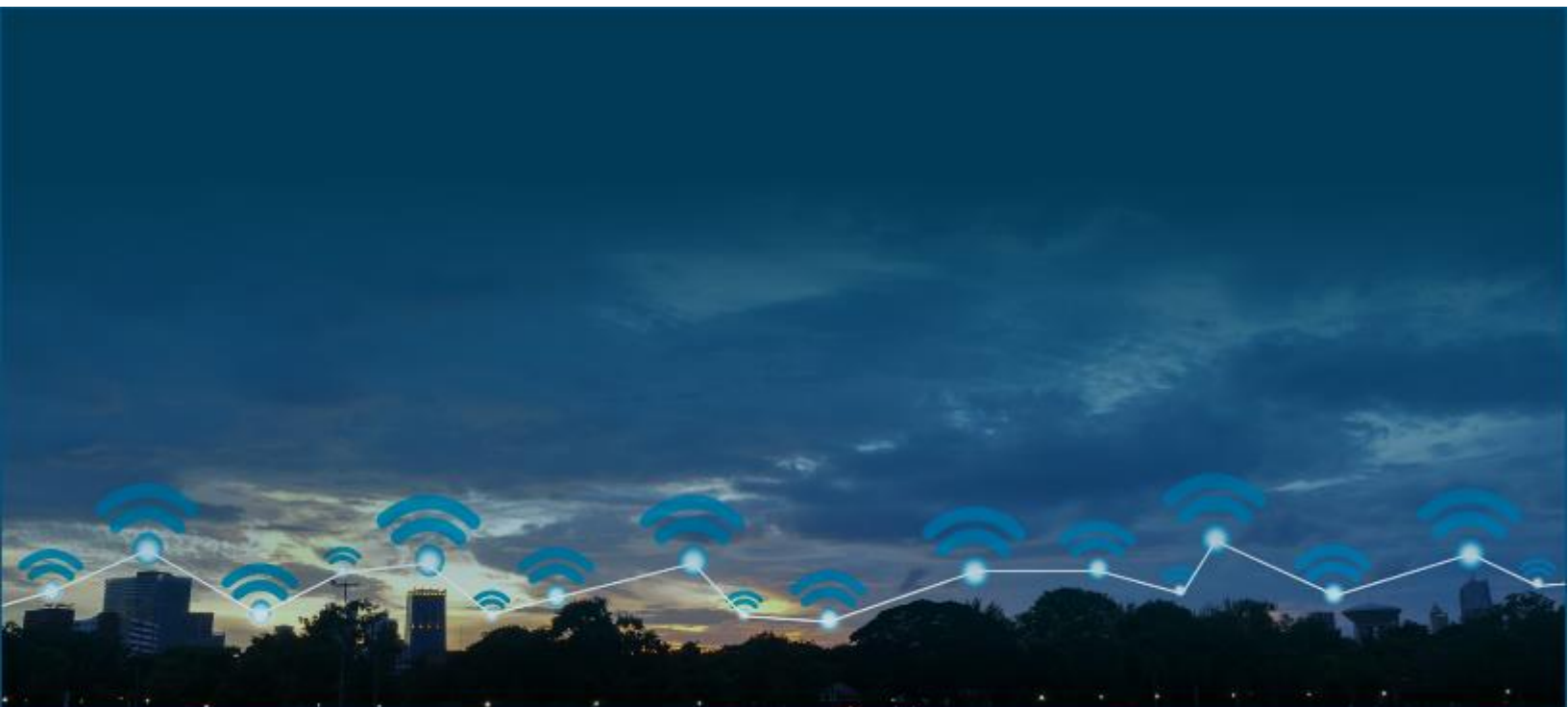


**Talaria TWO (INP2045)  
IEEE 802.11 b/g/n, BLE**

**Hardware User Guide  
Version 0.4  
1/5/2020**



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## 1. Introduction

Welcome to Talaria TWO Hardware user guide. This guide provides quick steps to get started with the provided Talaria TWO Module and SDK boards and allow basic Wi-Fi/BLE operations using the built-in Serial-to-Wi-Fi application.

