

# Talaria TWO EVB-A (INP3010 & INP3011)

Extreme Low Power Wireless Platform

IEEE 802.11 b/g/n, BLE

## User Guide for Talaria TWO Evaluation Board

Version 1.1

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## 3 Terms & Definitions

BLE	Bluetooth Low Energy
DMM	Digital Multimeter
DPDT	Double Pole Double Throw
FTDI	Future Technology Devices International
GPIO	General Purpose Input/Output
IO	Input Output
JTAG	Joint Test Action Group
LED	Light Emitting Diode
MPSEE	Multi-Protocol Synchronous Serial Engine
SCL	Serial Clock
SDA	Serial Data
SPI	Serial Peripheral Interface
SPDT	Single Pole Double Throw
UART	Universal Asynchronous Receiver-Transmitter
USB	Universal Serial Bus

## 4 Introduction

Welcome to INP301x Talaria TWO evaluation board user guide. This board is designed as an evaluation platform for the INP101x modules. This user guide provides an overview of the evaluation board explaining its key features and functions.

## 5 INP301x Package Contents

The package contains:

1. INP3010 or INP3011 board
2. Micro USB cable
3. Antenna (INP3011 board only)
4. Battery box

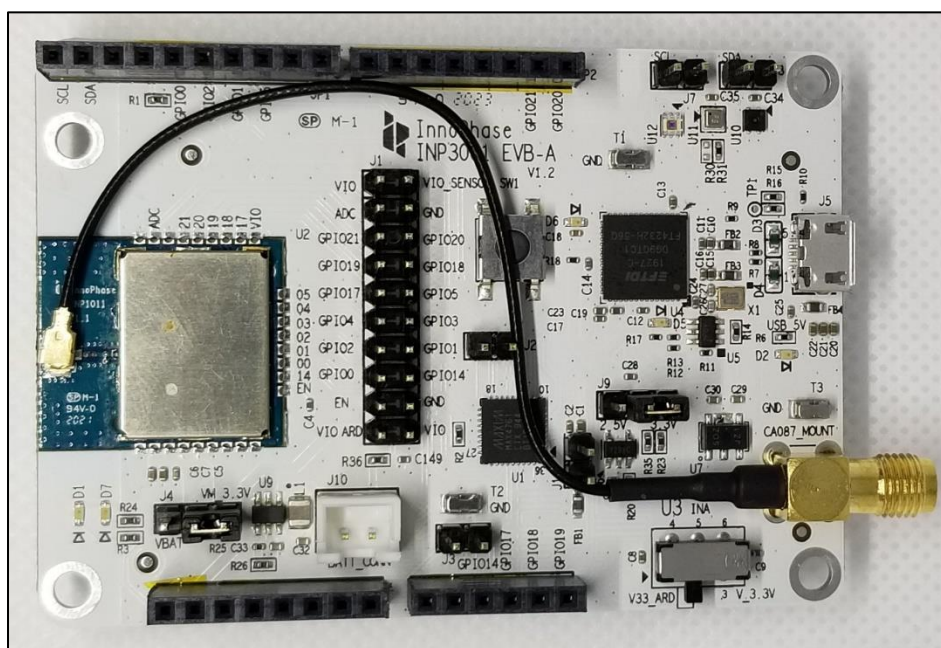


Figure 1: INP3011 EVB-A Board with INP1011 module board installed

## 6 Description of the board

### 6.1 Block Diagram

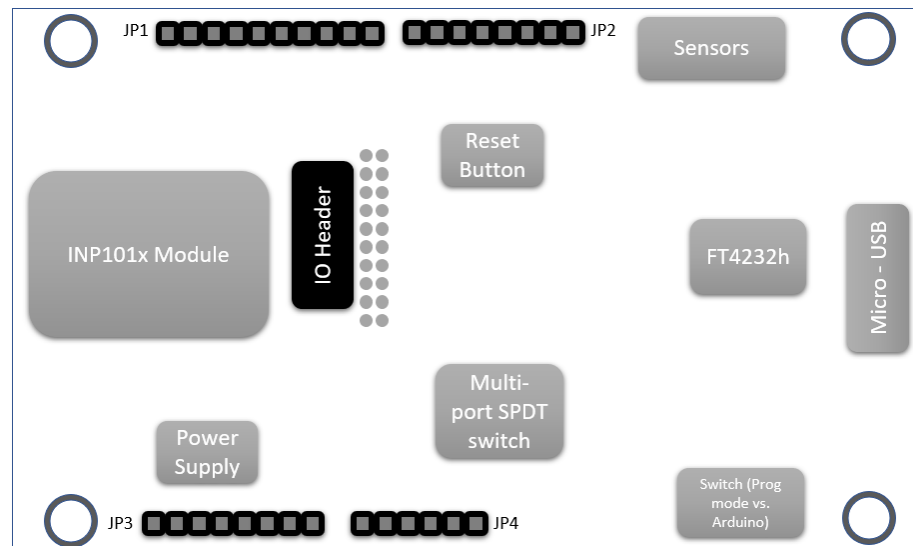


Figure 2: Block diagram of INP301x Evaluation Board

The block diagram of the INP301x Evaluation board is shown in Figure 2. The main component on the board is the INP101x module. Key features of the evaluation board are:

