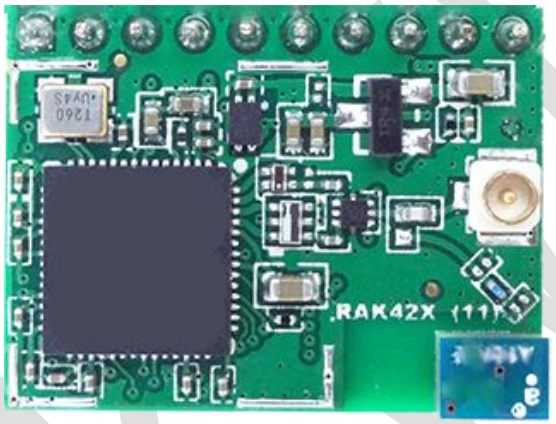
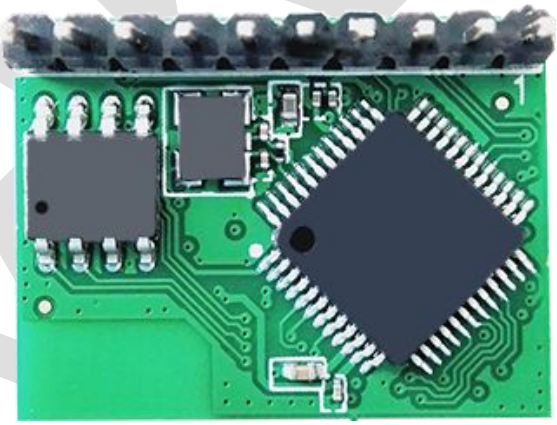
RAK425 Serial WIFI Module

User Guide V1.4





RAK WIFI

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1 Quick Start

Thank you for choosing RAK425 serial pass-through module, the pass-through module is extremely easy to use and feature-rich, to meet various needs of customers. First, we use RAK425 evaluation kit to have a feel of it. The Evaluation Kit is shown as Figure 1-1

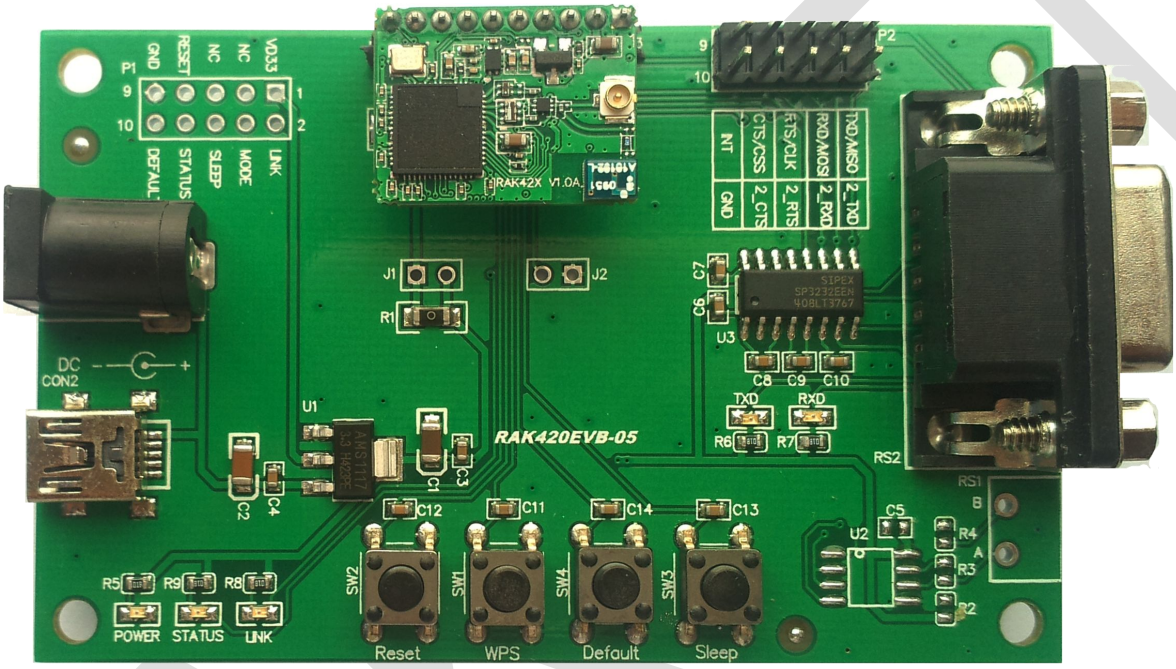

Figure 1-1 View of Development Board

Table 1-2 Main Peripherals

Function	Name	Description
External Interface	Power DC5V	Power Supply DC 5V input
	RS232	The main communication interface, standardserial port, female port
	RS485	Assistant communication interface, 485 industrial
Button	Reset	Module reset button
	WPS	WPS function,one-keyconfiguration to network (with a router WPS)
	Default	1. Press and hold 3 sec and longer, module will restore to factory parameters

		2. Press and hold shorter than 3 sec,one-key configuration to network (with phone)
	Sleep	Into ultra-low power mode button Press and holdlonger than 5 sec and release, into the ultra-low power Press, and then release to wake up module

STEP1: Check before Power Up

Evaluation Kit contains a serial adapter cable, a USB cable, a module with external antenna, also provides antenna with IPEX connector interface. If the module is with external antenna, plug in with the external antenna. Connect the module serial port with PC serial port (PC COM port or USB to serial port).

STEP2: State after Power Up

Normal phenomenon

When module is plug with power supply, module LED (Power LED) lights up, followed by Status lights (Status pin output low), which means that the module start properly.

If the power-Status light is not on, try pressing the Reset button, if the light still remains off, please contact Sales.

