Zigbee Module Technical Manual

Contents

1. Attention

1. This product does not have the waterproof features, please do not install this product directly to the outdoor and damp places;
2. This product is a wireless electronic products, please do not install it in the metal shielding shell, so far as to install in the open, the place where things did not hamper each other;
3. Installed in the outdoors, if the surrounding relatively empty, a lightning rod needs to be installed to prevent lightning strikes.

2. Description

Zigbee wireless communication module, integrates RF transceivers and microprocessors in keeping with ZIGBBE protocol standard. It has a long-distance communication range, anti-jamming ability, flexible networking, and other advantages and features; it can carry one-to-one, one-to-multi, multi-to-multi point transparent transmission of data between devices; It can form three kinds of network structures: a star, tree and mesh.

The Zigbee Module is constructed of the central coordinator, routers and end nodes. These three devices have different network capabilities: the central coordinator is the heart of the module. It is responsible for launching the network organization, network maintenance and management, it serves as a router too. The router is responsible for routing the data relay. The terminal nodes are responsible for sending and receiving their own data. Center coordinator, routers and end nodes of these three types of devices can be configured through software to achieve different device capabilities.

The serial data interface is a standard RS232 data interface. It has three way of data transmission: a)broadcast, b)umbrella between center coordinator and other equipment, c)destination address.

Any single module joined can map out the entire network topology through command query, including the number of nodes, the nodes mutual relations, the signal strength between the nodes.

3. Performance

·Low power consumption

The Zigbee was developed by using a variety of energy-saving mode. It can work for 6 months supported only by two AA batteries;

·Network self-organization, self-healing ability

The self-organizing feature: No manual intervention, network nodes can sense the presence of other nodes and determine the connection between the composition of structured network;

The self-healing functions: add or remove a node, the node position change, the node failure, etc., the network can self-repair, and network topology to be adjusted accordingly without human intervention to ensure that the whole system can still work properly;

• Low cost

The low complexity of the device and the royalty-free protocol make development of the zigbee at the low costs.

Zigbee's works in a flexible band for license-exempt band of 2.4GHz,it is no-user fees for wireless communication;

• Large network capacity

A Zigbee network can accommodate up to 65534 nodes; and up to co-exist within the region 16384 Zigbee network;

4. Technical specifications.

Specifications

Suggested work voltage:

Name	Min	Type	Max	Unit
Vcc-In	2.0	3.0	3.6	V
Vcr-Filter	1.75	1.8	1.85	V

The actual electrical characteristics (rated current) **Vcc = Vcc-In**

名称	Min	Type	Max	Unit
Logic“0”Input Voltage	0	0.7	0.9	V
Logic“1”Input Voltage	Vcc-0.7	Vcc	Vcc	V
Logic“0”Output Voltage *1	0	0	0.25	V
Logic“1”Output Voltage *1	Vcc-0.25	Vcc	Vcc	V
Logic“0”Input Current *2	NA	-1	-1	uA
Logic“1”Input Current *3	NA	1	1	uA
I/O pin pull-up and pull-down resistor	17	20	23	KΩ

*1 For up to 4mA output current on all pins except P1_0 and P1_1 which are up to 20 mA；

*2 Input equals 0V；

*3 Input equals Vcc；

Electrical Specifications

Measured with TA=25°C and VDD=3.0V unless stated otherwise.

Parameter	Type	Unit	C
Current Consumption			
MCU Active and RX Mode	26.7	mA	MCU running at full speed (32MHz), 32MHz XOSC running, radio in RX mode, -50 dBm input power. No peripherals active. Code run with Cache hit.
MCU Active and TX Mode, 0dBm	26.9	mA	MCU running at full speed (32MHz), 32MHz XOSC running, radio in TX mode, 0dBm output power. No peripherals active. Code run with Cache hit.
MCU Active Mode, 32 MHz	9.5	mA	MCU running at full speed (32MHz), 32MHz XOSC running. No radio or peripherals active.
Power mode 1	190	µA	Digital regulator on, High frequency RCOSC an crystal oscillator off. 3 XOSC, POR and ST active. RAM retention.
Power mode 2	0.5	µA	Digital regulator off, High frequency RCOSC and crystal oscillator off. 32.768 kHz XOSC, POR and ST active. RAM retention.
Power mode 3	0.3	µA	No clocks. RAM retention. POR active.

