s-Sense CCS811 by itbrainpower.net - I2C, 3-5V auto, air quality sensor how to

About this document

Those notes refer to CCS811* sensor breakout** integration with 3.3V or 5V compatible Arduino shields. CCS811 setup and read *carbon dioxide* [CO2] and *total volatile organic compound* [TVOC] values. Also, temperature and humidity read compensation notes. Tips and tricks.

* CCS811 – CO2 and TVOC low power sensor

** s-Sense by itbrainpower.net CCS811 I2C breakout [PN: SS-CCS811#I2C / SKU: ITBP-6004] or s-Sense by itbrainpower.net CCS811 + HDC2010 bundled sensors I2C breakout [PN: SS-HDC2010+CCS811#I2C / SKU: ITBP-6006]

About CCS811 - CO2 and tVOC sensor

CCS811 manufactured by AMS is a digital CO2 and tVOC air quality sensor. Main measurement characteristics:

- equivalent carbon dioxide range is 400ppm up to 29206ppm;
- equivalent Total Volatile Organic Compounds output range is from 0ppb up to 32768ppb;
- internal compensation algorithm using external ambient temperature and humidity data source;
- temperature range for operation -40C to +80C.

In June 2019, itbrainpower.net released 6 new environmental and air quality sensors, including *CCS811 I2C sensor breakout* and *HDC2010+CCS811 I2C combo sensors breakout*, all being part of the *s-Sense I2C sensor breakout family*. s-Sense sensors are designed and manufactured in EU.
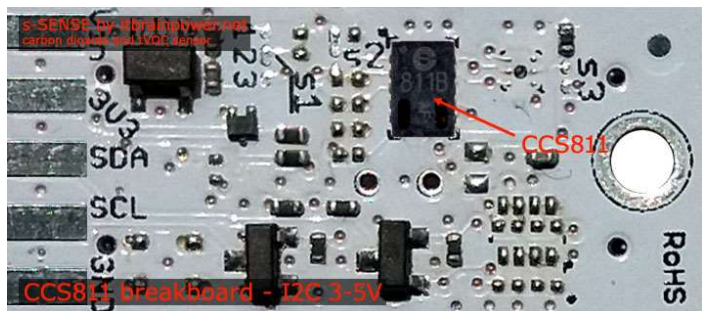
s-Sense CCS811 by itbrainpower.net   PN: SS-CCS811#I2C / *SKU: ITBP-6004*
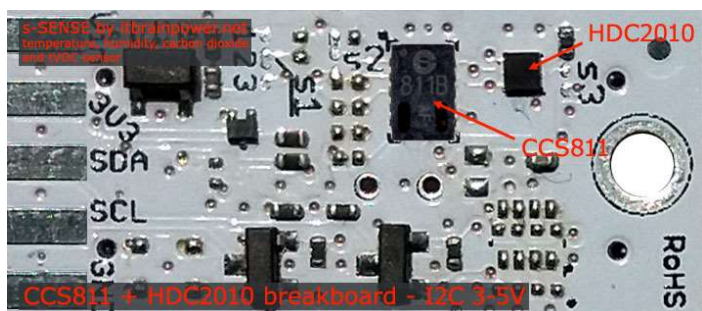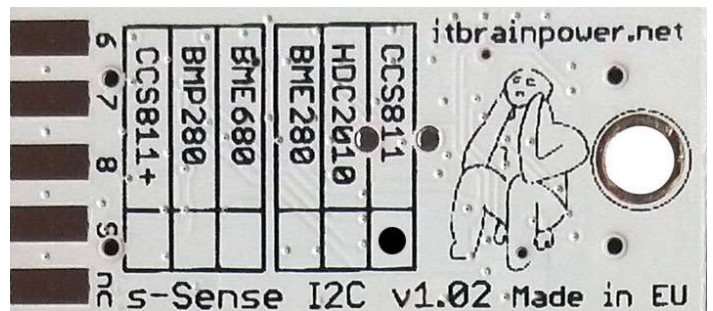
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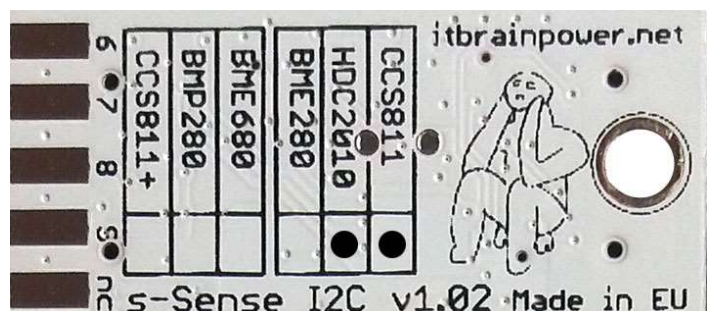
Next, let's kickstart with CCS811 sensor I2C breakout - around 10-15 minutes. Same hardware and software approach may be used for CCS811 + HDC2010 bundle sensors I2C breakout.

Arduino CCS811 sensor hardware integration (basic wiring)

IMPORTANT: s-Sensor I2C interface is 3-5V auto compliant, but still you must first identify if your Arduino board is 5V or 3.3V compliant!

