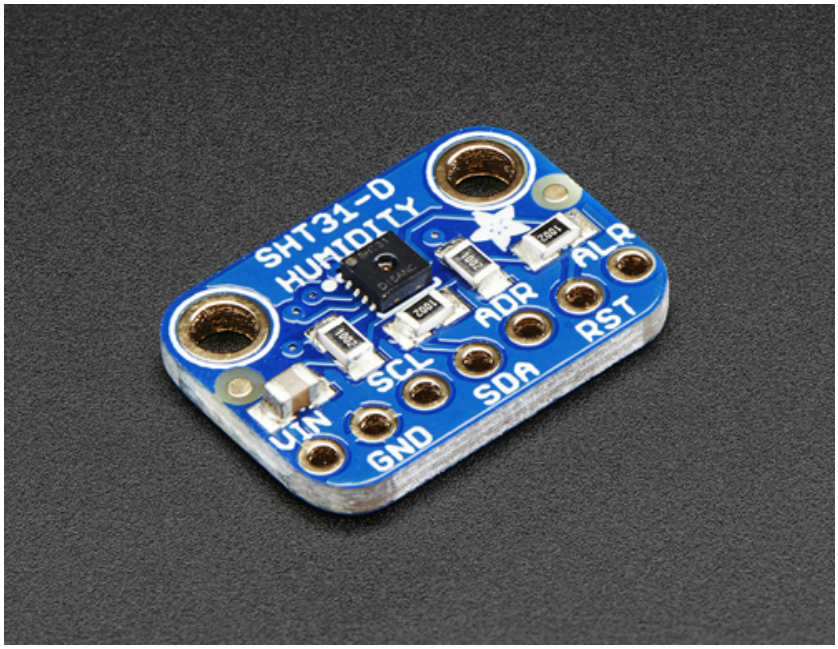
adafruit learning system

Adafruit SHT31-D Temperature & Humidity Sensor Breakout

Created by lady ada



Last updated on 2016-06-03 05:32:06 PM EDT

