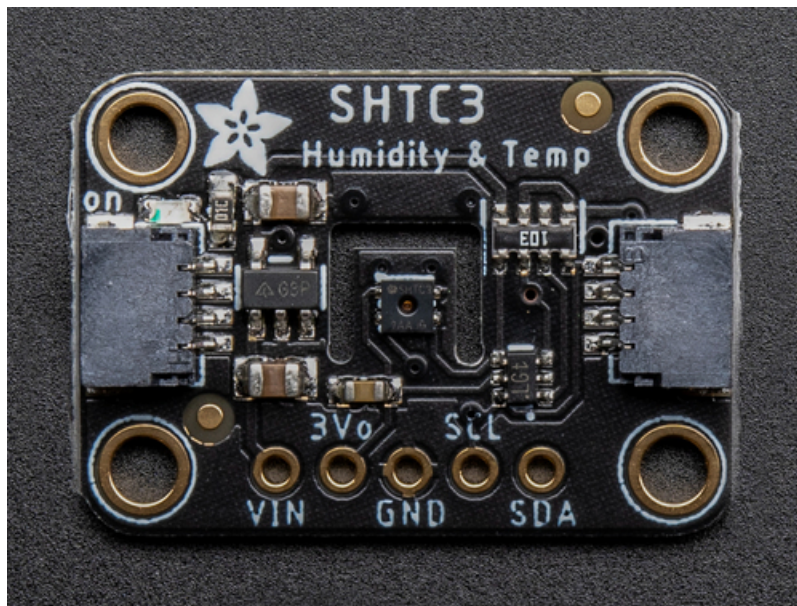


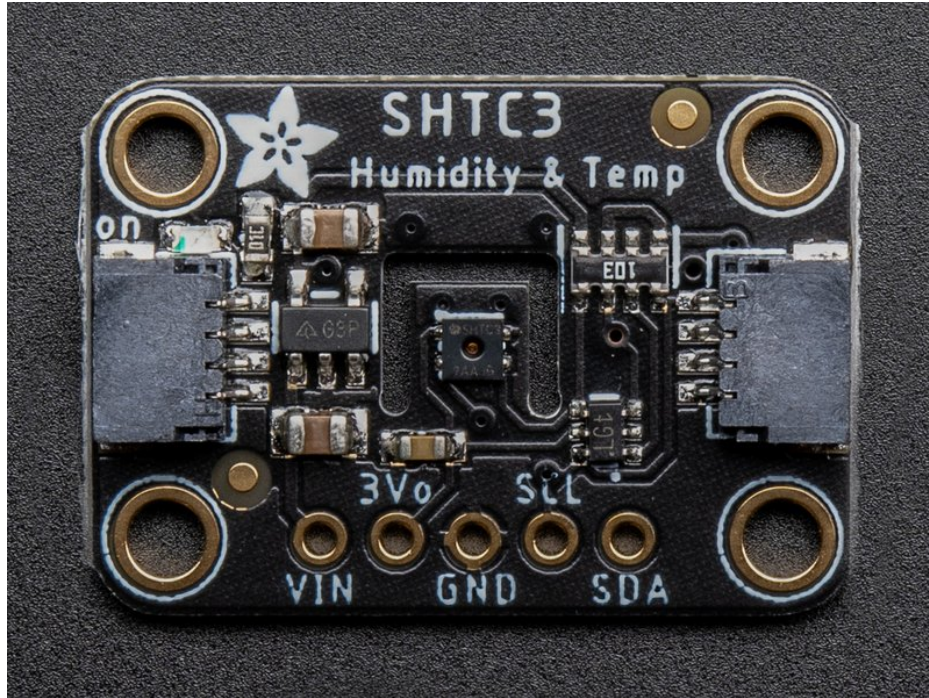
Adafruit Sensirion SHTC3 - Temperature & Humidity Sensor Breakout

