

# Ultrasound Platform PCM



**Datasheet**

## Content

---

|     |                                       |    |
|-----|---------------------------------------|----|
| 1.  | Notes on the manual.....              | 3  |
| 2.  | Description .....                     | 4  |
| 3.  | Intended use .....                    | 5  |
| 4.  | General safety instructions .....     | 5  |
| 5.  | Warranty and Guarantee .....          | 6  |
|     | Warranty .....                        | 6  |
|     | Warranty conditions .....             | 6  |
|     | Loss of warranty .....                | 6  |
| 6.  | Technical data .....                  | 6  |
| 7.  | Installation and commissioning.....   | 8  |
|     | Pin assignment .....                  | 8  |
|     | IO Connection.....                    | 9  |
| 8.  | Interface .....                       | 10 |
| 9.  | Maintenance, repair and disposal..... | 11 |
| 10. | Contact.....                          | 11 |
| 11. | Revision History .....                | 11 |

## 1. Notes on the manual

---

The manual is intended to be used by qualified specialists and trained workers.  
Before installation read the manual carefully and follow the notes.

### Danger signs and symbols used:



#### **WARNING/DANGER**

Warning of an imminent danger or dangerous situation.  
Failure to comply can result in serious injury, death or significant property damage.



#### **Note**

Note on important information that should be given special attention.



#### **DISPOSAL**

The PCM must be disposed of professionally in accordance with the country-specific regulations for electrical/electronic devices. The Ice Detector must not be disposed of with household waste.

## 2. Description

---

Analyzing ultrasound waves through a material of interest allows for extracting information about material structure and its properties. This, together with its ability to penetrate into and propagate through opaque and moving media, forms the basis for a wide spectrum of technical and medical applications.

However, the final success of such an application depends on optimizing the mutual interaction between the transducers, electronics and signal processing. For this challenge the PCM has genuinely been designed. The PCM Ultrasound Platform is a versatile system for generating well defined transmit and receive signals over a wide frequency range, high dynamic and high sensitivity.

The PCM can adapt the settings to the given configuration by varying the transmit settings as well as the receive settings over a wide range:

- Frequency, waveform and amplitude of the transmitter
- Bandwidth and sensitivity of the receiver including a time-gain-control for low-frequency applications
- Sample rate and acquisition depth of the digitalization

To optimize the receiving signal, alongside to the high transmit voltage and receiving amplification range, one out of four analogue filters can be used, as well as digital filtering and averaging (in any combination). Especially the bandwidth of the switchable analogue filters can be customized (low pass filters or band pass filters with different bandwidths can be integrated to fit the customer's needs). But also, the transmit settings, amplifications and impedances can be adapted.

The Platform is expandable to up to 8 analogue channels to measure and acquire in parallel. Also, a mixed system with different frequency bands is feasible.

An optional IO-Board provides different sensor interfaces (voltage and current loop, temperature measurement). In this way, the ultrasound data can be directly combined with other measure principles to deduce the correlation between them.

With the option to use internal or external trigger and also to provide a trigger output to external devices, the platform can run independently, as well be integrated in a whole system.

This flexibility is enhanced by the 1Gb-Ethernet interface, which can be integrated in an existing network or connected directly. This interface works also independently to the operating system.

All these features make the PCM Ultrasound Platform tailored to:

- ultrasound measurement and studies
- the development of an ultrasound system
- scientific investigation
- process control
- quality assurance

### 3. Intended use

---

The PCM Ultrasound Platform is used for research and development, but is also suitable to existing systems for process control and quality assurance.

The manual contains important safety information.



#### **WARNING/DANGER**

The PCM must only be operated under the conditions specified in the manual.  
The temperature ranges must be within the permissible limits.  
Information on electrical load capacity must not be exceeded.  
Please also observe the relevant national safety regulations when installing, commissioning and operating the PCM.

### 4. General safety instructions

---



#### **Note**

Use the included power supply to run the PCM Ultrasound Platform.



#### **WARNING/DANGER**

Danger of electric shock.

Before you install and use the PCM, read the operating instructions carefully. If the safety instructions described therein are not followed, this could result in danger for people, the device and the complete system. To ensure safe operation the operator must be safety-conscious and knowledgeable.



#### **WARNING**

The existing national regulations for accident prevention must be considered during all work.  
Only use the PCM if it is in perfect condition.

## 5. Warranty and Guarantee

### Warranty

The statutory warranties and warranty periods apply.