General Characteristics

Measured with TA=25°C and VDD=3.0V unless stated otherwise.

Parameter	Min	Type	Max	Unit	Condition/Note
Wake-Up and Timing					

Power mode 1 → mode 0		4.1		µS	Digital regulator on, High frequency RCOSC and crystal oscillator off. Startup of High frequency RCOSC.
Power mode 2 or 3 → mode 0		89.2		µS	Digital regulator off, High frequency RCOSC and crystal oscillator off. Startup of regulator and High frequency RCOSC.
Active → TX or RX 32MHz XOSC initially OFF. Voltage regulator initially OFF		525		µS	Time from enabling radio part in power mode 0, until TX or RX starts. Includes start-up of voltage regulator and crystal oscillator in parallel. Crystal ESR=16Ω.
Active → TX or RX Voltage regulator initially OFF		320		µS	Time from enabling radio part in power mode 0, until TX or RX starts. Includes start-up of voltage regulator.
Active → RX or TX			192	µS	Radio part already enabled. Time until RX or TX starts.

RF Receive Section

Measured with TA=25°C and VDD=3.0V unless stated otherwise.

Parameter	Min	Type	Max	Unit	Co
Receiver sensitivity		-91		dBm	PER = 1%, as specified by [1] Measured in 50 ? single endedly through a balun. [1] requires –85 dBm
Saturation (maximum input level)		10		dBm	PER = 1%, as specified by [1] Measured in 50 ? single endedly through a balun. [1] requires –20 dBm
Adjacent channel rejection + 5 MHz channel spacing		41		dB	Wanted signal -88dBm, adjacent modulated channel at +5 MHz, PER = 1 %, as specified by [1]. [1] requires 0 dB
Adjacent channel rejection - 5 MHz channel spacing		30		dB	Wanted signal -88dBm, adjacent modulated channel at -5 MHz, PER = 1 %, as specified by [1]. [1] requires 0 dB
Alternate channel rejection + 10 MHz channel spacing		55		dB	Wanted signal -88dBm, adjacent modulated channel at +10 MHz, PER = 1 %, as specified by [1] [1] requires 30 dB

Alternate channel rejection - 10 MHz channel spacing		53		dB	Wanted signal -88dBm, adjacent modulated channel at -10 MHz, PER = 1 %, as specified by [1] [1] requires 30 dB
Channel rejection ≥ + 15 MHz ≤ - 15 MHz		55 53		dB dB	Wanted signal @ -82 dBm. Undesired signal is an 802.15.4 modulated channel, stepped through all channels from 2405 to 2480 MHz. Signal level for PER = 1%. Values are estimated.
Co-channel rejection		-6		dB	Wanted signal @ -82 dBm. Undesired signal is an 802.15.4 modulated at the same frequency as the desired signal. Signal level for PER = 1%.
Blocking / Desensitization + 5 MHz from band edge + 10 MHz from band edge + 20 MHz from band edge + 50 MHz from band edge - 5 MHz from band edge - 10 MHz from band edge - 20 MHz from band edge - 50 MHz from band edge		-42 -45 -26 -22 -31 -36 -24 -25		dBm dBm dBm dBm dBm dBm dBm dBm	Wanted signal 3 dB above the sensitivity level, CW jammer, PER = 1%. Measured according to EN 300 440 class 2.
Spurious emission 30 – 1000 MHz 1 – 12.75 GHz		-64 -75		dBm dBm	Conducted measurement in a 50 ? single ended load. Complies with EN 300 328, EN 300 440 class 2, FCC CFR47, Part 15 and ARIB STD-T-66
Frequency error tolerance		±140		ppm	Difference between centre frequency of the received RF signal and local oscillator frequency. [1] requires minimum 80 ppm
Symbol rate error tolerance		±900		ppm	Difference between incoming symbol rate and the internally generated symbol rate [1] requires minimum 80 ppm

RF Receive Parameters
RF Transmit Section
Measured with TA=25°C and VDD=3.0V unless stated otherwise.

