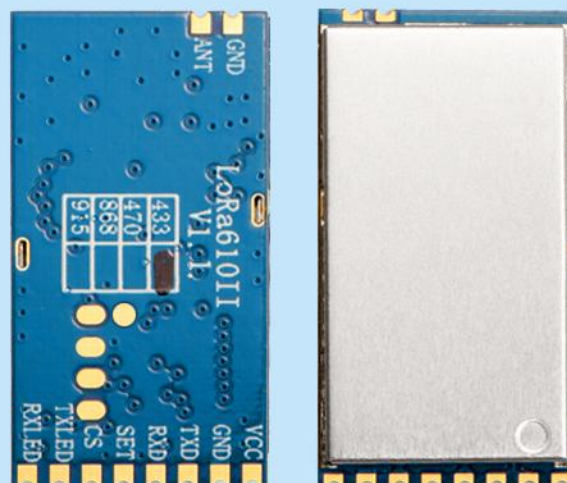


160mW & Embedded & Industrail

Mesh NetWork & AES128 Encryption

Transparent Data Transmission

Product Specification



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Note: Revision History

Revision	Date	Comment
V1.0	2021-12	First release
V1.1	2022-9	Correct CS description
V1.2	2023-3	Add Hop and CRC function description
V1.3	2023-8	Correct mechanical dimension
V1.4	2025-2	Frequency band modified
V1.5	2025-5	Modified Mechanical dimension
V1.6	2025-8	Update product description
V1.7	2026-7	Update Power level

1. Overview

The LoRa II module is a new series of upgraded networking wireless communication modules from Wireless. It uses advanced LoRa spread spectrum modulation frequency hopping technology to achieve high sensitivity. The penetrating power and communication distance are far superior to the current FSK and GFSK products, and have stronger anti-interference. In order to meet the application needs of different customers, we design the module software of this series as an all-in-one way. Users can switch between different working modes through the PC software configuration module. In MESH mode, the routing module has automatic routing. Function, the user can form a network transmission without blind zone without distance limitation by means of multi-module combination. At the same time, users can also encrypt AES128 wireless data through PC software or serial port instructions, making data transmission more secure.

The LoRa610II module is designed for 160mW output power and embedded small size design, which is widely used in wireless remote transmission control industries.

LoRa610II strictly uses lead-free process for production and testing, and meets RoHS and Reach standards.

Note: The LoRa Pro series can be configured to be compatible with our previous LoRa data transmission modules.

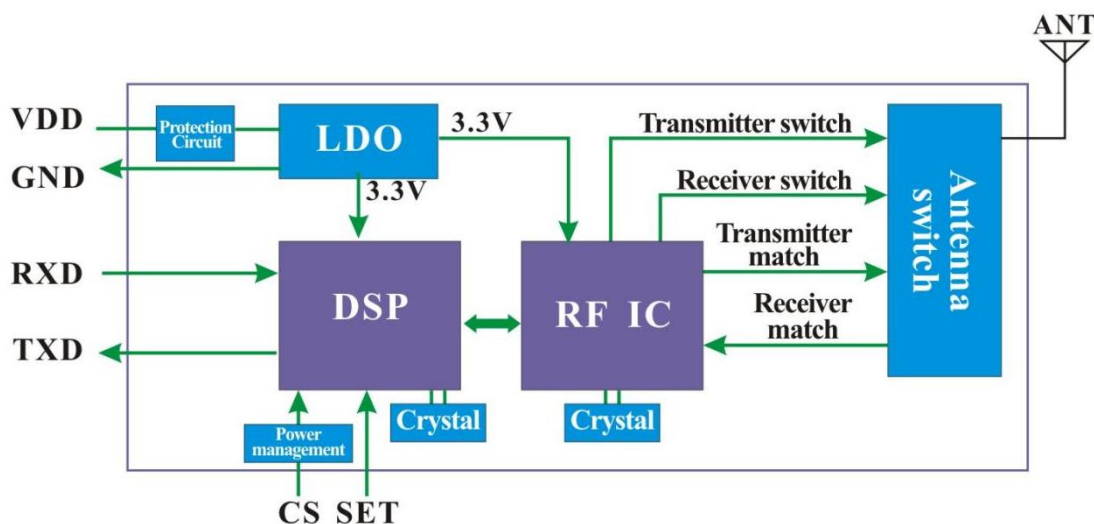
2. Feature

- AES128 data encryption method
- No blind zone without distance limitation
- Single module open transmission distance of 5Km @ low rate
- Frequency band: 433/470/868/915 MHz for option
- Up to 40 communication channels in the same frequency band
- Diversified serial port parameters
- Operating voltage range: 1.8 ~ 3.7 V
- LBT (Listen Before Talk) function optional
- Node/route/node+route optional in MESH mode(Hop level in MESH mode)
- Built-in hardware reset protection circuit
- LoRa modulation
- TTL interface
- Sensitivity up to -129 dBm
- Maximum output power: 160 mW (+22 dBm)
- CRC encryption optional
- Operating temperature range: -40 ~ +85 °C

3. Application

- Remote control
- Remote meter reading
- Industrial data collection
- Home automation telemetry
- Wireless data communication
- Access control system

