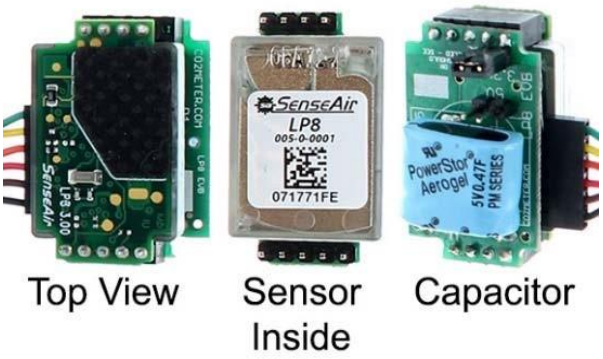
Application Note AN-170:
LP8 CO2 Sensor Development Kit

Introduction

The CM-0217 Sensor Development Kit provides an easy means for evaluation the SenseAir LP8 Miniature CO2 Sensor. It provides the necessary super-capacitor for operation from low current sources.

The development kit board has 4 pin and 5 pin female connectors that mate directly with the headers on the LP8 sensor. A 6 pin right angle header provides connection to a USB/UART serial cable that connects to a PC. This configuration is fully supported by the CO2Meter.com's GasLab software (Version 2.11 and above).



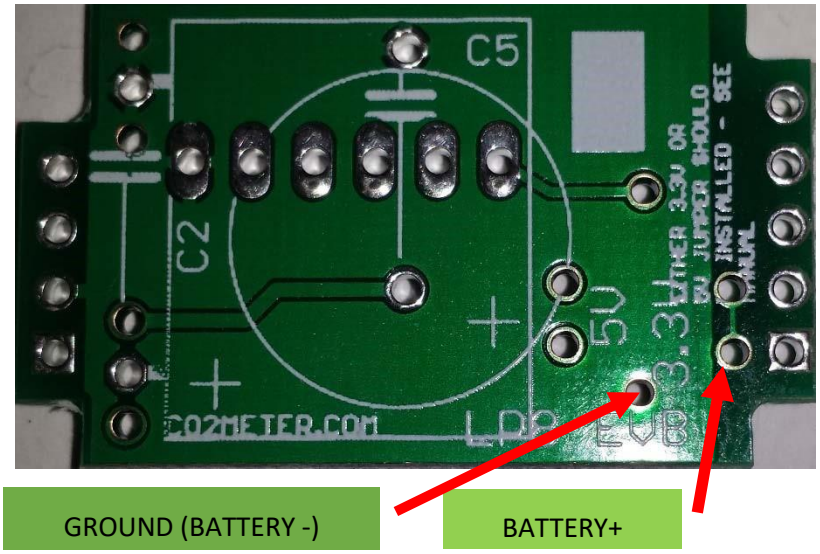
Background

The LP8 is an OEM sensor. It is designed to be used as a component of a low power system, e.g. a solar or long life battery powered LCD display sensor, logger, or Bluetooth LE based sensor.

All NDIR sensor consume significant power when illuminating the IR source (lamp). The LP8 is designed to utilize a low Equivalent Series Resistance (ESR) super-capacitor as the power source for powering the lamp during actual measurement. Combined with very low power consumption between readings, it can be used in an application that requires low AVERAGE power. For example, the LP8 could be used to measure CO2 over months or even years depending on the OEM application, the power source and the time between readings.

Given that the application power source could be very low (battery, solar, etc.) the power source by itself may not have sufficient power for the lamp during a reading. This depends on the source impedance of the power source. The load imposed by the lamp during the measurement cycle may momentarily lower the source voltage below that required by the lamp and sensor electronics. That is the role of the low ESR and low leakage (self-discharge current) super-capacitor.

Powering the Sensor



The default configuration of the jumpers powering the board from the FTDI serial cable (powered from the USB) is 5VDC. Even when attached to a PC via USB, the power level (not voltage) is often insufficient to power an NDIR sensor. There is an onboard 3.3VDC regulator which drops the voltage to 3.3V. This can be bypassed to power the system from 5VDC. In either case, one or the jumper allows the cable to provide power to the sensor for testing which also charges the super-capacitor.

The jumpers allow disabling of this arrangement so that the sensor can be directly powered in the manner to be used in the actual application. In this case the power is supplied direct. The FTDI cable can still be used to control and communication with the sensor, but the power is being supplied externally, e.g. from a solar/cell or battery.

5V power for the sensor is supplied from the connector. With the jumper installed in the 3.3V position as illustrated in the figure, the 5V USB power from the cable is regulated to 3.3V to power the sensor. This permits testing of the sensor at the nominal 3.3V input power. Removing the jumper and installing it in the 5V jumper position (adjacent to the super-capacitor) powers the sensor with 5V.

Note that the sensor monitors and reports the voltages to the super-capacitor at the start and end of the measurement cycle. The measurement will fail if the super-capacitor is unable to deliver the required power.