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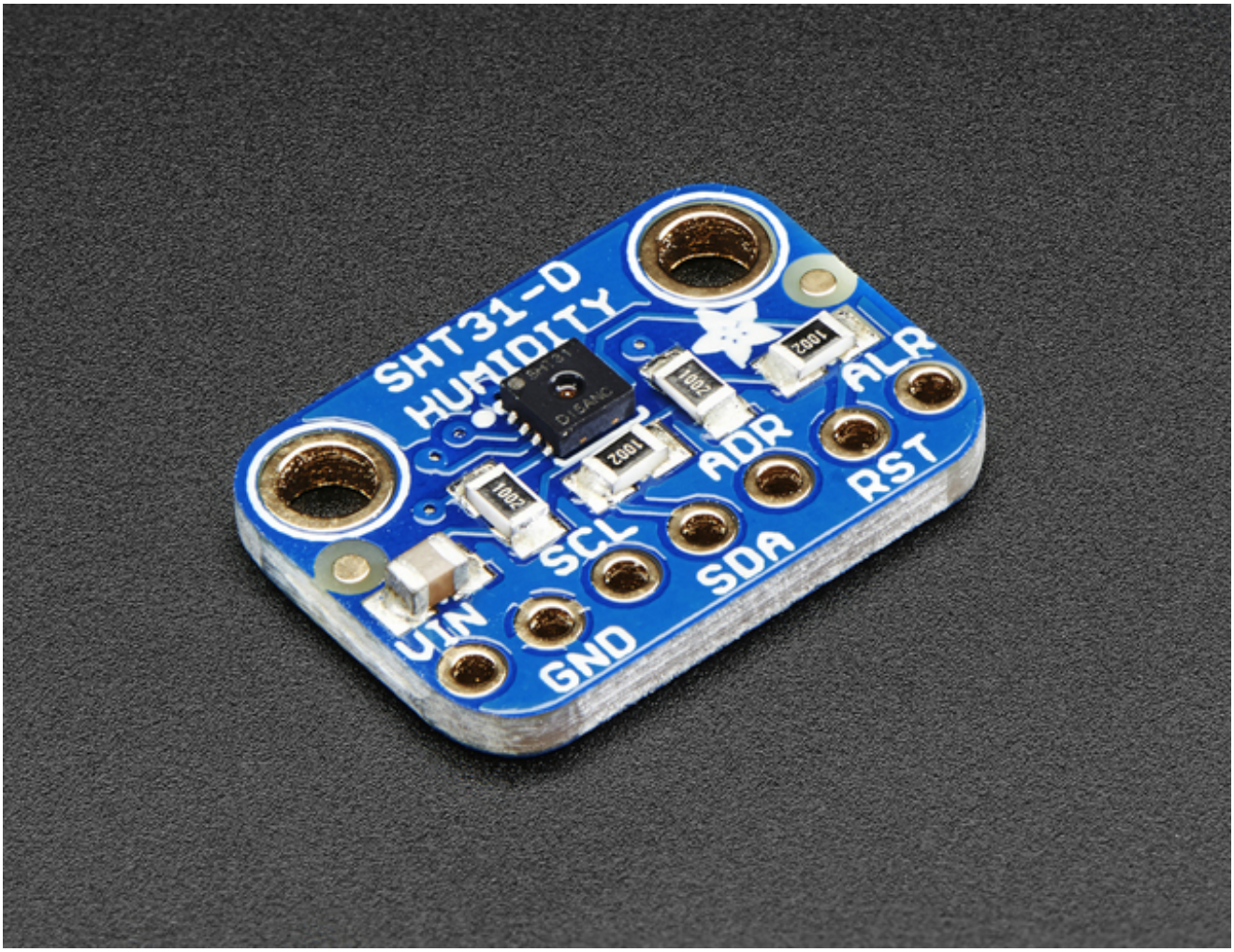
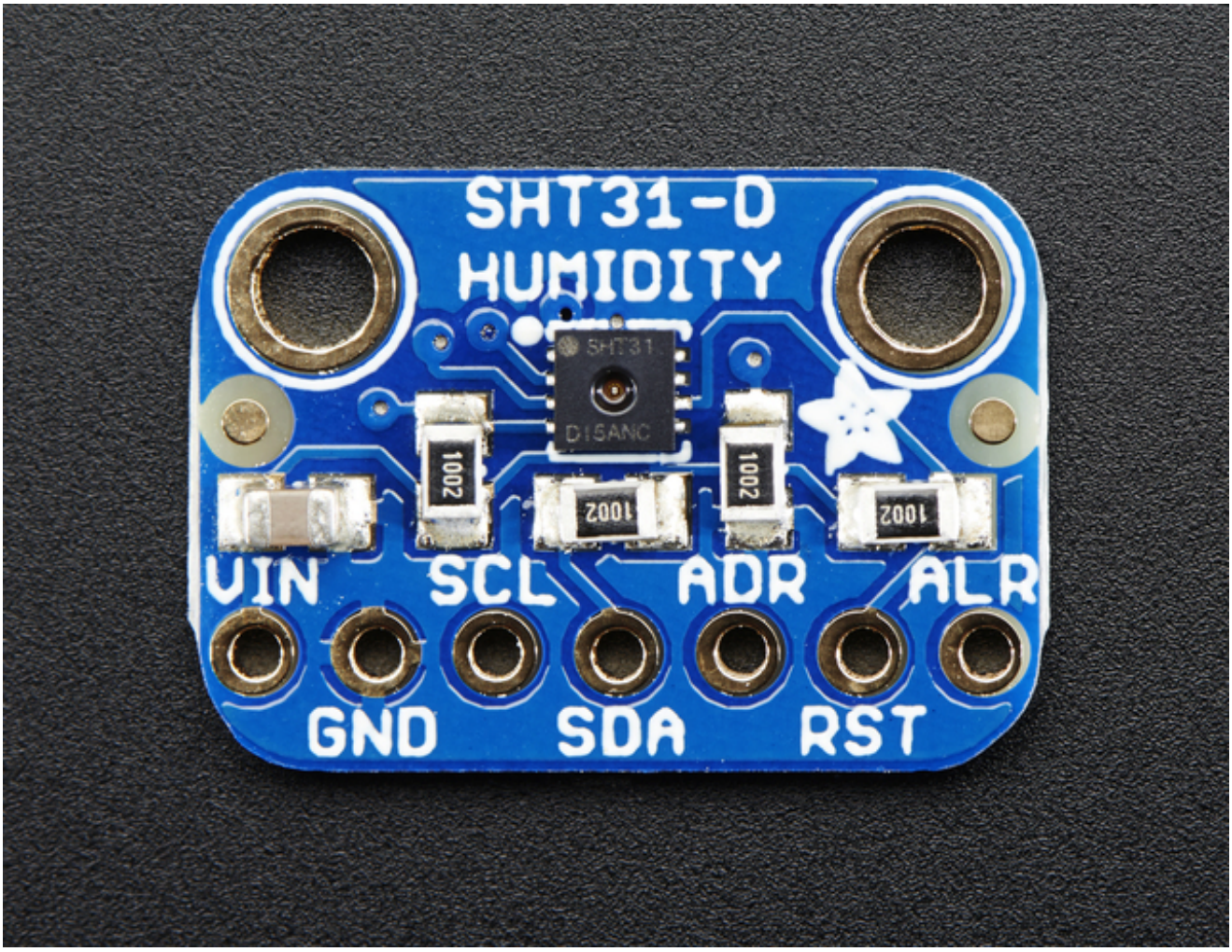
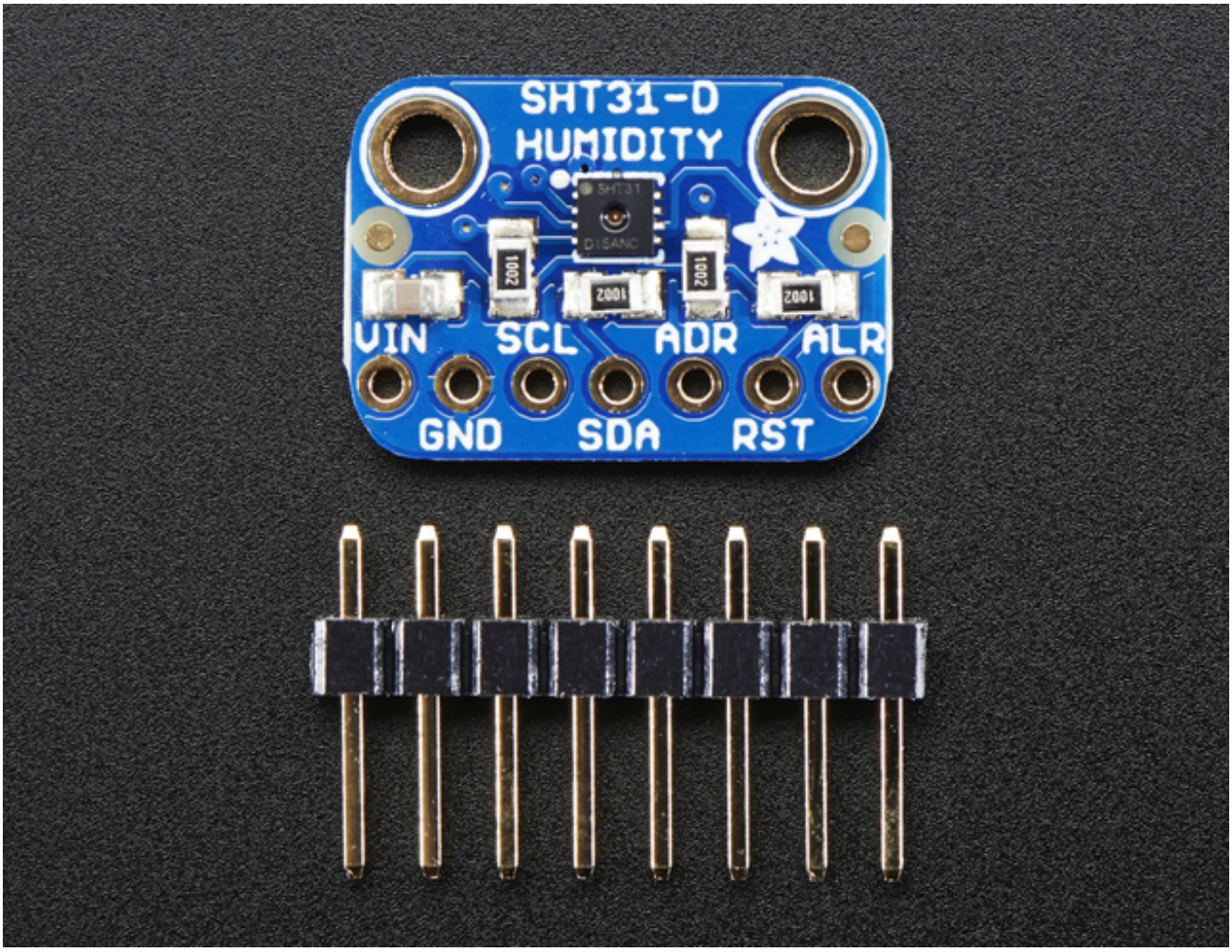
Overview