4. Block Diagram



5. Electrical Characteristics

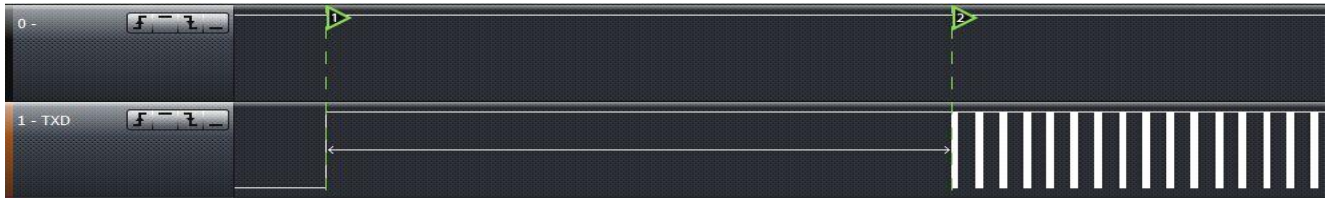
Parameters	Min.	Typ.	Max.	Unit	Condition
Working Condition					
Voltage range	1.8	3.3	3.7	V	
Operating Temperature	-40	25	+85	℃	
Current Consumption					
Rx current		<8		mA	TTL level
Tx current		< 110		mA	
Sleep current		< 5		uA	
RF Parameters					
Frequency range	414.92	433.92	453.92	MHz	@433MHz
	470.92	490.92	509.92	MHz	@470MHz
	849.92	868.92	888.92	MHz	@868MHz
	895.92	914.92	934.92	MHz	@915MHz
Data rate	1312		62500	bps	@LoRa
Output power	1		+22	dBm	Software level 7 adjustable
Sensitivity		-129		dBm	@1.3Kbps

Remark: If you need lower sleep power consumption, please contact us to send the “sleep current = 15uA” version.

6. Operation

1) Power on Reset

After powered on reset, the TX LED (Red) and RX LED (Blue) will blink 3 times, (If no lights, module may damaged) ,The total reset time is around 2s, as below:



Note: Contact us to customize if you want to shorten the POR time.

2) Working Mode

The upgraded LoRa PRO series can be compatible with all versions of our previous LoRa data transmission. Users can configure the module to their required working mode according to their own application requirements. Now, the simple comparison between several versions is as follows:

Model Number	Feature	Maximum payload length (bytes)	Delay time	Encryption	Routing	LBT	communicate with other module
LoRa series	transparent wireless communication, basic function	200	shortest	xor	No	No	LoRa, LoRa_AES, LoRa_MESH Not interoperable, LoRa Pro Can be configured Interoperate with these three models
LoRa_AES series	AES encryption /decryption added	62	longest	AES	No	No	
LoRa_Mesh series	Mesh function added	150	middle	xor	yes	No	
LoRa-II series	newest version , combine all the above function	227	different according to the setting.	configurable	yes	Yes	

- ✓ LoRa series: It is based on the most basic transmission in the LoRa modulation mode. In addition to the data content, it needs to be added: preamble, synchronization word, checksum, CRC and other packet structure processing;
- ✓ LoRa_AES series : In the above basic content, the AES encryption part is additionally added;
- ✓ LoRa_MESH series: Added part of the Mesh function to the LoRa series;
- ✓ LoRa_II series: Can be configured into the above 3, so the delay time will be set according to the settings.

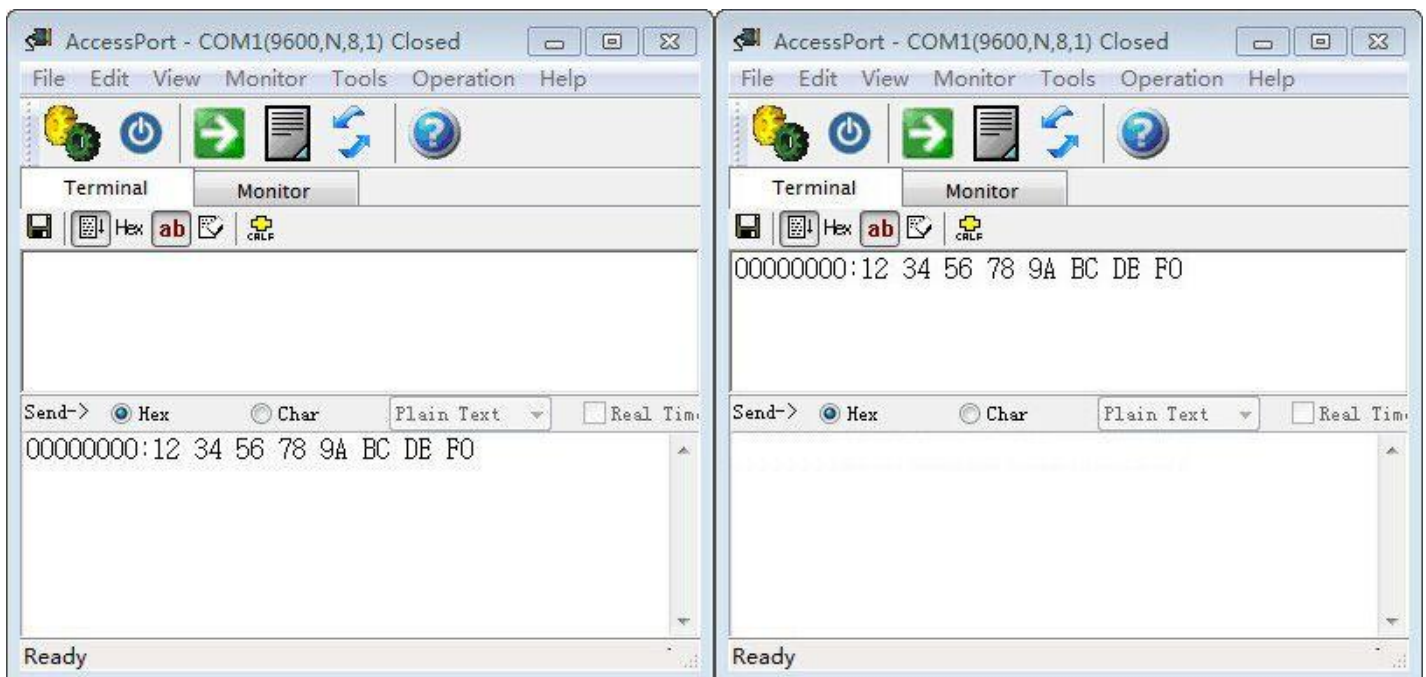
3) Non MESH Data transmission mode

Parameter configuration in Non MESH working mode: Working Mode = Non MESH

In this mode of operation, after a power-on reset (the CS and SET pins of the @ module are left floating or pulled high), the module enters the state of communication, and both the serial port and the RF section are in receive mode.

