PUDU 2.4G RF communication module Product specification

Product:

Description: 2.4G communication module

Model:CMMC02

Version: 1.0

Prepared on: 2024.10.21

Chapter 1 Module Introduction

1.1 Introduction

The CMMC02 is an industrial UART wireless pass-through module with high stability. The module uses Semtech SX1280/SX1281 devices with LoRa spread spectrum transmission and TTL level output. Compared with other 2.4G communication technologies, LoRa ™ direct sequence spread spectrum technology has the advantages of low power consumption, longer communication distance and strong anti-interference ability.

The module supports the PUDU LoRa TSCH standard communication technology, and can be used as a common transparent LoRa module, and can also greatly improve the anti-interference performance and bandwidth utilization under the PUDU LoRa TSCH communication system.

CMMC02 has a working frequency range of 2400MHz ~ 2500MHz, and each channel has an interval of 300KHz. Various parameters such as working mode, transmitting and receiving frequency, transmitting frequency and RF speed can be modified online.

Nevertheless, RF amplifier is equipped to extend communication range which gives advantages to more robust application and tough environment. An IPEX connector and integrated helix antenna are soldered on this module that supports different antenna requirements.

1.2 Functional characteristics

- License-free operating frequency band 2400MHz ~ 2500MHz.
- Standard miniPCIe 52-pin interface.
- The maximum transmitted power is 30dBm, Received sensitivity as low as -140dBm.
- Working mode, center frequency, bandwidth, data rates are software configurable.
- Support PUDU LoRa TSCH communication standard and stable transmission in high-bandwidth environment.
- Two types of antennas supported – stand-alone external antenna and integrated antenna.
- Industrial standard design, operating temperature -40 C° ~ + 85 C°

1.3 Electrical parameters

Serial number	Parameter name	Parameter value details
1	Supply voltage	2.8V ~ 3.6V
2	Operating frequency band	2400MHz ~ 2500MHz
3	Communication level	3.3 V TTL level
4	Reference distance	Classical environment (SF7BW203) ⩾ 1000 m (test conditions: clear, open, maximum power Rate, antenna gain 2dBi, height greater than 2m)
5	Transmitting power	30dBm Max, adjustable
6	Receive sensitivity	-140dBm @ SF12BW203
7	Air speed	8-level adjustable (25.38, 19.03, 8.88, 5.08, 2.85, 1.59, 0.87, 0.48) kbps
8	Emission current	900mA (30dBm transmit power) @ 3.3 V
9	Receive the current	40mA @ 3.3V
10	Communication interface	UART serial port, baud rate 115 200 8 bits 1 stop No check
11	Packet length	Maximum 200 bytes sent
12	Module address	Four BYTEs, preset with different data (convenient for networking, supporting broadcast and fixed point Transmission)
13	Module size	51mm * 30mm * 5.5mm (without shield)
14	Production process	RoHS

15	Operating temperature	-40C°~85C°

1.1 Introduction

The CCBC02 is an industrial UART wireless pass-through module with high stability, it is docked with standard miniPCIe 52-pin connector thus can be easily incorporated to large industry application. The module uses Semtech SX1280/SX1281 devices with LoRa spread spectrum transmission and TTL level output. Compared with other 2.4G communication technologies, LoRa ™ direct sequence spread spectrum technology has the advantages of low power consumption, longer communication distance and strong anti-interference ability.

The module supports the PUDU LoRa TSCH standard communication technology and can be used as a common transparent LoRa module, and can also greatly improve the anti-interference performance and bandwidth utilization under the PUDU LoRa TSCH communication system.

CCBC02 has a working frequency range of 2400MHz ~ 2500MHz, and each channel has an interval of 300KHz. Various parameters such as working mode, center frequency, bandwidth, data rates can be modified online.