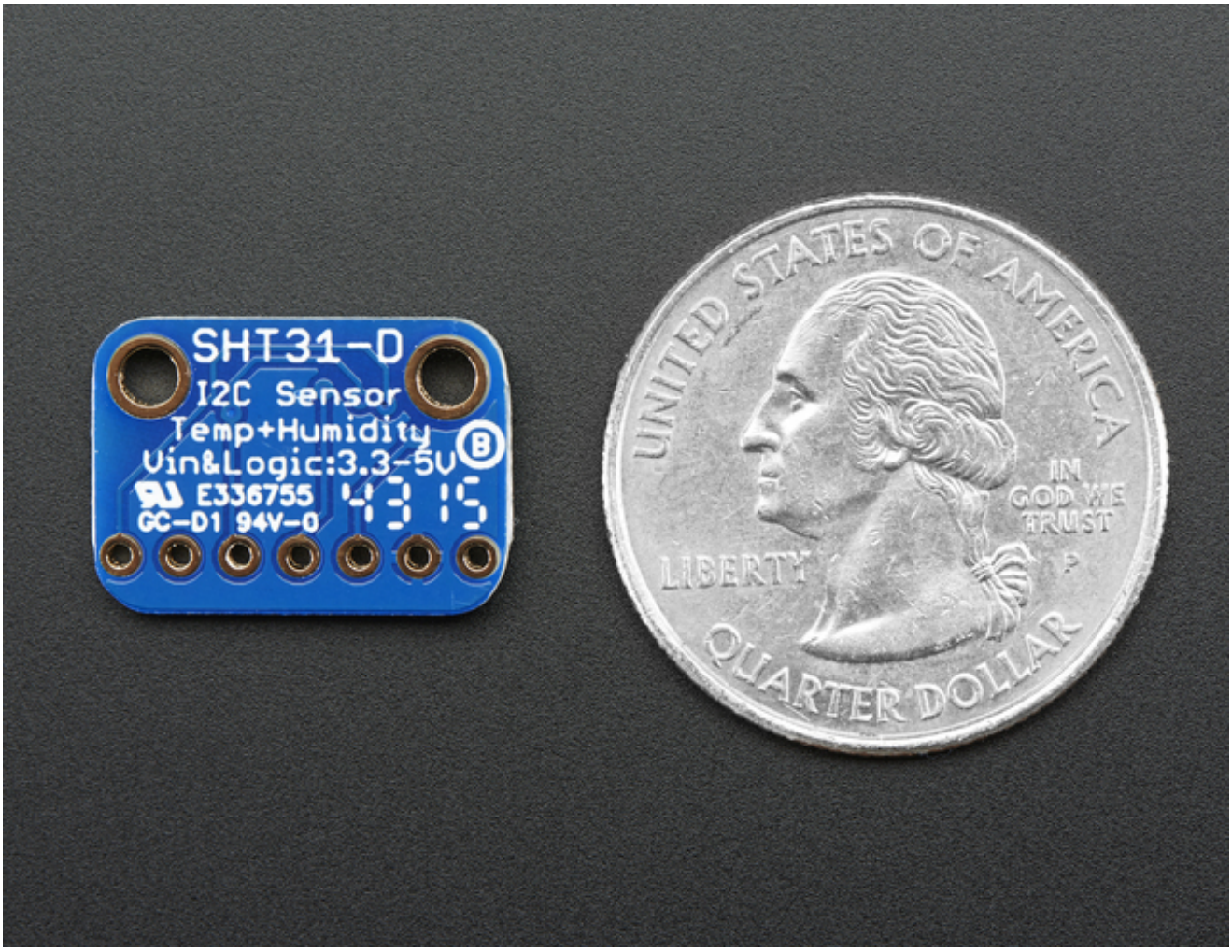
Sensirion Temperature/Humidity sensors are some of the finest & highest-accuracy devices you can get. And, *finally* we have some that have a true I2C interface for easy reading. The **SHT31-D** sensor has an excellent ±2% relative humidity and ±0.3°C accuracy for most uses.



Unlike earlier SHT sensors, this sensor has a *true* I2C interface, with two address options. It also is 3V or 5V compliant, so you can power and communicate with it using any microcontroller or microcomputer.