### 1.1 Package Contents

The package contains following items:

1. Talaria TWO INP2045 Module board mounted on SDK board
2. Micro USB cable

### 1.2 Pre-requisites

Following are pre-requisites for the quick start:

1. A Windows or Linux PC with one USB port to connect to Talaria TWO SDK board. A Linux PC is generally recommended over Windows.
2. A COM port console application such as PuTTY.
3. Python (3.6+) software installed.
4. Openocd (latest) & ZADIG software tools installed.

### 1.3 ESD Precaution



This electronic device can be damaged by ESD. Innophase Inc., recommends that all bare PCB and integrated circuits be handled with appropriate precautions. Failure to observe proper handling procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

## 2. Talaria TWO Description and Operation

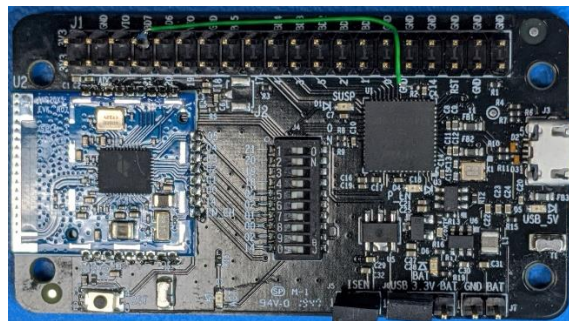
Talaria TWO module is designed for low power IOT devices that need Wi-Fi and BLE connectivity. The SDK board is a HW interface board developed for evaluation, SW development, and verification of Talaria module product.

The Talaria TWO module (INP2045) is shown in Figure.4-1. It is a very small form factor PCB at 19mm x 20mm, designed to be soldered down as a module on end product interface boards.

As shown in Figure 4-2, it is installed on a larger interface board (30mm x 65mm), known as the SDK board. This assembly is designed to match the standard Raspberry Pi Zero form factor, including its 40 pin interface connector.



*Figure 2-1 INP2045 Module*



*Figure 2-2 SDK Board with INP2045 module board installed*

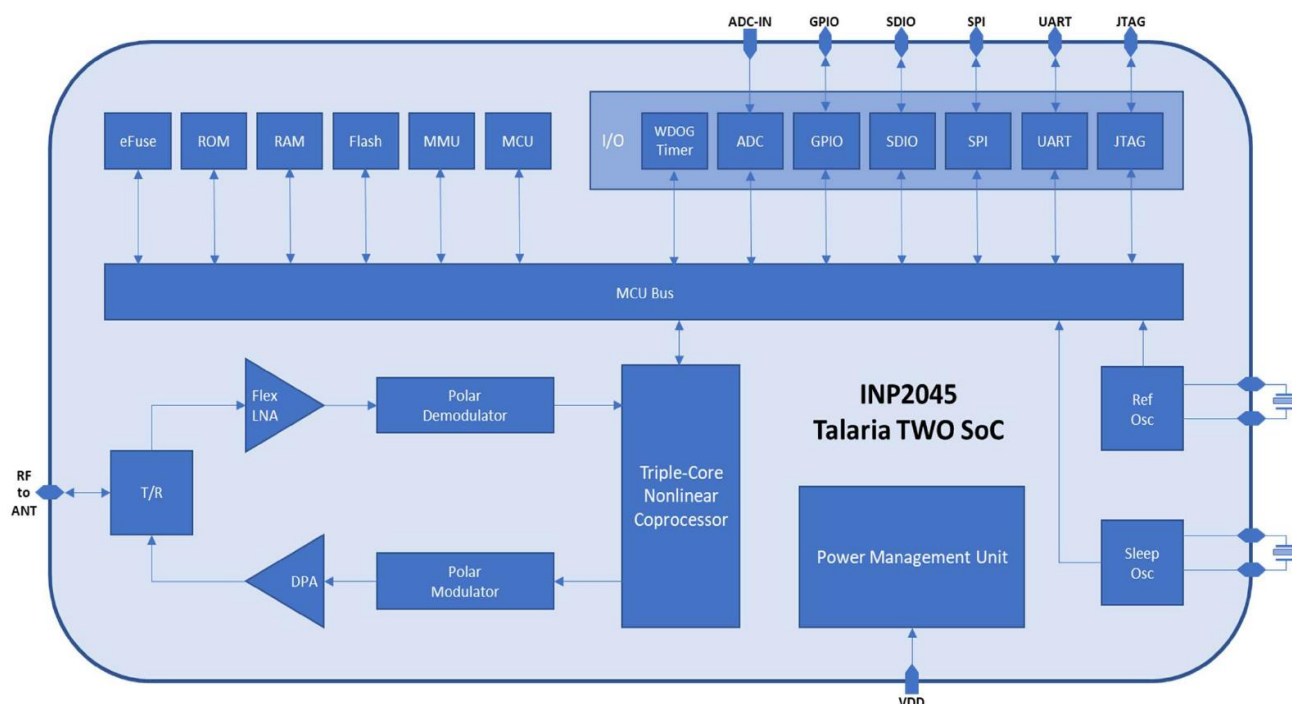
INP2045 module boards have all required components installed for standalone functionality. Edge connections provide access to all GPIO pins, ADC\_IN, En\_Chip/Reset input and external 3.3V power input. The module also contains an on-board printed antenna as well as RF shield (not shown in the Figure 4-2). The Talaria TWO module schematic is provided in Figure 4-3.

