Adafruit MiCS5524 CO / Alcohol / VOC Gas Sensor Breakout

Created by lady ada
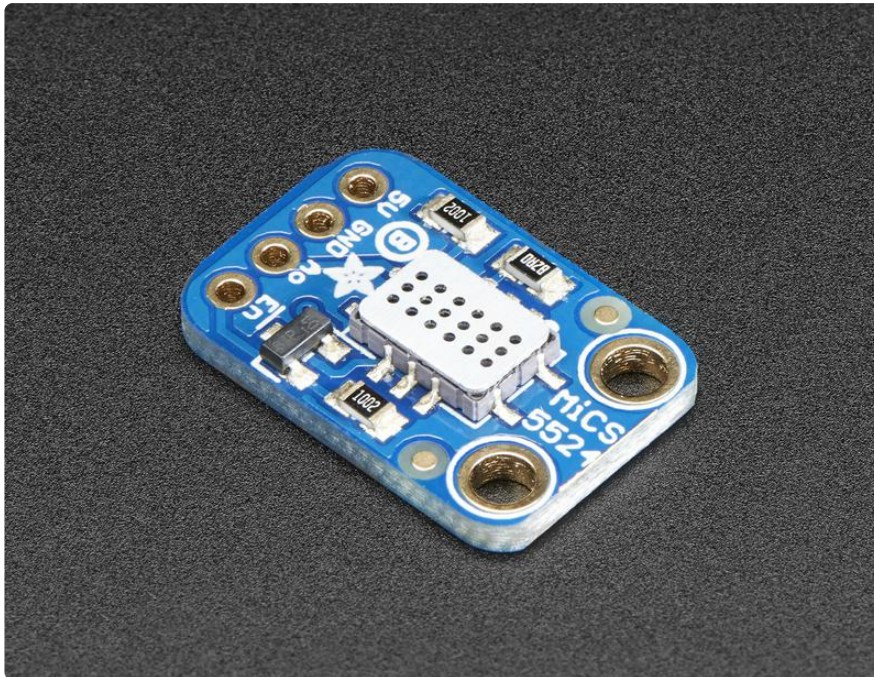

https://learn.adafruit.com/adafruit-mics5524-gas-sensor-breakout
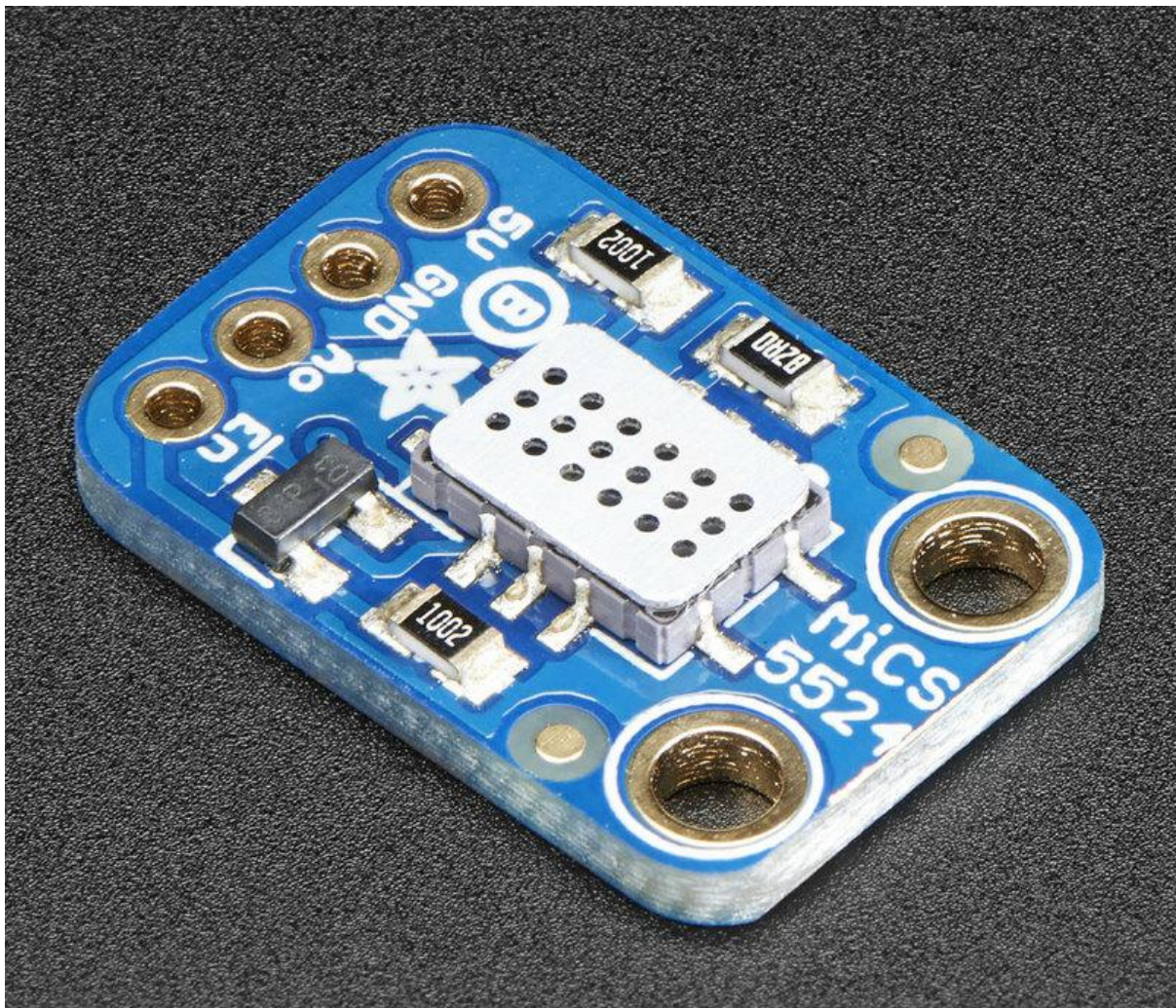
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Overview

Give your next sensor project a nose for gasses with the Adafruit MiCS-5524 Gas Sensor Breakout. This breakout makes it easy to use this nice sensor from SGX Sensortech. The MiCS-5524 is a robust MEMS sensor for indoor carbon monoxide and natural gas leakage detection, it's suitable also for indoor air quality monitoring; breath checker and early fire detection.

Please note: This sensor is sensitive to CO (~ 1 to 1000 ppm), Ammonia (~ 1 to 500 ppm), Ethanol (~ 10 to 500 ppm), H2 (~ 1 - 1000 ppm), and Methane / Propane / Iso-Butane (~ 1,000++ ppm). However, it can't tell you which gas it has detected.

All gas sensors require calibration for precision output. Note that the sensor is sensitive to multiple gasses - but cannot tell which it is! That's normal, most gas sensors are like that - so it is best for measuring changes in a known gas density, not detecting which is changing.

This breakout board is not for any safety, medical or finished product usage. We're selling it for hobby education & experimentation and don't guarantee it for any other purpose! Note that the sensor is sensitive to multiple gasses - but cannot tell which it is! That's normal, most gas sensors are like that - so it is best for measuring changes in a known gas density, not detecting which is changing.

Using it is easy: Power it with 5 VDC and read the analog voltage off of the output pin. When gasses are detected, the analog voltage will increase in proportion of detected gas. When powered, the heater draws about 25-35mA. You can use the EN pin to power it off (pull it high to 5V to turn off) to conserve energy. Just make sure to wait a second after turning the heater on to make sure its all heated before taking readings.

Each order comes with one assembled and tested MiCS-5524 breakout and a small amount of header. You'll need to do some light soldering to attach the header on - or you can use just plain wires.