In the module factory mode,after power up, it creates an open AP network named RAK_AP_XXXXXX, XX is the last 6 digits of module MAC address, IP address is 192.168.7.1, by default DHCPServer is on. (Factory parameters can be modified)

When the Status light turns on, computer's wireless network list will find RAK_AP_XXXXXX, as shown in Figure 1-3:

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Figure 1-3 AP Scanning after Factory

Doubleclick to join the network (the Link lights up), an IP address will be assigned as Figure 1-4 shows:

Figure 1-4 Join inFactory AP

Open browser and enterthe module gateway address 192.168.7.1, the default web authentication interface pops up, enter authentication username: admin password: admin. As Figure 1-5 shows:

Figure 1-5 WEB Authentication

The built-in WEBServer interface is shown. AP settingsand IO communication settings can be viewed (i.e.UART interface and socket communication settings), as shown in figure 1-6 and figure 1-7:

Figure 1-6 Factory Webpages

Figure 1-7 Factory IO Communication Test

STEP3: Pass-through Data Test

Open serial port tool, select the COM port. The default baud rate is 115200, data bit is 8, and stop bit is 1, no parity check, no flow control. Then open network debugging tools (TCP / UDP tools) to establish TCP client connection, with target IP 192.168.7.1, server port 25000, as Figure 1-8 shows:

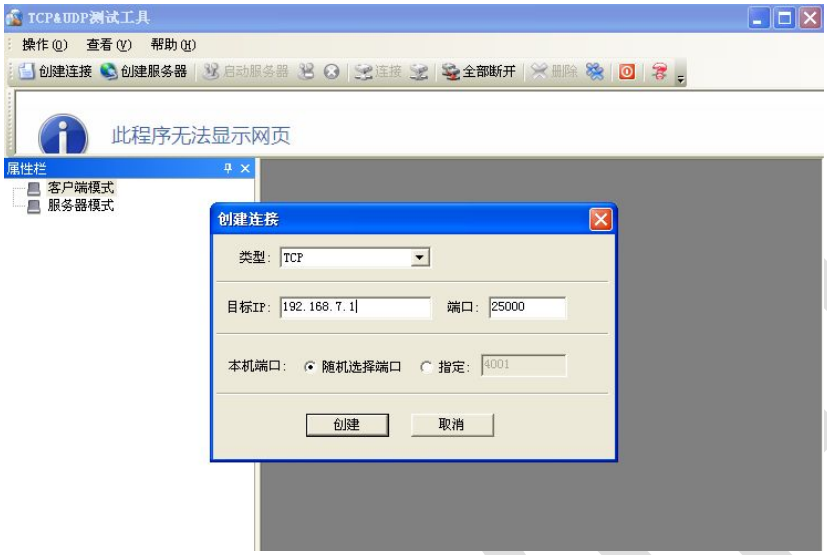

Figure 1-8 Establish a TCP Client

After the TCP is connected, data can be exchanged, as Figure 1-9 shows. At this point the module becomes a virtual serial port on the network, data from serial port and network can be exchanged.

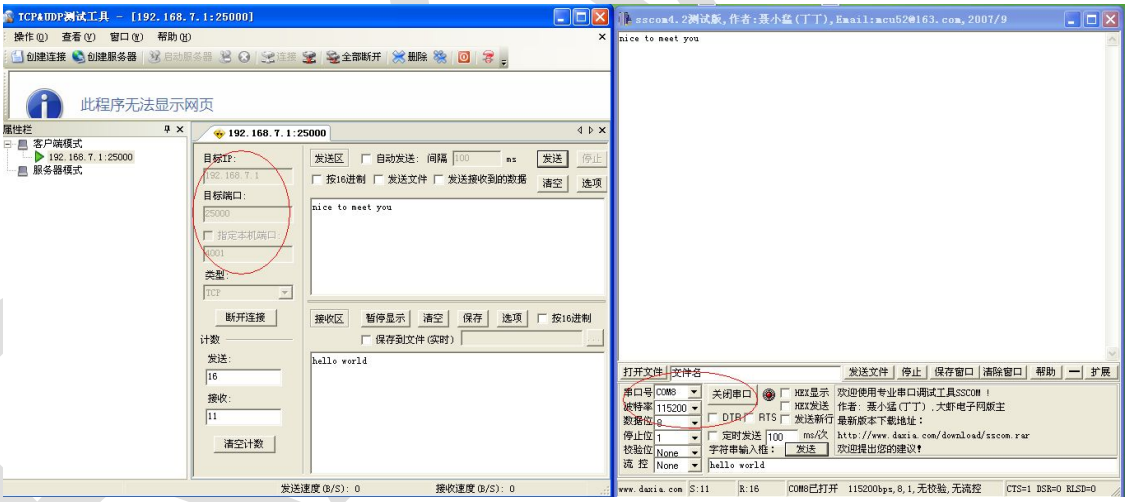

Figure 1-9 Factory Pass-throughTest

Keep in mind the state of the indicators

Status indicators:

Module started properly —— on (output low)

Module failed to start —— off

Module firmware is in upgrade —— quick flashing

Module is ready to enter factory mode —— quick flashing

Module Upgrade Error —— slow flashing

Link indicators:

module is connected to router in STA mode，

module builds STA connection in AP mode ——on(output low)

Conversely off

EasyConfig, WPS in one-key configuration —— quick flashing

Methods for module to factory reset

There is a Default button on developmentboard, it is used when configuring mistakes occur or forget the current configuration parameters for the module to restore factory reset:

Press the Default button, status indicator starts blinking rapidly, press and hold more than 3 seconds, the light stops flashing, and release the Default button, the module goes back to factory mode (by default AP is built) (factory parameterscan be modified)

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2 Functional Description

2.1 Overview

RAK425 module is an ultra-low power WIFI module that fully supports IEEE 802.11b/g/n wireless standards, with a small package and easy-to-use features. The RAK425 is a complete serial pass-through module integrated with TCP / IP protocol stack and drivers, easy to use by simply using the PC, WEB Browser, APPs tool to work individually or in bulk for parameters configuration, and then module connects the serial ports and network for normal usage.

