

# USB-ANNA-B4

## USB for ANNA-B402 and ANNA-B412 modules

### User guide



### Abstract

This document describes how to set up the USB-ANNA-B4 evaluation kit to evaluate ANNA-B4 series standalone Bluetooth® 5.1 low energy modules. It also describes the different options for debugging and testing the development capabilities included supported by the evaluation board.

# Document information

<b>Title</b>	<b>USB-ANNA-B4</b>		
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This document applies to the following products:

<b>Product name</b>	<b>Type number</b>	<b>Firmware version</b>	<b>PCN reference</b>
USB-ANNA-B402	USB-ANNA-B402-00	N/A	-
USB-ANNA-B412	USB-ANNA-B412-00	N/A	-

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# Contents

<b>Document information .....</b>	<b>2</b>
<b>Contents .....</b>	<b>3</b>
<b>1 Product description .....</b>	<b>4</b>
1.1 Key features .....	4
1.2 USB-ANNA-B4 block diagram.....	5
1.3 Connectors.....	5
<b>2 Setting up the evaluation board .....</b>	<b>6</b>
2.1 Evaluation board setup.....	6
2.1.1 Software and power prerequisites .....	6
2.1.2 Assigning COM ports .....	6
2.2 Software and flashing.....	6
2.2.1 USB-ANNA-B412.....	6
2.2.2 USB-ANNA-B402.....	7
<b>3 Interfaces and peripherals .....</b>	<b>8</b>
3.1 Buttons and LEDs .....	8
3.2 USB to UART interface .....	8
3.3 I2C temperature sensor .....	8
<b>Appendix .....</b>	<b>9</b>
<b>A Schematic and assembly drawing .....</b>	<b>9</b>
<b>B Glossary .....</b>	<b>10</b>
<b>Related documents .....</b>	<b>11</b>
<b>Revision history .....</b>	<b>11</b>
<b>Contact.....</b>	<b>11</b>

# 1 Product description

USB-ANNA-B4 is an evaluation board with a USB form factor. Accommodated within a standard USB stick that plugs directly into the USB port on your computer, the board allows quick prototyping of a variety of extremely low-powered Internet of Things (IoT) applications. USB-ANNA-B4 supports the full Bluetooth Core specification v5.1 and IEEE 802.15.4 standard.

USB-ANNA-B4 boards are available in two variants to accommodate alternative software solutions:

- USB-ANNA-B402 – includes an Open CPU ANNA-B402 module with an internal, 2.4 GHz antenna (integrated in the SiP).
- USB-ANNA-B412 – includes an ANNA-B412 module with pre-flashed u-connectXpress software and an internal, 2.4 GHz antenna (integrated in the SiP).



Figure 1: USB-ANNA-B402/B412 evaluation board

USB-ANNA-B4 evaluation boards support the SEGGER J-Link debug interface that can be used with the Open CPU, ANNA-B402, variants of the USB stick.

The manufacturer of the nRF52833 SoC, Nordic Semiconductor, provide a free Software Development Kit (SDK) that includes a broad selection of drivers, libraries, and example applications that can be used for rapid prototyping.

USB-ANNA-B4 USB evaluation sticks include an FTDI chip that converts USB data to UART data for module communication and require download of the FTDI driver. USB sticks integrating ANNA-B412 u-connectXpress module variants are preferably controlled using s-center evaluation software [7].

USB-ANNA-B4 software and documentation is available at [www.u-blox.com/evk-search](http://www.u-blox.com/evk-search).

## 1.1 Key features

The USB-ANNA-B4 Bluetooth Low Energy has the following features and interfaces:

- Full Bluetooth 5.1 functionality
- 802.15.4 PHY
- I2C interface
  - A temperature sensor, LM75B, is available on the I2C interface.
- USB-ANNA-B412 supports u-connectXpress software for accelerated time to market
- USB-ANNA-B402 with Open CPU for embedded application development
- Full UART to USB converter with a virtual COM port for control of the extended UART features of the u-connectXpress software
- On-board J-link 6-Pins-Needle connector
- RGB LED
- Reset push button
- SW2 for Reset of UART settings or connection trigger in u-connectXpress

## 1.2 USB-ANNA-B4 block diagram

Figure 2 shows the major interfaces and internal connections supported on the USB-ANNA-B4.

