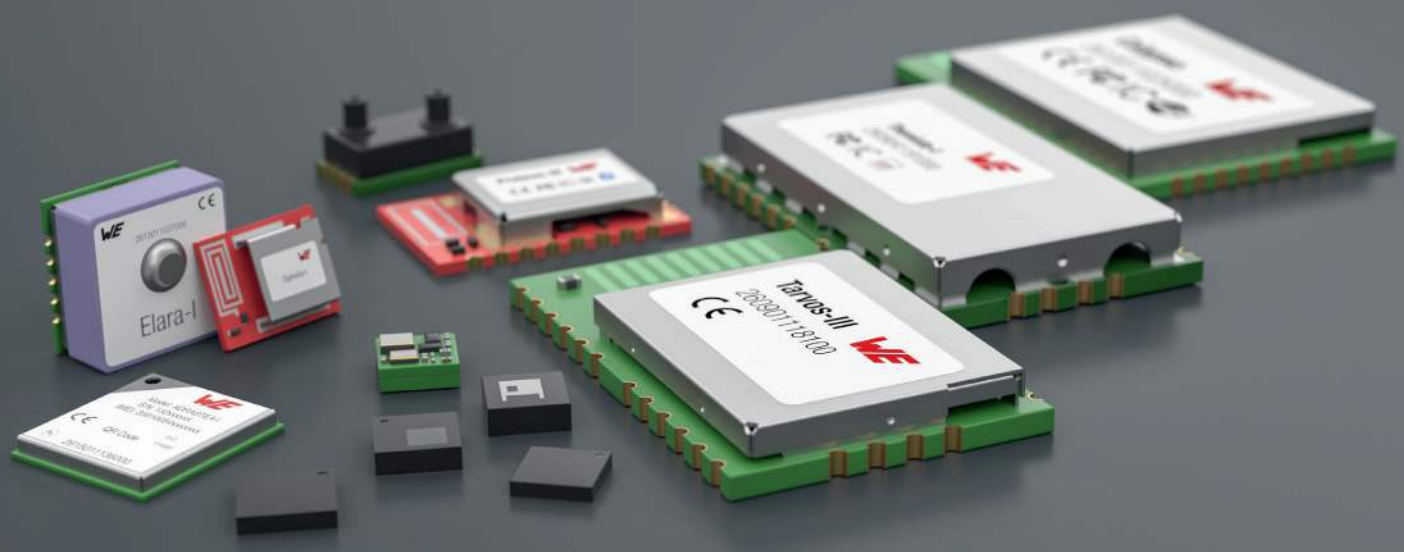


User manual

Evaluation board for WSEN-ISDS

2536030320091

Version 1.0

January 26, 2023

Würth Elektronik more than you expect

Revision history

Manual version	Product version	Notes	Date
1.0	1.0	• Initial release of the manual	January 2023

Abbreviations

Abbreviation	Description
I^2C	Inter integrated circuit
IMU	Inertial measurement unit
MEMS	Micro electro mechanical system
LSB	Least significant bit
SPI	Serial peripheral interface

Contents

1 General description

1.1 Introduction

The evaluation board of the IMU (Inertial Measurement Unit) 6 axis sensor provides an opportunity to verify the sensor performance and develop a prototype using an extension board e.g. Sensor shield for Arduino (Part No. 2501000101291). It can be directly plugged to sensor shield using the mounted I²C and SPI interface pins. The evaluation board can also be mounted on a bread board using through hole pin header connections. The 6 axis IMU sensor (Part No: 2536030320091) is a 16-bit digital ultra-low-power and high-performance MEMS sensor. It includes 3 axis linear accelerometer and 3 axis gyroscope. The digital host interface offers either I²C or SPI to communicate with the sensor.

