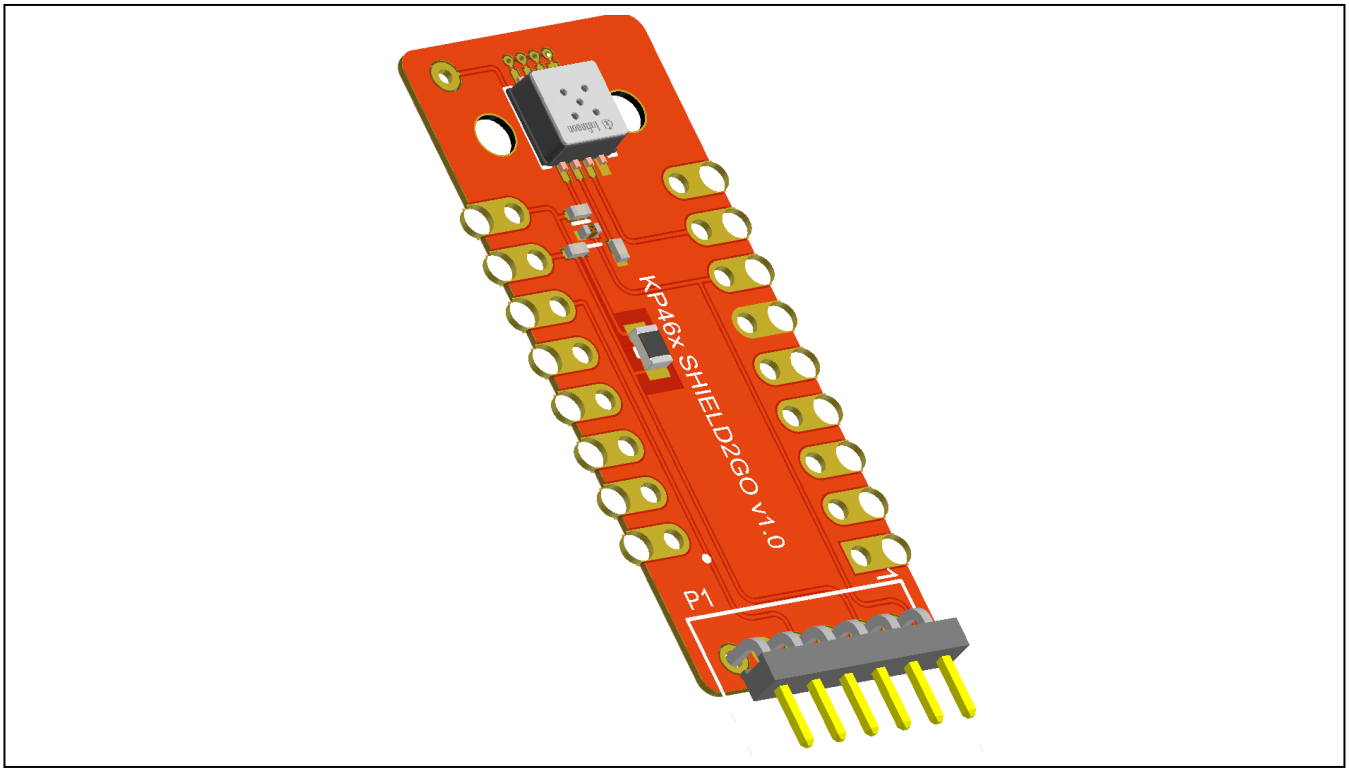
XENSIV™ Pressure Sensor Shield2GO - KP46x

User guide



About this document

Scope and purpose

This document describes the hardware and software functionalities of KP466 Pressure Shield2GO and KP467 Shield2GO, named generically in this document as “KP46x Shield2GO”.

The KP46x Shield2GO allows fast hardware evaluation and enables ease of prototyping on user side. The KP46x Shield2GO is compatible with the software examples provided by Infineon via the Infineon Developer Center platform.

Intended audience

This user guide is written for hardware and software engineers involved in the evaluation of sensors of the KP46x series.

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1 Introduction

The KP46x Shield2GO is a budget-priced evaluation board enabling the possibility to evaluate the pressure sensors included in the KP46x pressure sensor family. The board is design for enabling fast hardware and software prototyping while ensuring compatibility with microcontroller evaluation boards supported in Arduino IDE. The compatible example software provided is designed for enabling the user to have a fast working prototype. Compatible sensors are listed in **Table 1**.

