



USER MANUAL

EVALUATION BOARD FOR
WSEN-PDUS

25132545xxx9x

VERSION 2.0

JULY 20, 2023

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

Revision history

Manual version	Product version	Notes	Date
1.0	1.0	<ul style="list-style-type: none">• Initial release of the manual	October 2019
2.0	2.0	<ul style="list-style-type: none">• Adapting the manual to company's new corporate design• Added figure 1• Added new evaluation board part numbers 2513254515491, 2513254510192 and 2513254510492 to section 1.2• Added section 1.4 for the EV boards with horizontal-barbed nozzle sensors• Updated section 2.2: Schematic diagram• Added section 2.3	July 2023

Abbreviations

Abbreviation	Description
I ² C	Inter integrated circuit
MEMS	Micro electro mechanical system

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1 General description

1.1 Introduction

This evaluation board provides a straightforward and cost-effective option to test and evaluate the differential pressure sensors from Würth Elektronik eiSos. It can be connected to the host controller (e.g. Arduino) using I²C interface pins. Through hole pin header connections allow the board to be mounted on a bread board.

The differential pressure sensor (Part No: 25131308xxx01) is a MEMS based 15-bit piezo-resistive pressure sensor with a digital I²C and an analog interface. The sensor evaluation board is available in five pressure measurement ranges from 0.1 kPa to 1000 kPa (see table 1. In addition to the sensor and decoupling capacitors, the evaluation board consists of a mounted adapter with two nozzles. Pneumatic tubes can be connected to the nozzles. Barbed nozzle design improves the overall mechanical stability of the connection.

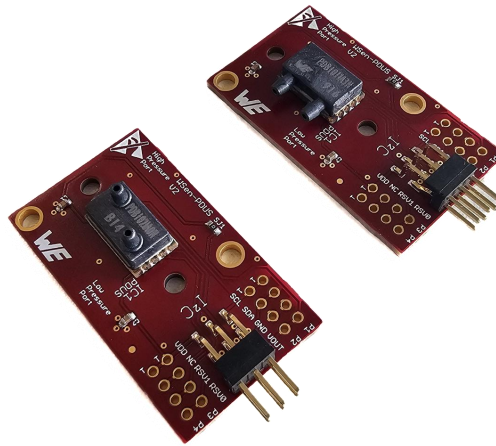


Figure 1: Evaluation board for the differential pressure sensor

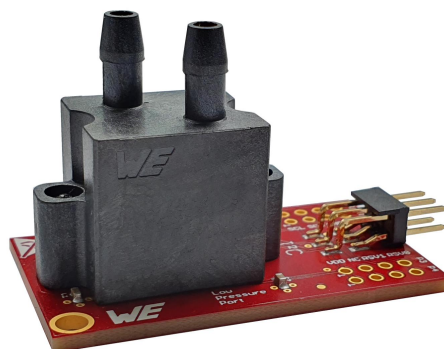


Figure 2: Evaluation board for the differential pressure sensor with mounted adapter

1.2 Ordering Information

WE order code	Pressure range [kPa]	Sensor Marking	Sensor Part Nr.	Operating Voltage
2513254510091	± 0.1	PDB100IA0N	2513130810001	5V
2513254510191	± 1	PDB101IA0N	2513130810101	
2513254510291	± 10	PDB102IA0N	2513130810201	
2513254510391	0 to 100	PDU103IA0N	2513130810301	
2513254510491	-100 to 1000	PDU104IA0N	2513130810401	
2513254515491	0 to 1500	PDU154IA0N	2513130815401	
2513254510492	-100 to 1000	PDU104IA3N	2513130810402	3.3V
2513254510192	± 1	PDU101IA3N	2513130810102	

Table 1: Ordering information



EVAL boards with order codes 2513254510192 does not include the adapter, o-rings and snap-rivets.

1.3 Vertical Nozzles

Sensors with horizontal straight nozzles are recommended to be used for manifold mounting. For the evaluation boards with vertical straight nozzles, additional mounting accessories are also provided.

