INPX-400 UWB Module

Product User Guide

INPX-DOC Revision 1.2
July 22, 2020

Table of Contents

1 General Description

This specification provides general information regarding performance and integration of INPX-400, a complete wireless subsystem featuring UWB capabilities in a small form factor module. The INPX-400 module is designed to simplify the process of adding UWB capability without lengthy design cycles or complex RF design. It is completely tested for functionality and performance along with coexistence with other wireless standards. A full menu of certifications will also be provided, simplifying the certification process for your end product while further reducing valuable time-to-market. Based on world-class silicon from Decawave, the INPX-400 has been fully optimized for throughput and receive sensitivity using careful design practices. Software development resources are available to create and to optimize the wireless subsystem for your application.

The specification maximum and minimum limits presented herein are to serve as representative performance characteristics of the INPX-400 when properly designed into a customer's product. Inpixon makes no warranty, implied or otherwise specified, with respect to design and performance characteristics presented in this specification when used in customer designs.

The latest revision of this document supersedes all previous versions of this document. Inpixon reserves the right to change this specification without notice.

2 Features

- A single chip wireless transceiver based on UWB techniques compliant with the IEEE802.15.4-2011
- Fully coherent receiver for maximum range and accuracy
- Supports 6 RF bands from 3.5GHz to 6.5GHz
- Support TDOA for precise real time location calculation
- ROHS Compliant
- USB interface (single 5V USB input voltage)
- 50-Ohm antenna launch
- FCC, IC, and CE Certified radio
- Small form factor design 64x23x7.5 mm

2.1 Applications

- Precision real time location systems (RTLS) using TDOA scheme for variety of markets: healthcare, retail, industrial, enterprise, and any indoor RTLS needs.
- Location aware wireless sensor network.

3 System Description

INPX-400 is a complete UWB module. It includes the Decwave1000, STM32 microcontroller, and all the components needed to operate the radio. It supports USB interface for data communication and the power. It requires an external UWB antenna It preserves characteristics from the Decawave1000 chipset while providing optimized system level functionality and performance.

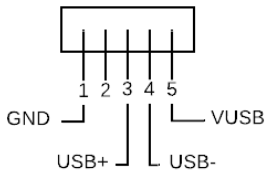
4 Host Product Integration

4.1 Integrating Inpixon UWB Module

The Inpixon UWB Module can be integrated to a host controller via a simple USB interface cable with a 5-pin modular termination and screws to mount the module board.

4.1.1 Connecting to Inpixon UWB Module

Inpixon UWB Module features a 5-pin 1.5mm-spaced header that provides integrated USB serial interface. Refer to the PIN Diagram for the 5-pin configuration.



Power from USB source (5V) is sufficient to drive the Inpixon UWB Module.

4.1.2 Serial Interface

Most modern operating systems would immediately recognize the UWB Module as a serial device, without additional driver installation. Standard 115200/8-N-1 baud rate configuration is used for serial communication with the Inpixon UWB Module.

4.1.3 Application Requirements

A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgment from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds, or the UWB device must cease transmitting.

4.2 Antenna Consideration

4.2.1 Antenna Selection

Inpixon UWB Module's antenna is tuned for 3.5GHz to 6.5Ghz frequency ranges, with peak gain of 5dBi, and efficiency of more than 70% across the bands. Inpixon UWB Module must be used together with the antenna certified.

4.2.2 RF Exposure Consideration

Host Product Manufacturer must provide RF exposure statements and use conditions in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID.

4.3 Host Product Manufacturer Notice

Th modular transmitter is only FCC authorized for the specific rule parts listed on the grant (47 CFR Part 15 Subpart F), and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the host product manufacturer markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the host product manufacturer shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

In addition, Host Product Manufacturer must comply with the following regulations:

1. The INPX-400 modular transmitter must be labeled with its own FCC ID number, and, if the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module.
2. This exterior label can use wording such as the following:

IMPORTANT: Contains FCC ID: 2AVTI-INPX400. This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this devise must accept any interference received, including interference that may cause undesired operation.