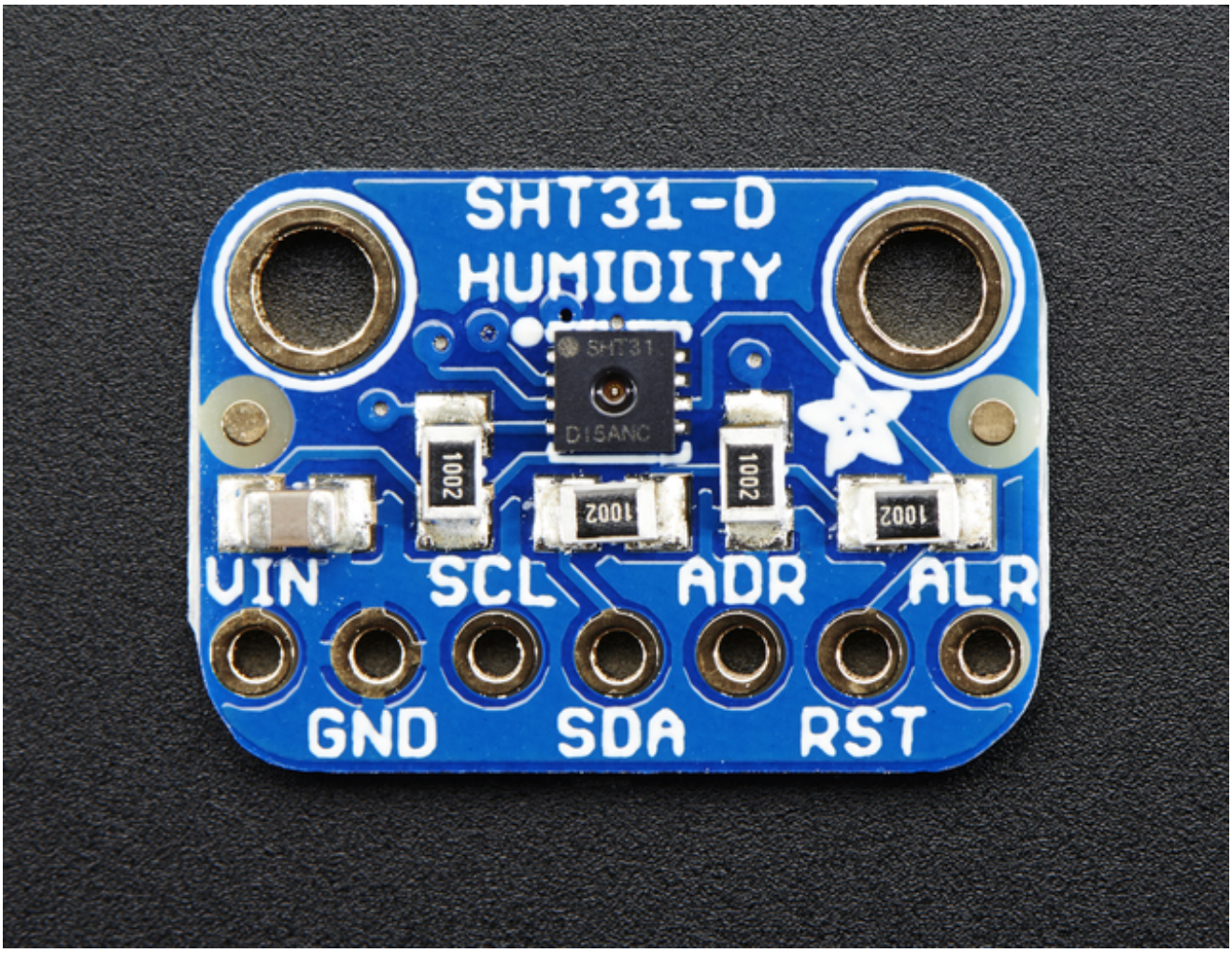


Such a lovely chip - so we spun up a breakout board with the SHT31-D and some supporting circuitry such as pullup resistors and capacitors. Each order comes with one fully assembled and tested PCB breakout and a small piece of header. You'll need to solder the header onto the PCB but it's fairly easy and takes only a few minutes even for a beginner.


SHT31-D
I2C Sensor
Temp+Humidity
Vin&Logic:3.3-5V
E336755
94V-0
UNITED STATES OF AMERICA
IN GOD WE TRUST
LIBERTY
QUARTER DOLLAR

Pinouts

The HTU21D-F is a I2C sensor. That means it uses the two I2C data/clock wires available on most microcontrollers, and can share those pins with other sensors as long as they don't have an address collision. For future reference, the default I2C address is **0x44** and you can also select address **0x45** by connecting the **ADDR** pin to a high voltage signal.



Power Pins:

- **Vin** - this is the power pin. The chip can use 2.5-5VDC for power. To power the board, give it the same power as the logic level of your microcontroller - e.g. for a 5V micro like Arduino, use 5V. For a 3.3V controller like a Raspbery Pi, connect to 3.3V
- **GND** - common ground for power and logic

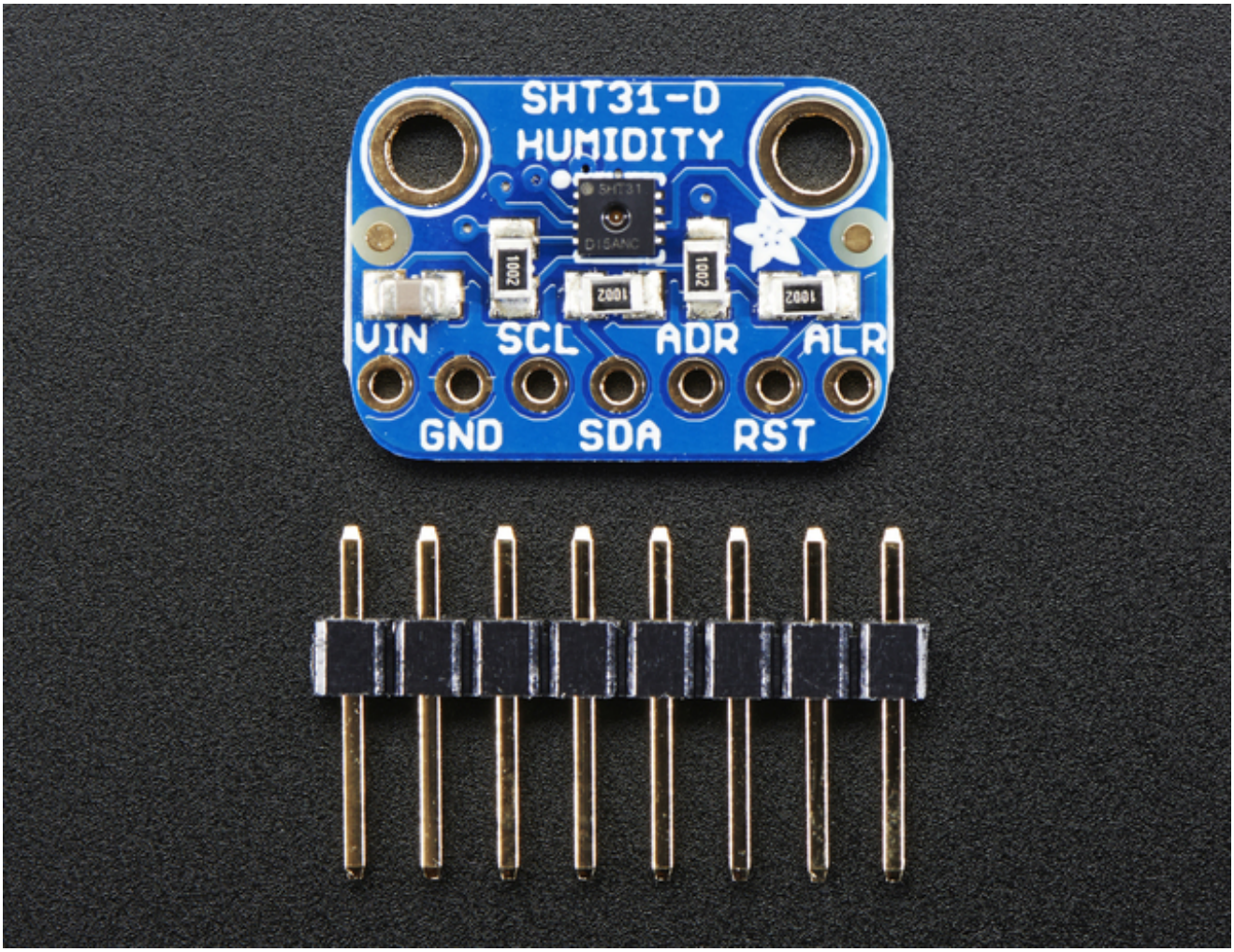
I2C Logic pins:

