

KIT_CSK_PASCO2

XENSIV™ PASCO2V01 Connected Sensor Kit

About this document

Scope and purpose

This user guide describes the function, circuitry, and performance of the XENSIV™ PASCO2V01 Wing board, part of Infineon's XENSIV™ PASCO2V01 Connected Sensor Kit ([KIT_CSK_PASCO2](#)).

Intended audience

The intended audience for this document is design engineers, technicians, and developers of electronic systems, working with Infineon's XENSIV™ photoacoustic spectroscopy (PAS) CO2 gas sensors or XENSIV™ DPS368 barometric pressure sensor.

Reference Board/Kit

Product(s) embedded on a PCB with a focus on specific applications and defined use cases that may include software. PCB and auxiliary circuits are optimized for the requirements of the target application.

Note: Boards do not necessarily meet safety, EMI, quality standards (for example UL, CE) requirements.

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Safety precautions

Safety precautions

Note: Please note the following warnings regarding the hazards associated with development systems.

Table 1 **Safety precautions**


	Caution: <i>The evaluation or reference board contains parts and assemblies sensitive to electrostatic discharge (ESD). Electrostatic control precautions are required when installing, testing, servicing or repairing the assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with electrostatic control procedures, refer to the applicable ESD protection handbooks and guidelines.</i>
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Table of contents

Table of contents

About this document.....	1
Important notice	2
Safety precautions.....	3
Table of contents.....	4
1 The board at a glance.....	5
1.1 Scope of supply	6
1.2 Block diagram.....	6
1.3 Main features	8
1.4 Board parameters and technical data.....	8
2 System and functional description	9
2.1 Getting started.....	9
2.2 Quick IoT experience.....	9
2.2.1 Signup and login	9
2.2.2 Add your device.....	10
2.2.3 Application	10
2.2.4 Configure Wi-Fi network	11
2.2.5 Submit your device configurations	11
2.2.6 Download the zip package.....	12
2.2.7 Program the KIT_CSK_PASCO2	13
2.2.8 Device management	14
2.2.9 Select desired application	14
2.2.10 Selected application attributes	15
2.2.11 View sensor data	15
3 System design	16
3.1 Schematics	17
3.2 Layout	20
3.3 Bill of materials.....	20
3.4 Connector details	21
References.....	24
Glossary	25
Revision history.....	26
Disclaimer.....	27

1 The board at a glance

1 The board at a glance

The XENSIV™ PASCO2V01 Connected Sensor Kit supports customers in testing sensor-driven IoT products and CO2 use cases as well as in prototyping. It offers a real-time sensor evaluation with custom configurations and cloud- and PAS CO2-based solution output visualization. The KIT_CSK_PASCO2 (Figure 1) comes with:

- Rapid IoT Connect Developer Kit (CYSBSYSKIT-DEV-01)
- XENSIV™ PASCO2V01 Wing (EVAL_PASCO2_WING)

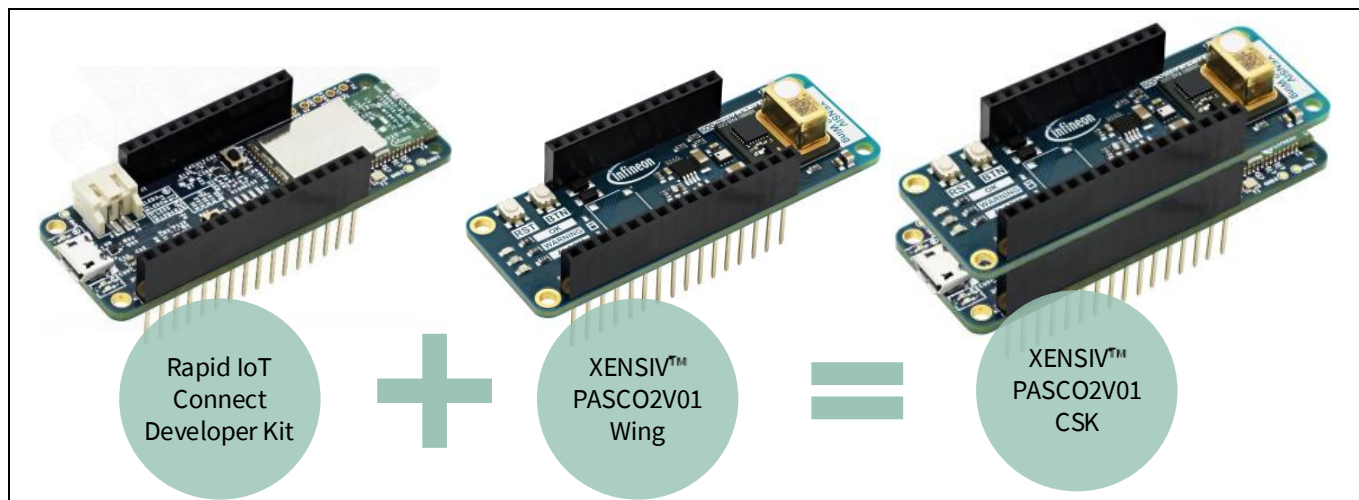


Figure 1 XENSIV™ PASCO2V01 Connected Sensor Kit

The Rapid IoT Connect Developer Kit (CYSBSYSKIT-DEV-01) shown in Figure 2 allows the evaluation of the Rapid IoT Connect module (CYSBSYS-RP01) on a standard Feather form-factor. The CYSBSYS-RP01 Rapid IoT Connect module is a turnkey module that enables secure, scalable, and reliable compute and connect.

The Rapid IoT Connect Developer Kit carries a CYSBSYS-RP01 Rapid IoT connect system-on-module (SoM), which includes a PSOC™ 6 MCU, an AIROC™ CYW43012 single-chip radio, onboard crystals, oscillators, chip antenna, and passive components.



Figure 2 Rapid IoT Connect Developer Kit

1 The board at a glance

The XENSIV™ PASCO2V01 Wing board shown in [Figure 3](#) is based on the PASCO2V01 CO₂ sensor. The sensor is based on the photoacoustic spectroscopy (PAS) principle, where CO₂ molecules within the sensor cavity absorb the infrared light, generating small pressure changes that are detected by an acoustic detector. The integrated microcontroller provides a direct readout of CO₂ concentration in parts per million (ppm). Precise CO₂ readings are guaranteed.

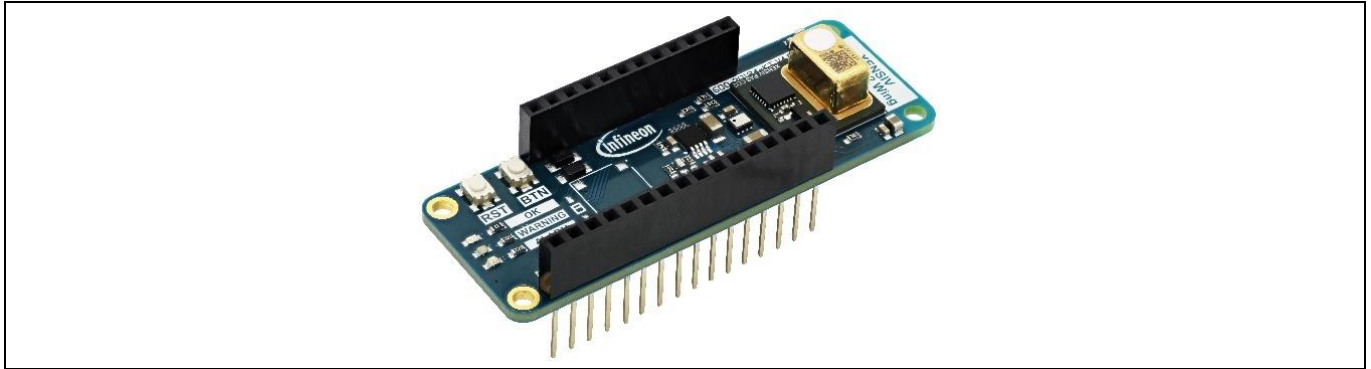


Figure 3 XENSIV™ PASCO2V01 Wing board

The board also comprises the XENSIV™ DPS368 digital barometric pressure sensor. This high-precision pressure sensor can detect very small changes in barometric pressure, which makes it an ideal device where accurate pressure event detection is required (for example, opening of doors or windows or fall detection).

Having both the CO₂ sensor and pressure sensor on the board gives the possibility to develop and test more complex scenarios where data from both sensors is combined for more reliable event detection.

1.1 Scope of supply

The kit can be powered from a 3.7 V LiPo battery or via a USB cable from an external 5 V power supply. The battery is automatically charged when the system is connected to an external power supply.

1.2 Block diagram

A block diagram of the wing board is shown in [Figure 4](#). The wing board comprises the XENSIV™ PASCO2V01 CO₂ gas sensor and the required power supply components. Power lines are highlighted in red. It is also equipped with push buttons and LEDs.