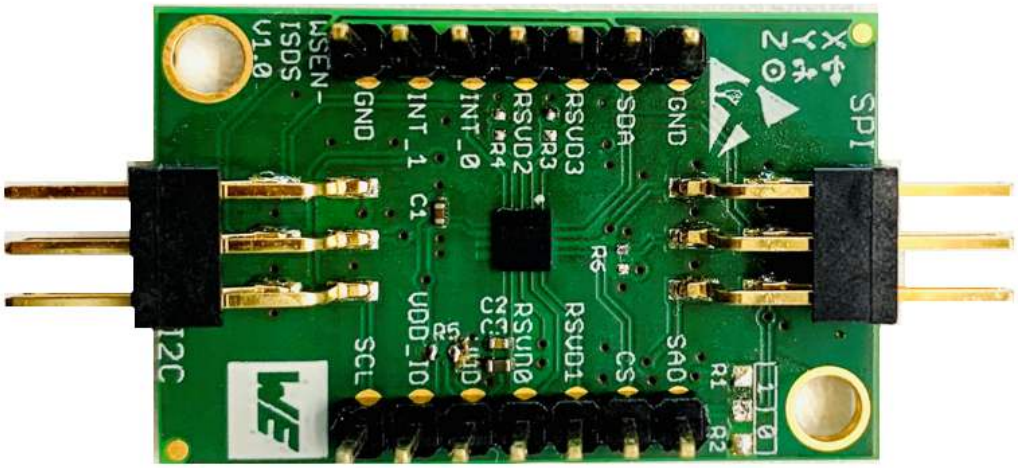


Figure 1: Evaluation board for the IMU 6 axis sensor

1.2 Pin header compatibility

6-pin right angle headers mounted on this evaluation board can be directly plugged into the sensor shield for Arduino or sensor FeatherWing. This serves a plug-and-play solution to quickly take the evaluation board into operation.

Sensor shield for Arduino is a stackable extension board for Arduino UNO and DUE to connect the sensor evaluation boards. More information can be found on our website.

2 Functional description

The acceleration sensor evaluation board supports the standard I²C and SPI communication interface. By default, I²C communication interface is enabled in the evaluation board.

- A positive supply voltage is applied to the sensor through *VDD* pin and I/O supply voltage for digital interface through *VDD_IO* pin. The *VDD* and *VDD_IO* pins on the board are connected together using 0Ω resistor R6.
- The I²C communication is enabled by connecting *CS* pin to *VDD_IO*. The *CS* pin is connected to *VDD_IO* using 100kΩ resistor R5.
- The 7-bit slave address of the acceleration sensor is 110101xb. LSB of the 7-bit slave address can be modified using the *SAO* pin.

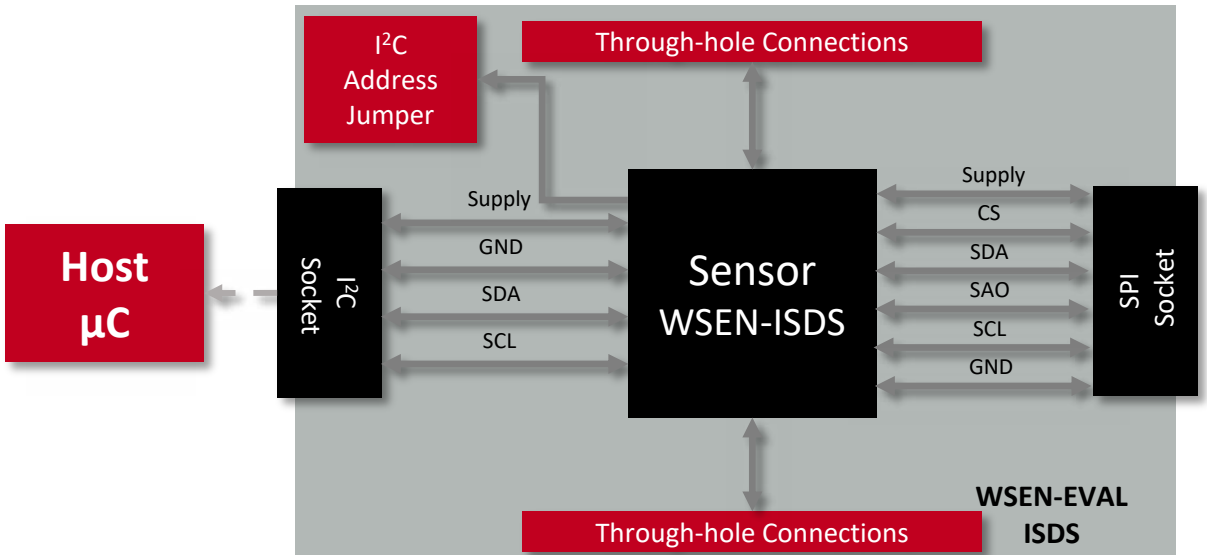


Figure 2: Block diagram of the evaluation board

By default the 7-bit slave address of the acceleration sensor on the evaluation board is 1101011b (0x6B). i.e. *SAO* pin of the sensor is connected to *VDD_IO* using 100kΩ resistor ADR.

