F8913D User Manual	Documentation No.	Product Version	Page
		V1.10	
	Product Name：F8913D		Total:99

F8913D User Manual

The user manual is suitable for the following model:

Model	Product Type
F8913D-N-NS	Without PA，DIP
F8913D-E-NS	With PA，DIP

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Date	Version	Remark	Author
2013-4-15	V1.00	Draft	Tady Chen
2013-07-04	V1.10	Add API configure command description, and route sleep mode configure.	Tady Chen

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F8913D V1.0
2013-03-29
Four-Faith
F8913D-N-NS
ZigBee Module


F8913D V1.0
2013-03-29
Four-Faith
F8913D-E-NS
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Contents

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Chapter 1 Brief Introduction of Product

1.1 Overview

F8913D ZigBee terminal is a kind of data terminal device that provides data transfer function by ZigBee network.

The product uses high-performance industrial-grade ZigBee solution, support transparent data transmission function; low power consumption design, the lowest working current can less than 1uA; supply 5 I/O channels, compatible 5 GPIO channels, 3 analog inputs and 2 pulse input counters.

It has been widely used on M2M fields, such as intelligent transportation, smart grid, industrial automation, telemetry, finance, POS, water supply, environment protection, post, weather, and so on.

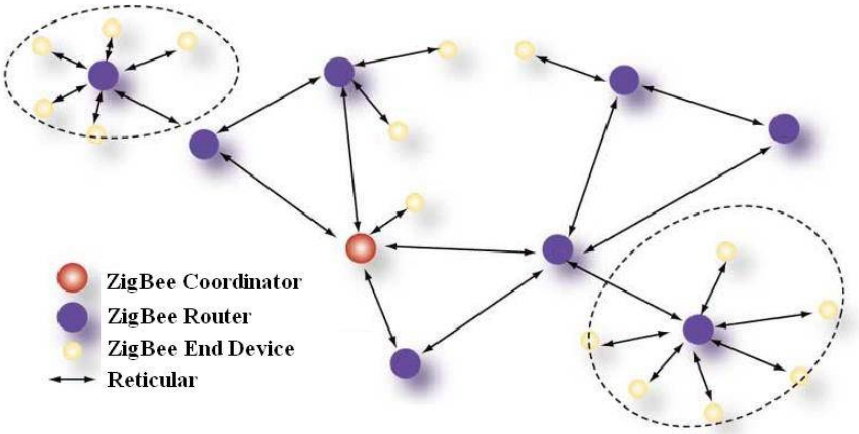


Figure 1-1 Application Topology

1.2 Features and Benefits

Design for Industrial Application

- High-powered industrial ZigBee chip
- Low power consumption design, support multi-sleep and trigger modes to reduce the power dissipation farthest
- Support UART
- Power range: DC 2.0~3.6V

Stability and Reliability

- Support hardware and software WDT
- Support auto recovery mechanism

Standard and Convenience

- Adopt a miniature package, support 2.0mm spacing stamp hole for SMT and 2.0mm spacing through-hole pins simultaneous
- Support intellectual mode, enter into communication state automatically when powered, support several work modes.
- Convenient configuration and maintenance interface
- Support for serial software upgrades

High-performance

- Support ZigBee wireless data transmission
- Support repeater and end-device function
- Support Point-to-Point, Point-to-Multipoint, Peer-to-Peer and Mesh network
- Support 65000 nodes
- Support center node, router node and terminal node
- Support broadcast and target address transfer
- Wide communication range
- Supply 5 I/O channels, 5 GPIO output channels, compatible 3 analog inputs and 2 pulse input counters.

1.3 Specification

F8913D Model Sheet

Model	Content
F8913D-N-NS	Without PA，DIP
F8913D-E-NS	With PA，DIP

ZigBee Specification

Item	Content
MCU	Industrial ZigBee Platform
Communication Protocol and Band	IEEE 802.15.4 ISM2.4~2.5GHz
Indoor/Urban Range	30m 90m(With PA)
Outdoor/RF Line-of-Sight Range	500m 2000m(With PA)
Transmit Power	2.82 mw (+4.5dBm) 100 mw (+20dBm) (With PA)
RF Data Rate	250Kbps
Receiver Sensitivity	-97dBm -103dBm (With PA)
Network Topologies	Point-to-Point, Point-to-Multipoint, Peer-to-Peer and Mesh
Channels	11 to 26
Max Serial Buffer Size	300 Bytes

Interface Type

Item	Content
UART	Data bits: 8 Stop bits: 1, 2 Checksum: none,odd,even Baudrate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400,57600, 115200 bps
Antenna connector	U.FL RF connector, impedance 50 ohm
Package	Support 2.0mm spacing through-hole pins simultaneous

Power Input

Item	Content
Recommended Power	DC 3.3V/0.1A
Power Range	DC 2.0~3.6V

Power Consumption

Working States			Power Consumption
F8913D-N-NS	Coordinator	Idle Mode	28.3～28.4mA@3.3VDC
		RX Mode	27.5～27.8mA@3.3VDC
		TX Mode	28.8～29.1mA@3.3VDC
	Router	Idle Mode	28.2～28.4mA@3.3VDC
		RX Mode	27.5～27.8mA@3.3VDC
		TX Mode	28.9～29.1mA@3.3VDC
		Timing wake up	1.1～1.2uA@3.3VDC
		Deep Sleep	0.3～0.4 uA@3.3VDC
	EndDevice	Idle Mode	8.6～8.9mA@3.3VDC
		RX Mode	10.8～11.5mA@3.3VDC
		TX Mode	14.4～15.2mA@3.3VDC
		Timing wake up	1.1～1.2uA@3.3VDC
		Deep Sleep	0.3～0.4 uA@3.3VDC
F8913D-E-NS	Coordinator	Idle Mode	30.5～31.5mA@3.3VDC
		RX Mode	32.2～33.2mA@3.3VDC
		TX Mode	41.2～42.4mA@3.3VDC
	Router	Idle Mode	30.4～31.5mA@3.3VDC
		RX Mode	32.4～33.2mA@3.3VDC
		TX Mode	41.2～42.5mA@3.3VDC
		Timing wake up	1.2～1.3uA@3.3VDC
		Deep Sleep	0.4～0.5 uA@3.3VDC
	EndDevice	Idle Mode	9.0～9.6mA@3.3VDC
		RX Mode	13.1～14.3mA@3.3VDC
		TX Mode	24.5～26.5mA@3.3VDC
		Timing wake up	1.2～1.3uA@3.3VDC
		Deep Sleep	0.4～0.5 uA@3.3VDC

Physical Characteristics

Item	Content
Dimensions	37.5 x 22.1 x 2.8 mm
Weight	3.5 g

Environmental Limits

Item	Content
Operating Temperature	-40~+85 ℃ (-104~+185 ℉)
Storage Temperature	-40~+125 ℃ (-104~+257 ℉)
Operating Humidity	95% (unfreezing)

Chapter 2 Module Interface

2.1 Module Signal Definition

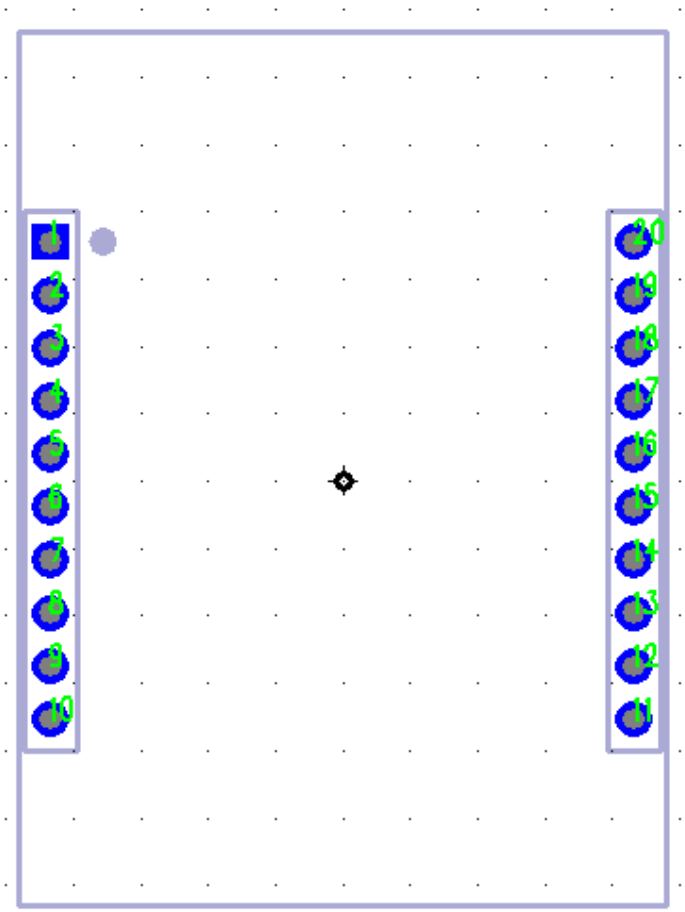


Figure 2-1 Module Pin Distributing

Table 2-1 Module signal definition 1-- DIP

Pin Number	Signal Name	Input/Output	Description
1	VCC	N/A	Power Supply
2	DOUT	Output	UART Data Out
3	DIN	Input	UART Data In
4	RD/DE	Output	RD/DE
5	RST	Input	Module Reset
6	D4	Either	GPIO
7	D3	Either	GPIO
8	[reserved]	N/A	N/A
9	SLEEP_RQ	Both	Pin Sleep Control Line
10	GND	N/A	Ground
11	D2	Input	ADC/GPIO
12	CTS	Output	Clear-to-Send
13	**SLEEP**/ON	Output	**SLEEP**/ON
14	AVDD5	N/A	VREF
15	Associate	Either	Associate Indicator
16	RTS	Input	Request-to-Send
17	DD	Either	Debug Data
18	DC	Input	Debug Clock
19	D1	Input	ADC/GPIO
20	D0	Input	ADC/GPIO

2.2 UART

The serial communication prot 1 is UART.The signal define as **Table 2-2**:

Table 2-2 UART Signal Assignments

UART Signal Name	Pin Number
TX	2
RX	3
CT	12
RT	16

Please reference the chapter 3 for the UART operation details.

2.3 GPIO Specification

The F8913D have 5 GPIO.The DC characteristics as the Table 2-4.

Table 2-4 GPIO DC Characteristics (Ta=25℃,VCC=3V)

Parameters	Test Conditions	Min	Type	Max
Logic 0 input voltage (V)				0.5
Logic 1 input voltage (V)		2.5		
Logic 0 input current (nA)	Input equals 0V	-50		50
Logic 1 input current (nA)	Input equals VCC	-50		50
I/O-pin pullup and pulldown resistors			20	
Logic 0 input voltage,4-mA pins (V)	Output load 4mA			0.5
Logic 1 input voltage,4-mA pins (V)	Output load 4mA	2.4		
Logic 0 input voltage,20-mA pins (V)	Output load 20mA			0.5
Logic 1 input voltage,20-mA pins (V)	Output load 20mA	2.4		

Please reference the chapter 3 for the GPIO configuration and operation details.

2.4 Antenna Interface

The Antenna connector part number：MM9329-2700/Murata，as the Figure 2-2:

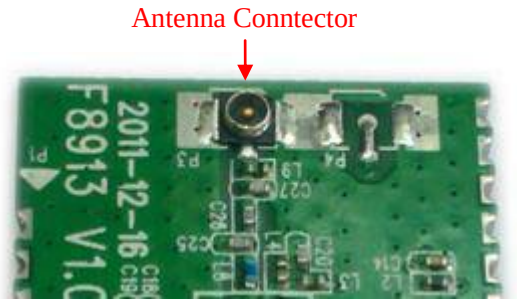


Figure 2-2 Antenna Connector

MM9329-2700/Murata dimension as the Figure 2-3:

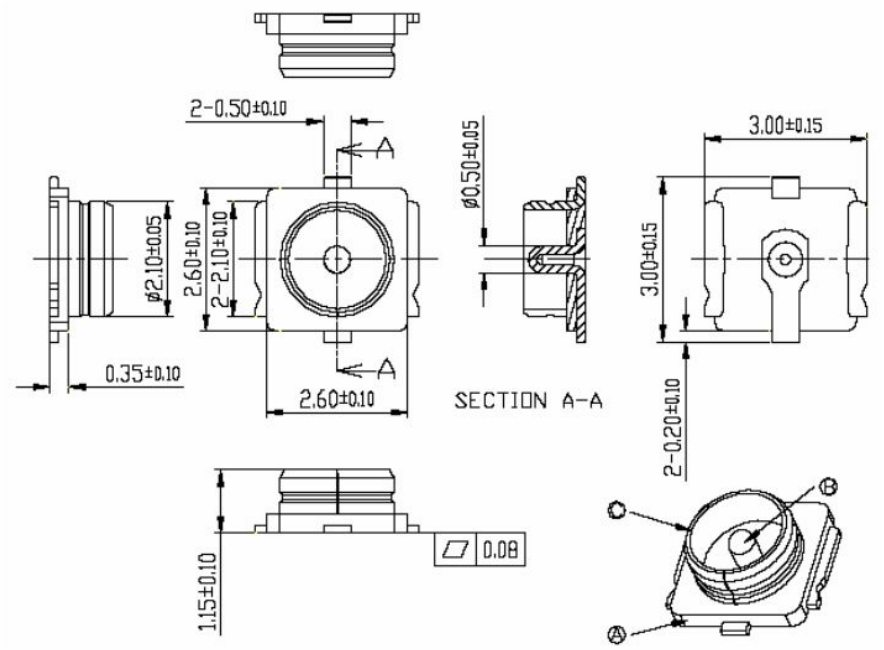


Figure 2-3 The MM9329-2700/Murata dimension

2.5 Antenna Installation

1、 Install the antenna far away from the large area metal and ground.