1 The board at a glance

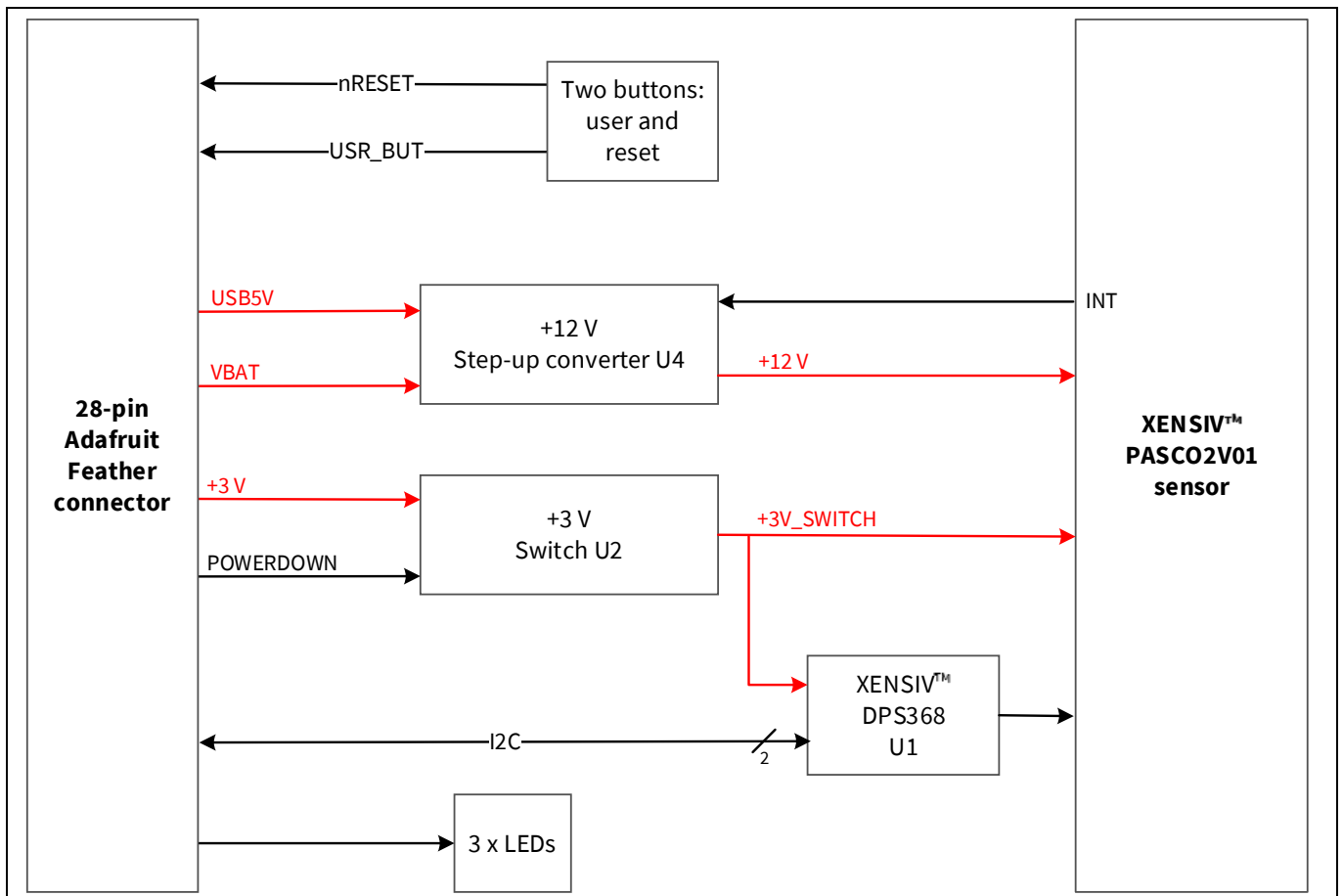


Figure 4 XENSIV™ PASCO2V01 Wing board block diagram

A system block diagram showing the shield connected to the CSK rapid IoT baseboard is shown in [Figure 4](#). The interface from the shield to the rapid IoT baseboard includes I²C, digital signals, analog signals and power lines. The baseboard can interact with the outside world using Wi-Fi, Bluetooth®, USB, or a combination of them depending on the firmware/software (FW/SW) installed on the baseboard. The kit can be powered from an external power supply or from a LiPo battery.

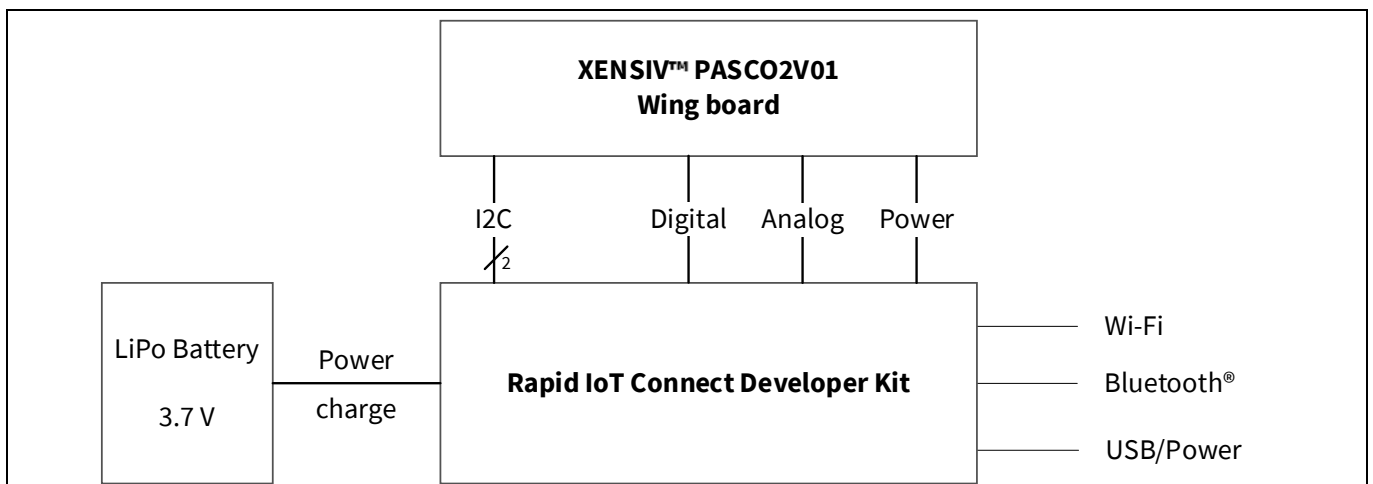


Figure 5 CSK system block diagram

1 The board at a glance

1.3 Main features

- XENSIV™ PASCO2V01 gas sensor
 - Exceptionally small form factor 14 mm x 13.8 mm x 7.5 mm sensor
 - Accurate and robust performance at ppm level (± 30 ppm ± 3 percent of reading)
 - Advanced compensation and self-calibration algorithms
 - Configurable sampling rate via UART and I²C interfaces
- XENSIV™ DPS368 barometric pressure sensor
 - Package dimensions: 8-pin PG-VLGA-8-2, 2.0 mm x 2.5 mm x 1.1 mm
 - IPx8 certified: Temporary immersion at 50 m for 1 hour
 - Interface: I²C and SPI (both with optional interrupt)
 - Operating modes: Command (manual), background (automatic), and standby
 - Pressure sensor precision: ± 0.002 hPa (or ± 0.02 m) (high precision mode)
 - Absolute accuracy: ± 1 hPa (or ± 8 m)
- XENSIV™ PASCO2V01 Wing board
 - 63 mm x 23 mm size on standard FR4 laminate
 - 3 LEDs and 2 configurable user buttons
 - Form-factor compatibility with Adafruit
- CYSBSYSKIT-DEV-01 Rapid IoT Connect Developer Kit (MCU board)
 - Operates with ModusToolbox™ and Infineon Rapid IoT Connect cloud platform

1.4 Board parameters and technical data

Table 2 Parameters

Parameter	Symbol	Conditions	Value	Unit
Supply voltage	–	–	3 (logic and pressure sensor) 12 (step up powering PAS sensor)	V

2 System and functional description

2 System and functional description

2.1 Getting started

The Connected Sensor Kit is a cutting-edge IoT development platform that empowers engineers to swiftly design, test, and refine innovative IoT devices. By providing pre-configured sensor scenarios and real-time data visualization, this kit enables developers to achieve the 10-minute IoT experience, allowing them to rapidly evaluate and validate their ideas.

To further accelerate development, a comprehensive suite of code examples is available within ModusToolbox™, offering a one-stop-shop for developers to kick-start their IoT projects with ease.

2.2 Quick IoT experience

2.2.1 Signup and login

1. Create an account with the [Infineon Rapid IoT Connect Platform](#) by signing up with your email address and other required details as shown [Figure 6](#)

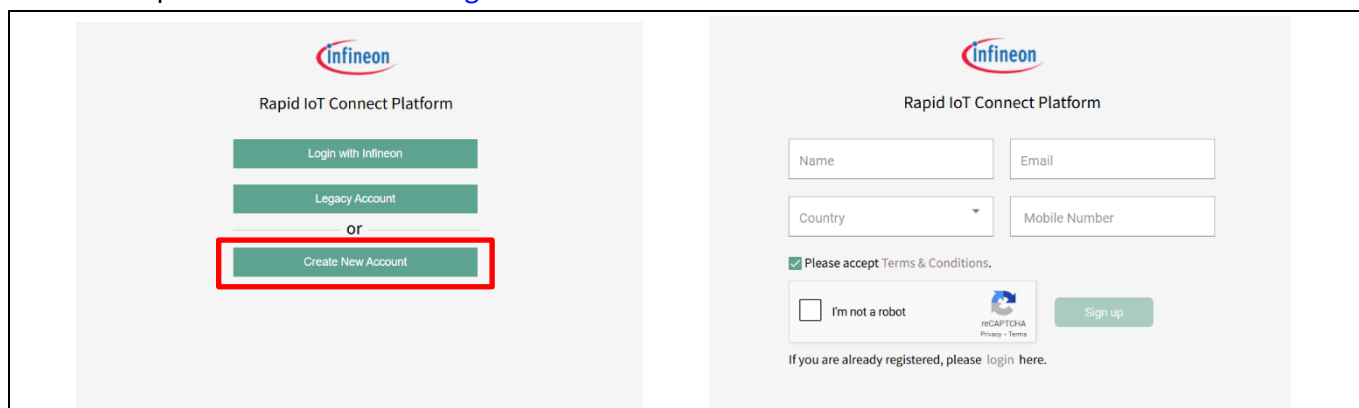


Figure 6 Rapid IoT Connect Platform signup

2. You will receive a password via email, which you will be prompted to change upon your first login to one of your choosing
3. Enter the credentials to login as shown in [Error! Reference source not found.](#)