Created by Bryan Siepert



Last updated on 2020-07-02 12:19:59 PM EDT

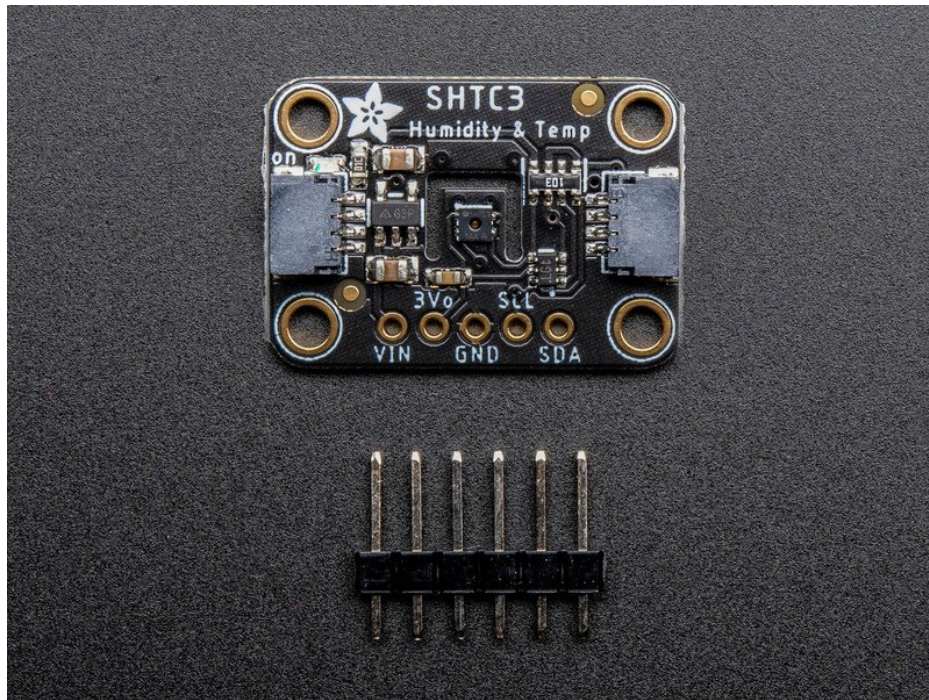
Overview



Sensirion Temperature/Humidity sensors are some of the finest & highest-accuracy devices you can get. And with a true I2C interface, reading the data is for easy. The **SHTC3** sensor has an excellent $\pm 2\%$ relative humidity and $\pm 0.2^\circ\text{C}$ accuracy for most uses.

