Product specification

JN5189 2.4GHz ZigBee Multifunction SoC Wireless Module

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CONTENTS

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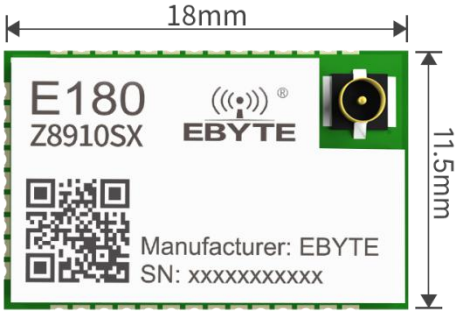
1. Product Overview

1.1 Brief Introduction



E180-Z8910SX is a ZIGBEE3.0 module designed and produced by Chengdu Ebyte based on NXP JN5189 wireless SOC. It has a small size, low power consumption, high reliability, and works in the 2.4GHz frequency band. It has an ARM architecture, M4 core, and a clock frequency of up to 48MHZ. The high-performance MCU, the maximum transmit power can reach 11dBm, and the lowest period sleep current can reach 1120nA. It integrates all node functions such as coordinator, router, terminal, and sleep terminal. The coordinator/router can directly connect to 150 terminal sub-nodes.

JN5189 is a wireless microcontroller with great potential to become the first choice for future smart home, IoT transformation, and industrial automation. Its network characteristics comply with the ZIGBEE 3.0 standard and provide a complete application integration solution based on the IEEE802.15.4 standard ISM frequency band. The product has been tested and certified by a series of authoritative radio frequency instruments, combined with years of market experience and the actual needs of users in the industry, integrates the extremely complex communication protocol of wireless products into the built-in SoC, supports serial transparent transmission mode, and integrates quickly and easily The self-organizing network function used provides multi-channel configurable ADC, IO, and PWM interfaces, which can simplify the complex and greatly simplify the complex development process of wireless products, so that your products can be quickly put into the market at a lower cost.

1.2 Feature

- Centralized network management: ZIGBEE 3.0 security standard centralized network access mechanism, data security and reliability;
- Large capacity: 640K capacity flash, 152K capacity RAM.
- Network nodes: parent nodes such as coordinators and routers can access up to 150 terminal child nodes, and network nodes can be expanded to more than 500;
- Ultra-low power consumption performance: cycle sleep power consumption is as low as 1120nA;
- Role switching: The user can switch the device arbitrarily among nodes such as coordinator, router, terminal and dormant terminal through serial port commands;
- Support multiple network topologies: point-to-point, star network, MESH network;
- Support fast broadcast: the minimum broadcast period can reach 500ms;
- Network self-healing: If the intermediate node of the network is lost, other networks will automatically join or maintain the original network;
- Address retrieval: Users can find the corresponding short address according to the MAC address of the node that has been added to the network, and at the same time find the corresponding long address of each node in the network according to the short address of the node.
- Data security: Integrate ZIGBEE 3.0 security communication standard, and the network contains multi-level

security keys;

- Serial port configuration: The module has built-in serial port commands, and users can configure (view) the parameters and functions of the module through the serial port commands.
- Change of network PAN_ID: Any switch of network PAN_ID, users can customize PAN_ID to join the corresponding network or automatically select PAN_ID to join the network;
- GPIO control: local/remote GPIO level control, 3 IOs can be selected;
- PWM control: local/remote PWM control, 4 PWM channels for users to choose;
- ADC control: local/remote ADC reading, 3 ADC channels for users to choose (including power supply voltage detection);
- One key to restore the baud rate: If the user forgets or does not know the baud rate, this function can be used to restore the default baud rate to 115200.
- Serial port receive wakeup: support the serial port receive wakeup function. When the module is in sleep state, it will be awakened when a frame of data is received. This data is a wake-up frame used to wake up the module and will not be processed as data.
- Module reset: the user can reset the module through the serial port command.
- Restore factory settings: the user can restore the factory settings of the module through the serial port command
- Over-the-air configuration: the user can use the over-the-air configuration command to remotely configure other devices in the network.

1.3 Introduction of Equipment Type

There are four types of logical devices in the ZigBee network: Coordinator, Router, End-Device and Sleep-End-Device. The ZigBee network consists of a Coordinator, multiple Routers, and multiple End_Devices (the terminal nodes can be divided into sleeping terminals and non-sleeping terminals). This product supports all nodes and can be interconnected with E180-ZG120A/B, E180-Z6907, E180-Z5812 and other models.

1.3.1 Non-sleeping terminal

The main task of the terminal device is to send and receive messages, and other nodes are not allowed to connect with the terminal device. A non-sleeping terminal is always in the working state and can receive and send data at any time.

1.3.2 Sleeping terminal

The dormant terminal, when there is no data transmission and reception, enters the dormant state, the dormant current is as low as about 1.1uA, and the pins that are not used by the dormant terminal node should be left floating. After sleep, all pins of the module have been configured as pull-down input mode, but the GPIO1 and GPIO2 channels do not support pull-down input. If the two GPIO channels of the sleep node are connected to an external circuit, it will affect the sleep power consumption of the module.

When you need to send wireless data or perform command operations, you need to send a wake-up frame through the serial port first. It is recommended to use "FF FF FF FF FF" with 5 bytes of "FF" to wake up. The wake-up time lasts for Uart_holdtime, during which serial data can be processed. (Configuration command, effective load), when a frame of serial port data is successfully received, the wake-up timeout counter will be refreshed, and the wake-up duration will go further by Uart_holdtime, otherwise the device will go to sleep again. Uart_holdtime defaults to 1000ms and supports HEX command to change its value.

Sleep terminal wake-up can also be awakened through the function pin WAKE. WAKE defaults to high level. Pull down

the WAKE pin to wake up the module continuously, and release the WAKE pin to restore the default high-level module to resume sleep.

When data needs to be received, the data is received through periodic wake-up. The longer the wake-up period is set, the longer the reception will be. The wake-up period setting must be less than 30 seconds. If you only need to upload data, you can set the wake-up period to be greater than 30 seconds or longer to reduce power consumption (the default is 10 seconds), such as battery-powered sensors.

1.4 Application scenarios

- Smart home and industrial sensors, etc.;
- Security system, positioning system;
- Wireless remote control, UAV;
- Wireless game remote control;
- Medical and healthcare products;
- Wireless voice, wireless headset;
- Advanced meter reading architecture (AMI);
- Applications in the automotive industry;
- Building automation solutions;
- Application of agricultural greenhouse automation;

2. Technical Parameters

2.1 Limit parameter

Main parameter	Performance		Note
	Min	Max	
Voltage supply [V]	1.9	3.6	Voltage over 3.6V will cause permanent damage to module
Blocking power [dBm]	-	10	Chances of burn is slim when modules are used in short distance
Operating temperature [℃]	-40	+85	Industrial grade