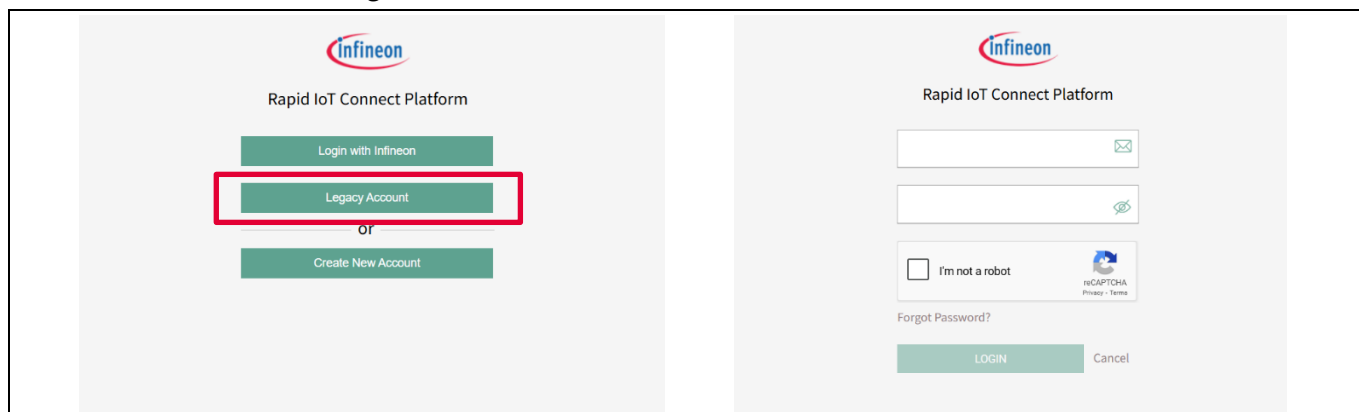


Figure 7 Rapid IoT Connect Cloud Platform login

2 System and functional description

2.2.2 Add your device

1. Click on the **Add device** button to start the process of adding your new KIT_CSK_PASCO2V01 device. A pop-up wizard appears to guide you through the process

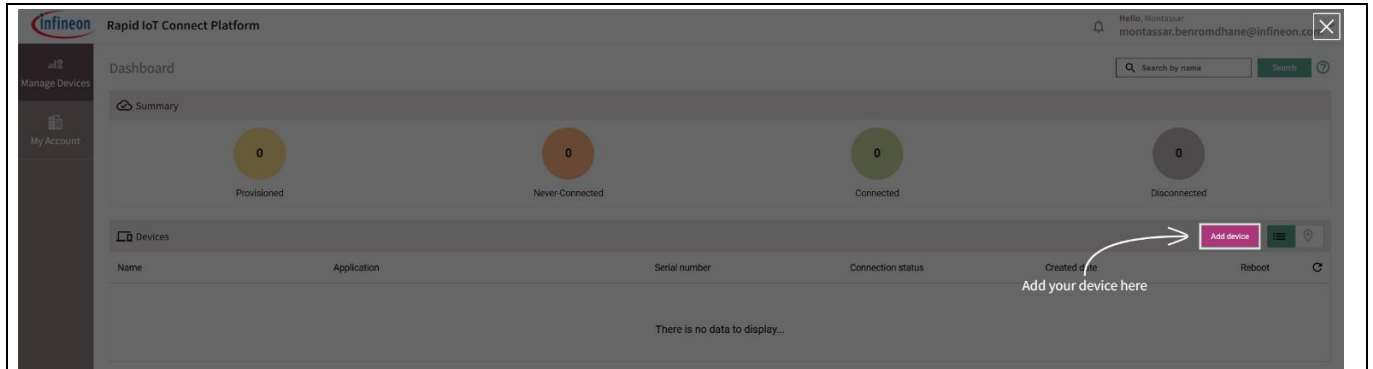


Figure 8 Add your device

2. On the **Device Details**, provide a name for your device, and enter the development kit serial number as shown [Figure 9](#). Click the **Next** button to proceed further

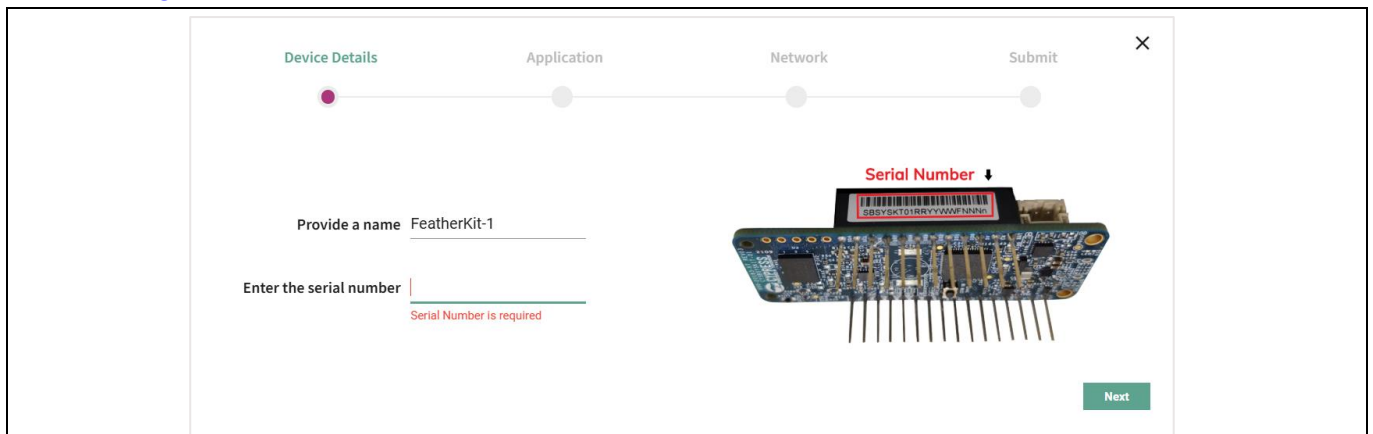
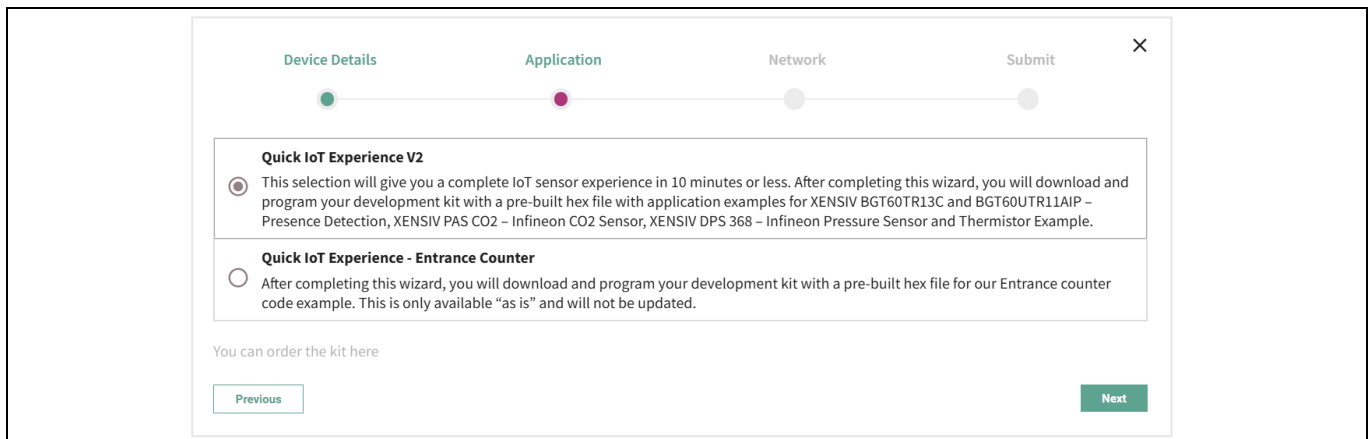


Figure 9 Add device wizard

2.2.3 Application

- With the Quick IoT Experience in **Application**, you can complete an IoT sensor experience that includes telemetry and fleet monitoring, in less than ten minutes
- After you complete the setup wizard, download and program your development kit with a built-in *hex* file. This *hex* file prepares and configures your development kit with the latest Wi-Fi firmware, an example application, and all the credentials required to securely connect to the cloud
- Note that the example application automatically uses the integrated temperature sensor. Ensure to select your desired application based on the XENSIV™ wing board you have, in this case it is XENSIV™ PASCO2V01 wing

2 System and functional description



Device Details Application Network Submit

Quick IoT Experience V2

☒ This selection will give you a complete IoT sensor experience in 10 minutes or less. After completing this wizard, you will download and program your development kit with a pre-built hex file with application examples for XENSIV BGT60TR13C and BGT60UTR11AIP – Presence Detection, XENSIV PAS CO2 – Infineon CO2 Sensor, XENSIV DPS 368 – Infineon Pressure Sensor and Thermistor Example.

Quick IoT Experience - Entrance Counter

☐ After completing this wizard, you will download and program your development kit with a pre-built hex file for our Entrance counter code example. This is only available "as is" and will not be updated.

You can order the kit here

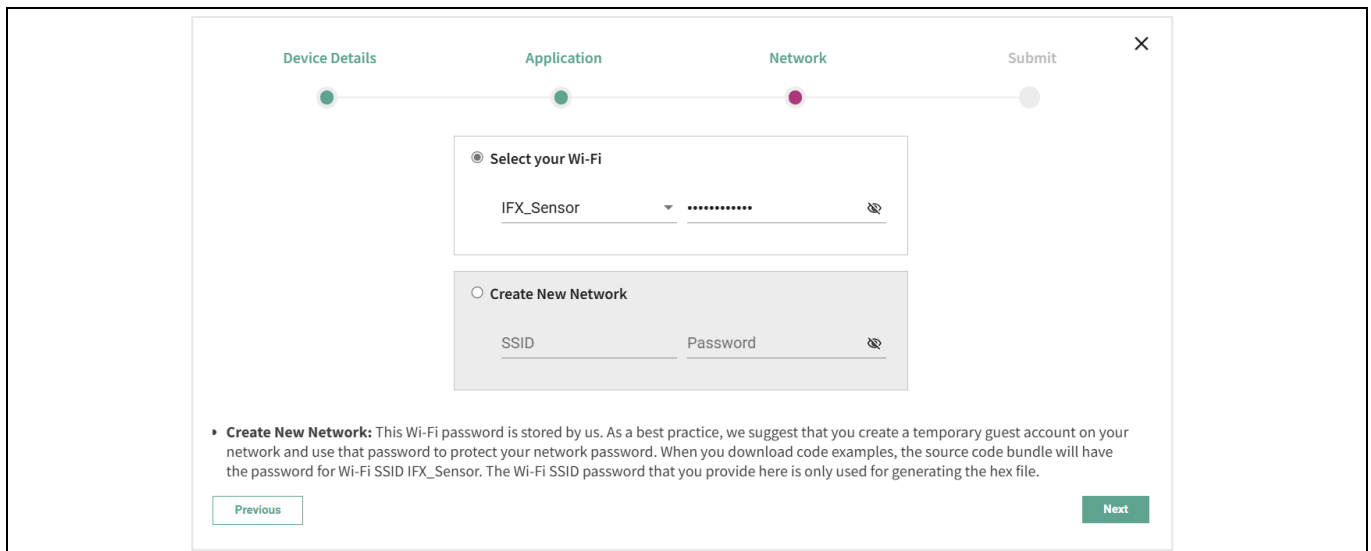
Previous Next

Figure 10 Select application

2.2.4 Configure Wi-Fi network

You can connect to your preferred WPA2 network by providing the Wi-Fi SSID and password by selecting **Create New Network**, or set up an access point/hotspot with WPA2-PSK security by using the following credentials:

- SSID: IFX_Sensor
- Security: WPA2-PSK
- Password: S66M14022021



Device Details Application Network Submit

Select your Wi-Fi

IFX_Sensor

Create New Network

SSID Password

• **Create New Network:** This Wi-Fi password is stored by us. As a best practice, we suggest that you create a temporary guest account on your network and use that password to protect your network password. When you download code examples, the source code bundle will have the password for Wi-Fi SSID IFX_Sensor. The Wi-Fi SSID password that you provide here is only used for generating the hex file.