1. Standalone mode vs. Shield mode: Using the mode switch U3, either standalone mode or shield mode can be selected.
  - a. In standalone mode, the INP101x can be accessed via micro USB cable for programming and debugging. This mode is recommended for standalone application development.
  - b. In shield mode, the INP101x module can be interfaced with any host CPU and can provide serial to Wi-Fi capabilities.
2. A peripheral IO header (J1) is available using which all the IO's of the INP101x module can be accessed.
3. Power supply section: Based on the mode, the power for module is derived from either USB or shield header. A battery header is available which can be used as power source as well.
4. On board sensors are available to develop sensor to cloud applications.

## 6.2 Jumpers on the board

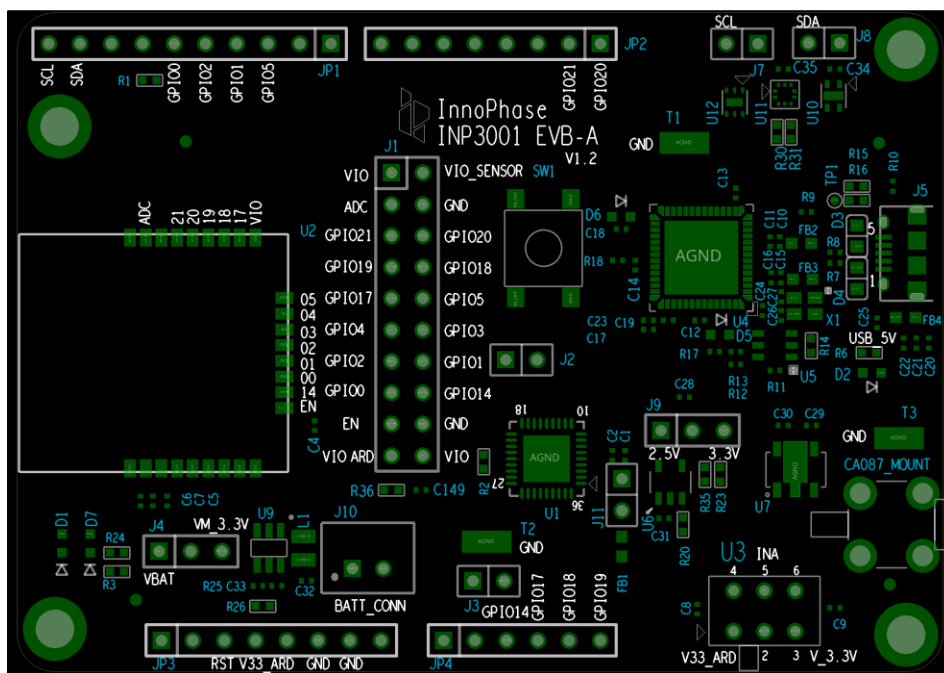


Figure 3: INP301x EVB-A control and connectivity points

Jumper	Mode and Operation
J1	IO header
J2	Used to enable Console logging in shield mode
J3	Connect LED D1 to GPIO14, for debug purposes
J4	Select power from battery connector, also used for current measurements
J7	Connect SCL to GPIO4
J8	Connect SDA to GPIO3
J9	Select IO voltage for FTDI IOs
J10	Battery terminal
JP1 to JP4	Arduino UNO shield compatible header (3.3V support only)
U3	Switch between Stand-alone mode and Arduino Shield Mode

Table 1: Jumper Information

### 6.3 Power Supply and Mode Switch

The INP301x board is designed to supply power to the INP101x module in following ways:

1. In standalone mode, power is drawn from USB connector
2. In shield mode, power is drawn from shield connector
3. A battery header is also available to provide power to the module

