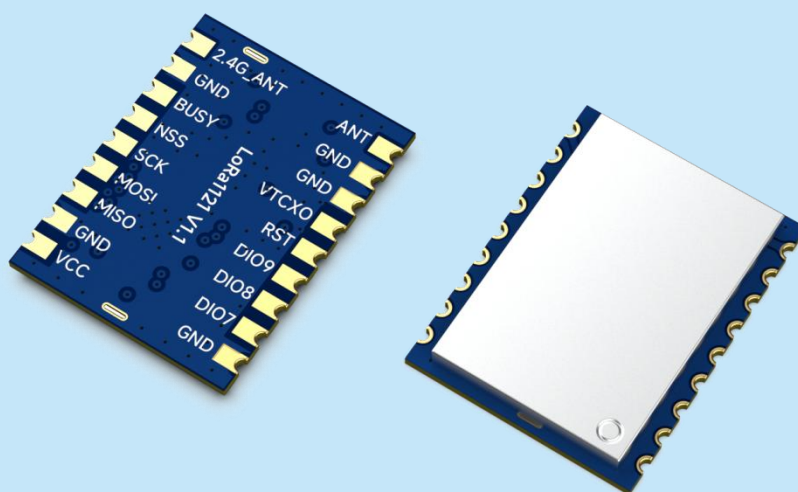


- Multi-Band: Sub-GHz, 2.4GHz, and S band (satellite communication)
- Supports LoRaWAN protocol and Sigfox protocol
- Supports AES-128 encryption and decryption algorithms
- Superior anti-interference: LR-FHSS technology

Product Specification



Catalogue

1. Descriptions	- 3 -
2. Features	- 3 -
3. Applications	- 3 -
4. Block Diagram	- 3 -
5. Electrical Characteristics	- 4 -
6. Typical Schematic Circuit:	- 4 -
7. Pin definition	- 5 -
8. Mechanism Dimension(Unit:mm)	- 5 -
Appendix 1: Function Demonstration Board	- 7 -
Appendix 2:SMD Reflow Chart	- 8 -

Note: Revision History

Revision	Date	Comment
V1.0	2024-8	First release
V1.1	2024-8	Add some content

1. Descriptions

The LoRa1121 module utilizes SEMTECH's LR1121 chip, an ultra-low-power, long-range transceiver that supports both global ISM band and 2.4GHz communication. The LoRa1121 supports LoRa and (G)FSK modulation in the Sub-GHz and 2.4GHz bands, as well as Sigfox® modulation in the Sub-GHz band, and long-range frequency hopping spread spectrum (LR-FHSS) in the Sub-GHz, 1.9-2.1GHz, and 2.4GHz ISM bands. The LR1121 complies with the physical layer requirements of the LoRaWAN® specifications released by the LoRa Alliance®, while remaining highly configurable to meet the needs of various applications and proprietary protocols.