Previous Next

Figure 11 Configure and select network

2.2.5 Submit your device configurations

- Ensure all the information that you have entered is accurate before clicking the **Submit** button
- If you need to make changes, you can go back to earlier screens by pressing the **Previous** button
- After you click **Submit**, a custom *hex* file will be built for your device, and a software bundle will be generated for programming your development kit, as shown in [Figure 13](#)

2 System and functional description

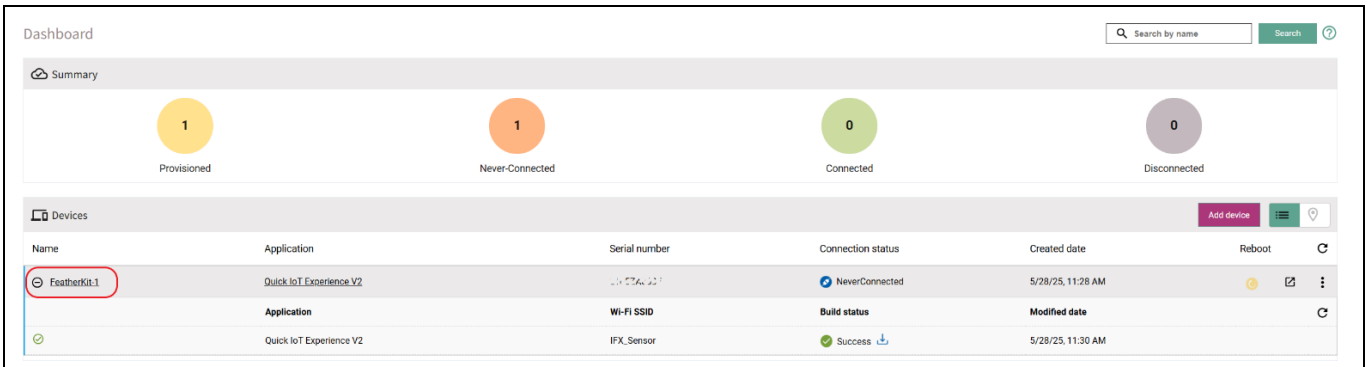


Figure 12 Device management dashboard

Note: You can add/register a maximum of five devices with the Rapid IoT Connect Cloud Platform account.

2.2.6 Download the zip package

Depending on your laptop or PC's operating system (Windows/Linux/Mac), you will receive a downloadable package that includes a *hex* file firmware image and a programming tool for your KIT_CSK_PASCO2 kit. The package will be in the form of a zip file. To view the detailed device status, click on the ⊕ (expand) button. To download the zip package, click ⬇️ (download) next to **Success** on the application as shown in Figure 13.

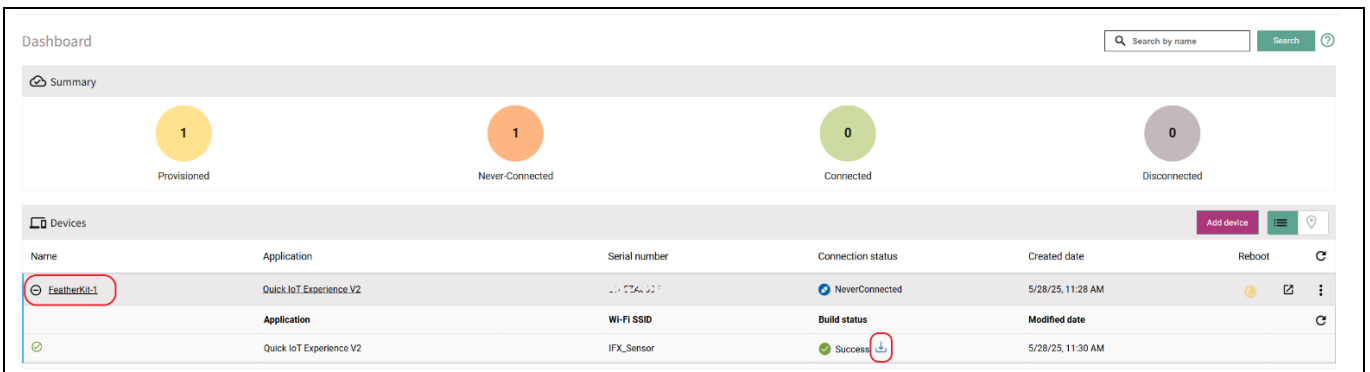


Figure 13 Device management dashboard

2 System and functional description

2.2.7 Program the KIT_CSK_PASCO2

- Use a Micro-USB cable to connect your development kit to your PC or laptop
- Extract the zip file and run the *program_kit* script

For Windows users, the script will be a *.cmd* file, while Linux and Mac users will see a *.sh* and *.command* files, respectively. If you are using Linux or Mac, ensure to run the script from a terminal with the necessary permissions. For detailed instructions, see the README.md file as shown in [Figure 14](#)

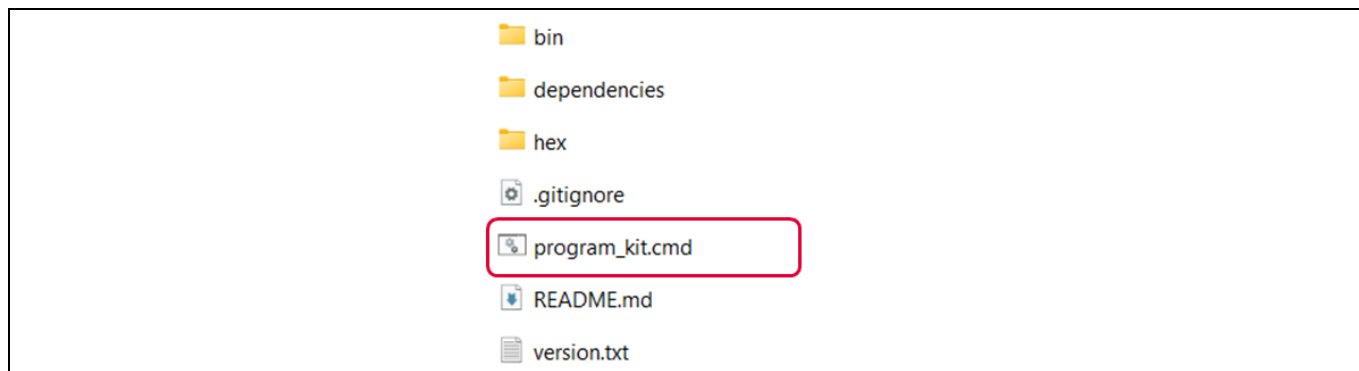


Figure 14 Package content

The successful kit programming command line logs are illustrated in [Figure 15](#).

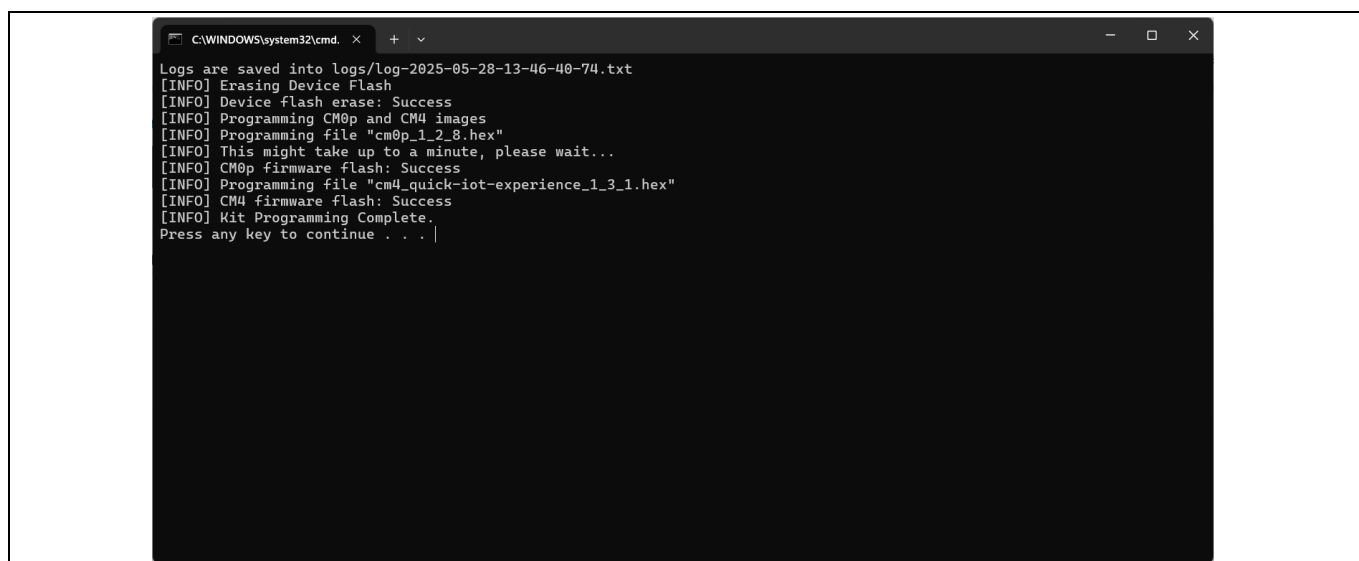



Figure 15 Kit programming complete

2 System and functional description

2.2.8 Device management

Manage your device (s) and their configurations in the device management tab. To view the details of a particular device, click on the expand icon  next to the **Created date** to view the respective device details.