The RAK425 module is characterized by stable performance, low power consumption and flexibility to meet the various needs of customers. It can also provide test reports, allowing customers to get started quickly, shorten the development cycle.

The RAK425 module also provides various types of customized services, such as user webpages, production and configuration tools, mobile phone APPs, etc.

2.2 Key Applications

- Portable products
- Home appliances and electricalappliances
- Industrial sensors
- Sales terminals
- Buildings automation
- Logistics and freight management
- Home security and automation
- Medical applications, such as patient monitoring, medical diagnostics
- Metering (stop timing, measuring instruments, meters, etc.)

2.3 Device Features

- Support IEEE 802.11b/g/n wireless standards
- Integrated TCP / IP protocol stack

- Support OPEN, WEP, WPA/WPA2-PSK Encryptions
- Support SoftAP, Station modes
- Support TCP, UDP protocols
- Support DHCP SERVER / DHCPCLIENT
- Support AT commands and transparent transmission mode
- Support UART communication with a data flow control, maximum rate of 921600bps
- Support multiple configuration tools for one-step configuration
- Support wireless upgrade firmware
- On-board ceramic antenna or U.FL antenna connector
- Operating voltage: 3.3V
- Support 4 kinds of power operating mode, with the lowest power consumption of 1.1uA
- Small package size: Small package size: 20.5mm×15.5mm
  (curved needle: height 6.4mm; vertical needle: height 8.7mm)
- FCC, RoHS and CE compliant

2.4 Feature Description

2.4.1 Hardware Interface

- Rate: 9600 - 921600bps
- Interface actual throughput up to 600kbps
- Support hardware flow control, ensuring the reliability of data transmission
- 485 function settings

2.4.2 Wireless Drivers

- Compliant with IEEE 802.11b/g/n standards
- Support AP and STA Mode
- Support WEP, WPA/WPA2-PSK encryptions
- Fast networking, allowing module to be added to network within 1 sec after power up
- Support WPS and EasyConfig one-key to network connection
- Support network and socket automatic reconnection

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- Supportproactively identifying devices in LAN
- Support wireless configuration and firmware upgrade

2.4.3 TCP/IP

- DHCP Client and Server features
- DNS Client and Server functions
- TCP Client, TCP Server, UDP Client, UDP Server and UDP Multicast functions
- Dualsocket transparent transmission of data (via uuid distinction)
- Support HTTP protocol
- TCPC / TCPS keep-alive time setting and TCPC reconnection

2.4.4 Power Consumption

The module supports four power consumption modes:

- Fullspeed working mode, withapprox 80mA average power consumption, peak current less than 200mA
- Automatic power-saving mode, with approx 10mA average power consumption, peak current <200mA, DTIM = 100ms
- lowest power mode, with approx 3mA average power consumption, peak current <200mA, DTIM = 100ms (maximum support to 115200bps)
- External cable, ultra-low-power consumption mode, less than 1.1uA

