

MEAS MS8607 XPLAINED PRO BOARD

Digital Pressure and Humidity
Digital Component Sensor (DCS) Development Tools

Performance

- 0% to 100% relative humidity range
- -40°C to 125°C temperature range
- Very low power consumption
- Operates from 1.5V to 3.6V
- Fast response time – 5 seconds typical
- Built-in heater for fast recovery from saturation
- Recovers fully from condensation
- Fast conversion time – 14ms 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
- Selectable 16-24 bits resolution for pressure
- Selectable 8-12 bit resolution for humidity
- Selectable 12-14 bit resolution for temperature

The MS8607 Xplained Pro provides the necessary hardware to interface the MS8607 digital pressure, relative humidity and temperature sensor to any system that utilizes Xplained Pro compatible expansion ports configurable for I²C communication. The MS8607 sensor is a self-contained pressure, humidity and temperature sensor that is fully calibrated during manufacture. The sensor can operate from 1.5V to 3.6V. The MS8607 is ideal for weather station applications embedded into compact devices and any applications in which pressure, humidity and temperature monitoring is required.

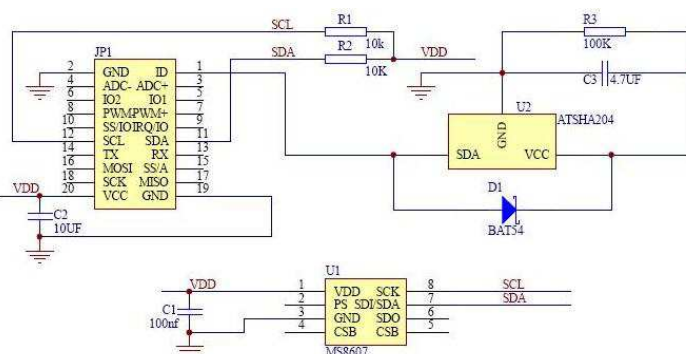
Refer to the MS8607 data sheet for detailed information regarding operation of the IC:

<http://www.te.com/usa-en/product-CAT-BLPS0018.html>

Specifications

- Operating pressure range: 300 to 1200 mbar
- Measures relative humidity from 0% to 100%
- Measures temperature from -40°C to 125°C
- Extended pressure range 10 to 2000 mbar
- Fast response time
- I²C communication
- Very low power consumption

Schematic

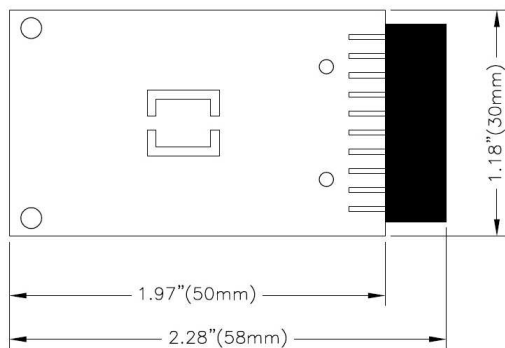


Connector Pin Assignments (I²C Communications)

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 MS8607_CPROJ.zip](#)