1.3.1 Material Contents

- **1 differential pressure sensor board:** With digital I²C and analog output; Includes all necessary de-coupling capacitors and SMT pin header
- **1 Adapter:** With barbed nozzles that can fit the pneumatic tubes with inner diameter 4 mm. (recommended tube: Festo PUN-6x1-XX)
- **2 O-rings:** 1.8 x 2 mm rubber (NBR-70) O-ring for sealing
- **2 Snap-rivets or Screws:** Provides quick and robust connection of the adapter with the PCB. Snap-rivets for operating pressure <500 kPa and screws (M3) for higher operating pressure >500 kPa.



EVAL boards with order codes 2513254510091, 2513254510191, 2513254510291 and 2513254510391 are shipped with snap-rivets.



EVAL boards with order code 2513254510491, 2513254515491 & 2513254510492 are shipped with screw fasteners.



Figure 3: Evaluation board with mounting accessories

1.3.2 Assembly

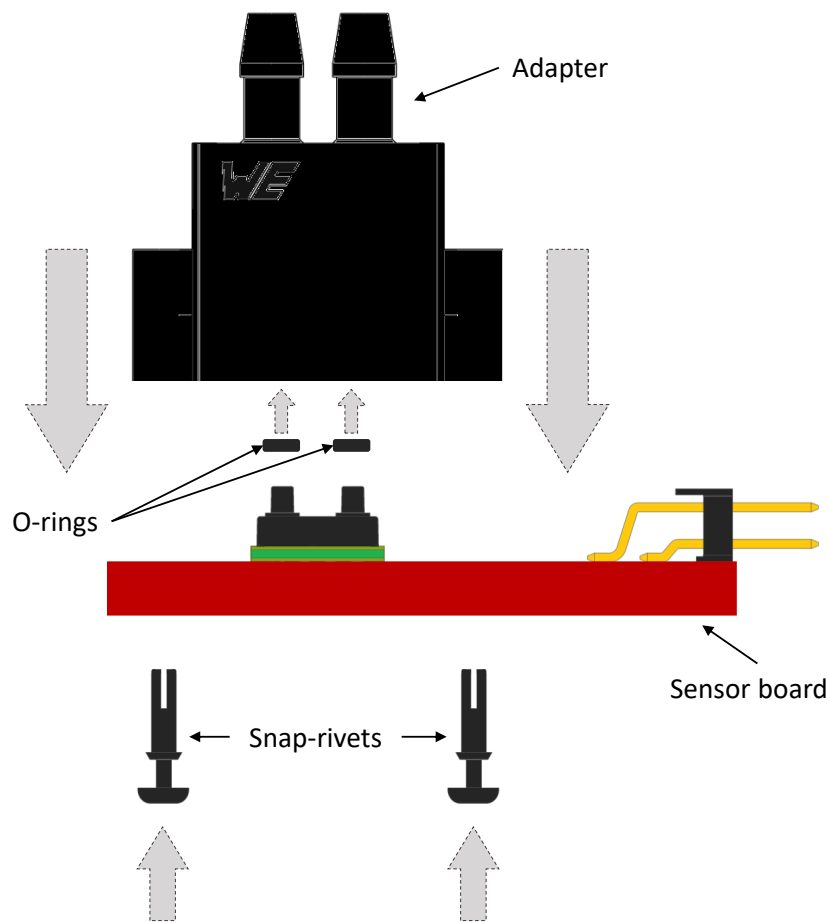


Figure 4: Assembly of the evaluation board (vertical straight nozzles)



Warning: The adapter can withstand pressure upto 1000 kPa. Do not apply more than 1000 kPa to the adapter.

1.4 Horizontal Nozzles

The evaluation boards featuring horizontal-barbed nozzle sensors do not come with additional adapter, O-rings, and snap-rivets. The design of the barbed nozzle enables a direct tube connection to the sensor, eliminating the need for manifold mounting. For a secure and reliable connection to the sensor, it is advised to use a tube with a 2 mm inner diameter.