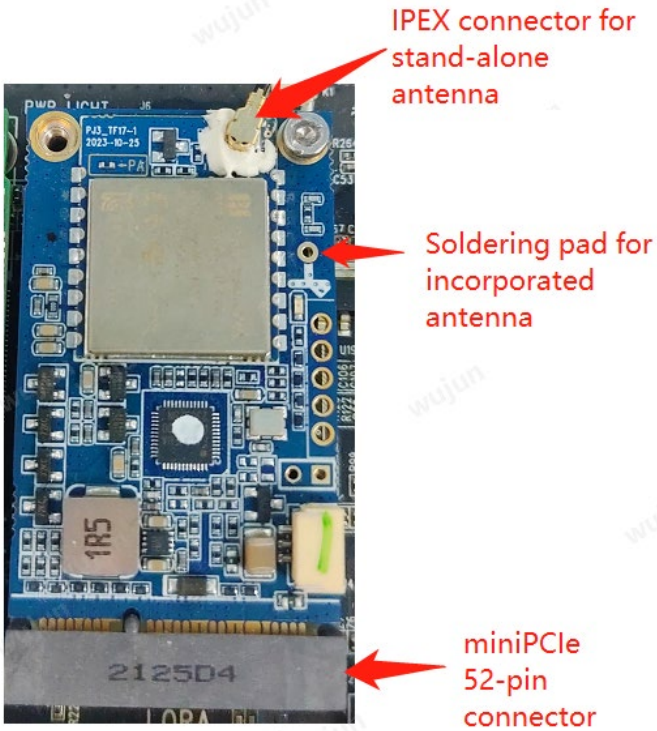
Nevertheless, RF amplifier is equipped to extend communication range which gives advantages to more robust application and tough environment. An IPEX connector and integrated helix antenna are soldered on this module that supports different antenna requirements.

1.2 Functional features

- License-free operating frequency band 2400MHz ~ 2500MHz.
- Standard miniPCIe 52-pin interface.
- The maximum transmitted power is 30dBm, Received sensitivity as low as -140dBm.
- Working mode, center frequency, bandwidth, data rates are software configurable.
- Support PUDU LoRa TSCH communication standard and stable transmission in high-bandwidth environment.
- Two types of antennas supported – stand-alone external antenna and integrated antenna.
- Industrial standard design, operating temperature -40 ℃ ~ + 85 ℃.

Chapter 2 Dimensions, Pin Definition and Application Information

This module can be directly inserted to miniPCIe 52-pin connector which is mounted on target PCBA and fastened firmly by two screws. It supports two types of antennas. One is stand-alone antenna which is connected to IPEX socket mounted on the module. The other is helix antenna soldered on the module. Users can choose one of them according to specific internal or external antenna requirements.



These two antennas information is listed below:

Type	Connector	Impedance	Part number	Supplier	Maximum gain
Stand-alone	IPEX	50 Ohm	YJA01.018.013.101A	Dongguan YiJia Electronics Communication Technology Co.,Ltd.	4.3 dBi
Incorporated	Soldering pad	50 Ohm	YJA01.018.010.301A	Dongguan YiJia Electronics Communication Technology Co.,Ltd.	-0.1 dBi

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 device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

The module is limited to OEM installation only

The OEM integrator is responsible for ensuring that the end-user has no manual instructions to remove or install module

If the FCC identification 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. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID:2AXDW-CMMC01 Or Contains FCC ID: 2AXDW-CMMC01”

When the module is installed inside another device, the user manual of the host must contain below warning statements;

1. 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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Any company of the host device which install this modular with limit modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C : 15.247 and 15.209 requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 requirement，then the host can be sold legally.

Antennas:

Freq (MHz)	Effi (%)	Effi (dB)	Gain (dBi)
2400	17.0	-7.7	-3.5
2410	19.8	-7.0	-3.0
2420	23.2	-6.4	-2.3
2430	27.3	-5.6	-1.7
2440	31.6	-5.0	-1.1
2450	36.4	-4.4	-0.8
2460	39.8	-4.0	-0.4
2470	44.6	-3.5	-0.1
2480	47.4	-3.2	0.1
2490	49.9	-3.0	0.3
2500	54.0	-2.7	0.7

The antenna is permanently attached, can’t be replaced. Trace antenna designs: Not applicable.

ISED Statement:

This device contains licence-exempt transmitter(s)/receiver(s) 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.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est

conforme aux CNR d'Innovation, Sciences et Développement économique 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'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ouémetteur. Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

Please notice that if the 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. This exterior label can use wording such as the following: “Contains IC: 26126-CMMC01” any similar wording that expresses the same meaning may be used.

Veuillez noter que si le numéro de certification ISDE n’est pas visible lorsque le module est installé à l’intérieur d’un autre dispositif, alors l’extérieur du dispositif dans lequel le module est installé doit également afficher une étiquette se référant au module fermé. Cette étiquette extérieure peut utiliser des libellés tels que: «contient IC: 26126-CMMC01» toute formulation similaire qui exprime la même signification peut être utilisée.