Drivers & Software

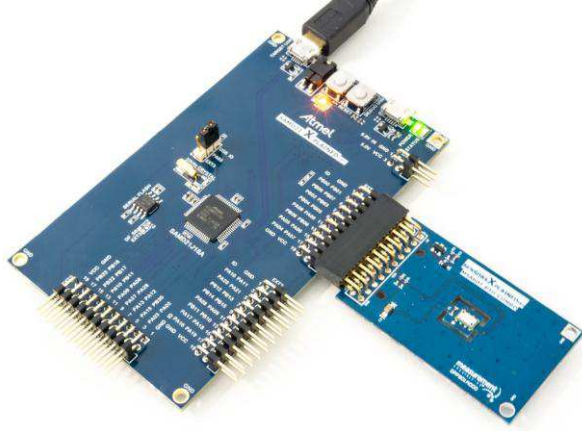
Detailed example software and drivers are available that execute directly without modification on a number of development boards that support an integrated or synthesized microprocessor. The download contains several source files intended to accelerate customer evaluation and design. The source code 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	ms8607_humidity_i2c_master_mode { ms8607_i2c_hold, ms8607_i2c_no_hold }
enum	ms8607_status { ms8607_status_ok, ms8607_status_no_i2c_acknowledge, ms8607_status_i2c_transfer_error, ms8607_status_crc_error, ms8607_status_heater_on_error }
enum	ms8607_humidity_resolution { ms8607_humidity_resolution_12b = 0, ms8607_humidity_resolution_8b, ms8607_humidity_resolution_10b, ms8607_humidity_resolution_11b }
enum	ms8607_battery_status { ms8607_battery_ok, ms8607_battery_low }
enum	ms8607_heater_status { ms8607_heater_off, ms8607_heater_on }
enum	ms8607_pressure_resolution { ms8607_pressure_resolution_osr_256 = 0, ms8607_pressure_resolution_osr_512, ms8607_pressure_resolution_osr_1024, ms8607_pressure_resolution_osr_2048, ms8607_pressure_resolution_osr_4096, ms8607_pressure_resolution_osr_8192 }
Functions	
void	ms8607_init (void) Configures the SERCOM I2C master to be used with the MS8607 device.
bool	ms8607_is_connected (void) Reset the MS8607 device.
enum ms8607_status	ms8607_reset (void) Reset the MS8607 device.
enum ms8607_status	ms8607_set_humidity_resolution (enum ms8607_humidity_resolution) Set Humidity sensor ADC resolution.
void	ms8607_set_pressure_resolution (enum ms8607_pressure_resolution) Set Pressure sensor ADC resolution.
void	ms8607_set_humidity_i2c_master_mode (enum ms8607_humidity_i2c_master_mode) Set I2C master mode.
enum ms8607_status	ms8607_read_temperature_pressure_humidity (float *, float *, float *) Reads the temperature, pressure and relative humidity value.
enum ms8607_status	ms8607_get_battery_status (enum ms8607_battery_status *) Provide battery status.
enum ms8607_status	ms8607_enable_heater (void) Enable heater.
enum ms8607_status	ms8607_disable_heater (void) Disable heater.
enum ms8607_status	ms8607_get_heater_status (enum ms8607_heater_status *) Get heater status.
enum ms8607_status	ms8607_get_compensated_humidity (float, float, float *) Returns result of compensated humidity Note : This function shall only be used when the heater is OFF. It will return an error otherwise.
enum ms8607_status	ms8607_get_dew_point (float, float, float *) Returns the computed dew point Note : This function shall only be used when the heater is OFF. It will return an error otherwise.

Project Setup

This project is based on ATSAM20J18 board with Measurement Specialties Xplained Pro extension board connected to EXT1 pad as shown on figure below.



Running the Application

1. Download the MS8607 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 MS8607 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.

```
/**
 * \file main.c
 *
 * \brief MS8607 Pressure monitoring application file
 *
 * Copyright (c) 2014 Measurement Specialties. All rights reserved.
 *
 */

#include <asf.h>

float temperature;
float pressure;
float relative_humidity;
float compensated_humidity;
float dew_point;

int main (void)
{
```

```
enum ms8607_status status;

float last_temperature = 0;

float variation = 0;

uint8_t n=0;

enum ms8607_heater_status heater;

system_init();
delay_init();

// Configure device and enable
ms8607_init();

if( !ms8607_is_connected() )
    return -1;

// Reset MS8607
status = ms8607_reset();
if( status != ms8607_status_ok)
    return -1;

// Configure resolution
status = ms8607_set_humidity_resolution(ms8607_humidity_resolution_12b);
if( status != ms8607_status_ok)
    return -1;

ms8607_set_pressure_resolution(ms8607_pressure_resolution_osr_8192);

// Monitor temperature every 500ms
while (1) {

    if( n&1 )
        ms8607_set_humidity_i2c_master_mode(ms8607_i2c_hold);
    else
        ms8607_set_humidity_i2c_master_mode(ms8607_i2c_no_hold);

    // Enable heater for 10s
    if( (n==10) ) {
        status = ms8607_enable_heater();
        if( status != ms8607_status_ok)
            return -1;
    }

    // Disable heater after 20s
    if( (n==20) ) {
        status = ms8607_disable_heater();
        if( status != ms8607_status_ok)
            return -1;
    }

    // Check heater status
```

```
status = ms8607_get_heater_status(&heater);
if( status != ms8607_status_ok)
    return -1;

status = ms8607_read_temperature_pressure_humidity(&temperature, &pressure, &relative_humidity);
if( status != ms8607_status_ok)
    return -1;

status = ms8607_get_compensated_humidity(temperature,relative_humidity,&compensated_humidity);
status = ms8607_get_dew_point(temperature,relative_humidity,&dew_point);

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;
n++;
if(n==50) n=0;
}
}
```

Ordering Information

Description	Part Number
MEAS MS8607 XPLAINED PRO BOARD	DPP901A000

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