After the serial port receives the data of the correct baud rate, the module will automatically process the data received by the serial port and then forward it through the wireless circuit (this data packet has been processed by ordinary encryption), then the red indicator light will flash; the other end After the module wireless circuit receives the entire data packet, the blue indicator light will flash. The module will unpack the air data and output it through the serial port (this data has been decrypted, which is the original data transmitted by the serial port), which is a kind of point-to-point and point. Transparent transfer application between multiple points.

The module itself uses a transparent transmission mechanism, without any additional protocol, users can easily send and receive data through the serial port. The module can be directly connected to the PC through the USB adapter board, and the serial port assistant can be used to simulate the data transmission and reception process, as shown in the following:



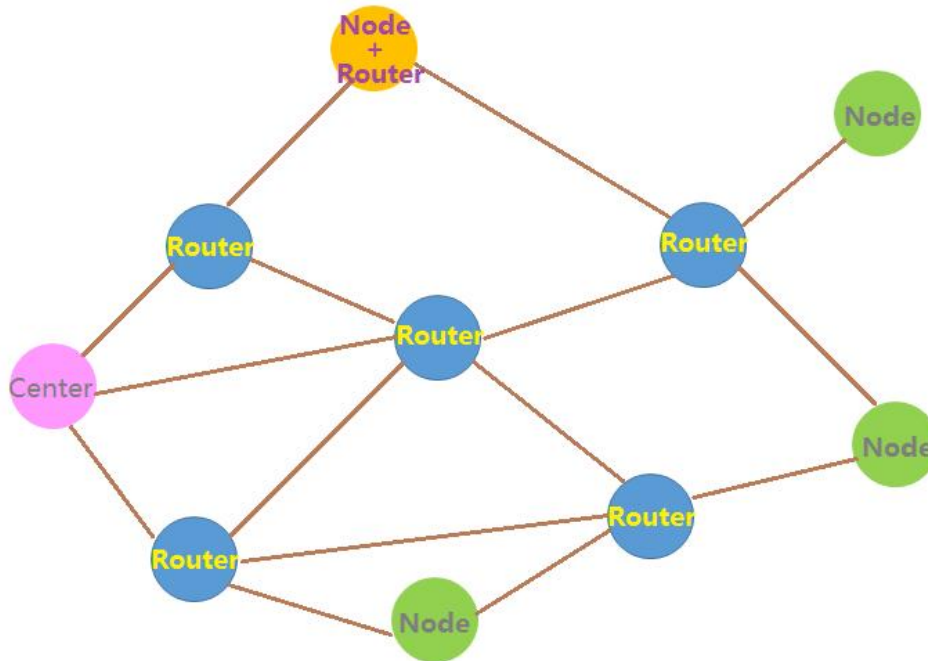
4) MESH network transmission mode

Parameter configuration in MESH networking working mode: Working Mode=MESH

Mode = "Node" or "Router" or "Node & Router"

In MESH mode, the module can be configured into nodes and routes through different modules, and

form a MESH network as a whole to realize point-to-point and point-to-multi point transmission. The node segment module configured as Node mode is similar to the standard communication terminal module. The router-based routing module forwards data in the same network to solve the problem that a single point-to-point transmission distance is insufficient in many practical applications, and there is no limit to the number of routes in the entire network. The hop number of the route can be configured as required.



There is no limit on the default hops of the module. In one way communication application, $\text{hop} = 0$ is suggested. The hop number is smaller as possible as possible to avoid in 2 way communication. the router does not forward the packet, if the number of forwarding times of the received packet exceeds the hop count.



Note:

- ◆ In the same MESH network, unique NODE id are required for all modules, including nodes, routes and nodes + routes.
- ◆ If $\text{hop}=0$, the hop count is not limited. If $\text{Hop}=n$, the packet can be forwarded a maximum of n times. If $\text{HOP}>0$, the hop count of a MESH module can be different.
- ◆ The $\text{hop}=0$ module cannot communicate with the $\text{hop}>0$ module.
- ◆ To communicate with an older version without the hop function, you need to set hop to 0.

5) AES128 data encryption transmission mode

In the wireless communication process, the module can superimpose and enable AES128 encryption in addition to its own data encryption function. The user can freely read or change the module's AES128 key through the PC software. When the AES128 encryption mode is enabled, the wireless transmission delay will be slightly longer, but the protection of the air data is the best. The AES128 encryption function of the module can be enabled by the customer in applications where the transmission data is highly encrypted.

6) LBT Features (Listen Before Talk)

When multiple transmitters are working at the same time, in order to ensure that they do not interfere with each other, The module checks whether other transmitters are transmitting in the environment before transmitting, if other transmitters are transmitting wireless signals, it will not be transmitted temporarily until the other transmitters stop transmission.

✓ **Special Note: Due to the limited internal data buffer of the module (200 bytes), if the channel is always busy, the serial port will continue to transmit data to the module, and the data will be overwritten.**

7) Dormancy

When the CS pin of the module is set high, the module is in the sleep state. At this time, the parameter cannot be set and data transmission is not performed. The module has the lowest power consumption in this state, and the current can reach the uA level.