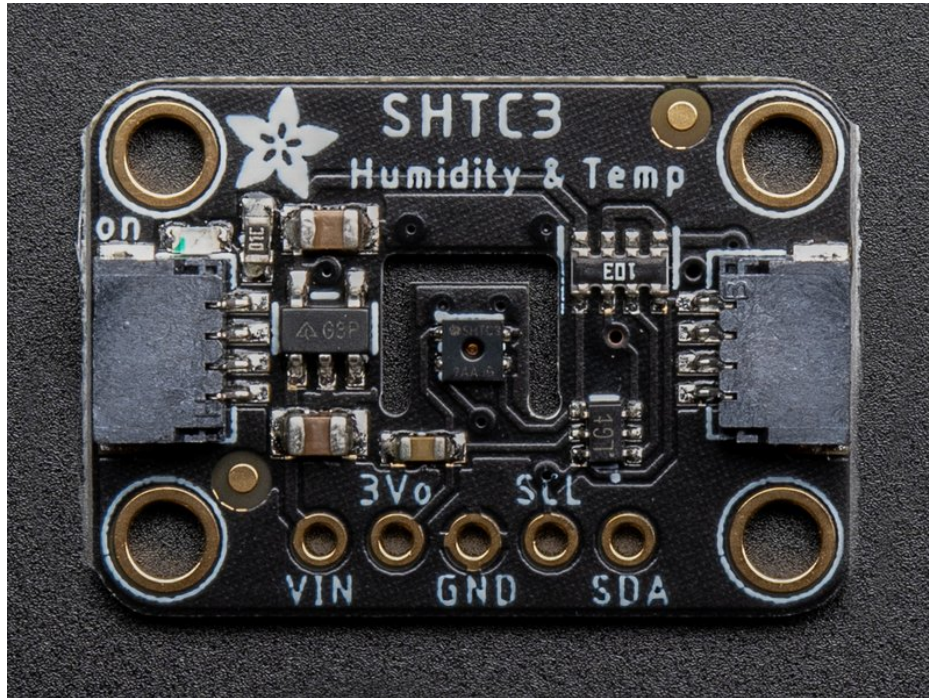


Unlike some earlier SHT sensors, this sensor has a *true* I2C interface for easy interfacing with only two wires (plus power and ground!). Thanks to the voltage regulator and level shifting circuitry we've included on the breakout It is also is 3V or 5V compliant, so you can power and communicate with it using any microcontroller or microcomputer.



Such a lovely chip - so we spun up a breakout board with the SHTC3 and some supporting circuitry such as pullup resistors and capacitors. To make things even easier, we've included [SparkFun Qwiic \(https://adafruit.com/product/251\)](https://adafruit.com/product/251) compatible [STEMMA QT \(https://adafruit.com/product/251\)](https://adafruit.com/product/251) connectors for the I2C bus so you don't even need to solder! If you prefer working on a breadboard, each order comes with one fully assembled and tested PCB breakout and a small piece of header. You'll need to solder the header onto the PCB but it's fairly easy and takes only a few minutes even for a beginner.

Pinouts



Power Pins

- **Vin** - this is the power pin. Since the sensor chip uses 3 VDC, we have included a voltage regulator on board that will take 3-5VDC and safely convert it down. To power the board, give it the same power as the logic level of your microcontroller - e.g. for a 5V microcontroller like Arduino, use 5V
- **3Vo** - this is the 3.3V output from the voltage regulator, you can grab up to 100mA from this if you like
- **GND** - common ground for power and logic

I2C Logic Pins

- **SCL** - this is the I2C clock pin, connect to your microcontroller's I2C clock line.
- **SDA** - this is the I2C data pin, connect to your microcontroller's I2C data line
- **STEMMA QT** (<https://adafru.it/Ft4>) - These connectors allow you to connect to dev boards with **STEMMA QT** connectors or to other things with [various associated accessories](https://adafru.it/Ft6) (<https://adafru.it/Ft6>)

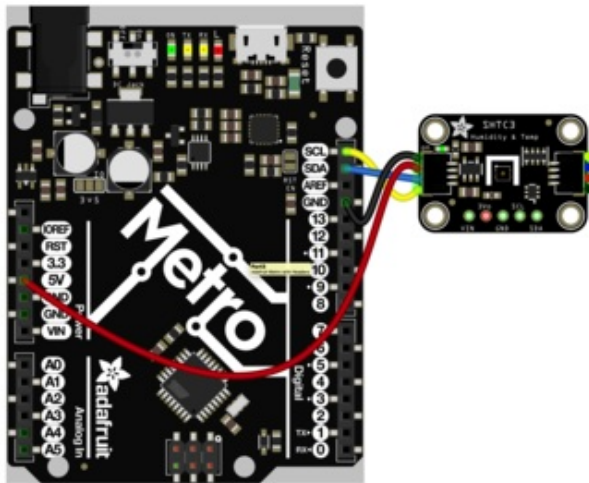
Arduino

Using the SHTC3 with Arduino is a simple matter of wiring up the sensor to your Arduino-compatible microcontroller, installing the [Adafruit SHTC3 \(https://adafru.it/LFR\)](https://adafru.it/LFR) library we've written, and running the provided example code.