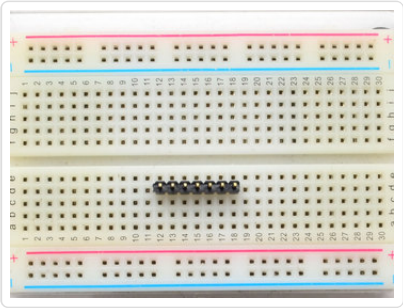
- **SCL** - I2C clock pin, connect to your microcontrollers I2C clock line. This pin has a 10K pullup resistor to Vin
- **SDA** - I2C data pin, connect to your microcontrollers I2C data line. This pin has a 10K pullup resistor to Vin

Other Pins:

- **ADR** - This is the I2C address selection pin. This pin has a 10K pull down resistor to make the default I2C address **0x44**. You can tie this pin to Vin to make the address **0x45**
- **RST** - Hardware reset pint. Has a 10K pullup on it to make the chip active by default. Connect to ground to do a hardware reset!
- **ALR** - Alert/Interrupt output. You can set up the sensor to alert you when an event has occured. Check the datasheet for how you can set up the alerts

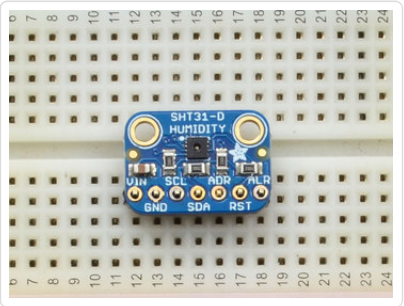
Assembly



- 

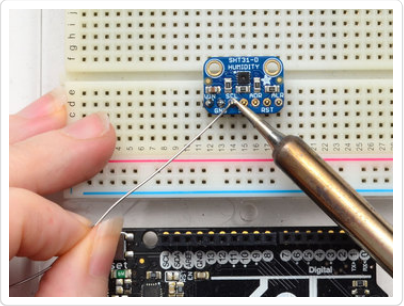
Prepare the header strip:

Cut the strip to length if necessary. It will be easier to solder if you insert it into a breadboard - **long pins down**

- 

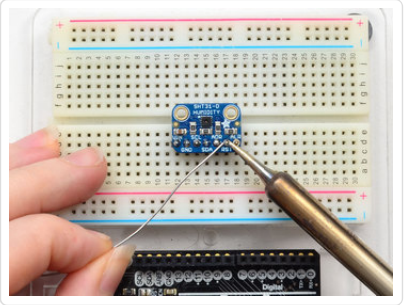
Add the breakout board:

Place the breakout board over the pins so that the short pins poke through the breakout pads

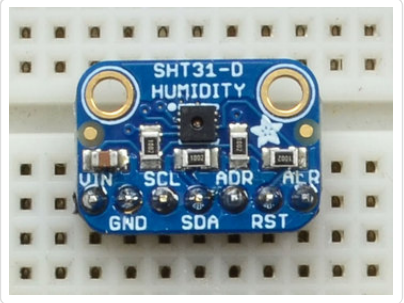
- 

And Solder!

Be sure to solder all pins for reliable electrical contact.

- 

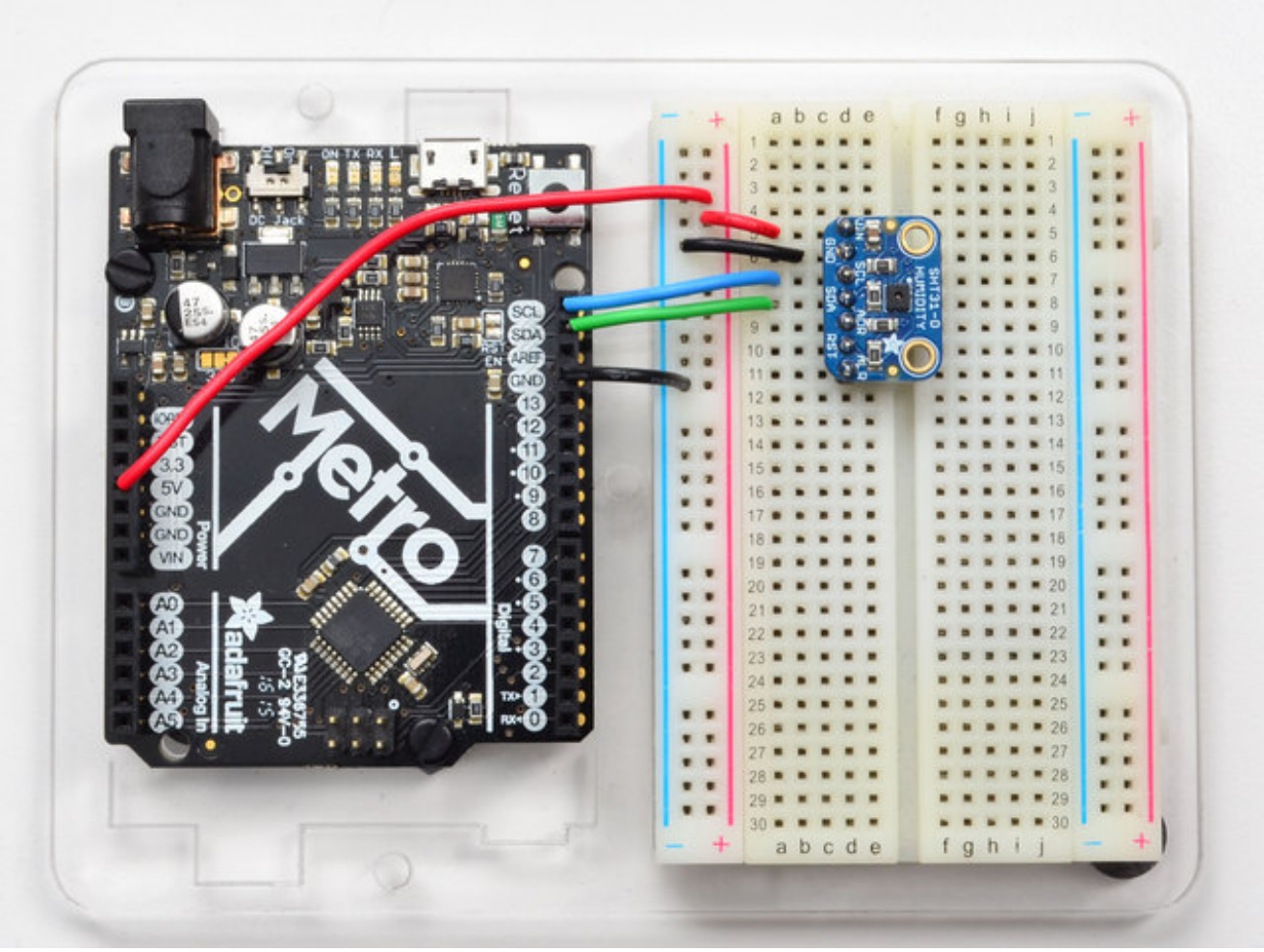
(For tips on soldering, be sure to check out our Guide to Excellent Soldering (http://adafru.it/aTk)).