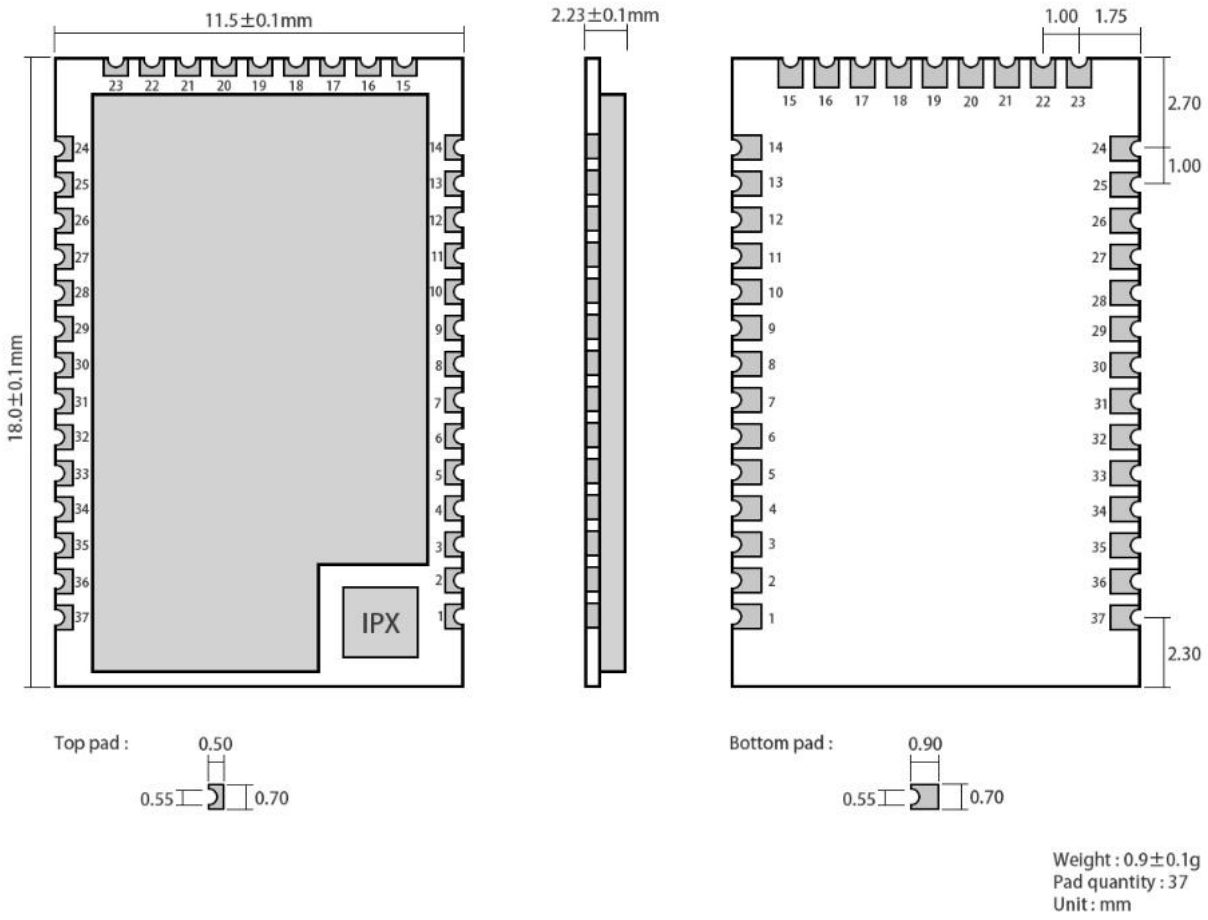
2.2 Operating parameter

Main parameter	Performance			Note
	Min	Typ	Max	
Voltage supply [V]	1.9	3.3	3.6	≥3.3 V ensures output power

Communication level [V]			3.3		For 5V TTL, it may be at risk of burning down
Operating temperature [℃]		-40	-	+85	Industrial grade
Frequency [MHz]		2405		2480	ISM band
Power consumption	Transmitting current（mA）	–	34.1	–	Emission current 34.1mA at 11dbm
	Receiving current（mA）	–	7.2	–	–
	Turn-off current（μA）	–	1120	–	Periodic sleep current averages 1120nA (1.1uA)
maximum emitting power [dBm]		–	11	–	–
Air data rate（bps）		–	250k	–	–

Main parameter	Description	Note
Distance	500m	Between two points (Zigbee network supports routing multi-hop function, which can extend the transmission distance by adding routers).
Support agreement	Zigbee 3.0	Single transmission maximum length
Package	SMD	-
Connector	1.27mm	stamp hole
Full name of IC	JN5189HN/001Z	
FLASH	640KB	-
RAM	152KB	
Kernel	ARM M4 Kernel	
Size	11.5*18.0mm	
Antenna	IPEX	50Ω Impedance

3. Dimension and Pin Definition



No.	Pin item	Pin direction	Application
1	NC	-	Reserved, directly suspended
2	GND	-	Ground wire, connected to the power reference ground
3	NC	-	Reserved, directly suspende
4	PIO1(WAKE)	Input	The WAKE pin is mainly used to wake up the dormant terminal. It is high when it is powered on. When the pin is pulled low externally, the dormant terminal device will be awakened.
5	PIO8(TX)	Output	Serial transmission port TX
6	PIO9(RX)	Input	Serial receiving port RX
7	NC	-	Reserved, directly suspended
8	NC	-	Reserved, directly suspended
9	PIO2(MODE)	Input	Working mode switching pin, when the pull-down time is greater than 500ms, working mode switching 。
10	PIO3(BAUD_R)	Input	The UART_BAUD_RESET pin is used to reset the baud rate of the device. It defaults to a high level after power-on. In any mode, the module serial port parameters will be restored to the default 115200 if the pin is pulled down for more than 1000ms.

11	PIO6(ACK)	Output	The ACK pin is used to indicate the status of the last user data transmission. The pin is pulled low before the transmission is started, and the pin is pulled high after the transmission is successful.
12	PIO7(GPIO0)	Input/Output	GPIO input/output port 0
13	VCC	-	Module power supply positive reference voltage, voltage range
14	GND	-	Ground wire, connected to the power reference ground
15	PIO10(GPIO1)	Input/Output	GPIO input/output port 1
16	PIO4	-	Reserved, directly suspended
17	PIO5	-	(PIO5 pulled low, the module is in download mode; PIO5 pulled high, the module is in running mode)
18	PIO16(AUX)	Output	The AUX pin indicates the current working status of the device. When the pin is low, it indicates that the device is busy, and the high level indicates that the device is idle.
19	PIO11(GPIO2)	-	Reserved, directly suspended
20	NC	-	Reserved, directly suspended
21	PIO14(ADC1)	Input	ADC detection port 1
22	PIO15(ADC2)	Input	ADC detection port 2
23	NC	-	Reserved, directly suspended
24	NC	-	Reserved, directly suspended
25	SWCLK	-	Reserved, directly suspended
26	SWDIO	-	Reserved
27	PIO17(PWM3)	Output	PWM output port 3
28	PIO18(PWM2)	Output	PWM output port 2
29	PIO19(PWM1)	Output	PWM output port 1
30	PIO21(LINK)	Output	The LINK pin indicates the current network status of the module, and the output high-level meter has been added to the network
31	PIO20(PWM0)	Output	PWM output port 0
32	NC	--	Reserved, directly suspended
33	NC	-	Reserved, directly suspended
34	NC	-	Reserved, directly suspended
35	NC	-	Reserved, directly suspended
36	GND	Input/Output	Ground wire, connected to the power reference ground
37	RESET	Output	Reset pin

4. Operating mode

4.1 Transmission mode

When the module enters the transmission mode, any data received by the serial port will be sent out wirelessly. The transmission mode is wireless communication between network nodes. The communication methods include uni-cast, protocol uni-cast, multicast, protocol multicast, and broadcast. and so on.