I2C Wiring

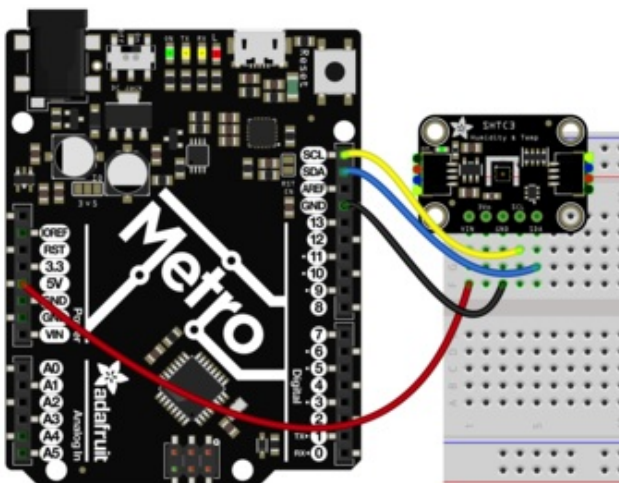
Use this wiring if you want to connect via I2C interface. The I2C address for the SHTC3 is **0x70**.

Here is how to wire up the sensor using one of the [STEMMA QT \(https://adafru.it/Ft4\)](https://adafru.it/Ft4) connectors. The examples show a Metro but wiring will work the same for an Arduino or other compatible board.



- Connect **board VIN (red wire)** to **Arduino 5V** if you are running a **5V** board Arduino (Uno, etc.). If your board is **3V**, connect to that instead.
- Connect **board GND (black wire)** to **Arduino GND**
- Connect **board SCL (yellow wire)** to **Arduino SCL**
- Connect **board SDA (blue wire)** to **Arduino SDA**

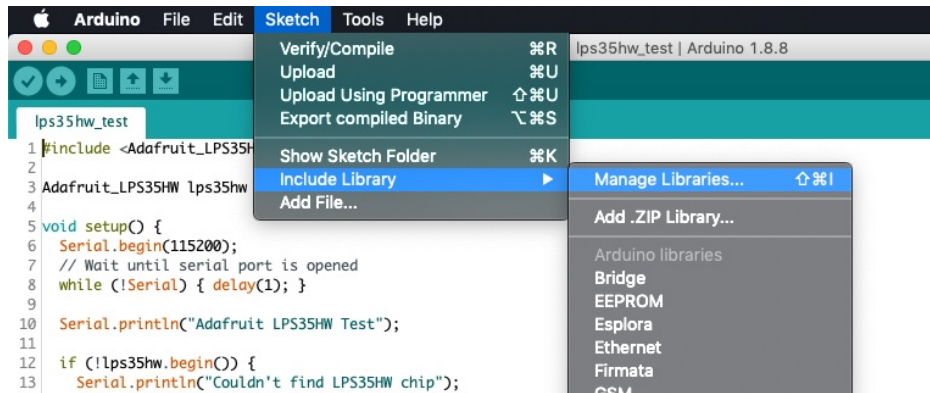
Here is how to wire the sensor to a board using a solderless breadboard:



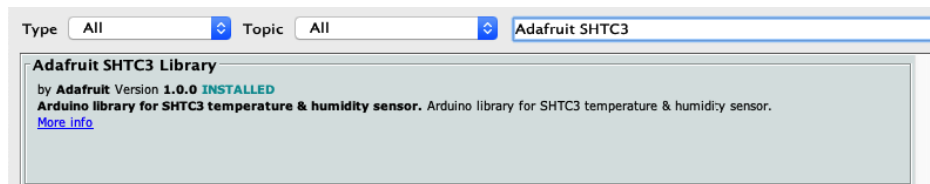
- Connect **board VIN (red wire)** to **Arduino 5V** if you are running a **5V** board Arduino (Uno, etc.). If your board is **3V**, connect to that instead.
- Connect **board GND (black wire)** to **Arduino GND**
- Connect **board SCL (yellow wire)** to **Arduino SCL**
- Connect **board SDA (blue wire)** to **Arduino SDA**

Library Installation

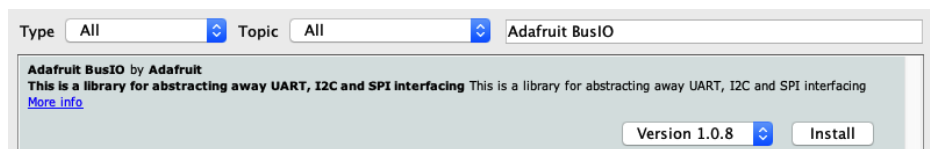
You can install the **Adafruit SHTC3** library for Arduino using the Library Manager in the Arduino IDE.