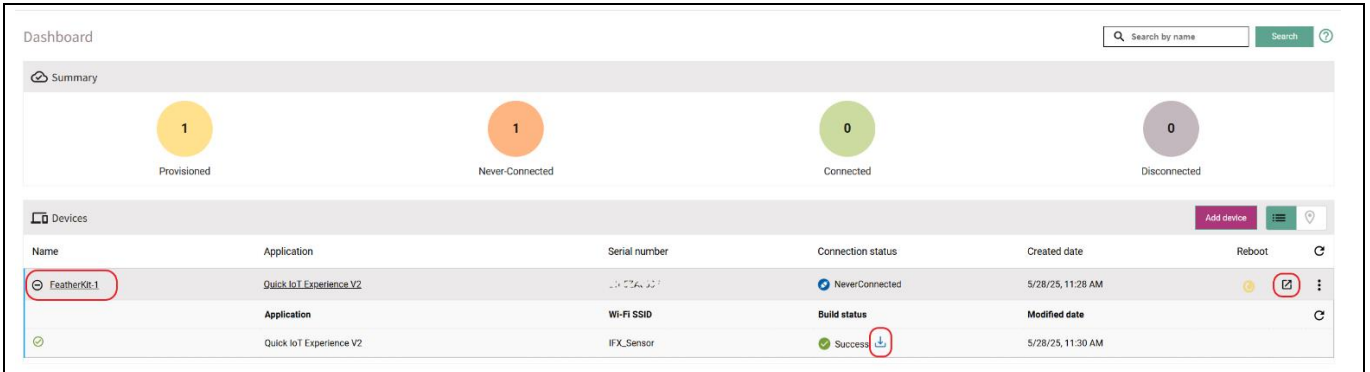


Figure 16 Device connection status

2.2.9 Select desired application

- To select the desired application for your connected Infineon sensor wing board (in this case, XENSIV™ PASCO2V01 wing), go to the **Attributes** tab in the device details
- Click on the dropdown menu for **Sensors** and select “**XENSIV PAS CO2**”
- After you select the application, the attributes will be pushed to the device, and it will reboot to the desired application

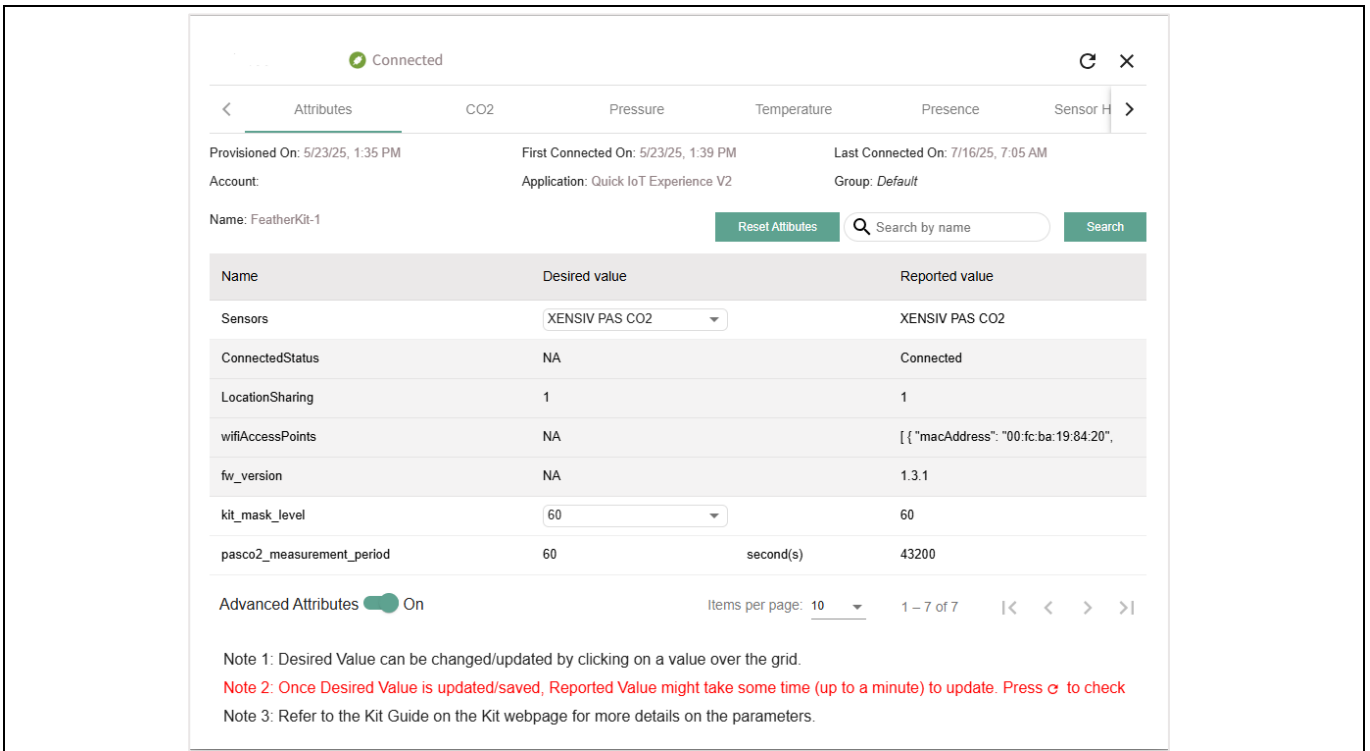


Figure 17 Attributes tab for connected device

Note: Selecting a new application can cause the connectivity to temporarily disconnect and reconnect from the Rapid IoT Connect Cloud Platform.

2 System and functional description

2.2.10 Selected application attributes

- To view all attributes on one page, click on the **Items per page** dropdown menu at the bottom of the **Attributes** tab and adjust the number of items accordingly
- For the Presence Detection use case, see the list of attributes as shown in [Table 3](#)

Table 3 CO2 measurement application attributes

Attribute	Description
kit_mask_level	Disable logs, enable minimal logs or full logs to cloud 60: WARN, MINOR, MAJOR, FATAL all to UART terminal 62: INFO, WARN, MINOR, MAJOR, FATAL all to UART terminal 124: WARN, MINOR, MAJOR, FATAL all to Cloud UI as well as UART terminal
pasco2_measurement_period	10 – 43200 PAS CO2 measurement period Default is 60 second(s)

2.2.11 View sensor data

- To view your sensor data on the cloud, click on the desired tab at the top of the device details window
- By default, your application will be set to Thermistor. Click on the **CO2** tab to view the data represented as a graph for easy viewing. You can also download the raw data in .CSV format by clicking the **Download** button in the top-right corner

Note: As a standard user, your data is retained for 14 days. After this period, the data will no longer be available for retrieval. If you require a longer data retention period, contact [Infineon Support](#) to discuss upgrading your account.

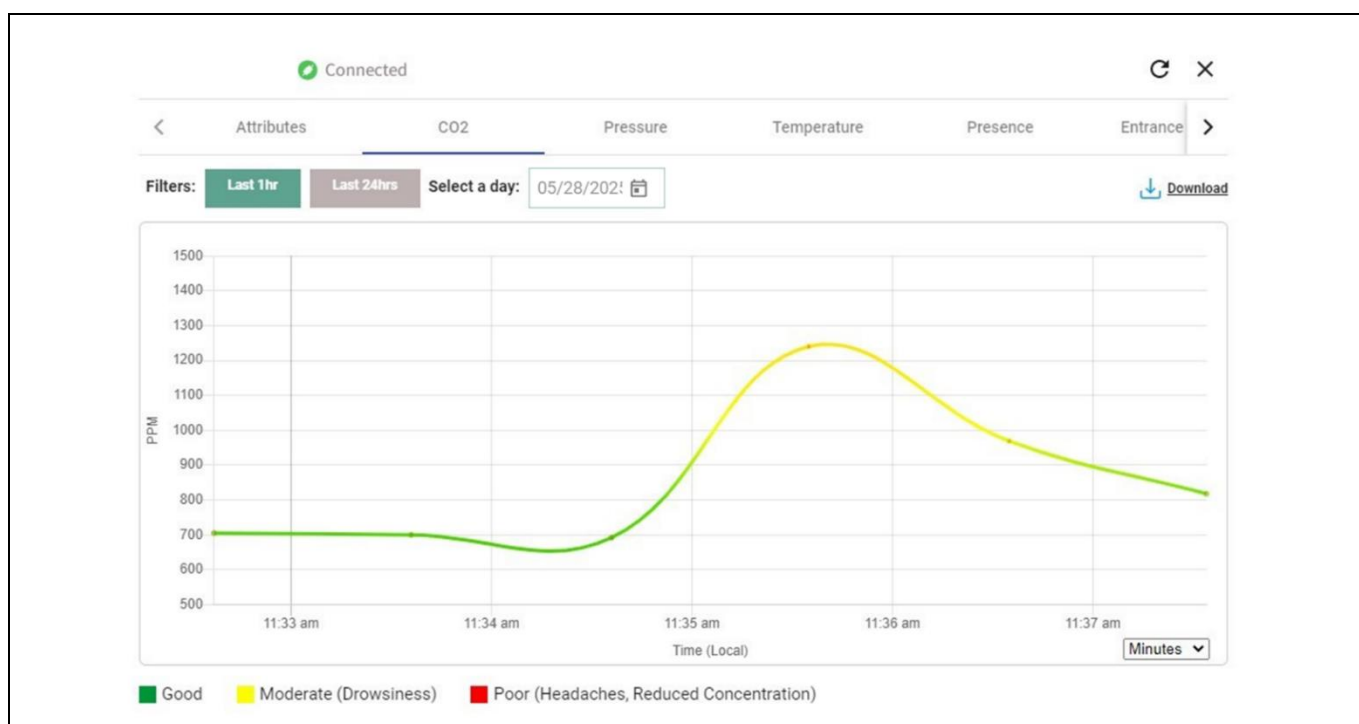


Figure 18 CO2 measurement data visualization

3 System design

3 System design

This section introduces you to the various features of the XENSIV™ PASCO2V01 Wing board. Apart from the headers, all components are mounted on the top side of the Wing board, which has male headers facing downwards to either plug the board directly on the Rapid IoT baseboard or on top of another Wing board such as the Infineon XENSIV™ PASCO2V01 Wing board.