### Warranty conditions

We provide a guarantee for the PCM Ultrasound Platform in accordance with legal regulations on function and material under regular operating and maintenance conditions.

### Loss of warranty

The guarantee expires due to:

- Improper use
- Improper handling and/or operation contrary to the instruction in the manual

There is no liability claim for any resulting damage or consequential damage.

## 6. Technical data

| General                |  |
|------------------------|--|
| Electrical data        |  |
| Power                  | 48 V, 25 W   |
| Temperature Range      | 10 °C – 50 °C  |
| Mechanical data        |  |
| dimensions             | Height 140 mm, Width 165 mm, Depth 270 mm                    |
| weight                 | 2.5 kg   |
| Interface              |  |
| Ethernet               | 1 Gb, CAT 5  |
| IP Address             | static, DHCP on request                                      |
| Trigger                |  |
| Internal trigger       | Up to 1000 Hz, at 100 MHz sample rate and 1000 sample points |
| External trigger input |  |
| - Voltage range        | 5 V – 24 V   |
| - Input impedance      | 1 kΩ   |
| - Pulse length         | 1 μs minimum   |
| - Polarity             | selectable   |
| - Delay                | < 500 ns   |
| Trigger output         |  |
| - Voltage              | 5 V, 12V, open collector up to 30V                           |
| - Output impedance     | 50 Ω   |
| - Pulse length         | 40 μs minimum  |
| - Polarity             | selectable   |
| - Delay                | < 500 ns   |

| TXRX-Board                               |  |
|--|--|
| <b>Transmitter</b>                       |  |
| Output type                              | Rectangle burst or Barker code, maximum 30 cycles  |
| Output voltage range                     | 5 Vpp – 95 Vpp at 50 Ω load, up to 200Vpp on request with lower output power                     |
| Output impedance                         | 2.5 Ω  |
| Output pulse power                       | 50 W at 50 Ω (at 200kHz transmit frequency, 15 cycles, PRF 100Hz)                                |
| Pulse repetition frequency (PRF)         | 1 Hz – 1000 Hz, depends on setup (transmit frequency, count and voltage), selectable via trigger |
| Constant load (in parallel to connector) | 220 Ω  |
| Dead time in pulse-echo                  | 50 μs – 100 μs at maximum transmit voltage   |
| <b>Receiver</b>                          |  |
| Crosstalk attenuation                    | 100 dB   |
| Input impedance                          | 220 Ω  |
| Input voltage range                      | 50 μVpp – 300 mVpp   |
| Gain                                     | -12 dB – 68 dB<br>additional 2x 12 dB<br>time-gain-control for a sampling rate of up to 20 MSps  |
| Bandwidth                                | 30 kHz – 8 MHz, customer-specific  |
| Input noise                              | $2 \text{ nV}/\sqrt{\text{Hz}}$  |
| <b>Digitalization</b>                    |  |
| Bits                                     | 14   |
| Sampling rate                            | Up to 100 MSps   |
| Acquisition depth                        | 1000 – 16000 samples, up to 262000 samples on request  |

| IO-Board                            |  |
|-------------------------------------|--|
| 2 ports per interface               |  |
| <b>General</b>                      |  |
| Supply voltage for external devices | 14 V, 50 mA  |
| <b>Temperature input</b>            |  |
| Sensor Type                         | PT1000, other temperature probes on request            |
| Connection                          | 3 wire   |
| Temperature range                   | -50 °C – +200 °C                                       |
| Accuracy                            | 0.2 °C   |
| <b>Current output</b>               |  |
| Output range                        | 4 mA – 20 mA, 0 mA – 23 mA                             |
| Accuracy                            | 20 μA  |
| <b>Voltage input</b>                |  |
| Input range                         | 0 V – 10 V   |
| Input impedance                     | 35 kΩ  |
| Accuracy                            | 10 mV  |
| <b>Current input</b>                |  |
| Input range                         | 0 mA – 23 mA   |
| Input impedance                     | 86 Ω   |
| Accuracy                            | 50 μA  |
| <b>Switching output</b>             |  |
| Type                                | Open collector or open emitter, selectable by software |
| Load                                | 330 Ω minimum  |
| Open collector voltage              | 35 V maximum   |
| Open emitter voltage                | 15 V   |

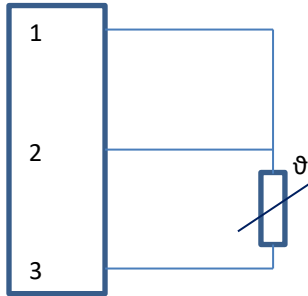
## 7. Installation and commissioning

Use only the included power supply to run the PCM.

