

USER MANUAL

EVALUATION BOARD FOR ITDS

2533203301691

VERSION 3.0

MARCH 19, 2024

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Revision history

Manual version	Product version	Notes	Date
1.0	1.0	<ul style="list-style-type: none">• Initial release of the manual	July 2019
1.1	1.0	<ul style="list-style-type: none">• Layout of schematic diagram updated	April 2020
2.0	2.0	<ul style="list-style-type: none">• SPI communication interface added• Chapter 1.2: Pin header compatibility added• Chapter 2: I²C and SPI chapter updated• Chapter 3.2: Layout added	February 2021
3.0	3.1	<ul style="list-style-type: none">• Updated Abbreviations page• Chapter 2: Updated with additional information on R3 and R4• Chapter 2.1: Updated with the hardware version 3.1• Chapter 3.2: Updated Figure 8	March 2024

Abbreviations

Abbreviation	Description
I ² C	Inter Integrated Circuit
SPI	Serial Peripheral Interface
LSB	Least Significant Bit
EV	Evaluation

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1 General description

1.1 Introduction

The EV board of the acceleration 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 the sensor shield using the mounted I²C and SPI interface pins. The EV board can also be mounted on a bread board using through hole pin header connections. The acceleration sensor (Part No: 2533020201601) is a 14-bit digital ultra-low-power and high-performance three-axis linear accelerometer with an I²C and SPI digital interface.

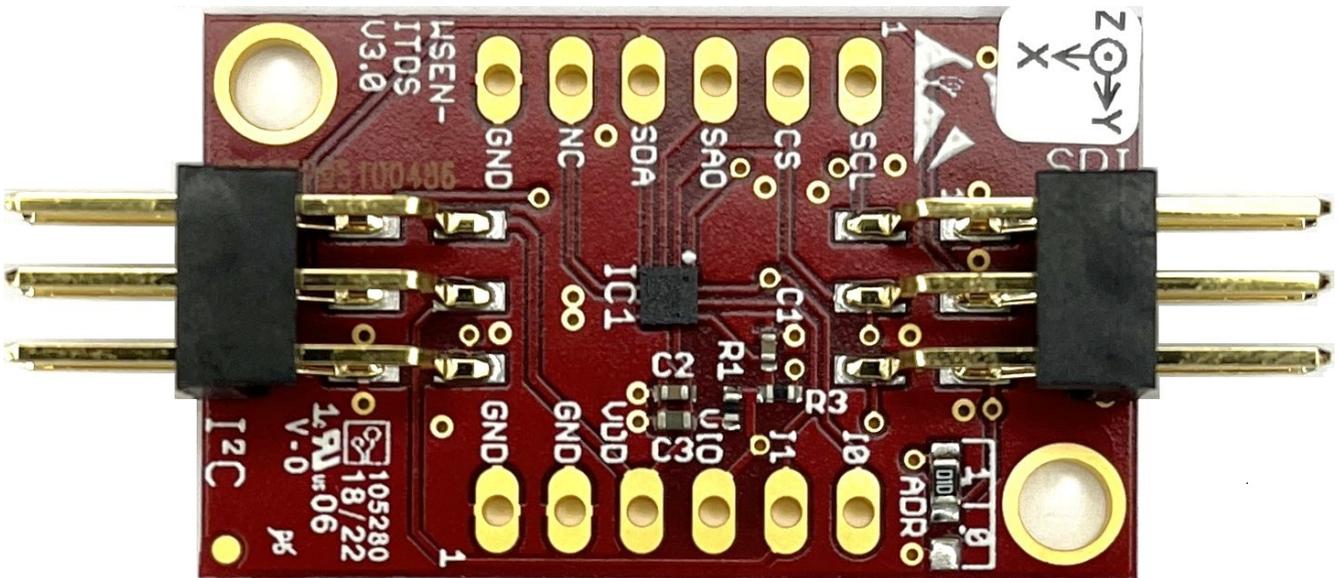


Figure 1: EV board for the acceleration sensor

1.2 Pin header compatibility

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



Sensor shield for Arduino is a stackable extension board for Arduino UNO and DUE to connect the sensor EV boards. More information can be found on our [website](#).

2 Functional description

The acceleration sensor EV board supports the standard I²C and SPI communication interface. By default, I²C communication interface is enabled in the EV board. R3 is mounted to choose the I²C interface, and R4 is mounted to set ADR1 to "0x19" as the 7-bit I²C address.