RAKWIFI

3 Hardware Introduction

3.1 Module type

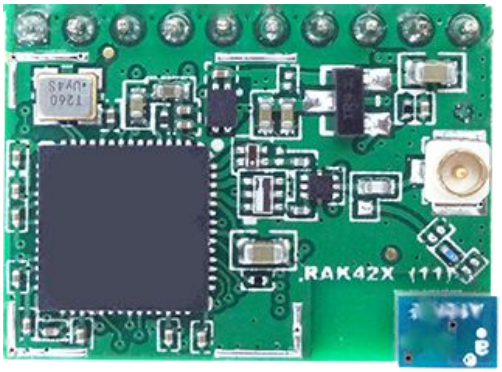

Figure 3-1 RAK425BI Top View

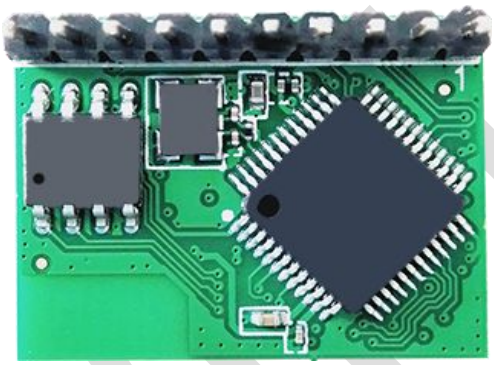

Figure 3-2 RAK425BI Bottom View

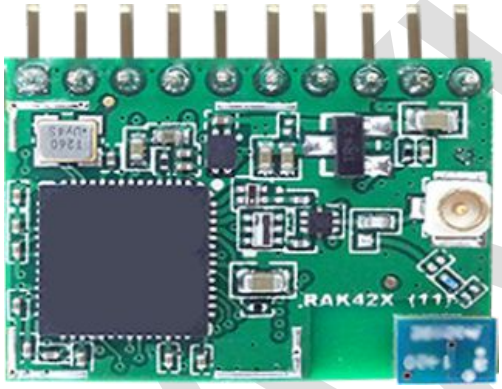

Figure 3-3 RAK425BL Top View

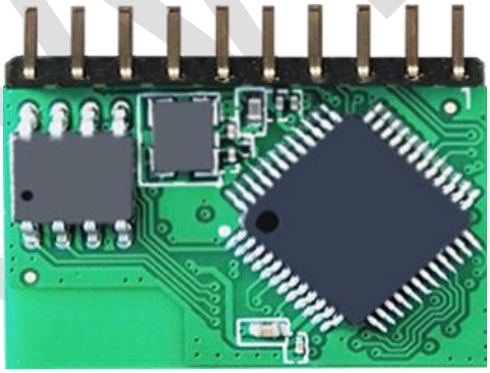

Figure 3-4 RAK425BL Bottom View

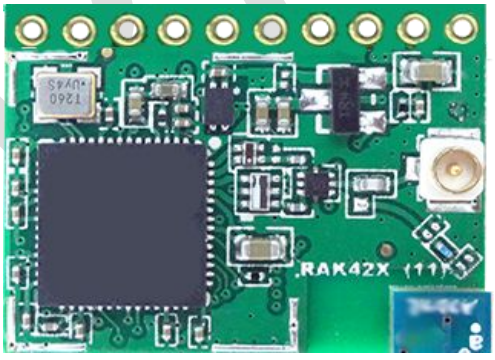

Figure 3-5 RAK425BX Top View

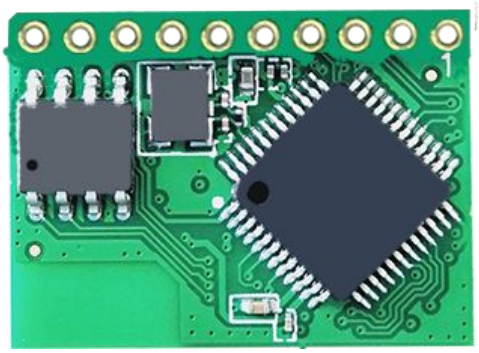

Figure 3-6 RAK425BX Bottom View

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3.2 Pin Definition

Table 3-1: Pin Definition

Pin Serial No.	Name	Type	Description
1	GND	Ground	connected to ground pad or the copper
2	VCC3V3	Power	3.3V power supply
3	CONFIG	I，PU	Module configuration pin to achieve EasyConfig and DefaultConfig function EasyConfig press (<3S) to enter intoone-key configuration network DefaultConfig Press (> = 3S) to restore factory settings
4	RESET	I，PU	Module reset pin, low effective
5	STATUS	O，PU	Normal startup output pin, output low effective
6	RXD	I	Serial flow control pin, ready to receive, low effective
7	TXD	O	Serial data communication interface send
8	SLEEP	I，PU	Power Management Module Pulldown and hold 2S, release - enter ultra-low-power mode Pull down, then release - normal power mode (full, save) Wake up falling edge, remain disconnected when no use
9	MODE/WPS	I，PU	WPS function pin (default) Module reuse mode selection (byconfiguration switching) "0" - open assistant command mode "1" - only data pass-through mode Remain disconnected when no use

10	LINK	O，PU	Module networking indicator "0" - STA connected in AP mode, Connected to router in STA mode "1" - disconnected Remain disconnected when no use

Note:

1. I - input O - output PU – pulling up PD - pulling down

Status indicator:

Module started properly —— On (Output Low)
Module failed to start —— Off
Module firmware is in upgrade —— quick flashing
Module is ready to enter factory mode —— quick flashing
Module Upgrade Error —— slow flashing

Link indicator:

module is connected to router in STA mode,
Module has STA connection under AP mode —— On (Output Low) Conversely off
EasyConfig, WPS is in one-key configuration —— Quick flashing

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4 Use Encyclopedia

4.1 Basic Flow Chart

The main working state of the module is pass-through mode, as well asassistant command mode, allowing parameters management and query. The module chooses mode according to the MODE pin level, which is high(default), it enters into the pass-through mode. If low, then turnsinto the assistant command mode. The module can enter into assistant command mode at all times. The figure 4-1 is a basic flowchart as below:

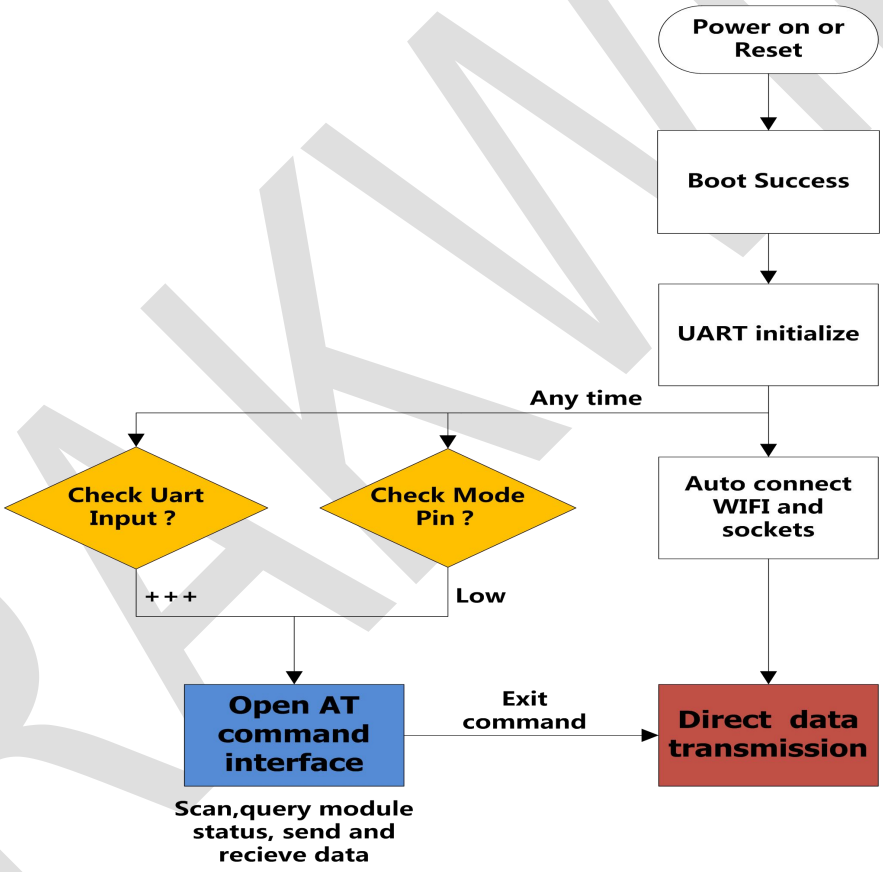

Figure 4-1 Basic Flow Chart

4.2 Variety of Configurations

For pass-through module, it's aim for data communications. The precondition of WIFI communication is parameter configurations, among which the more important ones are network configuration (network name, password, IP address) andcommunication protocol socket settings (TCP, UDP). For parameters, the module defines the following two concepts.

First, the module defines two parts, factory parameters and user parameters.

Factory parameters: when the module is not in properuse, it maintains the parameters of the initial state (usually as access point), and it has an independentnetwork name, a fixed IP address, etc. Factory mode ensures recoverability, to avoid user misconfiguration problems. (Factory parameters can be modified by the customer)

User parameters: When the module is in proper use and configured before, it will enable the new configuration as user parameters and these user parameters can be automatically loaded when module is reset, user parameters are the configuration for clients practical application scenarios. (Can be written at one time)

In order to facilitate entering fromfactory mode touser mode, pass-through mode provides four flexible ways to modify the configuration:

For Ad-hoc network customers(need to build their own networks)

1.parameter modification via the browser to access module built-inWEB server

2.parameter modification via wireless discovery and configurationsoftware provided

For the end customer scenarios by means of a router, it also provides a way for one-key networking

3. Quick Connect with router using WPS function

4. Connection with router using EasyConfig function

4.3 WEB Configuration

After the module has established AP or joineda router, enter the IP address in the browser to access themodule. When in AP mode, IP address is default recognized as gateway address, such as 192.168.7.1. When in STA mode, if the IP address is automatically acquired, module IP address cannot be determined. However, with the help of RAK4xx Wireless Tool.exe wireless configuration tool for local scanning, the IP address can be get, thenuser can get access to the WEB server. See Figure 4-2 as below:

Figure 4-2 Wireless Tool

When opening the address in the browser, message box will pop up that requires authentication (may take a few seconds before the pop-up), enter the default username | password: admin | admin, the configuration page will appear as shown in Figure 4-3:

Figure 4-3 WEB Page

Mode Selection Page

Select the network mode which is divided into AP mode and STA mode

AP Mode: AP mode is set to generate an encrypted WIFI wireless network, similar to our common wireless router. It is mainly applied for factory configuration, also for data collection point, simple and practical.

STA mode: STA mode can be configured to join home wireless router, usual configuration just with name and password of the router to select DHCP. It is mainly for LAN services, but also for remote data applications.

Power consumption options: power consumption mode can be configured for full power mode to achieve maximum performance. The automatically power saving

mode is set when module is before or after network connections,ensuringthe module to reduce power consumption when idle.

AP Settings

Set an AP network name, with length limit of 32 bit. It is also configurable whether the network has broadcast (that can be scanned by other WIFI device), for security reasons, choose not to broadcast. Select a channel and whether or not the network is encrypted. Currently the module supports WPA2 encryption, which is more secure and reliable.

IP parameter settings, user can set IP address and subnet mask of AP gateway, by default DHCP is enabled. Shown as Figure 4-4:

Figure 4-4 AP Settings Page

STA Node Parameter Settings

When module is used in STA mode, it adds its own routing equipment. The network name can be manually filled in orby search a router nearby, click the router into the searching page found to confirm.If the router is encrypted, pages will be prompted to enter password. If the module cannot connect with the set route after reset, it will automatically revert to the factory parameters (AP) for one minute, and then try to connect the set route for another one minute, and so forth, until connection or reconfiguration. (Enabled by default).

For IP parameter settings, user can choose a static setting. If static setting is chosen, note that the IP address is within gateway. It is recommended to select DHCP function is automatically assigned by router. Shown as Figure 4-5:

Figure 4-5 STA Settings Page

IO Communication Parameter Settings

IO communication includes serial ports parameter settings and network parameter settings shown as Figure 4-6:

Serial port parameters settings include serial port baud rate (autobaud is not supported), data bits, parity bits and stop bits. It supports hardware flow control, and 485 one-way communication function. The interval of Serial freedomsub-package is 5ms, that is, if a timeout is set for 5ms for serial port receiving bytes, when the interval is greater than 5ms, the serial data will be sent to networkin sub-packages.

Figure 4-6 IO Communication Settings Page

Network Parameter Settings

The network parameters are all about network communications settings, socket parameters settings includes three parameters, target server address, port number, and local port number.

The module supports two communication Sockets, SocketA and SocketB. They are all available for one of the TCP server, TCP client, UDP server and UDP client. When using the same serial port for communication, adda two-byte headerbefore communication data, "S0"meansthe data sent and received by SocketA, and"S1"by SocketB.

TCP timeout parametermeans that if the TCP connection is no data communication within the set time, the module will close the TCP connectioninitiatively. This parameter ensures that when the TCP connection is disconnected at any abnormal time, the module can be automatically restored. The time range of the parameter is 1 to 600s.

Advanced Management

Modify user name and password on login page.

Modify module name and the group name, the module default name is the AP name of the factory parameters.

