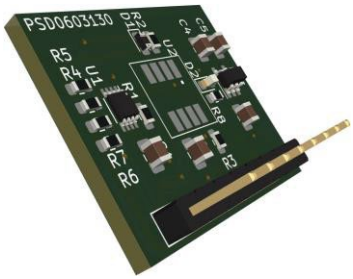


Data Sheet PSD0603130-EB Evaluation Board

PUI Audio's PSD0603130-EB pressure sensor demonstration board features the PUI Audio PSD0603130 digital output pressure sensor. The PSD0603130 features a 30kPa to 200kPa (4.35psi to 29.02psi) input pressure range.

The PSD0603130 features an anti-magnetic stainless-steel enclosure and SPI and I2C interfaces. The PSD0603130 combines high-linearity pressure sensor with an ultra-low-power 24-bit delta-sigma analog-to-digital converter (ΔΣADC). The pressure sensor is factory calibrated. The calibration coefficients are stored internally and used by the ΔΣADC as it processes the sensor's analog output. The PSD0603130 also includes a temperature sensor with a nominal resolution of 0.003°C

The board features a small size of 21.0mm x 25.0mm, 1.8V to 5.0V power supply voltage range, and header pins for easy design prototype development.

Features:

- 30kPa to 200kPa input pressure range
- Temperature resolution: 0.003°k/LSB
- 24-bit DSADC
- SPI or I2C serial interface
- 3.3VDC nominal power supply voltage
- Board's dimensions: 21.0mm x 25.0mm

Key Applications:

- Portable or wearable medical devices
- Security break-in detection
- Mobile altimeter
- Barometers
- Pressure & Temperature monitoring systems
- Indoor Navigation Systems

Absolute Maximum Rating

VDD with respect to GND ..... $V \le V_{DD} \le 5.5V$
Digital Inputs/Outputs with respect to GND ..... $0.3V \le (V_{DD} + 0.3V)$
Burst Pressure 2000kPa (289.85psi)

Electrical Characteristics (V_{DD} = 3.3±0.3V, T_A = 25°C, unless otherwise specified.)

Parameter	Conditions	Minimum	Typical	Maximum	Unit
V_{DD}		1.8		5.0	Volts
I_{DD}	PGA on; Gain > 4 Sleep Mode		1.8 100	2.8 200	mA nA
ADC Resolution			24		Bits
Operating Temperature		-40		125	°C
Storage Temperature		-40		125	°C
Pressure Characteristics					
Pressure Range		4.35		29.02	psi
Accuracy[1]	-40°C ≤ T_A ≤ -25°C 65°C ≤ T_A ≤ 85°C	-0.058		0.058	psi
	-25°C ≤ T_A ≤ 65°C	-0.029		0.029	
Conversion Time	Cyclic periodic pattern	2.5			ms
Overload Pressure				87.08	psi
Pressure Compensation Temperature Range		-40		85	°C
Pressure Temperature Drift Coefficient			0.00007		psi/°C
Pressure Compensation Temperature Range		-40		125	°C
Temperature Characteristics					
Temperature Resolution			0.003		°C/LSB
Temperature Accuracy	-40°C ≤ T_A ≤ 50°C	-0.5		0.5	
Temperature Compensation Temperature Range		-40		125	°C

Note 1: 11.60psi ≤ P_A ≤ 18.85psi

Electrical Characteristics (continued)

(V_{DD} = 3.7V, V_{GND} = 0V, $\overline{SHDN}$ = V_{DD}, GAIN = V_{DD} (0dB), C_{BIAS} = 0.1µF, C_{IN} = 0.47µF, no load: R_{IN} = R_F = 10kΩ, T_A = t_{MIN} ≤ t ≤ t_{MAX}. Typical values are given at T_A = 25°C, unless otherwise noted.)