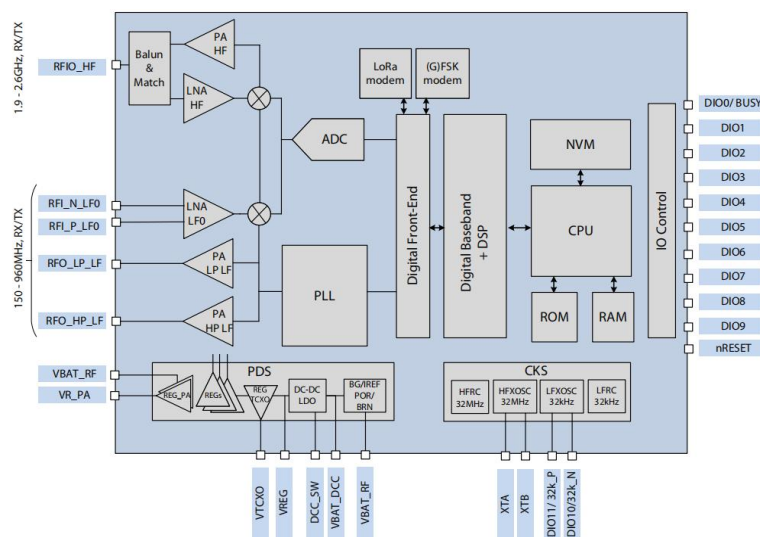
2. Features

- Sub-GHz Bands: 433/470/868/915MHz
Customizable frequency range: 150~960 MHz
2.4G band: 2400-2500MHz
S band: 1900-2200MHz
- Transmission distance : >5000 meters
at sub-GHz in open area
- S band sensitivity : up to -132 dBm
@ BW=125 KHz, SF=12
- 2.4GHz reception sensitivity: up to -129dBm
@ BW=406 KHz, SF=7
- Sub-GHz reception sensitivity: up to -144dBm
@ BW=62.5 KHz, SF=12
- Built-in electrostatic protection circuit
- Supports LR-FHSS
- Supports LoRaWAN and Sigfox protocol
- Supports AES-128 encryption and decryption
- Transmitter power is adjustable, up to 22dBm
- Sleep current < 1μA
- Receive current < 7mA
- Small size, stamp hole design

3. Applications

- Drones
- Smart home/Smart agriculture
- Remote irrigation
- Industrial manufacturing