2、 Keep the antennas visual.

3、 Minimize obstructions between the antennas.

4、 Reduce the extension cords of the antenna.

The performance of different antenna installation types, as the figure 2-4.

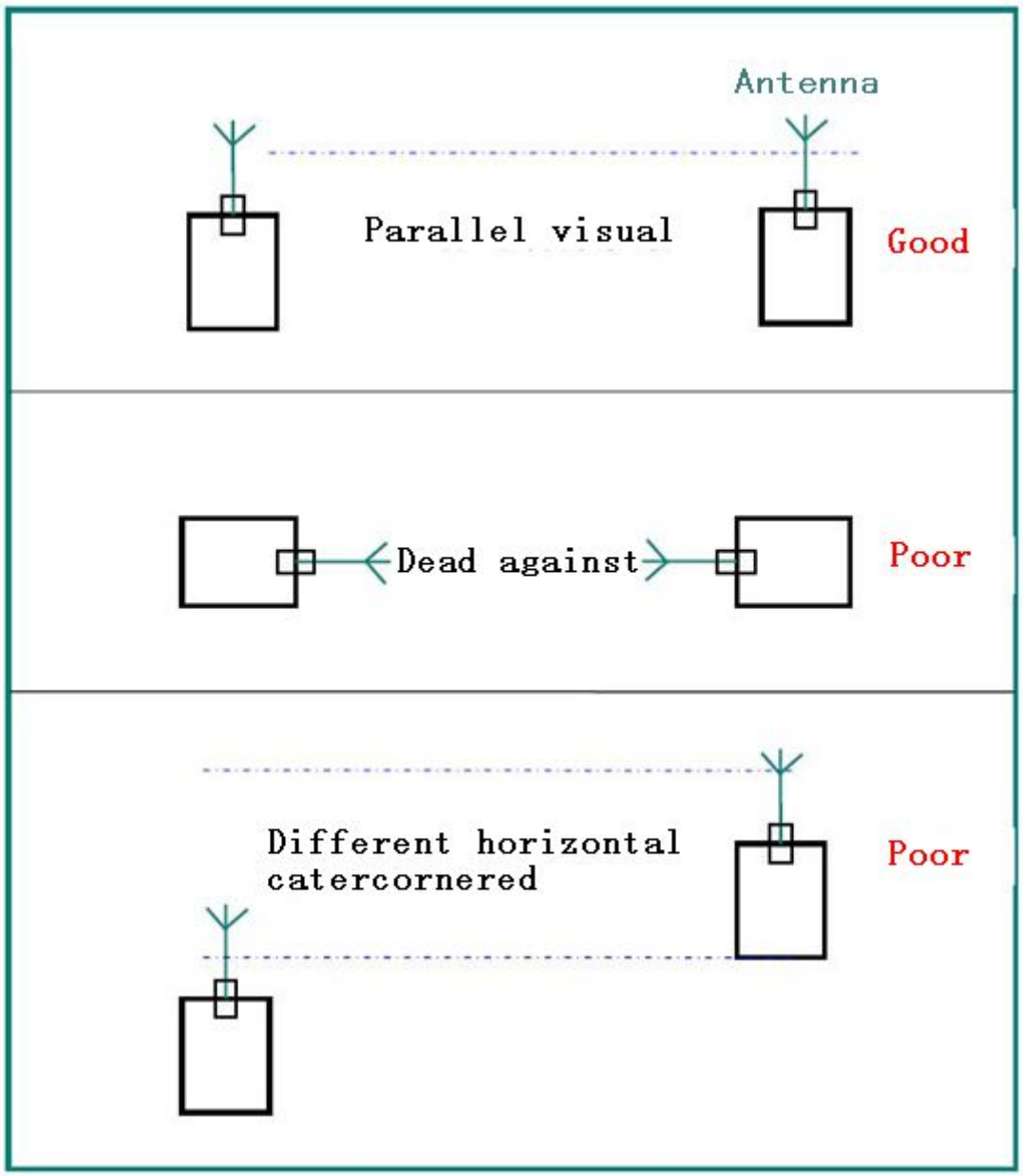


Figure 2-4 Different antenna installation types

2.6 Firmware Performance Specifications

Table 2-6 Firmware Performance Specfication

UART	Baudrate	115200 (Default)
	Configuration	8/N/1 (Default)
	Max serial buffer size	300Bytes
	XOR	1-byte XOR
	Command Mode	AT Command
		HEX Command
Network	Max nodes quantity	65000
	Node number range	0～65000 0：The center node 65535：Broadcast
Wakeup Mode	Extenal Wakeup Mode	
	Timer Wakeup Mode	

2.7 Absolute Maximum Ratings

Table 2-7 Absolute Maximum Ratings

Parameters	Min	Max	Unit
Supply Voltage	-0.3	3.9	V
Voltage on any digital pin	VCC-0.3	VCC+0.3 (≤3.9)	V
Input RF level		10	dBm
Storage temperate range	–40	125	℃

Notice: Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device.

Chapter 3 Communication Interface Operation

3.1 UART

3.1.1 UART signal description

- TX: Data transmit
- RX: Data receive
- CT: Clear to Send
- RT: Request to send

3.1.2 UART connections

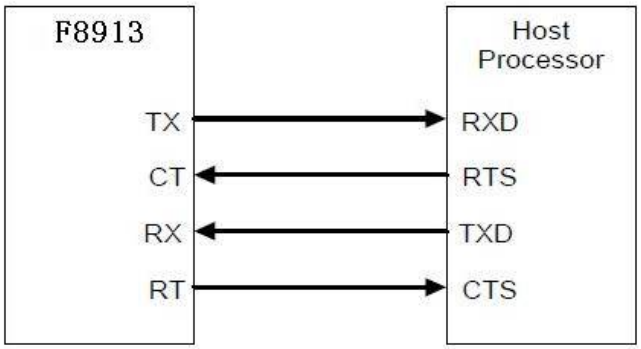


Figure 3-1 UART connection diagram

Note: device default has no hardware flow control

Example: As the figure 3-2, The UART convert to RF system can be set up when the device with a UART interface connect to F8913D directly.

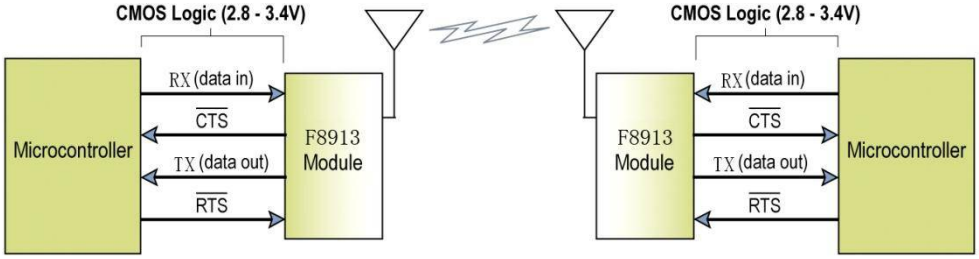


Figure 3-2 The UART convert to RF system

3.1.3 UART Characteristics

UART data format

	Start	D0	D1	D2	D3	D4	D5	D6	D7	Stop

Figure 3-3 Data format

1) Communication interface: UART
2) Baudrate: 300,600,1200,2400,4800,9600 ,19200,38400,57600 ,115200 bps (default)
3) Start bit: 1bit
4) Data bit: 8bit
5) Stop bit: 1bit,2bit
6) Checksum: none,odd,even

UART support full-duplex. The communication can launch by an external device or the module itself.

The 8-N-1 mode, each data byte includes a start bit (low), 8 data, and a stop bit (high). The following figure 3-3 illustrates the serial data bit patterns.The data packet is 0x1F.

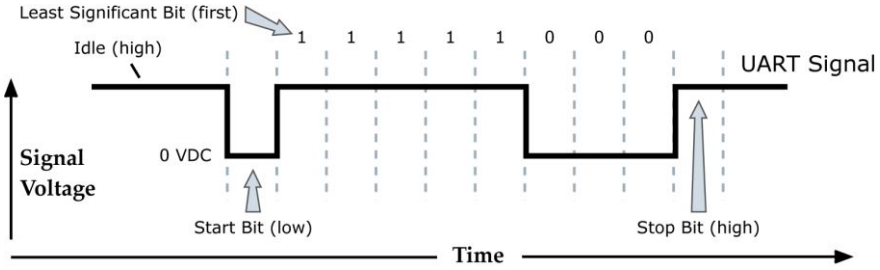


Figure 3-4 0x1F bit patterns

3.2 Analog and Digital I/O

3.2.1 Signal Definition

The F8913D support ADC and digital I/O line passing.The ADC and digital I/O can be inquired and configured by AT commands.The pins support ADC and digital I/O fuctions are listing in the table 3-1

Table 3-1 Analog and Digital I/O pins (SMT)

Pin Number	Pin Name	Default Function
6	D4	GPIO
7	D3	GPIO
11	D2	ADC/GPIO
19	D1	ADC/GPIO
20	D0	ADC/GPIO

3.2.2 Function Description

1.Digital I/O

The Digital D3&D4 support 4mA drive capability.

2.ADC

The ADC support 12 bits of resolution. The ADC input voltage range is 0V to 5V.

Please configure the right value when operate the I/O.

Table 3-3 I/O Configuration

Value	Description
0	Disabled
1	ADC
2	GPIO input
3	GPIO output low
4	GPIO output high
5	Pluse input count

Notice: Please reference the AT command “AT+DMn” in the charpter 4 for the details.

Chapter 4 Parameter Configuration

4.1 Zigbee Description

4.1.1 Device Type Description

ZigBee device has three types：coordinator,router and end device.They all can transmit and receive data.

4.1.1.1 Coordinator

This is the device that “starts” a ZigBee network. It is the first device on the network. The coordinator node scans the RF environment for existing networks, chooses a channel and a network identifier (also called PAN ID) and then starts the network.

Note that the role of the Coordinator is mainly related to starting up and configuring the network. Once that is accomplished, the Coordinator behaves like a Router node (or may even go away). The continued operation of the network does not depend on the presence of the Coordinator due to the distributed nature of the ZigBee network.

4.1.1.2 Router

A Router performs functions for allowing other devices to join the network multi-hop routing assisting in communication for its child battery-powered end devices.

In general, Routers are expected to be active all the time and thus have to be mains-powered.

4.1.1.3 End Device

An end-device has no specific responsibility for maintaining the network infrastructure, so it can sleep and wake up as it chooses. Thus it can be a battery-powered node.

4.1.2 ZigBee Network Description

4.1.2.1 Form a ZigBee Network Procedure

（1）The coordinator node scans the RF environment for existing networks, chooses a channel and a network identifier (also called PAN ID) and then starts the network.

（2）Router or end device also scans the RF environment for existing networks, chooses a channel and a network identifier (also called PAN ID) and then join the network.

（3）The coordinator's node address fixed to 0x0000， router's or end device's node address can be assigned randomly or configured previously.

（4）The nodes in the network can use node address transmit or receive data.。

NOTE：In a ZigBee network， just only using one coordinator.

4.1.2.2 Physical Channel

ZigBee is based on IEEE 802.15.4 that has defined the MAC layer and physical layer. IEEE 802.15.4 also defined 3 work band 2.5GHz(global),868MHz(Europe) and 915MHz(USA),they respectively has highest 250kbit/s, 40kbit/s, 20kbit/s transmission rate. On the three band has 27 work channels in total. 2.4GHz has 16 channels, 915MHz has 10 channels, 868MHz has only one channel.