The 7-bit slave address of the acceleration sensor can be changed to 1101010b (0x6A) by removing 100kΩ resistor ADR from '1' part and mounting 0Ω resistor on the '0' part of the evaluation board. i.e. *SAO* pin is connected to *GND*.

Please refer to the data sheet and user manual of the IMU 6 axis sensor (Part No: 2536030320001) for more information about the electrical properties.

2.1 Evaluation board in operation

2.1.1 I²C connection (CON1)

The pinning of connector CON1 provides I²C communication interface, which fits directly to the sensor shield for Arduino and sensor FeatherWing as mentioned in section 1.2. The I²C communication interface is the default state of the board.

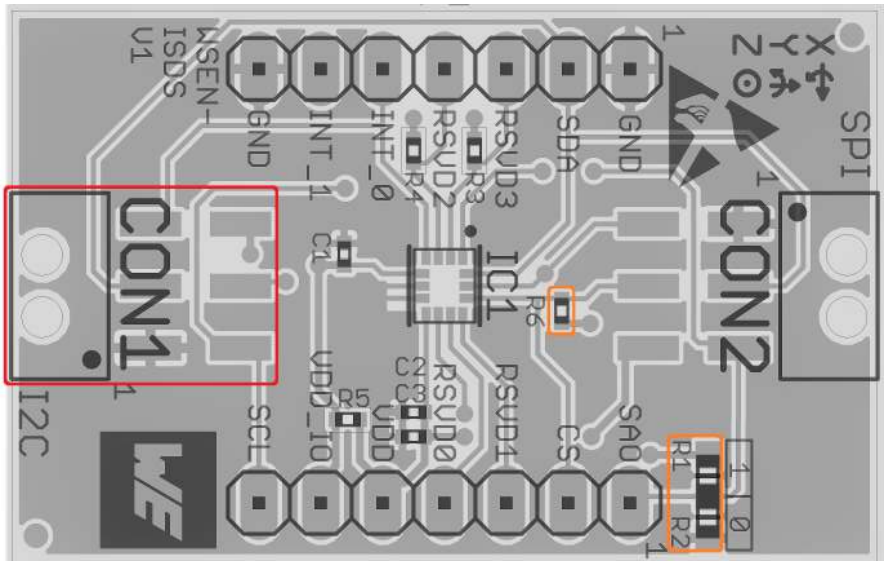
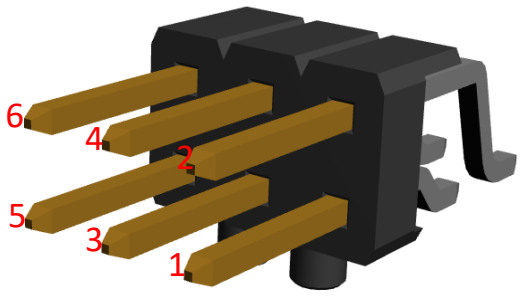


Figure 3: I²C Pin header connection to the external boards



Pin No	I²C Pins (CON1)
1	*GND*
2	*SCL*
3	*SDA*
4	*INT_1*
5	*INT_0*
6	*VDD*

Table 1: I²C Pin header

R6 shall be populated to enable I²C communication.

Either R1 or R2 shall be populated to define the LSB of sensor's address.

Connecting the sensor evaluation board to the sensor FeatherWing using I²C or SPI interface pins will disable INT_0 and INT_1 interrupt pin functions.

2.1.2 SPI connection (CON2)

The pinning of connector CON2 provides SPI communication interface, which fits directly to the sensor shield for Arduino and sensor FeatherWing as mentioned in section 1.2.