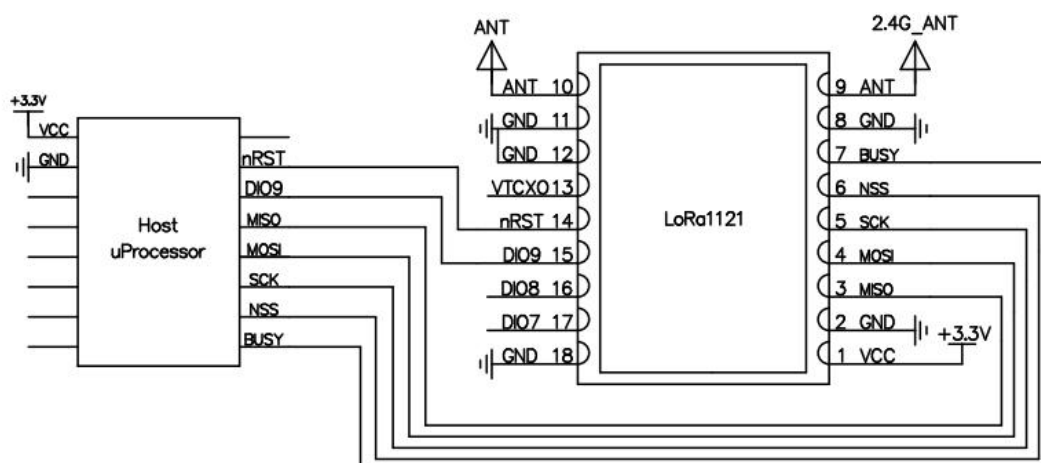
4. Block Diagram



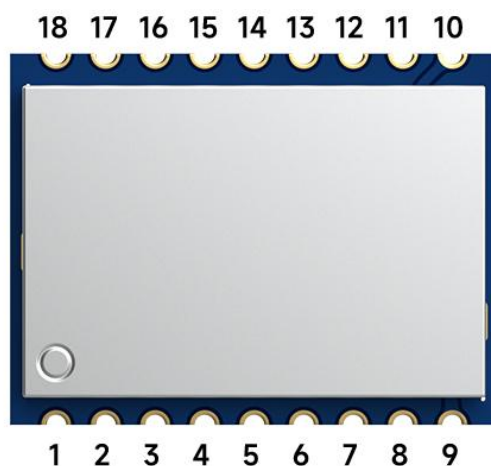
5. Electrical Characteristics

Parameters	Test condition	Min.	Typ.	Max	Unit
Voltage range		1.8	3.3	3.6	V
Operating Temperature		-40	25	85	°C
Maximum Input Signal			10		dBm
Current Consumption					
Transmit Current	@433MHz		< 110		mA
	@2.4GHz		< 36		mA
Receive Current	@3.3V, 2.4GHz		< 7		mA
	@3.3V, 433MHz		< 6		mA
Sleep Current	@3.3V		< 1		uA
RF Parameters					
Frequency Range	@433MHz	400		460	MHz
	@470MHz	470		510	MHz
	@868MHz	850		890	MHz
	@915MHz	900		940	MHz
Transmit Power	@Sub-GHz	19	21		dBm
	2.4GHz	10	11		dBm
Receive Sensitivity	BW=62.5KHz, SF=12 @Sub-GHz		-142		dBm
	BW=125KHz, SF=12 @S frequency band		-132		dBm
	BW=406KHz, SF=7 @2.4GHz		-129		dBm
Frequency Error			10		ppm
Modulation Rate (@sub-GHz)	@LoRa	0.091		62.5	Kbps
	@FSK	0.6		300	Kbps
Modulation Rate (@S Frequency bands)	@LoRa	0.292		87.5	Kbps
Modulation Rate (@2.4GHz)	@LoRa	0.476		87.5	Kbps

6. Typical Schematic Circuit:

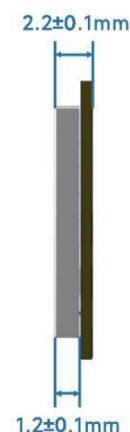
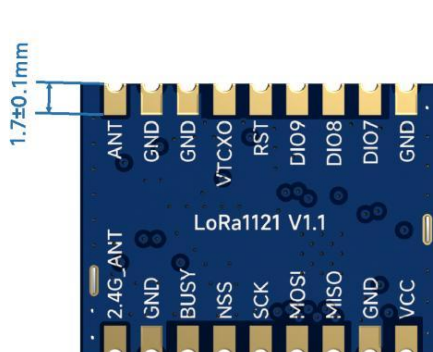
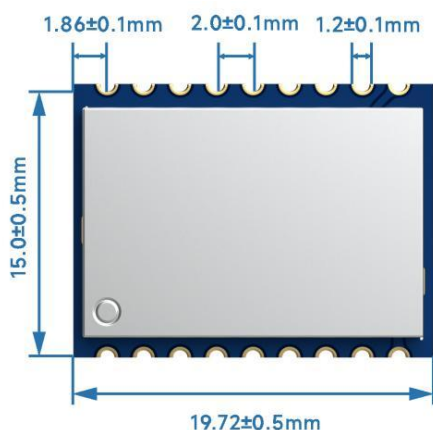