Four-Faith ZigBee product works on 2.4GHz band, and has 16 physical channel. In AT command mode ,we send "AT+CHA=N",(N=11~26) to configure the channel. We recommend 15 ,20 ,25 ,26 channel .

4.1.2.3 PAN ID

ZigBee network also calls personal area network, every personal area network has unique Pan ID.This Pan ID is used on every device in a same ZigBee network.

Four-Faith ZigBee product can preconfigure a Pan ID and randomly select a Pan ID. In AT command mode ,we send "AT+PID=N",(N=0-65531),if PID=65535 ,it will randomly select a Pan ID.

4.1.2.4 Node address

ZigBee device has two address types: 64 bit MAC address and 16 bit node address. 64 bit MAC address is unique in the world, and used in the product life. 16 bit node address usually assigned when the device joined in the network. It's unique in a same Pan ID network. We use node address to send and receive data.

Four-Faith ZigBee product can preconfigure a node address and randomly assigned a node address. In AT command mode ,we send "AT+NID=N",(N=0-65527), if NID=65535, it will randomly assigned a node address.

4.2 Configuration Connection

Before configuration, it's need to connect the F8913D with a host controller.The host controller could be a PC or other device which contain UART port. You can connect the F8913D with PC by the Four-Faith F8913D EVB, as showing in the figure 4-1.

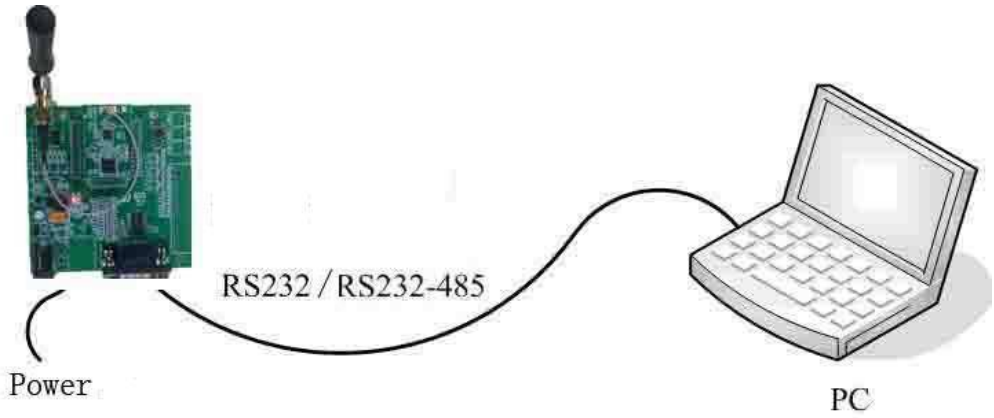


Figure 4-1 F8913D EVB connect with PC

4.3 Configuration Introduction

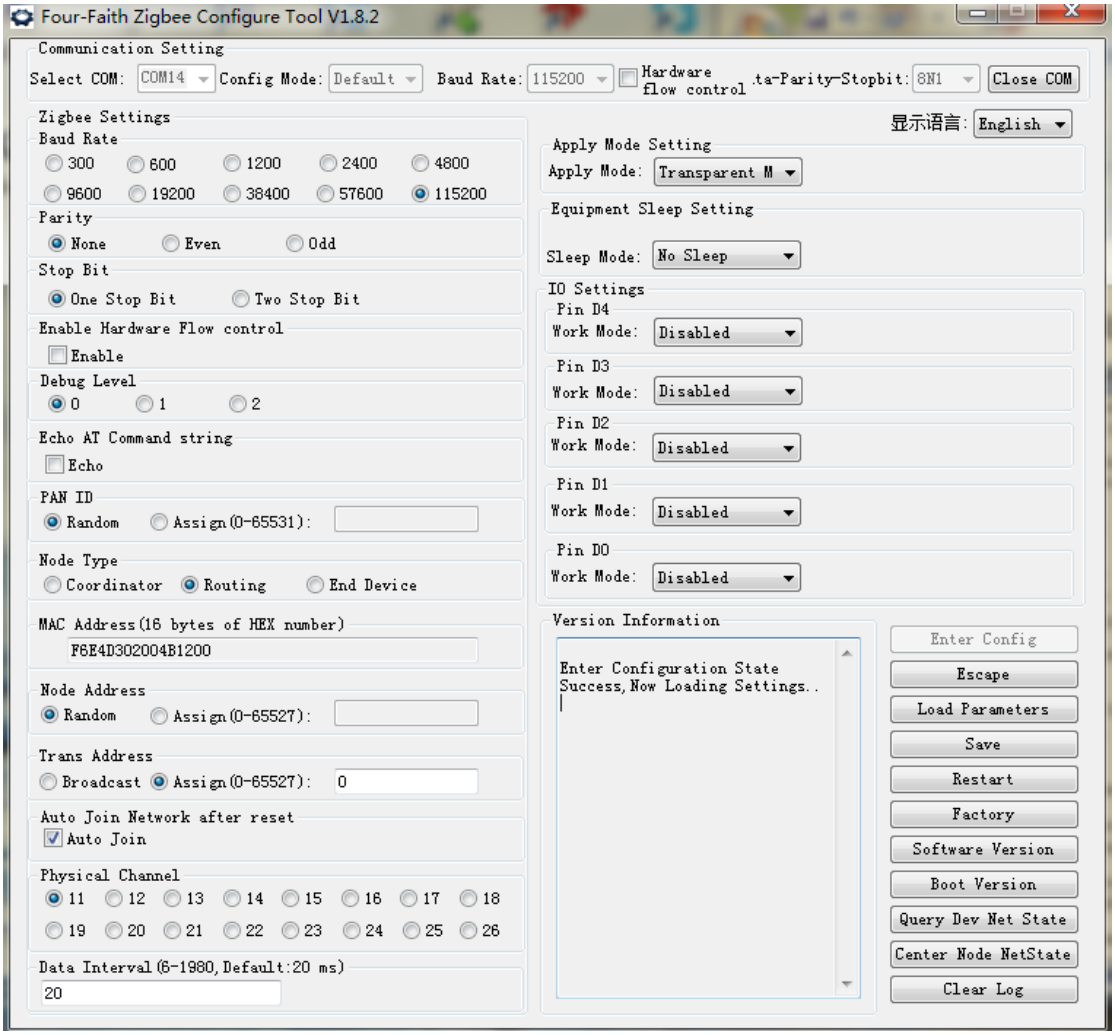
There are two ways to configure the device:

- Configuration software tool: All the settings are configured through the shipped software tool. It's necessary to have one PC to run this tool.
- Extended AT command: All the settings are configured through AT command, so any device with serial port can configure it. Before configuration with AT command, you should make device enter configure state.

The following describes how to configure device with AT command .At the same time, it gives out the corresponding the configure software tool of each configuration item.

Note: When device powers up, it has three second configuration time.During this time, the netwok not works,and the serial's baudrate is 115200,no parity, 1 stop bit. Send the 3-character command sequence"+++"twice through serial port.Then it goes into AT command configuration.

4.3.1 Run the configure Tool: ZigbeeConfigure.exe



The “Communication Setting” column shows the current serial port settings. To configure ZigBee modules, please choose the correct serial port parameters ,then open the serial port. If the button text is“Close”, it shows the serial port now has been opened. If the text is “Open”, you should open the port first.

When you had configure the correct serial port， please press the 

bottom, and follow the prompt,he node will enter configuration state.

4.4 Modes of Operation

F8913D supports three modes of Operation:Transparent Mode,AT Command Mode and API Mode.

4.4.1 Transparent mode

When operationg in transparent mode the modules act as a serial line replacement. All UART data received through the DIN pin is queued up for RF transmission. When data is received, the data is sent out through the DOUT pin.

Re-power module enter the transparent mode by default.

To enter transparent mode:

- In the AT command mode,send “AT+ESC<**CR**><**LF**>”through serial port.
- In the API mode, send “FE 01 21 2A 00 0A” through serial port.

4.4.2 AT command mode

AT command mode is a multiple function operation. This mode can configure the modules parameters,send data and recive data.

To enter AT command mode:

- In the transparent mode,send the 3-character command sequence"+++"twice through serial port.
- In the API mde,send "FE 01 21 2A 00 0A" through serial port.

CHECK the AT command mode,send "AT**<CR><LF>**" through serial port, it will return "OK".

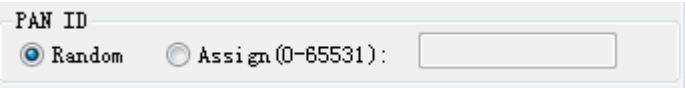
All AT command line should begin with "AT" or "at" and end with "**<CR><LF>**".In general, the AT command includes three forms, as shown in table 3-1.

Table 3-1 AT command forms

Form	Description	Instance
Set	Set the custom parameters	AT+XXX=<……>
Query	Query the current parameters value	AT+XXX?
Execute	Execute the command	AT+XXX

Note: every configure item is set, it should send save command.Network param(PAN ID,Physical Channel ,node address or device type changed),sleep param and serial param change should re-power device.

4.4.2.1 Set device PAN ID: AT+PID



Form	Command	Return
Set	AT+PID=<number strings>	0K
		ERROR
Query	AT+PID?	+PID: number strings OK

Parameter description :

number strings range: 0~65531,Set unique PAN ID

65535, System will assign a stochastic PAN ID

Default:65535

4.4.2.2 Query device current PAN ID: AT+PCD

Form	Command	Return
Query	AT+PCD?	+PCD: number strings OK

Attention: This command is different from "AT+PID". When the PAN ID is assigned by system and the node joined in the network , we can use this command to query the current PAN ID.

4.4.2.3 Set device physical channel: AT+CHA

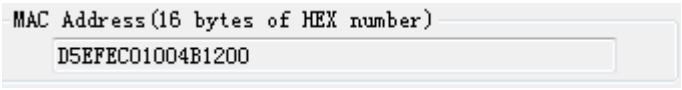
Form	Commad	Return
Set	AT+CHA=<number strings>	0K
		ERROR
Query	AT+CHA?	+CHA: number string OK

Parameter description :

number string range: 11~26

Default: 11

4.4.2.4 Query device MAC address: AT+MID



Form	Command	Return
Query	AT+MID?	+MID: hexadecimal strings OK

Attention: This command is read only. It will return 16 hexadecimal strings.

For example: 0x051B9B01004B1200

4.4.2.5 Set device type: AT+TYP

Form	Command	Return
Set	AT+TYP=<number string>	0K
		ERROR
Query	AT+TYP?	+TYP: number string OK

Parameter description :

number string range: 0 = Coordiantor
1 = Routerr
2 = End Device

Default:1

4.4.2.6 Set device node address: AT+NID

Form	Command	Return
Set	AT+NID=<number strings>	0K
		ERROR
Query	AT+NID?	+NID: number strings OK

Parameter description :

number string range: 0~65527,Set unique node address
65535, System will assign a stochastic node address

Default:65535

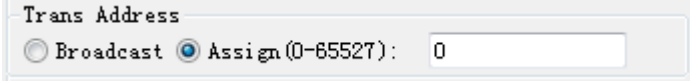
Attention : When coordiantor form a network, its node address is fixed to 0, the router and end device's node address must be non-zero.

4.5.2.7 Query device current node address : AT+NCD

Form	Command	Return
Query	AT+NCD?	+NCD: number strings OK

Attention: This command is different from "AT+NID". When the node address is assigned by system and the node joined in the network , we can use this command to query the current node address.