Parameter	Min	Type	Max	Unit	Con

Nominal output power		0		dBm	Delivered to a single ended 50Ω load through a balun and output power control set to 0x5F (TXCTRLL).
Programmable output power range		25.8		dB	The output power is programmable in 16 steps from approximately –25.2 to 0.6 dBm.
Harmonics 2nd harmonic 3rd harmonic 4th harmonic 5th harmonic		-50.7 -55.8 -54.2 -53.4		dBm dBm dBm dBm	Measurement conducted with 100 kHz resolution bandwidth on spectrum analyzer and output power control set to 0x5F (TXCTRLL). Output Delivered to a single ended 50Ω load through a balun.
Spurious emission 30 - 1000 MHz 1– 12.75 GHz 1.8 – 1.9 GHz 5.15 – 5.3 GHz		 -47 -43 -58 -56		 dBm dBm dBm dBm	Maximum output power. The peak conducted spurious emission is -47dBm@192MHz which is in an EN300440 restricted band limited to -54dBm.
Error Vector Magnitude (EVM)		11		%	Measured as defined by [1] [1] requires max. 35 %
Optimum load impedance		115 + j180		Ω	Differential impedance as seen from the RF-port (RF_P and RF_N) towards the antenna.

RF Transmit Parameters

ADC

Measured with TA=25°C, VDD=3.0V.Preliminary characterized parameters.

Parameter	Min	Type	Max	Unit	Conditio
Input voltage	0		AVDD	V	AVDD is voltage on AVDD_SOC pin
External reference voltage	0		AVDD	V	AVDD is voltage on AVDD_SOC pin
External reference voltage	0		AVDD	V	AVDD is voltage on AVDD_SOC pin
Input resistance, ADC single ended input		167		kΩ	AIN0 to AIN7 selected as ADC input
Input resistance, ADC differential		TBD			
Input resistance, single-ended		49		kΩ	AIN7 selected as external reference input
Input resistance, differential reference1		TBD			
Effective number of bits (ENOB)2		5.5 7.3 9.0 10.5		Bits	8-bits setting. 10-bits setting. 12-bits setting. 14-bits setting.
Effective number of bits (ENOB)		TBD			

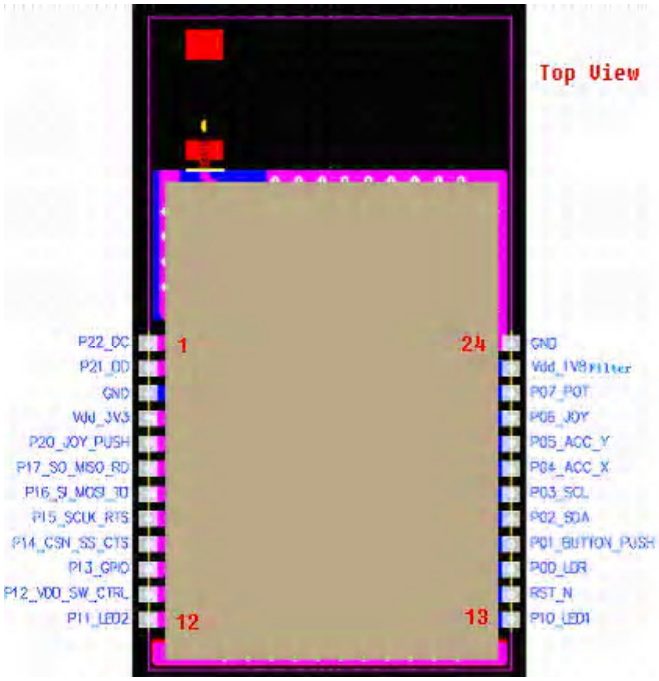
Offset1		TBD		LSB	
Conversion time		20 36 68 132		µS µS µS µS	8-bits setting. 10-bits setting. 12-bits setting. 14-bits setting.
Differential nonlinearity (DNL)3		± 0.14	1.0	LSB	8-bits setting.
Integral nonlinearity (INL) 2		±0.5	3.4	LSB	8-bits setting.
SINAD2 (sine input signal frequency 1 Hz and 1 kHz)		34 46 56 65		dB dB dB dB	8-bits setting. 10-bits setting. 12-bits setting. 14-bits setting.