8) CRC encryption

CRC encryption option is available for the module. It is recommended to enable this option when signal is weak or complicated environment.

Note: The CRC configuration of communication modules must be consistent.

7. Data transfer overview

In order to ensure the stability and correctness of wireless data transmission, the following points should be noted in use:

a) Wireless transmission matching

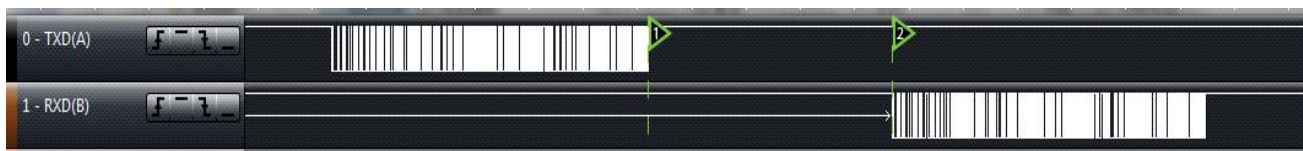
The RF module in the same network guarantees normal communication. The frequency band, channel, RF rate, and AES key must be set consistently. If any one of them is different, they can not communicate with each other. At the same time, the serial port parameters of the module must

ustalso be the same as the serial port parameters of the device. Otherwise, communication cannot be performed.

Note: Our default factory setting is: serial port baud rate 9600bps, data bit 8 bits, stop bit 1 bit, no parity bit.

b) Delay in data in wireless communication

Since the wireless communication transmitting end receives a certain amount of data from the terminal device, or waits for a certain time to start transmitting without new data, the data transmission from the wireless communication transmitting end to the wireless communication receiving end also takes time, so the data is transmitted from the transmitting end. There is a certain time delay to the output of the receiver. Under the same conditions, the delay time is fixed (the specific time is determined by the serial port rate, the air rate and the size of the transmitted data packet). The approximate correspondence is also related to the selected working mode, as shown in the following table:



✓ @ Non MESH Data transmission mode

Speed rate	1312	2375	1557	2932	4750	9501	17353	37500	62500
1byte time (ms)	132	69	113	59	37	22	13	10	8
227bytes time (ms)	1447	840	1141	646	425	220	134	61	40

✓ @ AES Encrypted transmission mode

Speed rate	1312	2375	1557	2932	4750	9501	17353	37500	62500
1byte time (ms)	224	140	204	130	87	61	50	42	39
227bytes time (ms)	1947	1320	1641	1116	884	666	577	500	481

✓ @ MESH Network transmission mode

Speed rate	1312	2375	1557	2932	4750	9501	17353	37500	62500
1byte time (ms)	154	90	133	80	48	27	18	11	9
227bytes time (ms)	1488	862	1820	657	436	223	137	63	41

Note: If the LBT function is used, the transmission time is based on the above time, and the random delay due to the LBT function needs to be added.

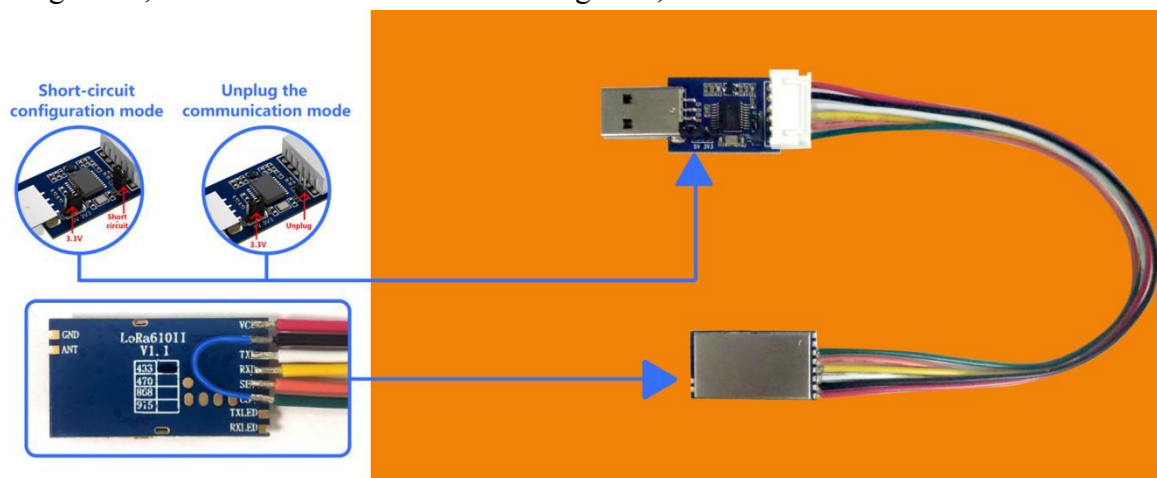
c) Data Flow

The module has a data buffer inside, and the module can send up to 227 bytes of data in a single time. LoRa communication can choose to transmit at a lower rate to get a longer communication distance. When sending a large packet, if the serial transmission rate is too high, and the wireless is too slow, there will be data loss. The user can unpack the data and ensure that the interval at which the serial port sends data is greater than the transmission time of the current gear RF.

8. Setting mode

In working mode, pull low the SET pin to force the module into setting mode. When using USB bridge board, simply put on the short cap to enter into setting mode.

In setting mode, both blue and red LED will be light on, shown as below:



Digital transmission module interface connection diagram

- Install the USB driver and PC configuration software.
- Solder the 6PIN terminal wire to the correct contact of the module and connect the level adapter board of the corresponding interface.
- Plug the USB head of the level adapter board into the PC port of the computer to connect to the PC section.
- At this point, the module switches to the configuration mode and the module is set by software.

Attention:

- The short cap must be connected to the 3.3V.
- CS pin needs to be grounded.