4.2 Configuration Mode

When the module enters the configuration mode, the data received by the serial port defaults to the configuration command to configure and operate the device. In the configuration mode, the data received by the serial port of the module is regarded as a HEX command.

4.3 Mode switch

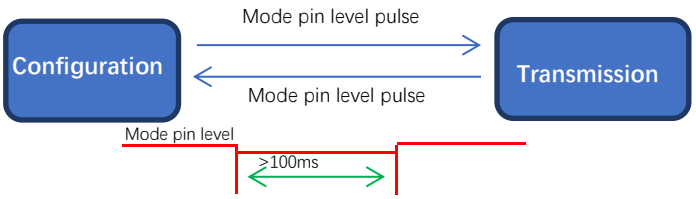
4.3.1 Command switching

The module power-on initialization defaults to the transmission mode.

In the transmission mode, when the module serial port receives the "2A 2D 2E" character, it will enter the configuration mode. After entering the configuration mode, it will return the "7A 7D 7E" character. In the configuration mode, when the module serial port receives the "2F 2C 2B" character, the module exits the configuration mode and enters the transmission mode. After entering the transmission mode, it returns the "7F 7C 7B" character.

4.3.2 Pin switching

Working mode switch pin PIO2, internal configuration pull-up resistor input mode, power-on default high level, in any mode when the mode switch pin PD4 is pulled down for more than 100ms, the module work mode switch. Switch to configuration mode by pin, serial port will return to "7A 7D 7E" character; switch to transmission mode via pin, serial port will return to "7F 7C 7B". The details are shown in the figure below:



5. Sending and receiving method

5.1 The way of data transmission

The data transmission mode of the module includes 5 modes: unicast, protocol unicast, multicast, protocol multicast, and broadcast.

5.1.1 Broadcast mode

In the broadcast mode, the sending device sends the data received by the serial port to each node in the network, and all devices in the network will receive the data. The minimum broadcast period is 500ms.

5.1.2 Multicast mode

In the multicast mode, first set the group number of the devices in the network in the configuration mode (grouping, restart to take effect), and the sending device specifies the target group number to send in the configuration mode (which group to send the data to), and then The sending device enters the transmission mode and sends the data received by the serial port to the network. The device with the same group number in the network will receive the data, and the minimum multicast period is 500ms.

5.1.3 Protocol Multicast Mode

When the sending device is in transmission mode, the serial port receives data, the first byte indicates the target group number, and the following data indicates valid wireless transmission data. No need to enter the configuration mode to configure the target group number

5.1.4 Uni-cast mode

In unicast mode, the devices in the network conduct point-to-point communication through the network address. The sending device sends the received serial port data to the target address device, and the target address device can return an ACK to the sending device after receiving the data to indicate that it has received the data. Data (the dormant terminal node has no ACK function).

5.1.5 Protocol uni-cast mode

When the sending device is in transmission mode, the serial port receives data. The first two bytes represent the short address of the target network, and the following data represents valid wireless transmission data. There is no need to

enter the configuration mode to configure the short address of the target network.
Note: When configured as broadcast or multicast, the period of periodic transmission is recommended to be greater than or equal to 500ms, otherwise it may cause data congestion.

5.2 Output mode of received data

The received data output mode refers to the way in which the serial port outputs data after the module receives wireless data;

5.2.1 Transparent output

If the output mode of the configuration device is transparent output, the module will output the original data through the serial port after receiving the wireless data;

5.2.2 Data + short address

When the output mode of the device is data + short address, after the module receives wireless data, the serial port will output the original data + the short address of the sending device;

5.2.3 Data + Long Address

This product does not support this output mode.

5.2.4 Data + RSSI

When the output mode of the device is data + RSSI, after the module receives the wireless data, the serial port will output the original data + the RSSI value of the received data packet;

5.2.5 Data + short address + RSSI

When the output mode of the device is data + short address + RSSI, after the module receives the wireless data, the serial port will output the original data + the short address of the sending device + the RSSI value of the received data packet;

5.2.6 Data + Long Address + RSSI

This product does not support this output mode.

6. Application function and command configuration

6.1 Function pins

6.1.1 LINK detailed explanation

The LINK pin indicates the current network status of the module. After the device is successfully connected to the network, the current pin is pulled high. When the device has no network or the parent node is lost, this pin is pulled low. The external device can query the device network status through the pin level.

6.1.2 Detailed WAKE

The WAKE pin is mainly used to wake dormant terminals. It defaults to a high level when powered on. When the pin is pulled low externally, the dormant terminal device will continue to be awakened. When the pin is released externally, it returns to high level and enters sleep ; Sleep time is determined by the duration of external pulling down the pin; for non-sleeping devices, this pin is meaningless;

6.1.3 Detailed AUX

The AUX pin indicates the current working status of the device. When the pin is low, it indicates that the device is busy; when the pin is low, it indicates that the device is idle; when the device receives data, the module will pull the AUX pin low for AUX_delaytime, and the serial port will start outputting. Data, used to wake up the external control device, AUX_delaytime defaults to 4ms, which can be changed by the serial port command and the customer decides according to the wake-up time of the main chip;

6.1.4 Detailed ACK

The ACK pin is used to indicate the status of the last user data transmission. The pin is pulled low before the transmission is started, and the pin is pulled high after the transmission is successful. The user can judge whether the data has arrived successfully through the pin state. This pin function cannot instruct the coordinator to send a broadcast message. (Only for non-sleeping terminals).

6.1.5 Detailed explanation of UART_BAUD_RESET

The UART_BAUD_RESET pin is used to reset the device baud rate. It defaults to a high level after power-on. In any mode, the module serial port parameters will be restored to the default 115200 and 8N1 by pulling this pin down for more than 1000ms.

Function pin	Pin port
LINK	PIO21
WAKE	PIO1
AUX	PIO16
ACK	PIO6
UART_BAUD_RESET	PIO3

6.2 Wireless remote configuration function

The module supports the remote configuration function, which is identified by the two-byte wireless configuration ID by default as A8 8A. The user can modify the remote configuration ID of the module. When the first two bytes of the wireless air data received by the module are the wireless configuration ID, The module judges that the data packet is a remote configuration command and executes the operation corresponding to the command. The data packet will not be output through the serial port. The remote configuration of the dormant terminal needs to wake up first.

6.3 Function parameter description

The module provides a wealth of configurable parameters, which can be used flexibly according to actual application requirements to construct different forms of networks.