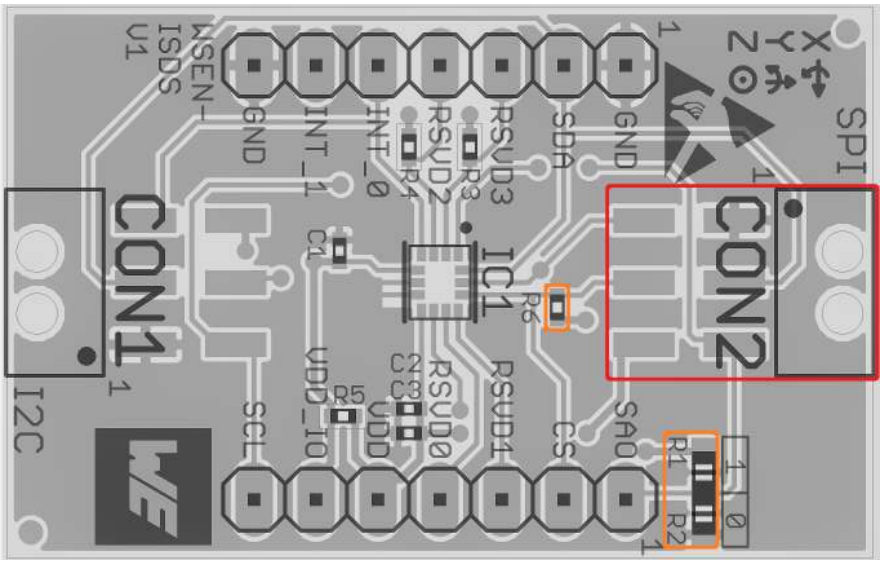
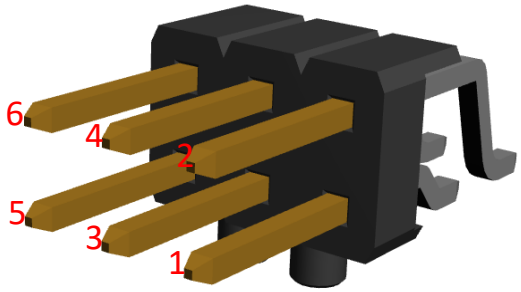


Figure 4: SPI Pin header connection



Pin No	SPI Pins (CON2)
1	*GND*
2	*SCL*
3	*SDA* (*MOSI*)
4	*CS*
5	*SAO* (*MISO*)
6	*VDD*

Table 2: SPI Pin header to external boards

SPI communication is enabled by removing the R1, R2, and R6 resistors.

2.1.3 Resistor functionality

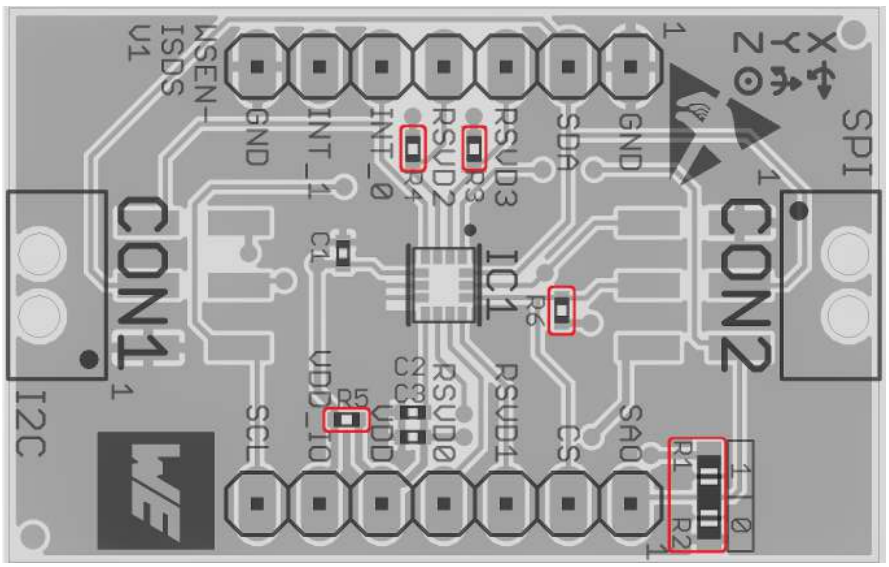


Figure 5: Resistor functionality

Resistor	Description
R1, R2	R1 is by default populated. *SAO* is connected to the *VDD_IO*, therefore the I²C address of sensor is 1101011b. If R2 is assembled the the I²C address of sensor is 1101010b.
R3, R4	Reserved functionality. Do not remove.
R5	VDD and VDD_IO pins are connected together.
R6	I²C enabled by default. *CS* is connected to *VDD_IO*. To enable SPI communication, remove R1, R2 and R6 resistors.

