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# **AdafruitMAX31856 Library Documentation**

***Release 1.0***

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**Jan 20, 2021**



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A CircuitPython driver for the MAX31856 Universal Thermocouple Amplifier



# CHAPTER 1

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## Dependencies

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This driver depends on:

- [Adafruit CircuitPython](#)
- [Bus Device](#)

Please ensure all dependencies are available on the CircuitPython filesystem. This is easily achieved by downloading the [Adafruit library and driver bundle](#).





## CHAPTER 2

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### Installing from PyPI

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On supported GNU/Linux systems like the Raspberry Pi, you can install the driver locally [from PyPI](#). To install for current user:

```
pip3 install adafruit-circuitpython-max31856
```

To install system-wide (this may be required in some cases):

```
sudo pip3 install adafruit-circuitpython-max31856
```

To install in a virtual environment in your current project:

```
mkdir project-name && cd project-name
python3 -m venv .env
source .env/bin/activate
pip3 install adafruit-circuitpython-max31856
```



## CHAPTER 3

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### Usage Example

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```
import board
import busio
import digitalio
import adafruit_max31856

# create a spi object
spi = busio.SPI(board.SCK, board.MOSI, board.MISO)

# allocate a CS pin and set the direction
cs = digitalio.DigitalInOut(board.D5)
cs.direction = digitalio.Direction.OUTPUT

# create a thermocouple object with the above
thermocouple = adafruit_max31856.MAX31856(spi, cs)

# print the temperature!
print(thermocouple.temperature)
```



## CHAPTER 4

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### Contributing

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Contributions are welcome! Please read our [Code of Conduct](#) before contributing to help this project stay welcoming.



## CHAPTER 5

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### Documentation

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For information on building library documentation, please check out [this guide](#).





### 6.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/max31856\_simpletest.py

```
1  # SPDX-FileCopyrightText: 2021 ladyada for Adafruit Industries
2  # SPDX-License-Identifier: MIT
3
4  import board
5  import busio
6  import digitalio
7  import adafruit_max31856
8
9  # create a spi object
10 spi = busio.SPI(board.SCK, board.MOSI, board.MISO)
11
12 # allocate a CS pin and set the direction
13 cs = digitalio.DigitalInOut(board.D5)
14 cs.direction = digitalio.Direction.OUTPUT
15
16 # create a thermocouple object with the above
17 thermocouple = adafruit_max31856.MAX31856(spi, cs)
18
19 # print the temperature!
20 print(thermocouple.temperature)
```

### 6.2 MAX31856

CircuitPython module for the MAX31856 Universal Thermocouple Amplifier. See examples/simpletest.py for an example of the usage.

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## 6.2.1 Implementation Notes

### Hardware:

- Adafruit [Universal Thermocouple Amplifier MAX31856 Breakout](#) (Product ID: 3263)

### Software and Dependencies:

- Adafruit CircuitPython firmware for the supported boards: <https://github.com/adafruit/circuitpython/releases>
- Adafruit's Bus Device library: [https://github.com/adafruit/Adafruit\\_CircuitPython\\_BusDevice](https://github.com/adafruit/Adafruit_CircuitPython_BusDevice)

**class** `adafruit_max31856.MAX31856` (*spi*, *cs*, *thermocouple\_type*=3)

Driver for the MAX31856 Universal Thermocouple Amplifier

#### Parameters

- **spi\_bus** (*SPI*) – The SPI bus the MAX31856 is connected to.
- **cs** (*Pin*) – The pin used for the CS signal.
- **thermocouple\_type** (*ThermocoupleType*) – The type of thermocouple. Default is Type K.

#### **fault**

A dictionary with the status of each fault type where the key is the fault type and the value is a bool if the fault is currently active

Key	Fault type
"cj_range"	Cold junction range fault
"tc_range"	Thermocouple range fault
"cj_high"	Cold junction high threshold fault
"cj_low"	Cold junction low threshold fault
"tc_high"	Thermocouple high threshold fault
"tc_low"	Thermocouple low threshold fault
"voltage"	Over/under voltage fault
"open_tc"	Thermocouple open circuit fault

#### **reference\_temperature**

The temperature of the cold junction in degrees celsius. (read-only)

#### **reference\_temperature\_thresholds**

The cold junction's low and high temperature thresholds as a (*low\_temp*, *high\_temp*) tuple

#### **temperature**

The temperature of the sensor and return its value in degrees celsius. (read-only)

#### **temperature\_thresholds**

The thermocouple's low and high temperature thresholds as a (*low\_temp*, *high\_temp*) tuple

**class** `adafruit_max31856.ThermocoupleType`

An enum-like class representing the different types of thermocouples that the MAX31856 can use. The values can be referenced like `ThermocoupleType.K` or `ThermocoupleType.S`. Possible values are

- `ThermocoupleType.B`
- `ThermocoupleType.E`
- `ThermocoupleType.J`

- `ThermocoupleType.K`
- `ThermocoupleType.N`
- `ThermocoupleType.R`
- `ThermocoupleType.S`
- `ThermocoupleType.T`



## CHAPTER 7

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### Indices and tables

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