E610-xxxTxxS Product Manuals

433/868/915MHz 100mW/1W wireless high-speed continuous transmission module



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1 Overview

1.1 Introduction

E610-xxx T xx S product is a high-speed continuous transmission wireless digital transmission module developed by Eite, with built-in high performance single chip microcomputer and wireless transceiver chip. The work was performed in 410-441 MHz band, 855-870 MHz band and 902-928 MHz band, with a transmission power of 20-30 dBm.

The main function is that when the module is in the continuous transmission mode, it can perform continuous uninterrupted transmission under different serial port wave rates, and the data output delay at the receiving end is low, which is suitable for the rapid transmission of large data volume scenarios, such as high-speed sensing, mapping measurement and control, remote sensing positioning and so on.

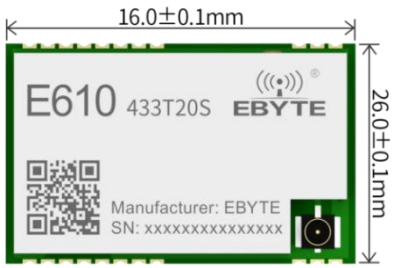


Figure 1: E610-433T20S

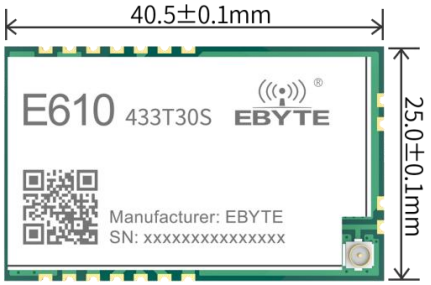


Figure 2: E610-433T30S



Figure 1: E610-900T20S

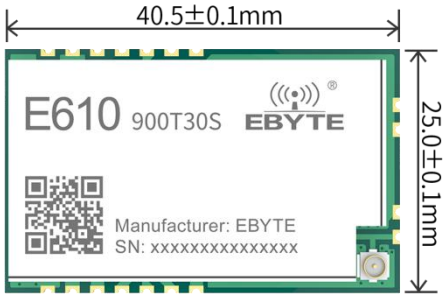


Figure 2: E610-900T30S

1.2 Features

- In general mode, automatic relay network is supported, multi-level relay is suitable for ultra-long distance communication, and multiple networks in the same area run at the same time;
- Support users to set the communication key, and can not be read, greatly improve the confidentiality of user data;
- Support RSSI signal strength indication function for assessing signal quality, improving communication network and ranging;
- Support wireless parameter configuration, through wireless sending command packet, remote configuration or reading wireless module parameters;
- Support fixed-point transmission, broadcast transmission, and channel monitoring;
- Support deep dormancy, the power consumption of the whole machine is about 2 uA;
- Support the global license free ISM 433MHz band and 868 MHz / 915 MHz band;

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- E610-433T30S and E610-900T30S modules have built-in PA + LNA + SAW, under ideal conditions, the communication distance can reach 10km;
- E610-433T 20S, E610-900T 20S modules have built-in LNA + SAW, under ideal conditions, the communication distance can reach 6km;
- The parameters are saved, and the module will work according to the set parameters;
- Efficient watchdog design, in case of abnormal, the module will automatically restart, and can continue to work according to the previous parameter Settings;
- Support the data transmission rate of 0.5 k ~ 470 kbps;
- Support 3.3V power supply has the best performance;
- Industrial standard design, support-40~ + 85℃ long time use;

1.3 Applications

- Home security alarm and remote keyless entry;
- High-speed industrial sensors;
- Wireless alarm security system;
- Building automation solutions;
- Wireless industrial-grade remote control;
- Health care products;
- Advanced meter reading architecture (AMI);
- Automotive industry applications.

2 Specification and parameter

2.1 RF parameters

Main parameter	Unit	Performance				Remarks
		E610-433T 20S	E610-433T 30S	E610-900T 20S	E610-900T 30S	
Work frequency band	MHz	410 ~ 441		855~870、902~928		User-programmable control
Transmitting power	dBm	20.0±0.5	30.0±0.5	20.0±0.5	30.0±0.5	User-programmable control
Block power	dBm	10.0				The probability of burning in close range use is small
Receiving sensitivity	dBm	-123 ~ -124				The ial rate of 1.5 kbps
Matched impedance	Ω	50				IPEX-1 interface antenna matching impedance
Air rate	kbps	0.5 ~ 470				User-programmable control [note[1]]

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Measured distance	k m	1 (Serial mode)	2 (Serial mode)	1 (Serial mode)	2 (Serial mode)	Clear and open, the height of 2 meters, serial port rate of 115200 [note2]
		6 (General mode)	10 (General mode)	6 (General mode)	10 (General mode)	Clear and open, 2 meters high, the air rate of 1.5 kbps
Note1: Effective in the general transmission mode; Note2: In the continuous transmission mode, the module automatically calculates and matches the air rate through the serial port wave rate;						

2.2 Working parameters

Main parameter	Unit	Performance				Remarks
		E610-433T20S	E610-433T30S	E610-900T20S	E610-900T30S	
Working voltage	V	1.8 ~ 3.6	3.0 ~ 3.6	1.8 ~ 3.6	3.0 ~ 3.6	3.3V can guarantee the output power, and exceeding 3.6V will permanently damage the module
Communication level	V	3.3				Risk of burning with a 5 VTTL
Emission current	mA	125	1000	125	1000	Instantaneous power consumption
Receive current	mA	38	40	38	40	
Dormant current	u A	2.0				Software off
Working temperature	℃	-40 ~ +85				technical grade
Storage temperature	℃	-40 ~ +125				technical grade

2.3 Hardware parameters

Main parameter	unit	Performance				Remarks
		E610-433T 20S	E610-433T 30S	E610-900T 20S	E610-900T 30S	
Subcontracted length	byte	55(General mode)				Packet length is not limited in continuous mode
Cache capacity	byte	4096(General mode)				It can be considered unlimited capacity in continuous mode
Modulation mode	-	GFSK				Gaussian frequency shift keycontrolled modulation
CI	-	UART gorge line				TTL electrical level
Serial port port	bps	2400 ~ 230400				

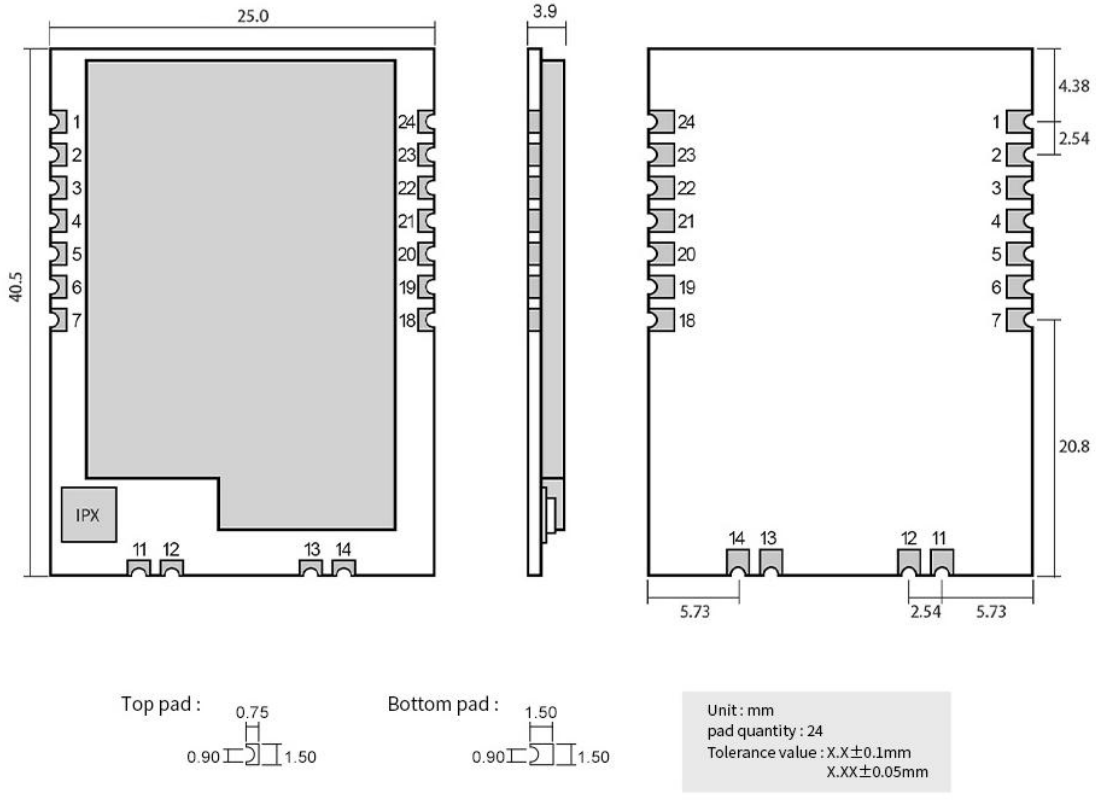
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rate						
Packaging method	-	Patch type				Stamp hole
PA+LNA	-	only LAN	have	only LAN	have	Power amplifier + low-noise amplifier
SAW	-	have				surface acoustic wave filter
Antenna interface	-	The IPEX-1 generation				The equivalent impedance is about 50 Ω
outline dimension	mm	16.0*26.0*3.9	40.5*25.0*3.9	16.0*26.0*3.9	40.5*25.0*3.9	Length * width * height, with an error of ± 0.1
weight	g	2.4	5.2	2.4	5.2	The error is ± 0.1