In the setting mode, the user can configure the relevant parameters of the module through the PC software. After the PC software is opened, click to open the corresponding COM port (can be viewed under the device manager), the PC will read the parameter information of the connected module and in the window. The corresponding model and version information is displayed, and the message "Device Found!" is displayed in the status bar below. When the device is unplugged or there is no response, the status bar below displays the message "Device Not Found!", and the product information box above becomes gray invalid. The PC interface after the module is successfully connected is shown below:

LORAI Module Communication Tools

G-NiceRF 深圳市思为无线科技有限公司
NiceRF Wireless Technology Co., Ltd

Net Parameters

NET ID: 00000000 NODE ID: 000A

Working Mode: Non Mesh

Mode: ☒ Node ☐ Router ☐ Node&Router

Serial Parameters

Baud Rate: 9600 Parity: None

Data bit: 8 Stop: 1

RF Parameters

Band: 433 Data Rate: 1312

Channel: 20 Power: 7

Frequency: 433.92 MHz

Encryption

☐ Enable Encryption

KEY: 000102030405060708090A0B0C0D0E0F

Com22 CLOSE

Model: LORA610II

Version: 2.0

☐ LBT Enable

SET READ DEFAULT

Device Found!

PC Version:V1.2

After the module is properly connected, the module is in the "settable parameters" state. The user can modify the relevant parameters of the module through the PC interface, such as: working frequency band, transceiver channel, air communication rate, transmission power; serial port baud rate, data bit, stop bit, parity check bit; NET ID, NODE ID, key, etc. Then, click the [SET] button to set the module. After each parameter is successfully changed, the "OK" message will be returned. After the PC software receives the OK response, the prompt dialog box for successful operation will pop up; otherwise, the output "ERROR" will pop up. If the operation error is incorrect, if there is no response within 0.5s after the PC sends the command, a communication error will occur and a dialog box for the operation error will pop up. These set parameters can be saved after power down. When the user clicks the [READ] button, the module will return all parameter information of the current module. The user clicks the [DEFAULT] button to set the module's parameters to the factory defaults.

(The relevant parameters of the serial port and wireless part in the above PC interface are the factory default values)

In addition to the PC side, the user can also read or modify the relevant parameters of the module online through the UART interface. The serial port sends configuration commands in accordance with the following protocols: Besides PC, user can set all the parameters by their own device. The

communication protocol is as below:

Baud rate=9600 bps; Data bit=8 bits Stop bit:1 Parity bit: none

Command format : AA FA + command +[parameters]

Command is 1 byte, parameters are 0 or Hex format.

Return value ended with “\r\n”.

➤ **Command [AA]:**

Read the product model number and version number of the module, without [parameter]

Configuration directive is: AA FA AA

The return value is: “LoRa610II_VER3.0\r\n”

➤ **Command [01]:**

Read the parameters currently set by the module, without [parameter]

Configuration directive is: AA FA 01

The return value is:

Transceiver channel - working frequency band - air communication rate - transmitting power - serial port baud rate - serial data bit - serial port stop bit - serial port check bit - NET ID - NODE ID - MESH - NODE - AES - key \r \n

➤ **Command[02]:**

Restore the factory default parameters of the module, without [parameter]

Configuration directive is: AA FA 02

The return value is: “OK\r\n”or“ERROR\r\n”

The default parameter is:

Receive/transmit operating frequency = 433.92 MHz Receive/transmit transmission rate = 656

bps Transmit power = Level 7 (highest)

Baud rate=9600 bps; Data bit=8 bits Stop bit:1 Parity bit: none

NET ID = 00 00 00 00 NODE ID = 00 00 MESH = 00 NODE = 00 AES = 00

Key = 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

LBT enable = 0

➤ **Command[03]:**

Parameter setting command, with [parameter] of 33 bytes, the sequence is as follows:

Transceiver channel - working frequency band - air communication rate - transmitting power - se

rial port baud rate - serial data bit - serial port stop bit - serial port check bit - NET ID - NO
DE ID - MESH - NODE - key type - 16 byte key

Configuration directive is: AA FA 03 XX XX XX XX XX XX XX XX XX XX XX XX
XX XX XX

The return value is: "OK\r\n" or "ERROR\r\n"

1) **Channel:** RF frequency

Each frequency band is divided into 40 channels, and the adjacent channels have a difference of
1 MHz. The specific corresponding frequencies are shown in the following table:

Band	Channel	1	2	3	4	5	6	7	8	9	10
433	Frequency(MHz)	414.92	415.92	416.92	417.92	418.92	419.92	420.92	421.92	422.92	423.92
	Channel	11	12	13	14	15	16	17	18	19	20
	Frequency(MHz)	424.92	425.92	426.92	427.92	428.92	429.92	430.92	431.92	432.92	433.92
	Channel	21	22	23	24	25	26	27	28	29	30
	Frequency(MHz)	434.92	435.92	436.92	437.92	438.92	439.92	440.92	441.92	442.92	443.92
	Channel	31	32	33	34	35	36	37	38	39	40
	Frequency(MHz)	444.92	445.92	446.92	447.92	448.92	449.92	450.92	451.92	452.92	453.92
Band	Channel	1	2	3	4	5	6	7	8	9	10
490	Frequency(MHz)	470.92	471.92	472.92	473.92	474.92	475.92	476.92	477.92	478.92	479.92
	Channel	11	12	13	14	15	16	17	18	19	20
	Frequency(MHz)	480.92	481.92	482.92	483.92	484.92	485.92	486.92	487.92	488.92	489.92
	Channel	21	22	23	24	25	26	27	28	29	30
	Frequency(MHz)	490.92	491.92	492.92	493.92	494.92	495.92	496.92	497.92	498.92	499.92
	Channel	31	32	33	34	35	36	37	38	39	40
	Frequency(MHz)	500.92	501.92	502.92	503.92	504.92	505.92	506.92	507.92	508.92	509.92
Band	Channel	1	2	3	4	5	6	7	8	9	10
868	Frequency(MHz)	849.92	850.92	851.92	852.92	853.92	854.92	855.92	856.92	857.92	858.92
	Channel	11	12	13	14	15	16	17	18	19	20
	Frequency(MHz)	859.92	860.92	861.92	862.92	863.92	864.92	865.92	866.92	867.92	868.92
	Channel	21	22	23	24	25	26	27	28	29	30
	Frequency(MHz)	869.92	870.92	871.92	872.92	873.92	874.92	875.92	876.92	877.92	878.92
	Channel	31	32	33	34	35	36	37	38	39	40
	Frequency(MHz)	879.92	880.92	881.92	882.92	883.92	884.92	885.92	886.92	887.92	888.92
Band	Channel	1	2	3	4	5	6	7	8	9	10
915	Frequency(MHz)	895.92	896.92	897.92	898.92	899.92	900.92	901.92	902.92	903.92	904.92
	Channel	11	12	13	14	15	16	17	18	19	20
	Frequency(MHz)	905.92	906.92	907.92	908.92	909.92	910.92	911.92	912.92	913.92	914.92
	Channel	21	22	23	24	25	26	27	28	29	30
	Frequency(MHz)	915.92	916.92	917.92	918.92	919.92	920.92	921.92	922.92	923.92	924.92
	Channel	31	32	33	34	35	36	37	38	39	40
	Frequency(MHz)	925.92	926.92	927.92	928.92	929.92	930.92	931.92	932.92	933.92	934.92

2) Working Band: RF Frequency center point

There are 4 working frequency bands, as shown in the following table:

Parameter	01	02	03	04
Band	433 MHz	470 MHz	868 MHz	915 MHz
	414.92 ~ 453.92	470.92 ~ 509.92	849.92 ~ 888.92	895.92 ~ 934.92

Note: The matching network and antenna are different in different frequency bands. In order to ensure the communication performance of the module, the central frequency band cannot be changed at will.

3) RF data rate: RF Data transmission speed

Set the wireless transmission rate, [parameter] occupies 1 byte.

Setting range: 1312 2375 1557 2932 4750 9501 17353 bps

Parameter	3	4	5	6	7	8	9
Data Rate	1312	2375	1557	2932	4750	9501	17353

4) RF output power : This parameter will affect the communication distance (the higher the power, the farther the module communication distance is)

Set the transmit power, [parameter] occupies 1 byte. Setting range: 0-7.

Power Level	0	1	2	3	4	5	6	7
Transmit Power	1.5dBm	4.5dBm	7.4dBm	10.3dBm	13.1dBm	15.7dBm	18.7dBm	21.3dBm

5) Serial baud rate

Set the transmission rate of the serial interface. [Parameter] occupies 1 byte.

Setting range: 1200 2400 4800 9600 14400 19200 38400 57600 76800 115200 bps

Parameter	0	1	2	3	4	5	6	7	8	9
Rate(bps)	1200	2400	4800	9600	14400	19200	38400	57600	76800	115200

6) Serial data bit

Set the data bit of the serial port, [parameter] occupies 1 byte. Setting range: 7 digits 8 digits 9 digits

Parameter	1	2	3
Data bit	7 digits	8 digits	9 digits

7) Serial stop bit

Set the stop bit of the serial port, [parameter] occupies 1 byte. Setting range: 1 bit 2 bits

Parameter	1	2
Stop	1 bit	2 bit

8) Serial parity bit

Set the parity bit of the serial port. [Parameter] is 1 byte. Setting range: No Odd Even

Parameter	1	2	3
Parity test	No	Odd	Even

9) NET ID

Set the network ID of the RF packet. [Parameter] is 4 bytes.

The NET ID of the module is inconsistent and cannot be communicated. Setting range: 00 00 00 00 ~ FF FF FF FF

10) NODE ID

In MESH mode, you must ensure that the NODE ID of each module in the network is different, otherwise you cannot communicate.

Set the node ID of the RF packet, [parameter] is 2 bytes. Setting range: 00 00 ~ FF FF

11) Working mode :

Normal operation mode or MESH networking mode, [parameter] is 1 byte. Setting range: 00 01

Parameter	0	1
Working mode	Non MESH	MESH

Note: The module with the MESH networking function turned off and the module with the MESH networking function enabled cannot communicate. To ensure communication, the MESH networking functions in the same network should be consistent.

12) Mode selection : Set the working mode in MESH mode. This option is valid only when the MESH networking function is turned on.

[Parameter] is 1 byte. Setting range: 0~2

Parameter	0	1	2
Working mode	node	routing	routing+node

13) Encryption selection : Set whether to enable AES encryption. [Parameter] is 1 byte. Setting range: 00 01

Parameter	0	1
AES encryption	close	open

14) Key : Set the wireless data encryption key, [parameter] is 16 bytes.

Setting range: 0 ~ FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

Default factory value: 000102030405060708090A0B0C0D0E0F

➤ Command [04] Read RSSI value

When the module is switched to the configuration state, the RF will detect the surrounding field strength signal in real time, and the user can send the corresponding command to get the RSSI value through the serial port.

The instruction to get the current instantaneous field strength value of the module.

Read command is: AA FA 04

The return value is: RSSI value \r\n (displayed in characters, range 000~255)

For example: "-032\r\n", indicating that the current signal strength value is -32dBm.

➤ Command [05] Read LBT status

Read the LBT parameter currently set by the module, without [parameter]

Configuration directive is: AA FA 05

The return value is: LBT Enable\r\n

For example: Return 01 0D 0A , indicating that idle detection is enabled.