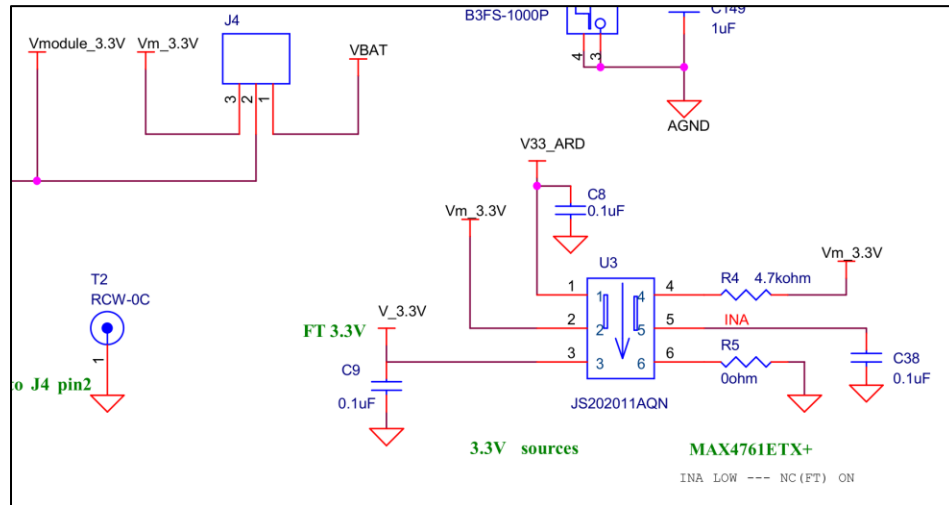


Figure 4: Power supply section

The power supply section is shown in the Figure 4. The INP101x module requires 3.3V supply. The DPDT switch (U3) selects between USB and Arduino header supply using the common net Vm\_3.3V. The jumper J4 is used to select between battery supply and Vm\_3.3V. The same jumper can be used for measuring current consumption of the module.

## 6.4 IO Header (J1)

The J1 header brings out all the IOs from INP101x module. These IOs can be used for debug, and/or any external interfacing needs. The pinout of this header is shown in Figure 5. To work with on board sensor, pins 1 & 2 needs to be shorted.

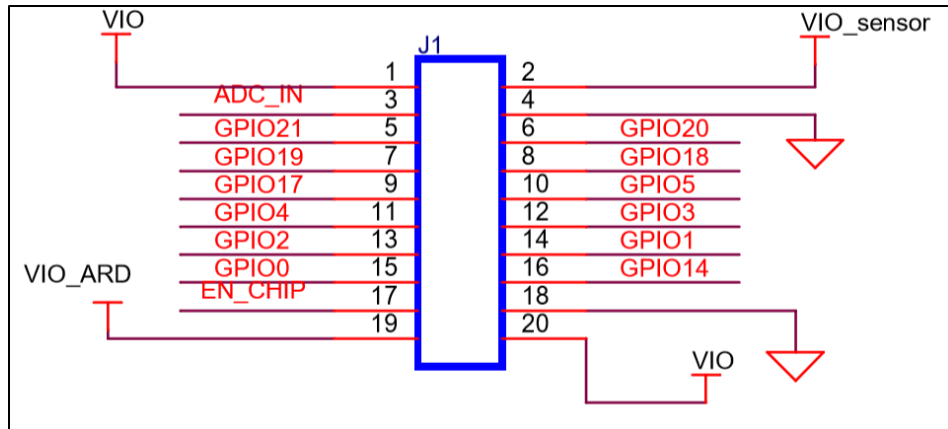


Figure 5: IO Header

## 6.5 Shield Headers (JP1 to JP4)

Arduino UNO compatible headers are available in the INP301x board to interface with any compatible host micro-controller.

The GPIOs assigned to shield headers are carefully chosen to achieve following capability:

1. INP101x's SPI slave pins available on JP1
2. INP101x's I2C master pins available on JP1
3. Remaining GPIOs are available on JP2 and JP4

Note that INP301x supports 2.5V IO as the default configuration. The shield header connections are shown in Figure 6.