Table 1 Currently supported sensors of the KP46x family

Sensor	Description and features
KP466	**Default assembly for KP466 Shield2GO .** Absolute pressure sensor, 60 to 165 kPa range, temperature measurement range -40 to 125 °C
KP467	**Default assembly for KP467 Shield2GO** . Absolute pressure sensor, 45 to 200 kPa range, temperature measurement range -40 to 125 °C, low monitoring power mode
KP464	**Alternative assembly*.** Absolute pressure sensor, 40 to 115 kPa, temperature measurement range -40 to 125 °C
KP464E	**Alternative assembly*.** Variant of KP464 with extended temperature measurement range of -40 to 160 °C.
KP465	**Alternative assembly*.** Absolute pressure sensor, 60 to 320 kPa pressure measurement range, temperature measurement range -40 to 125 °C
KP466P	**Alternative assembly*.** Higher precision variant of KP466. Same pressure / temperature range

***Note**: Implies that the hardware and example software is compatible to this product, but the user shall re-assemble the KP46x Shield2GO board with the specified sensor, or shall connect an external module based on the specified sensor.*

The KP46x Shield2GO offers a limited set of features, mainly directed towards sensor interface and data acquisition. More features are provided within complementary evaluation kits as:

- KP46x-PS2GO-KIT: providing easy to use graphical interface for data visualization and configuration.
- KP46x EVAL BOARD together with the PGSISI-3 board: providing full feature set, including sensor EEPROM programming.

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2 Getting started

This chapter describes the required hardware and the installation of the software components of an evaluation kit package.

2.1 Evaluation kit hardware

2.1.1 Content

The evaluation kit package consists of the following components:

- KP46x Shield2GO board - hardware details and revision history are provided within this document
- Pressure adapter: 3D printed adapter including silicone gasket
- M2 screws & nuts for attaching the pressure adapter to the PCB
- Pneumatic fast connector for 6mm tubes and M5 thread for fastening to pressure adapter
- Connectors

The evaluation hardware may be ordered online, on Infineon Website or via Infineon sales channels. The required order numbers are listed in **Table 2**.

Table 2 KP46x Shield2GO - Hardware list with order numbers

Name	Description	Infineon Sample Request (ISaR) SP Number
KP466 SHIELD2GO	KP46x Shield2GO assembled with KP466	SP006049566
KP467 SHIELD2GO	KP46x Shield2GO assembled with KP467	SP006049577

Figure 1 depicts the content of the KP46x Shield2GO.



Figure 1 KP46x Shield2GO components.

***Note**: The image provided is a general representation and my not reflect the exact design and features of the latest version, which may have undergone modifications.*

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2.1.2 Hardware design

This chapter offers a detailed description on the latest hardware design version of KP46x Shield2GO board. Please check the Hardware Revision Appendix for details on previous hardware variants.

The hardware is composed of the following main blocks:

- **Sensor [IC1]:** by default, assembled with KP466 / KP467, depending on ordered variant
- **XMC2GO Headers [X1]:** pin headers, pitch 2.54mm, by default not assembled, but connectors included in the package as optional assembly. These pin headers are compatible with either XMC1100 2GO KIT, or XMC1400 2GO KIT
- **PMOD Connector [P1]:** connector, by default assembled on the board. May be used for probing or for connecting the KP46x Shield2GO to compatible hardware (e.g. BMS application kits)
- **Soldering Jumper [R1]:** by default, not assembled. Used for KP467 variant only, if 3-wire SPI mode is enabled. This jumper will connect MISO / MOSI lines together on same net.