Configuration information	Attributes	Parameter range	Function Description
PANID	Read/Write	0x0000 ~ 0xFFFF	PANID is the network identifier of ZIGBEE, which is used to determine the identity of the network to which it belongs. The PANID of all devices in the same network must be the same. When the terminal or router is configured as 0xFFFF, it can join any network where the same channel already exists;
Local network address	Read	0x0000 ~ 0xFFFF	It is used to distinguish each node in the network. Each device is in the same network. The local network address must be unique. When not joining the network, the network address of the device is 0xFFFF. After joining, the short address of the device is assigned by the coordinator. The coordinator is fixed as: 0x0000;
Network status	Read	0、2、3	Indicates the network status of the current device, including no network, has successfully joined the network, there is a network without a parent node;
Destination network address	Read/Write	0x0000 ~ 0xFFFF	The current device communication target (short address) can be switched at any time through configuration commands;
Local MAC address	Read	64bitMAC	The MAC address allocated by the network of this module cannot be changed by the user (re-entry to the network to change)
Destination MAC address	Read/Write	64bitMAC	In fixed-point mode, use long address to send
Equipment type	Read/Write	C、R、E、S	They are: coordinator, router, non-sleeping terminal, and sleeping terminal;
Channel	Read/Write	CH11 ~ 26	The physical channel where ZIGBEE works ;
Send mode	Read/Write	0、1、2、3、4、5	The transmission modes of the configuration module are: broadcast mode, multicast mode, short address on demand mode, long address on demand mode, protocol on demand, and protocol multicast. For details, please refer to the corresponding mode function introduction;
Output mode	Read/Write	0、1、3、4	Configure the data output mode of the module, respectively: Penetrate;

			Data + short address; Data + RSSI; Data + short address + RSSI;
Transmit power	Read/Write	-3~11dbm	The output power of the module requires high power consumption, and the transmission power can be reduced to save the average power consumption when the distance is not required;
Remote configuration ID	Read/Write	2 Byte	Used to judge whether the data received wirelessly in the air is a remote configuration command. Customers can change the unlimited configuration ID according to their needs. The default is A8 8A;
Local network group number	Read/Write	1 ~ 254	Used to configure the group number of the device in the network ;
Target network group number	Read/Write	1 ~ 254	Used to configure the group number of the corresponding target when the device is multicast;
Wake-up period (sleep time)	Read/Write	1 ~ 2010S	Used to configure the wake-up period of the terminal sleeping device. The larger the period, the lower the overall power consumption, but the greater the delay in receiving data;
Lost parent node reconnection cycle	Read/Write	1 ~ 2010S	When the parent node is lost (the coordinator is powered off), the terminal device will reconnect to the previous network at regular intervals ;
Maximum number of reconnections	Read/Write	0 ~ 255 times	After the parent node is lost, the maximum number of reconnections. If the reconnection has not been successful, the previous network information will be cleared, and the new network will be rescanned. The scanning period is equal to the reconnection period;
IO status	Read/Write	High/low	Access/control module GPIO channel level status;
PWM	Read/Write	1us ~ 1700ms	The duty cycle and period of the PWM channel of the access/control module ;
ADC value	Read	0 ~ 3300mv	Read the ADC value of the device, among which channel 0 can read the device power supply voltage value;

6.4 HEX instruction set

6.4.1 Instruction Rules

Local serial port reading format:

Network parameter reading FE LEN CMD FF

Peripheral parameter reading FE LEN CMD CHANNEL FF

FE: fixed head

LEN: Actual length of DATA

CMD: Actual named ID

CHANNEL: Channel selection when reading PWM, ADC, GPIO

FF: end of command

Reading return format: FB CMD DATA

FB: fixed head

CMD: Command ID

DATA: parameter

Local serial port configuration format: FD LEN CMD DATA FF

FD: fixed head

LEN: the actual length of DATA

CMD: Actual named ID

DATA: actual parameters

FF: end of command

Configuration Return: FA CMD

FA: fixed head

CMD: Command ID

Return when reading/configuration access: F7 FF does not exist the information/reading/configuration/format failed

Wireless remote reading/configuration format: add wireless configuration ID before the command format of the local serial port

The default is A8 8A (its value can be modified), for example:

The configuration format is A8 8A FD LEN CMD DATA FF

Parameter reading format A8 8A FE LEN CMD (CHANNEL) FF

Network operation format: F5 LEN CMD DATA FF

F5: fixed head

LEN: the actual length of DATA

CMD: Actual named ID

DATA: actual parameters

FF: end of command

Configuration Return: FC CMD STATUS

FC: fixed head

CMD: Actual named ID

STATUS: 00 operation is successful

01 operation failed

6.4.2 Read instruction set

Instruction description	Command ID	Instruction format	Command example
Read device type	01	Send: FE 01 01 FF Return: FB 01 dev_type	Send: FE 01 01 FF Return: FB 01 03
Read network status	02	Send: FE 01 02 FF Return: FB 02 nwk_state	Send: FE 01 02 FF Return: FB 02 02
Read network PAN_ID	03	Send: FE 02 03 FF Return: FB 03 pan_id	Send: FE 02 03 FF Return: FB 03 FE 5B
Read local network short address	05	Send: FE 02 05 FF Return: FB 05 Short_Addr	Send: FE 02 05 FF Return: FB 05 F6 FA
Read local MAC address	06	Send: FE 08 06 FF Return: FB 06 Mac_Addr	Send: FE 08 06 FF Return: FB 06 1F 1C 21 FE FF 57 B4 14
Read the short network address of the parent node	07	Send: FE 02 07 FF Return: FB 07 Coor_shortAddr	Send: FE 02 07 FF Return: FB 07 00 00
Read the MAC address of the parent node	08	Send: FE 08 08 FF Return: FB 08 Coor_Mac_Addr	Send: FE 08 08 FF Return: FB 08 0C 46 0C FE FF 9F FD 90
Read network group number	09	Send: FE 01 09 FF Return: FB 09 group	Send: FE 01 09 FF Return: FB 09 01
Read communication channel	0A	Send: FE 01 0A FF Return: FB 0A channel	Send: FE 01 0A FF Return: FB 0A 0B
Read transmit power	0B	Send: FE 01 0B FF Return: FB 0B txpower	Send: FE 01 0B FF Return: FB 0B 0A
Read serial port baud rate	0C	Send: FE 01 0C FF Return: FB 0C baud	Send: FE 01 0C FF Return: FB 0C 09
Read sleep time	0D	Send: FE 01 0D FF Return: FB 0D sleep_time	Send: FE 01 0D FF Return: FB 0D 54
Read the short network address of the target	23	Send: FE 02 23 FF Return: FB 23 Dec_ShortAddr	Send: FE 02 23 FF Return: FB 23 00 00
Read the network group number of the target	24	Send: FE 01 24 FF Return: FB 24 Dec_netid	Send: FE 01 24 FF Return: FB 24 00
Read the long address of the target	25	Send: FE 08 25 FF Return: FB 25 Dec_mac	Send: FE 08 25 FF Return: FB 25 0A 1C 21 FE FF 57 B4 14
Read system sending mode	26	Send: FE 01 26 FF Return: FB 26	Send: FE 01 26 FF Return: FB 26 02