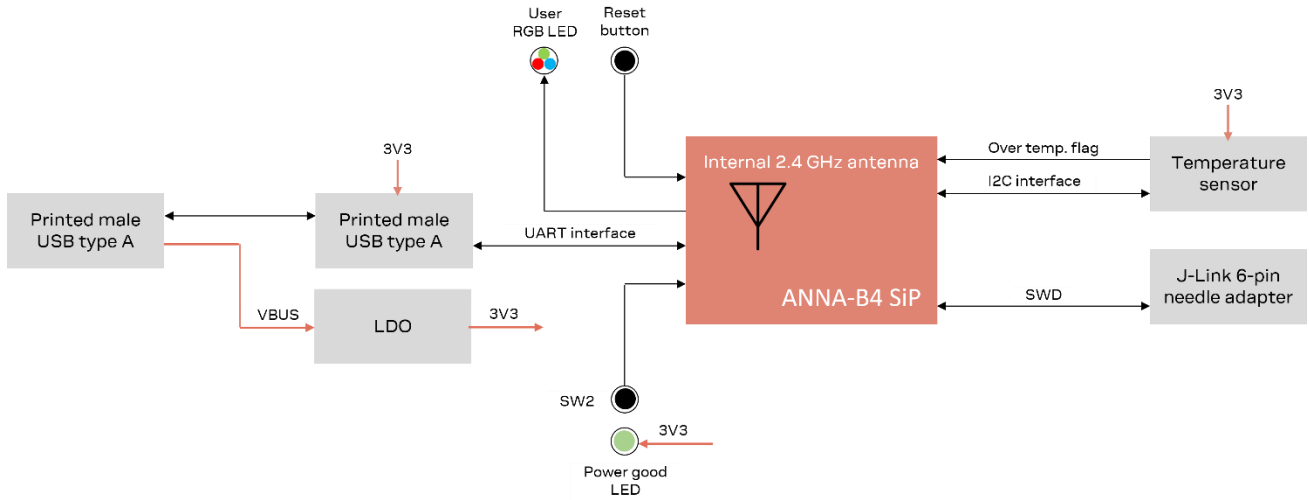


Figure 2: USB-ANNA-B4 block diagram

## 1.3 Connectors

Table 1 describes the available connectors of the USB-ANNA-B4, as shown in Figure 3.

Connector	Function	Description
J1	USB power supply	5 V USB power supply
J2	Cortex debug connector	J-link 6-Pin Needle Adapter used to connect external debuggers to the ANNA-B402 module. ANNA-B402 modules support Serial Wire debug (SWD) and Serial Wire Viewer, but not JTAG debug.

Table 1: USB-ANNA-B4 connector descriptions



Figure 3: Available connectors, pinout, and designators

## 2 Setting up the evaluation board

### 2.1 Evaluation board setup

USB-ANNA-B402 is intended for the purpose of customer software development. In addition to the SWD interface, it includes a bootloader that can be used to flash the board.

USB-ANNA-B412 is delivered with pre-installed u-connectXpress software and can only be used via the UART interface that is made available when plugging in the device.

#### 2.1.1 Software and power prerequisites

1. Before connecting the USB board, download and install the latest u-blox s-center evaluation software from the u-blox website (required for USB-ANNA-B412 only)
2. Plug in USB-ANNA-B4 to the USB host.

The operating system installs the correct drivers automatically. The drivers need only be installed once when you connect the unit to a new computer.



If the drivers are not installed automatically, download the FTDI driver FT234XD-R

#### 2.1.2 Assigning COM ports

A COM port is automatically assigned to the device by Windows:

- The COM port labelled “USB Serial Port” is used to communicate with the UART interface of the USB-ANNA-B4.

##### Windows 7

To view assigned COM ports in Windows 7:

1. Open the **Control Panel** and select **Hardware and Sound**.
2. Open the **Device Manager** in **Devices and Printers**. This opens the Device Manager window where you can view the assigned COM ports.

