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PCR Click

PID: MIKROE-4636

PCR Click is a compact add-on board that allows you to use a pulsed coherent radar (PCR) in your application. This board features the XM125, the Entry+ PCR module from Acconeer. The XM125 uses an Acconeer A121 pulsed coherent radar system based on a patented PCR technology with picosecond time resolution. The PCR Click provides access to the interfaces from the module so that it can easily be flashed and debugged. This Click board™ makes the perfect solution for developing high-precision people presence detection with the capability to recognize movement within configurable zones, motion detection, parking space occupancy detection, and level measurement in tanks or waste containers with configurable update frequency.

PCR Click is fully compatible with the mikroBUS™ socket and can be used on any host system supporting the mikroBUS™ standard. It comes with the mikroSDK open-source libraries, offering unparalleled flexibility for evaluation and customization. What sets this Click board™ apart is the groundbreaking ClickID feature, enabling your host system to seamlessly and automatically detect and identify this add-on board.

How does it work?

PCR Click is based on the XM125, the Entry+ PCR module from Acconeer. The A121 used in the module works on 60GHz and is optimized for ultra-low power consumption and high performance. It integrates baseband, RF front-end, and antenna. The A121 is unaffected by natural interference, such as dust, noise, color, and direct or indirect light. It can be used for distance and velocity measurements, object tracking, gesture control, monitoring, proximity, motion, and material detection. The radar can measure absolute and relative distance ranges in millimeters and up to 20m of distance.

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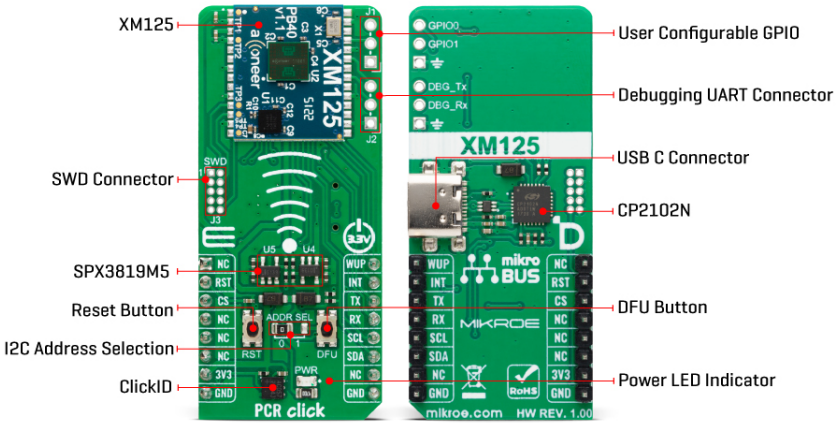

The module is delivered with a bootloader, allowing you to download the Acconeer Radar System Software (RSS) software and the SDK (Software Development Kit) for standalone usage, where customers can embed their application on top of RSS software. For this purpose, the XM125 is equipped with an STM32L 32-bit ARM Cortex-M4 MCU with an 80MHz clock speed. In addition, there are RST and DFU buttons that allow you to start the module in the embedded bootloader. The PCR Click uses a CP2102, a highly integrated USB-to-UART bridge from Silicon Labs, to allow you to connect it to the PC over the USB C connector. Besides evaluation and debugging, you can also flash the module's USB C and UART interface.

There are several headers on PCR Click. There is an SWD connector that you can use to upgrade the STM32L firmware. The J1 connector provides the GPIO0 and GPIO1 pins that are configurable for different functions. For debugging purposes, you can use a J2 connector and UART interface of the module with an external UART adapter.

PCR Click uses a standard 2-wire UART interface to communicate with the host MCU with commonly used UART RX and TX pins. In addition, there is an I2C interface too. The I2C address can be selected over the ADDR SEL jumper. Besides the RST button, you can reset the module over the RST pin with a LOW logic State. In addition to resetting, you can wake up the module over the WUP pin. If an event occurs, the module can interrupt the host MCU over the INT pin.

This Click board™ can be operated only with a 3.3V logic voltage level. The board must perform appropriate logic voltage level conversion before using MCUs with different logic levels. Also, it comes equipped with a library containing functions and an example code that can be used as a reference for further development.

Specifications

Type	Proximity
Applications	Can be used for for developing high-precision people presence detection with the capability to recognize movement within configurable zones, motion detection, parking space occupancy detection, and level measurement in tanks or waste containers with configurable update frequency

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On-board modules	XM125 - Entry+ PCR module from Acconeer
Key Features	Pulse coherent radar (PCR) with an integrated baseband, RF front-end and antenna in package (AiP), 32-bit ARM Cortex-M4 MCU, SWD/JTAG, integration of the device behind plastic or glass radomes without any need for a physical aperture, and more
Interface	I2C,UART,USB
ClickID	Yes
Compatibility	mikroBUS™
Click board size	L (57.15 x 25.4 mm)
Input Voltage	3.3V

Pinout diagram

This table shows how the pinout on PCR Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin	mikroBUS				Pin	Notes
	NC	1	AN	PWM	16	**WUP**	Module Wake Up
Reset	**RST**	2	RST	INT	15	**INT**	Interrupt
ID COMM	**CS**	3	CS	RX	14	**TX**	UART TX
	NC	4	SCK	TX	13	**RX**	UART RX
	NC	5	MISO	SCL	12	**SCL**	I2C Clock
	NC	6	MOSI	SDA	11	**SDA**	I2C Data
Power Supply	**3.3V**	7	3.3V	5V	10	NC	
Ground	**GND**	8	GND	GND	9	**GND**	Ground

Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
JP1	ADDR SEL	Left	I2C Address Selection 0/1: Left position 0, Right position 1
T1	RST	-	Reset Button
T2	DFU	-	DFU Button

PCR Click electrical specifications

Description	Min	Typ	Max	Unit
Supply Voltage	-	3.3	-	V
PCR Operating Frequency	-	-	60	GHz
Proximity Distance Range	-	-	20	m

Software Support

We provide a library for the PCR Click as well as a demo application (example), developed using MIKROE compilers. The demo can run on all the main MIKROE development boards.

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Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended), downloaded from our LibStock™ or found on Mikroe github account.

Library Description

This library contains API for PCR Click driver.

Key functions

- pcr_write_reg PCR register writing function.
- pcr_check_if_busy PCR check if device is busy function.
- pcr_get_distance PCR read distance function.

Example Description

This example demonstrates the use of PCR Click board™ by reading distance between click board and object.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended), downloaded from our LibStock™ or found on Mikroe github account.

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.PCR

Additional notes and informations

Depending on the development board you are using, you may need USB UART click, USB UART 2 Click or RS232 Click to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MIKROE compilers.

mikroSDK

This Click board™ is supported with mikroSDK - MIKROE Software Development Kit. To ensure proper operation of mikroSDK compliant Click board™ demo applications, mikroSDK should be downloaded from the LibStock and installed for the compiler you are using.

For more information about mikroSDK, visit the official page.

Resources

mikroBUS™

mikroSDK

Click board™ Catalog

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Click Boards™

ClickID

Downloads

PCR click 2D and 3D files

XM125 datasheet

CP2102N datasheet

SPX3819 datasheet

PCR click example on Libstock

PCR click schematic