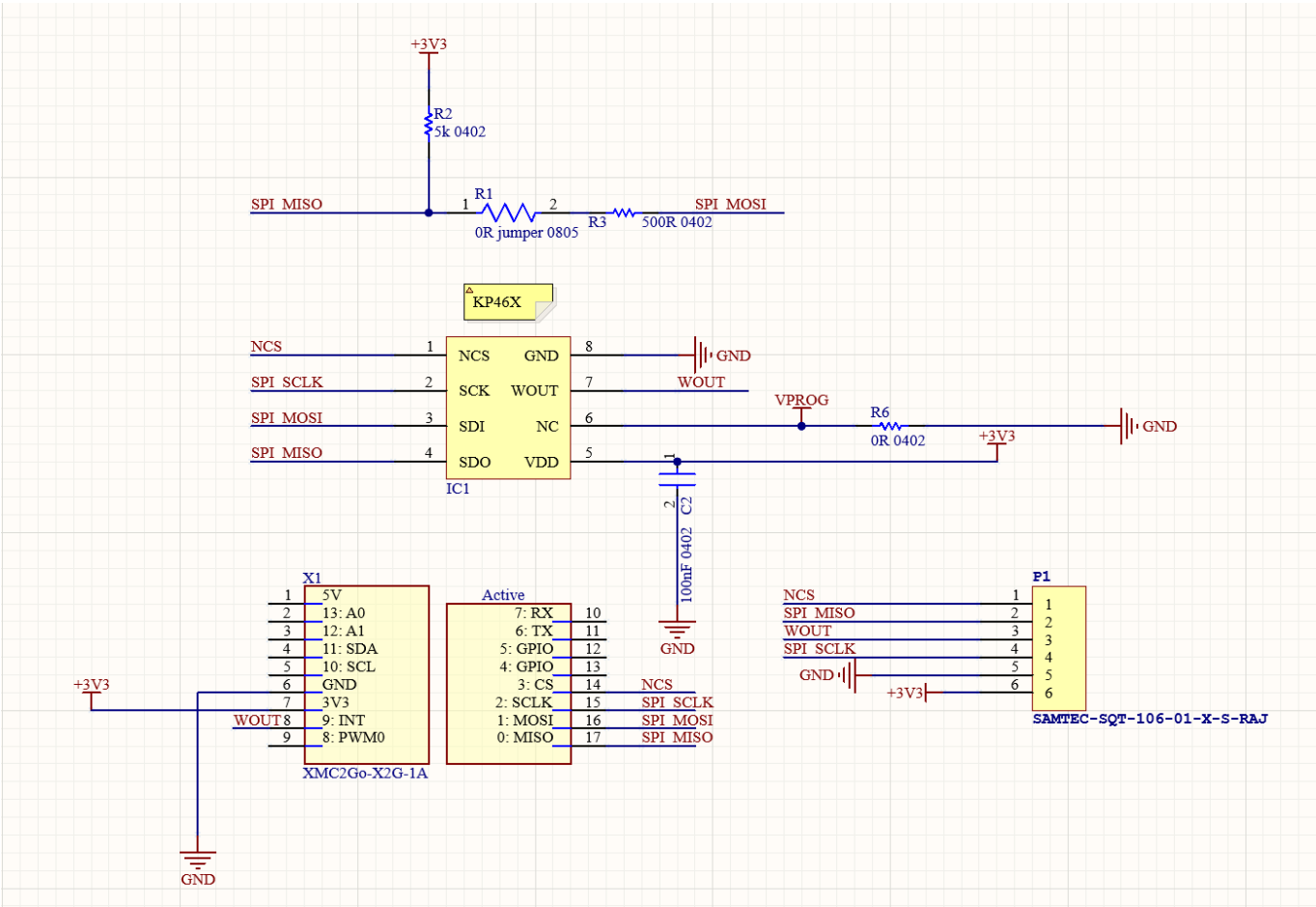


Figure 2 KP46x Shield2GO schematic design.

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The side connectors encapsulated as device X1, are described below and may be used for debugging, probing or connecting additional hardware:

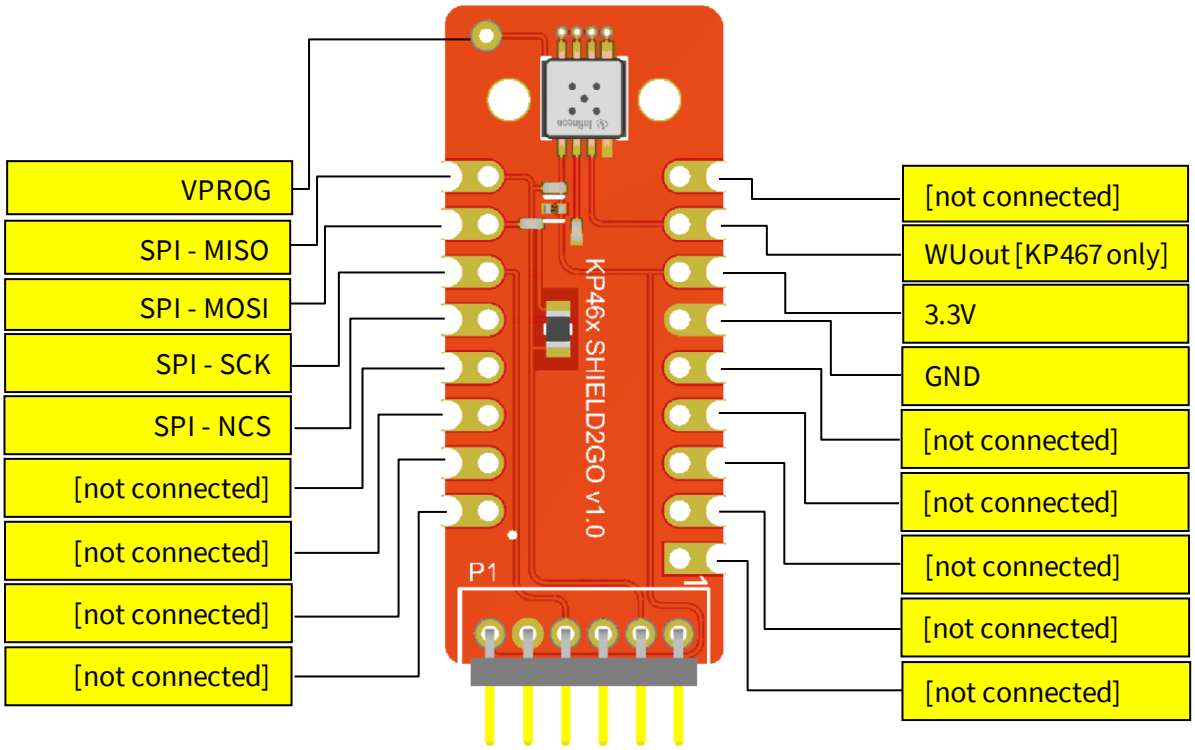


Figure 3 KP46x Shield2GO side connectors pin-out.