3 Size and pin definition

3.1 E610-433T30S / E610-900T30S size and pin definition



Pin Definition:

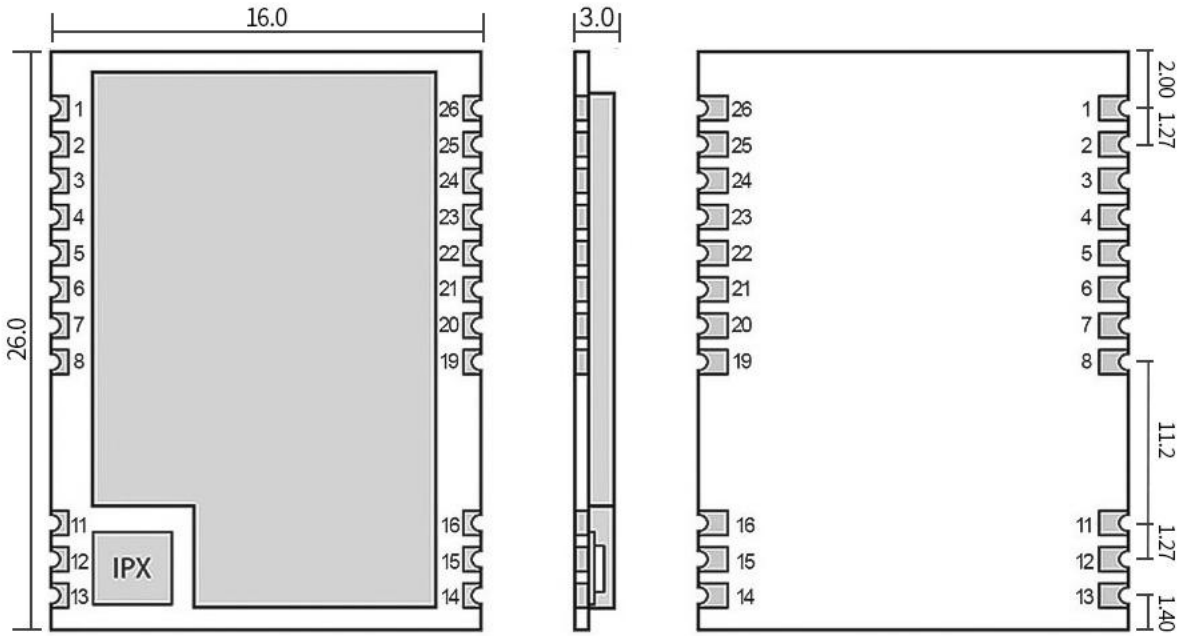
Pin No.	Item	Direction	Description
1	GND	-	Module ground wire

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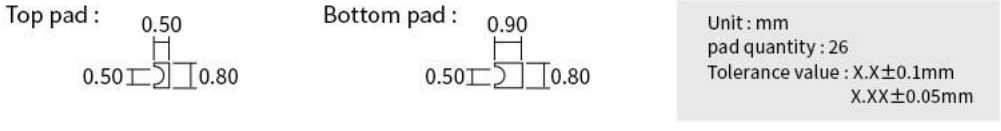
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2	VCC	-	Module power supply is positive reference, voltage range: 3.0 to 3.6 VDC
3	AUX	output	Used to indicate the working state of the module; user awakens external MCU and output low level during self-test initialization (can be suspended)
4	TXD	output	TTL serial port output, connected to the external RXD input pin;
5	RXD	import	TTL serial port input, connected to the external TXD output pin;
6	M1	Input (very weak pull-up)	With M0, determine the four working modes of the module (not suspended, if not grounded)
7	M0	Input (very weak pull-up)	With M1, determine the four working modes of the module (not suspended, if not grounded)
11	ANT	output	Antenna interface (high-frequency signal output, 50 ohm characteristic impedance)
12	GND	-	Fixed to
13	GND	-	Fixed to
14	GND	-	Fixed to
18	NC	-	The NC pin, which needs to be suspended
19	NC	-	The NC pin, which needs to be suspended
20	NC	-	The NC pin, which needs to be suspended
21	REST	import	Module reset pin, low level reset
22	NC	-	The NC pin, which needs to be suspended
23	NC	-	The NC pin, which needs to be suspended
24	NC	-	The NC pin, which needs to be suspended

3.2 E610-433T20S / E610-900T20S size and pin definition



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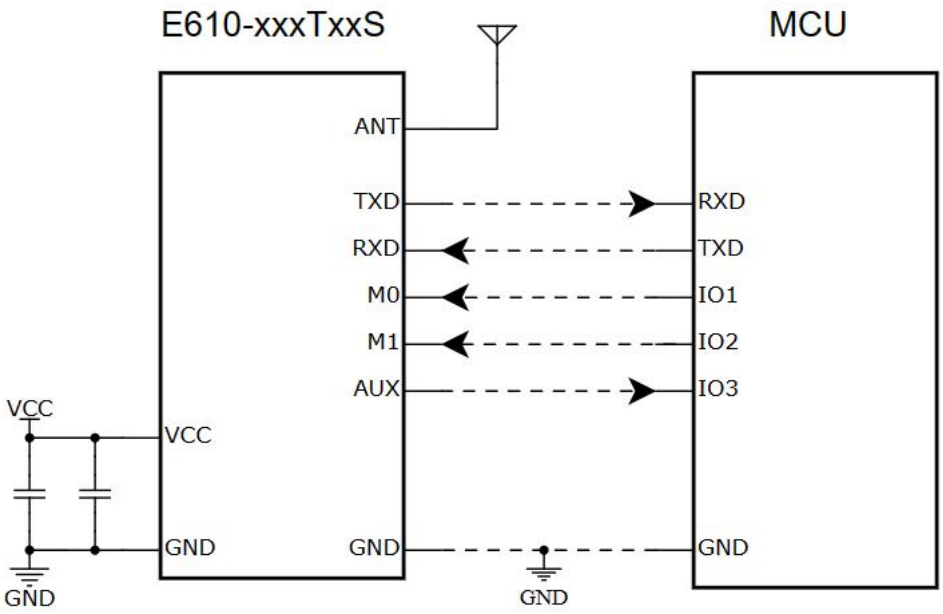
Pin definition:

Pin No.	Item	Direction	Description
1	NC	-	Empty feet
2	GND	-	Module ground wire
3	NC	-	Empty feet
4	REST	import	Module reset pin, low level reset
5	NC	-	Empty feet
6	NC	-	Empty feet
7	NC	-	Empty feet
8	GND	-	Module ground wire
11	GND	-	Module ground wire
12	ANT	-	Antenna interface (high-frequency signal output, 50 ohm characteristic impedance)
13	GND	-	Module ground wire
14	GND	-	Module ground wire
15	GND	-	Module ground wire
16	GND	-	Module ground wire
19	GND	-	Module ground wire
20	M0	Input (very weak pull-up)	With M1, determine the four working modes of the module (not suspended, if not grounded)
21	M1	Input (very weak pull-up)	With M0, determine the four working modes of the module (not suspended, if not grounded)
22	RXD	import	TTL serial port input, connected to the external TXD output pin;
23	TXD	output	TTL serial port output, connected to the external RXD input pin;
24	AUX	output	To indicate the working status of the module; The user wakes up the external MCU to output low level during the self-test (can be suspended)
25	VCC	-	Module power supply is positive reference, voltage range: 1.8~3.6V DC
26	GND	-	Module ground wire