ADC Characteristics

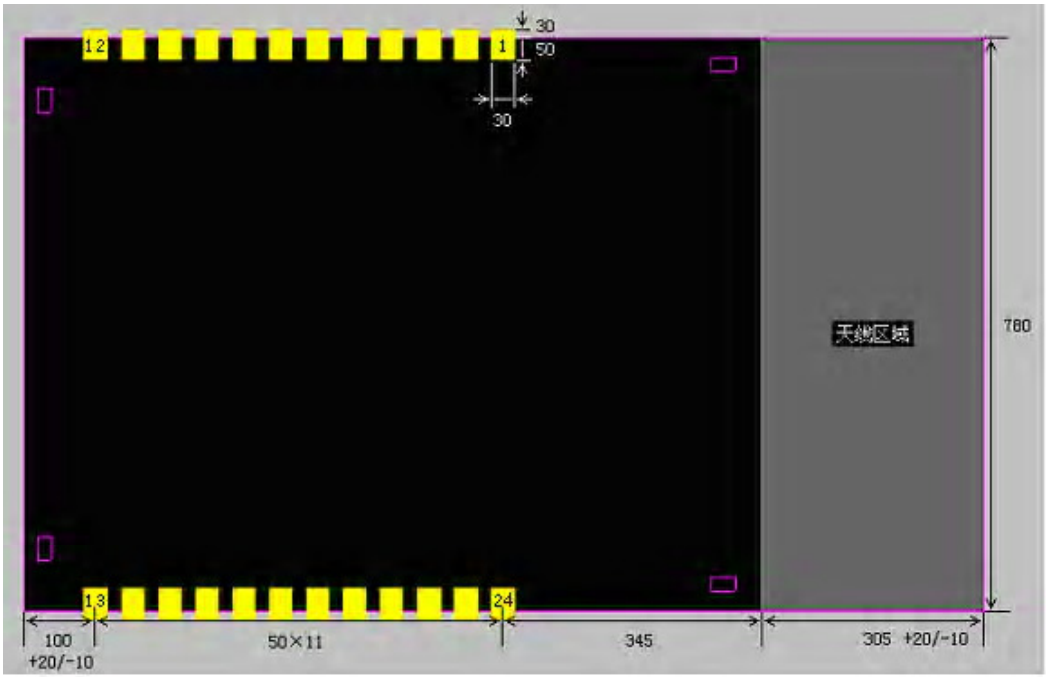
1. Only for devices with Chip Version register, CHVER.VERSION equal to 0x02 or greater
2. Not characterized for this data sheet revision.
3. Single-ended input signal and AVDD used as reference. Sine input, tested at frequencies 1 Hz and 1 kHz

5. Hardware Interface Specification

5.1 Appearance



5.2 Recommended PCB Package



5.3 Pin List

No.	Label	Type	Deacription
1	P22	Digital I/O	
2	P21	Digital I/O	
3	GND	Ground	a ground.
4	Vcc-In	Power Input	2.0V-3.6V digital power supply for digital I/O.
5	P20	Digital I/O	Mode switching pin MODE, input, high parameter setting state, low normal working state
6	P17	Digital I/O	UART RXD
7	P16	Digital I/O	UART TXD
8	P15	Digital I/O	UART RTS
9	P14	Digital I/O	UART CTS
10	P13	Digital I/O	
11	P12	Digital I/O	
12	P11	Digital I/O	Network indicator（20 mA drive capability）
13	P10	Digital I/O	Operation indicator（20 mA drive capability）
14	RST		Reset, active low, Usually high.
15	P00	Digital I/O	
16	P01	Digital I/O	Sleep-pin SLEEP, input, high dormancy, wake up low
17	P02	Digital I/O	
18	P03	Digital I/O	
19	P04	Digital I/O	
20	P05	Digital I/O	
21	P06	Digital I/O	
22	P07	Digital I/O	

23	Vcr-Filter	Power Output	1.8V Voltage regulator power supply output. Only intended for supplying the analog 1.8V part.
24	GND	Ground	a ground.

6.Functional Interface Specification

6.1 Button

Zigbee wireless communication module provides a pin (16 pin, P01) MODE as a switch pin, you can add call-off switch, or directly controlled by an external processor which used to select operating modes or parameters configuration mode.

MODE is set to low when the zigbee module is in working condition, the operation indicator is flickering (13 pin); MODE is set to high when the zigbee module is in parameter setting condition, the operation indicator is on.

For the terminal nodes, the module also provides a pin (16-pin P01) SLEEP as a sleep wake-up pin, set high system sleep, set low system wake-up. The module will shut down the wireless signal as well as the serial transceiver functionality in the dormant state.