Usage

Wiring the sensor is very simple. Power it from 5V and Ground. Then listen on the analog output pin with analogRead(A0)
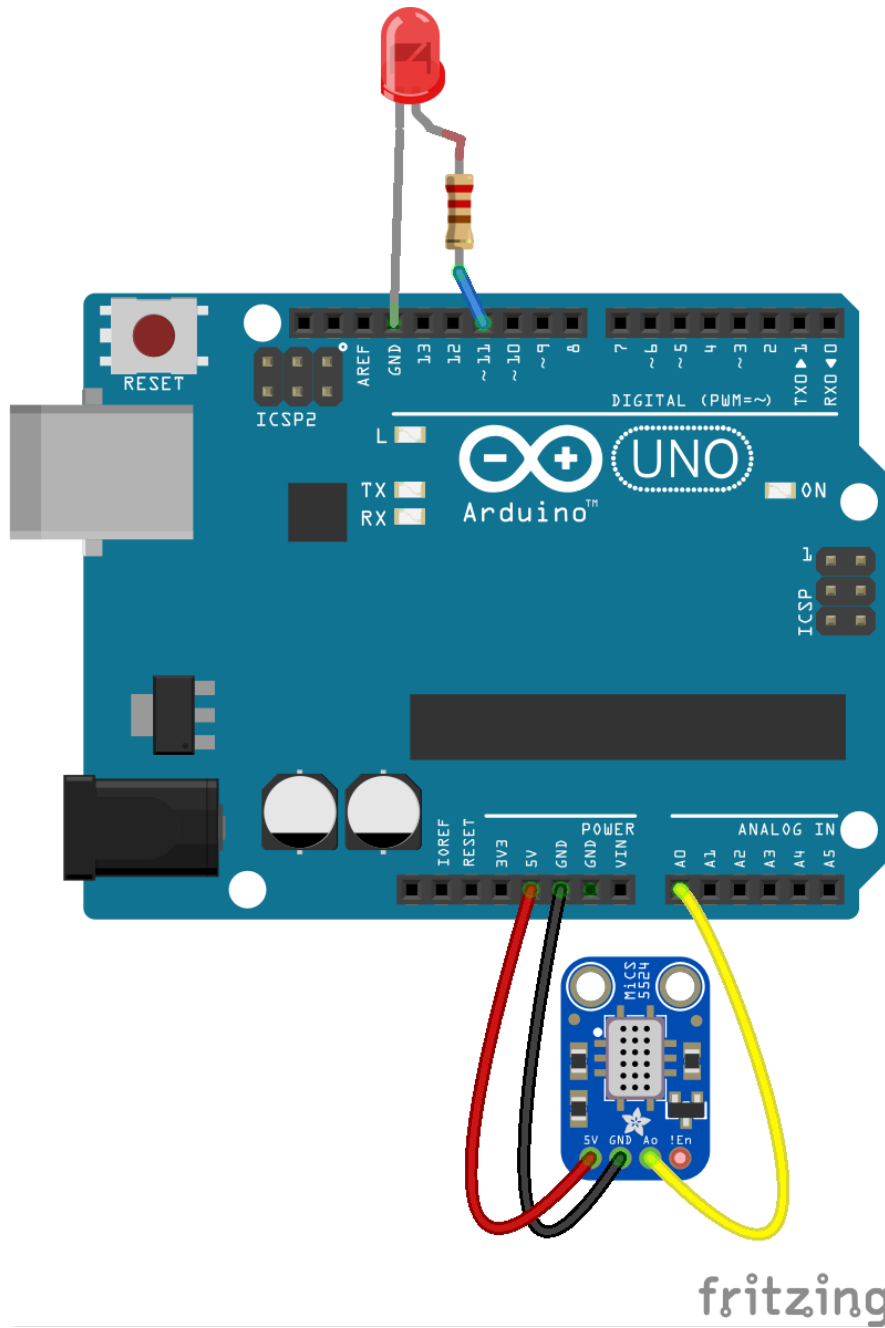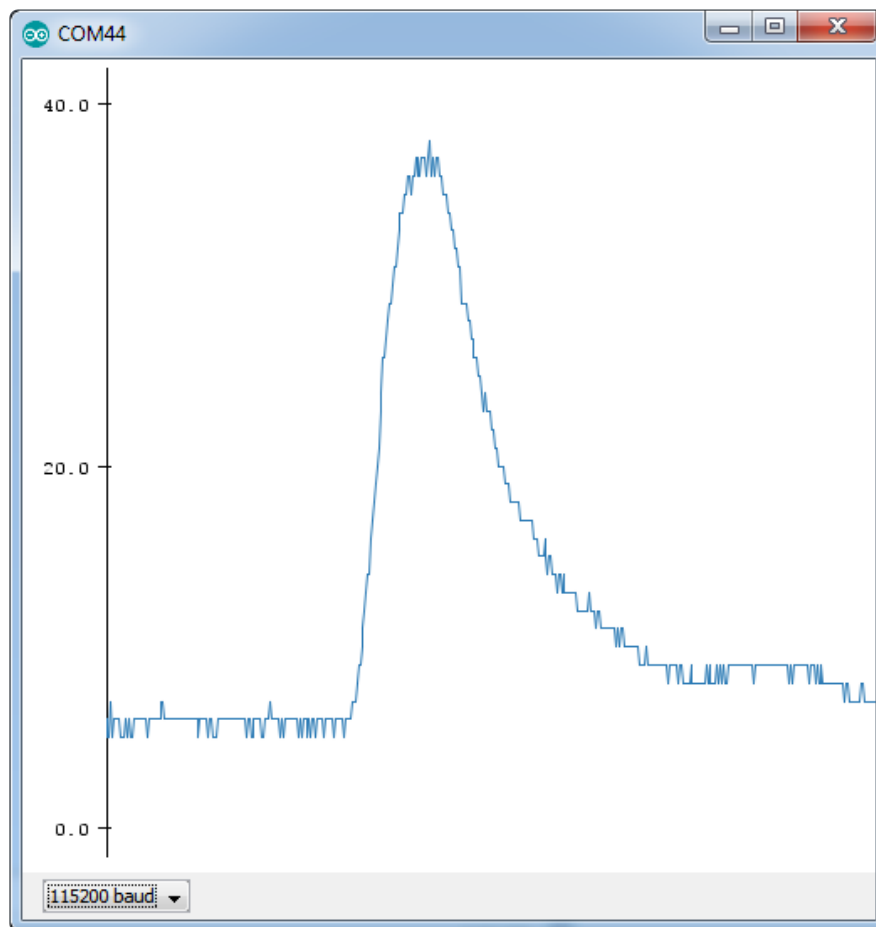
```
#define LED 11

void setup() {
  Serial.begin(115200);
  Serial.println("MiCS-5524 demo!");

  pinMode(LED, OUTPUT);
}

void loop() {
  int reading = analogRead(A0);
  Serial.println(reading);
```

```
  analogWrite(LED, reading);
  delay(10);
}
```