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4 Recommended Design



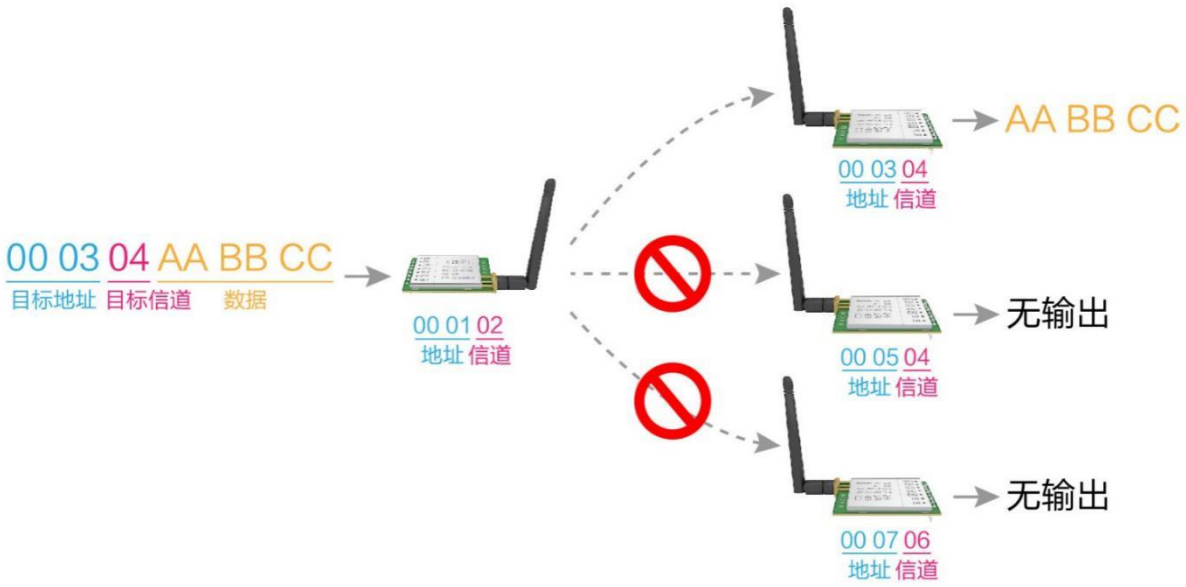
No.	Brief connection between module and MCU (above takes STM 8 L as an example)
1	The wireless serial port module is TTL level, please connect to the MCU of TTL level.
2	Some 5V chips may need to add 4~10K on the TXD and AUX feet of the module.

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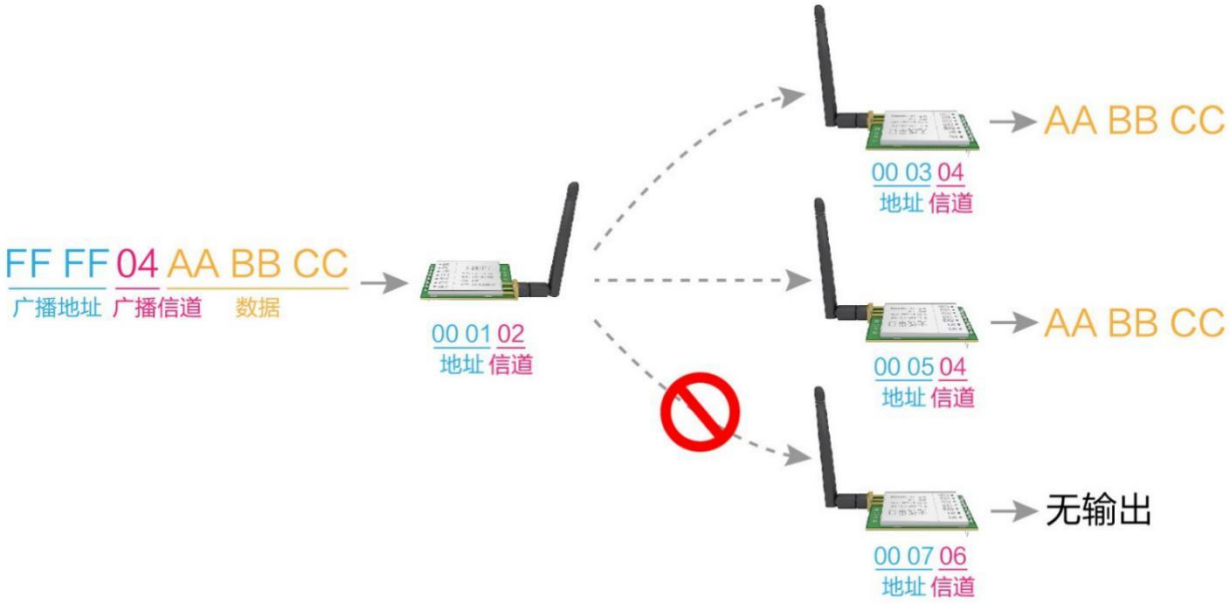
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5 Functions

5.1 Fixed-point transmission



5.2 Broadcast transmission



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5.3 Broadcast address

- Example: Set module A address to 0xFFFF and channel to 0x04.
- When module A is used as transmission (the same mode, transparent transmission mode), all the receiving modules under the 0x04 channel can receive data to achieve the purpose of broadcasting.

5.4 Monitor address

- Example: Set module A address to 0xFFFF and channel to 0x04.
- When module A is received as, all the data under the 0x04 channel to achieve the purpose of monitoring.

5.5 Module reset

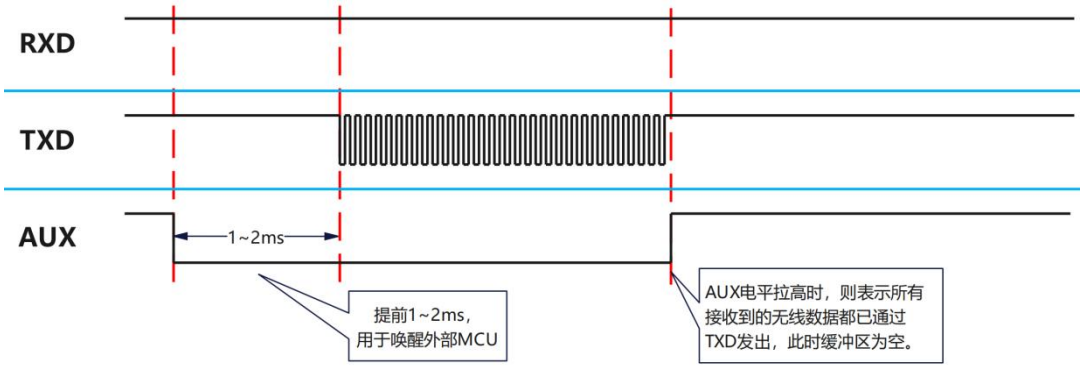
- After the module is powered on, the AUX will immediately output the low level, conduct the hardware self-test, and set the working mode according to the user parameters;
  In this process, AUX keeps a low level, after which AUX outputs a high level, and starts to work normally according to the combination of M1 and M0;
  Therefore, the user needs to wait for the AUX to rise along, as the starting point for the normal operation of the module.

5.6 AUX explanation

- AUX is used for wireless sending and receiving buffer indication and self-test indication.
- It indicates whether the module has data that has not been transmitted wirelessly, or whether the wireless data has not been transmitted entirely through the serial port, or whether the module is in the process of initializing the self-test.

5.6.1 Serial data output indication

- For awakening the external MCU in dormancy;



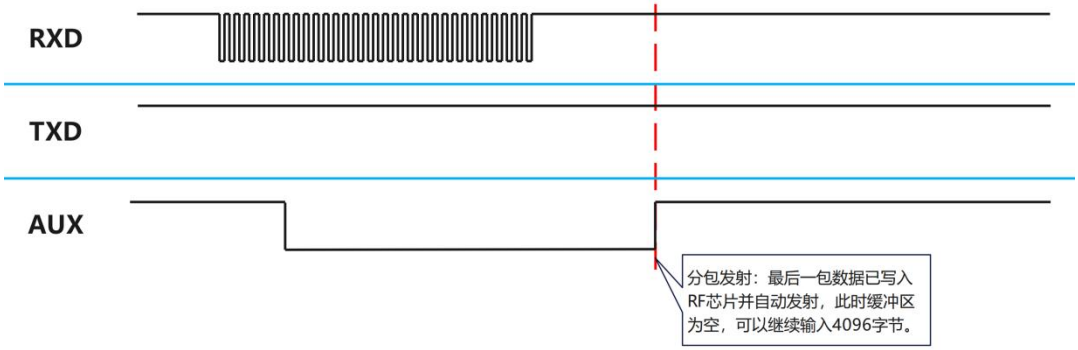
AUX pin timing diagram when sending data from the module serial port

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5.6.2 Wireless transmission indication

