MEAS MS5611 XPLAINED PRO BOARD

Digital Barometric Pressure and Temperature
Digital Component Sensor (DCS) Development Tools

The MS5611 Xplained Pro provides the necessary hardware to interface the MS5611 digital barometric pressure and temperature sensor to any system that utilizes Xplained Pro compatible expansion ports configurable for I²C communication. The MS5611 sensor is a self-contained pressure and temperature sensor that is fully calibrated during manufacture. The sensor can operate from 1.5V to 3.6V. The sensor module includes a high-linearity pressure sensor and an ultra-low power 24 bits ΔΣ ADC with internal factory-calibrated coefficients.
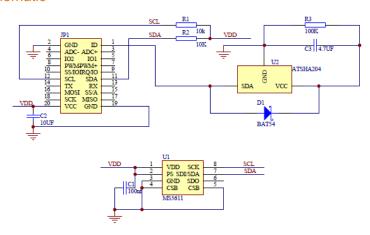
Refer to the MS5611 data sheet for detailed information regarding operation of the I²C:

http://www.te.com/usa-en/product-CAT-BLPS0036.html

Performance
- 10 to 1200mbar pressure range
- -40°C to 85°C temperature range
- Very low power consumption
- Operates from 1.5V to 3.6V
- Altitude resolution at sea level is 20 cm of air
- Fast conversion time – 0.5ms typical

Specifications
- Measures pressure from 10mbar to 1200mbar
- Measures temperature from -40°C to 125°C
- I²C communication
- Fully calibrated
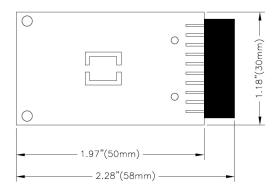- Fast response time
- Very low power consumption

Features
- 20-pin Xplained Pro compatible connector
- I²C interface
- Xplained Pro Hardware identification Chip
- Atmel Studio 7 Project available for download
- µC C code available for download
- 24 bits resolution for pressure
- 24 bits resolution for temperature

Schematic

Connector Pin Assignments (I^{2}C Communications)

System Plug

Connector JP1					
Pin No.	Signal	Description	Pin No.	Signal	Description
1	ID	Hardware identification	11	SDA	TWI Serial Data
2	GND	Ground	12	SCL	TWI Serial Clock
3	N/C	Not Connected	13	N/C	Not Connected
4	N/C	Not Connected	14	N/C	Not Connected
5	N/C	Not Connected	15	N/C	Not Connected
6	N/C	Not Connected	16	N/C	Not Connected
7	N/C	Not Connected	17	N/C	Not Connected
8	N/C	Not Connected	18	N/C	Not Connected
9	N/C	Not Connected	19	GND	Ground
10	N/C	Not Connected	20	Vdd	Power Supply

Dimensions (mm)

1.18"(30mm)

1.97"(50mm)

2.28"(58mm)

Detailed Description

I^{2}C Interface
The peripheral module can interface to the host being plugged directly into an Xplained Pro extension port (configured for I^{2}C) through connector JP1.

External Control Signals
The IC operates as an I^{2}C slave using the standard 2 wire I^{2}C connection scheme. The IC is controlled either by the host (through the Xplained Pro connector). In cases where one or more of the SCL and SDA signals are driven from an external source, 10k resistors R1, R2 provide pull-up. However, this also increases the apparent load to the external driving source. If the external source is not capable of driving these loads (10k), they should be removed.

Reference Materials
The complete software kit is available for download at: MS5611_CPROJ.zip
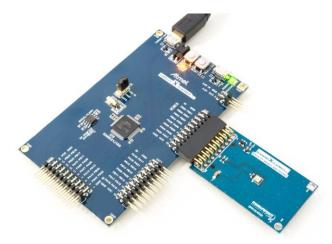
Drivers & Software

Detailed example software and drivers are available that execute directly without modification on a number of development boards that support an integrated or synthesized microprocessor. The download contains several source files intended to accelerate customer evaluation and design. The source code is written in standard ANSI C format, and all development documentation including theory/operation, register description, and function prototypes are documented in the interface file.

Functions Summary

Enumerations		
	enum	**ms5611_resolution_osr {** **ms5611_resolution_osr_256 = 0, ms5611_resolution_osr_512,** **ms5611_resolution_osr_1024, ms5611_resolution_osr_2048,** **ms5611_resolution_osr_4096, ms5611_resolution_osr_8192** **}**
	enum	**ms5611_status {** **ms5611_status_ok, ms5611_status_no_i2c_acknowledge,** **ms5611_status_i2c_transfer_error, ms5611_status_crc_error** **}**
Functions		
	void	**ms5611_init (void)** Configures the SERCOM I2C master to be used with the ms5611 device.
	bool	**ms5611_is_connected (void)** Check whether MS5611 device is connected.
enum ms5611_status		**ms5611_reset (void)** Reset the MS5611 device.
	void	**ms5611_set_resolution (enum ms5611_resolution_osr)** Set ADC resolution.
enum ms5611_status		**ms5611_read_temperature_and_pressure (float *, float *)** Reads the temperature and pressure ADC value and compute the compensated values.

Project Setup

This project is based on ATSAMD20J18 board with TE Connectivity Xplained Pro extension board connected to EXT1 pad as shown on figure below.

Running the Application

1. Download the MS5611 Xplained Pro example package at: MS5611_CPROJ.zip

2. Decompress the archive file

3. Open the .cproj project file with Atmel Studio 6

4. You will now be able to build the MS5611 example project -

5. Finally, run the build result on your Xplained Pro Board -

Application Code

This section is intended to provide a basic example of functionality.

```c
/**
 * \file main.c
 *
 * \brief MS5611 Pressure monitoring application file
 *
 * Copyright (c) 2014 Measurement Specialties. All rights reserved.
 *
 */


#include <asf.h>


float temperature;
float pressure;


int main (void)
{
        enum ms5611_status status;
        float last_temperature = 0;
        float variation = 0;

        system_init();
        delay_init();

        // Configure device and enable
        ms5611_init();

        if( !ms5611_is_connected() )
                return -1;

        // Reset MS5611
        status = ms5611_reset();
        if( status != ms5611_status_ok)
                return -1;

        ms5611_set_resolution(ms5611_resolution_osr_256);

        // Monitor temperature & pressure every second
```

```c
while (1) {

        status = ms5611_read_temperature_and_pressure( &temperature, &pressure);

        if( status != ms5611_status_ok)

                return -1;


        variation += temperature - last_temperature;


        // Look for significant temperature variation

        if (  variation >= 0.5 ) {

                // Yes, so turn LED on.

                port_pin_set_output_level(LED_0_PIN, LED_0_ACTIVE);

                variation = 0;

        } else if ( variation <= -0.5 ) {

                // No, so turn LED off.

                port_pin_set_output_level(LED_0_PIN, LED_0_INACTIVE);

                variation = 0;

        }


        delay_ms(1000);

        last_temperature = temperature;

    }

}
```

Ordering Information

Description	Part Number
MEAS MS5611 XPLAINED PRO BOARD	DPP102A000