4.4.2.8 Set decice transparent address: AT+TID



Form	Command	Return
Set	AT+TID=<number strings>	0K
		ERROR
Query	AT+TID?	+TID: number strings OK

Parameter description :

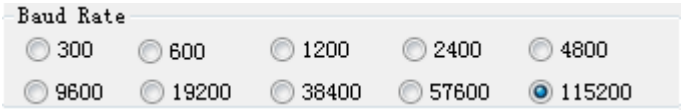
number strings range: 0~65527,Set unique node trans address

65535, broadcast address

Default:0

4.4.2.9 Set device serial

4.4.2.9.1 Set device serial baudrate: AT+IPR



Form	Command	Return
Set	AT+IPR=<number string>	0K
		ERROR
Query	AT+IPR?	+IPR: number string OK

Parameter description :

number strings range: 0 = 300 1 = 600 2 = 1200

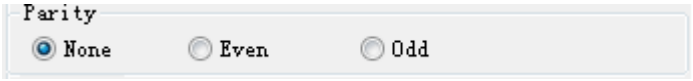
3 = 2400 4 = 4800 5 = 9600

6 = 19200 7 = 38400 8 = 57600

9 = 115200

Default:9

4.4.2.9.2 Set device serial parity: AT+PAR



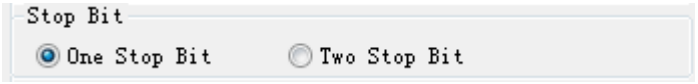
Form	Command	Return
Set	AT+PAR=<number string>	0K
		ERROR
Query	AT+PAR?	+PAR: number string OK

Parameter description :

number strings range: 0 = None
1 = Even
2 = Odd

Default:0

4.4.2.9.3 Set device serial stop bit: AT+STO



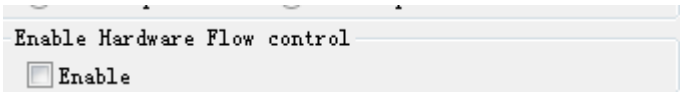
Form	Command	Return
Set	AT+STO=<number string>	0K
		ERROR
Query	AT+STO?	+STO: number string OK

Parameter description :

number strings range: 0 = 1 stop bit
1 = 2 stop bit

Default: 0

4.4.2.9.4 Set device serial port hardware flow control:AT+UFC



Form	Command	Return
Set	AT+UFC=<number string>	0K
		ERROR
Query	AT+ UFC?	+ UFC: number string OK

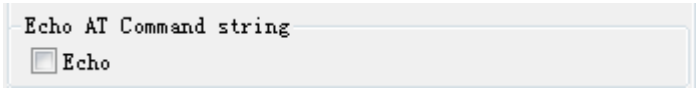
Parameter description :

number strings range: 0 = Disable

1 = Enable

Default: 0

4.4.2.10 Set device AT command echo: AT+ECH



Form	Command	Return
Set	AT+ECH=<number string>	0K
		ERROR
Query	AT+ECH?	+ECH: number string

Parameter description :

number strings range: 0 = Non-echo

1 = Echo

Default:0

4.4.2.11 Set device to get acknowledge: AT+ACK

Form	Command	Return
Set	AT+ACK=<number string>	0K
		ERROR
Query	AT+ACK?	+ACK: number string OK

Attention : whether or not to get the application level acknowledge data

Parameter description :

number strings range: 0 = No
1 = Yes

Default:0

4.4.2.12 Set device debug level: AT+DBL

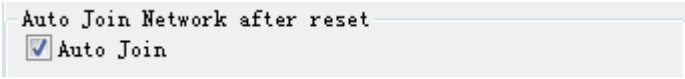
Form	Command	Return
Set	AT+DBL=<number string>	0K
		ERROR
Query	AT+DBL?	+DBL: number string OK

Parameter description :

number strings range: 0 = Close all debug messages
1 = Info the important debug messages
2 = Info all debug messages

Default: 0

4.4.2.13 Set device whether auto starts network when powered:AT+AST



Form	Command	Return
Set	AT+AST=<number string>	0K
		ERROR
Query	AT+AST?	+AST:number string OK

Parameter description :

number strings range: 0 = Not auto start

1 = Auto start

Default:1

4.4.2.14 Start devcie network : AT+STA

Form	Command	Return
Execute	AT+STA	OK
		ERROR

Attention : When "AT+AST = 0",this command can start the network.

4.4.2.15 Set device whether RF data output the serial port: AT+PRF

Form	Command	Return
Set	AT+PRF=<number string>	0K
		ERROR
Query	AT+PRF?	+PRF: number string OK

Parameter description :

number strings range: 0 = Not output

1 = Output

Default:1

Attention : This command parameter don't save in flsah. It is used to close the RF data output the serial port.

4.4.2.16 Query device softwarte version : AT+VER

Version

Form	Command	Return
Execute	AT+VER	Four-Faith Zigbee Standard Ver: V1.10 Time: Jul 24 2012 11:21:04

4.4.2.17 Query all devices state in the same network: AT+NWS

Center Node NetState

Form	Command	Return
Execute	AT+NWS	OK +NWS: <state>,<node address>,<MAC address >,<node type> … … …

Command description :

When this command executed, it will recive Asynchronous response.

+NWS: <state>,<node address>,<MAC address >,<node type>

For example:

+NWS:0,0,1122334455667788,0

+NWS:0,2,1122334455667799,1

+NWS:0,8,1122334455667732,2

Table 4-2 State information

0	Normal
1	Not in the net
2	Don’t exist the node address
3	Opposite don’t response
4	Reserve
5	Invaild value

Attention: In order to avoid blocking, every node recived the command will delay for a period of time and send the message itself to the sender. This time range from 0 to 66 seconds.

4.4.2.18 Query a device node address : AT+QNA

Form	Command	Return
Set	AT+QNA=<MAC address>	SRSP：OK AREQ： +NWS: <state>,<node address>,<MAC address >,<node type>
		SRSP：ERROR

Parameter description :

MAC Address : the required 16 hexadecimal strings

4.4.2.19 Query a device MAC address : AT+QMA

Form	Command	Return
Set	AT+QNA=<node address>	SRSP：OK AREQ： +NWS: <state>,<node address>,<MAC address >,<node type>
		SRSP：ERROR

Parameter description :

Node Address : the required node address

4.4.2.20 Query device net state: AT+SNS

Query Dev Net State

Form	Command	Return
Execute	AT+SNS	+SNS：as shown table 3-3 OK

Table 4-3 DEV NETWORK STATE:

00	Initialized - not started automatically
01	Initialized - not connected to anything
02	Discovering PAN's to join
03	Joining a PAN
04	ReJoining a PAN, only for end devices
05	Joined but not yet authenticated by trust center
06	Started as device after authentication
07	Device joined, authenticated and is a routerr
08	Started as Zigbee Coordinator
09	Started as Zigbee Coordinator
10	Device has lost information about its parent.

4.4.2.21 Send data (HEX mode): AT+TXH

Form	Command	Return
Set	AT+TXH=<node address><content>	OK
		ERROR

Parameter description :

Node Address: two byte hexadecimal，the lowest byte comes first

Content: the hexadecimal data.

For example:

AT+TXH=0123383838383838**<CR><LF>**

The node address is 0x2301 and the content is “888888”.

Attention : The content length can’t be longer than 160 character.

4.4.2.22 Send data (ASCII mode) : AT+TXA

Form	Command	Return
Set	AT+TXA=<node address>，<content>	OK
		ERROR

Parameter description :

Node Address: decimal address

Content: ASCII data.

For example:

AT+TXA=12245,123456789

12245 is the reciver node address，123456789 is the ASCII content.

Attention : The content length can’t be longer than 80 character.

4.4.2.23 Receive RF data

Form	Command	Return
		+RCV:<source address>,<data strings>

Parameter description :

Source Address: the sender node address

Content: ASCII data strings

4.4.2.24 Device IO pins command

Attention： 1.The return value from IO pins should be read in AT command mode or API mode;
2.When configure sleep mode ,IO configure is invalid.

Table 4-4 n and IO pins

n	IO pin
0	D0
1	D1
2	D2
3	D3
4	D4

4.5.2.24.1 Set IO pin mode: AT+DMn

(n refer toTable 4-4)

Form	Command	Return
Set	AT+DMn=<number string>	0K
		ERROR
Query	AT+DMn?	+DMn: number string OK

Parameter description :

number string range: 0 = Disabled 1 = ADC
2 =GPIO input 3 = GPIO output low
4 = GPIO output hig 5 = Pluse input count

Default:0

For example: AT+DM0=1 set the D0 Analog to Digital Converter

Attention: 1.D3 and D4 have mode 0, 2,3,4,5
2.D0,D1 and D2 have mode 0,1,2,3,4

4.4.2.24.2 Set IO pin data acquisition time interval : AT+DTn

(n refer toTable 4-4)

Form	Command	Return
Set	AT+DTn=<number strings>	0K
		ERROR
Query	AT+DTn?	+DTn: number strings OK

Parameter description :

number string range: 0~65535 seconds， set the report time interval

0,not report

Default:0

Attention : 1.Should used in IO pin ADC and DI mode.

2.When configure device sleep mode,it doesn't work.

3.The collected data will send to the transparent address node.

For example : tansparent address in AT command mode

+NVn: <node address>,<pin>,<mode>,<value>

Node address: the sender address

IO pin: n refer to Table 4-4

IO mode: 0 = Disable 1= ADC

2= GPIO input 3=GPIO output low

4= GPIO output high 5=Pluse input count

Value: IO mode 1\2 means ADC or GPIO acquisition value

IO mode 5 means pluse input count current value.

4.4.2.24.3 Set IO pluse input count value: AT+DSn

(n refer toTable 4-4)

Form	Command	Return
Set	AT+DTn=<number strings>	0K
		ERROR

Description: Only D3 and D4 have pluse input count function ,so that n is 3 or 4.This param is not save flash. D3 or D4 is configure pluse input count return OK,others return ERROR.

Parameter description :

number string range: 0~65535

4.4.2.24.4 Query IO pin value : AT+DVn

(n refer toTable 4-4)

Form	Command	Return
Query	AT+DVn?	+DVn: number string OK

Description :

Get local IO pin value (ADC , GPIO or pluse input count value)

4.4.2.24.5 Query a device IO pin value: AT+NVn

(n refer toTable 4-4)

Form	Command	Return
Query	AT+NVn=<node address>	SRSP: OK AREQ +NVn: <node address>,<pin>,<mode>,<value>
		SRSP: ERROR

Parameter description :

Node Address: The required node address

4.4.2.24.6 Remote set a device IO pin mode : AT+NSn

(n refer toTable 4-4)

Form	Command	Return
Set	AT+NSn=<node address>,<IO mode>,<configure value>	SRSP: OK AREQ +NSn: <node address>,<pin>,<state>
		SRSP: ERROR

Parameter description :

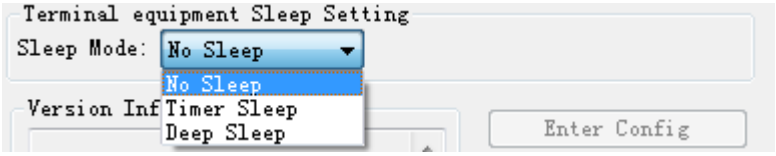
Node Address : the required node address

IO mode: 0 = Disabled 1 = ADC
2 =GPIO input 3 = GPIO output low
4 = GPIO output high 5 = Pluse input count

Value : IO mode 1\2 : set the report value 0~65535 second
IO mode 5 : set the pluse input count value

State: 0 = Success
1 = Failure

4.4.2.25 Set device sleep mode:AT+SLE



Form	Command	Return
Set	AT+SLE=<Number String>	0K
		ERROR
Query	AT+SLE?	+SLE: Number String OK

Parameter description :

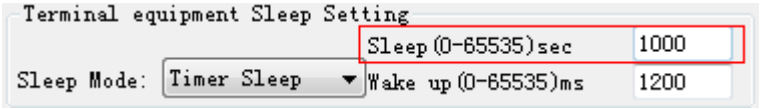
number string ： 0 = No sleep

1 = Timer sleep mode

2 = Deep sleep mode

Default: 0

4.4.2.26 Set device sleep time:AT+STC



Form	Command	Return
Set	AT+STC=<number strings>	0K
		ERROR
Query	AT+STC?	+STC: number strings OK

Parameter description :

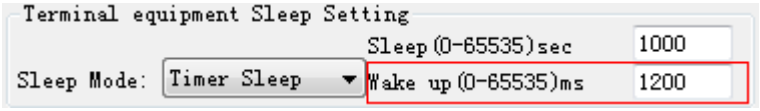
number string range: 0~65535 seconds，

Default:0

Note: 1.When AT+SLE =1, set the sleep time

2.When sleep time is zero ,the module doesn’t go to sleep.

4.4.2.27 Set device wake time:AT+WTC



Form	Command	Return
Set	AT+WTC=<number strings>	0K
		ERROR
Query	AT+WTC?	+WTC: number strings OK

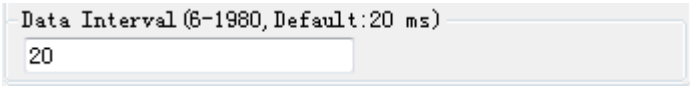
Parameter description :

number string range: 0~65535 millisecond

Default:0

Note: when AT+SLE =1, set the wake time

4.4.2.28 Set serial data interval:AT+ITV



Form	Command	Return
Set	AT+ITV=<number strings>	0K
		ERROR
Query	AT+ ITV?	+ ITV: number strings OK

Parameter description :

number string range: 6-1980 millisecond

Default:20

Note: data interval is used to judge if the serial has recived the data. If data interval greater than the setting ,the program will process the serial data. The lower baudrate ,the longer data interval.