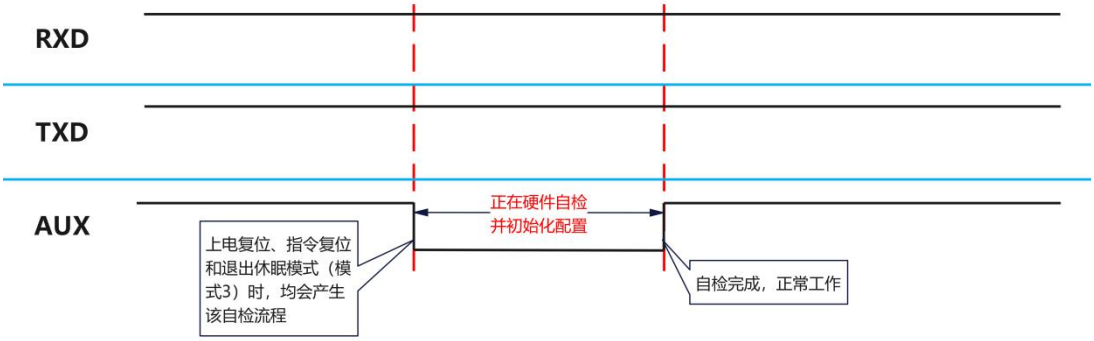
- In the general transmission mode:
  Buffer empty: data from the internal 4096-byte buffer is written to the wireless chip (automatic subcontracting);
  When AUX = 1, the user continuously initiates data less than 4096 bytes, which will not overflow;
  When AUX = 0, the buffer is not empty: the data of the internal 4096 byte buffer has not yet been fully written to the wireless chip and turned on transmission. At this time, the module may wait for the user data to end the timeout, or is undergoing wireless subcontract transmission.
- Continuous transmission mode:
  Data in the buffer is "access and access", so the buffer size can be considered infinite.
- [Note]: AUX = 1 does not mean that all the serial port data of the module is transmitted wirelessly, or the last packet of data may be being transmitted.



AUX pin timing diagram when the module receives serial port data

5.6.3 Module is in the configuration process

- The following states appears only for power reset, command reset, and exit hibernation mode (Mode 3).



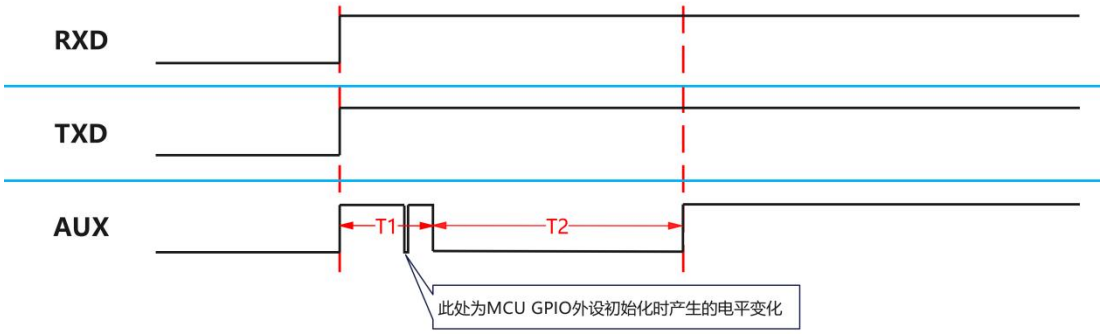
Time iming diagram of AUX pins during the module self-test

5.6.4 Power initialization process

- 'T 1': initialization of MCAD (initialization time is 4~5ms);
- 'T 2' in the figure: represents the initialization of the RF chip configuration parameters (the initialization time is about 500ms);
- When the AUX pin is initialized, the GPIO peripheral configuration, as shown in the figure below.

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AUX pin timing diagram when initialized

5.6.5 Module mode switching process

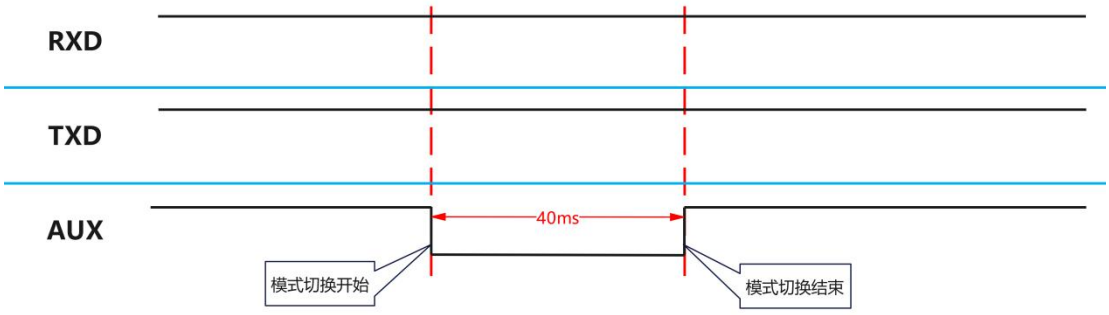
- Switching mode process through M0 and M1 hardware:

  1、M0, M1 pin external interrupt trigger;

  2、AUX to pull down the pin;

  3、 Exit the current task mode, and then read the M0 and M1 pin level to judge the new mode;

  4、Enter the new mode task, AUX pull up, complete the mode switch (switching time is about 40ms).



AUX pin timing diagram when the module switches the mode

5.6.6 Notes

No.	AUX Matters
1	The above function 1 and function 2, the output low level priority, that is, meet any one of the output low level conditions, AUX output low level; When all low level conditions are not satisfied, AUX outputs a high level.
2	When AUX output is low, the module is busy and the working mode detection will not be conducted; When the module AUX output high level within 1ms, the mode switching work will be completed.
3	After the user switches to the new working mode, he / she needs to rise along the AUX for at least 2ms before the module will really enter this mode; If the AUX is always at a high level, then the mode switch takes effect immediately.
4	The user enters another mode from mode 3 (sleep mode), or during the reset process, the module resets the user parameters, during which the AUX outputs a low level.

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6 Working mode

The module has 4 working modes, set by pins M1 and M0; the details are shown in the following table:

Mode (0-3)	M1	M0	Model introduction	remarks
0 Continuous mode	0	0	The module will automatically calculate the air transmission rate required for continuous uninterrupted transmission according to the serial port wave rate, and the user can transmit the data continuously	Support for continuous and uninterrupted transmission
1 General mode	0	1	The user-configured air transfer rate is performed within the module. Subcontract transmission will be carried out in 55 bytes per package.	General transparent transmission
2 Configuration mode	1	0	The user can access the register through the serial port to control the working status of the module	At port rate 9600
3 Deep dormancy	1	1	Module enters dormancy	low power consumption

6.1 Mode switching

No.	Remarks
1	● Users can combine M1 and M0 with high and low levels to determine the module working mode. Two GPIO of the MCU can be used to control the mode switching; ● When M1 and M0 are changed: if the module is idle, after 1ms, it can start working according to the new mode; ● If the module has serial data that has not been transmitted wirelessly, the new working mode can be entered after the launch; ● If the module receives the wireless data and sends the data through the serial port, it needs to send the data before entering the new working mode; ● So mode switching can only be effective when AUX outputs 1, otherwise it will be delayed.
2	● For example, if the user continuously inputs a large amount of data and switches the mode, the switching mode operation is invalid; the module will process all the user data before conducting new mode detection; ● Therefore, it is generally recommended to detect the output state of the AUX pin, and wait for the output high level for 2ms before switching.
3	● When the module is switched from other mode to dormant mode, if there is data not processed; ● The module will process the data (including receiving and sending) before entering the hibernation mode. This feature can be used for fast sleep to save power consumption; for example, the transmission module works in mode 0, the user initiates the serial port data "12345", and then do not have to wait for the AUX pin idle (high level), can directly switch to the sleep mode, and the user main MCU immediately sleep, the module will automatically send all the user data through wireless, automatically into hibernation within 1ms; ● This saves the working time of MCU and reduces the power consumption.
4	● Similarly, any mode switching, can use this feature, the module handles the current mode event, within 1ms, will automatically enter the new mode; thus eliminating the user query AUX work, and can achieve the purpose of rapid switching; ● For example, switching from transmitting mode to receiving mode; the user MCU can also enter hibernation before the mode switching premise, and use the external interrupt function to obtain AUX changes, thus performing mode switching.

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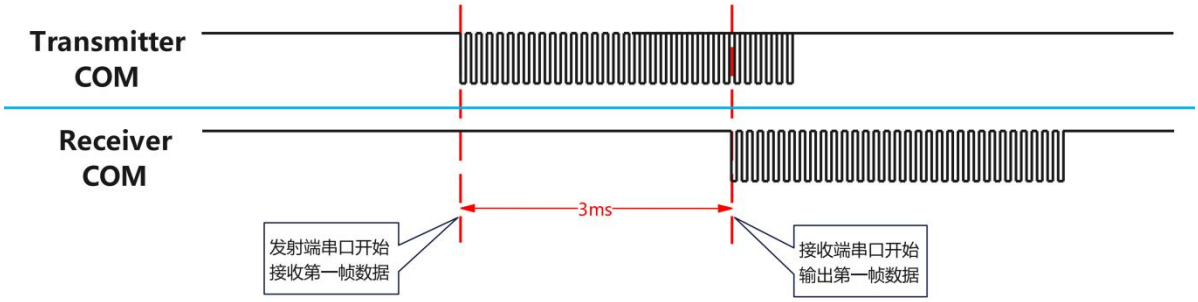
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5	● This operation mode is very flexible and efficient, which is designed in accordance with the convenience of operation of the user MCU, and can reduce the workload of the whole system as much as possible, improve the system efficiency and reduce the power consumption.