The “[not connected]” pins may be ignored by user, as these are not routed on the board. The board may be interfaced with an external microcontroller / device by using the SPI lines and WUout pin (in case of using the KP467 variant). Additionally, the user shall ensure a stable supply between pins “3.3V” and “GND”. If the user is implementing a programming sequence, the pin VPROG shall be connected to an external supply to provide the VPROG voltage level stated in datasheet and user manual, but prior to this, the user shall remove the resistor R6 on the board to ensure that the VPROG pin is not connected anymore to GND plane.

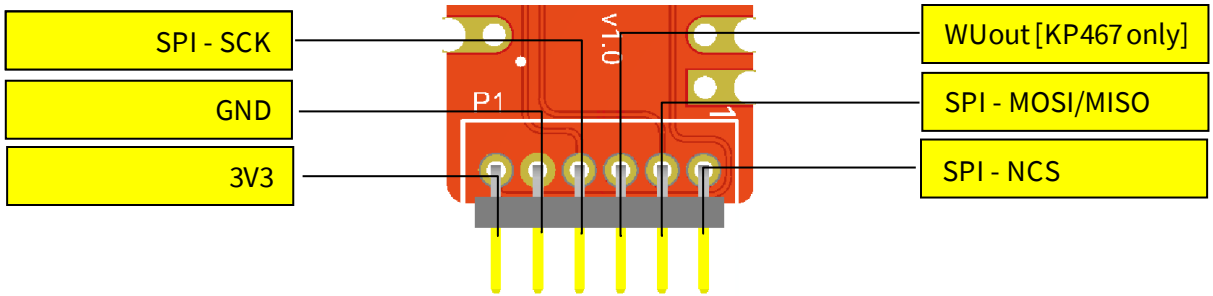


Figure 4 KP46x Shield2GO PMOD Connector pinout.

Figure 4 depicts the pinout of the PMOD connector assembled on the board. The connector is mainly designed for interfacing external application boards used for BMS applications, therefore it is optimized in terms of pinout to 3-wire SPI mode. Nonetheless, the user may use these pins for connecting to external microcontroller

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or for probing but having in mind that on the default assembly the MOSI line is not routed to this connector. In order to connect MOSI and MISO line together, the R1 jumper needs to be placed (either by placing a 0 Ω 0805 resistor, or by creating a short on the pads. Reprogramming the part to 3-wire SPI is mandatory.

2.1.3 PCB Layout considerations

The design described in **section 2.1.2** is physically implemented in PCB technology using a standard process with following characteristics:

- PCB material: FR4
- PCB thickness: 1.6 mm +/- 10 %
- Copper: 2 layers Top/Bottom, 35 µm thickness