6.2 Indicator

Zigbee provides 2 LED indication interfaces to show the work status, they are Operation Indicator(13pin,P10) Network indicator(12pin,P11); 2 indicators as well. The status and indication as follows:

Indicator	Indication	Status	
Operation （P10）	Flicker per second	Running normally	
	On	Parameter setting	
	Off	System halt , no power or system failure	
Network （P11）	Off	Coordinator	setup network successfully
		Router	Join
		End node	Join
	On	Connection failure	

6.3 Data Interface

Zigbee provides the standard UART interface .

The UART interface provides TX、RX、RTS、CTS、GND 5-line mode and TX、RX、GND 3-line mode.

Default data interface and parameter：

Serial port parameter	default settings
Baud	9600
Parity bit	NONE
Data bit	8
Stop bit	1

6.4 Configuration Interface

When Zigbee wireless communication module MODE (mode switch P01) pin is in HIGH, the system is in the configuration state; when t is in LOW, the system in the working status.

The configuration interface is used for this product, some of the parameters to configure the interface, serial data interface to a fixed set.

Serial port parameter	default settings
Baud	9600
Parity bit	NONE
Data bit	8
Stop bit	1

7.Module Configuration

Command 1：Test

Command	Response	Parameter
AT\r\n	OK	None

Command2：Query Program Version

Command	Response	Parameter
AT+VERSION? \r\n	OK \r\n＋VERSION：<Para1>\r\n	Para1： Version Number

Command3：Set/Query Baud

Command	Respon	Parameter
AT+BAUD=< Para1>\r\n	OK	Para1:baud（1200、2400、4800、9600、19200、 38400、57600、115200、230400） Default：9600
AT+BAUD?\r\n	OK \r\n＋BAUD：<Para1>\r\n	

Notice：A fixed baud rate of 9600bps set for configuration, a set baud rate is for communication work.

Command4：Set / Query flow control mode

Co	Response	Parameter
AT+FLOWCONTROL=<Para1>\r\n	OK	<Para1>: 0：No flow control 1：Hardware flow control Default：1
AT+ FLOWCONTROL?\r\n	OK \r\n＋FLOWCONTROL：<Para1>\r\n	

Command5：Set / Query serial data bit

Command	Response	Parameter
AT+ DATABIT=<Para1>\r\n	OK	<Para1>： 8：8 bit 9：9 bit Default：8
AT+ DATABIT?\r\n	OK \r\n＋DATABIT：<Para1>\r\n	

Command6：Set / Query Serial stop bits

Command	Response	Parameter
AT+ STOPBIT=<Para1>\r\n	OK	<Para1>： 1：1 bit 2：2 bit Default：1
AT+ STOPBIT?\r\n	OK \r\n＋STOPBIT：<Para1>\r\n	

Command 7：Set / Query Serial Parity

Command	Response	Parameter
AT+ VERIFYBIT=<Para1>\r\n	OK	<Para1>： 0：No parity 1：odd parity 2: even parity Default：0
AT+ VERIFYBIT?\r\n	OK \r\n＋VERIFYBIT：<Para1>\r\n	

Command 8：Set / Query the type of device

Command	Response	Parameter
AT+ ROLE=<Para1>\r\n	OK	<Para1>： 0：Canter node 1：Router node 2：End node Default：1
AT+ ROLE?\r\n	OK \r\n＋ROLE：<Para1>\r\n	

Command9：Set / Query the network ID

Command	Response	Parameter
AT+ PANID=<Para1>\r\n	OK	<Para1>： 0000～3FFF FFFF: Auto Select Default: FFFF
AT+ PANID\r\n	OK \r\n＋PANID：<Para1>\r\n	

Command10：Set / Query Communication Channel

Command	Response	Parameter
AT+ HANNEL=<Para1>\r\n	OK	<Para1>： 0 ~ 15 Default：0
AT+ CHANNEL\r\n	OK \r\n＋CHANNEL：<Para1>\r\n	

Channel	Configuration	Remarks
0 ~ 15	00：2.405GHz 01：2.410 GHz 02：2.415 GHz 03：2.420 GHz 04：2.425GHz 05：2.430 GHz 06：2.435GHz 07：2.440 GHz 08：2.445GHz 09：2.450 GHz 10：2.455GHz 11：2.460 GHz 12：2.465GHz 13：2.470 GHz 14：2.475GHz 15：2.480 GHz	Suggest to use channel 4、9、14、15 to avoid WIFI influence。

Command11：Set/Query data transmission mode

Command	Response	Parameter
AT+SENDMODE=<Para1>\r\n	OK	<Para1>： 0：Broadcast mode 1：Master-slave mode 2：P to P mode Default：0
AT+ SENDMODE \r\n	OK \r\n＋SENDTYPE：<Para1>\r\n	

Broadcast Mode: Transparent data transmission of node serial port; Any data from a node can received by other nodes.