6.2 Continuous transmission mode (mode 0)

Type	When M0 = 0 and M1 = 0, the module works in mode 0
send	Automatically calculate the air rate required for continuous transmission according to the serial port wave rate configured by the user; The user can enter the data through the serial port, and the module will initiate the wireless transmission.
receive	In the non-transmitted state, the data can be received normally.

In the continuous transmission mode, the intuitive experience is that the user does not need to wait for all the data to be packaged to transfer the data out. Instead, the module transmits from the first frame of data until the data transmitted by the user is completed. Thus saving the time of data packaging and subcontracting, and greatly shortening the delay time of data.



Schematic of data delay (with serial port rate of 115200,22 bytes sent)

Continuous transmission mode is divided into "distance first" and "speed first" two continuous transmission strategies for users to choose from (please see chapter 7 for details). From the reference data in the following table, we can see that the difference between the data of the two strategies is not obvious when the higher the serial port rate and the smaller the amount of data sent. But once the data reaches thousands of bytes, the problem of data delay becomes apparent.

UART Baud rate	Even pass strategy	Data extension time (ms)		
		1 byte	22 byte	55 byte
2400	Distance first	77.634	213.094	417.224
	Speed first	57.267	161.193	161.233
4800	Distance first	41.396	111.040	216.195
	Speed first	29.028	81.043	81.043
9600	Distance first	21.024	55.926	108.611
	Speed first	15.274	41.675	41.651
19200	Distance first	10.853	28.355	54.736
	Speed first	7.973	21.199	21.211

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38400	Distance first	6.160	15.031	28.083
	Speed first	4.701	11.085	11.080
57600	Distance first	4.392	10.352	19.101
	Speed first	3.373	7.569	7.583
115200	Distance first	2.478	5.364	9.890
	Speed first	1.867	3.874	3.890

*** There will be some errors in the experimental test data, please refer to the actual physical test ***

6.3 General Transmission Mode (Mode 1)

Type	When M0 = 1 and M1 = 0, the module works in mode 1
send	Subcontracted transmission according to 55 bytes per package using the air rate configured by the user; The user can enter the data through the serial port, and the module will initiate the wireless transmission.
receive	In the non-transmitted state, the data can be received normally.

6.4 User configuration mode (mode 2)

Type	When M0 = 0 and M1 = 1, the module works in mode 2
send	Only the remote configuration instructions can be transmitted.
receive	Only receive the remote configuration instruction responses.
configure	The user can access the register to configure the module operating state.

6.5 Sleep mode (mode 3)

type	When M0 = 1 and M1 = 1, the module works in mode 3
send	Unable to transmit the wireless data.
receive	Unable to receive the wireless data.
pay attention to	When entering from the hibernation mode to the other mode, the module will reconfigure the parameters, and the AUX remains low during the configuration process; After the output high level, so it is recommended that the user detect the AUX rising edge.

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7 Register read/write control

7.1 Command format

Under the configuration mode (mode 2: M1=1, M0=0), the supported instruction list is as follows (when setting, only 9600,8N1 format is supported):

No	Command format	Instruction
1	Set the register	Instructions: C0 + starting address + length + parameter Response: C1 + starting address + length + parameter Example 1: The configuration channel is 0x09 *Command start address length parameter* *Send to: C0 05 01 09* *Return: C1 05 01 09* Example 2: simultaneously configure the module address (0x1234), network address (0x00), serial port (9600 8N1), empty speed (1.2K) *Send to: C0 00 04 12 34 00 61* *Return: C1 00 04 12 34 00 61*
2	Read the register	Instructions: C1 + starting address + length Response: C1 + starting address + length + parameter Example 1: Read the access channel *Command start address length parameter* *Send to: C1 05 01* *Return: C1 05 01 09* Example 2: Read the module address, network address, serial port, and empty speed simultaneously *Send to: C1 00 04* *Return: C1 00 04 12 34 00 61*
3	Set up the temporary register	Instructions: C2 + starting address + length + parameter Response: C1 + starting address + length + parameter Example 1: The configuration channel is 0x09 *Command start address length parameter* *Send to: C2 05 01 09* *Return: C1 05 01 09* Example 2: simultaneously configure the module address (0x1234), network address (0x00), serial port (9600 8N1), empty speed (1.2K) *Send to: C2 00 04 12 34 00 61* *Return: C1 00 04 12 34 00 61*
5	Wireless configuration	Instruction: CF CF + General instruction Response: CF CF + conventional response Example 1: The wireless configuration channel is 0x09 *Wireless command header command starting address length parameter* *Send to: CF CF C0 05 01 09* *Return: CF CF C1 05 01 09* Example 2: wireless simultaneous configuration module address (0x1234), network address (0x00), serial port (9600), empty speed (1.5K)

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		Send to: CF CF C0 00 04 12 34 00 61 *Return: CF CF C1 00 04 12 34 00 61*
6	format error	Format error response *FF FF FF*

7.2 Register description

<table>
<tr><th>No.</th><th>Function</th><th>Name</th><th colspan="8">Description</th><th>Remarks</th></tr>
<tr><td>00H</td><td>Read / write</td><td>ADDH</td><td colspan="8">ADDH (default 0)</td><td rowspan="2">* Module address of high byte and low byte;
* Note: When the module address is equal to FFFF, it can be used as a broadcast and listening address, that is, the module will not filter the address.</td></tr>
<tr><td>01H</td><td>Read / write</td><td>ADDL</td><td colspan="8">ADDL (default 0)</td></tr>
<tr><td>02H</td><td>Read / write</td><td>NETID</td><td colspan="8">NETID (default 0)</td><td>* Network address for distinguishing networks;
* When communicating with each other.</td></tr>
<tr><td rowspan="19">03H</td><td rowspan="19">Read / write</td><td rowspan="19">REG0</td><td>7</td><td>6</td><td>5</td><td colspan="5">UART Serial Rate (bps)</td><td rowspan="19">* In general transmission mode, the serial port wave rate can be different, and the verification mode can be different. Generally, it is suggested that the baud rate of both sides is the same;
* The serial port port rate of the two modules that communicate with each other in continuous transmission mode must be the same.</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td colspan="5">The serial port port rate is 2400</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td colspan="5">The serial port port rate is 4800</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td colspan="5">Serial port port rate of 9600 (default)</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td colspan="5">The serial port port rate is 19200</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td colspan="5">The serial port port rate is 38400</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td colspan="5">The serial port port rate is 57600</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td colspan="5">The serial port port rate is 115200</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td colspan="5">The serial port port rate is 230400</td></tr>
<tr><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td><td colspan="3">Airial rate (bps)</td><td rowspan="11">* Only applicable to the general transmission mode, the user needs to choose their own wireless transmission rate;
* In continuous transmission mode, this configuration parameter is invalid and automatically calculated by the module.</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td colspan="3">0.5K</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td colspan="3">1.5K</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td colspan="3">3.5K</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td colspan="3">5.5K</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td colspan="3">6.5K</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td colspan="3">11K</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td colspan="3">13K</td></tr>
</table>

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			0	0	1	1	1	21K		
			0	1	0	0	0	26K		
			0	1	0	0	1	42K		
			0	1	0	1	0	51K		
			0	1	0	1	1	82K		
			0	1	1	0	0	76K		
			0	1	1	0	1	125K		
			0	1	1	1	0	160K		
			0	1	1	1	1	410K		
			1	0	0	0	0	470K		
			1	X	X	X	X	470K		
04H	Read / write	REG1	7	6	Serial check bit					* Module serial port check type
			0	0	8N1 (by default)					
			0	1	8O1					
			1	0	8E1					
			1	1	8N1 (equivalent to 00)					
			5	Channel RSSI enables						* Only for general transmission mode; * When enabled, the instruction "C0 C1 C2 C3" can be sent in general transmission mode to read register: register [0x00]: current ambient noise RSSI [0]; register [0x 01]: RSSI [1] when last received data; * Conversion formula: dBm = RSSI / 2-154; * Instruction format resolution: send: C0 C1 C2 C3 + starting address + read length; Return: C1 + address + read length + read valid value; [Example 1]: Send the C0 C1 C2 C3 00 01, Return to C1 00 01 RSSI [0]; [Example 2]: Send the C0 C1 C2 C3 00 02, Return to the C1 00 02 RSSI [0] RSSI [1]; [Special Note] Address can only start at 0x00, If required to read the RSSI [1], Can only refer to [Example 2] for execution; If the module never receives the data, The RSSI [1] default value is 0x00.
			0	Close (default)						
			1	open						
			4	3	continue to have					
			2	Type of policy in the continuous transmission mode						* After the opening speed is preferred, the data output delay of the receiving end will be reduced by about 60%, but it will affect the receiving distance. For example, in the 115200 rate continuous
			0	Distance Priority (Default)						
			1	Speed first						

