Description:

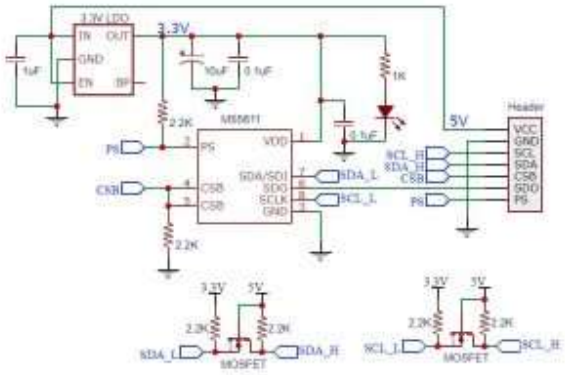
The GY-63 MS5611 is a high performance pressure and temperature sensor module with I2C and SPI interface.
PACKAGE INCLUDES:

GY-63 Pressure Temperature Sensor Module
7-pin male header straight
7-pin male header right-angle

KEY FEATURES OF GY-63 PRESSURE TEMPERATURE SENSOR MODULE:

Temperature: -40 to 85°C
Pressure: 10 to 1200 mb
Altitude resolution: 10cm
Fast conversion as short as 1ms
I2C and SPI Interface
5V operation

The MS5611 is a high precision sensor from MEAS Switzerland that can be used in many applications from portable altimeters, gaming controls and indoor navigation.GY-63 MS5611 Pressure Sensor Module Schematic



The sensor achieves its excellent performance by being factory calibrated with the calibration data stored on the device. In addition it takes and averages a large number of measurements to filter out noise. It can take 4096 24-bit analog measurements in just 8ms and provide the average of the data points to the digital data bus. It also has built-in temperature compensation which uses the same method to filter out noise.

The temperature measurement is primarily used to temperature compensate the pressure sensor, but it can also be used to estimate the ambient temperature as well.

Internally the MS5611 sensor operates at 3.3V, but the module contains a 3.3V regulator so the module should be supplied with 5V on the VCC pin. The module also includes level shifting MOSFET transistors on the logic pins to make the module fully 5V compatible.

Measuring Temperature

The MS5611 can measure temperature over the range of -40 to 80°C.

Full accuracy of ±0.8°C is obtained over the entire range with a resolution of 0.01°C.

Measuring Pressure

The MS5611 can measure pressure over the range of 10 to 1200 mbar with excellent accuracy.

Full accuracy of ±1.5 mbar is obtained over the pressure range of 450 to 1100 mbar. Outside that pressure range the guaranteed accuracy is ±2.5 mbar

Resolution can be as high as 0.012 mbar which gives an altitude resolution as small as 10 cm (4″).

Calculating Altitude / Elevation

The MS5611 does not measure altitude directly, but it can be calculated using the pressure reading. Some libraries for this device include altitude calculation routines.

Since the device does a very good job of measuring pressure, it can do a very good job of calculating relative altitude. If you have an altitude reading with the device sitting on a table and then raise it 6″, it will show a 6″ increase in altitude.

If on the other hand you are trying to measure absolute altitude, such as the altitude of your table relative to sea level, things get more complicated. Since altitude is relative to sea level the device needs to know the current air pressure corrected to sea level so that it has a reference by which to calculate the altitude given the air pressure that it is currently reading.

Using the I2C Interface

The I2C interface is the most used interface as it only requires two pins on the MCU.

The PS (Protocol Select) pin determines which bus to use. A logic HIGH selects the I2C bus. A 1K pull-up resistor on the module pulls this pin HIGH and so the I2C bus is selected by default unless this pin is grounded.

The module supports two different I2C addresses, either 0x77 or 0x76 which allows up to 2 sensors to be used on the same bus. If the CSB pin is grounded, the address is 0x77. If it is connected to VCC the address is 0x76 (inverse logic). The CSB pin as a 2.2K pull-down resistor on the module so 0x77 is the default address if the CSB pin is not connected. Connect the CSB to Vcc to select 0x76 instead or if two sensors are used on the same I2C bus.

The SCL and SDA pins connect to the SCL and SDA pins on the MCU.

If more than 2 sensors are needed, then the SPI bus can be used.
Using the SPI Interface

To enable the SPI interface, connect PS to ground.

The other connection are:

Connect

1.SCL pin to the SPI SCK on MCU
2.SDA pin to SPI SDI on MCU
SDO pin to SPI SDO on MCU

Note that logic level shifters are included on the module for these lines to make them 5V compatible.
Module Connections

The module brings out the following connections.

1 x 7 Header

VCC = 5V nominal. Connect to 5V output of the MCU
GND = Ground
SCL = Clock (SCL / SCK) for I2C and SPI
SDA = Data (SDA / SDI) for I2C and SPI
CSB = Chip Select. Chip Select for SPI. Address select for I2C
SDO = Data Out (SDO) for SPI
PS = Protocol Select. Default pulled HIGH for I2C. Connect to GND for SPI

Module Assembly

The module ships with the male header strips loose. It includes both a straight and right-angle header for flexibility. The header can be soldered to the top or bottom of the module depending on the planned use or wires can be used to make the connections.

For breadboard use, we put the straight headers on the bottom, though some people prefer to use the right-angle header so that the module stands vertical. Soldering is easiest if the header is inserted into a solderless breadboard to hold it in position during the soldering process.