Symbol	Parameters	Conditions	Minimum	Typical	Maximum	Unit
f_{SCL}	Serial Bus Frequency				400	kHz
t_{LOW}	Clock-Low Time		1.3			µs
t_{BHIGH}	Clock-High Time		0.6			µs
t_{SUDATB}	SDA Setup Time		0.1			µs
t_{HDOATB}	SDA Hold Time					µs
t_{SUSTAB}	SDA Valid After Rising CLK Edge Setup Time		0.6			µs
t_{HDSTA}	Delay Between SDA Falling Edge and SCL Falling Edge		0.6			µs
t_{SUSTO}	Delay Between SCL Rising Edge and SDA Rising Edge		0.6			µs
t_{BUF}	Bus Free Time Between Stop and Start Conditions		1.3			µs

Note 1: Thermally limited by package.
Note 2: Inputs are AC-coupled to GND.
Note 3: Mode transitions controlled by $\overline{SHDN}$

PSD0603130 Digital Output Pressure Sensor Pin Descriptions

Pin	Symbol	Description
1	SCL	I²C and SPI serial interface clock input
2	GND	Ground
3	CSB	I²C and SPI interface select, or SPI enable
4	NC	No Connect
5	VDD	Power supply voltage input
6	INT	Interrupt signal - Occurs at the end of a measurement
7	SDA	I²C interface – Data input and output SPI interface – Data input
8	SDO	SPI interface – Data output I²C address end Interrupt signal output

Functional Description

The PSD0603130-EB demonstration board and its PSD0603130 pressure sensor uses a MEMS piezoresistive absolute pressure sensor as a pressure detecting element. The digital output is a serial data bit stream, containing data that is proportional to the local ambient atmospheric pressure. The pressure sensor's analog output is amplified by a programmable amplifier (PGA) whose gain is adjustable from 4 to 64. This is followed by a buffer that is designed to drive the DSADC's input capacitance with the necessary current and slew rate to ensure accurate analog to digital conversion. The 24-bit delta-sigma analog to digital

converter (DSADC) performs the conversion from the sensor's analog signal to a corresponding digital value and simultaneously applies temperature and linearity compensation. The PSD0603130's block diagram is shown in Figure 1.

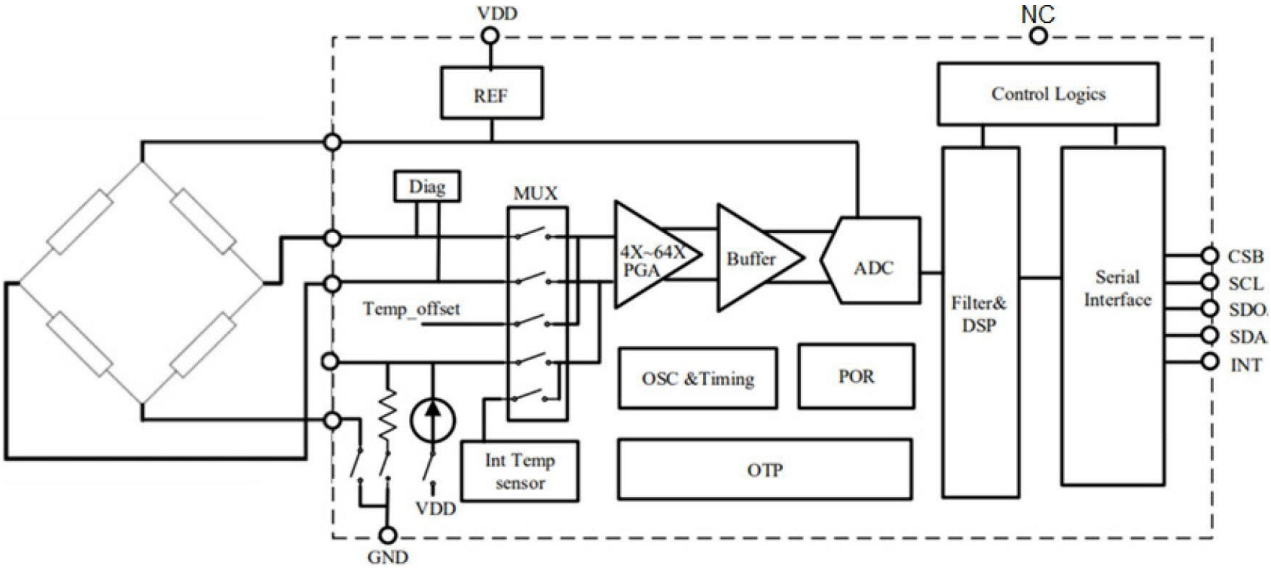


Figure 1. PSD0603130 block diagram.