		send_mode	
Read data output method	27	Send: FE 01 27 FF Return: FB 27 out_mode	Send: FE 01 27 FF Return: FB 27 00
Read node rejoin cycle	29	Send: FE 01 29 FF Return: FB 29 net_rejoinperiod	Send: FE 01 29 FF Return: FB 29 05
Read the maximum number of reconnections of the lost parent node	30	Send: FE 01 30 FF Return: FB 30 net_rejoincount	Send: FE 01 30 FF Return: FB 30 05
Read wireless configuration ID	31	Send: FE 02 31 FF Return: FB 31 header	Send: FE 02 31 FF Return: FB 31 A8 8A
Read all network parameters of the device	FE	Send: FE 2F FE FF Return: FB FE all_info	Send: FE 2F FE FF Return: FB FE 03 02 FE 5B F6 FA 1F 1C 21 FE FF 57 B4 14 00 00 0C 46 0C FE FF 9F FD 90 01 0B 0A 09 54 00 00 00 0A 1C 21 FE FF 57 B4 14 02 00 FF 05 05 A8 8A
Query the long address of the target node through the short address in the network	14	Command: FE 0A 14 Short_Addr FF Return: FB 14 Mac_Addr Short_Addr	Send: FE 0A 14 F6 FA FF Return: FB 14 1F 1C 21 FE FF 57 B4 14 F6 FA
Query the short address of the target node through the long address in the network	15	Command: FE 0A 15 Mac_Addr FF Return: FB 14 Mac_Addr Short_Addr	Send: FE 0A 15 1F 1C 21 FE FF 57 B4 14 FF Return: FB 14 1F 1C 21 FE FF 57 B4 14 F6 FA
Read remote/local GPIO level	20	Command: FE 03 20 GpioId FF Return: FB 20 GpioId In/Out level	Send: FE 03 20 00 FF Return: FB 20 00 01 01
Read remote/local PWM parameters	21	Command: FE 06 21 PWMId FF Return: FB 21 PWMId start/stop Period Period duty duty	Send: FE 06 21 00 FF Return: FB 21 00 01 0A 3E 63 50
Read local/remote ADC status	22	Command: FE 03 22 adcid FF Return: FB 22 adcid voltage1 voltage2	Send: FE 03 22 00 FF Return: FB 22 00 0C E4
Read firmware version number	34	Command: FE 03 34 FF Ret	Send: FE 03 34 FF Return: FB 34 89 10 00

		urn: FB 34 FirmwareVersion	
Read the delayed printing time of AUX waking up the external MCU serial port in the wireless receiving state	35	Send: FE 01 35 FF Return: FB 35 AUX_delaytime	Send: FE 01 35 FF Return: FB 35 04
Read serial port wake-up hold time	36	Send: FE 01 36 FF Return: FB 36 Uart_holdtime	Send: FE 01 36 FF Return: FB 36 64
Read endpoint information	37	Send: FE 05 37 FF Return: FB 37 Endpoint_info	Send: FE 05 37 FF Return: FB 37 01 FE B0 05 04
Read the trust center connection key	38	Send: FE 10 38 FF Return: FB 10 TrustCentLinkKey	Send: FE 10 38 FF Return: FB 38 5A 69 67 42 65 65 41 6C 6C 69 61 6E 63 65 30 39

6.4.3 Configuration instruction set

Configure device type	Send: FD 01 01 dev_type FF Return: FA 01	Send: FD 01 01 03 FF Return: FA 01
Configure PAN_ID	Send: FD 02 03 pan_id FF Return: FA 03	Send: FD 02 03 FE 5B FF Return: FA 03
Configure the network group number	Send: FD 01 09 group FF Return: FA 09	Send: FD 01 09 01 FF Return: FA 09
Configure communication channel	Send: FD 01 0A channel FF Return: FA 0A	Send: FD 01 0A 0B FF Return: FA 0A
Configure transmit power (0-10 corresponds to power)	Send: FD 01 0B txpower FF Return: FA 0B	Send: FD 01 0B 0A FF Return: FA 0B
Configure the serial port baud rate	Send: FD 01 0C baud FF Return: FA 0C	Send: FD 01 0C 09 FF Return: FA 0C
Configure sleep time (valid for terminal)	Send: FD 01 0D sleep_time FF Return: FA 0D	Send: FD 01 0D 54 FF Return: FA 0D
Configure the target network short address	Send: FD 02 23 dec_addr FF Return: FA 23	Send: FD 02 23 00 00 FF Return: FA 23
Configure the target network group number	Send: FD 01 24 netid FF Return: FA 24	Send: FD 01 24 00 FF Return: FA 24
Configure the target long address	Send: FD 08 25 dec_mac FF Return: FA 25	Send: FD 08 25 0A 1C 21 FE FF 57 B4 14 FF Return: FA 25
Configure system sending mode	Send: FD 01 26 mode FF Return: FA 26	Send: FD 01 26 02 FF Return: FA 26
Configure the data output mode of the module	Send: FD 01 27 mode FF Return: FA 27	Send: FD 01 27 00 FF Return: FA 26
Configure node rejoin period	Send: FD 01 29 time FF Return: FA 29	Send: FD 01 29 05 FF Return: FA 29
The maximum number of rejoins after the node loses its parent node	Send: FD 01 30 time FF Return: FA 30	Send: FD 01 30 05 FF Return: FA 30
Configure wireless remote configuration ID	Send: FD 02 31 header FF Return: FA 31	Send: FD 02 31 A8 8A FF Return: FA 31
Configure all network parameters	Send: FD 1A FE all_info FF Return: FA FE	Send: FD 1A FE 03 FE 5B 01 0B 0A 09 54 00 00 00 0A 1C 21 FE FF 57 B4 14 02 00 FF 05 05 A8 8A FF Return: FA FE
Configuration Remote/local GPIO	指令 : FD 03 20 GpioId In/Out level	Send: FD 03 20 00 01 01

input and output status	FF Return: FA 20	FF Return: FA 20
Configure remote/local PWM status	指令：FD 06 21 PwmId start/stop Period1 Period2 duty1 duty2 FF Return: FA 21	Send: FD 06 21 00 FF 03 65 02 48 FF Return: FA 21
Device restart	Send: FD 00 12 FF Return: FA 12	Send: FD 00 12 FF Return: FA 12
Reset	Send: FD 00 13 FF Return: FA 13	Send: FD 00 13 FF Return: FA 13
Configure the delayed printing time for AUX to wake up the external MCU serial port in the wireless receiving state	Send: FD 01 35 AUX_delaytime FF Return: FA 35	Send: FD 01 35 04 FF Return: FA 35
Configure the serial port wake-up hold time	Send: FD 01 36 Uart_holdtime FF Return: FA 36	Send: FD 01 36 64 FF Return: FA 36
Configure endpoint information	Send: FD 05 37 Endpoint_info FF Return: FA 37	Send: FD 05 37 01 FE B0 05 04 FF Return: FA 37
Configure the trust center connection key	Send: FD 10 38 TrustCentLinkKey FF Return: FA 38	Send: FD 10 38 5A 69 67 42 65 65 41 6C 6C 69 61 6E 63 65 30 39 FF Return: FA 38

6.4.4 Network operation instruction set

Open network	Send: F5 01 40 01 FF Return: FC 40 00	Send: F5 01 40 01 FF Return: FC 40 00
Leave the network	Send: F5 01 40 02 FF Return: FC 40 00	Send: F5 01 40 02 FF Return: FC 40 00
New network	Send: F5 01 40 03 FF Return: FC 40 00	Send: F5 01 40 03 FF Return: FC 40 00

Open the network: The main coordinator node is effective, which means that the open network allows the terminal to join for a period of time. The command configures the "centralized network open time" parameter. This command is invalid for the terminal and the dormant terminal, and only the coordinator node is effective.

Leaving the network: The coordinator executes this command to clear the original network and rebuild a new network at the same time. The terminal node executes this command to clear the saved network, and then executes the restart or new network command to join the new network.

New network: mainly for the terminal, execute this command to join a new network, you need to leave the network and then execute the new network to join the new network.