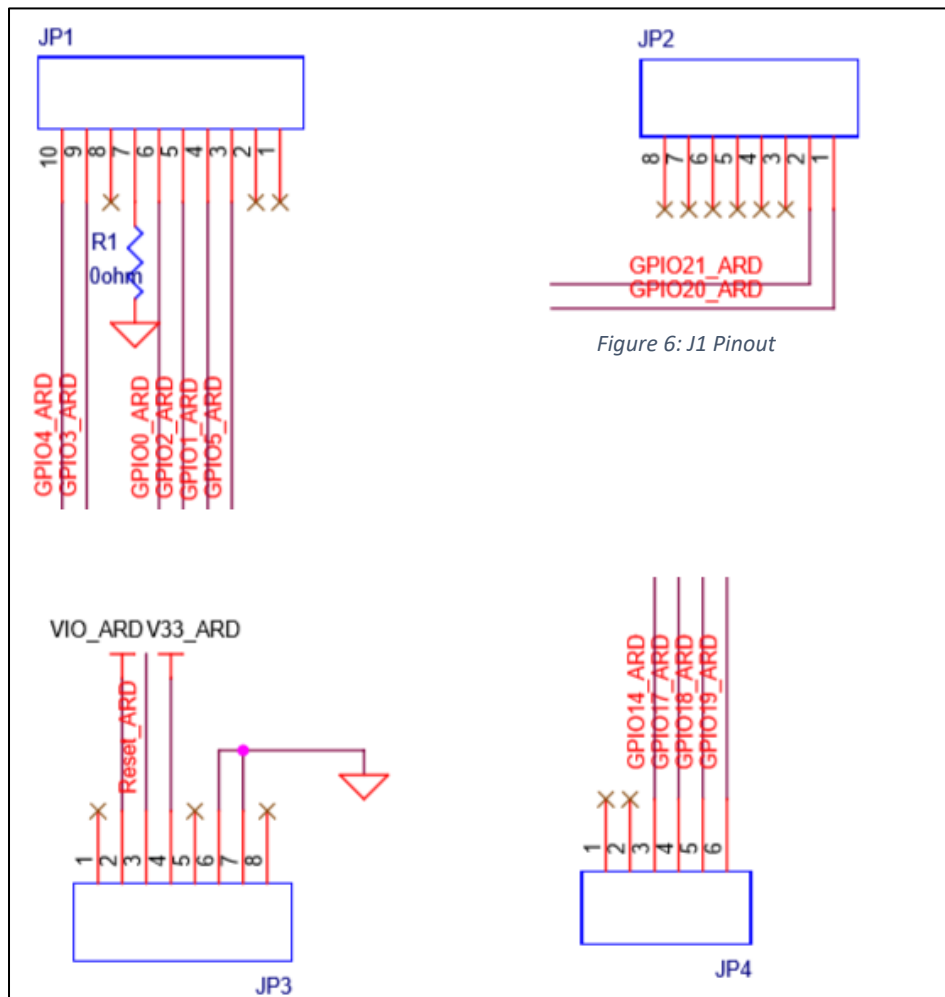


Figure 7: Arduino UNO shield compatible jumpers

## 6.6 On Board Sensors

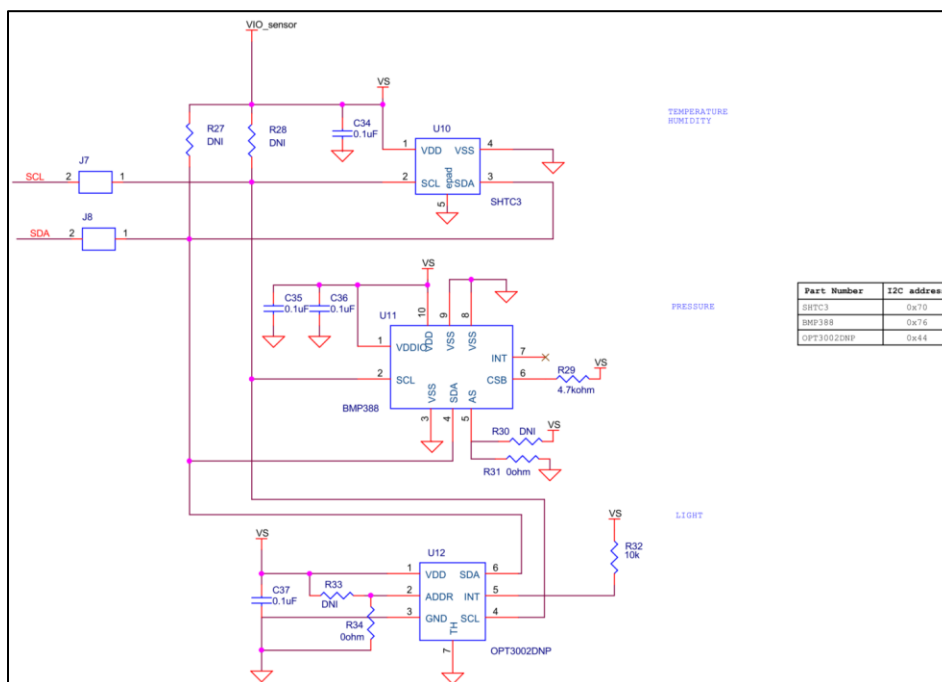


Figure 8: On board sensors

The INP301x board has following sensors available on board for quick prototyping/testing:

1. Temperature/Humidity (Sensirion SHTC3)
2. Pressure (Bosch BMP388)
3. Light (TI OPT3002)

To use the sensors, J7, J8, pins 1 & 2 of J1 should be connected. This enables power connection to the sensors on board, I2C connection on GPIOs 3 & 4.

## 7 Functional Description

Following are the functional modes that can be achieved in the INP301x board:

1. Stand-alone mode
2. Shield mode

More details about each mode is available in subsequent sections. Switching between the modes is handled by DPDT switch U3 for power, and multi-port SPDT switch U1 for the GPIOs.

### 7.1 Stand-alone mode

The stand-alone mode is intended for following use cases:

1. Host-less application development on INP101x modules
2. Programming access to INP101x modules

In stand-alone mode, the U3 switch is pushed towards pin 3, which disconnects power and IO from shield headers and connects them to FTDI. The FTDI port layout is shown in

FTDI Bus	Interface to Talaria TWO
<b>A</b>	JTAG
<b>B</b>	RESET
<b>C</b>	UART
<b>D</b>	CONSOLE (UART)

Table 2: FTDI Layout

The A & B bus of FTDI device supports MPSEE protocol, hence JTAG is assigned to A-bus. The BDBUS7 is connected EN\_CHIP of the INP101x module. The C & D bus of FTDI device used as UARTs, with C-bus connected to peripheral UART of INP101x module and D-bus connected is CONSOLE port (GPIO17) of INP101x module.