Module Management provides function buttons to restart and restore factory settings shown as Figure 4-7:

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Figure 4-7 Advanced Management Page

Firmware Upgrade

The module provides wireless upgrade functionality to facilitate customer evaluation. Please upgrade carefully, for technical support please contact RAK shown as Figure 4-8:

Figure 4-8 Firmware Upgrade Page

4.4 Wireless Configuration Tool

Wireless configuration tool of the module can conduct locally discovery, RAK module can be found in LAN after scanning. Click to select the module for authentication, enter the default authentication. When succeeded, configurethe corresponding parameters, save and reset. See Figure 4-9:

For details, refer to RAK4xx Configuration Tool User Guide V1.0.pdf。

Figure 4-9 Wireless Scanning Configuration Page

4.5 Serial Interface Configuration Tool

The module provides AT command assessment under assistant command mode, the tool can also complete bulk editing on the factory parameters settings and user parameters settings. Software provides open source, customers can also independentlydesign.

Select the module corresponding serial interface and click Open, the module enters an assistant command mode. After successfully entered, user can execute the corresponding commands. The interface is shown as below: For details, refer to RAK4xxConfiguration Tool User Guide V1.0.pdf Shown as Figure 4-10:

Figure 4-10 Wireless Scanning Configuration Page

4.6 Dual Socket Applications

The module supports opening sockets for two-way communication to meet customer demand for multi-sockets. The following shows how to configurerouter and open dual sockets from the factory mode. One socketis to establish TCP server for local access. The other one is to create a TCP client for LAN server or Extranet/Internet server access.

First, create a TCP server in LAN, 192.168.1.101:12345 shown as Figure 4-11:

Figure 4-11 TCP Server in LAN

Enter into the module factory AP, addingits WEB, at Home page select the operating mode: STA mode. Click Save shown as Figure 4-12. Then into the STA Settings page, click to scan, select the corresponding routing, confirm it and return, a password is prompted to fill in. See Figure 4-13, 4-14:

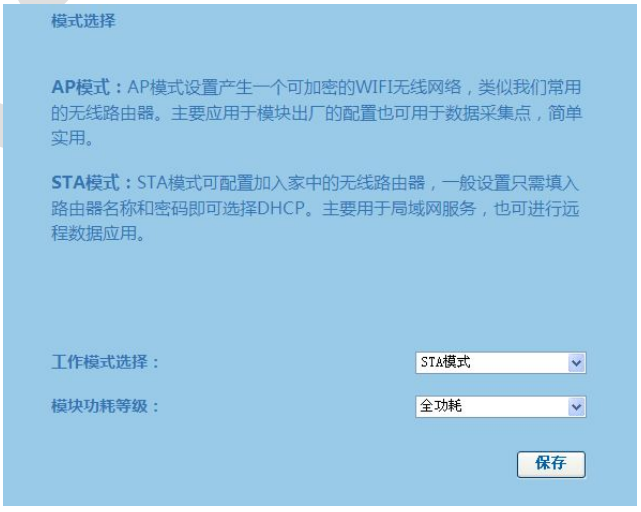

Figure 4-12 STA Mode

Figure 4-13 Select Specified Router

Figure 4-14 Fill in Password

Now, configure IO communication socket, open dual sockets, set socketA to TCP server, local port 25000, ignore the target server address and port number shown as Figure 4-15: set SocketB to TCP client, with the server IP 192.168.1.101, server port

number 12345. Save and restart. See Figure 4-16 as below:

Figure 4-15 Socket A Settings

Figure 4-16 Socket B Settings

After the restart, until the link light on the development board starts flashing, the module is connected to the specified router, then there is a client connected to SocketB 192.168.1.120:12345 this is the module TCP connection. Verify it by openingmodule WEB page, from the browser enter 192.168.1.120. Then open the STA sectionshown as Figure 4-17:

Figure 4-17 Assigning IP

Create another TCP client on the TCP / UDP tool connecting to module TCP server, build SocketA, 192.168.1.120:25000. Shown as Figure 4-18:

Figure 4-18 Dual Socket Established

Now, conduct a dual socket pass-through demonstration, SocketA sends"I am SocketA", the serial port received "S0I am SocketA", the serial replied with adding S0 "S0hello SocketA", the tool received"hello SocketA"that means the serial and network completed a pass-through. Similarly repeat the above process by socketB. Shown as Figure 4-19:

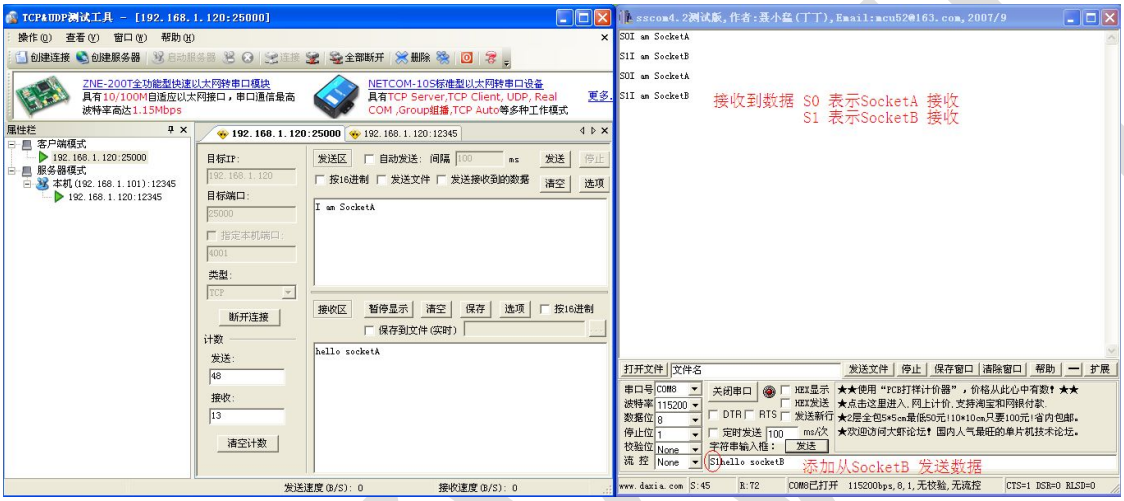

Figure 4-19 Dual Socket Demonstration

4.7 EasyConfig Functional Demonstration

Module supports Easyconfig connection, simply press the button on the module, the module will connect user's phone to the network specified, open the configuration software provided, wait a few seconds, the module will automatically connect to a specific network.