### Pin assignment

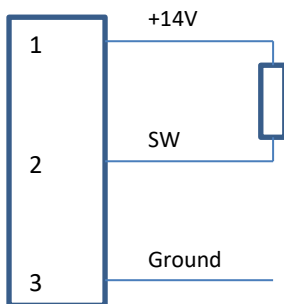
| Main-Board                       |                 |   |
|----------------------------------|-----------------|---|
| Ethernet                         |                 |   |
| Connector                        | RJ45            |   |
| Trigger Output                   |                 |   |
| Connector                        | SMA             |   |
| Trigger Input                    |                 |   |
| Connector                        | SMA             |   |
| TXRX-Board                       |                 |   |
| Receiver only (RX)               |                 |   |
| Connector                        | SMA             |   |
| Transmitter or Pulse-Echo (TXRX) |                 |   |
| Connector                        | SMA             |   |
| IO-Board                         |                 |   |
| Temperature Input                |                 |   |
| Connector                        | Phoenix 1952270 |   |
| Pin assignment                   | 1               | Current source / temperature sensor wire 1        |
|                                  | 2               | Temperature sensor wire 1                         |
|                                  | 3               | Temperature sensor wire 2                         |
| Switching output                 |                 |   |
| Connector                        | Phoenix 1952270 |   |
| Pin assignment                   | 1               | Supply voltage for external device                |
|                                  | 2               | Switching output (open collector or open emitter) |
|                                  | 3               | Ground  |
| Current Output                   |                 |   |
| Connector                        | Phoenix 1952270 |   |
| Pin assignment                   | 1               | Supply voltage for external device                |
|                                  | 2               | Current output                                    |
|                                  | 3               | Ground  |
| Current Input                    |                 |   |
| Connector                        | Phoenix 1952283 |   |
| Pin assignment                   | 1               | Supply voltage for external device                |
|                                  | 2               | Current input +                                   |
|                                  | 3               | Current input –                                   |
|                                  | 4               | Ground  |
| Voltage Input                    |                 |   |
| Connector                        | Phoenix 1952270 |   |
|                                  | 1               | Supply voltage for external device                |
|                                  | 2               | Voltage input                                     |
|                                  | 3               | Ground  |

Temperature Sensor

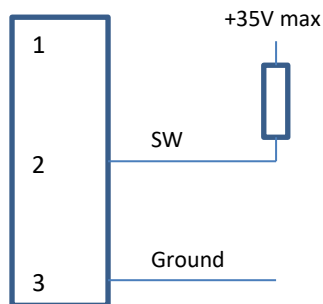


Switching Output

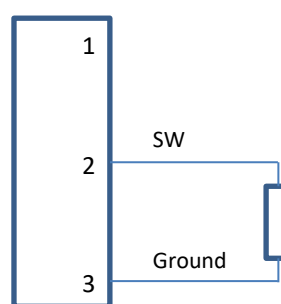
Open Collector (OC)



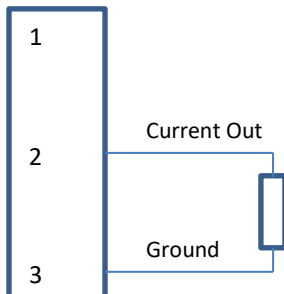
OC with external voltage



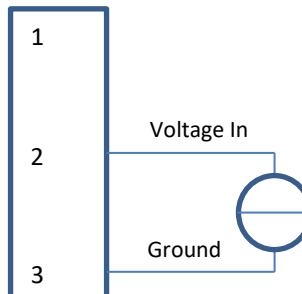
Open Emitter (OE)