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<table>
<tr><td></td><td></td><td></td><td></td><td></td><td>transmission mode, the first frame data from the receiver can be output after 3ms.
* Only distance priority is supported at 230,400 baud rates.</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>0 transmitting power</td><td rowspan="5">* Power and current are a non-linear relationship, when the maximum power, the power supply efficiency is the highest;
* Current will not decrease with power.</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td>0 20 / 30 dBm (by default)</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td>1 17/27d B m</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>0 14/24d B m</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>1 11/21d B m</td></tr>
<tr><td>05H</td><td>Read / write</td><td>REG2</td><td colspan="2">Channel Control (CH)
0 – 62 represent a total of 62 channels, respectively</td><td>* Actual frequency = 410 MHz + CH * 0.5 MHz, default 433 MHz = [0x2E].
* Range of values: 410 MHz ~ 441 MHz, [0x00] ~ [0x3E].</td></tr>
<tr><td></td><td></td><td></td><td colspan="2">Channel Control (CH)
0 – 30 represent a total of 30 channels, respectively</td><td>* Actual frequency = 855MHz + CH * 0.5MHz, default 868 MHz = [0x1A].
* Range of values: 855MHz ~ 870MHz, [0x00] ~ [0x1E].</td></tr>
<tr><td></td><td></td><td></td><td colspan="2">Channel Control (CH)
31 – 83 represent a total of 52 channels, respectively</td><td>* Actual frequency = 902MHz + CH * 0.5MHz, default 915 MHz = [0x1A].
* Range of values: 902MHz ~ 928MHz, [0x1F] ~ [0x53].</td></tr>
<tr><td>06H</td><td>Read / write</td><td>REG3</td><td>7</td><td>Receive the data package RSSI</td><td>* Only for general transmission mode;
* When enabled, the module receives the wireless data, output through the serial TXD, will follow an RSSI strength byte to indicate the signal strength when receiving the data;
* Conversion formula: dBm = RSSI / 2-154.</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td>Close (default)</td><td></td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>open</td><td></td></tr>
<tr><td></td><td></td><td></td><td>6</td><td>transmission mode</td><td>* Only for general transmission mode;
* During the fixed-point transmission, the module will identify the first three bytes of the serial port data as: high address + low address + channel, and take it as the wireless transmission target.</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td>Transparent transfer (by default)</td><td></td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>Fixed-point transmission</td><td></td></tr>
<tr><td></td><td></td><td></td><td>5</td><td>Relay function</td><td>* Only for general transmission mode;
* When the relay function is enabled, if the target address is not the module itself, the module will start a forwarding;
* To prevent data return, it is recommended to work with fixed mode; namely, the target address and source address are</td></tr>
<tr><td></td><td></td><td></td><td>0</td><td>Close (default)</td><td></td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>open</td><td></td></tr>
</table>

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									different.
			4	3	2	1	0	continue to have	
07H	write	CRYPT_H	Key High Bytes (default 0)						* Write only, read back to 0; for encryption to avoid airborne wireless data intercepted by similar modules; * These two bytes will be used as the calculation factor to encrypt the airborne wireless signal.
08H	write	CRYPT_L	Key Low Bytes (default 0)						

7.3 Default parameters

7.3.1 E610-433T20S / E610-433T30S default parameters

Model	**Restore the factory default parameter instruction: C0 00 09 00 00 00 40 00 2E 00 00 00**						
Module model	Frequency	Address	Channel	Air rate	Baud rate	Serial port format	Transmitting power
E610-433T20S	433MHz	0x0000	0x 2E	0.5kbps	9600	8N1	20dbm
E610-433T 30S	433MHz	0x0000	0x 2E	0.5kbps	9600	8N1	30dbm

7.3.2 E610-900T20S / E610-900T30S default parameters

Model	**Restore the factory default parameter instruction: C0 00 09 00 00 00 40 00 39 00 00 00**						
Model	Frequency	Address	Channel	Air rate	Baud rate	Serial port format	Transmitting power
E610-900T20S	915MHz	0x0000	0x 39	0.5kbps	9600	8N1	20dbm
E610-900T 30S	915MHz	0x0000	0x 39	0.5kbps	9600	8N1	30dbm

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8 Use of the relay network mode

No.	Relay mode description
1	After setting the relay mode through the configuration mode, switch to the general mode, and the relay starts working.
2	In relay mode, ADDH and ADDL are no longer module addresses, but are matched according to NETID forwarding. If one network is received, it is forwarded to another network; the network ID of the repeater itself is invalid.
3	In relay mode, the relay module cannot send and receive data and cannot perform low-power operation.
4	From Mode 3 (sleep mode) to another mode or during reset the module reset user parameters during the AUX output low level.

Description of the relay networking rules:

1、 Forward rule, the relay can forward data between two NETIDs.

2、In relay mode, ADDH \ ADDL is no longer used as a module address and serves as a NETID forwarding pairing.

as shown in the figure:

① Level 1 Relay

"Node 1" NETID is 08.

"Node 2" NETID is 33.

The ADDH \ ADDL for relay 1 was 08,33, respectively.

So the signal sent by node 1 (08) can be forwarded to node 2 (33)

At the same time, node 1 and node 2 have the same address, so the data sent by node 1 can be received by node 2.

② Secondary Relay

The ADDH \ ADDL for relay 2 was 33,05, respectively.

So the relay 2 can forward the data of the relay 1 to the network NETID: 05.

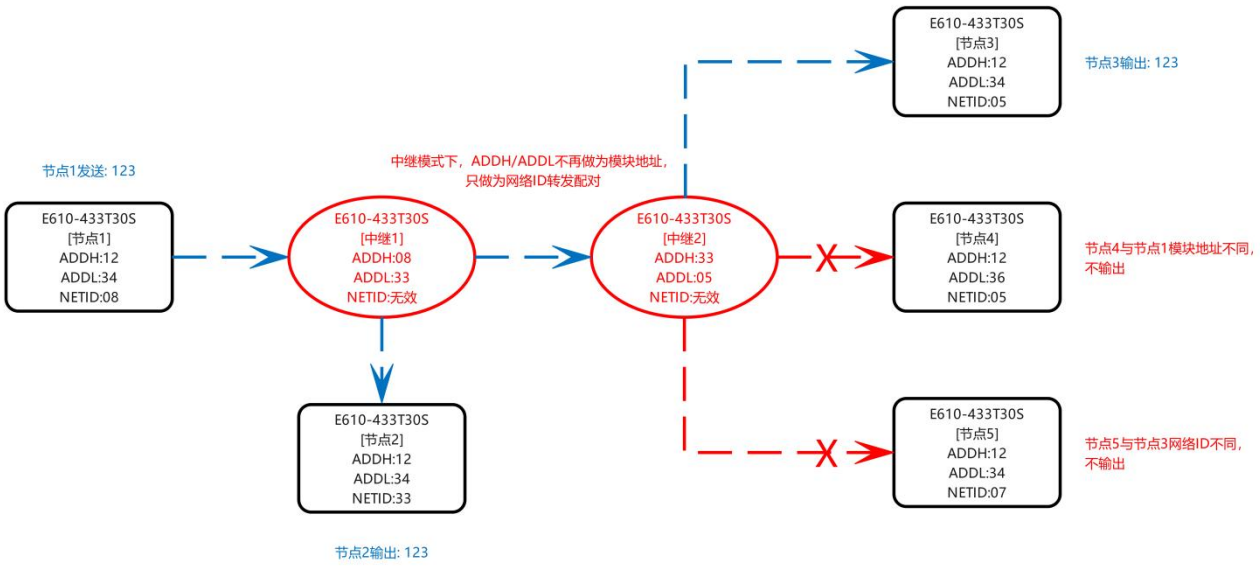
Thus, the nodes 3 and the node 4 can receive the node 1 data. Node 4 normally outputs data, and node 3 has different addresses from node 1, so it does not output data.

③ Bi-directional relay

As configured, data nodes 2 and 4 sent by nodes 1 may be received, and data sent by nodes 2 and 4 may also be received by nodes 1.