Open up the Serial Monitor or Serial Plotter to see the sensor output

Note that the sensor is sensitive to multiple gasses - but cannot tell which it is! That's normal, most gas sensors are like that - so it is best for measuring changes in a known gas density, not detecting which is changing.

Best Practices

Question:

> I'm evaluating the MiCS-5524 as a replacement for the Hanwei Electronics MQ-3 ethanol sensor that I'm using in a fermentation monitor application, where the sensor is placed in the headspace above the fermentation broth. I've found that the MiCS-5524 sensitivity falls off by half after 48 hours, and half again after 96 hours. Is this normal and is this sensitivity drop-off reversible?

Reply:

To clean sensors please turn on for minimum 24 hours in clear air. Probably he will be back to right lvl of measurement or maybe you will be need to calibrate.
Situation from your environment isn't standard for our sensors. They don't lost measurement if they're using right.

Find few important information below and please to read attachments.

Aged and non-aged sensors
Performances of non-aged sensor are changing strongly during the first hours of operation in terms of baseline and sensitivity.
Baseline resistance will take some hours to reach a stable value in stable environmental conditions.
Sensitivity is partially a function of baseline resistance as the sensitivity is affected by the bias current in the detector layer so sensitivity will also change during the first hours of operation.
This is the reason why we advise to age the sensor for 24 hours before any characterization or calibration procedure.
There is only one part number: Mics-5524. These sensors have aging process.