The JTAG on A-bus is used for debugging applications on the INP101x module. The UART on C-bus is used for programming the INP101x module. The CONSOLE port is a unidirectional UART from INP101x module that operates at high baud rate of 2457600, used for debug prints.

### 7.1.1 Driver Installation for Windows OS

On Windows OS, `libusbK` driver needs to be installed to communicate and control the Talaria TWO module via the FTDI device on the evaluation board. The tools/applications provided by InnoPhase will use this driver. Install/uninstall instructions for this driver is given subsequent sections.

#### 7.1.1.1 Installation instructions for libusbK driver

Download the free software Zadig, available here: - <https://zadig.akeo.ie/>. Connect your Windows PC or Laptop to the evaluation board using the provided USB cable. Now, open Zadig and click on Options. Select List All Devices and deselect Ignore Hubs or Composite Parents as shown in Figure 9.

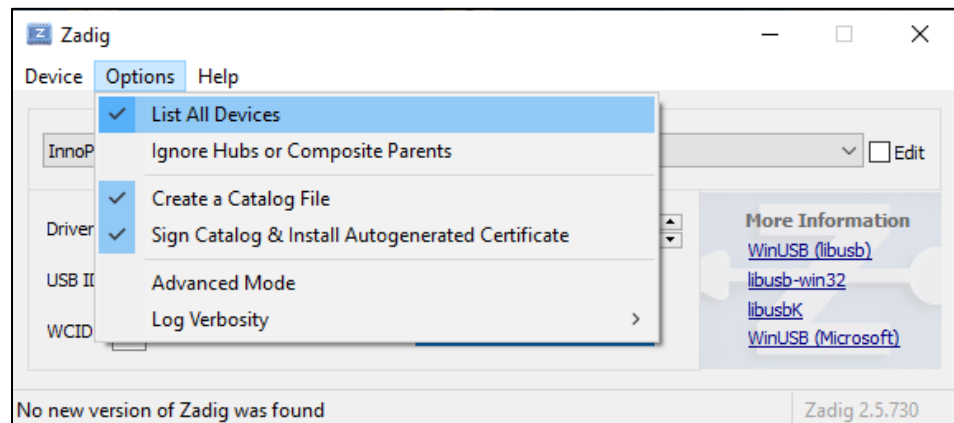


Figure 9: Listing devices in Zadig

To establish communication with Talaria TWO module via the FTDI device on the InnoPhase Evaluation Board, the Talaria TWO USB driver must be `libusbK`. In case the current driver is not `libusbK`, use the drop-down menu to select `libusbK` and click on `Reinstall Driver` which will update the drivers to `libusbK`.

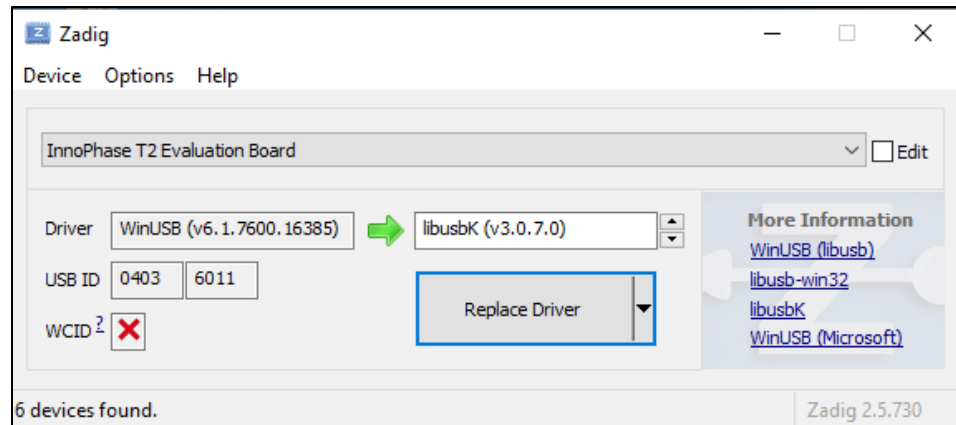


Figure 10: Updating Talaria TWO USB driver to `libusbK`

### 7.1.1.2 Uninstall instructions for libusbK driver

To uninstall libusbK and retrieve COM ports, follow the following steps:

1. Expand the libusbK USB Devices and right click on the InnoPhase T2 Evaluation Board. Click on Update Devices as shown in Figure 11.