Table 3: Functionality of the resistors on the evaluation board

Check in your configuration, if the resistors R1, R2 and R6 have to be removed before connecting the evaluation board to a processor.

2.1.4 Through hole connection

Through hole pin headers connection gives direct access to each sensor pin. Please refer to table 4 and 5 for the pin description of P1 and P2 respectively.

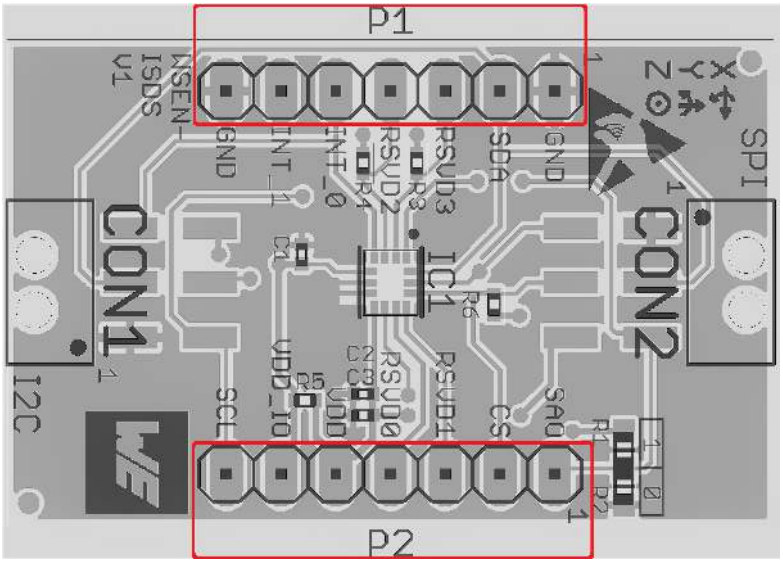


Figure 6: Through hole connection P1 and P2

Pin No.	Evaluation board pins	Description	Input/Output
1	*GND*	Negative supply voltage	Supply
2	*SDA*	I^2C serial data, SPI serial data input	Input/Output
3	*RSVD3*	Reserve functionality. Corresponds to sensor's pin 2	Input/Output
4	*RSVD2*	Reserve functionality. Corresponds to sensor's pin 3	Input/Output
5	*INT_0*	Interrupt pin 0	Output
6	*INT_1*	Interrupt pin 1	Output
7	*GND*	Negative supply voltage	Supply

Table 4: Pin description of P1

Pin No.	Evaluation board pins	Description	Input/Output
1	*SAO*	I^2C device address selection, SPI serial data output	Input/output
2	*CS*	I^2C enable/disable, SPI chip select	Input
3	*RSVD1*	Reserved functionality. Corresponds to sensor's pin 11	Input/Output
4	*RSVD0*	Reserved functionality. Corresponds to sensor's pin 10	Input/Output
5	*VDD*	Positive supply voltage	Supply
6	*VDD_IO*	Positive supply voltage for I/O pins	Supply
7	*SCL*	I^2C/SPI serial clock	Input

