MEAS TSD305 XPLAINED PRO BOARD

Digital Thermopile Temperature Sensor

The TSD305 Xplained Pro provides the necessary hardware to interface the TSD305 digital temperature sensor to any system that utilizes Xplained Pro compatible expansion ports configurable for I²C communication. The TSD305 sensor is a contactless temperature sensor that is fully calibrated during manufacture. The sensor can operate from 1.68V to 3.6V. The sensor module includes a low power 16-bits ΔΣ ADC with internal factory-calibrated coefficients.

Refer to the TSD305 data sheet for detailed information regarding operation of the I²C:

http://www.te.com/usa-en/product-G-TPMO-101.html

Performance

- Contactless temperature measurement from 0°C to 100°C
- -10°C to 85°C operating temperature range
- Low power consumption
- Operates from 1.68V to 3.6V
- Resolution is 0.1°C
- Conversion time – 44.8ms typical

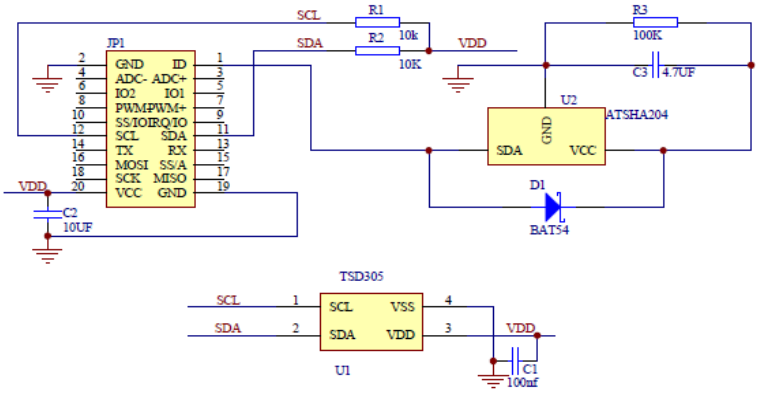
Features

- 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
- 16-bits resolution for temperature

Specifications

- Measures temperature from 0°C to 100°C
- Operating Temperature Range: -10°C to 85°C
- Contactless temperature measurement
- I²C communication
- Fully calibrated
- Up to ±1°C accuracy
- Low current consumption

Schematic

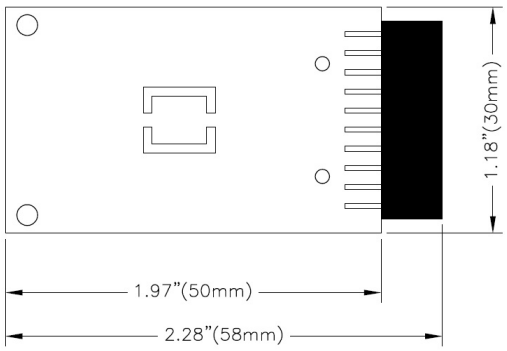


Connector Pin Assignments (I^2C Communications)

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

I^2C Interface

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

External Control Signals

The IC operates as an I^2C slave using the standard 2 wire I^2C 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: TSD305_CPROJ.zip

Drivers & Software

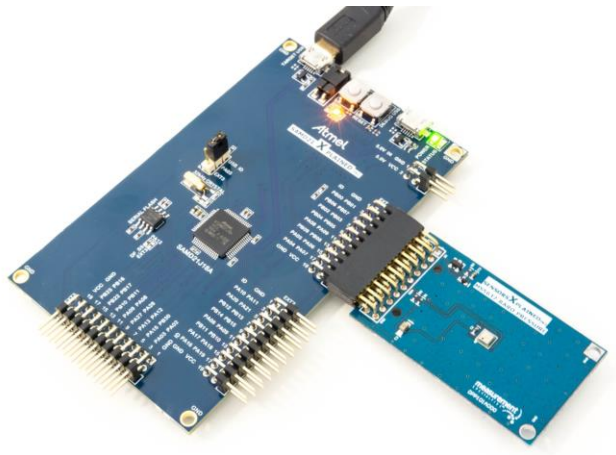
Detailed example software and drivers are available that execute directly without modification on a number of development boards that support an integrated or synthesized microprocessor. The download contains several source files intended to accelerate customer evaluation and design. The source code 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	**tsd305_status {** **tsd305_status_ok,** **tsd305_status_no_i2c_acknowledge,** **tsd305_status_i2c_transfer_error,** **tsd305_status_busy,** **tsd305_status_memory_error,** **tsd305_status_out_of_range** **}**
Functions	
void	**tsd305_init (void)** Configures the SERCOM I2C master to be used with the tsd305 device.
bool	**tsd305_is_connected (void)** Check whether TSD305 device is connected.
enum tsd305_status	**read_temperature_and_object_temperature (float *, float *)** Reads the ambient temperature and object temperature 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 TSD305 Xplained Pro example package at: TSD305_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 TSD305 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 TSD305 Temperature monitoring application file
 *
 * Copyright (c) 2018 TE Connectivity. All rights reserved.
 *
 */

#include <asf.h>

float temperature;
float object_temperature;

int main (void)
{
	enum tsd305_status status;
	float last_object_temperature = 0;
	float variation = 0;

	system_init();
	delay_init();

	// Configure device and enable
	tsd305_init();

	if( !tsd305_is_connected() )
		return -1;

	// Monitor temperature & object_temperature every second
	while (1) {

		status = tsd305_read_temperature_and_object_temperature(&temperature, &object_temperature);
		if( status != tsd305_status_ok)
			return -1;

		variation += object_temperature - last_object_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_object_temperature = object_temperature;
          }
}
```

Ordering Information

Description	Part Number
MEAS TSD305 XPLAINED PRO BOARD	DPP203A000

NORTH AMERICA
Measurement Specialties, Inc.,
a TE Connectivity Company
Phone: +1-800-522-6752
customercare.hmpt@te.com

EUROPE
MEAS France(Europe)
a TE Connectivity Company
Phone: +31 73 624 6999
customercare.tise@te.com

ASIA
Measurement Specialties (China), Ltd.,
a TE Connectivity Company
Phone: +86-400-820-6015
customercare.shzn@te.com

TE.com/sensorsolutions