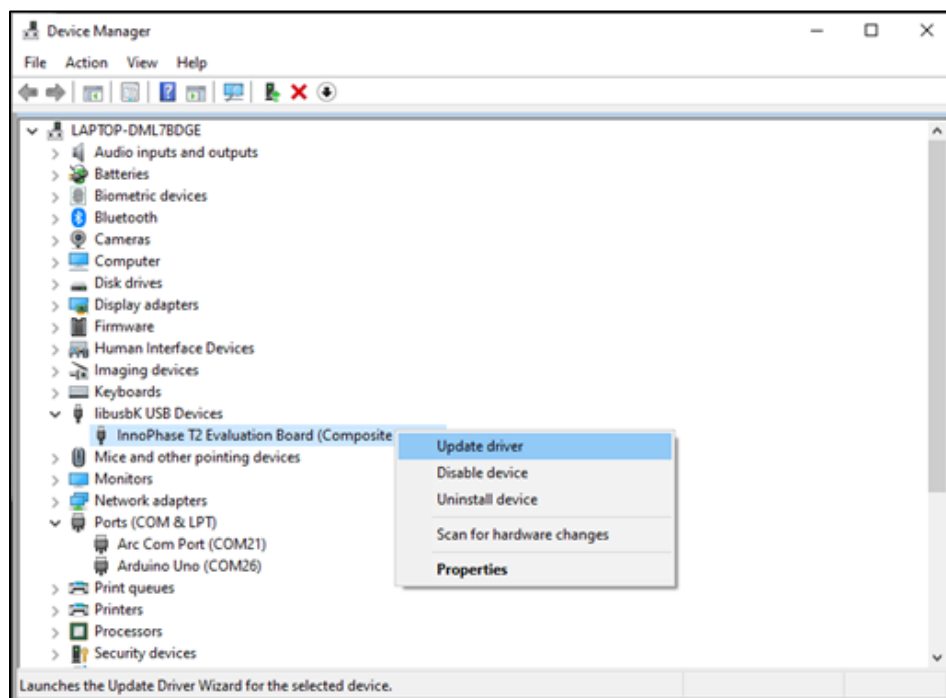


Figure 11: Device Manager

2. On the new window, click on Let me pick from a list of available drivers on my computer option and click on Next.

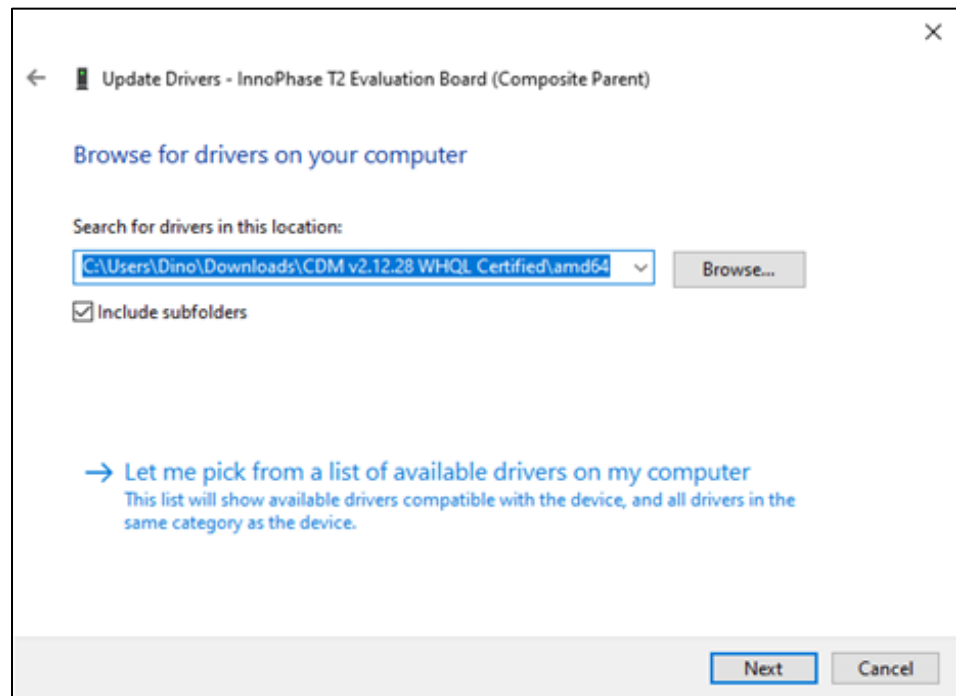


Figure 12: Update Devices

3. Select USB Composite Device Driver and install the same for reinstalling COM ports.

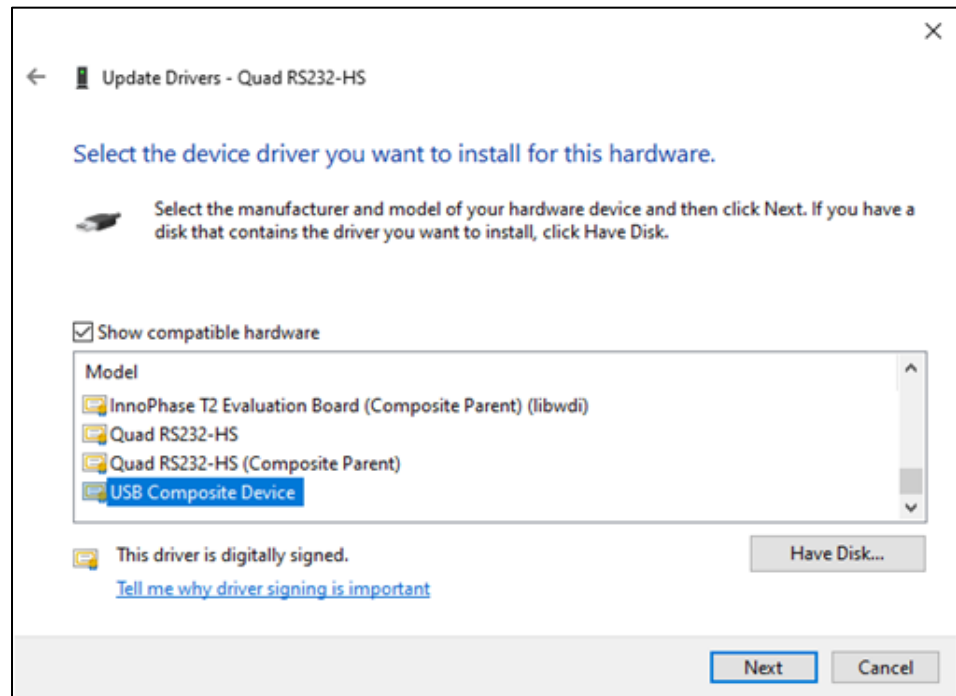


Figure 13: Select the device driver

## 7.2 Shield Mode

This mode will make the EVB-A board to act as a Wi-Fi shield. To enable this mode, flip the switch U3 towards V33\_ARD. This also pulls up the INA pin of the multi-port SPDT device MAX4761ETX, which then routes the GPIOs from the INP101x module to the shield headers JP1, JP2, JP3 and JP4. In the shield mode a suitable firmware (such as Serial to Wi-Fi application available in the SDK) should be pre-flashed in the INP101x.