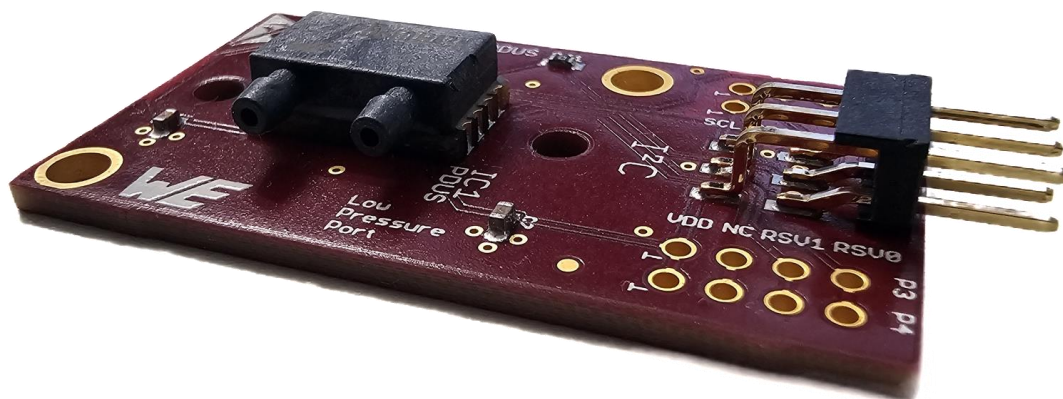


Figure 5: Assembly of the evaluation board (horizontal-barbed nozzles)

2 Functional description

The differential pressure sensor evaluation board supports the standard I²C communication interface as well as analog voltage output.

- A positive supply voltage, 5 V or 3.3 V (depending on the sensor operating voltage) is applied to the sensor through *VDD* pin.
- The I²C interface pins *SDA* and *SCL* are connected with the interface pins on the host controller side
- 7-bit slave address of the differential pressure sensor on the board is 0x78.



SDA and *SCL* pins must be connected to the *VDD* through pull-up resistors on the host controller (master) side. There are no pull up resistors on the sensor board (slave).



In case the host controller is working on 3.3V, proper hardware set up including level-shifters and stable 5 V power supply must be used to power up the EV boards with the sensors operating on 5V supply.

Pin No.	Name	Function	Input/output	Comments
1	<i>SCL</i>	I ² C serial clock	Input	
2	<i>SDA</i>	I ² C serial data	Input/Output	
3	<i>GND</i>	Negative supply voltage	Supply	
4	<i>VOU</i>	Analog output	Output	
5	<i>VDD</i>	Positive supply voltage	Supply	
6	<i>NC</i>	No connection		
7	<i>RSVD</i>	Reserved		Do not connect
8	<i>RSVD</i>	Reserved		Do not connect

Table 2: Pin description of the sensor



Please refer to the corresponding data sheet of the sensor (Part No: 25131308xxxxx) for more information about the sensor parameters and electrical properties.

2.1 Evaluation board in operation

2.1.1 Pin header connection

Pin no.	Description
1	GND
2	SCL
3	SDA
4	Not connected
5	VOUT
6	VDD

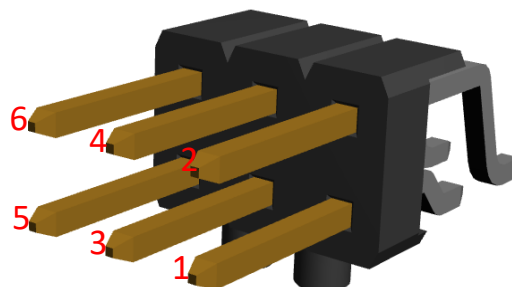


Table 3: Pin header connection to external boards

2.1.2 Analog Output

SJ1 is assembled with a 0 Ω resistor enabling the analog voltage output. The analog output can be read directly through the pin 6 (VOUT) of the pin header connection.

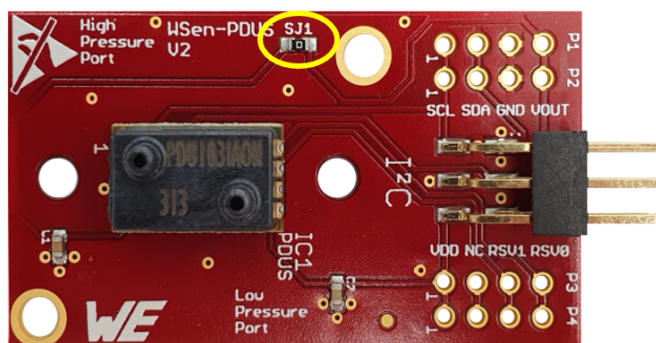


Figure 6: Analog output resistor



By removing the 0 Ω resistor (SJ1), the analog output can be disabled.