4.4.2.29 Query device bootload version :AT+BTL

Form	Command	Return
Execute	AT+BTL	Four-Faith Zigbee BootLoad Ver: V1.01

4.4.2.30 Set device work mode：AT+MOD

Form	Command	Return
Set	AT+ MOD =<Number String>	0K
		ERROR
Query	AT+ MOD?	+ MOD: Number String OK

Parameter description :

number string: 0 = Transparent Mode

1 = AT command Mode

2 = API mode

Default: 0

Attention: The command set device start up work mode,when configure and save ,it need restart.

4.4.2.31 Set data route method：AT+SKP

Form	Command	Return
Set	AT+ SKP =<Number String>	0K
		ERROR
Query	AT+ SKP?	+ SKP: Number String OK

Parameter description :

number string: 0 = Use mesh network route data

1 = Not route data and direct send data

Default: 0

Attention: If ZigBee devices just in a hop distance between each other, data can directly send out and not use mesh network route so that other devices needn't relay the data.It helps improving communicating speed.

4.4.2.32 Set API mode whether echo data send state：AT+MTC

Form	Command	Return
Set	AT+ SKP =<Number String>	0K
		ERROR
Query	AT+ SKP?	+ SKP: Number String OK

Parameter description :

number string: 0 =Not echo

1 =Echo

Default: 1

Attention: API mode ,when RF data is send out ,the data send state will output the serial port.

4.4.2.33 Other execute command

Command	Return	Description
AT+SAV Save	OK	Save parameters
AT+ESC Escape	OK	Escape AT command mode Then enter transparent mode
AT+API	OK	Enter API mode
AT+FAC Factory	OK	Factory
AT+SRS Restart	OK	Restart

4.4.3 API mode

API operation requires that communication with the module be done through a structured interface (data is communicated in frames in a defined order). The API specifies how commands, command responses and module status messages are sent and received from the module using a UART Data Frame.

To enter API mode :

- In the transparent mode,send the 3-character command sequence"= = ="twice through serial port.
- In the AT command mode,send "AT+API<CR><LF>" through serial port.

The UART data frame structure is defined as follows:

SOF	Length	Command	Frame data	Frame check sequence
1 Byte	1 Byte	2 Bytes	xx Bytes (xx<82)	1 Byte

SOF (Start of Frame): This is a one byte field with value equal to 0xFE that defines the start of each general serial packet.

Length : 1 byte length of the actual data.

Command : 2 byte command Id.

Frame data : the data ranging from 0-82 bytes.

FCS (Frame Check Sequence):

This is a one byte field that is used to ensure packet integrity. This field is computed as an XOR of all the bytes in the message starting with LEN field and through the last byte of data. The following is a sample code FCS calculation:

```
unsigned char calcFCS(unsigned char *pMsg, unsigned char len)
{
    unsigned char result = 0;
    while (len--)
    {
        result ^= *pMsg++;
    }
    return result;
}
```

Note:1.Frame data some place need little-endian (node address,IO value and other set commands)

2.Every configure item is set, it should send save command.Network param(PAN ID,Physical Channel ,node address or device type changed),sleep param and serial param change should re-power device.

4.4.3.1 Device send data

Send command:FE 06 24 5F 00 00 41 41 41 41 7D

SOF	Length	Command	Data		FCS
FE	06	24 5F	Destination address (2 bytes)	Send data (<80 bytes)	7D
			00 00	41 41 41 41	

Data Description:

Destination address：Low byte comes first.

Send data：Endian as normal.

Respone to send command state:FE 01 44 80 00 C5

SOF	Length	Command	Data	FCS
FE	01	44 80	Command send state (1 byte)	C5
			00	

Data Description:

Command send state： 00 = Success

01 = Failure

The command send state respone can be closed as the configure item “API mode whether echo data send state” is closed.

4.4.3.2 Device receive the RF data

Receive RF data

SOF	Length	Command	Data		FCS
FE	06	44 5F	Sender address (2 bytes)	Receive data	03
			10 0E	41 41 41 41	

Data Description:(little-endian)

Sender address：10 0E means 0x0E10 = 3600

4.4.3.3 Remote query a device IO value

Send command:FE 04 24 5E 10 0E 00 02 62

SOF	Length	Command	Data			FCS
FE	04	24 5E	Destination address (2 bytes)	Read command (1 byte)	IO pin (1 byte)	62
			10 0E	00	02	

Data Description: (little-endian)

Destination address：10 0E means 0x0E10 = 3600

IO pin: 00 = D0 01 = D1 02 = D2

03 = D3 04 = D4

Respone to send command state:FE 01 44 80 00 C5

SOF	Length	Command	Data	FCS
FE	01	44 80	Command send state (1 byte)	C5
			00	

Data Description:

Command send state： 00 = Success

01 = Failure

The command send state respone can be closed as the configure item “API mode whether echo data send state” is closed.

Receive IO state data

SOF	Length	Command	Data				FCS
FE	06	44 5E	Sender address (2 bytes)	IO pin (1 byte)	IO mode (1 byte)	value (2 bytes)	01
			10 0E	02	01	00 00	

Data Description: (little-endian)

Sender address: 10 0E means 0x0E10 = 3600

IO pin: 00 = D0 01 = D1 02 = D2

03 = D3 04 = D4

IO mode： 00 = Disabled 01 = ADC

02 = GPIO input 03 = GPIO output low

04 = GPIO output high 05 = Pluse input count

value： IO mode is 00 = 00 00

IO mode is 01 = ADC acquisition value

IO mode is 02 = GPIO acquisition value 00 00 / 01 00

IO mode is 03 = current output value 00 00

IO mode is 04 = current output value 01 00

IO mode is 05 = current Pluse input count value

4.4.3.4 Remote set a device IO mode

Send command:FE 07 24 60 10 0E 01 02 01 00 00 5F

SOF	Length	Command	Data					FCS
FE	07	24 60	Destination address (2 bytes)	Write command (1 byte)	IO pin (1 byte)	IO mode (1 byte)	IO value (2 bytes)	5F
			10 0E	01	02	01	00 00	

Data Description: (little-endian)

Destination address：10 0E means 0x0E10 = 3600

IO pin: 00 = D0 01 = D1 02 = D2

03 = D3 04 = D4

IO mode： 00 = Disabled 01 = ADC

02 = GPIO input 03 = GPIO output low

04 = GPIO output high 05 =Pluse input count

IO value： IO mode is 01 or 02 : configure report time

IO mode is 05 : set the pluse input count value

Respone to send command state:FE 01 44 80 00 C5

SOF	Length	Command	Data	FCS
FE	01	44 80	Command send state (1 byte)	C5
			00	

Data Description:

Command send state： 00 = Success

01 = Failure

The command send state respone can be closed as the configure item “API mode whether echo data send state” is closed.

Receive IO state data

SOF	Length	Command	Data			FCS
FE	04	44 60	Sender address (2 bytes)	IO pin: (1 byte)	State (1 byte)	3C
			10 0E	02	00	

Data Description: (little-endian)

Sender address: 10 0E means 0x0E10 = 3600

IO pin : 00 = D0 01 = D1 02 = D2

03 = D3 04 = D4

State ： 00 = Set success

01 = Set failure

4.4.3.5 Query all devices state in the same network

Send command:FE 01 24 5B 01 7F

SOF	Length	Command	Data	FCS
FE	01	24 5B	Query command (1 byte)	7F
			01	

Command send state respone:FE 01 44 80 00 C5

SOF	Length	Command	Data	FCS
FE	01	44 80	Command send state (1 byte)	C5
			00	

Data Description:

Command send state： 00 = Success
01 = Failure

The command send state respone can be closed as the configure item “API mode whether echo data send state” is closed.

Receive device’s state data

SOF	Length	Command	Data			FCS
FE	0B	44 5D	Sender address (2 bytes)	MAC address (8 bytes)	Device type (1 byte)	1B
			10 0E	AA CF 28 02 00 4B 12 00	01	

Data Description: (little-endian)

Sender address: 10 0E means 0x0E10 = 3600

MAC address: 0x00124B000228CFAA

Device type : 00 = Coordinator
01 = Router
02 = End device

4.4.3.6 Query a device MAC address

Send command:FE 03 24 5D 10 0E 02 66

帧头	长度域	命令域	数据域		异或和
FE	03	24 5D	Destination address (2 bytes)	Query command (1 byte)	66
			10 0E	02	

Data Description: (little-endian)

Destination address: 10 0E means 0x0E10 = 3600

Respone to send command state:FE 01 44 80 00 C5

SOF	Length	Command	Data	FCS
FE	01	44 80	Command send state (1 byte)	C5
			00	

Data Description:

Command send state： 00 = Success

01 = Failure

The command send state respone can be closed as the configure item “API mode whether echo data send state” is closed.

Receive device’s state data

SOF	Length	Command	Data			FCS
FE	0B	44 5D	Sender address (2 bytes)	MAC address (8 bytes)	Device type (1 byte)	1B
			10 0E	AA CF 28 02 00 4B 12 00	01	

Data Description: (little-endian)

Sender address: 10 0E means 0x0E10 = 3600

MAC address: 0x00124B000228CFAA

Device type : 00 = Coordinator

01 = Router

02 = End device

4.4.3.7 Query a device node address

Send command

SOF	Length	Command	Data		FCS
FE	09	24 5C	Query command (1 bytes)	MAC address (8 bytes)	64
			03	AA CF 28 02 00 4B 12 00	

Data Description: (little-endian)

MAC address: 0x00124B000228CFAA

Respone to send command state:FE 01 44 80 00 C5

SOF	Length	Command	Data	FCS
FE	01	44 80	Command send state (1 byte)	C5
			00	

Data Description:

Command send state： 00 = Success

01 = Failure

The command send state respone can be closed as the configure item “API mode whether echo data send state” is closed.

Receive device’s state data

SOF	Length	Command	Data			FCS
FE	0B	44 5D	Sender address (2 bytes)	MAC address (8 bytes)	Device type (1 byte)	1B
			10 0E	AA CF 28 02 00 4B 12 00	01	

Data Description: (little-endian)

Sender address: 10 0E means 0x0E10 = 3600

MAC address: 0x00124B000228CFAA

Device type : 00 = Coordinator

01 = Router

02 = End device

4.4.3.8 Set the node current operating mode

Send command :FE 01 21 2A 00 0A

SOF	Length	Command	Data	FCS
FE	01	21 2A	Work mode command (1 byte)	0A
			00	

Data Description:

Operating mode： 00 = Transparent Mode
01 = AT command Mode
02 = API Mode

Respone to send command

SOF	Length	Command	Data	FCS
FE	01	61 2A	State (1 byte)	4A
			00	

State : 00 = Success
01 = Failure

4.4.3.9 Set device parameter

4.4.3.9.1 Set device work mode

Note: this command defines the device work mode when device quit the 3 second configure time.

Send query command: FE 01 21 2B 00 0B

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	0B
			00	

Respone to query command: FE 03 61 2B 00 02 00 4B

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	4B
			00	02 00	

Data Description: (little-endian)

Respone value: 00 00 = Transparent mode
01 00 = AT command mode
02 00 = API mode

Send set command:FE 03 21 2B 00 02 00 0B

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	0B
			00	02 00	

Data Description: (little-endian)

Parameter value: 00 00 = Transparent mode
01 00 = AT command mode
02 00 = API mode

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.2 Set device physical channel

Send query command: FE 01 21 2B 01 0A

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	0A
			01	

Respone to query command: FE 03 61 2B 01 0B 00 43

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	43
			01	0B 00	

Data Description: (little-endian)

Respone value: 0B 00 ~ 1A 00

Send set command: FE 03 21 2B 01 0B 00 03

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	03
			01	0B 00	

Data Description: (little-endian)

Parameter value: 0B 00 ~ 1A 00

Default :0B 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

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4.4.3.9.3 Set device type

Send query command: FE 01 21 2B 02 09

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	09
			02	

Respone to query command: FE 03 61 2B 02 00 00 4B

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	4B
			02	00 00	

Data Description: (little-endian)

Respone value: 00 00 = Coordinator
01 00 = Router
02 00 = End device

Send set command: FE 03 21 2B 02 00 00 0B

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	0B
			02	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = Coordiator
01 00 = Router
02 00 = End device

Default :01 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.4 Set device PAN ID

Send query command: FE 01 21 2B 03 08

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	08
			03	

Respone to query command: FE 03 61 2B 03 01 00 4B

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	4B
			03	01 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FB FF

FF FF,will be assigned by system

Send set command: FE 03 21 2B 03 01 00 0B

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	0B
			03	0100	

Data Description: (little-endian)

Parameter value: 00 00 ~ FB FF

FF FF ,will be assigned by system

Default :FF FF

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.5 Set device node address

Send query command: FE 01 21 2B 04 0F

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	0F
			04	

Respone to query command: FE 03 61 2B 04 01 00 4C

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	4C
			04	01 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FB FF

