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MEAS MS5637 XPLAINED PRO BOARD

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

The MS5637 Xplained Pro provides the necessary hardware to interface the MS5637 digital barometric pressure and temperature sensor to any system that utilizes Xplained Pro compatible expansion ports configurable for I²C communication. The MS5637 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 MS5637 data sheet for detailed information regarding operation of the IC:

http://www.te.com/usa-en/product-CAT-BLPS0037.html

Performance
* 300 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

Features
* 20-pin Xplained Pro compatible connector
* I²C interface
* Xplained Pro Hardware identification Chip
* Atmel Studio 6 Project available for download
* µC C code available for download
* 24 bits resolution for pressure
* 24 bits resolution for temperature

Specifications
* Measures pressure from 300mar to 1200mbar
* Measures temperature from -40°C to 125°C
* I²C communication
* Fully calibrated
* Fast response time
* Very low power consumption

Schematic
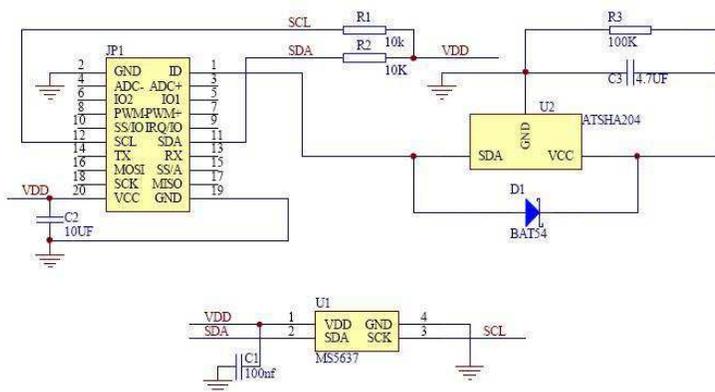
## Connector Pin Assignments (I²C Communications)

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)
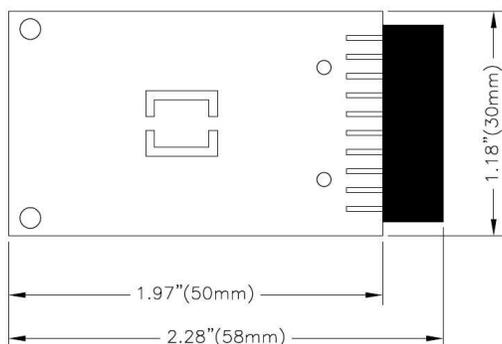
Detailed Description

I²C Interface
The peripheral module can interface to the host being plugged directly into an Xplained Pro extension port (configured for I²C) through connector JP1.

External Control Signals
The IC operates as an I²C slave using the standard 2 wire I²C 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: Link to MS5637_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	**ms5637_resolution_osr {** **ms5637_resolution_osr_256 = 0, ms5637_resolution_osr_512,** **ms5637_resolution_osr_1024, ms5637_resolution_osr_2048,** **ms5637_resolution_osr_4096, ms5637_resolution_osr_8192** **}**
enum	**ms5637_status {** **ms5637_status_ok, ms5637_status_no_i2c_acknowledge,** **ms5637_status_i2c_transfer_error, ms5637_status_crc_error** **}**
Functions	
void	**ms5637_init (void)** Configures the SERCOM I2C master to be used with the ms5637 device.
bool	**ms5637_is_connected (void)** Check whether MS5637 device is connected.
enum ms5637_status	**ms5637_reset (void)** Reset the MS5637 device.
void	**ms5637_set_resolution (enum ms5637_resolution_osr)** Set ADC resolution.
enum ms5637_status	**ms5637_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 Measurement Specialties Xplained Pro extension board connected to EXT1 pad as shown on figure below.
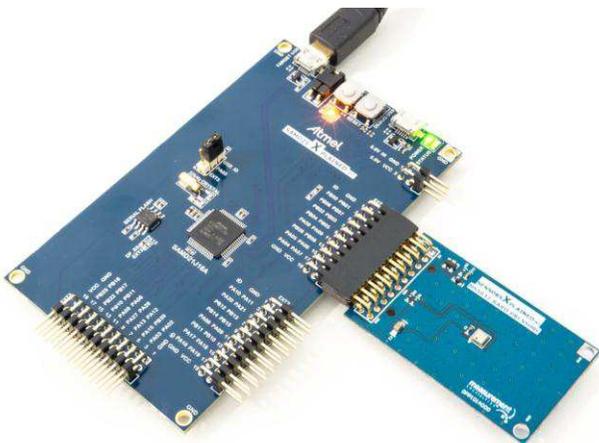
Running the Application

1. Download the MS5637 Xplained Pro example package on [TE Website](#)

2. Decompress the archive file

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

4. You will now be able to build the MS5637 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 MS5637 Pressure monitoring application file
 *
 * Copyright (c) 2014 Measurement Specialties. All rights reserved.
 *
 */


#include <asf.h>


float temperature;
float pressure;


int main (void)
{
        enum ms5637_status status;
        float last_temperature = 0;
        float variation = 0;

        system_init();
        delay_init();


        // Configure device and enable
        ms5637_init();


        if( !ms5637_is_connected() )
                return -1;


        // Reset MS5637
        status = ms5637_reset();
        if( status != ms5637_status_ok)
                return -1;


        ms5637_set_resolution(ms5637_resolution_osr_256);


        // Monitor temperature & pressure every second
```

```c
while (1) {

        status = ms5637_read_temperature_and_pressure( &temperature, &pressure);

        if( status != ms5637_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 MS5637 XPLAINED PRO BOARD	DPP101A000

te.com/sensorsolutions

PRODUCT SHEET