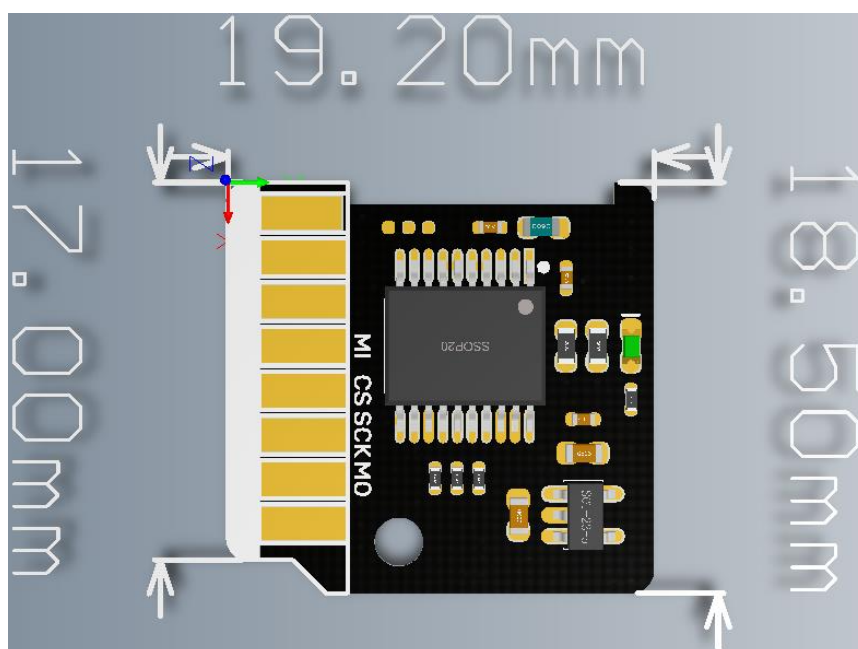
3 wires can also use 2 wires, but the accuracy is slightly reduced (same as 2 wires).

3.Connection of Module Installation Method

The installation method is consistent with EZ series drive

Modify the program of the motherboard, select the SPI mode of the motherboard driver jumper, and directly connect BIGTREETECH MAX31865V2.0 to the idle motor driver of the motherboard, and then connect the PT100/PT1000 thermistor to the corresponding original motor line On the interface (need to pay attention to the line sequence, subject to the actual motherboard, only support the motherboard that supports the SPI mode pluggable drive).

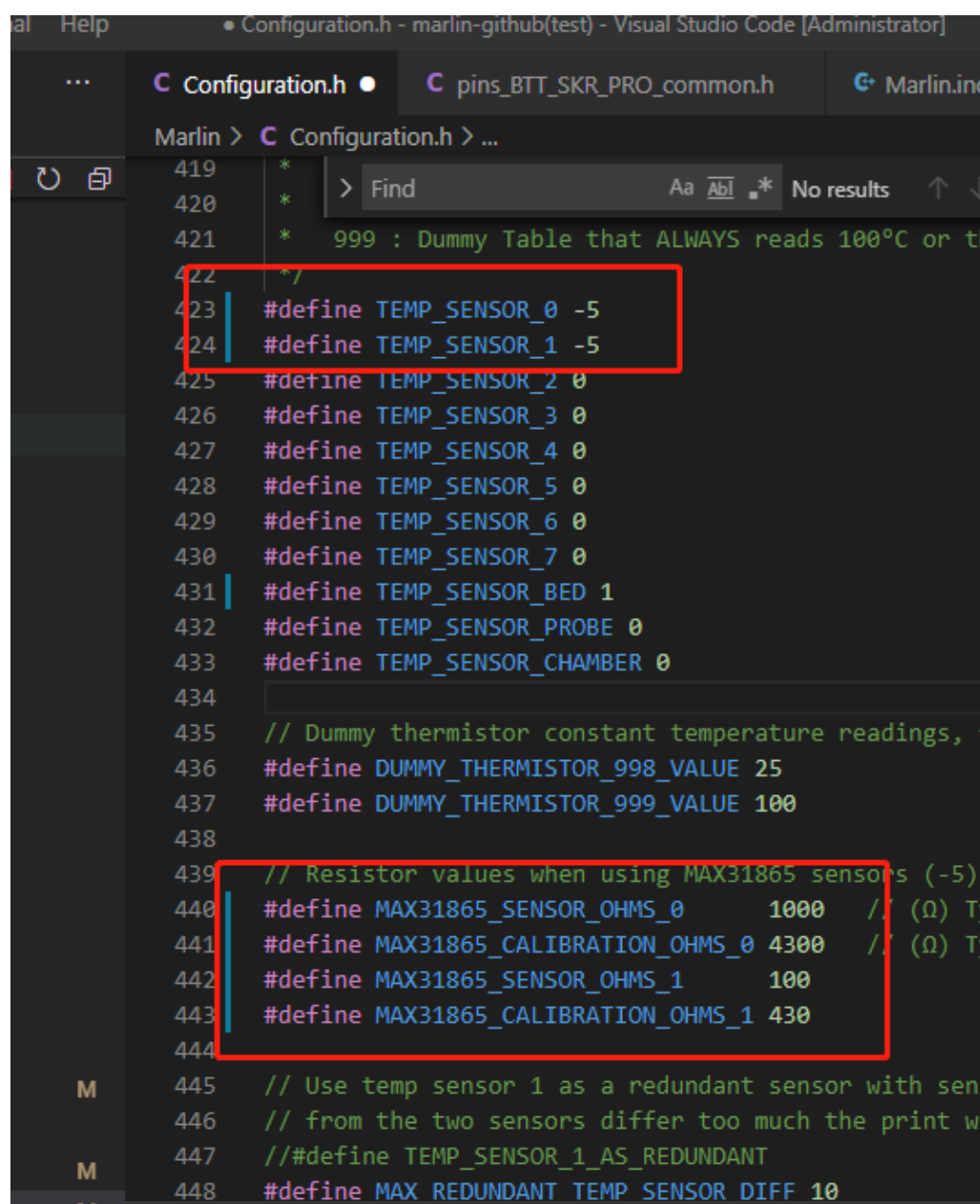
Installation Size:



Marlin firmware configuration:

Marlin firmware supports the connection of up to two BTT PT1000&PT100 modules. The default is two-wire and four-wire common, through the configuration of 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 in Configuration.h:



```
419  *
420  *
421  * 999 : Dummy Table that ALWAYS reads 100°C or th
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,
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
445  // Use temp sensor 1 as a redundant sensor with sens
446  // from the two sensors differ too much the print w
447  // #define TEMP_SENSOR_1_AS_REDUNDANT
448  #define MAX_REDUNDANT_TEMP_SENSOR_DIFF 10
```

TEMP_SENSOR_0 Set to -5: Use MAX31865 module on heater 0

TEMP_SENSOR_1 Set to -5: Use MAX31865 module on heater 1

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

If using **PT100**:

MAX31865_SENSOR_OHMS Set to 100

MAX31865_CALIBRATION_OHMS Set to 430

If using **PT1000**:

MAX31865_SENSOR_OHMS Set to 1000

MAX31865_CALIBRATION_OHMS Set to 4300

In the picture above: Temperature sensor 0 is configured as a PT1000 MAX31865 module

Temperature sensor 1 is configured as a PT100 MAX31865 module

The number of heating rods is 2 (#define **EXTRUDERS** 2)

2, Configuration in 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, Use BTT-SKR motherboard V1.1 V1.3 V1.4

BTT-SKR V1.4 turbo

Note: After steps 1, 2 are completed, compile the program, and the program will report an error as shown below

```

File Edit Selection View Go Run Terminal Help  Adafruit_MAX31865.h - marlin-github(github) - Visual Studio Code [Administrator]
EXPLORER
  > OPEN EDITORS
  > MARLIN-GITHUB(GITHUB)
    > .github
    > build
    > libdeps
      > BIGTREE_GTR_V1_0
      > BIGTREE_SKR_PRO
      > LPC1768 \ Adafruit MA...
        > .github
        > examples
        > .pio\pm
        > Adafruit_MAX31865.cpp 1
        > Adafruit_MAX31865.h 2
        > library.properties
        > README.md
        > STM32F103RC_btt
        > .vscode
        > buildroot
          > bin
          > etc
          > share
          > tests
          > config
          > data
          > docker
          > docs
          > Marlin
          > lib
          > OUTLINE
          > TIMELINE
  > bugfix-2.0.x*

platformio.ini  Adafruit_MAX31865.cpp  Adafruit_MAX31865.h x  pins_BTT_S...
.pio > libdeps > LPC1768 > Adafruit MAX31865 library > Adafruit_MAX31865.h > ...
38
39 #define MAX31865_FAULT_HIGHTHRESH 0x80
40 #define MAX31865_FAULT_LOWTHRESH 0x40
41 #define MAX31865_FAULT_REFINLOW 0x20
42 #define MAX31865_FAULT_REFINHIGH 0x10
43 #define MAX31865_FAULT_RTDINLOW 0x08
44 #define MAX31865_FAULT_OVUV 0x04
45
46 #define RTD_A 3.9083e-3
47 #define RTD_B -5.775e-7
48
49 #if (ARDUINO >= 100)
50 #include "Arduino.h"
51 #else
52 #include "wProgram.h"
53 #endif
54
55 typedef enum max31865_numwires {
56     MAX31865_2WIRE = 0,
57     MAX31865_3WIRE = 1,
58
59 } max31865_numwires_t;
60
52 | #include "wProgram.h"
compilation terminated.
*** [.pio\build\LPC1768\lib4c7\Adafruit_MAX31865_library\Adafruit_MAX31865.cpp.o] Error 1
In file included from Marlin\src\module\temperature.cpp:48:
.pio\libdeps\LPC1768\Adafruit_MAX31865_library\Adafruit_MAX31865.h:52:10: fatal error: wProgram.h:
*****
* Looking for wProgram.h dependency? Check our library registry!
*
* CLI > platformio lib search "header:wProgram.h"
* Web > https://platformio.org/lib/search?query=header:wProgram.h
*

bugfix-2.0.x*  Ln 51, Col 1  Spaces: 2  UTF-8  LF  C++  Win32