### 7.2.1 EVB-A as Wi-Fi Shield with STM32 Nucleo Board

A comprehensive set of host application packages are available to download via ST or InnoPhase websites to demonstrate the use of EVB-A as a Wi-Fi/BLE shield board.

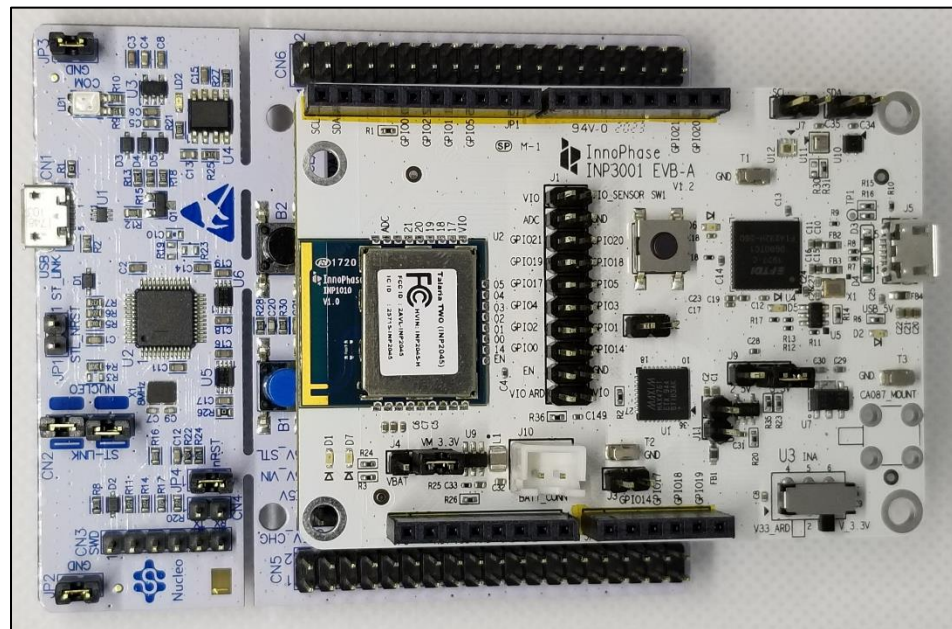


Figure 14: INP3010 EVB-A as Wi-Fi Shield

## 8 Power Measurement

The power consumption of the INP101x module is measured by either connecting a DMM on the jumper J4 or supplying power directly on J4 using specialty power supplies like Otti Arc from Qitech. **Error! Reference source not found.** shows the connection setup to measure current consumption using Otti Arc.



Figure 15: Current measurement setup using Otti Arc

## 9 Using Battery as Power Source

Header J4 will switch between VBat and Vm\_3.3V. **Error! Reference source not found.** shows VBat connection.