- 

You're done! Check your solder joints visually and continue onto the next steps

Wiring & Test

You can easily wire this breakout to any microcontroller, we'll be using an Arduino. For another kind of microcontroller, just make sure it has I2C, then port the code - its pretty simple stuff!



- Connect **Vin** to the power supply, 3-5V is fine. Use the same voltage that the microcontroller logic is based off of. For most Arduinos, that is 5V
- Connect **GND** to common power/data ground
- Connect the **SCL** pin to the I2C clock **SCL** pin on your Arduino. On an UNO & '328 based Arduino, this is also known as **A5**, on a Mega it is also known as **digital 21** and on a Leonardo/Micro, **digital 3**
- Connect the **SDA** pin to the I2C data **SDA** pin on your Arduino. On an UNO & '328 based Arduino, this is also known as **A4**, on a Mega it is also known as **digital 20** and on a Leonardo/Micro, **digital 2**

The SHT31-D has a default I2C address of **0x44** which you can change to **0x45** by connecting the **ADR** pin to the **VIN** pin

Download Adafruit_SHT31

To begin reading sensor data, you will need to download Adafruit_SHT31 from our github repository (http://adafru.it/k6d). You can do that by visiting the github repo and manually downloading or, easier, just click this button to download the zip

Download Adafruit_SHT31 Library

http://adafru.it/k6e

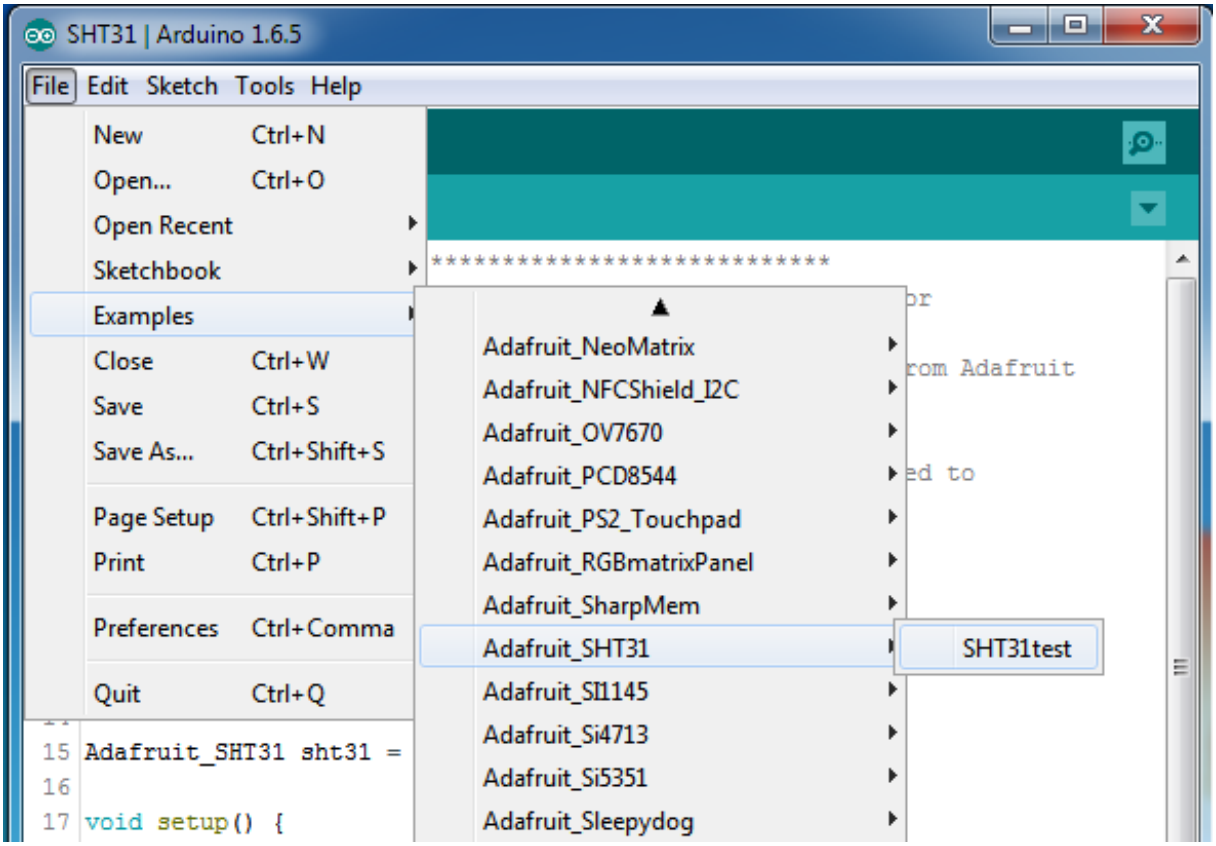
Rename the uncompressed folder **Adafruit_SHT31** and check that the **Adafruit_SHT31** folder contains **Adafruit_SHT31.cpp** and **Adafruit_SHT31.h**

Place the **Adafruit_SHT31** library folder your **arduinosketchfolder/libraries/** folder.
You may need to create the **libraries** subfolder if its your first library. Restart the IDE.