7. Pin definition

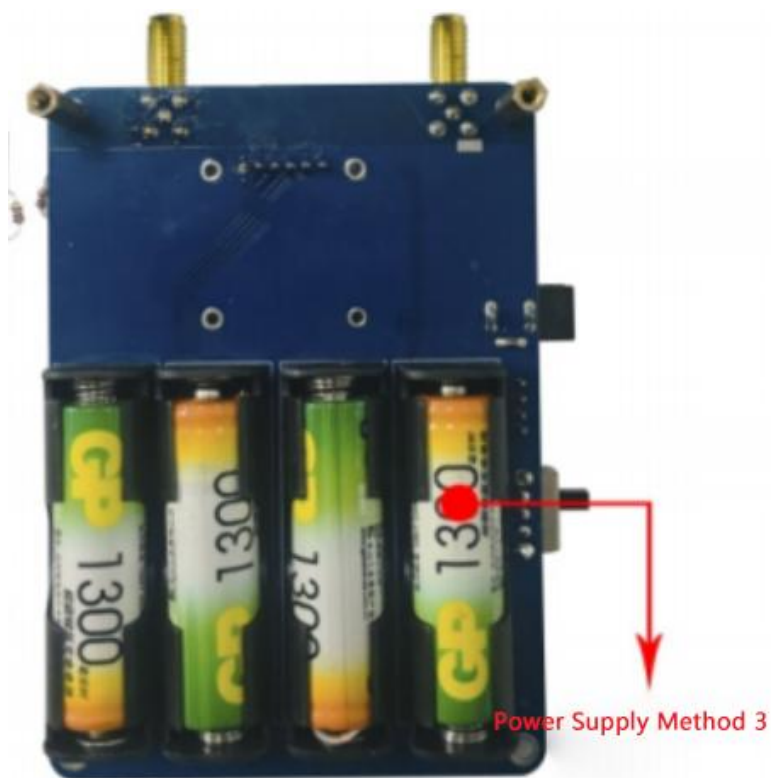
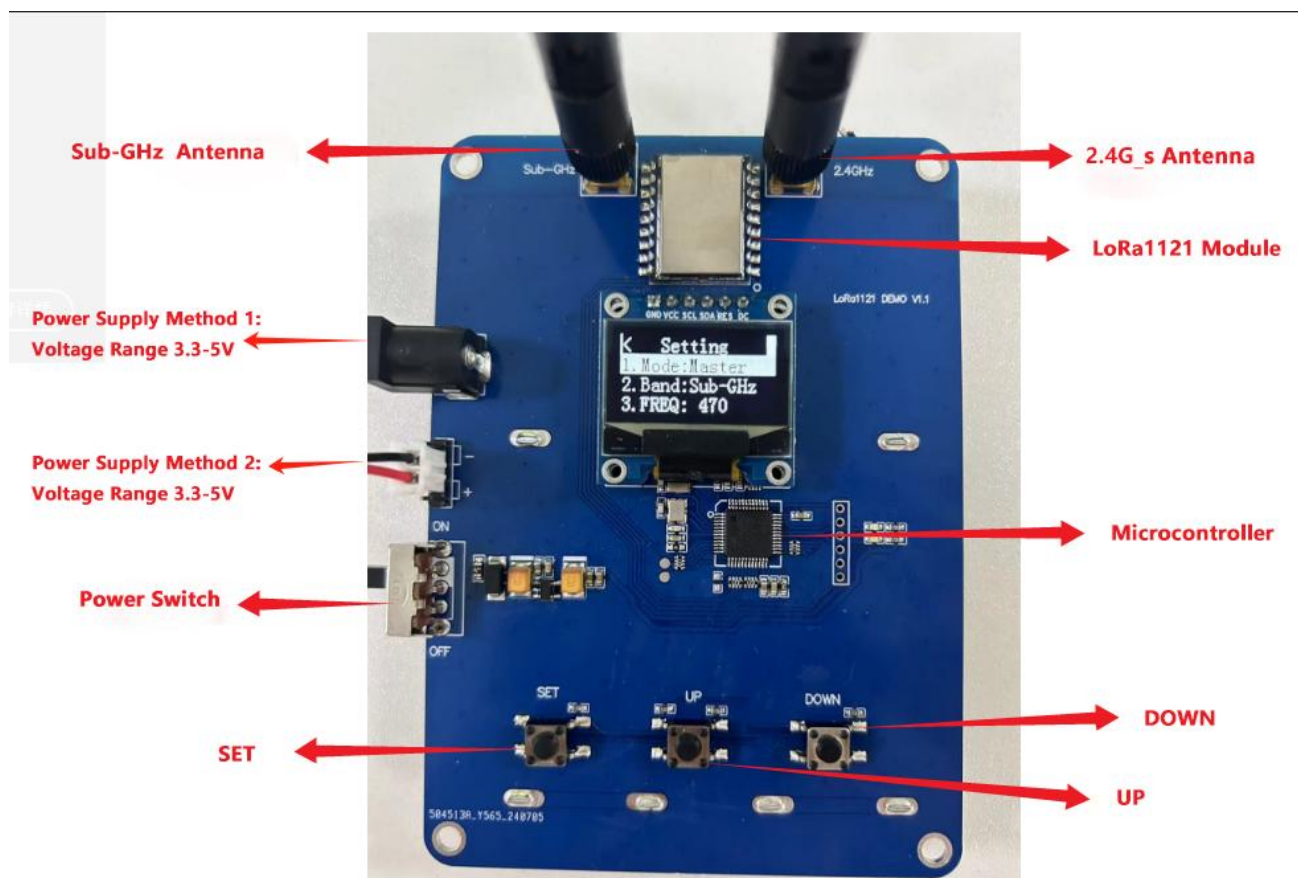