The SDK board can be powered from an external 1.2-4.2 V battery through connector J10, or from USB through Micro USB connector J7. Selection of input power supply source is commutated using connector J8.

Jumper J9 can be used to monitor INP2045 current consumption using an external current meter.

## 3. Talaria TWO Block Diagram

Talaria TWO (INP2045) Block Diagram



## 4. Talaria TWO Maximum Transmit Power and Operating Temp

Mode	Maximum TX Power
Wi-Fi: DSSS, 1Mbps	18 dBm
Wi-Fi: CCK, 11 Mbps	18 dBm
Wi-Fi: OFDM, 54 Mbps	15 dBm
Wi-Fi: MCS7, 65 Mbps	12 dBm
BLE	10 dBm

Talaria TWO Operating Temperature: -10°C to +75°C

## 5. Talaria TWO Schematics

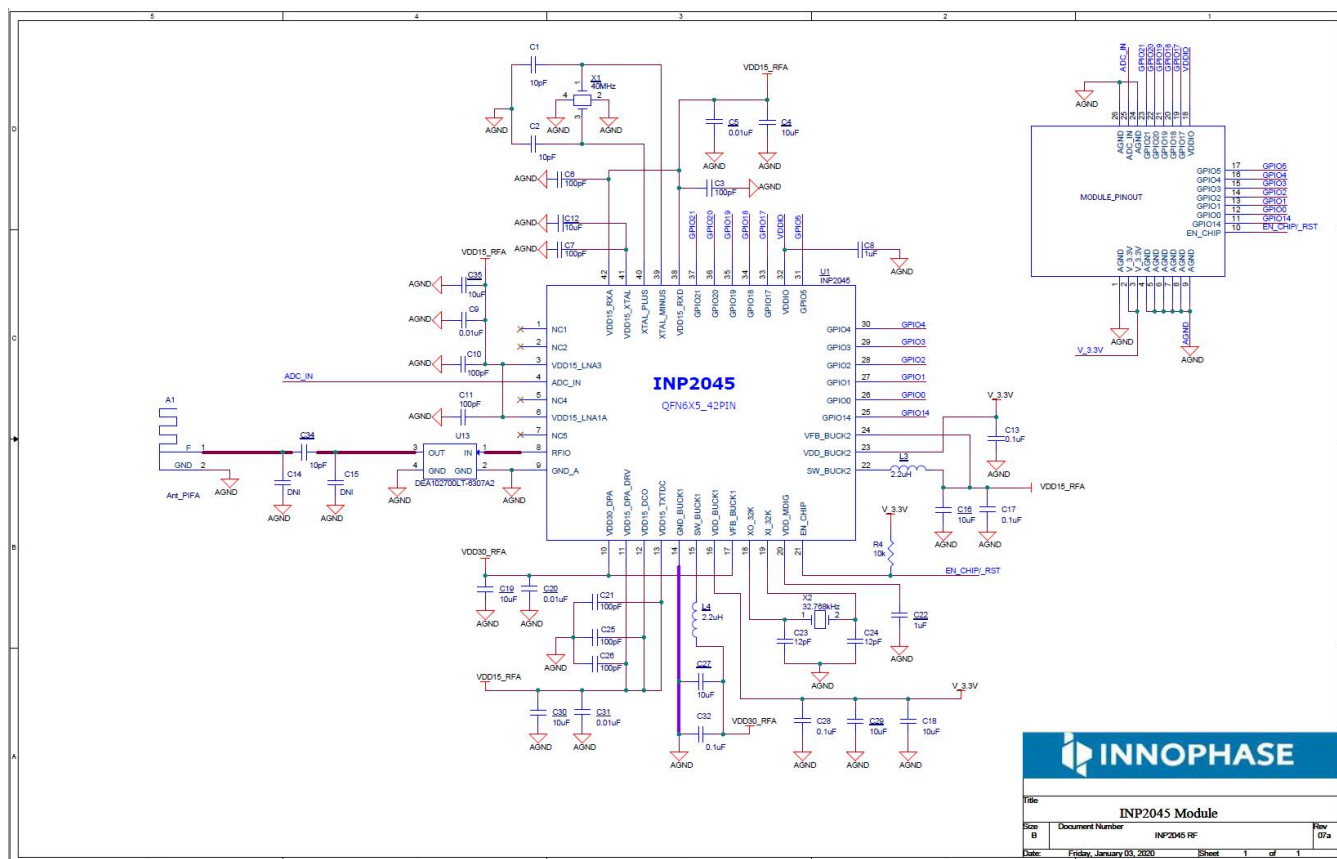