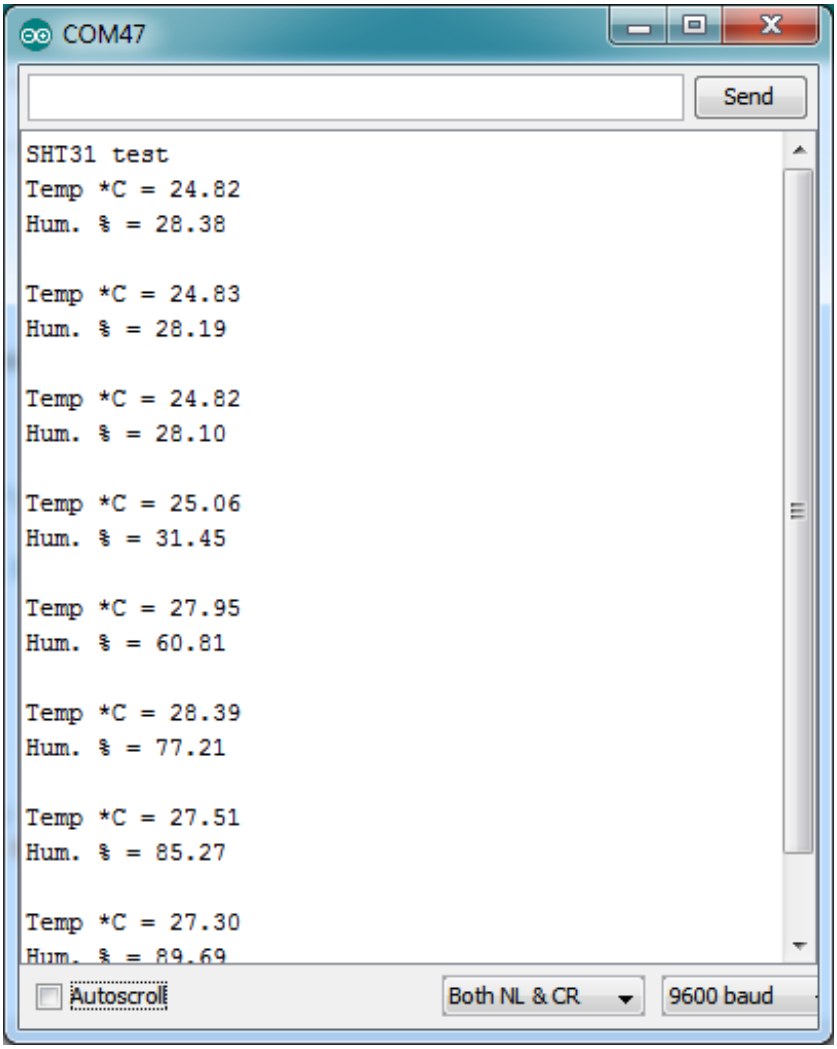
We also have a great tutorial on Arduino library installation at:
http://learn.adafruit.com/adafruit-all-about-arduino-libraries-install-use (http://adafru.it/aYM)

Load Demo

Open up **File->Examples->Adafruit_SHT31->SHT31test** and upload to your Arduino wired up to the sensor



Thats it! Now open up the serial terminal window at 9600 speed to begin the test.



You can try breathing on the sensor to increase the humidity. The sensor reacts very fast!

Library Reference

The library we have is simple and easy to use

You can create the **Adafruit_SHT31** object with:

```
Adafruit_SHT31 sht31 = Adafruit_SHT31();
```

There are no pins to set since you must use the I2C bus!

Then initialize the sensor with:

```
sht31.begin(0x44)
```

This function returns **True** if the sensor was found and responded correctly and **False** if it was not found

The **0x44** is the i2c address you have the sensor set up for. By default its 0x44, you can also adjust the sensor for **0x45** and then pass that value in

Once initialized, you can query the temperature in °C with

```
sht31.readTemperature()
```

Which will return floating point (decimal + fractional) temperature. You can convert to Fahrenheit by multiplying by 1.8 and adding 32 as you have learned in grade school!

Reading the humidity is equally simple. Call

```
sht31.readHumidity()
```

to read the humidity also as a floating point value between 0 and 100 (this reads % humidity)

We also have a few helper functions. Want to soft-reset the sensor? Use

```
sht31.reset()
```

There's also a heater built into the sensor, used to heat/evaporate any condensation. You can turn it on or off with

```
sht31.heater(true)
sht31.heater(false)
```

