# AdafruitMAX31856 Library Documentation

***Release 1.0***

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# Contents

A CircuitPython driver for the MAX31856 Universal Thermocouple Amplifier

CHAPTER 1

# Dependencies

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

## Usage Example

```
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 3

# Contributing

Contributions are welcome! Please read our Code of Conduct before contributing to help this project stay welcoming.

CHAPTER 4

# Building locally

## 4.1 Zip release files

To build this library locally you'll need to install the circuitpython-build-tools package.

```
python3 -m venv .env
source .env/bin/activate
pip install circuitpython-build-tools
```

Once installed, make sure you are in the virtual environment:

```
source .env/bin/activate
```

Then run the build:

```
circuitpython-build-bundles --filename_prefix adafruit-circuitpython-max31856 --
↪library_location .
```

## 4.2 Sphinx documentation

Sphinx is used to build the documentation based on rST files and comments in the code. First, install dependencies (feel free to reuse the virtual environment from above):

```
python3 -m venv .env
source .env/bin/activate
pip install Sphinx sphinx-rtd-theme
```

Now, once you have the virtual environment activated:

```
cd docs
sphinx-build -E -W -b html . _build/html
```

This will output the documentation to `docs/_build/html`. Open the index.html in your browser to view them. It will also (due to -W) error out on any warning like Travis will. This is a good way to locally verify it will pass.

CHAPTER 5

# Table of Contents

## 5.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/max31856_simpletest.py

```
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.D0)
cs.direction = digitalio.Direction.OUTPUT

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

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

## 5.2 MAX31856

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

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### 5.2.1 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

**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 6

# Indices and tables

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# Python Module Index

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# Index