Click Default / Easyconfig button,the module (Link) networking light starts flashing, meaningit entered the configuration mode, press the phone configuration, wait a few seconds, Link light stops flashing, and light again. MAC address of the module pops up on the phone. See Figure 4-20 as below:

RAK provides Android and IOS client development libraries, and also provides customized services.

Note: when user confirms the choice of EasyConfig functionality, it is recommendedconnect the module Link pin with LED indicator.

If the module Link light is on, but there is no return with the MAC address of the phone, it is primarily because the module is already networked, but DHCP IP is not assigned. Check signal value of the router, and whether the DHCPServer is turned on or the route is busy. (Too many clients added).

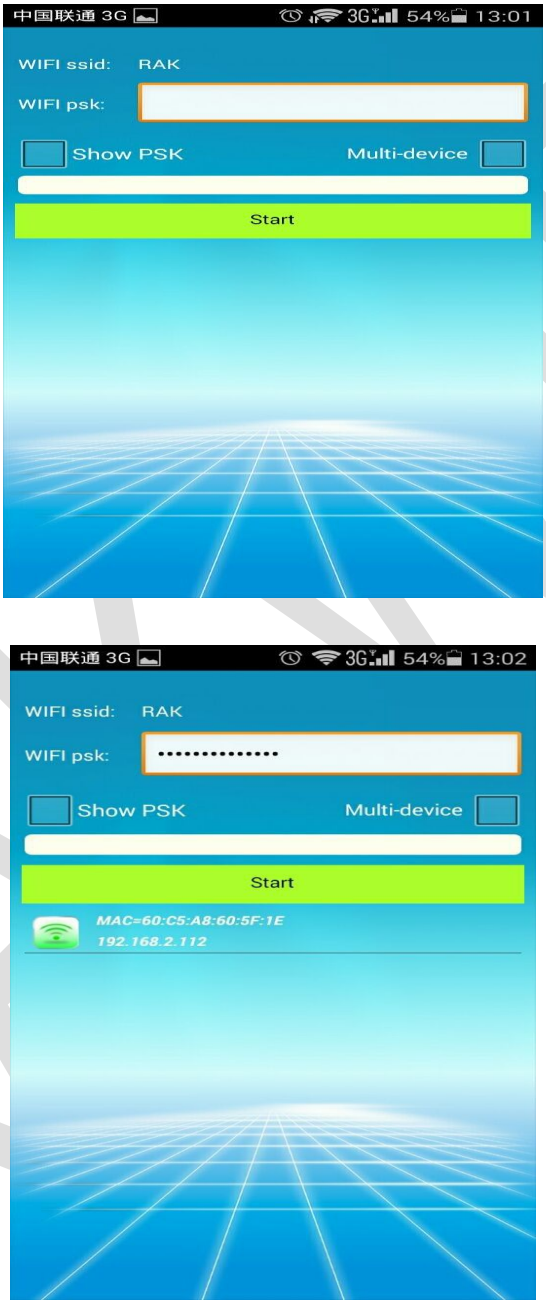

Figure 4-20 Android Configuration Page

5 Assistant AT Command

Table 5-1 AT Command Set

AT Command	Description
Module Management Commands	
at+ascii=<mode>\r\n	Open ASCII display
at+mac\r\n	Query Module MAC address
at+easy_txrx\r\n	Enter pass-through mode
at+version\r\n	Check software version
at+reset \r\n	Reset module
at+restore\r\n	Restore factory settings
Parameter Configuration Commands	
at+write_config=configuration parameter length,configuration parameter length \r\n	Write user configuration
at+read_config\r\n	Read user configuration
at+read_restoreconfig\r\n	Read factory configuration
at+write_restoreconfig= configuration parameter length , configuration parameter\r\n	Modify factory configuration
at+copy_cfg	Copy user profile configuration to factory
AP SAT Operating Commands	
at+con_status\r\n	Query AP connection status
at+rssi\r\n	Query STA wireless signal strength
at+scan=<channel>,<ssid>\r\n	Scan wireless networks
at+get_scan=<scan_num>\r\n	Obtain specified number of network information
at+easy_config\r\n	Module enters one-key configuration mode
at+wps\r\n	WPS functionis enabled, joined specified router
at+ping=<host>, <count>, <size>\r\n	Ping network host command
at+tcp_status=0\r\n	Query TCP connection status

at+apconfig=<contry code>\r\n	AP Advanced Settings
Send and Receive Data Commands	
at+send_data=0,dest_port,dest_ip,datalen,databuffer \r\n	Send data from SocketA
at+recv_data=0,dest_port，dest_ip，datalen,databuffer \r\n	Receive data from SocketA

5.1 Syntax

Host to module： at+<command>=<para 1>, <para 2>,.....<para n>\r\n

All AT commands, including parameters are ASICII code,

e.g: at+scan=0,TP-LINK_2.4GHz\r\n

After each command has been executed, the module will send a return value in the following format

1) If the command is executed successful, the return value
   OK\r\n or OK<para 1><para 2>.....<para n>\r\n
   Note: In addition to OK, the other parameters are in hexadecimal, for example,
   OK\r\n HEX=4F 4B 0D 0A----------No parameter
   OK@\r\n HEX=4F 4B 64 0D 0A----------parameter=0x64

2) If the command failed, the return value : ERROR<code>

   Note: ERROR is ASCII code, <code> hexadecimal, for example,

   ERROR ?\r\n HEX=45 52 52 4F 52 FE 0D 0A----------<code>=oxFE

AT command format introduction AT command begins with"at +" (lowercase), ends with "\ r \ n", the maximumlength is 80 bytes, all commands beginning with any other format are wrong.