Exposure to high levels of gas
As long as the level is only say 25% above the specified level then there should be no issues. Above this the sensor zero & calibration to the target gas would need to be rechecked.
Certainly concentrations in the % range would probably have a permanent effect.

Calibration of Sensors
For all the sensors apart from the ozone sensor you will need to purchase a calibration gas mixture with a known concentration of your target gas. The mixtures are supplied in a variety of sizes and volumes depending on your requirement . The simplest form consists of a low-pressure aluminium cylinder with an in-built regulator which will give you ~20-50 litres of gas. Other cylinders are available with pressures up to 200 bar which require a regulator.
You will then require suitable tubing and an in-line flowmeter which needs to be set at about 0.5 Litre per minute. Finally you will need a flowhood to place over the sensor which allows gas to pass across (not directly to) the sensor which simulates what happens in normal applications. Flowhoods are available for the EC SO2 sensor but for the other sensors you may need to develop your own version.
For the Ozone sensor the situation is different as Ozone is so reactive that it cannot be made and stored in a cylinder. It needs to made in-situ using an electrical generator , however the concentration produced cannot be accurately selected by the generator and hence needs to be measured with an external analyser .

Also if you want to measure the MICS sensors over a range of concentrations you will need to carry out calibration at various points and produce a response curve for each sensor. This is because the sensor response ,as with all sensors of this type , is not linear . Please see the following link for further information http://www.sgxsensortech.com/content/up ... ors-V1.pdf (https://adafru.it/qjC)

If you need more information please let me know.

Greg
Pozdrawiam/Best regards,
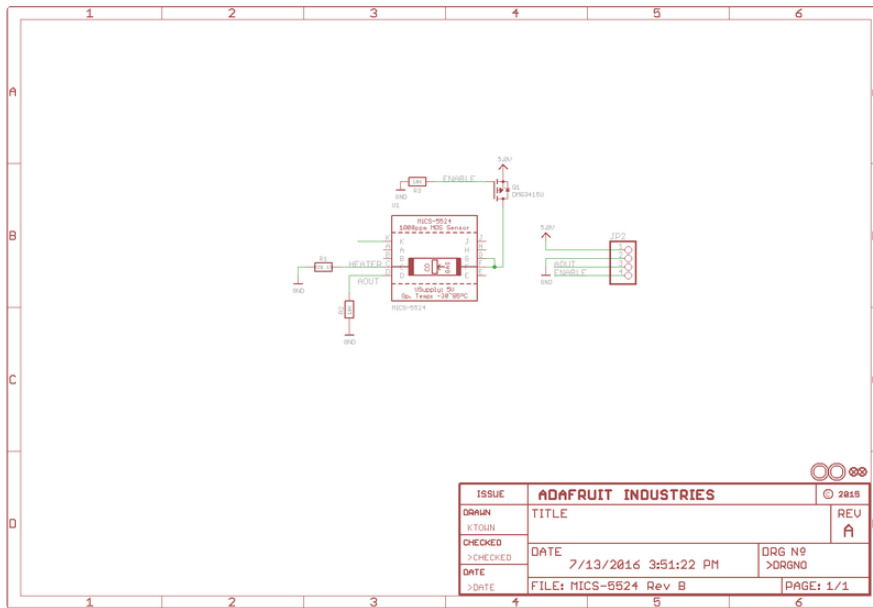
Grzegorz Duda
Sales Engineer
BU Industrial Gas Sensors
SGX Europe Sp. z o.o.

Downloads

Files

- EagleCAD PCB files on GitHub (https://adafru.it/oQf)
- Fritzing object in the Adafruit Fritzing library (https://adafru.it/c7M)
- MiCS-5524 Datasheet (https://adafru.it/oQA)
- App Note on Alcohol detection (https://adafru.it/oQB)

Schematic

Fabrication Print

Dimensions in inches