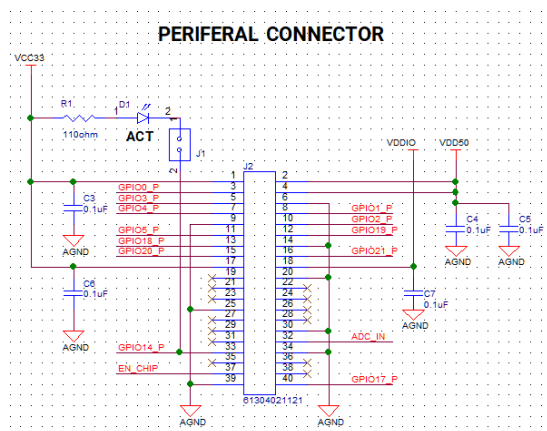
Figure 5-3 INP2045 Module schematic.

For evaluation and SW development, the INP2045 Talaria TWO module is installed on an SDK board which provides communication to an external PC though a standard USB interface.

An additional 40 pin connector on the SDK provides access to UART, JTAG and SPI communication with peripheral devices as well as exposes all the INP2045 GPIO for development and integration of the application.

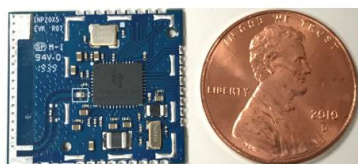
40 pin connector pinout is shown in Figure 5-4.



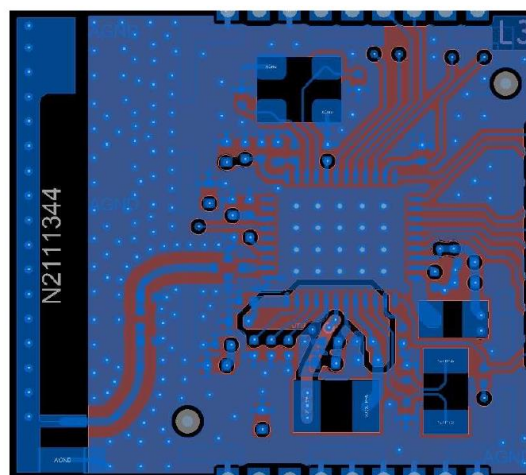


*Figure 5-4 Pinout of 40 Pin Connector*

## 5.1 PCB Layout



Layout (19mm x 21.6mm)