Table 5: Pin description of P2

3 Evaluation board

3.1 Schematic diagram

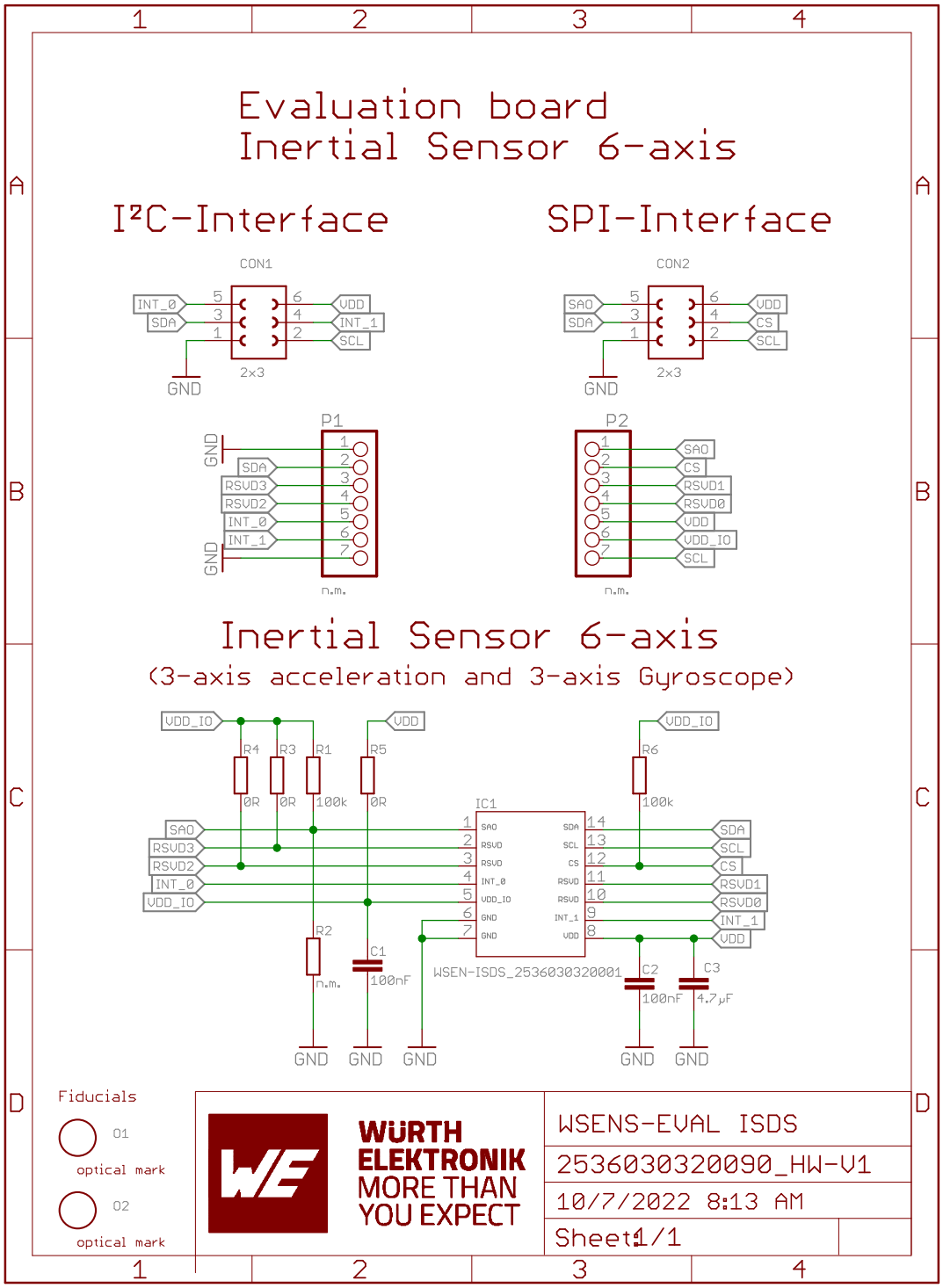


Figure 7: Schematic diagram

3.2 Layout

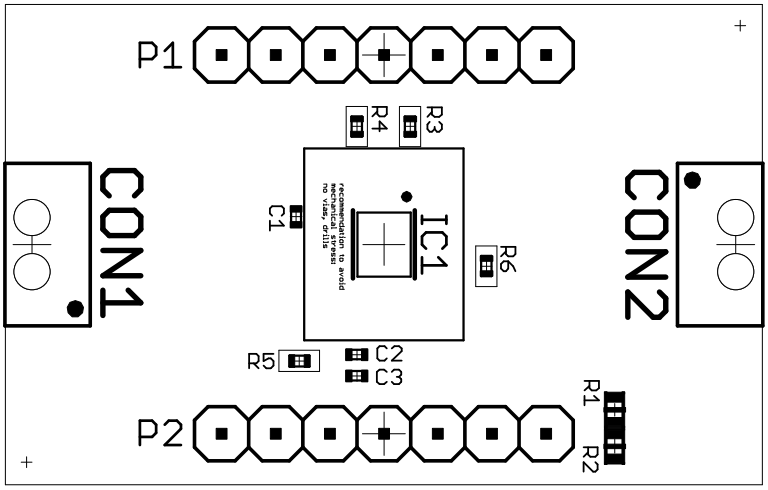


Figure 8: Assembly diagram

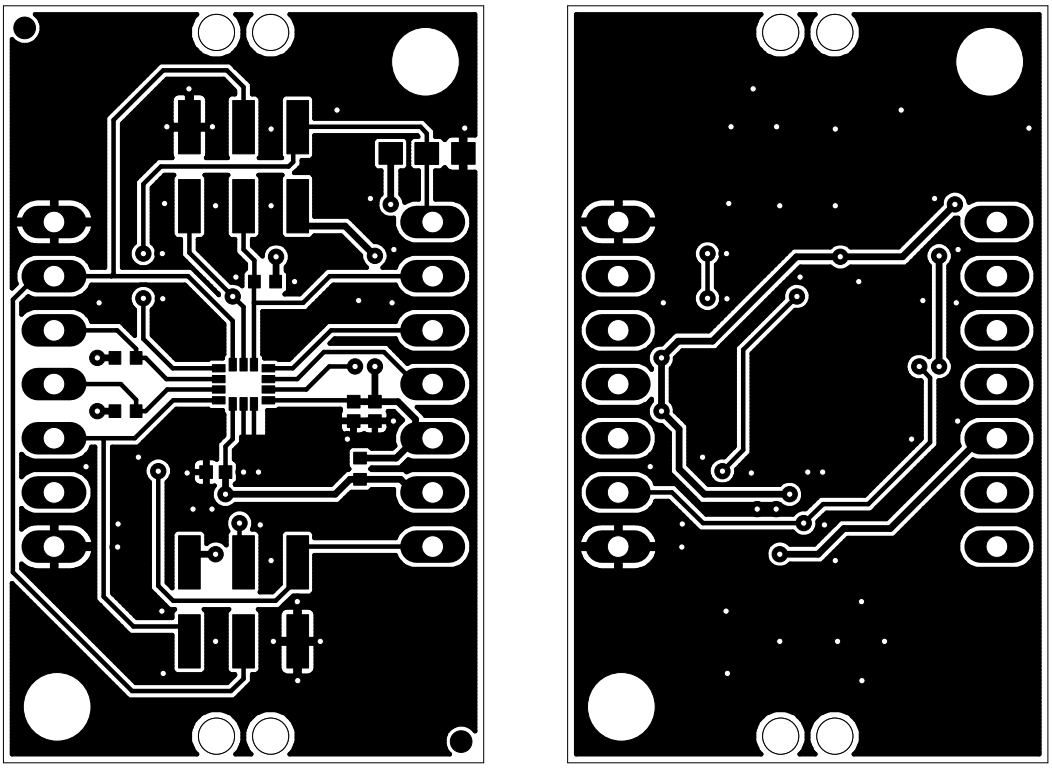


Figure 9: Top (left) and bottom (right) layers

3.3 Bill of materials

Part	Value	Pack	Manufacturer	NR
C1	100 nF	0402	Würth Elektronik eiSos	*885012205037*
C2	100 nF	0402	Würth Elektronik eiSos	*885012205037*
C3	4.7 µF	0402	Würth Elektronik eiSos	*885012105008*
CON1	2x3	THT	Würth Elektronik eiSos	*610106249121*
CON2	2x3	THT	Würth Elektronik eiSos	*610106249121*
IC1	WSEN-ISDS	SMT	Würth Elektronik eiSos	2536030320001
P1	n.m.	SMT	n.m.	n.m.
P2	n.m.	SMT	n.m.	n.m.
R1	100 kΩ	0603	Yageo	RC0603FR-10100KL
R2	n.m.	SMT	n.m.	n.m.
R3	0 Ω	0402	Yageo	RC0402FR-070RL
R4	0 Ω	0402	Yageo	RC0402FR-070RL
R5	0 Ω	0402	Yageo	RC0402FR-070RL
R6	100 kΩ	0402	Yageo	RC0402FR-07100KL

Table 6: Bill of materials

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