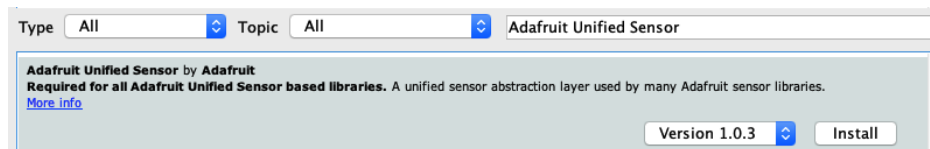
Click the **Manage Libraries ...** menu item, search for **Adafruit SHTC3**, and select the **Adafruit SHTC3** library:



Then follow the same process for the **Adafruit BusIO** library.



Finally follow the same process for the **Adafruit Unified Sensor** library:



Load Example

Open up **File -> Examples -> Adafruit SHTC3 -> SHTC3test**

After opening the demo file, upload to your Arduino wired up to the sensor. Once you upload the code, you will see the **Temperature** and **Humidity** values being printed when you open the Serial Monitor (**Tools->Serial Monitor**) at **115200 baud**, similar to this:

```
SHTC3 test
Found SHTC3 sensor
Temperature: 31.53 degrees C
Humidity: 31.68% rH
Temperature: 31.54 degrees C
Humidity: 31.18% rH
Temperature: 31.50 degrees C
Humidity: 30.42% rH
```

Example Code

Temporarily unable to load content:

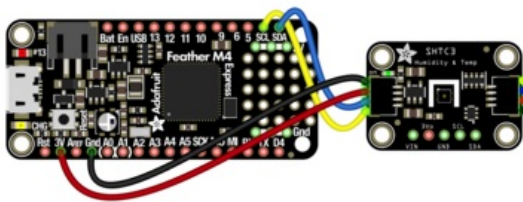
Python & CircuitPython

It's easy to use the **SHTC3** with Python or CircuitPython, and the [Adafruit CircuitPython SHTC3 \(https://adafru.it/LFS\)](https://adafru.it/LFS) module. This module allows you to easily write Python code that reads humidity and temperature from the **SHTC3** sensor.

You can use this sensor with any CircuitPython microcontroller board or with a computer that has GPIO and Python thanks to [Adafruit_Blinka](https://adafru.it/BSN), our [CircuitPython-for-Python compatibility library \(https://adafru.it/BSN\)](https://adafru.it/BSN).

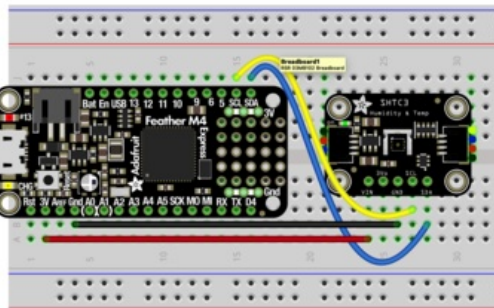
CircuitPython Microcontroller Wiring

First wire up a SHTC3 to your board exactly as shown below. Here's an example of wiring a Feather M4 to the sensor with I2C using one of the handy [STEMMA QT \(https://adafru.it/Ft4\)](https://adafru.it/Ft4) connectors:



- Board 3V to sensor VIN (red wire)
- Board GND to sensor GND (black wire)
- Board SCL to sensor SCL (yellow wire)
- Board SDA to sensor SDA (blue wire)

You can also use the standard 0.100" pitch headers to wire it up on a breadboard:

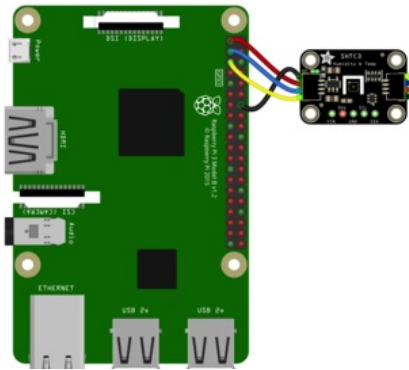


- Board 3V to sensor VIN (red wire)
- Board GND to sensor GND (black wire)
- Board SCL to sensor SCL (yellow wire)
- Board SDA to sensor SDA (blue wire)