6.5 HEX parameter description

6.5.1 System sending mode

Read command format:

Command format	Command example
Send: FE 01 26 FF Return: FB 26 send_mode	Send: FE 01 26 FF Return: FB 26 02

Configuration instruction format:

Command format	Command example
Send: FD 01 26 mode FF Return: FA 26	Send: FD 01 26 02 FF Return: FA 26

mode:

0x00 broadcast (default);

0x01 Multicast (you need to configure the target group number in the configuration mode first);

0x02 Transparent transmission on demand + short address (need to configure the target short address in configuration mode);

0x03 transparent transmission on demand + long address (need to configure the target long address in configuration mode);

0x04 protocol on demand + short address (the first two bytes in the transmission mode are the short address of the target device network);

0x05 protocol multicast (the first byte in the transmission mode is the target network group number);

6.5.2 Receive data output mode

Read command format:

Command format	Command example
Send: FE 01 26 FF Return: FB 27 out_mode	Send: FE 01 27 FF Return: FB 27 00

Configuration instruction format:

Command format	Command example
Send: FD 01 27 mode FF Return: FA 27	Send: FD 01 27 00 FF Return: FA 26

mode:
0x00 transparent transmission (default);
0x01 data + short address;
0x03 data+RSSI;
0x04 data + short address + RSSI;

Note: The sender supports a single packet with a maximum data packet length of 82 bytes

6.5.3 Network node type

Read command format:

Command format	Command example
Send: FE 01 01 FF Return: FB 01 dev_type	Send: FE 01 01 FF Return: FB 01 03

Configuration instruction format:

Command format	Command example
Send: FD 01 01 dev_type FF Return: FA 01	Send: FD 01 01 03 FF Return: FA 01

dev_type:

0x03 terminal (default)

0x04 Sleep terminal

The configuration of changing the node type needs to be restarted to take effect. In normal operation, the device configured with the node type will leave the current network in a non-network state, and will switch to the changed node type after restarting. The dormant terminal supports the wake-up function of the serial port receiving pin. The first frame of data sent by the serial port during sleep is the wake-up frame. It is recommended to use the 5-byte "FF" to wake up "FF FF FF FF FF".

6.5.4 Network status

Read command format:

Command format	Command example
Send: FE 01 02 FF Return: FB 02 nwk_state	Send: FE 01 02 FF Return: FB 02 02

nwk_state:

0x00 No network

0x02 has joined the network

0x03 There is a network but no parent node

No network: It means that the module has not joined any network in the factory state, or has joined the network before but performed the action of leaving the network, and the network information saved in the flash is cleared.

Already joined the network: it means that the module has joined the network normally, and data can be sent and received normally.

There is a network but no parent node: It means that the module has joined the network, but the parent node is offline, and the data cannot be sent and received normally.

6.5.5 Network PAN_ID

Read command format:

Command format	Command example
Send: FE 02 03 FF Return: FB 03 pan_id	Send: FE 02 03 FF Return: FB 03 FE 5B

Configuration instruction format:

Command format	Command example
Send: FD 02 03 pan_id FF Return:FA 03	Send: FD 02 03 FE 5B FF Return: FA 03

pan_id:

0x0000 ~ 0xFFFE fixed network PAN_ID

0xFFFF random network PAN_ID

Note: If the coordinator is configured as 0xFFFF, then PANID is randomly selected to establish a network. Terminals, routing, etc. can be configured with 0xFFFF to join any PANID network. PANID parameters need to be configured before joining the network.

6.5.6 Network short address:

Read command format:

Command format	Command example
Send: FE 02 05 FF Return: FB 05 Short_Addr	Send: FE 02 05 FF Return: FB 05 F6 FA

Short_Addr: 2 Byte address randomly assigned by the coordinator

After the network short address is added to the network, as long as you do not leave the network or switch the node type, the short network address will not change regardless of abnormal power failure or restart.

6.5.7 MAC address

Read command format:

Command format	Command example
Send: FE 08 06 FF Return: FB 06 Mac_Addr	Send: FE 08 06 FF Return: FB 06 1F 1C 21 FE FF 57 B4 14

Mac_Addr: 8 Byte, 64-bit IEEE address of the module, fixed.

6.5.8 Parent node network short address

Read command format:

Command format	Command example
Send: FE 02 07 FF Return: FB 07 Coor_shortAddr	Send: FE 02 07 FF Return: FB 07 00 00

Coor_shortAddr: 2 Bytes the short address of the parent node of the current node, if the coordinator is 0x0000

6.5.9 Parent node MAC address

Read command format:

Command format	Command example
Send: FE 08 08 FF Return: FB 08 Coor _Mac_Addr	Send: FE 08 08 FF Return: FB 08 0C 46 0C FE FF 9F FD 90

Coor_Mac_Addr: 8 Byte long address of the parent node of the current node

6.5.10 Network group number

Read command format:

Command format	Command example
Send: FE 01 09 FF Return: FB 09 group	Send: FE 01 09 FF Return: FB 09 01

Configuration instruction format:

Command format	Command example

Send: FD 01 09 group FF Return: FA 09	Send: FD 01 09 01 FF Return: FA 09

group: group number range 0x01 ~ 0xFE (default 1)

6.5.11 Network Channel

Read command format:

Command format	Command example
Send: FE 01 0A FF Return: FB 0A channel	Send: FE 01 0A FF Return: FB 0A 0B

Configuration instruction format:

Command format	Command example
Send: FD 01 0A channel FF Return: FA 0A	Send: FD 01 0A 0B FF Return: FA 0A

channel: Channel range 0x0B(11) ~ 0x1A(26) (default 11 channels), 0xFF means full channel scanning, 0xFE means scanning on the channel recommended by the zigbee alliance (including 11, 15, 20, 25 four channels).
The channel parameter needs to be configured before entering the network.

6.5.12 Transmit power

Read command format:

Command format	Command example
Send: FE 01 0B FF Return: FB 0B txpower	Send: FE 01 0B FF Return: FB 0B 0C

Configuration instruction format:

Command format	Command example
Send: FD 01 0B txpower FF Return: FA 0B	Send: FD 01 0B 0C FF Return: FA 0B

txpower: transmit power level, the default is 0C (11dbm), need to be configured before entering the network

txpower	**Transmit power level （dbm）**	**txpower**	**Transmit power level （dbm）**
00	-3	07	5
01	-2	08	6
02	-1	09	7
03	0	0A	9
04	1	0B	10
05	2	0C	11

06	3		

Note: The actual reference value of transmit power.

6.5.13 Serial port baud rate

Read command format:

Command format	Command example
Send: FE 01 0C FF Return: FB 0C baud	Send: FE 01 0C FF Return: FB 0C 09

Configuration instruction format:

Command format	Command example
Send: FD 01 0C baud FF Return: FA 0C	Send: FD 01 0C 09 FF Return: FA 0C

Baud rate parameter baud comparison table:

Buad	Baud rate	Buad	Baud rate
01	4800	08	76800
02	9600	09	115200（default ）
03	14400	0A	128000
04	19200	0B	230400
05	38400	0C	256000
06	50000	0D	460800
07	57600		

Note: To change the baud rate configuration of serial communication, you need to restart the device for the changed baud rate to take effect

6.5.14 Sleep time

Read command format:

Command format	Command example
Send: FE 01 0D FF Return: FB 0D sleep_time	Send: FE 01 0D FF Return: FB 0D 0A

Configuration instruction format:

Command format	Command example
Send: FD 01 0D sleep_time FF Return: FA 0D	Send: FD 01 0D 0A FF Return: FA 0D

When the node is a dormant terminal, the functions are as follows:
sleep_time: (1 ~ 60) The sleep wake-up period means 1 ~ 60 units (seconds)
(61 ~ 255) Sleep wake-up cycle representation 60+(sleep_time-60)*10 unit (seconds)

The default value of the parameter is 10, which means 10 seconds.