##### Windows 10

To view assigned COM ports in Windows 10:

1. Right click the Windows **Start** button.
2. Select **Device Manager**.

## 2.2 Software and flashing

### 2.2.1 USB-ANNA-B412

USB-ANNA-B412 includes an ANNA-B412 module running u-connectXpress software. The software is preinstalled on the module.



For the latest software go <https://www.u-blox.com>. Instructions for reflashing ANNA-B4 modules can be found in the Software section of the ANNA-B4 system integration manual [1]. The same procedure is applicable for USB-ANNA-B412 evaluation boards.

### 2.2.1.1 s-center evaluation software

s-center is convenient to use together with ANNA-B412 when running the AT commands supported in u-connectXpress. It also includes predefined functions. Install [s-center](#) evaluation software [7] and set the baud rate to 115200 with 8N1 configuration and flow control. All available AT commands are described in the u-connectXpress AT commands manual [3].

To get started with the u-connectXpress software for USB-ANNA-B412, see the user guide [5].

## 2.2.2 USB-ANNA-B402

ANNA-B402 is the Open CPU variant of ANNA-B4. You can use the legacy Nordic SDK or nRF Connect SDK for application development, but the latter is recommended for use with the USB-ANNA-B402 evaluation board.

### 2.2.2.1 nRF Connect SDK

The nRF Connect SDK allows developers to include new features, such as Bluetooth Direction Finding and Bluetooth LE Audio, into customer applications. To use USB-ANNA-B402 together with the Zephyr-based nRF Connect SDK:

- Create your own board definition
- Build the examples in the nRF Connect SDK to use this board definition

For more information about performing these tasks, see the Software section of the ANNA-B4 system integration manual [1]. Reference code for u-blox Open CPU modules is available from the u-blox short range open CPU github repository [6].

### 2.2.2.2 Nordic Semiconductor SDK

The older (not recommended for new designs) nRF5 SDK is natively a “bare-metal” kit that does not depend on a Real Time Operating System (RTOS). Notably, new features beyond Bluetooth LE 5, like Bluetooth Direction Finding and Bluetooth LE Audio, are not supported in this SDK.

To use the USB-ANNA-B402 together with the legacy Nordic Semiconductor SDK:

- Create your own board file
- Adapt the examples in the Nordic Semiconductor SDK to use this board file

For more information about these tasks, see the Software section of the ANNA-B4 system integration manual [1]. See also the u-blox short range open CPU github repository [6].

### 2.2.2.3 Software debug options

To debug using the onboard J-Link connector on USB-ANNA-B402, use an external debugger connected to the J-link 6-Pin Needle Adapter with the SEGGER J-Link software [4].

### 2.2.2.4 Flashing software

USB-ANNA-B402 can be flashed using the J-link connector or over UART using the preflashed bootloader on the ANNA-B402 module. See also the ANNA-B4 SIM [2].

# 3 Interfaces and peripherals

## 3.1 Buttons and LEDs

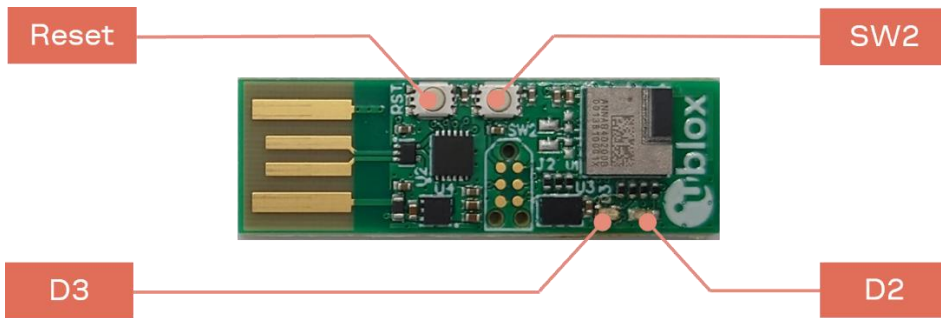


Figure 4: Position of the push buttons and LEDs on the evaluation board

Annotation	Function	Description
RST	Reset button	Connected directly to the ANNA RESET_N pin.
SW2	SWITCH_2	With u-connectXpress this button can be used to reset UART settings. <a href="#">↗</a> See also the ANNA-B412 data sheet [1].