FF FF,will be assigned by system

Send set command: FE 03 21 2B 04 01 00 0C

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	0C
			04	01 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ FB FF

FF FF ,will be assigned by system

Default :FF FF

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.6 Set device serial port baudrate

Send query command: FE 01 21 2B 05 0E

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	0E
			05	

Respone to query command: FE 03 61 2B 05 09 00 45

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	45
			05	09 00	

Data Description: (little-endian)

Respone value: 00 00 = 300 01 00 = 600 02 00 = 1200
03 00 = 2400 04 00 = 4800 05 00 = 9600
06 00 = 19200 07 00 = 38400 08 00 = 57600
09 00 = 115200

Send set command: FE 03 21 2B 05 09 00 05

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	05
			05	09 00	

Data Description: (little-endian)

Parameter value: 00 00 = 300 01 00 = 600 02 00 = 1200
03 00 = 2400 04 00 = 4800 05 00 = 9600
06 00 = 19200 07 00 = 38400 08 00 = 57600
09 00 = 115200

Default :09 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.7 Set device serial port parity

Send query command: FE 01 21 2B 06 0D

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	0D
			06	

Respone to query command: FE 03 61 2B 06 00 00 4F

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	4F
			06	00 00	

Data Description: (little-endian)

Respone value: 00 00 = None
01 00 = Even
02 00 = Odd

Send set command: FE 03 21 2B 06 00 00 0F

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	0F
			06	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = None
01 00 = Even
02 00 = Odd

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.8 Set device serial port stop bit

Send query command: FE 01 21 2B 07 0C

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	0C
			07	

Respone to query command: FE 03 61 2B 07 00 00 4E

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	4E
			07	00 00	

Data Description: (little-endian)

Respone value: 00 00 = 1 stop bit

01 00 = 2 stop bit

Send set command: FE 03 21 2B 07 00 00 0E

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	0E
			07	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = 1 stop bit

01 00 = 2 stop bit

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.9 Set device serial port hardware flow control

Send query command: FE 01 21 2B 08 03

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	02
			08	

Respone to query command: FE 03 61 2B 08 00 00 41

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	41
			08	00 00	

Data Description: (little-endian)

Respone value: 00 00 = Disable

01 00 = Enable

Send set command: FE 03 21 2B 08 00 00 01

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	01
			08	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = Disable

01 00 = Enable

Default : 00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.10 Set device serial port data interval

Note: Data Interval is used to judge if the serial has recived the data . If data interval greater than the setting ,the program will process the serial data. The lower baudrate ,the longer data interval.

Send query command: FE 01 21 2B 09 02

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	02
			09	

Respone to query command: FE 03 61 2B 09 14 00 54

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	54
			09	14 00	

Data Description: (little-endian)

Respone value: 06 00 ~ BC 07 (Millisecond)

Send set command: FE 03 21 2B 09 14 00 14

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	14
			09	14 00	

Data Description: (little-endian)

Parameter value: 06 00 ~ BC 07 (Millisecond)

Default : 14 00 (Millisecond)= 0x0014 = 20

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

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4.4.3.9.11 Set device debug level

Send query command: FE 01 21 2B 0A 01

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	01
			0A	

Respone to query command: FE 03 61 2B 0A 00 00 43

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	43
			0A	00 00	

Data Description: (little-endian)

Respone value: 00 00 = Close all debug messages
01 00 = Info the important debug messages
02 00 = Info all debug messages

Send set command: FE 03 21 2B 0A 00 00 03

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	03
			0A	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = Close all debug messages
01 00 = Info the important debug messages
02 00 = Info all debug messages

Default :00 00

Respone to set command: FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.12 Set device sleep mode

Send query command: FE 01 21 2B 0B 00

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	00
			0B	

Respone to query command: FE 03 61 2B 0B 00 00 42

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	42
			0B	00 00	

Data Description: (little-endian)

Respone value: 00 00 = No sleep
01 00 = Timer sleep
02 00 = Deep sleep

Send set command: FE 03 21 2B 0B 00 00 02

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	02
			0B	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = No sleep
01 00 = Timer sleep
02 00 = Deep sleep

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.13 Set device wake time

Note: 1.When AT+SLE =1, set the wake time .

Send query command: FE 01 21 2B 0C 07

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	07
			0C	

Respone to query command: FE 03 61 2B 0C B0 04 F1

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	F1
			0C	0B 04	

Data Description: (little-endian)

Respone value: 00 00 ~ FF FF (Millisecond)

Send set command: FE 03 21 2B 0C B0 04 B1

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	B1
			0C	0B 04	

Data Description: (little-endian)

Parameter value: 00 00 ~ FF FF (Millisecond)

Default : B0 04 (Millisecond)= 0x04B0 = 1200

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.14 Set device sleep time

Note: 1.When AT+SLE =1, set the sleep time .

2.When sleep time is zero ,the module doesn't go to sleep

Send query command: FE 01 21 2B 0D 06

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	06
			0D	

Respone to query command: FE 03 61 2B 0D 00 00 44

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	44
			0D	00 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FF FF (second)

Send set command: FE 03 21 2B 0D 00 00 04

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	04
			0D	00 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ FF FF (second)

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.15 Set D0 pin mode

Send query command: FE 01 21 2B 0E 05

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	05
			0E	

Respone to query command: FE 03 61 2B 0E 00 00 47

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	47
			0E	00 00	

Data Description: (little-endian)

Respone value: 00 00 = Disable 01 00 = ADC
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high

Send set command: FE 03 21 2B 0E 00 00 07

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	07
			0E	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = Disable 01 00 = ADC
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.16 Set D0 pin data acquisition time interval

Note:1. Should used in IO pin ADC or GPIO input mode.

2.When configure device sleep mode,,it doesn't work

3. The collected data will send to the trans address node. The IO pins value should be read in AT command mode or API mode.

Send query command: FE 01 21 2B 0F 04

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	04
			0F	

Respone to query command: FE 03 61 2B 0F 00 00 46

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	46
			0F	00 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FF FF (second)

Send set command: FE 03 21 2B 0F 00 00 06

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	06
			0F	00 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ FF FF (second)

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.17 Query D0 pin value

Send query command: FE 01 21 2B 10 1B

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	1B
			10	

Respone to query command: FE 03 61 2B 10 00 00 59

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	59
			10	00 00	

Data Description: (little-endian)

Respone value: ADC value :00 00 ~ FF 07

GPIO value:00 00 ~ 01 00

4.4.3.9.18 Set D1 pin mode

Send query command: FE 01 21 2B 11 1A

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	1A
			11	

Respone to query command: FE 03 61 2B 11 00 00 58

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	58
			11	00 00	

Data Description: (little-endian)

Respone value: 00 00 = Disable 01 00 = ADC
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high

Send set command: FE 03 21 2B 11 00 00 18

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	18
			11	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = Disable 01 00 = ADC
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.19 Set D1 pin data acquisition time interval

Note:1. Should used in IO pin ADC or GPIO input mode.

2.When configure device sleep mode,,it doesn't work

3. The collected data will send to the trans address node. The IO pins value should be read in AT command mode or API mode.

Send query command: FE 01 21 2B 12 19

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	19
			12	

Respone to query command: FE 03 61 2B 12 00 00 5B

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	5B
			12	00 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FF FF (second)

Send set command: FE 03 21 2B 12 00 00 1B

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	1B
			12	00 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ FF FF (second)

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.20 Query D1 pin value

Send query command: FE 01 21 2B 13 18

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	18
			13	

Respone to query command: FE 03 61 2B 13 00 00 5A

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	5A
			13	00 00	

Data Description: (little-endian)

Respone value: ADC value :00 00 ~ FF 07

GPIO value:00 00 ~ 01 00

4.4.3.9.21 Set D2 pin mode

Send query command: FE 01 21 2B 14 1F

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	1F
			14	

Respone to query command: FE 03 61 2B 14 00 00 5D

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	5D
			16	00 00	

Data Description: (little-endian)

Respone value: 00 00 = Disable 01 00 = ADC
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high

Send set command: FE 03 21 2B 14 00 00 1D

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	1D
			14	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = Disable 01 00 = ADC
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.22 Set D2 pin data acquisition time interval

Note:1. Should used in IO pin ADC or GPIO input mode.

2.When configure device sleep mode,,it doesn't work

3. The collected data will send to the trans address node. The IO pins value should be read in AT command mode or API mode.

Send query command: FE 01 21 2B 15 1E

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	1E
			15	

Respone to query command: FE 03 61 2B 15 00 00 5C

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	5C
			15	00 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FF FF (second)

Send set command: FE 03 21 2B 15 00 00 1C

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	1C
			15	00 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ FF FF (second)

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.23 Query D2 pin value

Send query command: FE 01 21 2B 16 1D

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	1D
			16	

Respone to query command: FE 03 61 2B 16 00 00 5F

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	5F
			16	00 00	

Data Description: (little-endian)

Respone value: ADC value :00 00 ~ FF 07

GPIO value:00 00 ~ 01 00

4.4.3.9.24 Set D3 pin mode

Send query command: FE 01 21 2B 17 1C

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	1C
			17	

Respone to query command: FE 03 61 2B 17 00 00 5E

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	5E
			17	00 00	

Data Description: (little-endian)

Respone value: 00 00 = Disable 01 00 = Invalid
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high 05 00 = Pluse input count

Send set command: FE 03 21 2B 17 00 00 1E

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	1E
			17	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = Disable 01 00 =Invalid
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high 05 00 = Pluse input count

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.25 Set D3 pin data acquisition time interval

Note:1. Should used in IO pin GPIO input or Pluse input count mode.

2.When configure device sleep mode,,it doesn't work

3. The collected data will send to the trans address node. The IO pins value should be read in AT command mode or API mode.

Send query command: FE 01 21 2B 18 13

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	13
			18	

Respone to query command: FE 03 61 2B 18 00 00 51

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	51
			18	00 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FF FF (second)

Send set command: FE 03 21 2B 18 00 00 11

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	11
			18	00 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ FF FF (second)

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.26 Query D3 pin value

Send query command: FE 01 21 2B 19 12

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	12
			19	

Respone to query command: FE 03 61 2B 19 00 00 50

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	50
			19	00 00	

Data Description: (little-endian)

Respone value: GPIO input value: 00 00 ~ 01 00

Pluse input value:00 00 ~ FF FF

4.4.3.9.27 Set D4 pin mode

Send query command: FE 01 21 2B 1A 11

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	11
			1A	

Respone to query command: FE 03 61 2B 1A 00 00 53

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	53
			1A	00 00	

Data Description: (little-endian)

Respone value: 00 00 = Disable 01 00 = Invalid
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high 05 00 = Pluse input count

Send set command: FE 03 21 2B 1A 00 00 13

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	13
			1A	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = Disable 01 00 = Invalid
02 00 = GPIO input 03 00 = GPIO output low
04 00 = GPIO output high 05 00 = Pluse input count

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.9.28 Set D4 pin data acquisition time interval

Note:1. Should used in IO pin GPIO input or Pluse input count mode.

2.When configure device sleep mode,,it doesn't work

3. The collected data will send to the trans address node. The IO pins value should be read in AT command mode or API mode.

Send query command: FE 01 21 2B 1B 10

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	10
			1B	

Respone to query command: FE 03 61 2B 1B 00 00 52

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	52
			1B	00 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FF FF (second)

Send set command: FE 03 21 2B 1B 00 00 12

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	12
			1B	00 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ FF FF (second)

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.29 Query D4 pin value

Send query command: FE 01 21 2B 1C 17

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	0B
			00	

Respone to query command: FE 03 61 2B 1C 00 00 55

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	4B
			00	02 00	

Data Description: (little-endian)

Respone value: GPIO input value : 00 00 ~ 01 00

Pluse input value:00 00 ~ FF FF

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http：//www.fourfaith.com Tel： +86 592-6300326 6300325 6300324 Fax：+86 592-5912735

4.4.3.9.30 Query device current PAN ID

Note:This command is different from "AT+PID". When the PAN ID is assigned by system and the node joined in the network , we can use this command to query the current PAN ID.

Send query command: FE 01 21 2B 1D 16

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	16
			1D	

Respone to query command: FE 03 61 2B 1D 01 00 55

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	55
			1D	01 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FB FF

FE FF means device is forming or joining a network

4.4.3.9.31 Query device current node address

Note:This command is different from "AT+NID". When the node address is assigned by system and the node joined in the network , we can use this command to query the current node address.