Pin NO.	Pin name	I/O	Description
1	VCC		Connect to the positive power supply.
2,8,11,12	GND		Connect to the negative power supply.
3	MISO	O	SPI data output
4	MOSI	I	SPI data input
5	SCK	I	SPI clock input
6	NSS	I	SPI chip select input
7	BUSY	O	Used for status indication, refer to the chip datasheet for details.
9	2.4/S_ANT		2.4G and S band antenna interface, external 50-ohm antenna.
10	ANTA ANT		@sub-GHz band antenna interface, external 50-ohm antenna.
13	VTCXO	O	Can provide power for an external TCXO.
14	RST	I	Reset trigger input, refer to the chip datasheet for details.
15	DIO9	IO	Multipurpose digital interface, refer to the chip datasheet for details.
16	DIO8	IO	Multipurpose digital interface, refer to the chip datasheet for details.
17	DIO7	IO	Multipurpose digital interface, refer to the chip datasheet for details.

8. Mechanism Dimension(Unit:mm)



Appendix 1: Function Demonstration Board



Note: Only one power supply method can be selected

1. Function Description

The LoRa1121 wireless module DEMO board primarily implements the following functions: LoRa1121 communication, power measurement, sensitivity measurement, and sleep mode.

2. Key Functions

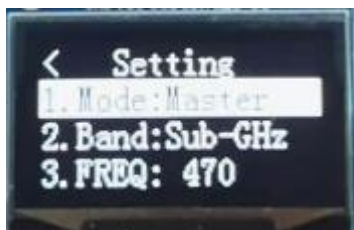
The demo board has three buttons: SET, UP, and DOWN. Their functions are as follows:

Buttons	Functions
SET Key Short Press	Confirm or enter the next level of the interface
SET Key Long Press	Return to the previous interface
UP Key Short Press	Move cursor up or increase parameter by 1
UP Key Long Press	Increase parameter
DOWN Key Short Press	Move cursor down or decrease parameter by 1
DOWN Key Long Press	Decrease parameter

Operation Method:

Ensure normal power supply, then toggle the power switch to turn on the power. The DEMO board screen will display the current function interface. Short press the SET key to enter the setting mode. To select an option, short press the SET key; to return, long press the SET key. Use the UP and DOWN keys to select the parameter you want to adjust. Finally, short press the SET key to complete the modification.