- 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 0 Ω resistor R1.
- The I²C communication is enabled by connecting *CS* pin to *VDD_IO*. The *CS* pin is connected to *VDD_IO* using 100 kΩ resistor R3.
- The 7-bit slave address of the acceleration sensor is 001100xb. LSB of the 7-bit slave address can be modified using the *SAO* pin.

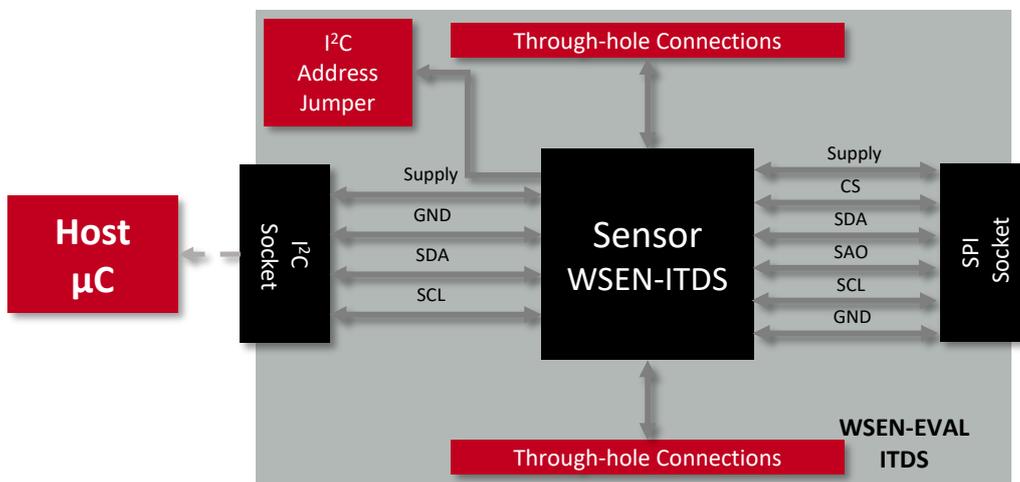


Figure 2: Block diagram



By default the 7-bit slave address of the acceleration sensor on the EV board is 0011001b (0x19). i.e. *SAO* pin of the sensor is connected to *VDD_IO* using 100 kΩ resistor ADR.



The 7-bit slave address of the acceleration sensor can be changed to 0011000b (0x18) by removing 100 kΩ resistor ADR from '1' part and mounting a 0 Ω resistor on the '0' part of the EV board (refer Figure 3). i.e. *SAO* pin is connected to *GND*.



For further information about the electrical properties of the sensor, refer to the data sheet and/or user manual of the acceleration sensor (Part No: 2533020201601).

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, as mentioned in section 1.2. The I²C communication interface is the default state of the board.

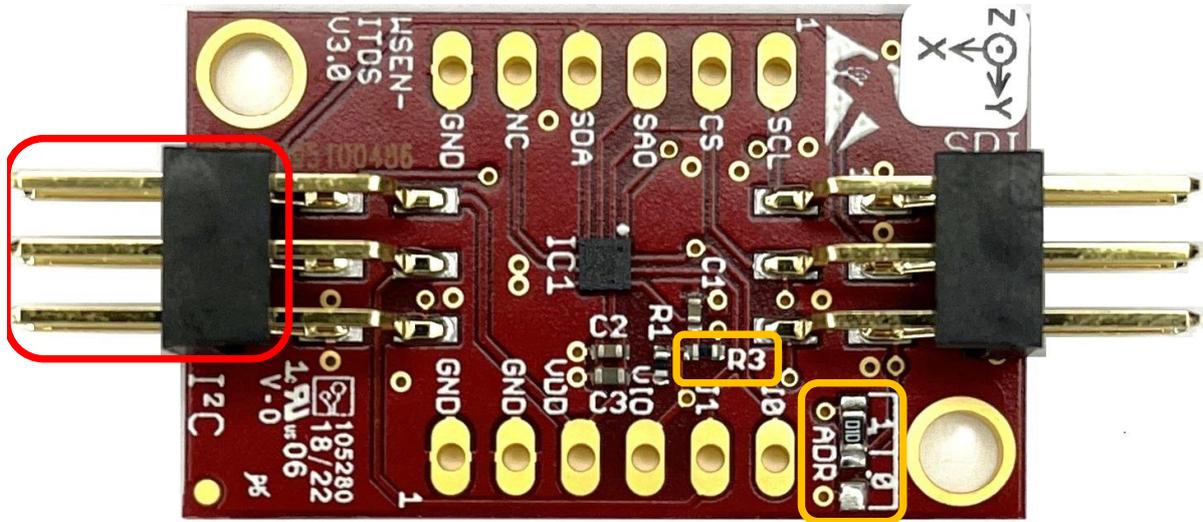
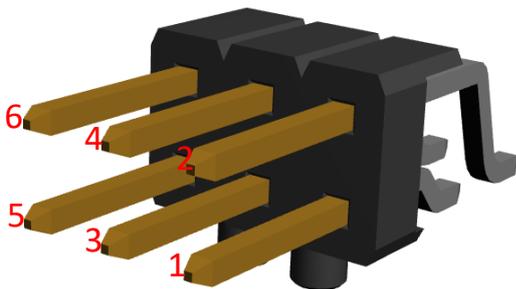