Python Computer Wiring

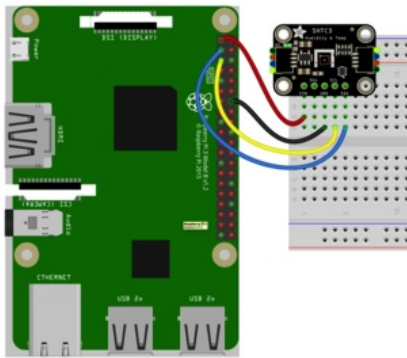
Since there's *dozens* of Linux computers/boards you can use, we will show wiring for Raspberry Pi. For other platforms, please visit the [guide for CircuitPython on Linux to see whether your platform is supported \(https://adafru.it/BSN\)](https://adafru.it/BSN).

Here's the Raspberry Pi wired to the sensor using I2C and a [STEMMA QT \(https://adafru.it/Ft4\)](https://adafru.it/Ft4) connector:



- Pi 3V to sensor VCC (red wire)
- Pi GND to sensor GND (black wire)
- Pi SCL to sensor SCL (yellow wire)
- Pi SDA to sensor SDA (blue wire)

Finally here is an example of how to wire up a Raspberry Pi to the sensor using a solderless breadboard



- Pi 3V to sensor VCC (red wire)
- Pi GND to sensor GND (black wire)
- Pi SCL to sensor SCL (yellow wire)
- Pi SDA to sensor SDA (blue wire)

CircuitPython Installation of SHTC3 Library

You'll need to install the [Adafruit CircuitPython SHTC3 \(https://adafru.it/LFS\)](https://adafru.it/LFS) library on your CircuitPython board.

First make sure you are running the [latest version of Adafruit CircuitPython \(https://adafru.it/Amd\)](https://adafru.it/Amd) for your board.

Next you'll need to install the necessary libraries to use the hardware--carefully follow the steps to find and install these libraries from [Adafruit's CircuitPython library bundle \(https://adafru.it/ENC\)](https://adafru.it/ENC). Our CircuitPython starter guide has [a great page on how to install the library bundle \(https://adafru.it/ABU\)](https://adafru.it/ABU).

Before continuing make sure your board's `lib` folder or root filesystem has the `adafruit_shtc3.mpy` file and `adafruit_bus_device` folder copied over.

Next [connect to the board's serial REPL \(https://adafru.it/Awz\)](https://adafru.it/Awz) so you are at the CircuitPython `>>>` prompt.

Python Installation of SHTC3 Library

You'll need to install the **Adafruit_Blinka** library that provides the CircuitPython support in Python. This may also require enabling I2C on your platform and verifying you are running Python 3. [Since each platform is a little different, and Linux changes often, please visit the CircuitPython on Linux guide to get your computer ready \(https://adafru.it/BSN\)](https://adafru.it/BSN)!

Once that's done, from your command line run the following command:

- `sudo pip3 install adafruit-circuitpython-shtc3`

If your default Python is version 3 you may need to run 'pip' instead. Just make sure you aren't trying to use CircuitPython on Python 2.x, it isn't supported!

CircuitPython & Python Usage

To demonstrate the usage of the sensor we'll initialize it and read the temperature and humidity measurements from the board's Python REPL.