3. Setting Interface Description



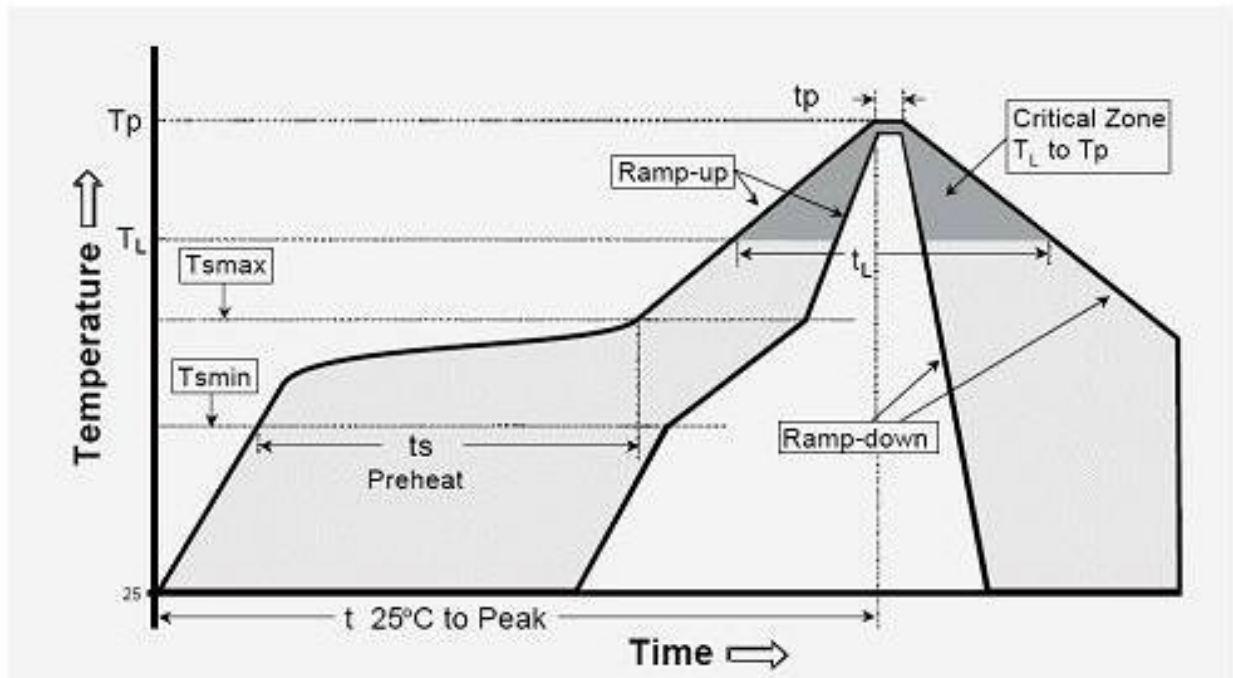
- Mode: Function
- Band: Frequency Band
- FREQ: Frequency
- SF: Spreading Factor



- BW: Bandwidth
- POWER: Power
- CR: Coding Rate

Appendix 2: SMD Reflow Chart

Below reflow profile is recommended for SMT technology:



IPC/JEDEC J-STD-020B the condition for lead-free reflow soldering	big size components (thickness $\geq 2.5\text{mm}$)
The ramp-up rate (Tl to Tp)	3°C/s (max.)
preheat temperature	
- Temperature minimum (Tsmin)	150°C
- Temperature maximum (Tsmax)	200°C
- preheat time (ts)	60~180s
Average ramp-up rate(Tsmax to Tp)	3°C/s (Max.)
- Liquidous temperature(TL)	217°C
- Time at liquidous(tL)	60~150 second
peak temperature(Tp)	245+/-5°C

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.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications or changes to this equipment. Such modifications or changes could void the user's authority to operate the equipment.

RF exposure information: To maintain compliance with FCC RF exposure requirements, use the product that maintain a 20cm separation distance between the user's body and the host.

This device is intended only for OEM integrators under the following conditions:

The antenna must be installed such that 20 cm is maintained between the antenna and users.

The transmitter module may not be co-located with any other transmitter or antenna. As long as the two conditions above are met, additional transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required for the installed module.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the Federal Communications Commission of the U.S. Government (FCC) is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator shall be responsible for re-evaluating the end-product (including the transmitter) and obtaining a separate FCC and IC authorization in the U.S. and Canada.

OEM Integrators -End Product Labeling Considerations:

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains, FCC ID: 2AD66-LORA1121. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

OEM Integrators -End Product Manual Provided to the End User:

The OEM integrator shall not provide information to the end user regarding how to install or remove this RF module in end product user manual. The end user manual must include all required regulatory information and warnings as outlined in this document.