➤ Command [06] LBT Enable/Disable

Parameter setting command, with [parameter] 1 byte, parameter: idle detection enable

When LBT function is enable, the module won't transmit the message until there is no signal transmitting in the air.

Configuration directive is: AA FA 06 XX

Return instruction: "OK\r\n" or "ERROR\r\n"

For example: Enable LBT enable, should be sent in hexadecimal: AA FA 06 01

1) LBT enable

Enable idle detection, [parameter] is 1 byte. Setting range: 0~1

Parameter	0	1
LBT enable	close	open

➤ Command [07]

The number of hops currently set by the read module without [parameters]

The configuration command is AA FA 07

The return value is: hop count \r\n

For example, if 02 0D 0A is returned, the hop count is 2

➤ Command [08]

Set the hop count command. The parameter is 1 byte. The parameter is: Forward hop count.

The configuration command is AA FA 08 XX

Return instruction: "OK\r\n" or "ERROR\r\n"

For example, if the forwarding hop is set to 2, the packet should be sent in hexadecimal format:

AA FA 08 02

Forwarding hop number: [parameter] is 1 byte. The value ranges from 0 to 16

➤ Command [09]

Read the CRC enable parameters currently set by the module without [parameters]

The configuration command is AA FA 09

The return value is: CRC enable \r\n

For example, if 01 0D 0A is returned, the CRC function is on

➤ Command [0A]

Set the CRC enable command with [parameter] 1 byte and the parameter is: CRC enable

The configuration command is AA FA 0A XX

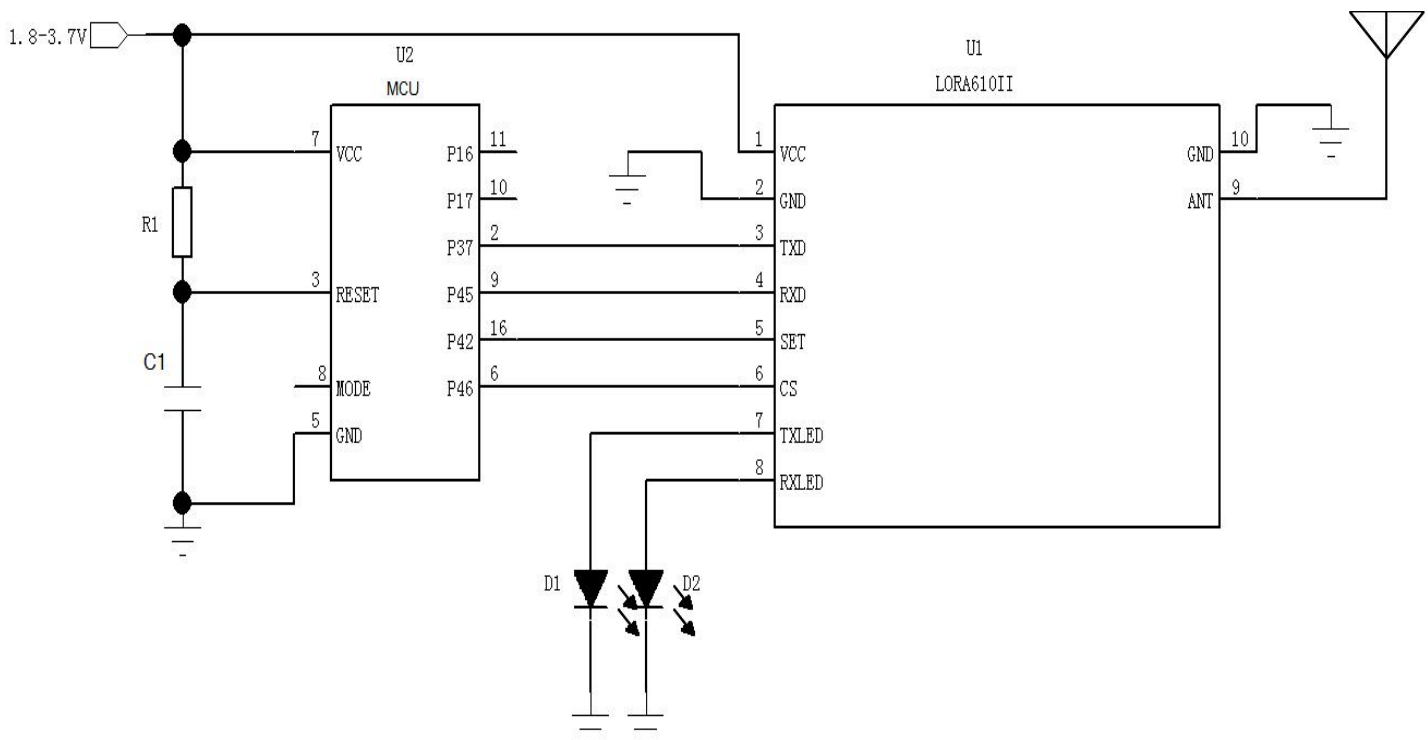
Return instruction: "OK\r\n" or "ERROR\r\n"

For example, to enable CRC, send the following hexadecimal message: AA FA 0A 01

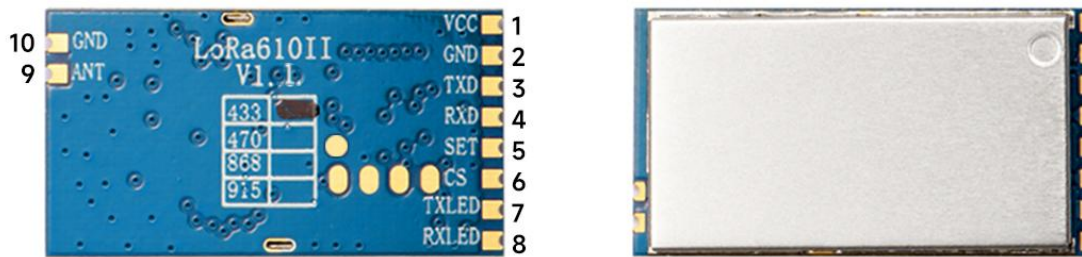
CRC Enable: Enables or disables CRC. [Parameter] is 1 byte. Setting range: 0~1