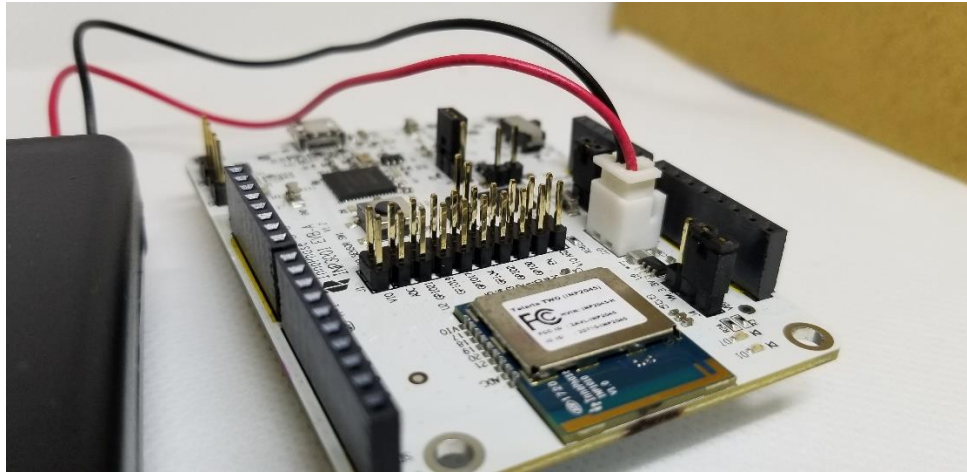


Figure 16: J4 Header

## 10 Antenna

Talaria TWO module has a proprietary integrated/printed antenna. It is a Double-sided Inverted F (IFA) antenna and has been implemented as printed PCB elements.

By design and verification, Antenna does not require any additional matching component if the module is used as standalone product.

Talaria TWO module's antenna has omnidirectional radiating pattern and following performance specifications:

Max (Peak) Antenna Gain	0.98 dBi
Average Antenna Efficiency	-5.0 dB (31.4%)

## 11 Power Supply

Talaria TWO INP1010 module is designed to use external power supply. It utilizes internal power management circuit including 2 high efficiency buck converters.

External power can be delivered from battery or a power supply connected to pins 2, 3 and AGND. Voltage from power source should be between 2.7V to 4.0V.

## 12 Talaria TWO Module Integration in End Products

INP1010 Module is provided to customers with a reference interface board (SDK board) as an example of how the module can be integrated with an end product.

For specific questions and support need to integrate Talaria TWO into customer platforms, customers are advised to contact InnoPhase Inc. We provide comprehensive support for HW and SW source documentation, design reviews, and verification.

Our corporate web site ([www.innophaseinc.com](http://www.innophaseinc.com)) provided links to product briefs, applications, knowledge base and client portal for personalized support to InnoPhase customers.

Customers can send also contact InnoPhase by mail for general queries ([sales@innophaseinc.com](mailto:sales@innophaseinc.com)).

## 13 FCC/ISED Regulatory Notices

### 13.1 Modification Statement

Changes or modifications made to this equipment not expressly approved by InnoPhase Inc. may void the FCC authorization to operate this equipment.

### 13.2 Interference Statement

This device complies with Part 15 of the FCC Rules and with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement

### 13.3 Radio Frequency Radiation Exposure Statement

This device complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment.

The device should be installed and operated with minimum distance of 20 CM between the device/antenna and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter without further RF Exposure evaluation.

## 13.4 RF Exposure Statement for Module Integration

This module has been granted modular approval for mobile applications. Host products integrators may use the module in their final products without additional FCC certification if they meet the following conditions. Otherwise, additional FCC approvals must be obtained.

1. The host product with the module installed must be evaluated for simultaneous transmission requirements
2. The user manual for the host product must clearly indicate the operating requirements and conditions that must be observed to ensure compliance with current FCC IC RF exposure guidelines.

### 13.5 Labeling Requirements for the Host Device

The host device shall be properly labelled to identify the module within the host device. The certification label of the module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the FCC ID and IC of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

1. Contains FCC ID: 2AVAL-INP2045
2. Contains IC: 25715-INP2045

L'équipement hôte doit être correctement étiqueté pour identifier les modules dans l'équipement. L'étiquette de certification du module doit être clairement visible en tout temps lorsqu'il est installé dans l'hôte, l'équipement hôte doit être étiqueté pour afficher le FCC ID et IC du module, précédé des mots "Contient le module émetteur", ou le mot "Contient", ou un libellé similaire exprimant la même signification, comme suit:

1. Contient FCC ID: 2AVAL-INP2045
2. Contient IC: 25715-INP2045

**Talaria TWO™**

**INP1010-A1**



**HVIN: INP1010**

**YYWW**

**FCC ID: 2AVAL-INP2045**

**IC: 25715-INP2045**

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  - b. Also Visit: <https://innophaseinc.com/talaria-two-modules>
  - c. Contact: [support@innophaseinc.com](mailto:support@innophaseinc.com)

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