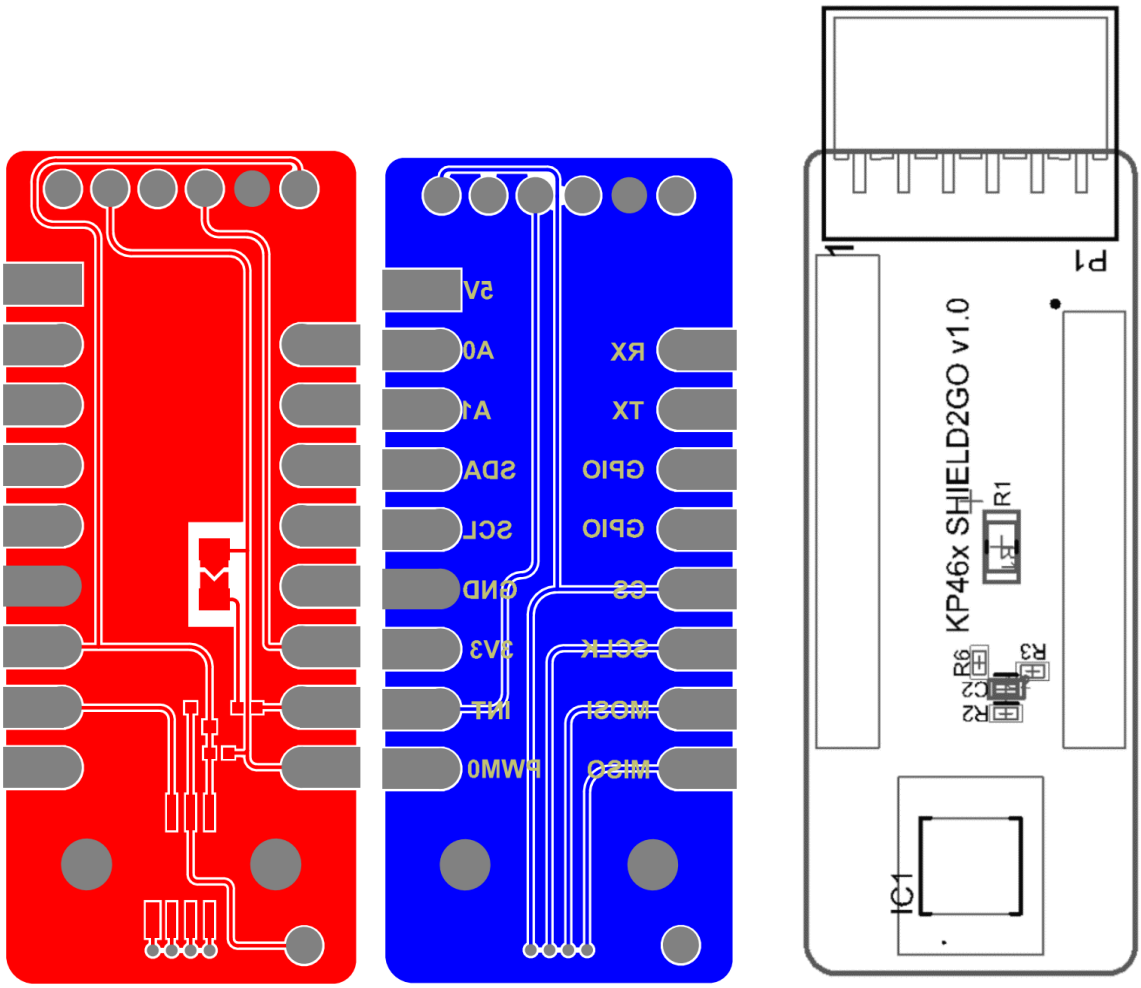


Figure 5 KP46x Shield2GO PCB Layout Details

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2.1.4 Bill of materials

Table 3 KP46x Shield2GO PCB Assembly bill of materials

Designator	Description	Quantity	Assembled on PCB	Infineon Part
R1	0R resistor, 0805	1	No	No
R2	5k resistor, 0402, 1 %	1	YES	No
R3	500R resistor, 0402, 1 %	1	YES	No
R6	0R resistor, 0402	1	YES	No
C2	100 nF, 0402, X7R, 16 V	1	YES	No
X1	1x9 + 1x8 headers, 2.54 mm pitch	1	Included, not assembled	No
P1	1x6 header, 2 mm pitch, 90 °	1	YES	No
IC1	KP46x sensor	1	YES	**YES**

The bill of material components listed in **Table 3** may be identified on the PCB as depicted in **Figure 5.**

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2.2 Compatible hardware

2.2.1 KIT_XMC14_2GO

The KP46x Shield2GO is designed to ensure compatibility with KIT_XMC14_2GO platform. The KP46x Shield2GO shall be stacked over the KIT_XMC14_2GO, by using the provided header pins. The user shall ensure proper placement and electrical connection of all interface pins. Please have in mind that for correct placement, the PMOD connector is facing toward the USB-C connector, as depicted in **Figure 6**.

The KIT_XMC14_2GO provides the following functionality:

- Supplying the KP46x Shield2GO with 3.3 V
- Interfacing the KP46x sensor via SPI lines (P0.0, P0.1, P0.3, P0.4)
- Interfacing the KP46x WUout signal – KP467 only (P1.4)

Please consult the KIT_XMC14_2GO User Manual for more details about functionality and building blocks.