Figure 19 and Table 4 provide a description of the components mounted on the XENSIV™ PASCO2V01 Wing board.

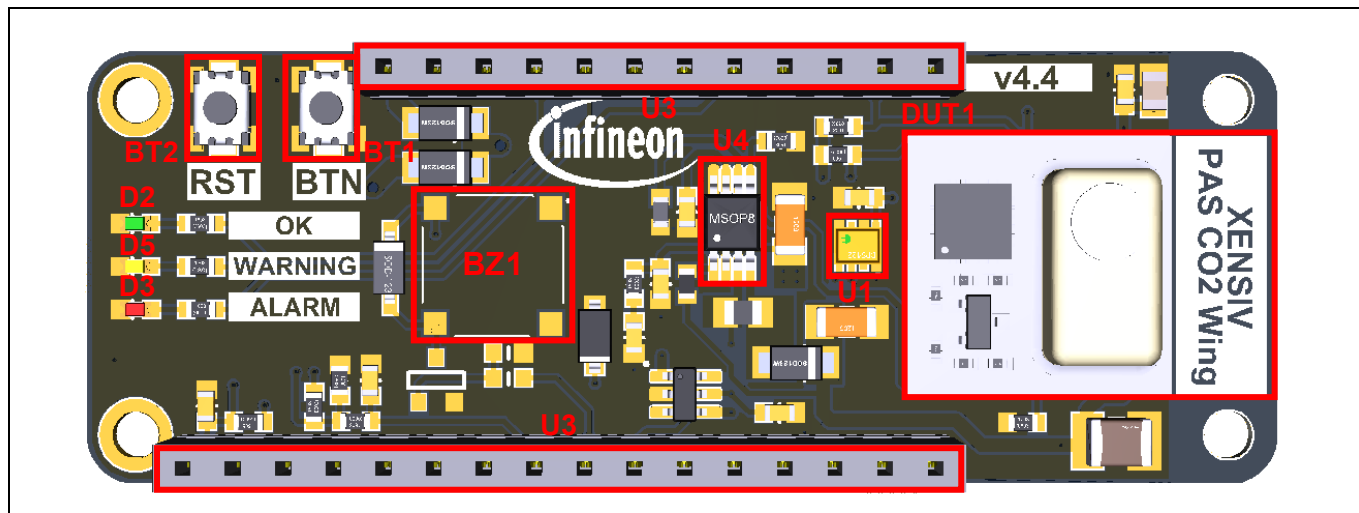


Figure 19 Front view of the XENSIV™ PASCO2V01 Wing board

Table 4 Onboard hardware

Ref designator	Function
U1	XENSIV™ DPS368 digital barometric pressure sensor
U2	2:1 (SPDT), 1-channel analog switch, programmable control of the on and off output 3 V
U3	28-pin Adafruit feather-compatible adaptor headers
U4	Boost/inverting DC-DC converter with 2 A switch, soft-start and synchronization
DUT1	XENSIV™ PASCO2V01 gas sensor
BT1	Touch button; active LOW
BT2	Touch button; active LOW, system reset function
D2	Green color LED for acceptable level of CO2 concentration
D3	Red color LED for alarm level of CO2 concentration
D5	Yellow color LED for warning level of CO2 concentration
BZ1	Option for buzzer (not populated by default)

3.1 Schematics

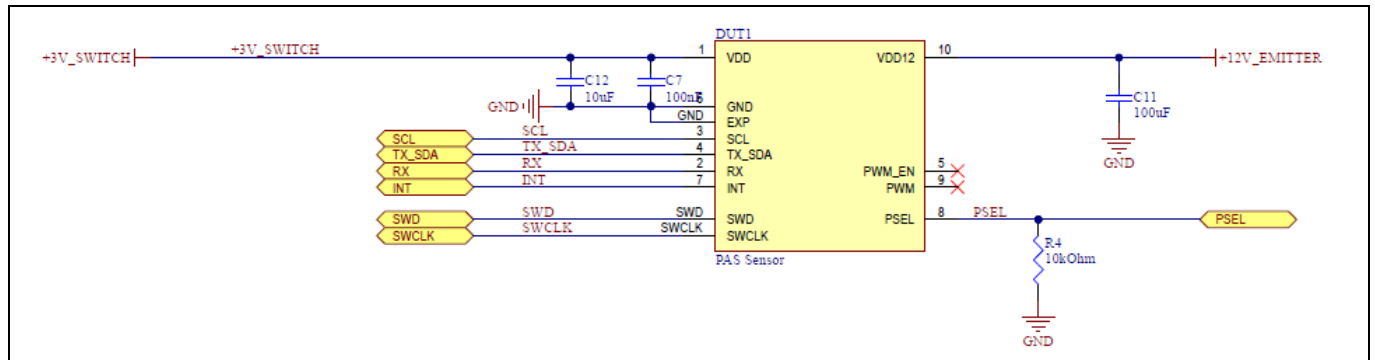


Figure 20 XENSIV™ PASCO2V01 schematic

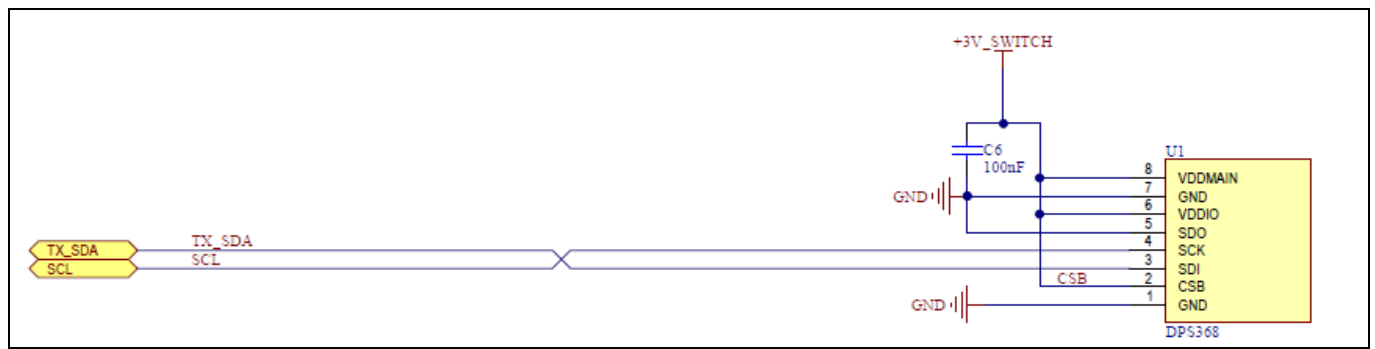


Figure 21 XENSIV™ DPS368 schematic

The user interface on the wing board consists of two mechanical buttons (Figure 22) and three LEDs (Figure 23).

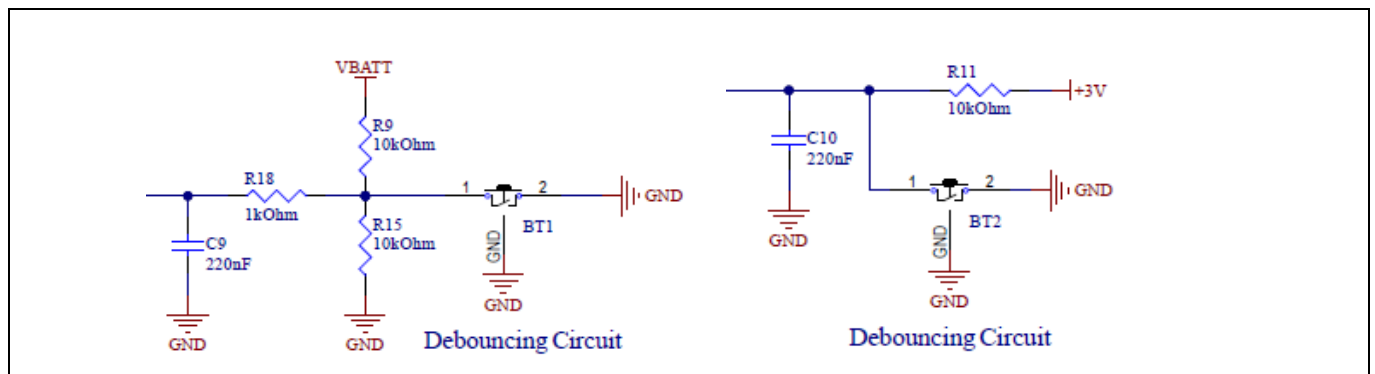


Figure 22 User (BT1) and reset button (BT2) schematic

3 System design

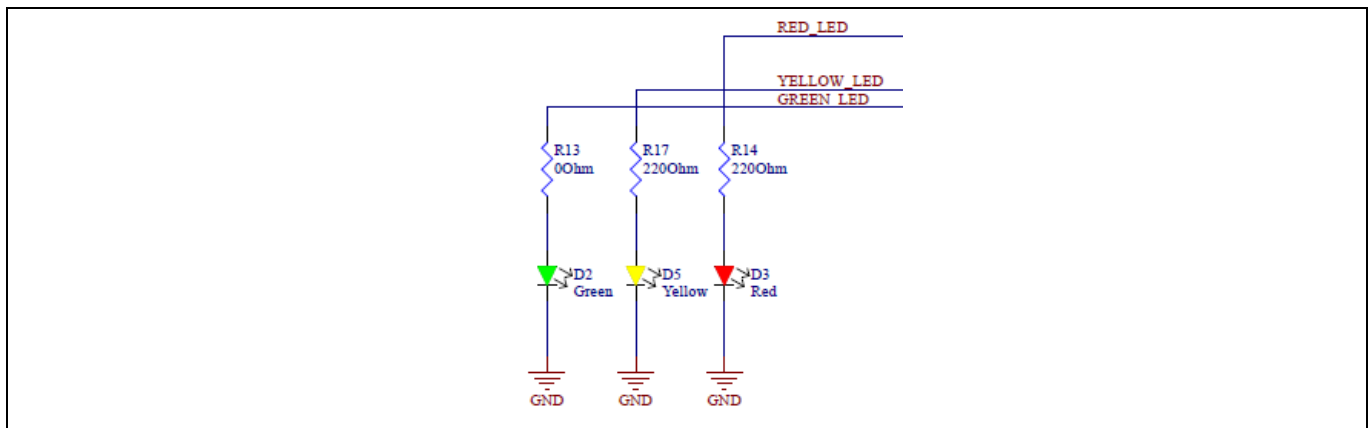


Figure 23 LEDs schematic

Figure 24 shows the 1-channel analog switch. It is a programmable control of the 3 V output status, i.e., on or off. This function is used to switch the PAS module only on, when it is supposed to execute a measurement. That way the board's power consumption is reduced.