Master-slave Mode: Transparent data transmission of node serial port. The data sent from the central node can be received by any other nodes; The data from other nodes can by received only by the center node.

P to P mode: The node must follow the format for sending and receiving serial data; A node can only send the data to the destination address node in the package; only the node of the destination address can receive the data; The node from the destination address of the serial received data packet contains the active node address. If the node is sending out a package in the address

broadcast address, all nodes in the network can receive the package. The data package received from these nodes contains the active Node Address.

Command12：Back to the Default configuration

Command	Response	Parameter
AT+RESET\r\n	OK	None

Command13：Query local MAC address

Command	Response	Parameter
AT+LEXTADDR?\r	\r\nOK\r\n \r\n+LEXTADDR:<eaddr>\r\n	eaddr：64 bit expanded MAC address.

8.P to P mode data specifications

In P to P mode, the communication between the Zigbee module and the external processor is based on specific data packet format. All the flow data as well as additional AT Command need in such a format and module communication, otherwise the module will be regarded as invalid data.

8.1. The data package format

Packet format is defined as the 5 bytes of header plus valid data：

Sync header		Package Type	Serial	Data length	Valid Data
0x55	0xAA	1 Byte	1 Byte	1 Byte	（0 - 80）Bytes

·Sync header: A packet starts with 0x55、0xAA, in the one packet

·Package type: 1 byte length of the type of field, used to indicate the current data packet categories. For example, it indicates an AT Command, or other type of data packets, as below：

Package type	Explanation	Data transmit direction
0x00	AT command request	External MCU ->Zigbee module
0x01	AT command response	Zigbee module ->external MCU
0x10	Data Package	External MCU <-> Zigbee
0x20	Package receive response	Zigbee module -> external MCU

·Serial: The serial number of the field within 1 byte, the serial number automatically add 1 when the external processor send the data package to the Zigbee. The Zigbee responses to the external processor through 0x20 package type, the serial number is the same as the received serial number. The serial number of other data package sent by Zigbee automatically adds 1 every time.

·Data length: The field of 1 byte length counts the byte number of the following data. Maximum

data length is 80 bytes.

·Valid Data: This field is the specific data, the length of the field was counted by the data length

8.2 . The extra AT Command request（0x00）& response（0x01）package

Under the P-to-P Mode, some AT Commands were added to queries including: queries the local MAC address, the network short address, through the MAC address queries remote network short address, through the network short address queries the remote MAC address, through the network short address queries node parent and child node, queries the local node and the parent and child node signal, queries the local node and the neighbor node signal.

The communication format between the Zigbee and external processor is as follows

The external processor queries the local MAC address:

55 AA 00 01 0D 41 54 2B 4C 45 58 54 41 44 44 52 3F 0D

Zigbee responses to the query from the external:

55 AA 20 01 06 0D 0A 4F 4B 0D 0A

Zigbee returns the local MAC address:

55 AA 01 01 1E 0D 0A 2B 4C 45 58 54 41 44 44 52 3A 30 30 30 30 30 30 30 30 30 30 30 30 31 32 31 31 0D 0A

Command1：Query local MAC address

Command	Response	Parameter
AT+LEXTADDR?\r	\r\n+LEXTADDR:<eaddr>\r\n	eaddr：MAC address 64-bit extensions

Note: In the configuration state, a "check the local MAC address" command is also provided and it sends a command without adding header. An additional header needed when send a command in the work mode and in the P to P mode.