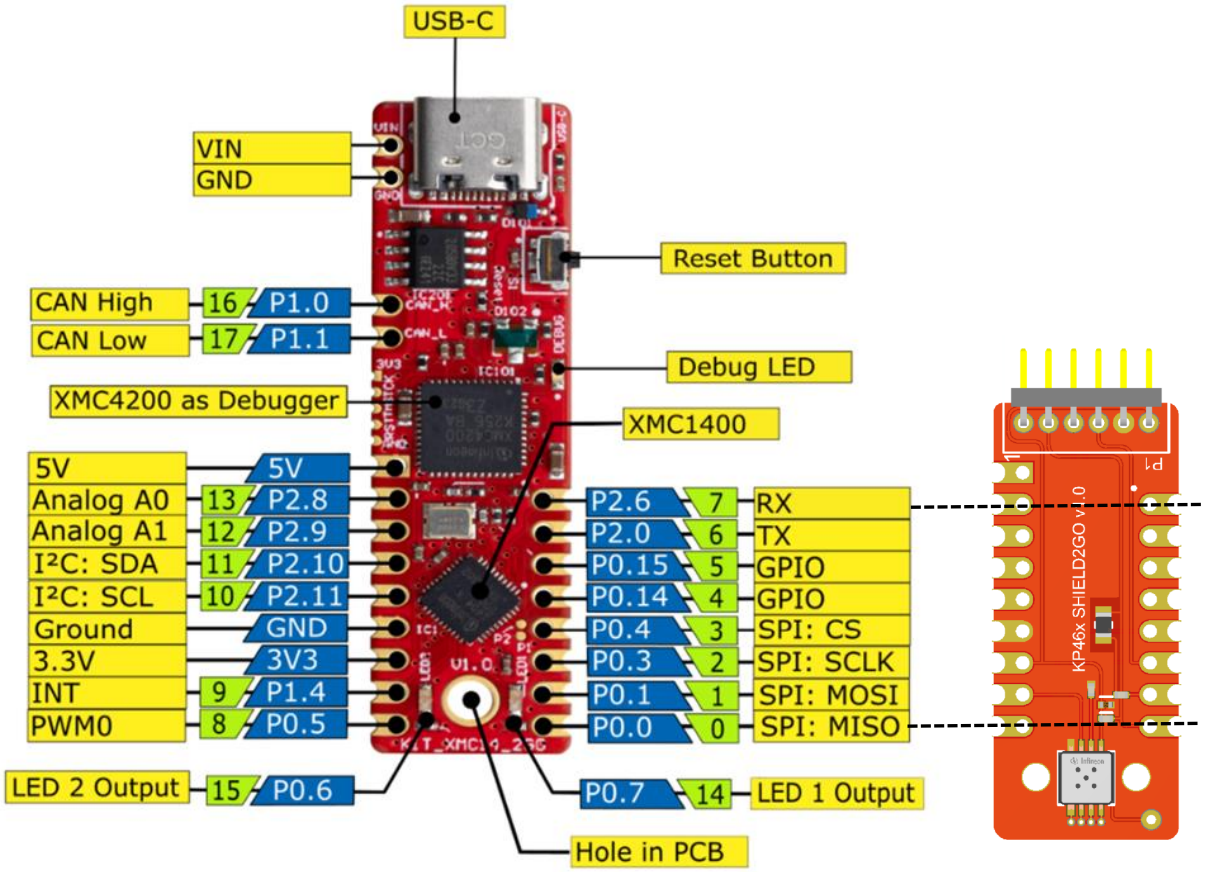


Figure 6 KP46x Shield2GO and KIT_XMC14_2GO

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2.2.2 KIT_XMC_2GO_XMC1100_V1

KP46x Shield2GO maintains compatibility with the KIT_XMC_2GO_XMC1100_V1 platform. Similar to the KIT_XMC14_2GO, the KIT_XMC_2GO_XMC1100_V1 is used in stacked approach. Use the provided pin headers for properly attaching stacking the two PCBs, while keeping the correct orientation: PMOD connector facing towards the micro-USB connector, as depicted in **Figure 7**.

Note: *The KIT_XMC_2GO_XMC1100_V1 is not supported anymore by Infineon but remains widely available on the market.*

The KIT_XMC_2GO_XMC1100_V1 provides the following functionality:

- Supplying the KP46x Shield2GO with stable 3.3 V
- Interfacing the KP46x sensor via SPI lines (P0.6, P0.7, P0.8, P0.9)
- Interfacing the KP46x WUout signal – KP467 only(P0.0)

Please consult the KIT_XMC_2GO_XMC1100_V1 User Manual for more details about functionality and building blocks.