Run the following code to import the necessary modules and initialize the I2C connection with the sensor:

```
import busio
import board
import adafruit_shtc3

i2c = busio.I2C(board.SCL, board.SDA)
sht = adafruit_shtc3.SHTC3(i2c)
```

```
>>> import busio
>>> import board
>>> import adafruit_shtc3
>>>
>>> i2c = busio.I2C(board.SCL, board.SDA)
>>> sht = adafruit_shtc3.SHTC3(i2c)
```

Now you're ready to read values from the sensor using these properties:

- **relative_humidity** - The relative humidity measured by the sensor, this is a value from 0-100%.
- **temperature** - The temperature measured by the sensor, a value in degrees Celsius.

```
print("Temperature: %0.1f C" % sht.temperature)
print("Humidity: %0.1f %%fH" % sht.relative_humidity)
```

```
>>> print("Temperature: %0.1f C" % sht.temperature)
Temperature: 31.2 C
>>> print("Humidity: %0.1f %%rH" % sht.relative_humidity)
Humidity: 28.6 %rH
```

We've also added a **measurements** property that simultaneously reads the **temperature** and **relative_humidity** properties and returns them as a **(temperature, relative_humidity)** tuple:

```
print("Temperature: %0.1f C Humidity: %0.1f %%rH" % sht.measurements)
```

```
>>> print("Temperature: %0.1f C Humidity: %0.1f %%rH" % sht.measurements)
Temperature: 31.3 C Humidity: 31.4 %rH
```

Example Code

```
# SPDX-FileCopyrightText: Copyright (c) 2020 Bryan Siepert for Adafruit Industries
#
# SPDX-License-Identifier: MIT
import time
import busio
import board
import adafruit_shtc3

i2c = busio.I2C(board.SCL, board.SDA)
sht = adafruit_shtc3.SHTC3(i2c)

while True:
    temperature, relative_humidity = sht.measurements
    print("Temperature: %0.1f C" % temperature)
    print("Humidity: %0.1f %" % relative_humidity)
    print("")
    time.sleep(1)
```


Python Docs

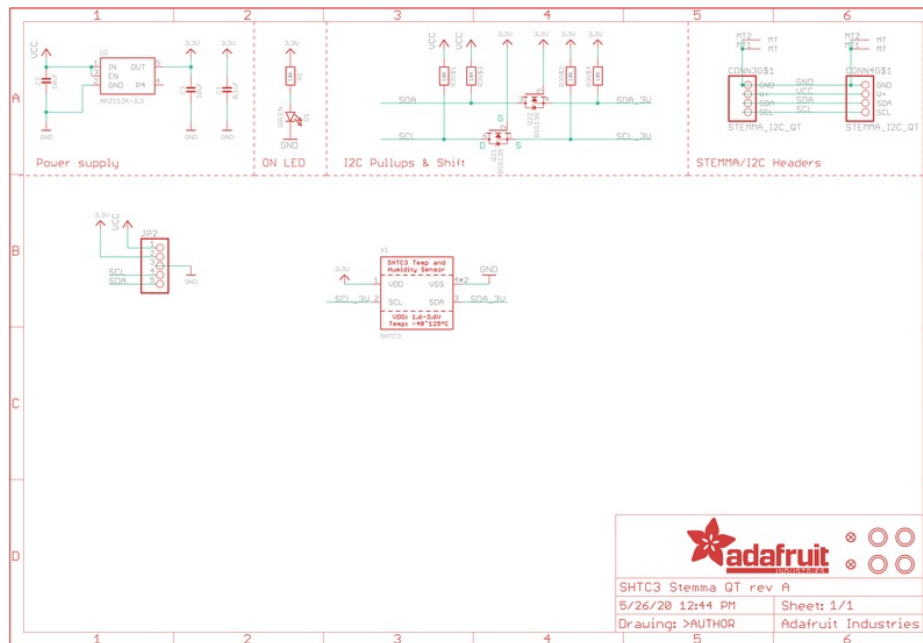
[Python Docs \(https://adafru.it/LFv\)](https://adafru.it/LFv)

Downloads

Files

- [SHTC3 Datasheet \(https://adafru.it/LFT\)](https://adafru.it/LFT)
- [EagleCAD files on GitHub \(https://adafru.it/LFU\)](https://adafru.it/LFU)
- [Fritzing object in the Adafruit Fritzing Library \(https://adafru.it/LFV\)](https://adafru.it/LFV)

Schematic



Fab Print