Figure 3: I²C pin header connection to the external boards



Pin No	I ² C Pins (CON1)
1	<i>GND</i>
2	<i>SCL</i>
3	<i>SDA</i>
4	<i>GND</i>
5	<i>NC</i>
6	<i>VDD</i>

Table 1: I²C pin header to external boards



R3 shall be populated to enable the I²C communication. Either '0' part or '1' part at ADR shall be populated to define the LSB of sensor's address (refer the orange marked area in Figure 3).

2.1.2 SPI connection (CON2)

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

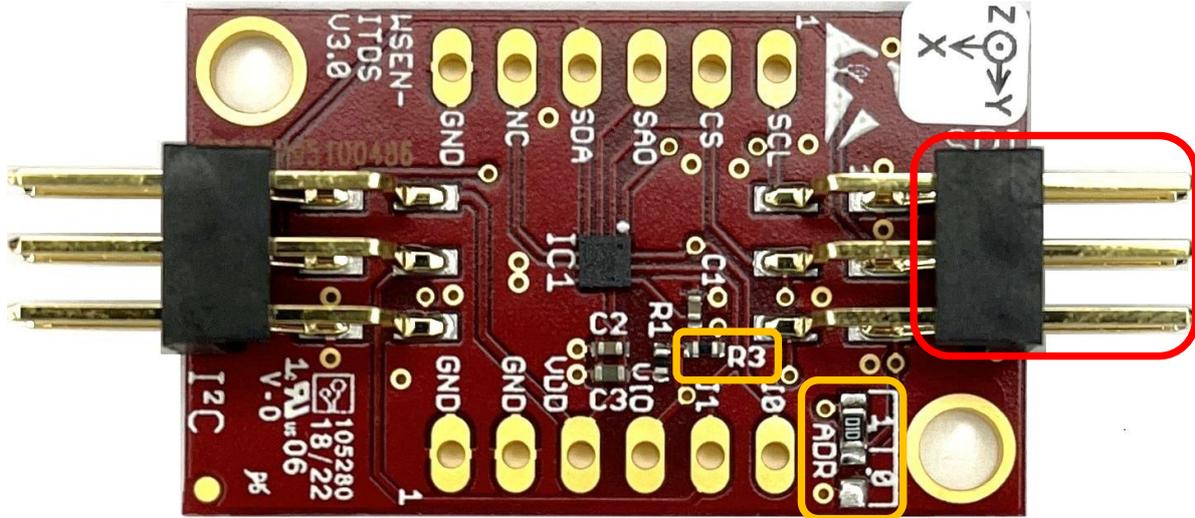
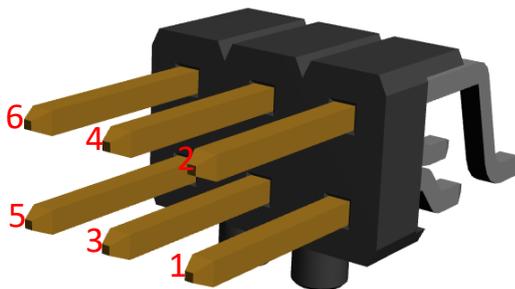


Figure 4: SPI pin header connection to the external boards



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 R3 and ADR resistors.