Current Output

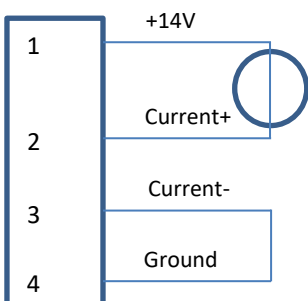


Voltage Input

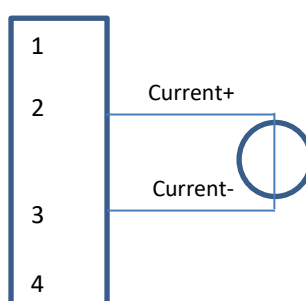


Current Input

internal



external



## 8. Interface

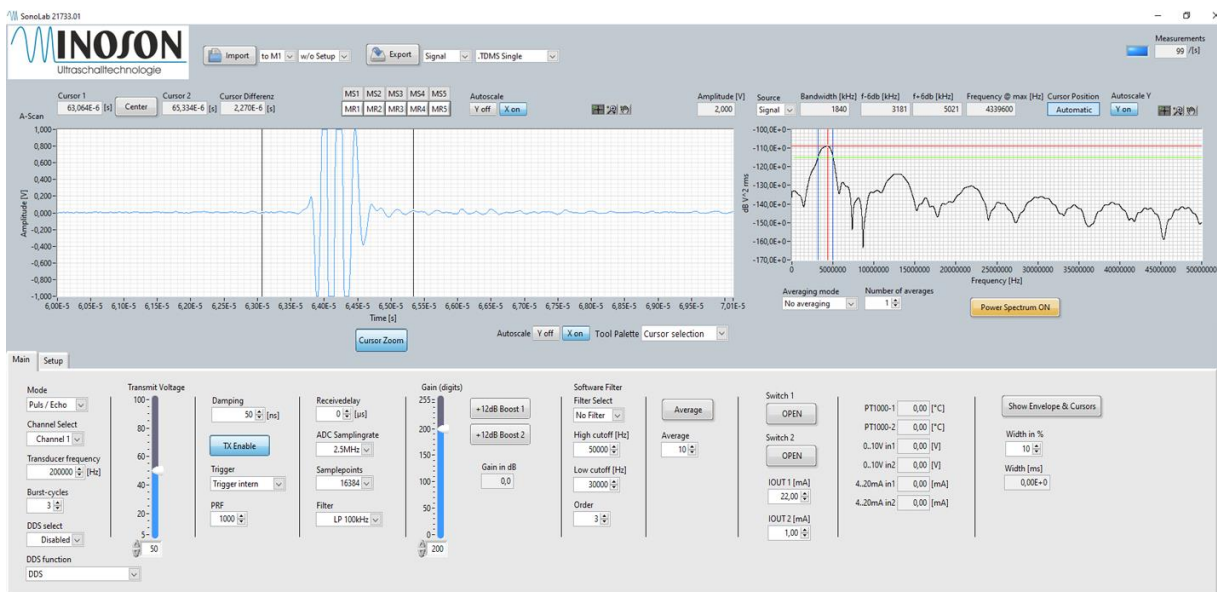
The PCM is controlled and readout over Ethernet. Therefore, it's simple to integrate it in an existing network.

The SonoLab Software provides the GUI to handle the following settings:

- Trigger
- Transmitter frequency, waveform, count and voltage
- Receiver gain and bandwidth, time-gain-control
- Digitalization delay, sampling rate and acquisition depth

Also, the SonoLab Software shows all the available measurement data and provides functions for data analyzing and processing:

- Time signals
- Digital filtering and Power spectrum of the Ultrasound signal
- Customized algorithms for data processing (e.g. zero-crossing-detection, correlation)
- Sensor data of the IO-Board




The SonoLab Software can easily be modified and adapted to fit to specific applications and solve its special challenges.

Also, the customer can apply his own development environment. Therefore, all the commands and Ethernet frames will be hold available.

## 9. Maintenance, repair and disposal

---

The PCM is maintenance-free and cannot be repaired by the user. In case of damage / malfunction the PCM has to be returned to the manufacturer for maintenance repair.

|   |   |
|---|---|
|  | <b>DISPOSAL</b><br>Dispose of the device in an environmentally friendly manner.<br>Comply with national waste disposal regulations. |
|---|---|

## 10. Contact

---

### **inoson GmbH**

Sophie-Kraemer-Str. 8  
66386 St. Ingbert  
Germany

Tel: +49(6894)99 89 80-0

Fax: +49(6894)99 89 80-1

E-Mail: [info@inoson.de](mailto:info@inoson.de)

[www.inoson.de](http://www.inoson.de)

## 11. Revision History

---

| <b>Revision</b> | <b>Description</b>                  |
|-----------------|-------------------------------------|
| V1.0            | initial                             |
| V1.1            | trigger, transmit voltage and power |