



MODEL NAME: U05N250A

USER MANUAL

PRODUCT NAME: UWB module
MODEL NAME: U05N250A

HW VERSION: V1.0
SW VERSION: V1.0

1. General Description

This document specifies the product specifications for the U05N250A module based on the NXP SR150 chipset, which is compliant with IEEE 802.15.4z.

The SR150 provides common Ultra-Wideband(UWB) ranging technologies like Single-Sided (SS) and Double-Sided(DS) Two-Way-Ranging (TWR) and Time Differential of Arrival (TDoA) Ranging.

SR150 also supports generation of the Scrambled Timing Sequence (STS) needed for IEEE802.15.4z enhanced and secure ranging.

The SR150 is capable of secure ranging achieving an accuracy of $< \pm 10\text{cm}$. Further the SR150 can perform measurement of the angle of arrival with an accuracy of $\pm 3^\circ$ in one measurement cycle using the on-chip dual receiver architecture. It is designed for Ranging applications in an IOT environment.

2. Features

- Supports SHF UWB bands from 7.73 GHz to 8.24 GHz for worldwide use
- IEEE 802.15.4z HRP PHY compliant
- Programmable transmitter output power of up to 10dBm
- Data rates of 6.8Mbps, 7.8Mbps, 27Mbps and 31.2Mbps
- Supports 2-way ranging and one-way ranging (TDOA)
- Supports Angle of Arrival Measurement

3. Compliance Information

FCC

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 device 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.

ISED

This device contains licence-exempt transmitter(s)/receiver that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada. Son fonctionnement est soumis aux deux conditions suivantes:

- (1) Cet appareil ne doit pas provoquer d'interférences.
- (2) Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent provoquer un fonctionnement indésirable de l'appareil



INTEGRATION INSTRUCTIONS

List of applicable FCC/ISED rules

-This device complies with FCC Part 15 Subpart F and ISED RSS-220.

Summarize the specific operational use conditions

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.

Indoor UWB communications devices, by the nature of their design, shall be capable of operation only indoors or in locations completely enclosed by walls and a ceiling.

Limited module procedures

-NA

Trace antenna designs

-NA

RF exposure considerations

This device complies with RF exposure requirement.

Antennas

The antenna is permanently attached.

Label and compliance information

The module is labeled with its own FCC ID/ISED certification number.

If the FCC ID/ISED certification number 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. In that case, the final end product must be labeled in a visible area with the following:

For FCC

“Contains FCC ID: 2B03L-U05N250A”,

For ISED

“Contains IC: 2703H-U05N250A”.

The host manual shall include the regulatory statement:

Please refer to the Compliance Information Section in this document.

Note: If the host product is required to be authorized as a Part 15B device, it must be evaluated and accompanied by a corresponding compliance information

Information on test modes and additional testing requirements

Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the multi-transmitter procedures.



Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, 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.

The host product may need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

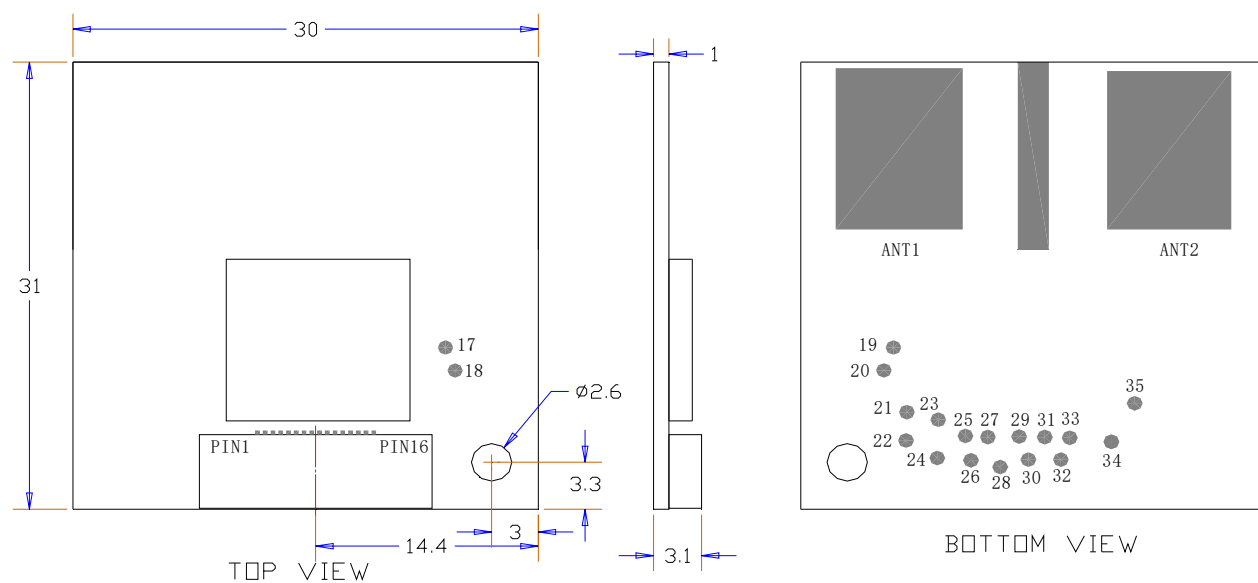
Note EMI Considerations

Note that a host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

How to make changes

Since only Grantees are permitted to make permissive changes, a new FCC ID may be required if the module is used in a manner different from the certified configuration.

4. Mechanical Dimension



Note: Not include adhesive backing

Tolerance:

Length(mm)	Tolerance (mm)
0-5	±0.15
5-10	±0.20
10-50	±0.30
>50	±0.40

ANT Definition:

Pin	Definition	Description
1	ANT1	TX/RX2
2	ANT2	RX1-H (2D AOA)

5. Pin Description

Pin	Definition	Description
1	CHIP_EN	Connection for disabling/enabling the chip
2	GND	Ground
3	SPI_MISO	SPI MISO (Master In Slave Out) connection
4	SPI_MOSI	SPI MOSI (Master Out Slave In) connection
5	GND	Ground
6	SPI_CLK	SPI clock line
7	GND	Ground
8	SPI_CS	SPI Slave select connection
9	GPIO3	SPI Rx Handshake from Host to the chip, switching time is 125ns
10	GND	Ground
11	VDD_3.3V	Power supply 3.3V
12	VDD_3.3V	Power supply 3.3V
13	GPIO5	IRQ sent to the Host to let it know data are available for read
14	GND	Ground
15	I2C_SCL	I2C_SCL
16	I2C_SDA	I2C_SDA

6. Recommended Operating Conditions

Parameter	Min	Max	Unit
Power Supply Voltage : VDD_3.3V	2.97	3.63	V
Storage Temperature	-40	+118	°C
operating temperature	-30	+85	°C

7. Mechanical Characteristics

Feature	Detailed Description
Length	● 31mm
Width	● 30mm
PCB Height	● 1.0 mm
Module Height	● 3.1mm (Note: Not include adhesive backing)

8. RF Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
Frequency Range	Operating frequency Channel 9	7.73	-	8.24	GHz
Channel Bandwidth	Operating frequency Channel 9	-	500	-	MHz
Output power	Operating frequency Channel 9	-	-41.3	-	dBm/MHz
	Operating frequency Channel 9	-	0	-	dBm/50MHz
RX Sensitivity	Channel 9 @ 6.8Mbps Data Rate	-	-88	-	dBm
Max input level	CW signal or other UWB, no damage	-	7	-	dBm
Start-up time	from wake-up or reset release to start of application execution	-	600	-	ms