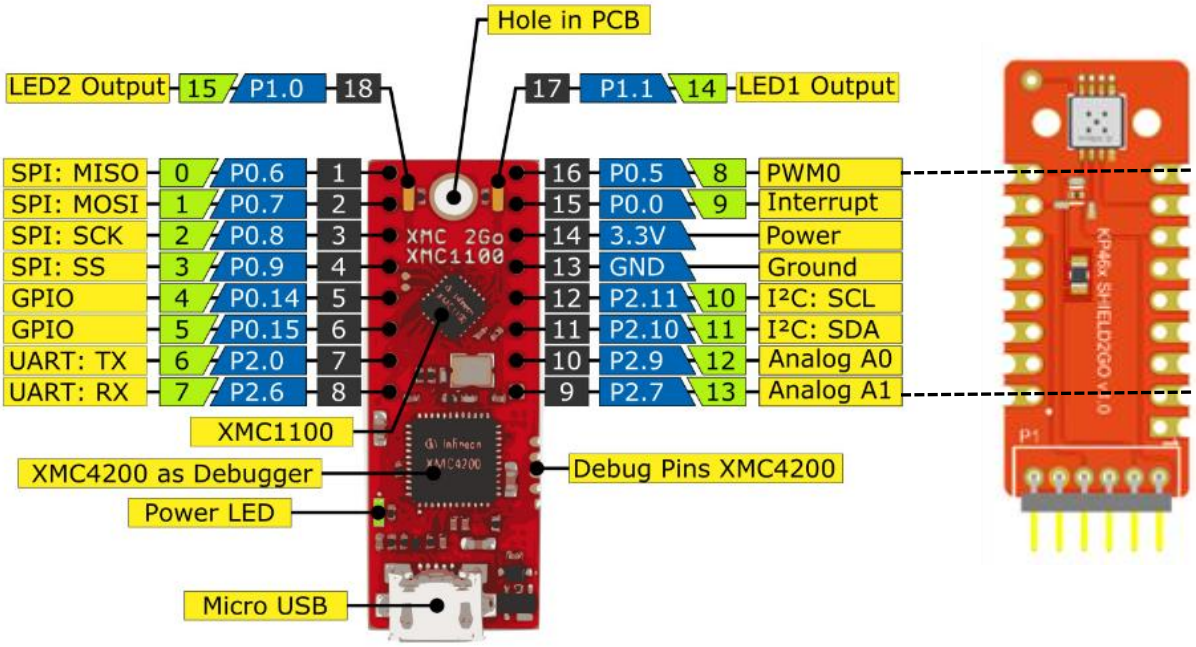


Figure 7 KP46x Shield2GO and KIT_XMC _2GO_XMC1100_V1

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2.2.3 Customized setup

The use cases for this board are not restricted to using the platforms mentioned in **chapters 2.2.1 and 2.2.2**. The user may opt for creating a customize setup, by following the below listed guidelines.

Interfacing:

- The user shall supply the board with a stable 3.3 V or 5 V supply, between 3V3 and GND pins
- The user shall connect SPI lines to an SPI master (e.g. microcontroller peripheral)
- The user shall monitor the WUout pin via an interrupt detector (e.g. microcontroller, GPIO, configured as interrupt source) – only for KP467
- Optionally, the user can opt for connecting an external 16.1V supply on VPROG pin for enabling test-mode access and programming of internal EEPROM settings.