Send query command: FE 01 21 2B 1E 15

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	15
			1E	

Respone to query command: FE 03 61 2B 1E 00 00 57

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	57
			1E	00 00	

Data Description: (little-endian)

Respone value: 00 00 ~ FB FF

FE FF means device is forming or joining a network

4.4.3.9.32 Query device current network state

Send query command: FE 01 21 2B 1F 14

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	14
			1F	

Respone to query command: FE 03 61 2B 1F 09 00 5F

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	5F
			1F	09 00	

Data Description: (little-endian)

Respone value:

00 00	Initialized - not started automatically
01 00	Initialized - not connected to anything
02 00	Discovering PAN's to join
03 00	Joining a PAN
04 00	ReJoining a PAN, only for end devices
05 00	Joined but not yet authenticated by trust center
06 00	Started as device after authentication
07 00	Device joined, authenticated and is a routerr
08 00	Started as Zigbee Coordinator
09 00	Started as Zigbee Coordinator
0A 00	Device has lost information about its parent.

4.4.3.9.33 Set device whether auto starts network when powered

Send query command: FE 01 21 2B 20 2B

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	2B
			20	

Respone to query command: FE 03 61 2B 20 01 00 68

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	68
			20	01 00	

Data Description: (little-endian)

Respone value: 00 00 = Not auto start

01 00 = Auto start

Send set command: FE 03 21 2B 20 01 00 28

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	28
			20	01 00	

Data Description: (little-endian)

Parameter value: 00 00 = Not auto join

01 00 = Auto join

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.34 Set device whether RF data output the serial port

Note:This command parameter don't save in flsah. It is used to close the RF data output the serial port.

Send query command: FE 01 21 2B 21 2A

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	2A
			21	

Respone to query command: FE 03 61 2B 21 01 00 69

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	69
			21	01 00	

Data Description: (little-endian)

Respone value: 00 00 = Not output

01 00 = Output

Send set command: FE 03 21 2B 21 01 00 29

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	29
			21	01 00	

Data Description: (little-endian)

Parameter value: 00 00 = Not output

01 00 = Output

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.35 Set data route method

Note:If ZigBee devices just in a hop distance between each other, data can directly send out and not use mesh network route so that other devices needn't relay the data.It helps improving communicating speed.

Send query command: FE 01 21 2B 22 29

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	29
			22	

Respone to query command: FE 03 61 2B 22 00 00 6B

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	6B
			22	00 00	

Data Description: (little-endian)

Respone value: 00 00 = Use mesh network route data

01 00 = Not route data and direct send data

Send set command: FE 03 21 2B 22 00 00 2B

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	2B
			22	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = Use mesh network route data

01 00 = Not route data and direct send data

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.36 Set device to get acknowledge

Note:whether or not to get the application level acknowledge data

Send query command: FE 01 21 2B 23 28

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	28
			23	

Respone to query command: FE 03 61 2B 23 00 00 6A

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	6A
			23	00 00	

Data Description: (little-endian)

Respone value: 00 00 = No

01 00 = Yes

Send set command: FE 03 21 2B 23 00 00 2A

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	2A
			23	00 00	

Data Description: (little-endian)

Parameter value: 00 00 = No

01 00 = Yes

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.37 Set API mode whether echo data send state

Note: API mode ,when RF data is send out ,the data send state will output the serial port.

Send query command: FE 01 21 2B 24 2F

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	2F
			24	

Respone to query command: FE 03 61 2B 24 01 00 6C

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	6C
			24	01 00	

Data Description: (little-endian)

Respone value: 00 00 = Not echo

01 00 = Echo

Send set command: FE 03 21 2B 24 01 00 2C

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	2C
			24	01 00	

Data Description: (little-endian)

Parameter value: 00 00 = Not echo

01 00 = Echo

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.38 Set D3 pluse input count value

Note: This param is not save flash.It works when device is running.

Send set command: FE 03 61 2B 25 00 00 6C

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	6C
			25	00 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ FF FF

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.39 Set D4 pluse input count value

Note: This param is not save flash.It works when device is running.

Send set command: FE 03 61 2B 26 00 00 6F

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	6F
			26	00 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ FF FF

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.9.40 Set device transparent address

Send query command: FE 01 21 2B 27 2C

SOF	Length	Command	Data	FCS
FE	01	21 2B	command (1 byte)	2C
			27	

Respone to query command: FE 03 61 2B 27 00 00 6E

SOF	Length	Command	Data		FCS
FE	03	61 2B	command (1 byte)	Respone value (2 bytes)	6E
			27	00 00	

Data Description: (little-endian)

Respone value: 00 00 ~ F7 FF

FF FF means broadcast address

Send set command: FE 03 21 2B 27 00 00 2E

SOF	Length	Command	Data		FCS
FE	03	21 2B	command (1 byte)	parameter value (2 bytes)	2E
			27	00 00	

Data Description: (little-endian)

Parameter value: 00 00 ~ F7 FF

FF FF means broadcast address

Default :00 00

Respone to set command:FE 01 61 2B 00 4B / FE 01 61 2B 02 49

SOF	Length	Command	Data	FCS
FE	01	61 2B	Command state (1 byte)	4B
			00	

Data Description: 00 = Success

02 = Failure

4.4.3.10 Device parameter execute command

4.4.3.10.1 Parameter save command

Send execute command: FE 01 21 2C 00 0C

SOF	Length	Command	Data	FCS
FE	01	21 2C	command (1 byte)	0C
			00	

Respone to execute command: FE 01 61 2C 00 4C /FE 01 61 2C 02 4E

SOF	Length	Command	Data	FCS
FE	01	61 2C	Command state (1 byte)	4C
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.10.2 Factory command

Send execute command: FE 01 21 2C 01 0D

SOF	Length	Command	Data	FCS
FE	01	21 2C	command (1 byte)	0D
			01	

Respone to execute command: FE 01 61 2C 00 4C /FE 01 61 2C 02 4E

SOF	Length	Command	Data	FCS
FE	01	61 2C	Command state (1 byte)	4C
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.10.3 Restart device

Send execute command: FE 01 21 2C 02 0E

SOF	Length	Command	Data	FCS
FE	01	21 2C	command (1 byte)	0E
			02	

Respone to execute command: FE 01 61 2C 00 4C /FE 01 61 2C 02 4E

SOF	Length	Command	Data	FCS
FE	01	61 2C	Command state (1 byte)	4C
			00	

Data Description: 00 = Success
02 = Failure

4.4.3.10.4 Start device network

Send execute command: FE 01 21 2C 03 0F

SOF	Length	Command	Data	FCS
FE	01	21 2C	command (1 byte)	0F
			03	

Respone to execute command: FE 01 61 2C 00 4C /FE 01 61 2C 02 4E

SOF	Length	Command	Data	FCS
FE	01	61 2C	Command state (1 byte)	4C
			00	

Data Description: 00 = Success
02 = Failure

4.5 Device sleep mode configuration description

F8913D support router and end device configure Timer sleep and Deep sleep.

4.5.1 Timer sleep

Function description:

Timer sleep can set the sleep interval,when it wake up,the device will wake up a centain time then it goes to sleep again.

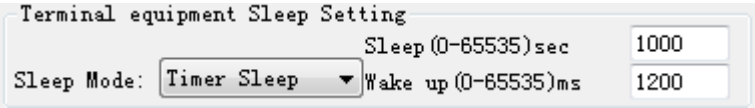
SLEEP/ON pin indicates device current work state: high level means sleep and low level means wake.

After device waking up, if device successfully joined in the network **Associate pin** will output low level to indicate online. If device unsuccessfully joined in the network or went into sleep **Associate pin** will output high level to indicate off-line.

Configuration conditions

(1)Hardware：**SLEEP_RQ pin** must connect to high level (3V ~3.3V).

(2)Software：Devcie should be configured as end device or router and Timer Sleep.The sleep interval must be greater than 0.



4.5.2 Deep sleep

Function description:

Deep sleep is waked up by extern interrupt. When **SLEEP_RQ pin** is low level ,device not goes to sleep. When **SLEEP_RQ pin** is high level(3V ~3.3V),device goes to deep sleep.

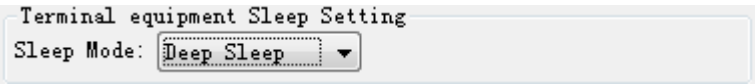
SLEEP/ON pin indicates device current work state: high level means sleep and low level means wake.

After device waking up, if device successfully joined in the network **Associate pin** will output low level to indicate online. If device unsuccessfully joined in the network or went into sleep **Associate pin** will output high level to indicate off-line.

Configuration conditions

(1) Hardware :Operate on **SLEEP_RQ pin** level.

(2) Software : Devcie should be configured as end device or router and Deep Sleep.



Chapter 5 Reference Circuit

5.1 Power

The F8913D typical operating voltage is 3.3VDC.The figure 5-1 is the recommend 5VDC convert to 3.3VDC circuit.

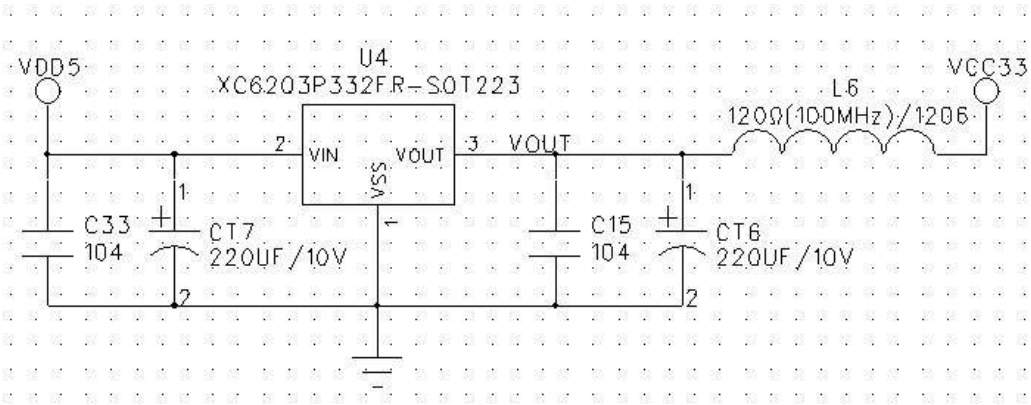
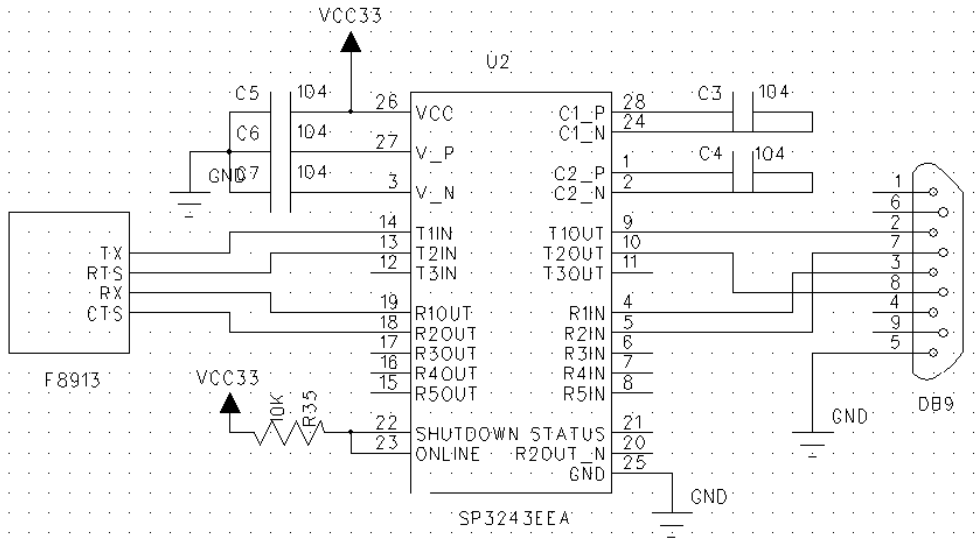


Figure 5-1 Power Reference

5.2 Communication

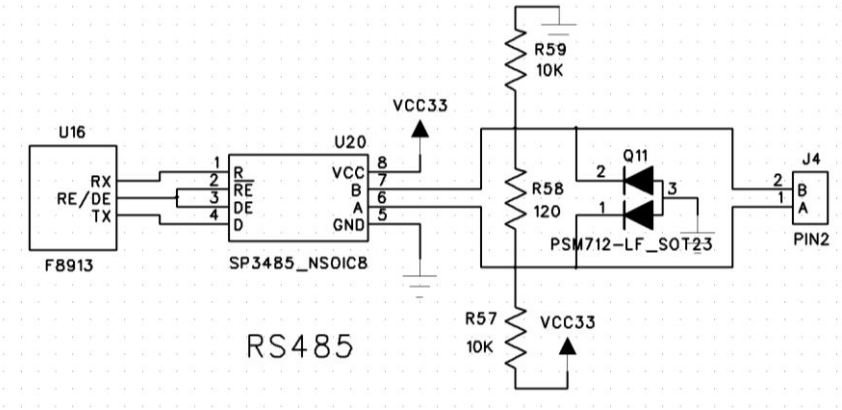
There are three modes:

1, The host controller support RS232 (such as: PC).The figure 5-2 is the recommend UART convert to RS232 circuit.