4.3.1 OEM Integrator Text

This device is intended only for OEM integrators under the following conditions: The module must be installed in the host equipment such that the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 5mm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

The module shall be only used with the antenna that has been originally tested and certified with this module. Antenna shall not be modified. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for

example, digital device emissions, PC peripheral requirements, etc.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change, or new Certification. Please involve an FCC certification specialist in order to determine what will be precisely applicable for the end-product.

End product labeling: This transmitter module is authorized only for use in a device where the antenna may be installed to ensure satisfying RF exposure compliance. The final end product must be labeled in a visible area with the following: “Contains FCC ID: 2AVTI-INPX400”, “Contains ISED ID: 26211-INPX400”.

The OEM integrator has to be aware not to provide information to the end-user regarding how to install or remove this RF module in the user's manual of the end product, which integrates this module. The end-user manual shall include all required regulatory information/warning, as shown in this manual.

The Host Product Integration section must be followed when integrating this device, including regulating the 10-second transmission cease requirement (4.1.3 Application Requirements).

4.3.2 FCC 15.519 compliance for Handheld Operation

Inpixon UWB Module complies with FCC Part 15.519. Manufacturer claims that the communication between the UWB Modules and other devices are for time synchronization only. The transmission from this module is a beacon type periodic signals (default 150 ms) and will not contain any information.

4.3.3 FCC 15.250 compliance on 5925-7250 MHz

Inpixon UWB Module, when limited to channel 5 and 7 transmissions, complies with FCC Part 15.250. Operation is subject to other operation limitations in this document and must prevent, e.g. via firmware, transmitting on any channel except channels 5 and 7 (allowed frequencies in range 5925 – 7250 MHz). In addition, operation on board an aircraft or a satellite is prohibited. Devices operating under this section may not be employed for the operation of toys. Except for operation onboard a ship or a terrestrial transportation vehicle, the use of fixed outdoor infrastructure is prohibited. A fixed infrastructure includes antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole.

5 Disclaimers

Inpixon PRODUCTS ARE NOT AUTHORISED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF Inpixon.

The definitions used herein are:
a) Life support devices or systems are devices which (1) are intended for surgical implant into the body, or (2) support or sustain life and whose failure to perform when properly used in accordance with the

instructions for use provided in the labeling can reasonably be expected to result in a significant injury to the user. b) A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Inpixon does not assume responsibility for use of any of the circuitry described, no circuit patent licenses are implied and Inpixon reserves the right at any time to change without notice said circuitry and specifications.

6 Ordering Information

The following part numbering scheme is used for this part:

- INPX-400

7 Certifications

INPX-400 conforms to the following certifications.

- FCC (FCC ID: 2AVTI-INPX400)
- ISED (ISED ID: 26211-INPX400)

FCC statement
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this devise must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could not void the user's authority to operate the equipment.
"This equipment may only be operated indoors. Operation outdoors is in violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties."

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that is deemed to comply without testing of specific absorption rate (SAR).

ISED statement

This device complies with Industry Canada's applicable licence-exempt RSSs. Operation is subject to the following two conditions: (1) This device may not cause interference; and (2) This devise must accept any interference, including interference that may cause undesired operation of the device.

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; 2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment has very low levels of RF energy that is deemed to comply without testing of specific absorption rate (SAR).

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'IC. Cet équipement émet une énergie RF très faible qui est considérée comme conforme sans évaluation du débit d' absorption spécifique (DAS).

The term "IC:" before the radio certification number only signifies that Industry Canada technical specifications were met.

8 References

- Decawave 1000 datasheet
- IEEE 802.15.4-2011 standard
- FCC's Guidelines for Labeling and User Information for RF Devices - KDB Publication 784748

8.1 Contact and Support

Inpixon
2479 E. Bayshore Rd, Ste 195
Palo Alto, CA 94303

For support, please visit: https://inpixon.com/support/