Command2：Query local network short address

Command	Response	Parameter
AT+LSHORTADDR?\r	\r\n+LSHORTADDR:<saddr>\r\n	saddr：16-bit short address

Command3：Query remote MAC address

Command	Response	Parameter
AT+REXTADDR=<saddr>\r	\r\n+REXTADDR:<saddr>,<eaddr>\r\n	saddr：16-bit short address eaddr：MAC address 64-bit extensions

Command4：Query remote short address

Command	Response	Parameter
AT+RSHORTADDR= <eaddr>\r	\r\n+RSHORTADDR: <eaddr>,<saddr>\r\n	eaddr：MAC address 64-bit extensions saddr：16-bit short address

Command5：Query parent and child node

Command	Response	Parameter
AT+ASSOCDEVLIST= <saddr>\r	\r\n+ASSOCDEVLIST: <paddr>,<caddr>\r\n \r\nCOMPLETE\r\n	paddr：parent node caddr：child node

Command6：Query signal of parent and child node

Command	Response	Parameter
AT+ASSOCDEVRSSI?\r	\r\n+ASSOCDEVRSSI: <saddr>,<rssi>\r\n \r\n COMPLETE\r\n	saddr：Remote address rssi：signal volume

Command7：Query signal of the surrounded nodes

Command	Response	Parameter
AT+NEIGHBORRSSI?\r	\r\n+NEIGHBORRSSI: <saddr>,<rssi>\r\n \r\n COMPLETE\r\n	saddr：Remote address rssi：signal volume

8.3Data package(0x10）

The data must be packed to this type in order to send out, "Data package" of the valid data segment need to occupy two bytes to fill the purpose of the network short address, the remaining is the data which to be sent Valid data segment is as follows:

the purpose of the network short address(2BYTE)	payload

Network short address: 2 bytes, it refers to the network address of a child node assigned by the parent node. It is used to identify destination devices in the network that the data will be sent to.

Payload： The data to be sent out. Its length equals the header length minus 2

For example: To send the text ”Hello World” to a device with short address 0001 through remote MAC address. The first step is to query the device short address in the network by Command 4.The second step is to send the data “55 AA 10 0C 00 01 48 65 6C 6C 6F 57 6F 72 6C 64” to Zigbee.

Caution：

When the transmission of data starts, the data package traffic load will be very large, it is recommended to enable the module flow control model to guarantee the fast and reliable transmission of data.

- Setting as the hardware flow control mode, and the external MCU must strictly follow the flow control mode, the data packet (0x10) valid length will be up to 80 bytes (including the handle). And the transmission must be confirmed that response message (0x20) for a one-answer approach to be delivered.
- Setting as non-hardware-flow-control mode, the file exchange between the data package and response package should be in a one-answer approach. And there should be 100ms delay between the packages. Otherwise the data will be lost.

8.4 Data package response(0x20)

Response to the received package, data package response refers to the comparison with the error package, the valid data instruction packet state.

Status	Result
\r\nOK\r\n	Response correctly
\r\nERROR\r\n	Package type error: not the defined package type

for example :Response correctly 55 AA 20 02 06 0D 0A 4F 4B 0D 0A

9. Layout

First, set the MODE pin high to enable the module to enter parameters for the configuration status.

1. Set the node type, a Zigbee network has one and only one central node, you can have multiple routing nodes and multiple end-nodes; users need to set the module, the module factory default routing node.
2. Set transmit mode, the default factory module is broadcast mode.
3. Set parameters of serial port baud rate, data bits, stop bits, parity bit ,etc.
4. The factory default network ID is automatically selected . Select a network is not being used ID for the central node which is based on the current environment in the Zigbee network status, and select the strongest signal ID in the network environment for the routing node and the terminal nodes. If the user need to specify the network ID of the devices , you can set the device's network ID.
5. The factory default communication channel is 2.405GHz. If you need to use multiple Zigbee network, you’d better set different values for each communication channel in their networks. These can minimize the conflict between the networks.

After setting parameter, set the MODE pin low to the working state.

If the network equipment which is set to broadcast mode or master-slave mode in the send mode, you can send the data directly.

For the network equipment in point to point mode, there are two ways to achieve data communication:

1. If all of the devices users in the network known each other, they can read their own MAC address in work mode or parameter setting mode, save the MAC address for Zigbee peripheral control processor. when the devices join the network, you can identify the network address (short address) through these MAC addresses, send data through the short address.
2. If all of the devices users in the network do not known each other in advance, you can query father and son nodes for the local equipment, identify the network address (short address) for the equipment which has the father-son relationship with the local equipment after the device join the network. Then re-check father and son nodes for the equipment, the network will know the network address (short address) of all devices followed by successively query. Finally, send data through the short address.