Figrue 5-2 UART convert to RS232

2, Ipc as epistatic machine: F8913D and ipc through the RS485 bus is linked together, need to use level conversion chips for level conversion (such as SP3485), as shown in figure 5-3.



Figrue 5-3 F8913D and ipc RS485 connection reference circuit

3, The host controller support UART/SPI.The connection please reference figure 3-1 and figure 3-5.

5.3 Reset

The RST pin should be pull-up with a 10kΩ resistance for the module power on normally.The hardware reset can execution by a switch.Press down the swich will reset the F8913D, as figure 5-4.

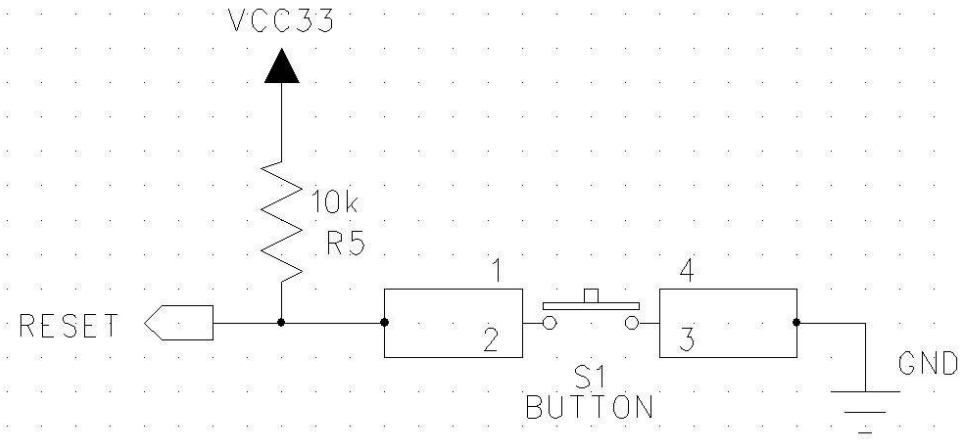


Figure 5-4 Reset Circuit

5.4 Digital I/O

The figure 5-5 is the demo circuit of the digital I/O control a LED.

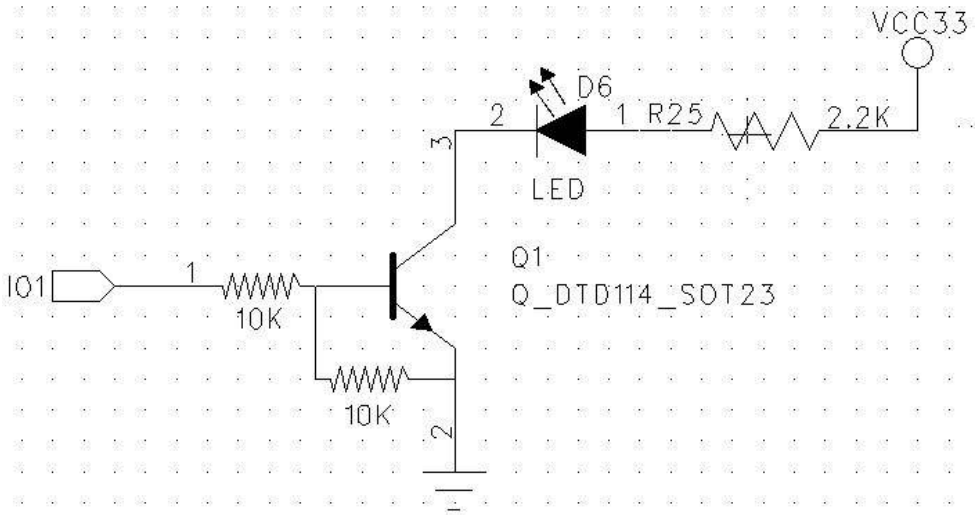


Figure 5-5 Digital I/O Control a LED

5.5 ADC Sampling Circuit

The figure 5-6 is applies to voltage acquisition (0-5VDC).The figure 5-7 is applies to current acquisition (0-20mA).

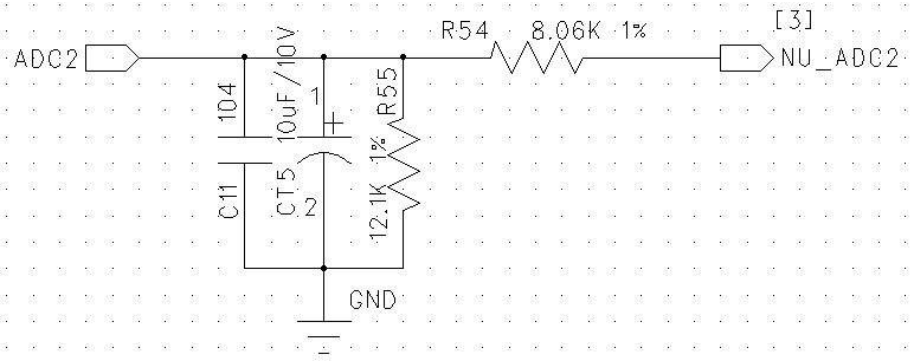


Figure 5-6 Voltage Acquisition (0-5VDC)

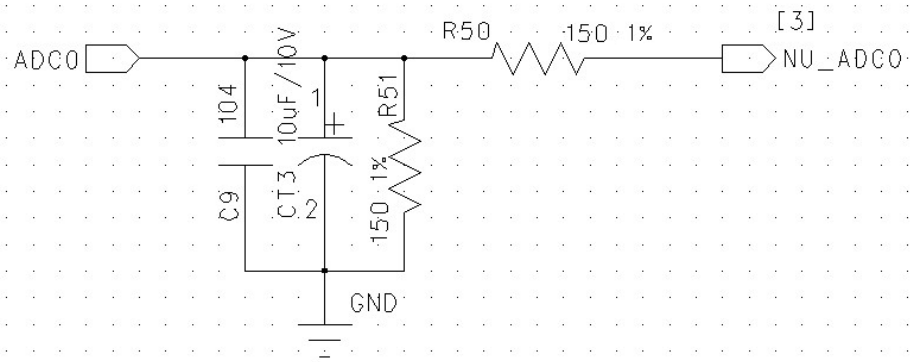


Figure 5-7 Current Acquisition (0-20mA)

Chapter 6 Dimension and solder

6.1 Outline Dimension

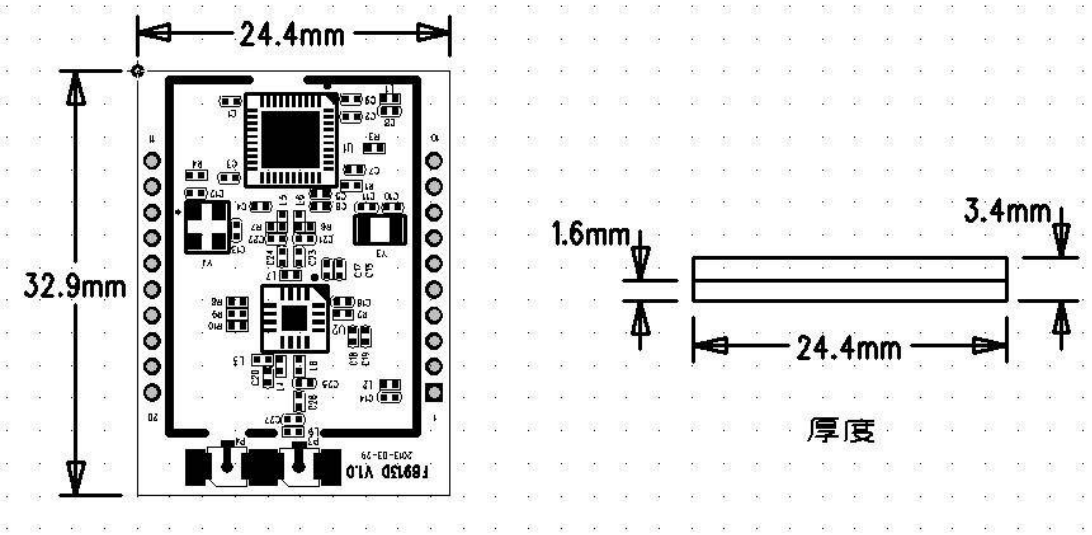


Figure 6-1 Outline Dimension

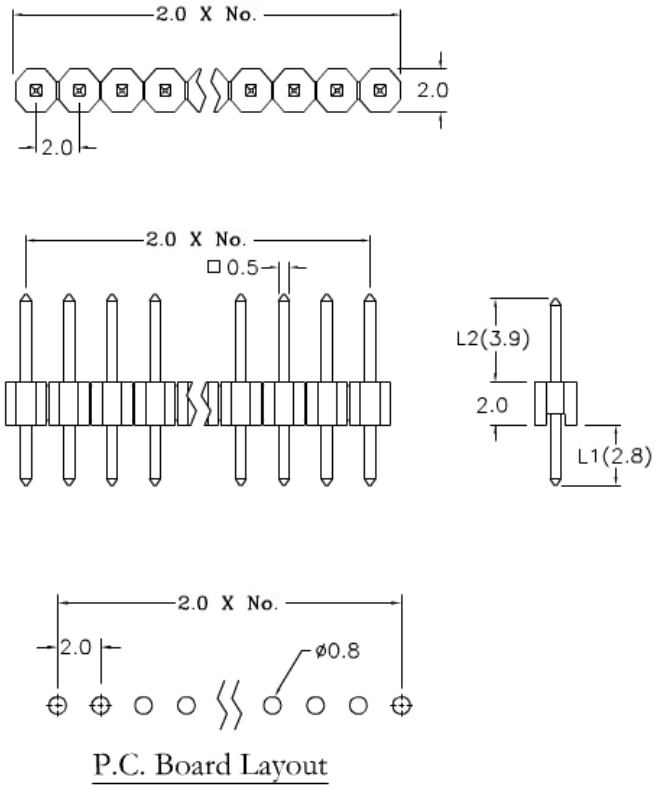


Figure 6-2 Pin Header Dinmension (optional)

6.2 PCB Footprint

The figure 6-3 and figure 6-4 are the recommend PCB Footprint. (Unit:mm)

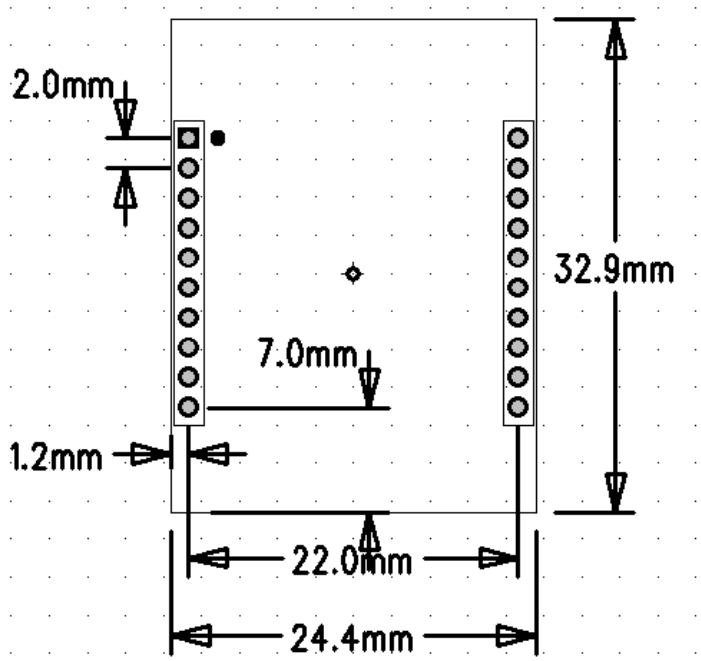


Figure 6-3 PCB Footpring (DIP)

6.3 Re-flow Temperature Specification

Please reference the IPC/JEDEC J-STD-020B for the Re-flow.

Table 6-1 Re-flow temperature

	Ideal (ºC)	Maximum (ºC)
Maximum Re-flow Temperature	215	230

Chapter 7 Ordering Information

You can contact the sales of Xiamen Four-Faith Communication Technology Co., Ltd to buy the modules or EVB. Please specify the model you need.

Contact Four-Faith:

Xiamen Four-Faith Communication Technology Co., Ltd.

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