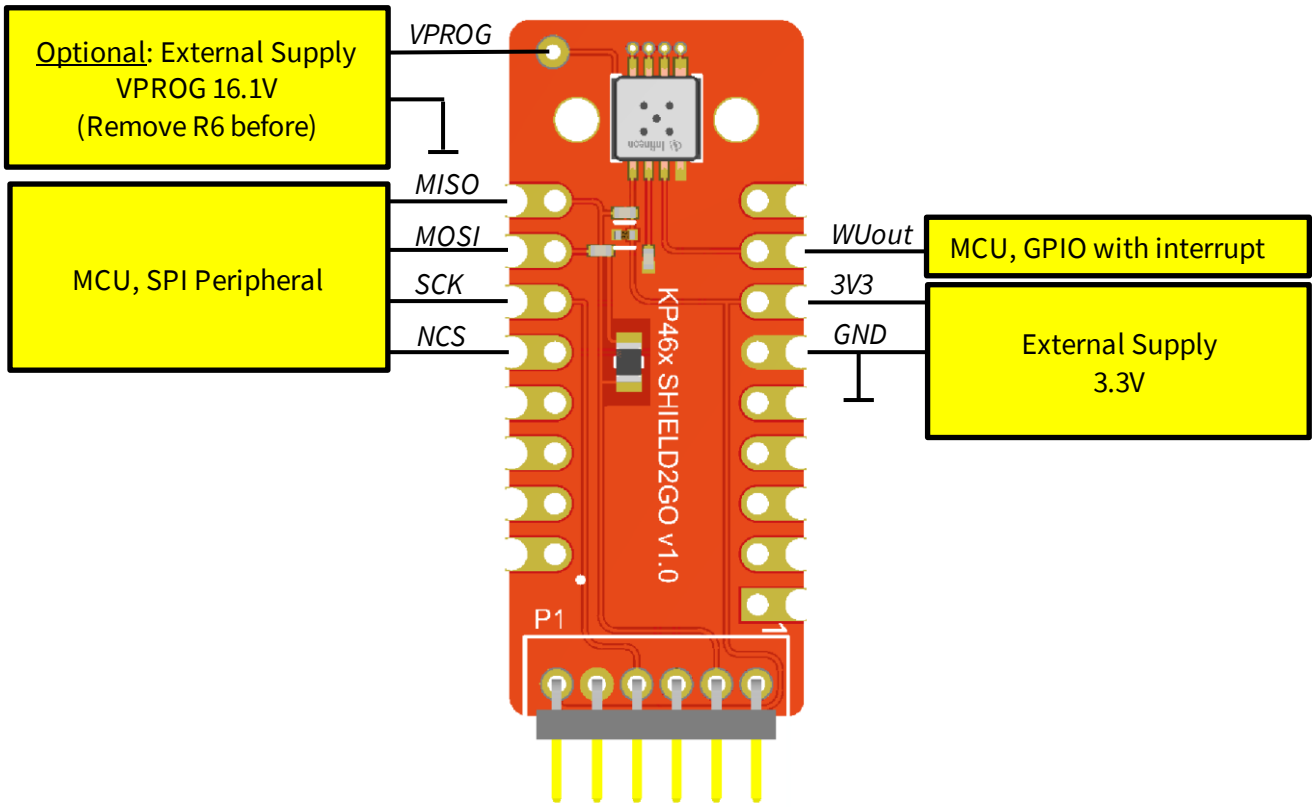


Figure 8 KP46x Shield2GO - Customized setup

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2.3 Software Examples

Infineon offers two software examples, in Arduino IDE format, in order to easily get started with the KP46x Shield2GO in combination with KIT_XMC14_2GO or KIT_XMC_2GO_XMC1100_V1.

Follow next steps for getting started:

- Install Arduino IDE and configure it for XMC compatibility as instructed here: https://github.com/Infineon/XMC-for-Arduino
- Download the software example projects: go to the KP466 / KP467 product page. Under “Design Support” tab, in the category “Embedded Software”, download one of the example software packages:

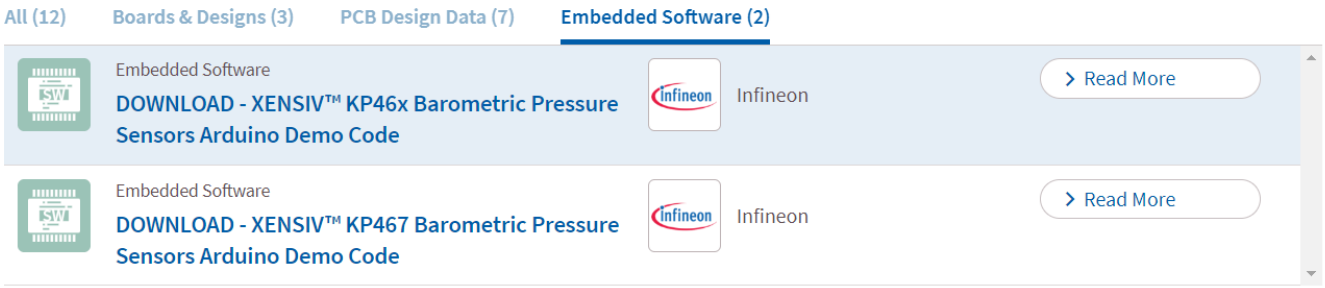


Figure 9 KP46x Shield2GO - Software Example Download

- Extract the .ZIP archive
- Load the .INO file in Arduino and execute the program
- Optionally, follow the attached documentation for integration with native Arduino hardware
- Interpret output data sent over serial interface (see examples in **Figure 10**)

```
43      96.82 kPa       23.06 degC      DIAG 01010
44      96.82 kPa       23.23 degC      DIAG 01010
45      96.82 kPa       23.23 degC      DIAG 01010
46      96.82 kPa       23.06 degC      DIAG 01010
47      96.82 kPa       23.06 degC      DIAG 01010
48      96.82 kPa       23.23 degC      DIAG 01010
49      97.27 kPa       23.06 degC      DIAG 01010
50      106.52 kPa      23.23 degC      DIAG 01010
51      130.15 kPa      23.06 degC      DIAG 01010
52      160.30 kPa      23.23 degC      DIAG 01010
53      166.97 kPa      23.06 degC      DIAG 01010
54      144.55 kPa      23.23 degC      DIAG 01010
55      98.03 kPa       23.23 degC      DIAG 01010
56      96.82 kPa       23.23 degC      DIAG 01010
57      97.27 kPa       23.06 degC      DIAG 01010
58      97.42 kPa       23.06 degC      DIAG 01010
59      97.42 kPa       23.23 degC      DIAG 01010
60      97.42 kPa       23.06 degC      DIAG 01010
61      97.42 kPa       23.23 degC      DIAG 01010
```

Figure 10 KP46x Shield2GO - Software Example - Output

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APPENDIX 1 – Hardware Revision History

Version V1.0 of the KP46x Shield2GO PCB, is the first released hardware version. This section may be updated with new version releases. Please check back regularly for the latest information.

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Revision history

Document version	Date of release	Description of changes
V1.0	December 2024	First official release.

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