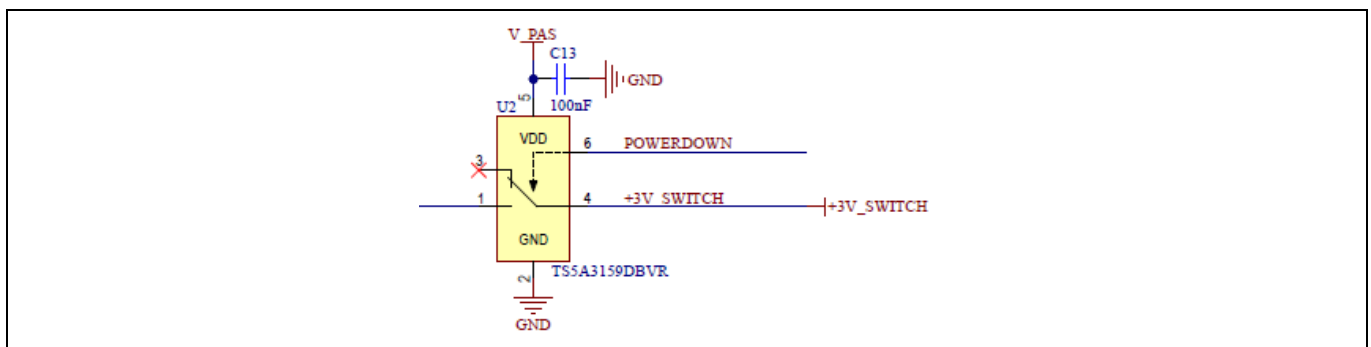


Figure 24 1-channel analog switch schematic

Figure 25 shows the voltage booster circuit. It is required to switch from 5 V to 12 V supply for the CO2 sensor module.

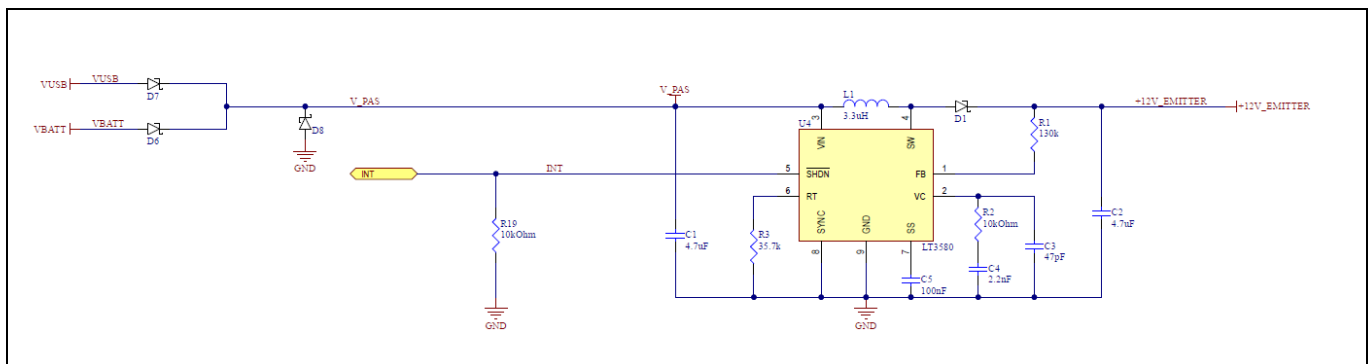


Figure 25 Boot circuit from 5 V to 12 V schematic

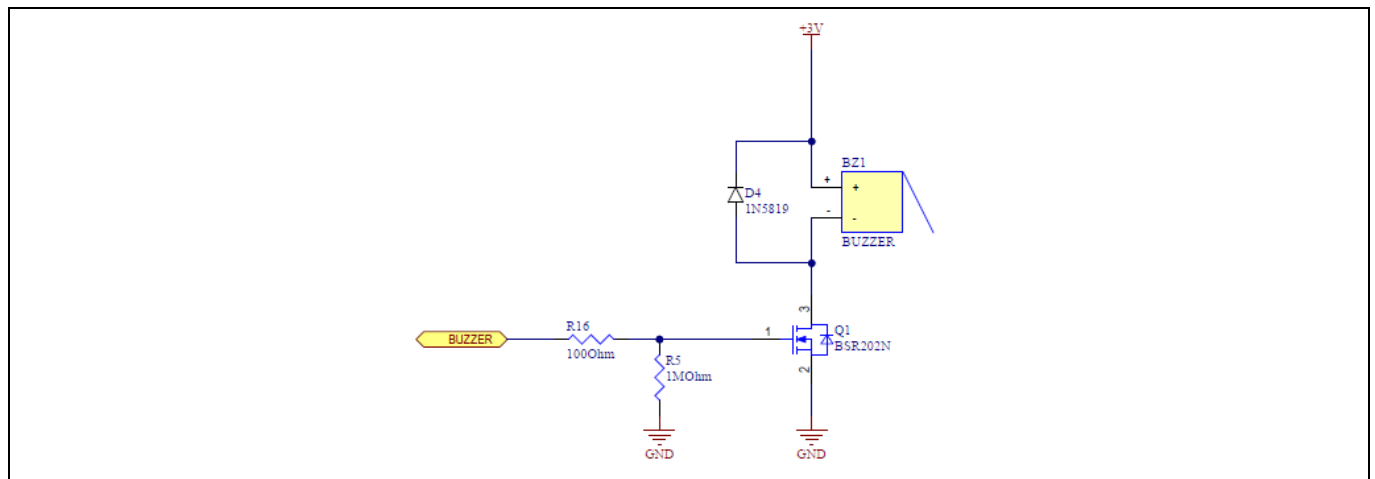


Figure 26 Optional buzzer circuit (not populated) schematic

Figure 27 shows the pin assignment of J1 and J2 on the XENSIV™ PASCO2V01 Wing board. The Adafruit feather-compatible header is used to plug into the CYCBSYSKIT-DEV-01 Rapid IoT Connect Developer Kit.

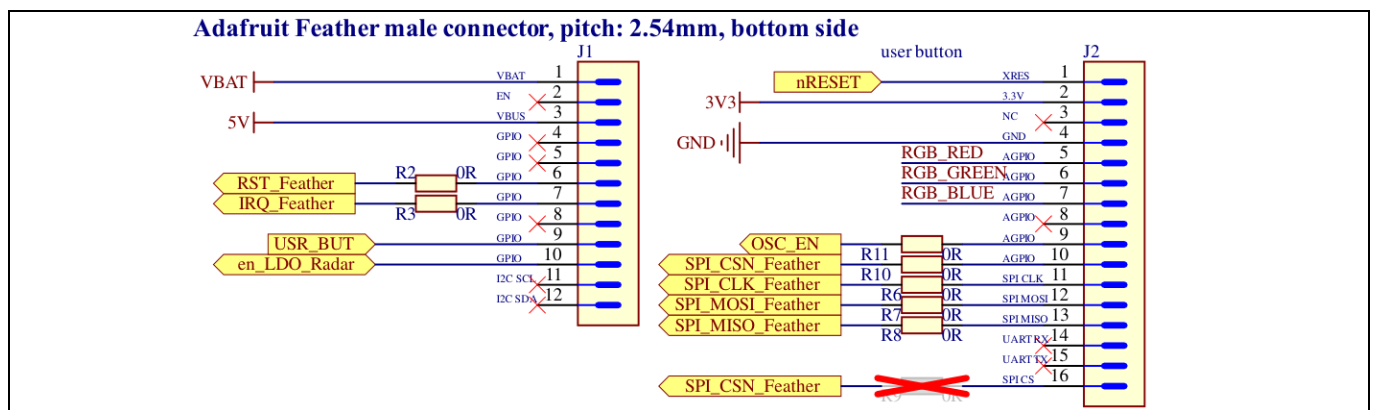


Figure 27 Adafruit headers schematic

3 System design

3.2 Layout

The size of the XENSIV™ PASCO2V01 Wing board is 43 mm (L) x 23 mm (W), as shown in Figure 28.

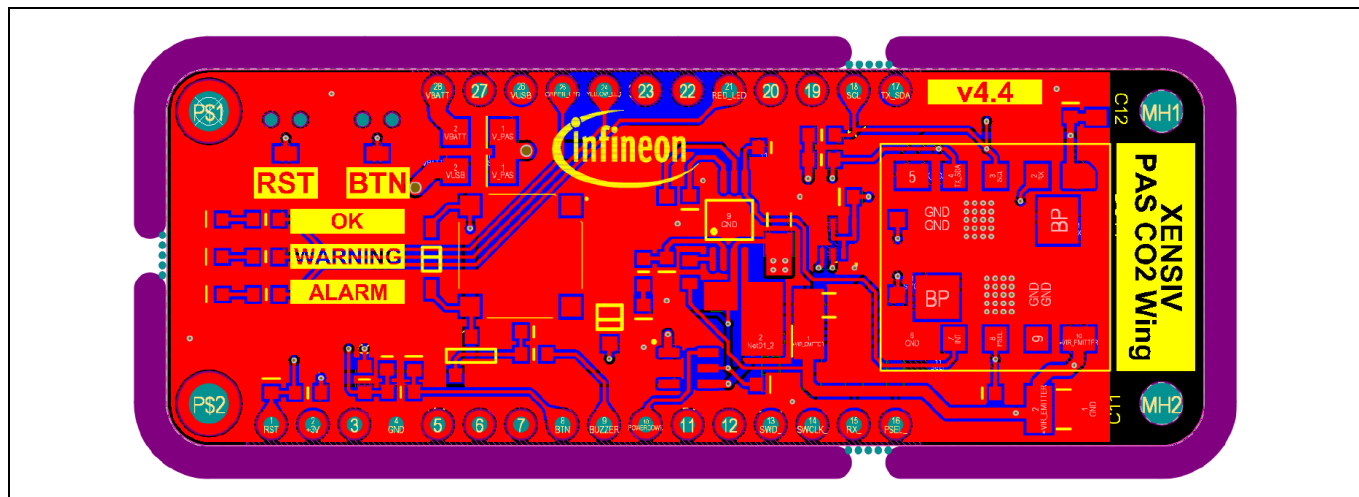


Figure 28 PCB layout of XENSIV™ PASCO2V01 Wing board

3.3 Bill of materials

Table 5 lists the bill of materials (BOM) of the XENSIV™ PASCO2V01 Wing board.