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9 Configuration Tool Description

- The following figure shows the display interface of E610-433T 30S. Users can switch to command mode through M0 and M1, and quickly configure and read parameters in the upper computer.



- In the configuration computer, the module address, frequency channel, network ID and key are all decimal display mode; taking the values of each parameter:

  Network address: 0~65535

  Frequency channel: 0~61

  network ID:0~255

  Key: 0~65535

- When the user uses the upper computer configuration relay mode, they need to pay special attention to, because in the upper computer, each parameter is decimal display mode, so the module address and network ID need to be

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filled in through the conversion input system;

If the network ID input by the transmitter A is 02 and the network ID input by the receiver B is 10, then the relay R sets the module address, convert the hex value 0X020A into the decimal value 522 as the module address filled in by the relay R;

That is, the module address value that the relay terminal R needs to be filled in is 522.

10 Firmware Upgrade

The E610 module supports serial port firmware upgrade. When special after-sale support is needed, you can contact us to obtain the corresponding firmware for upgrade processing.

Method 1: Use the TTL to USB tool to connect the module VCC / TX / RX / GND, and control the M0 / M1 level to enter the configuration mode. Select the firmware upgrade tab in the official website configuration tool, click the "Open File" button to select the firmware, then click to download, and wait for the progress bar 100%.



Method 2: the module first power, the module AUX pin and GND pin on (at least 1 second before release), the module will automatically enter the upgrade mode, and then use the configuration tool to download the firmware.

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11 Hardware Design

- It is recommended to use DC voltage regulator power to supply the module, the power ripple coefficient is as small as possible, and the module should be reliably grounded;
- Please note the correct connection of the positive and negative poles of the power supply, if the reverse connection may cause permanent damage to the module;
- Please check the power supply to ensure that between the recommended supply voltage, exceeding the maximum value will cause permanent damage to the module;
- Please check the stability of the power supply, and the voltage cannot fluctuate substantially and frequently;
- When designing power supply circuit for modules, it is often recommended to retain more than 30% allowance, and the whole machine is conducive to long-term stable work;
- Modules should be as far as possible away from the power supply, transformer, high frequency wiring and other electromagnetic interference parts;
- High frequency digital routing, high frequency analog wiring, power wiring must avoid below the module, if really need to pass below the module, assuming that the module is welded in Top Layer, Top Layer in the contact part of the module with copper (all paved copper and good grounding), must be close to the digital part of the module and line in Bottom Layer;
- Assuming that the module is welded or placed in Top Layer, it is also wrong to walk randomly in Bottom Layer or other layers, which will affect the stray dispersion and receiving sensitivity of the module to different degrees;
- Assuming that there are devices with large electromagnetic interference around the module will also greatly affect the performance of the module, according to the strength of the interference according to the module, if the situation allows to do appropriate isolation and shielding;
- Assuming that there is a wiring around the module with large electromagnetic interference (high frequency digital, high frequency simulation, power wiring) will also greatly affect the performance of the module, according to the strength of the interference is recommended to be appropriate away from the module, if the situation allows to do appropriate isolation and shielding;
- If the communication line uses a 5V level, the 1k-5.1k resistance must be connected in series (not recommended, there is still a risk of damage);
- The antenna installation structure has a great impact on the performance of the module, so make sure that the antenna is exposed and the best vertical upward;
- When the module is installed inside the casing, a high-quality antenna extension line can be used to extend the antenna to the outside of the casing;
- The antenna must not be installed inside the metal shell, which will greatly weaken the transmission distance.

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12 FAQ

12.1 Communication range is too short

- When there is a linear communication obstacle, the communication distance will decay accordingly;
- Temperature, humidity, the same frequency interference, will lead to the communication packet loss rate increased;
- Ground absorption, reflection of radio waves, close to the ground test effect is poor;
- Seawater has a strong ability to absorb radio waves, so the seaside test effect is poor;
- There are metal objects near the antenna, or placed in the metal shell, the signal attenuation will be very serious;
- Power register setting is wrong, the air rate setting is too high (the higher the air rate, the closer the distance);
- At room temperature, the low voltage of the power supply is lower than the recommended value, and the lower the voltage, the lower the power generation;
- The antenna is poor to match the module or the quality of the antenna itself.

12.2 Module is easy to damage

- Please check the power supply to ensure that between the recommended supply voltage, exceeding the maximum value will cause permanent damage to the module;
- Please check the stability of the power supply, and the voltage cannot fluctuate substantially and frequently;
- Please ensure anti-static operation during installation and use process and static sensitivity of high frequency devices;
- Please ensure that the humidity should not be too high, and some components are humidity sensitive devices;
- If there is no special demand, it is not recommended to use it at too high or too low temperature.

12.3 BER(Bit Error Rate) is high

- There is the same frequency signal interference nearby, stay away from the interference source or modify the frequency, channel to avoid interference;
- The power supply is not ideal may also cause disorderly code, be sure to ensure the reliability of the power supply;
- Extension line, feeder quality is poor or too long, will also cause high bit error rate.

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13. Production guidance

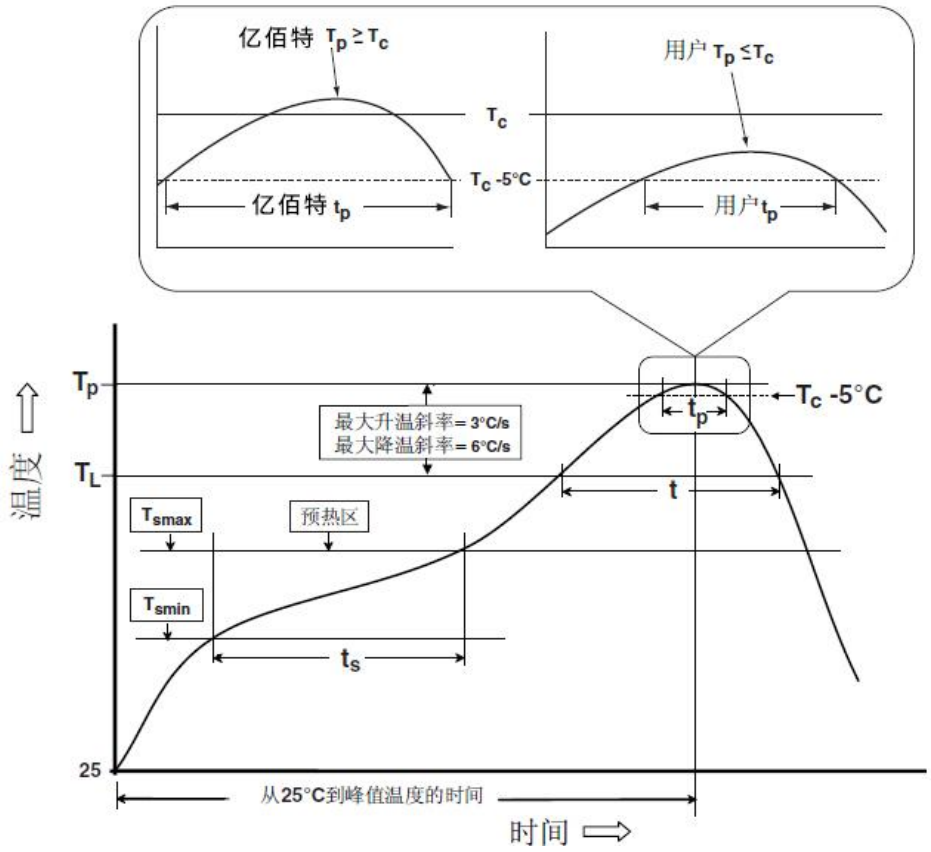
13.1 Reflow soldering temperature

Reflow weld curve characteristics		Lead process assembly	Lead-free process assembly
Preheat / heat preservation	Minimum Temperature (Tsmin)	100℃	150℃
	Maximum Temperature (Tsmax)	150℃	200℃
	Time (Tsmin to Tsmin)	For the 60-120 seconds	For the 60-120 seconds
Temperature rise slope (TL ~ Tp)		At 3℃ / s, with the maximum value	At 3℃ / s, with the maximum value
Liquid-phase temperature (TL)		183℃	217℃
Hold time above the TL		60~90 Seconds	60~90 Seconds
Package bulk peak temperature Tp		Users must not exceed the temperature specified on the "Humidity sensitivity" label of the product.	Users must not exceed the temperature specified on the "Humidity sensitivity" label of the product.
Time (Tp) within 5℃ of the specified grade temperature (Tc), shown in the figure below		20 Seconds	30 Seconds
Cooling slope (Tp ~ TL)		6℃ / s, maximum value	6℃ / s, maximum value
Time from the room temperature to the peak temperature		Six minutes, the longest	8 Minutes, longest
The peak temperature (Tp) tolerance of the temperature curve is defined as the upper limit of the user			