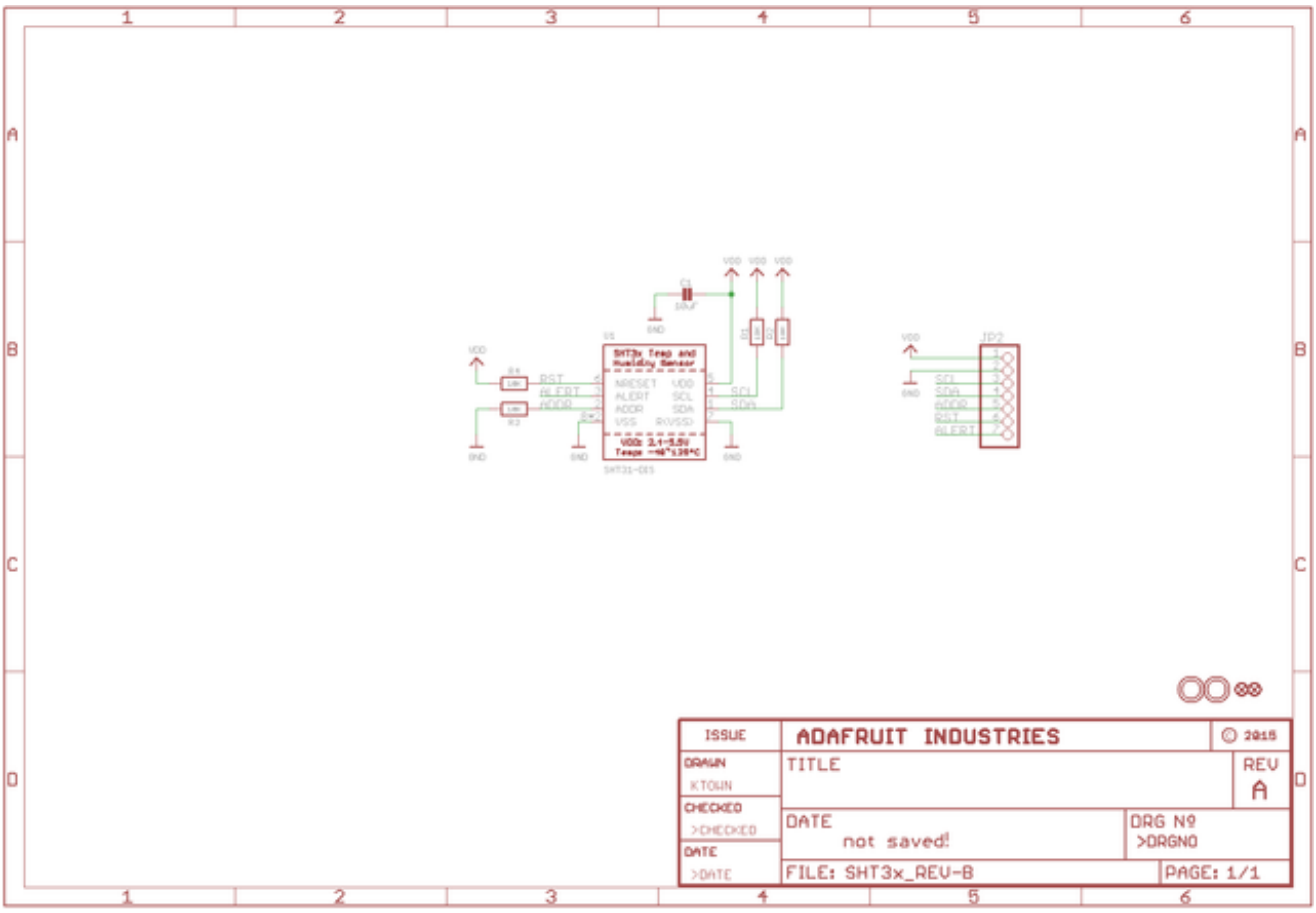
Downloads

Datasheets!

- SHT31-DIS dataheet (http://adafru.it/k6a)

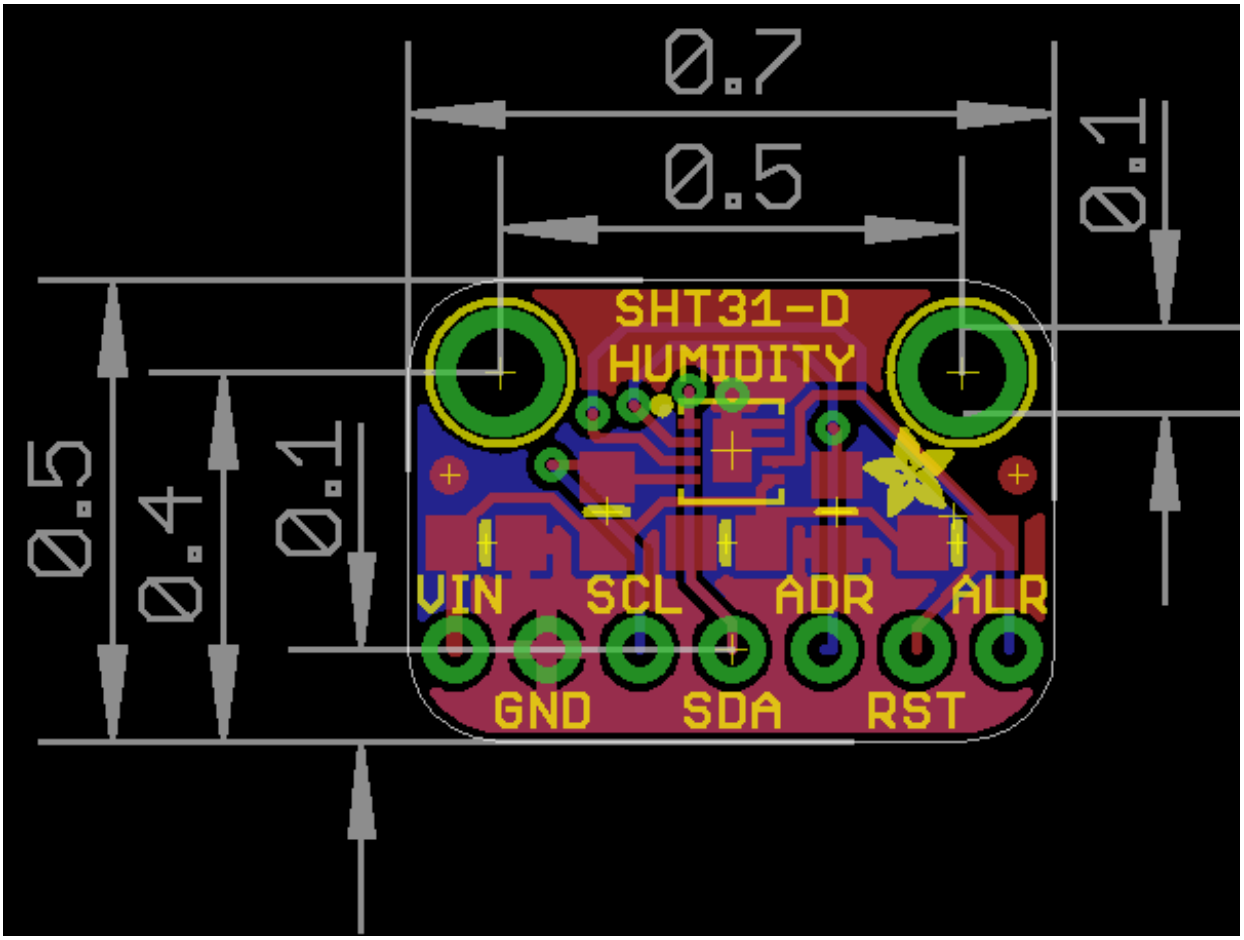
Schematic

Click to enlarge



Fabrication Print

Dimensions in inches


0.7
0.5
0.1
0.5
0.4
0.1
SHT31-D
HUMIDITY
VIN
SCL
ADR
ALR
GND
SDA
RST