It indicates the sleep period, and also indicates the data request period, and also indicates the heartbeat period. Less than 30 seconds can receive the data sent by the parent node. The shorter the period, the smaller the delay in receiving data; the shorter the period, the faster the optimal parent node switching speed, and the detection The faster the parent node is lost.

When the node is a terminal, the functions are as follows:

If the node is a terminal, this parameter represents the heartbeat cycle of the terminal and the parent node. The faster the heartbeat cycle, the faster the terminal switches the route to find the best parent node, and at the same time, the heartbeat is used to detect the online status of the parent node.

Note: If the node is a coordinator and a router, this parameter is invalid;

6.5.15 Parent node save time

time: The parent node saves the data of its child nodes for 30 seconds. If a terminal node needs to receive the parent node data, the sleep time configuration cannot be greater than 30 seconds

Note: This parameter is the parameter of the parent node (router and coordinator), and temporarily saves the data buffered and sent to the sleeping node.

6.5.16 Node Rejoin Cycle

Read command format:

Command format	Command example
Send: FE 01 29 FF Return: FB 29 net_rejoinperiod	Send: FE 01 29 FF Return: FB 29 05

Configuration instruction format:

Command format	Command example
Send: FD 01 29 time FF Return: FA 29	Send: FD 01 29 05 FF Return: FA 29

Rejoin period: (1 ~ 60) Rejoin period means 1 ~ 60 units (seconds)

(61 ~ 255) Rejoin period display 60+(sleep_time-60)*10 unit (seconds)

The default value of the parameter is 5, which means 5 seconds.

When the node is powered on, it will join the network (if there is no network status) or restore the network (if there is no network status) or resume the network (if there is no parent node status). When the node is running, it will rejoin the network after the parent node is offline. even.

6.5.17 Maximum number of attempts to reconnect

Read command format:

Command format	Command example
Send: FE 01 30 FF Return: FB 30 net_rejoincount	Send: FE 01 30 FF Return: FB 30 05

Configuration instruction format:

Command format	Command example
Send: FD 01 30 time FF Return: FA 30	Send: FD 01 30 05 FF Return: FA 30

Rejoin maxcount: (0 ~ 254) The maximum number of rejoins ranges from 0 to 254 times, the default is 5,

0: means no reconnection or periodic network access action will be performed

After the node is running, if the parent node is lost or there is a network without a parent node, the maximum number of rejoin attempts are attempted after power-on. If the previous network has not been restored, the previous network information is cleared, and the rejoin period is periodically scanned for new networks to join.

When set to 0, the module will not reconnect after detecting the parent node is offline when the module has network status. When the module has no network status or the network has no parent node status and is powered on, it will not perform periodic network access or network recovery actions.

6.5.18 Wireless remote configuration ID

Read command format:

Command format	Command example
Send: FE 02 31 FF Return: FB 31 header	Send: FE 02 31 FF Return: FB 31 A8 8A

Configuration instruction format:

Command format	Command example
Send: FD 02 31 header FF Return: FA 31	Send: FD 02 31 A8 8A FF Return: FA 31

Remote Header: 0x0000 means to close the wireless network configuration, 0x0001 ~ 0xFFFF means to open the remote configuration, the default setting is 0xA88A (0xA8 0x8A).

6.5.19 User gpio parameters

Read command format:

Command format	Command example
Send: FE 03 20 GpioId FF Return: FB 20 GpioId In/Out level	Send: FE 03 20 00 FF Return: FB 20 00 01 01

Configuration instruction format:

Command format	Command example
Send: FD 03 20 GpioId In/Out level FF Return: FA 20	Send: FD 03 20 00 01 01 FF Return: FA 20

The format of gpio peripheral configuration data (3 Byte): GpioId In/Out level.

gpioid: channel ID

Channel ID	GPIO port
00	PIO7 port

01	PIO10 port
02	PIO11port

In/Out: Channel output/input mode

0 output

1 input

level: the level status of the channel

0 low level

1 high level

2 flip

Note: When configured as input, level represents the input level value of 0 (low level) or 1 (high level), and when configured as output, level represents 0 (low level), 1 (high level), 2 (electrical Flip) output.

6.5.20 User pwm parameters

Read command format:

Command format	Command example
Send: FE 06 21 PWMId FF Return: FB 21 PWMId start/stop Period Period duty duty	Send: FE 06 21 00 FF Return: FB 21 00 01 0A 3E 63 50

Configuration instruction format:

Command format	Command example
Send: FD 06 21 PwmId start/stop Period1 Period2 duty1 duty2 FF Return: FA 20	Send: FD 06 21 00 FF 03 65 02 48 FF Return:FA 21

Pwm peripheral configuration data format (6 Byte): PwmId start/stop Period1 Period2 duty1 duty2

PwmId: Channel ID

Channel ID	PWM GPIO port
0x00	PIO20 port
0x01	PIO19 port
0x02	PIO18 port
0x03	PIO17 port

start/stop: start and stop channel PWM output

0xFF means to start PWM in the unit of 1mS, the parameter range is 0-1700, and the maximum period that can be set is 1700mS.

0xFE means to start PWM with 1uS as the unit, and the parameter range is 0-1700, then the maximum period that can be set is 1700uS.

0x00 means stop PWM

period: pwm cycle time (determine the unit of the cycle and the maximum cycle according to the start/stop byte)

Period1 represents the upper 8 bits of the period

Period2 means that the lower 8 of the period is

duty: pwm duty cycle time (according to the start/stop byte to determine the cycle unit and the maximum cycle)

duty1 represents the high 8 bits of the duty cycle
duty2 means the lower 8 of the duty cycle is
Note: The duty cycle is less than the period

6.5.21 User adc parameters

Read command format:

Command format	Command example
Send: FE 03 22 adcid FF Return: FB 22 adcid voltage1 voltage2	Send: FE 03 22 adcid FF Return: FB 22 00 0C E4

Adc peripheral read data format (3 Byte): adcid voltage1 voltage2
adcid: ADC channel ID

Channel ID	ADC GPIO port
0x00	VDD Power supply voltage detection
0x01	PIO14 port
0x02	PIO15 port

voltage: ADC channel voltage value read (unit mV)
The detectable range is 0x0000 ~ 0x0E74 (0 ~ 3700)
voltage 1 means high 8 bits
voltage 2 represents the lower 8 bits
Column such as the read value: voltage =0x0C voltage =0xE4
The voltage value is: voltage =0x0CE4
Note:
1. If the power supply voltage is the highest 3.3V, the detection range of the ADC can reach a voltage of 3.3V at this time
2. The interval between reading the ADC voltage value of the same device twice must be greater than 10ms

6.5.22 Configure all network parameters

Configuration instruction format:

Command format	Command example
Send: FD 01 26 mode FF Return: FA 26	Send: FD 01 26 02 FF Return: FA 26

all_info: FD 1A FE 03 FE 5B 01 0B 0A 09 54 00 00 00 0A 1C 21 FE FF 57 B4 14 02 00 FF 05 05 A8 8A FF
Node type 03; network short address FE 5B; network group number 01; channel 0B; transmit power 0A; baud rate 09; sleep time 54; target network short address 00 00; target network group number 00; target long address 0A 1C 21 FE FF 57 B4 14; System sending mode 02; Data output mode 00; Network open time FF (not supported by this module of non-coordinator); Period of rejoin 05; Number of rejoins 05; Wireless ID A8 8A;