```

Make the following modifications in the file Adafruit_MAX31865.h Comment out (ARDUINO >= 100) to determine

```

> BIGTREE_GTR_V1_0
> BIGTREE_SKR_PRO
> LPC1768 \ Adafruit MAX3186...
  > .github
  > examples
  > .pio\pm
  > Adafruit_MAX31865.cpp
  > Adafruit_MAX31865.h
  > library.properties
  > README.md
  > STM32F103RC_btt
  > .vscode
  > buildroot
    > bin
    > etc
    > share
    > tests
    > config
    > data
    > docker
    > docs
    > Marlin
    > lib

46 #define RTD_A 3.9083e-3
47 #define RTD_B -5.775e-7
48
49 // #if (ARDUINO >= 100)
50 // #include "Arduino.h"
51 // #else
52 // #include "wProgram.h"
53 // #endif
54
55 typedef enum max31865_numwires {
56     MAX31865_2WIRE = 0,
57     MAX31865_3WIRE = 1,
58     MAX31865_4WIRE = 0
59 } max31865_numwires_t;
60

PROBLEMS 12  OUTPUT  DEBUG CONSOLE  TERMINAL  2: Task - Build
Checking size .pio\build\LPC1768\firmware.elf
Advanced Memory Usage is available via "PlatformIO Home > Project Inspect"
RAM: [==] 15.7% (used 5137 bytes from 32736 bytes)
Flash: [==] 19.0% (used 90356 bytes from 475136 bytes)
===== [SUCCESS] Took 10.41 seconds =====

Environment  Status  Duration
-----
LPC1768      SUCCESS  00:00:10.415
===== 1 succeeded in 00:00:10.415 =====

```

BIGTREETECH motherboard and BIGTREETECH EZ31865

V1.0 module connection configuration:

The following is a tutorial for using the module on the BTT OCTOPUS V1.0 motherboard (marlin firmware)

1, Use a 4-wire PT1000 sensor and E3 drive interface. Select the SPI mode of the drive and use BTT EZ Driver Connector V1.0 to connect EZ31865.

2, Add pins in the pin file

```

198 #define E2_DIR_PIN          PE3
199 #define E2_ENABLE_PIN       PD4
200 #ifndef E2_CS_PIN
201
202 #define E2_CS_PIN           PE1
203 #endif
204
205 // #define E3_STEP_PIN        PE6 // MOTOR 7
206 // #define E3_DIR_PIN         PA14
207 // #define E3_ENABLE_PIN      PE0
208 // #ifndef E3_CS_PIN
209 // #define E3_CS_PIN          PD3
210 // #endif
211 // #endif
212 //Max31865
213 //Thermocouple sensor
214 //If the TEMP_SENSOR value of -5 is enabled in the configuration file, it will work
215 #ifndef MAX31865_CS_PIN
216 #define MAX31865_MISO_PIN    PA6
217 #define MAX31865_SCK_PIN     PA5
218 #define MAX31865_MOSI_PIN    PA7
219 #define MAX6675_SS_PIN      PD3
220 // #define MAX31865_CS_PIN    PD3
221 #endif
222 //
223 //
224 // Temperature Sensors
225 //
226 #define TEMP_BED_PIN         PF3 // TB
227 #if TEMP_SENSOR_0 == 20
228 | #define TEMP_0_PIN          PF8 // PT100 Connector
229 #else
230 | #define TEMP_0_PIN          PF4 // TH0
231 #endif
232 #define TEMP_1_PIN           PF5 // TH1
  
```

```

#ifndef MAX31865_CS_PIN
#define MAX31865_MISO_PIN    PA6
#define MAX31865_SCK_PIN     PA5
#define MAX31865_MOSI_PIN    PA7
#define MAX6675_SS_PIN      PD3
// #define MAX31865_CS_PIN    PD3
#endif
  
```

At present, to use this module on marlin, you need to define the MAX31865 chip select as MAX6675_SS_PIN, compile the bin file, and you can use it after updating

Precautions:

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

Because this module uses SPI communication, motherboards that do not support SPI mode pluggable drivers cannot be used directly.