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13.2 Reflow welding curve diagram



14 Other recommended models

Model	Chip	frequency Hz	TX power dBm	Distance km	Packaging form	Size mm	CI
E62-433T20D	-	433M	20	1	plug-in components	21*36	TTL
E62-433T30D	-	433M	30	1	plug-in components	21*36	TTL
E34-2G4H11S	-	2.4G	11	0.13	paster	12*19	TTL
E34-2G4D11S	-	2.4G	11	0.13	paster	12*19	TTL
E34-2G4H20D	nRF24L01+	2.4G	20	2.5	plug-in components	21*36	TTL
E34-2G4D20D	nRF24L01+	2.4G	20	2.5	plug-in components	21*36	TTL
E34-2G4H27D	nRF24L01+	2.4G	27	5	plug-in components	21*36	TTL
E34-2G4D27D	nRF24L01+	2.4G	27	5	plug-in components	21*36	TTL
E70-433T14S2	CC1310	433M	14	1.5	paster	14*20	TTL
E70-433T14S	CC1310	433M	14	1.5	paster	16*26	TTL
E70-433T30S	CC1310	433M	30	6	paster	24*38.5	TTL

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E70-900T14S2	CC1310	868M /915M	14	1.5	paster	14*20	TTL
E70-900T14S	CC1310	868M /915M	14	1.5	paster	16*26	TTL
E70-900T30S	CC1310	868M /915M	30	6	paster	24*38.5	TTL

15 Antenna recommendation

Antenna is an important role in the communication process, and often inferior antenna will have a great impact on the communication system, so our company recommends some antennas as antennas supporting our wireless modules with excellent performance and reasonable price.

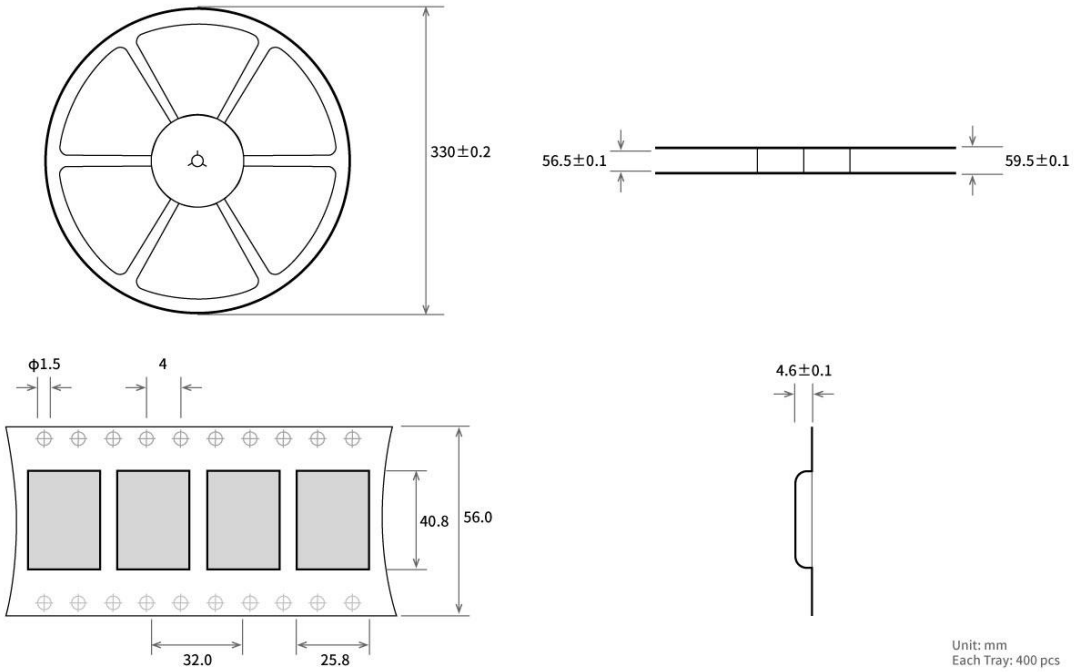
Model	Type	Frequency Hz	Interface	Gain dBi	Altitude mm	Feeder cm	Feature
TX433-FPC-5711	Flexible antenna	433M	IPEX-1	2.5	10.5*57	-	Built-in flexible, FPC soft antenna
TX433-JZ-5	Rubber rod antenna	433M	SMA-J	2.0	52	-	Ultra-short straight, omnidirectional antenna
TX433-JZG-6	Rubber rod antenna	433M	SMA-J	2.5	62	-	Ultra-short straight, omnidirectional antenna
TX433-JW-5	Rubber rod antenna	433M	SMA-J	2.0	50	-	Bend the adhesive rod, and the omnidirectional antenna
TX433-JWG-7	Rubber rod antenna	433M	SMA-J	2.5	75	-	Bend the adhesive rod, and the omnidirectional antenna
TX433-JK-11	Rubber rod antenna	433M	SMA-J	2.5	110	-	Bendable adhesive rod, omnidirectional antenna
TX433-JK-20	Rubber rod antenna	433M	SMA-J	3.0	210	-	Bendable adhesive rod, omnidirectional antenna
TX433-XP L -100	The suction dish antenna	433M	SMA-J	3.5	185	100	Small suction cup antenna, cost-effective
TX433-XP-200	The suction dish antenna	433M	SMA-J	4.0	190	200	Neutral suction cup antenna, low loss
TX433-XPH-300	The suction dish antenna	433M	SMA-J	6.0	965	300	Large sucker antenna, with high gain

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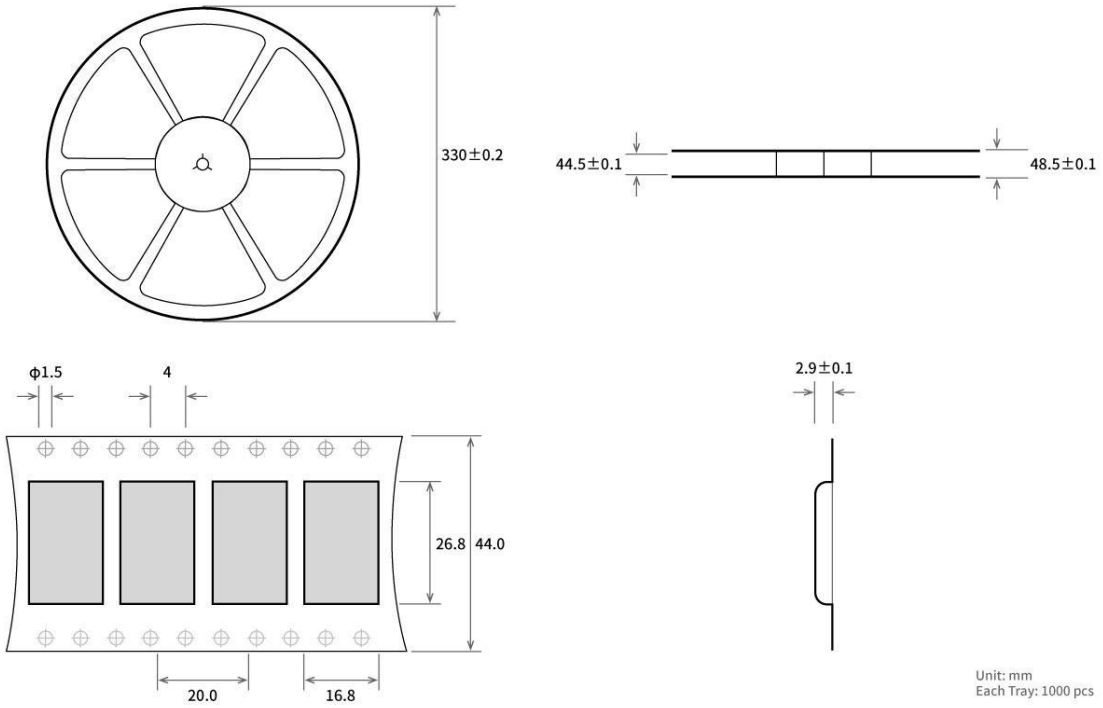
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16 Batch packaging method

16.1 E610-433T20S / E610-433T30S packaging mode



16.2 E610-433T30S / E610-900T30S packaging mode



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Revise the history

Version	Date	Description	Issued by
1.0	2022-12-15	The initial version	Ning
1.1	2023-02-9	New low-power products	Hao
1.2	2023-9-11	Revise the content	Hao
1.3	2023-11-17	Revise the content	Hao
1.4	2023-12-4	Add 900 frequency band products	Hao
1.5	2024-8-21	Fixed the 900 band range description error	Hao

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