6.5.23 Read all network parameters

Read command format:

Command format	Command example
Send: FE 2F FE FF Return: FB FE all_info	Send: FE 2F FE FF Return: FB FE 03 02 FE 5B F6 FA 1F 1C 21 FE FF 57 B4 14 00 00 0C 46 0C FE FF 9F FD 90 01 0B 0A 09 54 00 00 00 0A 1C 21 FE FF 57 B4 14 02 00 FF 05 05 A8 8A
Send: FE 2F FE FF Return: FB FE all_info	Send: FE 2F FE FF Return: FB FE 03 02 FE 5B F6 FA 1F 1C 21 FE FF 57 B4 14 00 00 0C 46 0C FE FF 9F FD 90 01 0B 0A 09 54 00 00 00 0A 1C 21 FE FF 57 B4 14 02 00 FF 05 05 A8 8A

all_info: FB FE 03 02 FE 5B F6 FA 1F 1C 21 FE FF 57 B4 14 00 00 0C 46 0C FE FF 9F FD 90 01 0B 0A 09 54 00 00 00 0A 1C 21 FE FF 57 B4 14 02 00 FF 05 05 A8 8A

Node type 03; network status 02; network short address FE 5B; local network short address F6 FA; local MAC address 1F 1C 21 FE FF 57 B4 14; parent node network short address 00 00; parent node MAC address 0C 46 0C FE FF 9F FD 90; Network group number 01; Channel 0B; Transmit power 0A; Baud rate 09; Sleep time 54; Target network short address 00 00; Target network group number 00; Target long address 0A 1C 21 FE FF 57 B4 14 ; System sending mode 02; Data output mode 00; Network open time FF (the coordinator is valid and this module does not support); Period of rejoin 05; Number of rejoins 05; Wireless ID A8 8A;

6.5.24 When configuring AUX to wake up the external MCU serial port in the wireless receiving state to delay printing

Read command format:

Command format	Command example
Send: FE 01 35 FF Return: FB 35 AUX_delaytime	Send: FE 01 35 FF Return: FB 35 04

Configuration instruction format:

Command format	Command example
Send: FD 01 35 AUX_delaytime FF Return: FA 35	Send: FD 01 35 04 FF Return:FA 35

AUX_delaytime: 1 ~ 255 unit is ms, the default parameter is 4ms, that is, after the module receives wireless data, it first pulls down the AUX pin to wake up the external MCU, and then delays 4ms to output the serial port data to the external MCU.

6.5.25 Configure the serial port wake-up hold time

Read command format:

Command format	Command example

Send: FE 01 36 FF Return: FB 36 Uart_holdtime	Send: FE 01 36 FF Return: FB 36 64

Configuration instruction format:

Command format	Command example
Send: FD 01 36 Uart_holdtime FF Return: FA 36	Send: FD 01 36 64 FF Return:FA 36

Uart_holdtime: The unit of 1 ~ 255 is 10ms, the default parameter is 100, that is, the serial port will keep waking up for 100*10ms after waking up, and then going to sleep after 1000ms.

6.5.26 Configure endpoint information

Read command format:

Command format	Command example
Send: FE 05 37 FF Return: FB 37 Endpoint_info	Send: FE 05 37 FF Return: FB 37 01 FE B0 05 04

Configuration instruction format:

Command format	Command example
Send: FD 05 37 Endpoint_info FF Return: FA 37	Send: FD 05 37 01 FE B0 05 04 FF Return: FA 37

Endpoint_info: 5-byte length data format is endpoint clusterId_H clusterId_L profileId_H profileId_L The default parameters are endpoint 0x01, clusterId 0xfeb0, profileId 0x0504.

endpoint	clusterId		profileId	
	clusterId_H	clusterId_L	profileId_H	profileId_L
01	FE	B0	05	04

6.5.27 Trust Center Connection Key

Read command format:

Command format	Command example
Send: FE 10 38 FF Return: FB 10 TrustCentLinkKey	Send: FE 10 38 FF Return: FB 38 5A 69 67 42 65 65 41 6C 6C 69 61 6E 63 65 30 39

TrustCentLinkKey: 16 bytes in length, the default value is the default key of the ZigBee Alliance, and its value is 0x5A 0x69 0x67 0x42 0x65 0x65 0x41 0x6C 0x6C 0x69 0x61 0x6E 0x63 0x65 0x30 0x39

Note: This product uses the default trust center connection key of the ZigBee Alliance, and currently does not support configuration changes.

6.5.28 Firmware version command parameter description

Read command format:

Command format	Command example
Send: FE 03 34 FF Return: FB 34 FirmwareVersion	Send: FE 03 34 FF Return: FB 34 89 10 00

Firmware_version: 89 10 00

89 10 indicates the product model

00 represents the firmware version number

6.5.29 Query the long MAC address through the short address in the network

Read command format:

Command format	Command example
Send: FE 0A 14 Short_Addr FF Return: FB 14 Mac_Addr Short_Addr	Send: FE 0A 14 F6 FA FF Return: FB 14 1F 1C 21 FE FF 57 B4 14 F6 FA

When the short network address of the remote target node is known, this command can be used to read the long network MAC address of the remote target node.

6.5.30 Query the short address through the MAC long address in the network

Read command format:

Command format	Command example
Send: FE 0A 15 Mac_Addr FF Return: FB 15 Mac_Addr Short_Addr	Send: FE 0A 15 1F 1C 21 FE FF 57 B4 14 FF Return: FB 15 1F 1C 21 FE FF 57 B4 14 F6 FA

When the short network address of the remote target node is known, this command can be used to read the long network MAC address of the remote target node.

7. FAQ

7.1 Poor transmission range

- When there is a straight line communication obstacle, the communication distance will be attenuated accordingly;
- Temperature, humidity, and co-frequency interference will increase the communication packet loss rate;

- The ground absorbs and reflects radio waves, and the test effect is poor when it is close to the ground;
- Sea water has a strong ability to absorb radio waves, so the seaside test effect is poor;
- If there is a metal object near the antenna or placed in a metal shell, the signal attenuation will be very serious;
- The power register is set incorrectly, and the air rate is set too high (the higher the air rate, the closer the distance);
- The low voltage of the power supply at room temperature is lower than the recommended value, and the lower the voltage, the lower the power output;
- The matching degree of the antenna and the module is poor or the quality of the antenna itself is problematic.

7.2 Module is easy to damage

- Check the power supply to ensure that permanent damage to the module occurs between recommended supply voltages, if exceeded;
- Please check the stability of the power supply. The voltage cannot fluctuate significantly and frequently.
- Please ensure anti-static operation during installation and high frequency device electrostatic sensitivity;
- Please ensure that the installation process is not too humid. Some components are humidity sensitive.
- If there is no special requirement, it is not recommended to use it at too high and too low temperatures.

7.3 The error rate is too high

- There is co-frequency signal interference nearby, stay away from the interference source or modify the frequency and channel to avoid interference;
- Unsatisfactory power supply may also cause garbled codes. Be sure to ensure the reliability of the power supply;
- Poor or too long extension cables and feeders can also cause high bit error rates.

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