2.1.3 Resistor functionality

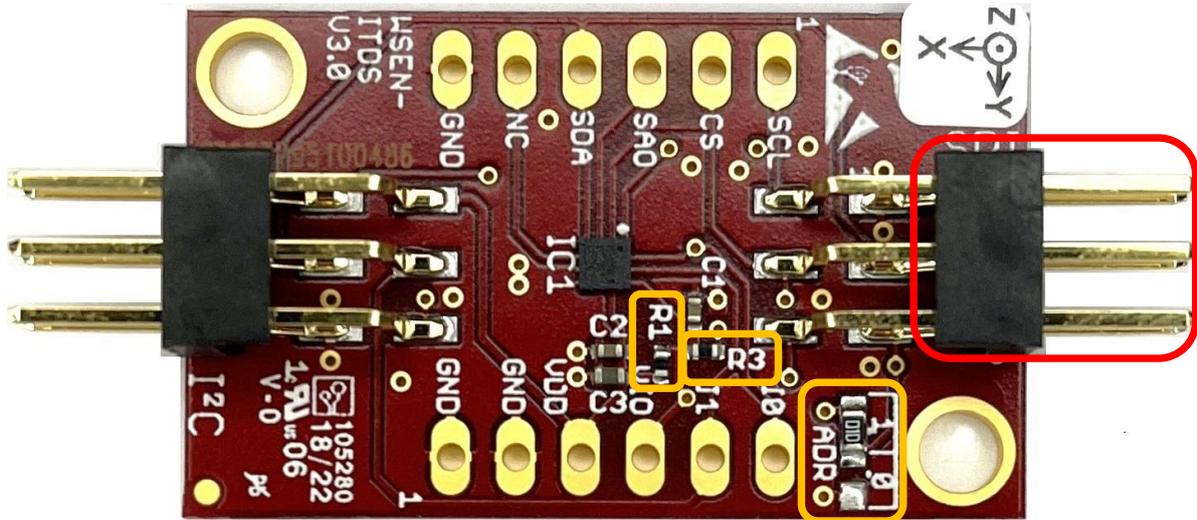


Figure 5: Resistor functionality

Resistor	Description
R1	VDD and VDD_IO pins are connected together
R3	I ² C enabled by default. CS is connected to VDD_IO. To enable SPI communication, remove the mounted R3 and ADR resistors
ADR R4 & R5	I ² C address of the sensor is 0011001b. SAO is connected to the VDD_IO

Table 3: Functionality of the resistors on the EV board



Check if necessary for your configuration, the resistors R1, R3 and ADR have to be removed before connecting the EV board to a processor.

2.1.4 Through hole connection

Through hole pin header connection gives direct access to each sensor pin. To use I²C via this through hole connection, SDA and SCL pins must be connected to VDD_IO via pull-up resistors. Please refer to the following table for the pin description of the EV board.

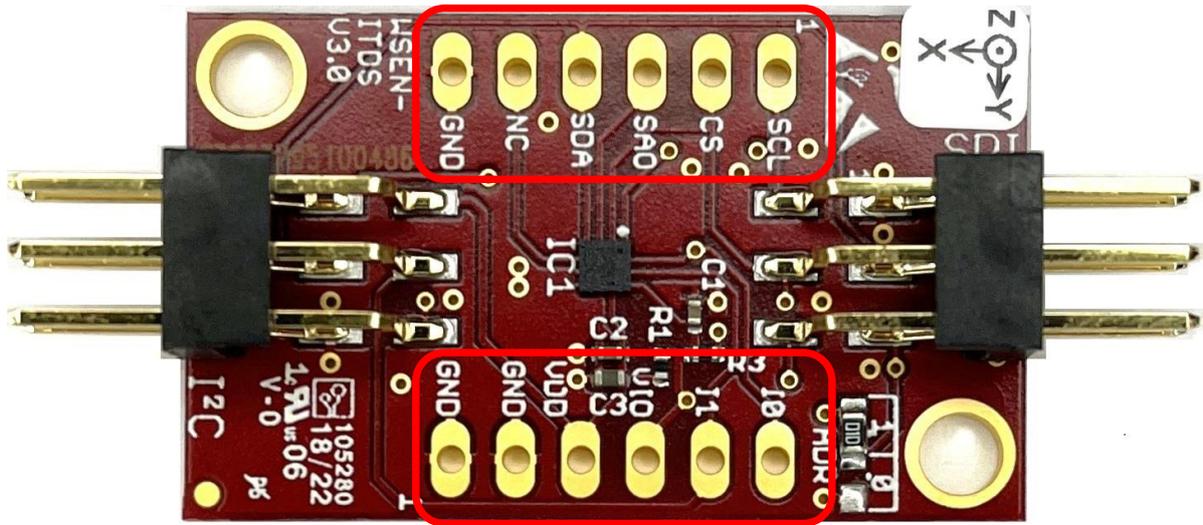


Figure 6: Through hole connection

Pin No.	EV board pins	Description	Input/Output
1	<i>SCL</i>	I ² C/SPI serial clock	Input
2	<i>CS</i>	I ² C enable/disable, SPI chip select	Input
3	<i>SAO</i>	I ² C device address selection, SPI serial data output	Input/output
4	<i>SDA</i>	I ² C serial data, SPI serial data input	Input/Output
5	<i>NC</i>	No connection	-
6	<i>GND</i>	Negative supply voltage	Supply