Table 5 BOM of the most important/critical parts of the evaluation

Ref designator	Description	Manufacturer	Manufacturer P/N	Qty
BT1, BT2	Touch button, 3 mm x 4 mm	ITT C&K	PTS820J20MSMTRLFS	2
BZ1	–	Mallory Sonalert	AST7525MATRQ	1
C1, C2	Capacitor 1206 4.7 μ F 25 V 10%	Multicomp	MC1206X475K250CT	2
C3	Capacitor 0603 47 pF 50 V 5%	KEMET	C0603C470J5GACTU	1
C4	Capacitor 0603 2.2 nF 10 V 5%	KEMET	C0603C222J8RACTU	1
C5, C6, C7, C13	Capacitor 0603 100 nF 25 V 5%	Kyocera AVX	06033C104JAT2A	4
C9, C10	Capacitor 0603 220 nF 25 V 10%	Murata	GRM188R71E224KA88D	2
C11	Capacitor 1210 100 μ F 16 V 20%	KEMET	C1210C107M4PACTU	1
C12	Capacitor 0805 10 μ F 25 V 10%	Kyocera AVX	08053D106KAT2A	1
D1	1 A low VF mega Schottky barrier rectifier	Nexperia	PMEG2010ER, 115	1
D2	LED 0603 green 525 nm	Kingbright	KPG-1608ZGC	1
D3	LED 0603 red	Dialight	598-8010-107F	1
D4	Diode 1N5819 SOD123	Diodes	1N5819HW-7-F	1
D5	LED 0603 yellow	Rohm	SML-D12Y8WT86	1
D6, D7	2 A low VF mega Schottky barrier rectifier	Nexperia	PMEG3020ER, 115	2
D8	STPS0520Z Schottky rectifier 20 V 500 mA single, SOD-123, 2 pins, 320 mV	STMicroelectronics	STPS0520Z	1

3 System design

Ref designator	Description	Manufacturer	Manufacturer P/N	Qty
DUT1	PAS sensor new pin update on 28082019	–	–	1
L1	Coil MLZ2012N3R3LT 3.3 μ H	TDK	MLZ2012N3R3LT	1
Q1	OptiMOS™ N-channel enhancement small signal transistor, 20 V	Infineon	BSR202NL6327HTSA1	1
R1	Resistor 0603 130 k Ω 0.1 W 1%	Panasonic	ERJ-3EKF1303V	1
R2, R4, R9, R10, R11, R12, R15, R19	Resistor 0603 10 k Ω 0.1 W 1%	Bourns	CR0603-FX-1002ELF	8
R3	Resistor 0603 35.7 k Ω 0.1 W 1%	Vishay	CRCW060335K7FKEA	1
R5	Resistor 0603 1 M Ω 0.1 W 1%	Bourns	CR0603-JW-105GLF	1
R13	Resistor 0603 0 Ω	Vishay	CRCW06030000Z0EA	1
R14, R17	Resistor 0603 220 Ω 0.1 W 1%	Panasonic	ERJ-3GEYJ221V	2
R16	Resistor 0603 100 Ω 0.1 W 1%	Bourns	CR0603-FX-1000ELF	1
R18	Resistor 0603 1 k Ω 0.125 W 1%	Multicomp	MCHP03W8F1001T5E	1
U1	Digital barometric pressure sensor for portable devices	Infineon	DPS368XTSA1	1
U2	1 Ω , 5 V, 2:1 (SPDT), 1-channel analog switch	Rochester Electronics	TS5A3159DBVR	1
U4	Boost/inverting DC-DC converter with 2 A switch, soft-start and synchronization	Analog Devices/Linear Technology	LT3580IMS8E#PBF	1

3.4 Connector details

Figure 29 highlights the 28-pin Adafruit Feather-compatible headers. The function of the respective header pins is described in Table 6. The image also shows the test points which were used for testing the boards in the lab or production.

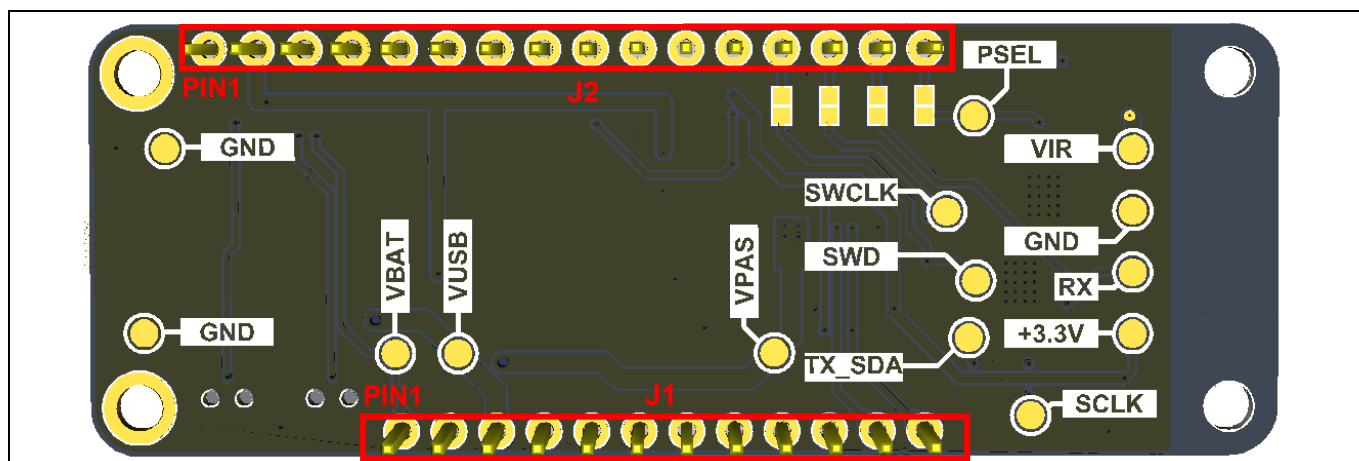


Figure 29 Adafruit headers and test points on bottom of the XENSIV™ PASCO2V01 Wing board

3 System design

Table 6 **Adafruit Feather-compatible pinout**

Header mapping	Primary onboard function	PSOC™ 6 MCU pin (Rapid IoT baseboard)	Adafruit Feather-compatible mapping (Rapid IoT baseboard)	Adafruit Feather-compatible mapping (PASCO2V01 Wing board)	Details
J1.1	VBAT	–	–	VBAT	LiPo battery voltage
J1.2	EN	–	–	–	Not connected
J1.3	VBUS	–	–	VUSB	USB power
J1.4	GPIO	P9_0	GPIO13	GREEN_LED	Green LED
J1.5	GPIO	P9_1	GPIO12	YELLOW_LED	Yellow LED
J1.6	GPIO	P9_2	GPIO11	–	Not connected
J1.7	GPIO	P9_3	GPIO10	–	Not connected
J1.8	GPIO	P9_4	GPIO9	RED_LED	Red LED
J1.9	GPIO	P9_7	GPIO6	–	Not connected
J1.10	GPIO	P8_4	GPIO5	–	Not connected
J1.11	I ² C SCL	P6_0	SCL	SCL	Connected to KitProg3. Note that this pin has a 4.7 kΩ pull-up for I ² C communication
J1.12	I ² C SDA	P6_1	SDA	TX_SDA	Connected to KitProg3. Note that this pin has a 4.7 kΩ pull-up for I ² C communication
J2.1	XRES	XRES	XRES	RST	Reset button
J2.2	3.3 V	VDDA, VDDIO	VCC	+3V	Analog voltage for PSOC™ 6 MCU
J2.3	NC	–	NC	–	Not connected
J2.4	GND	–	GND	GND	Ground
J2.5	Analog GPIO	P10_0	A0	–	Not connected
J2.6	Analog GPIO	P10_1	A1	–	Not connected
J2.7	Analog GPIO	P10_2	A2	–	Not connected
J2.8	Analog GPIO	P10_3	A3	BTN	User button/VBAT voltage monitoring
J2.9	Analog GPIO	P10_4	A4	BUZZER	PAS buzzer
J2.10	Analog GPIO	P10_5	A5	POWERDOWN	PAS board POWERDOWN
J2.11	SPI Clock	P5_2	SCK	–	Not connected

3 System design

Header mapping	Primary onboard function	PSOC™ 6 MCU pin (Rapid IoT baseboard)	Adafruit Feather-compatible mapping (Rapid IoT baseboard)	Adafruit Feather-compatible mapping (PASCO2V01 Wing board)	Details
J2.12	SPI MOSI	P5_0	MOSI	–	Not connected
J2.13	SPI MISO	P5_1	MISO	SWD	SWD
J2.14	UART RX	P6_4	RX	SWCLK	SWCLK
J2.15	UART TX	P6_5	TX	RX	RX
J2.16	SPI CS	P5_3	GPIO	PSEL	PSEL at PAS sensor

References**References**

- [1] Infineon Technologies AG. *PASCO2V01 gas sensor datasheet*; [Available online](#)
- [2] Infineon Technologies AG: *AN228571 – Getting started with PSOC™ 6 MCU on ModusToolbox™ application note*; [Available online](#)
- [3] Infineon Technologies AG: *Code examples for ModusToolbox™*; [Available online](#)

Glossary

Glossary

BSP

board support package (BSP)

CSK

connected sensor kit (CSK)

GPIO

general-purpose input/output (GPIO)

HW

hardware (HW)

I²C

inter-integrated circuit (I²C)

IoT

internet of things (IoT)

LED

light-emitting diode (LED)

PAS

photoacoustic spectroscopy (PAS)

PCB

printed circuit board (PCB)

SPI

serial peripheral interface (SPI)

UART

Universal asynchronous receiver transmitter (UART)

Revision history**Revision history**

Document revision	Date	Description of changes
1.00	2022-04-25	Initial release
1.10	2025-07-22	Removed CYSBSYSKIT-DEV-01 dedicated hardware section Updated to the latest template

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