Table 2: USB-ANNA-B4 button

Annotation	Function	Description
D2	Power Good Led	Indicates when 3V3 voltage is applied
D3	RGB LED	Connected to the ANNA RED (GPIO_31), GREEN (GPIO_32) and BLUE (GPIO_33) pins. The RGB LED shows the status for u-connectXpress. See also the u-connectXpress user guide [5] for details. <a href="#">↗</a> See also the ANNA-B412 data sheet [1].

Table 3: USB-ANNA-B4 LED indicators

## 3.2 USB to UART interface

A serial COM port is available if the USB board is connected to a PC using the USB connector J1.

## 3.3 I2C temperature sensor

USB-ANNA-B4 has an LM75B temperature sensor mounted on the PCB. This sensor measures the environmental temperature and can be addressed using the I2C address 0x48.



# Appendix

## A Schematic and assembly drawing

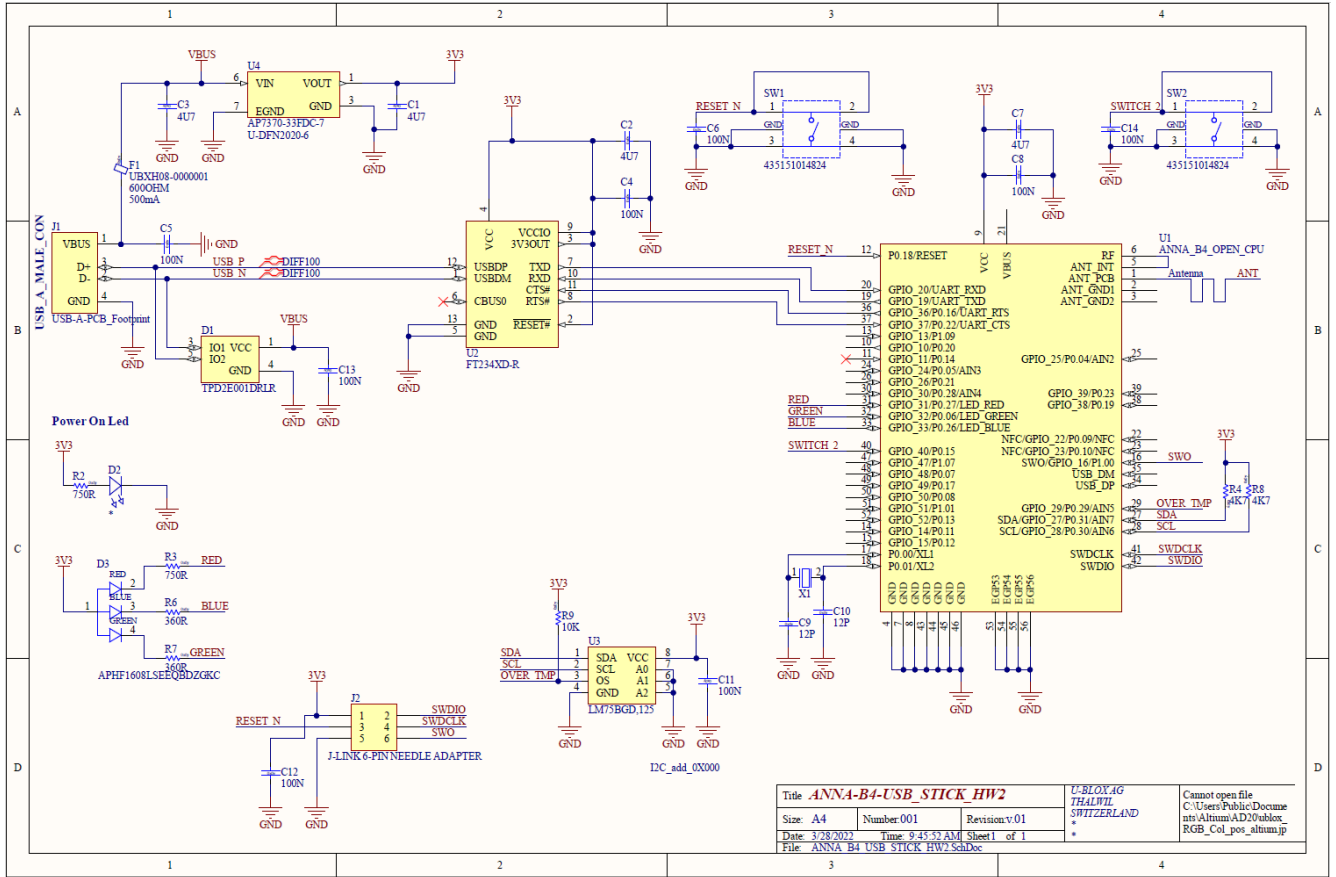


Figure 5 USB-ANNA-B4 schematic

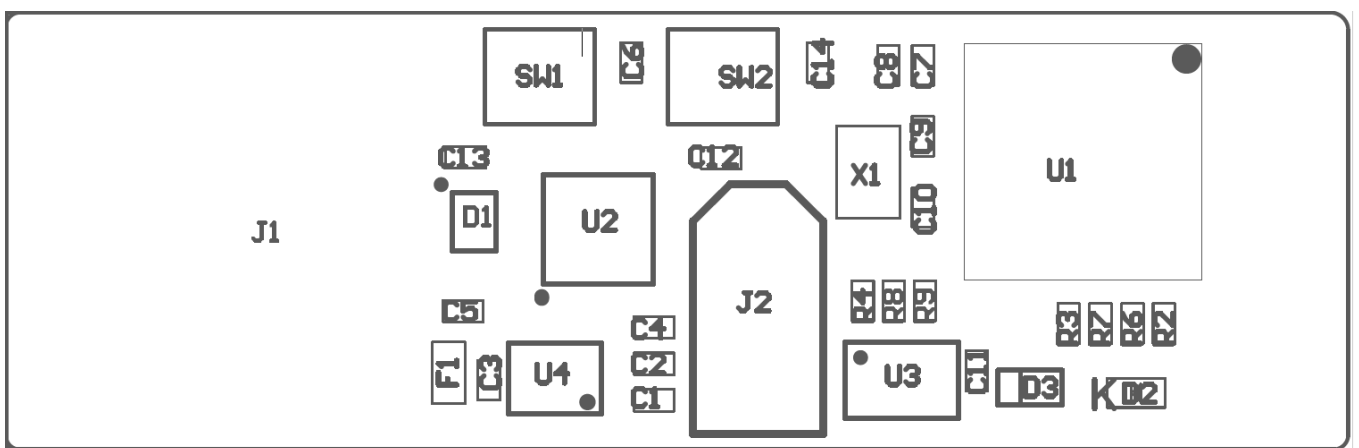


Figure 6 USB-ANNA-B4 assembly drawing – top view


## B Glossary

Abbreviation	Definition
<b>EVK</b>	Evaluation kit
<b>GND</b>	Ground
<b>GPIO</b>	General-Purpose Input/Output
<b>I2C</b>	Inter-Integrated Circuit
<b>LED</b>	Light-Emitting Diode
<b>SiP</b>	System in Package
<b>UART</b>	Universal Asynchronous Receiver/Transmitter
<b>USB</b>	Universal Serial Bus

**Table 4: Explanation of the abbreviations and terms used**

## Related documents

- [1] ANNA-B412 data sheet, [UBX-21028698](#)
- [2] ANNA-B4 series system integration manual, [UBX-21000517](#)
- [3] Short range AT commands manual, [UBX-14044127](#)
- [4] SEGGER J-Link software - <https://www.segger.com/jlink-software.html>
- [5] u-connectXpress user guide, [UBX-16024251](#)
- [6] <https://github.com/u-blox/u-blox-sho-OpenCPU>
- [7] s-center user guide, [UBX-16012261](#)

 For product change notifications and regular updates of u-blox documentation, register on our website, [www.u-blox.com](http://www.u-blox.com).

## Revision history

Revision	Date	Name	Comments
R01	26-Sep-2022	dspa, lber, mape	Initial release

## Contact

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