2.1.3 Through hole connection

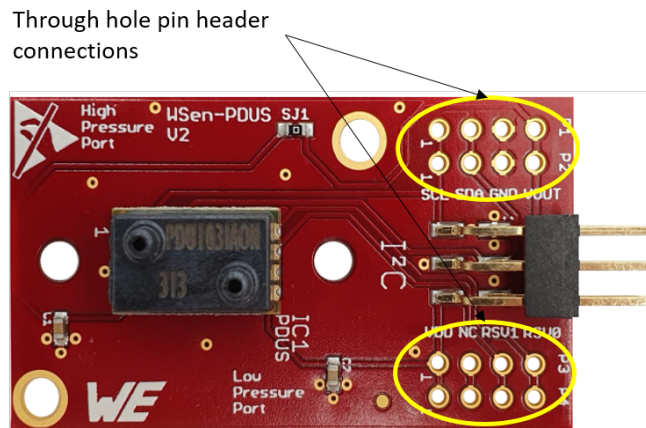


Figure 7: Through hole connection



Please refer to Table 2 for the pin description of the sensor.



Please refer to the user manual of the differential pressure sensor for information regarding the conversion of digital and analog values into pressure SI unit.

2.2 Schematic diagram

2.3 Layout

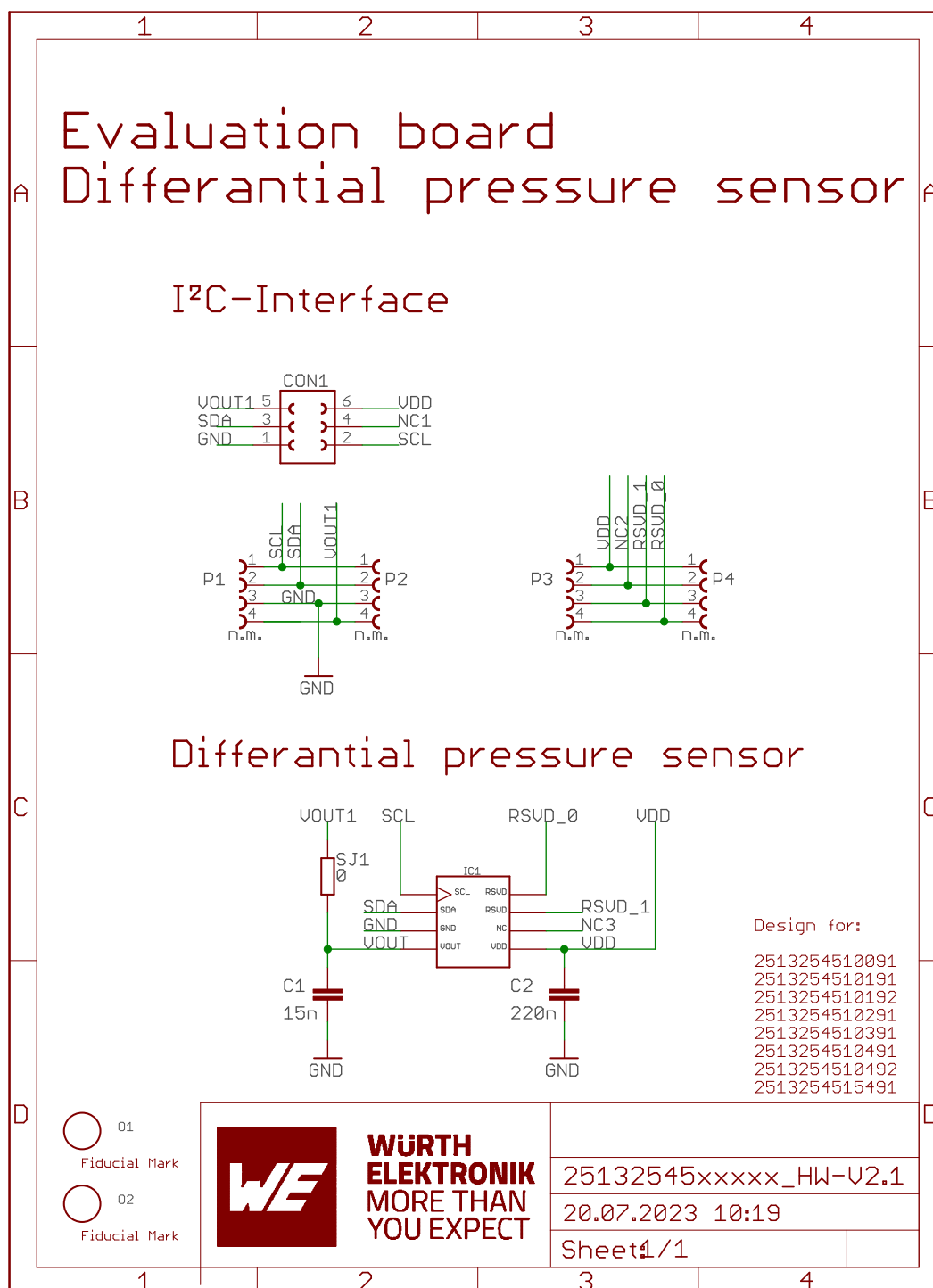


Figure 8: Schematic diagram

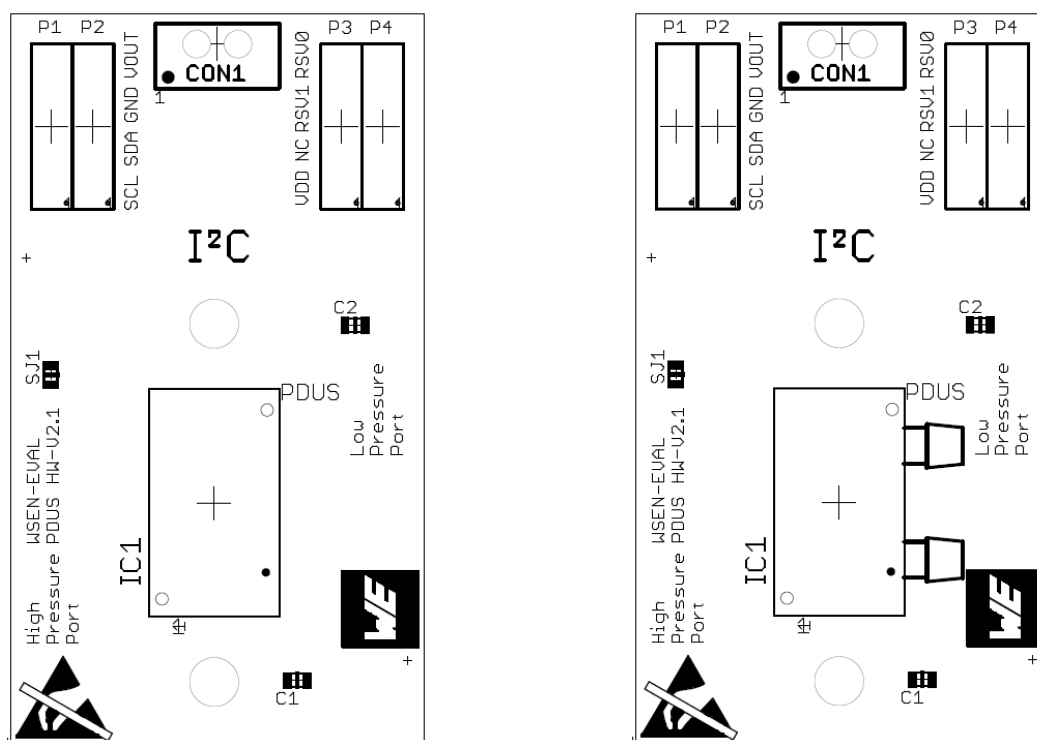


Figure 9: Assembly diagram: vertical nozzles (left); horizontal nozzles (right)

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Any product-specific data sheets, manuals, application notes, PCN's, warnings and cautions must be strictly observed in the most recent versions and matching to the products revisions. This documents can be downloaded from the product specific sections on the wireless connectivity and sensors homepage.

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Some products within the product range may contain substances, which are subject to restrictions in certain jurisdictions in order to serve specific technical requirements. Necessary information is available on request. In this case, the field sales engineer or the internal sales person in charge should be contacted who will be happy to support in this matter.

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