Circuit Description

Referring to Figure 2, the PSD0603130-EB is designed for a nominal supply 5V power supply voltage, applied through connector J1's pin 1. This voltage is converted to 3.3V by U3 to power the PSD0603130. That voltage is also available on connector J1's pin 2. The board features a level shifter (U1, PCA9306DC1) that allows the sensor to operate on its nominal 3.3V supply while the system to which it is connected can operate on a higher voltage, such as 5V.

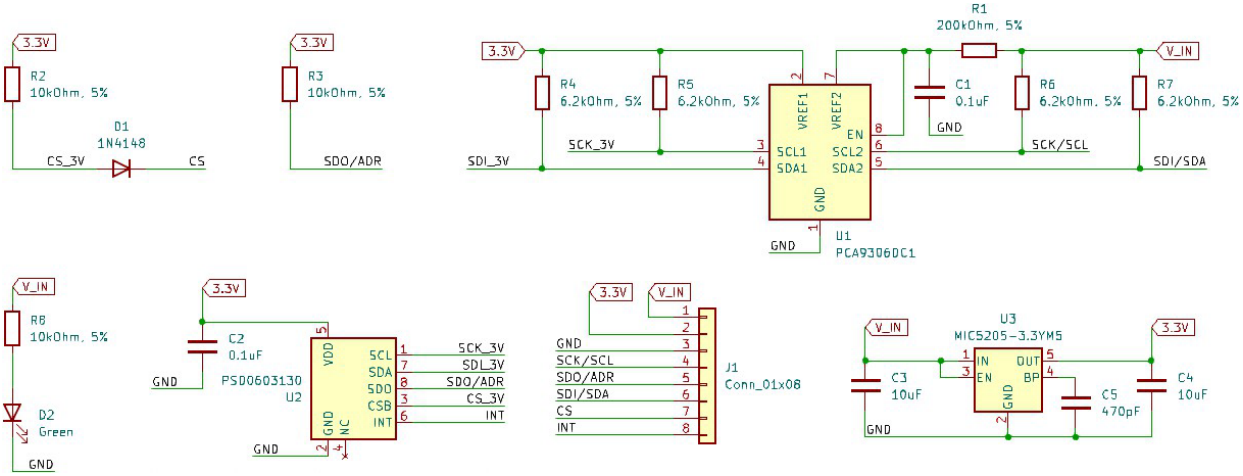


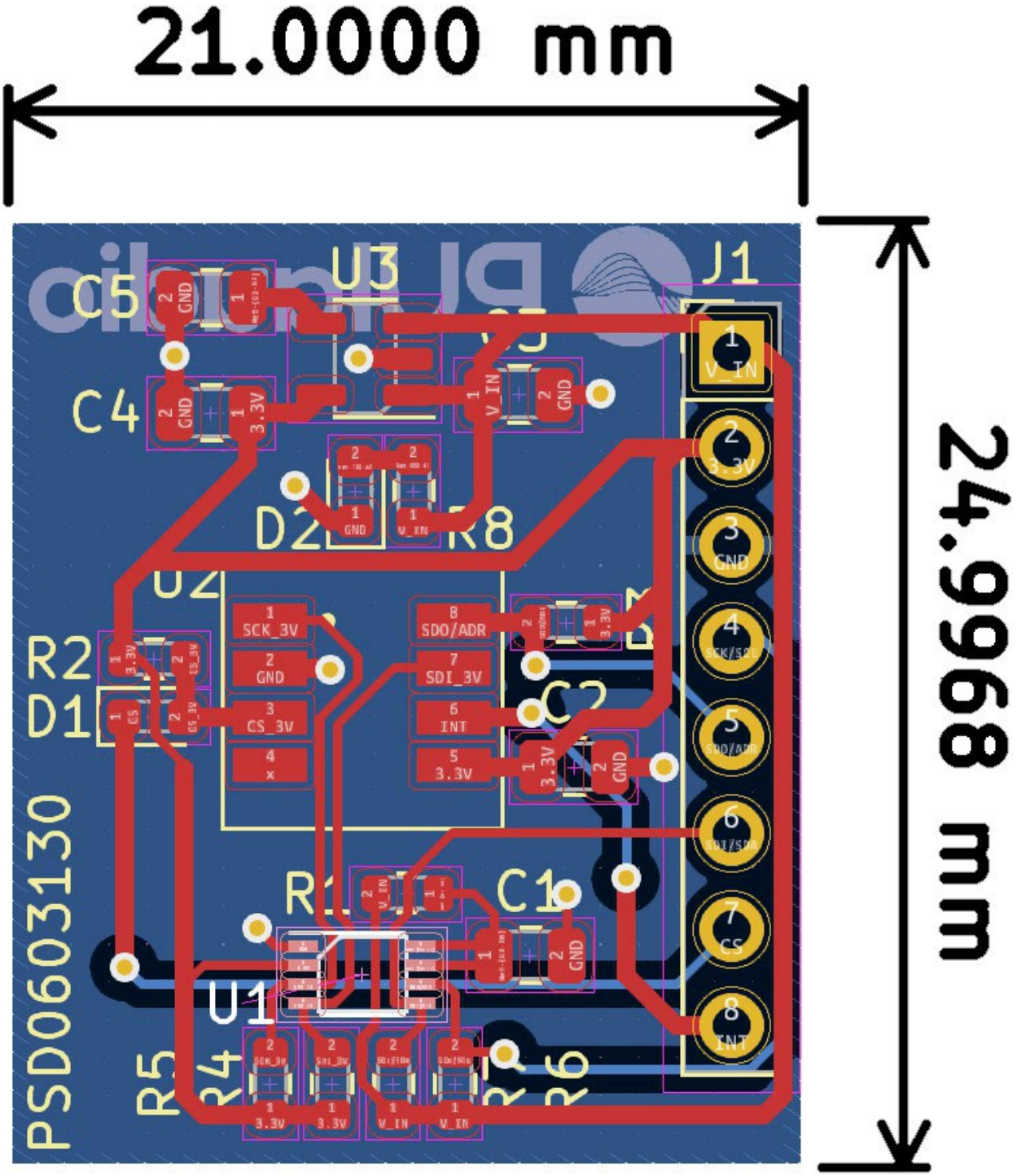
Figure 2. PSD0603130-EB schematic.

Code Sample

The sample code shown in Listing 1 is a simple program that enables an Arduino to read the PSD0603130's digital output values that represent the currently measured pressure and display the results in the Arduino IDE's output console.

```
#include <Adafruit_I2CDevice.h>
#include "mis20xx.h"

Adafruit_I2CDevice i2c_dev = Adafruit_I2CDevice(0x6D);

uint8_t mode = MIS20xx_TP_MODE;
float sleep_ms = 20;

void setup() {
  while (!Serial) { delay(10); }
  Serial.begin(115200);

  if (!i2c_dev.begin()) {
    Serial.print("Did not find I2C device at 0x");
    Serial.println(i2c_dev.address(), HEX);
    while (1);
  }
  Serial.print("I2C Device found on address 0x");
  Serial.println(i2c_dev.address(), HEX);
  Mis20xx_begin(mode,sleep_ms);
  delay(100);
}

void loop() {
  float T, P;
  Mis20xx_start(1000);
  Mis20xx_getPressTemp(&P, &T);

  Serial.println();
  Serial.println("======== start print ========");
  Serial.print("temperature (unit Celsius): "); Serial.println(T);
  Serial.print("pressure  (unit  kpa):     ");  Serial.println(P);
  Serial.println("========  end print  ========");
  delay(500);
}
```

Dimensions



Packaging

One box that contains one PSD0603130-EB demonstration board and through-hole headers contained within an ESD-protective bag.

Specifications Revisions

Revision	Description	Date	Approved
A	Datasheet released from Engineering	08/15/2024	KH

Note:

1. Unless otherwise specified:
   A. All dimensions are in millimeters.
   B. Default tolerances are ±0.5mm and angles are ±3°, unless otherwise specified.
2. Specifications subject to change or withdrawal without notice.