Table 4: Pin description of P1

Pin No.	EV board pins	Description	Input/Output
1	<i>GND</i>	Negative supply voltage	Supply
2	<i>GND</i>	Negative supply voltage	Supply
3	<i>VDD</i>	Positive supply voltage	Supply
4	<i>VIO</i>	Positive supply voltage for I/O pins	Supply
5	<i>I1</i>	Interrupt pin 1	Input/Output
6	<i>I0</i>	Interrupt pin 0	Output

Table 5: Pin description of P2

3 Evaluation board

3.1 Schematic diagram

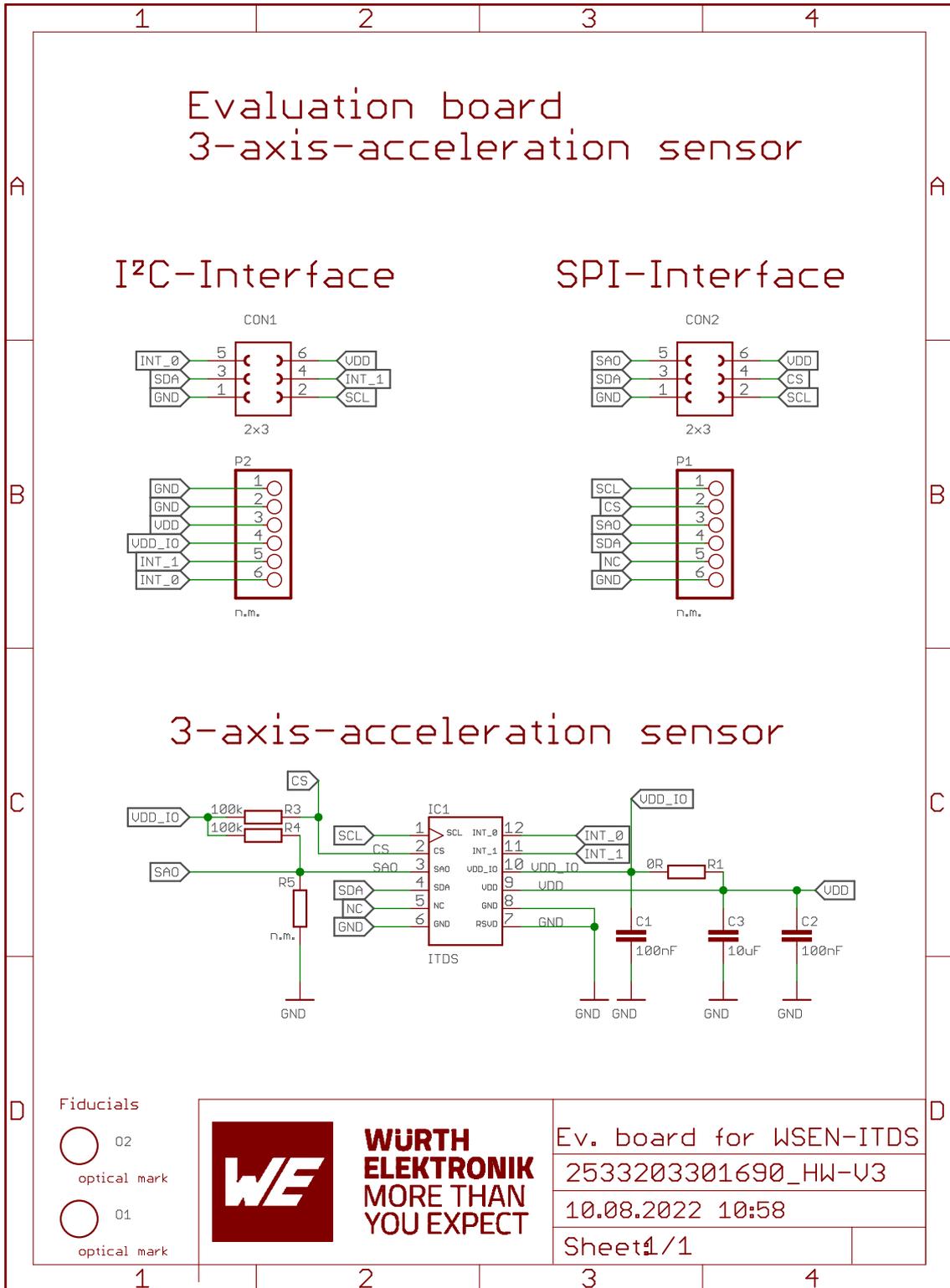


Figure 7: Schematic diagram

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