## 5.2 FTDI Layout and Port Connections

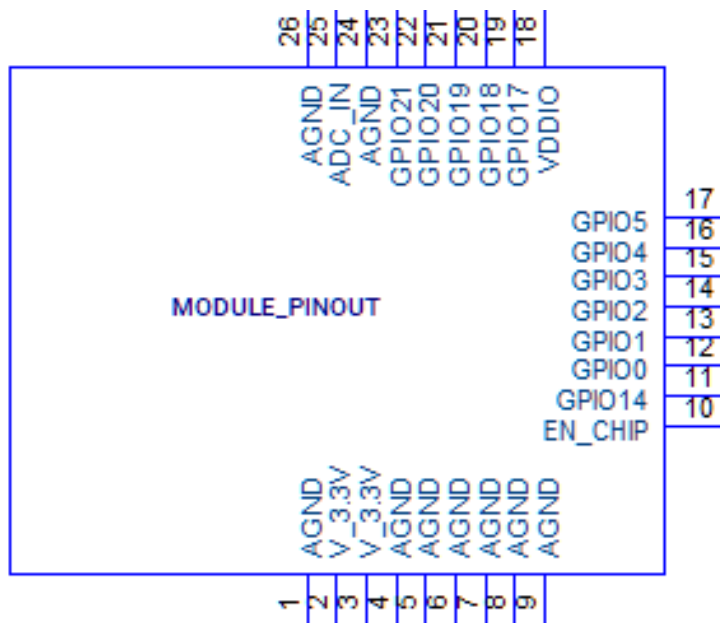
The Talaria TWO SDK board uses an FTDI 4232h quad high-speed USB multi-purpose serial device to interface the Talaria TWO device to a host for evaluation and development. The FTDI device implementation is given below:

FTDI Bus	Interface to Talaria TWO
A	JTAG
B	SPI
C	UART
D	CONSOLE (UART)

Table 1: FTDI Bus Utilization

The port numbers A, B, C and D are assigned by the Windows OS based on which port on the PC is used. Note that the order of COM ports is important and directly map to the FTDI layout. In this case COMc corresponds to UART and COMd corresponds to CONSOLE. Note that if a different USB port is used, the port numbers will change.

## 5.3 Talaria TWO Module Pinout





## 5.4 Pin Description

PIN #	Name	Description
1	AGND	Ground connection
2	V_3.3V	Power Supply Input 2.7...4.0V
3	V_3.3V	Power Supply Input 2.7...4.0V
4	AGND	Ground connection
5	AGND	Ground connection
6	AGND	Ground connection
7	AGND	Ground connection
8	AGND	Ground connection
9	AGND	Ground connection
10	EN_CHIP	Chip Enable/_Reset or Shutdown Input
11	GPIO 14	GPIO Input/Output
12	GPIO 0	GPIO Input / Output
13	GPIO 1	GPIO Input / Output
14	GPIO 2	GPIO Input / Output
15	GPIO 3	GPIO Input / Output
16	GPIO 4	GPIO Input / Output
17	GPIO 5	GPIO Input / Output
18	VDDIO	Power Output. SW configurable
19	GPIO 17	GPIO Input / Output
20	GPIO 18	GPIO Input / Output
21	GPIO 19	GPIO Input / Output
22	GPIO 20	GPIO Input / Output
23	GPIO 21	GPIO Input / Output
24	AGND	Ground connection
25	ADC_IN	ADC Analog Input (voltage range is 0...1 V)
26	AGND	Ground connection

## 6. 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 dBi
Average Antenna Efficiency	-5.0 dB (31.4%)

## 7. Power Supply

Talaria TWO INP2045 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.

## 8. Talaria TWO Module Integration in End Products

INP2045 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)).

## 9. FCC/ISED Regulatory Notices

### 9.1 Modification statement

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

### 9.2 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

### 9.3 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.

### 9.4 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.

- The host product with the module installed must be evaluated for simultaneous transmission requirements
- 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.

## 9.5 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:

Contains FCC ID: 2AVAL-INP2045

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:

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



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Technical Support:

Visit <http://innophaseinc.com/technical-support/>

- SDK is available for fast on-chip programming
- Open source tool chains based on GCC
- Innoscope proprietary debug development tool

Contact [support@innophaseinc.com](mailto:support@innophaseinc.com)

Documentation

- Datasheet
- QuickStart Guide
- SDK User Guide
- API Reference Manual
- Power Measurement Guide
- HW User Guides
- Release Notes/Errata

Hardware Resources

- Reference Design (layout and design CAD files available)
- Software Development Platform

Coming soon:

- Knowledge Database
- Discussion Forums
- Customer Web Portal

InnoPhase has offices in US, Asia and Europe providing outstanding support for our customers.



## 12. Abbreviations

SPI	Serial Peripheral Interface
UART	Universal asynchronous receiver transmitter

## 13. Revision History

Date	Version	Release Notes
1/5/2020	0.4	FCC/IC Notices added
9/13/19	0.3	ESD Precaution added
9/13/19	0.2	Initial release
9/12/18	0.1	Initial Draft