Parameter	0	1
CRC enable	close	open

9. Typical application diagram



10. Pin definition



NO.	PIN	Description
1	VCC	Connect to the positive pole of the power supply (external 1.8-3.7V)
2	GND	Connect to power ground
3	TXD	Serial communication data transmission
4	RXD	Serial communication data reception
5	SET	Setting mode enable when CS is pulled high (0: setting mode, 1: normal working mode)
6	CS	0: Working mode, 1: Sleep mode. Normal communication when CS is pulled low; Pull high or float to sleep mode, Sleep current <5uA.
7	TXLED	LED indicator, LED will blink once when one packet is sent out
8	RXLED	LED indicator, LED will blink once when one packet is received
9	ANT	connect to 50 ohm antenna
10	GND	Ground of antenna

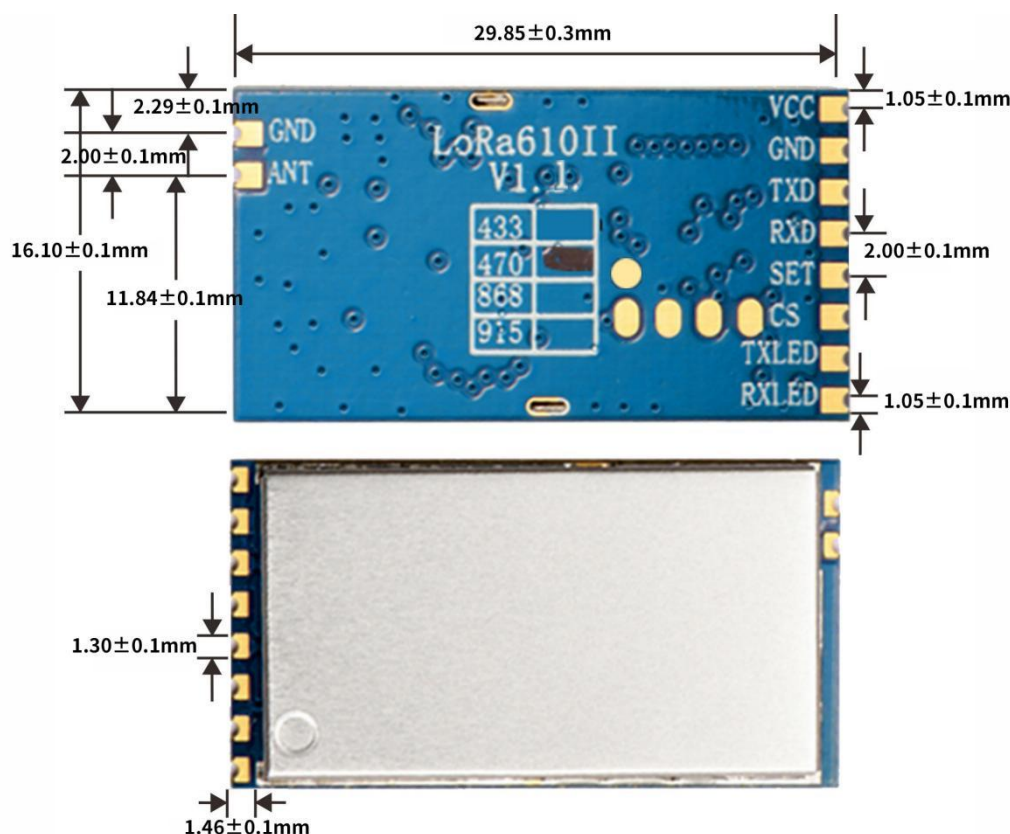
11. Antenna

The antenna is an important part of the communication system. Its performance directly affects the parameters of the communication system. The antenna impedance required by the module is 50ohms. The universal antenna has a spring antenna, and can also be used to connect the straight head/elbow/folding rod shape, small suction cup, etc. through SMA. Users can purchase the antenna according to their own application environment. In order to make the module work in the best working condition, it is recommended to use this. The antenna provided by the company.

★ Tips for antenna:

- When working , to get good performance , avoid to close to the big metal, magnet, big current;
- If you are using the sucker antenna, pull the wire as straight as possible, the sucker foundation should stick with metal

12. Mechanical dimension(Unit: mm)



Thickness: 3mm

13. Order information

For example:

If the customer needs 433MHz band, then part number of released order shall be: LoRa610II-433.

Product Name	Description
LoRa610II-433	433MHz, TTL interface
LoRa610II-470	470MHz, TTL interface
LoRa610II-868	868MHz, TTL interface
LoRa610II-915	915MHz, TTL interface

14. FAQ

- Why module can not communicate properly?
 - a) Check if the band, channel, rate, NET ID has set to the same;
 - b) Check if there is power connection error;
 - c) Check if the module is enabled (CS high);
 - d) Check if the antenna connection is not correct;

- e) Check if the module is damaged.
 - Why transmission distance is not far as it should be?
 - a) Power supply ripple is too large;
 - b) The antenna types do not match, or not properly installed;
 - c) The surrounding environment is harsh, strong interference sources;
 - d) Surrounding co-channel interference;
 - Why receiving data incorrect?
 - a) Improper parameter settings;
 - b) Module data interface is bad.