The CCS811 I2C sensor breakout it's shipped default in *auto 3-5V* compliant configuration. In a nut shell, wire as bellow:

CCS811 breakout	Arduino 5V [Eg.: UNO]	Arduino 3.3V [Eg.: Zero]
Vin PAD	5V	3.3V
Vdd PAD (3V3)	do not connect	do not connect
SDA PAD	SDA	SDA
SCL PAD	SCL	SCL
GND PAD	GND	GND
PAD 6 [on PCB bottom]**	D5 / GND	D5 / GND

** PAD 6 - CCS811 WAKE signal [placed on PCB bottom side]

- when *connected directly to GND*, the *CCS811 will avoid enter into SLEEP mode* [sensor it's always ACTIVE].
- when *connected to D5*, the MCU host software must be able to control SLEEP/ACTIVE mode switching [implemented in library, see bellow].

Whatever PAD6 [CCS811 WAKE] wiring used, the software will be able to handle sensor data initializing and environmental data readings.

Bellow, some wiring examples, left to right, with *Arduino UNO* and *xyz-mIoT by itbrainpower.net*
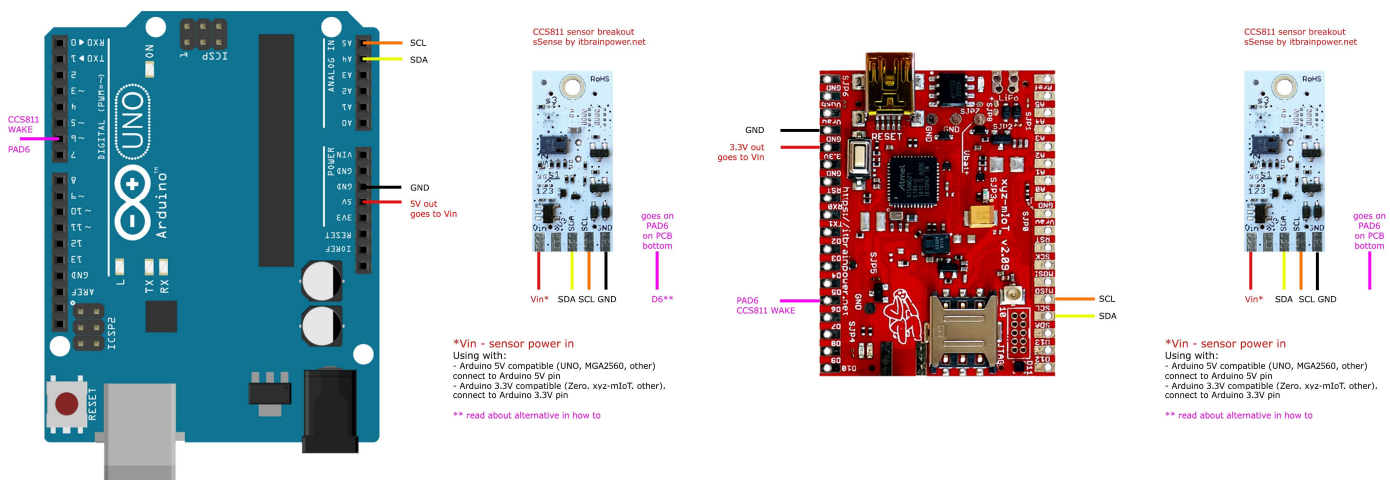
I2C hint, for some popular ARDUINO boards:

- SDA (Serial Data) --> A4 on Uno/Pro-Mini, 20 on Mega2560/Due, 2 Leonardo/Pro-Micro
- SCK (Serial Clock) --> A5 on Uno/Pro-Mini, 21 on Mega2560/Due, 3 Leonardo/Pro-Micro

Arduino CCS811 sensor software

a. download CCS811 Arduino library from https://itbrainpower.net/downloads.php#s-Sense
b. expand the archive and copy the class in Arduino Library folder into the 'libraries' folder found in your Arduino Sketchbook. Take a look at "readme.md" and/or "readme.md" files. Restart Arduino.
c. open *"ssense_CCS811_example"* example located in Arduino "File-> Examples", under "ssense-CCS811" library folder. You may preview the code here: https://itbrainpower.net/downloadables/ssense_CCS811_example.ino
d. choose your Arduino shield from "Tools->Boards".
e. compile and upload the code to your Arduino shield.
f. the sensor data may be seen on Arduino Serial Monitor (set the speed at 19200bps).

Advanced CCS811 Arduino feature [read CO2 and tVOC compensated data - using external temperature and humidity data source]

The CCS811 sensor have some interesting features (read datasheet…) - one of them being the **temperature** *drift compensation*.

In a nut shell, CCS811 allow to set the external *temperature* and *humidity* values from external data source and use them for internal compensation algorithm.

In order to enable this feature, look at *line 59* in *ssense_CCS811_example*. There you may inject the data supplied by external THS sensor. I suppose, at this point, you may like to have your **s-Sense HDC2010+CCS811 by itbrainpower.net combo sensor**! 😉

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