1. All AT Syntax above does not apply to the Receive data commands "at + recv_data" and"at + send_data", for details, please refer to "at + recv_data", "at + send_data".

5.2 Open AssistantCommand

Open the assistant command interface in pass-through mode, similar to handshake way shown as Figure 5-2.

1. PC (master MCU) sends"+ + +", the request goes to the command mode。
2. Set timer 200ms, and wait for module returning"U" (0x55). If the module is not returned

within the specified time, the timer of 200ms is sent again

Send "+ + +" for request to enter the command mode, till the module successful is returned with"U" (0x55). This indicates that the module is ready to enter the command mode, waiting for the final confirmation (wait for 3S).

3. PC (master MCU) receives a "U" (0x55), and sends within 3S the module the final confirmation, with"U" (0x55). Module receives this confirmation and return "OK" entering the commandmode. If module did not receive the confirmation within 3S, module will exit standby mode, waiting for re-request command, then repeat steps 1-3.

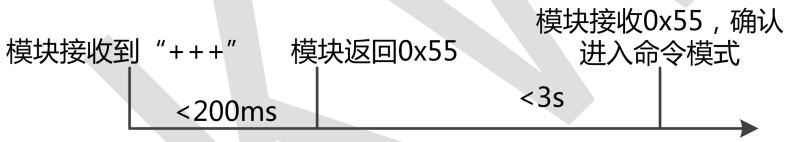

Figure 5-2 Enter command timing

5.3 Module Management Commands

5.3.1 Open ASCII Display

Command: at+ascii=<mode>\r\n

Parameter: mode = 0 close ASCII display (The default setting)

mode = 1 open ASCII display

ASCII display is turned on or off,the module sends a command format has no effect.

Return: OK\r\n

ERROR<code>\r\n

5.3.2 Query Module MAC address

Command: at+mac\r\n

Description: Check MAC address of the module

Return: OK<Mac>\r\n

ERROR<code>\r\n

5.3.3 Enter pass-through mode

Command: at+easy_txrx\r\n

Description: Send the command to enter pass-through mode

Return: OK\r\n

ERROR<code>\r\n

5.3.4 Check software version

Command: at+version\r\n

Descrption: Check the current version of the firmware, including the host version and WLAN version

Return: OK<2.0.5>\r\n

ERROR<code>\r\n

5.3.5 Reset module

Command: at+reset \r\n

Description: Reset module

Return: OK\r\n

ERROR<code>\r\n

5.3.6 Restore factory settings

Command: at+restore\r\n

Description: Restore factory parameter mode of module

Returen: OK\r\n

ERROR<code>\r\n

5.4 Parameter Configuration Commands

The following configuration and its parameters of keywords Please see the appendix 1

RAKWIFI

5.4.1 Write user configuration

Command: at+write_config=configuration parameter length, configuration parameter\r\n

Description:

Write the user configuration parameters at one time, user sends all of the configuration parameters to the module including network mode, power consumption mode, network parameters, serial port and communication parameters. User can also enable and disable the factory advanced features, such as LAN discovery, WEBServer and AP / STA switching mechanism.

For example:

at+write_config=622,wifi_mode=AP&power_mode=full&ap_channel=1&ap_ssid=RAK_000001&ap_secu_en=0.....\r\n

return：

OK\r\n

ERROR<code>\r\n

5.4.2 Read user configuration

Command: at+read_config\r\n

Description: Read all user configuration parameters, at onetime, andlocate into the correspondingstructure.

return：

OKwifi_mode=AP&power_mode=full&ap_channel=1&ap_ssid=RAK_000001&ap_secu_en=0.....\r\n

ERROR<code>\r\n

5.4.3 Read factory configuration

Command : at+read_restoreconfig\r\n

Description:

Read all the factory configuration parameters at one time and put these factory configuration parameters into the corresponding structure.

The AP established during factory configurationis the name of module,as default

RAK_XXXXXX the last 3 letters are that of MAC address, which can also be configured by the factory modification.

return：

OKwifi_mode=AP&power_mode=full&ap_channel=1&ap_ssid=RAK_000001&ap_secu_en=0.....\r\n

ERROR<code>\r\n

5.4.4 Modify factory configuration

Command:

at+write_restoreconfig=configuration parameter length, configuration parameter\r\n

Description:

Modify the default configuration parameters, also customers can modify the default configuration parameters as required.

For example:

at+write_restoreconfig=602,wifi_mode=AP&power_mode=full&ap_channel=1&ap_ssid=RAK_000001&ap_secu_en=0.....\r\n

return：

OK\r\n

ERROR<code>\r\n

5.4.5 Copy user parameters

Command: at+copy_cfg\r\n

Description: Copy the user parameters to the factory parameters.

return：

OK\r\n

ERROR<code>\r\n

5.5 AP SAT Operating Commands

5.5.1 Query AP connection status

Command: at+con_status\r\n

Description: Check the connection status under AP or STA mode.

Return: OK<code>\r\n
code=0 Not connected
code=1 Connected

5.5.2 Query STA wireless signal strength

Command: at+rssi\r\n
Description: Check wireless signal strength under STA.
Return: OK<RSSI>\r\n
ERROR<code>\r\n
Note:
When there is no network connection, the command is invalid.
When module is as the AP, the default is-0db.

5.5.3 Scan for wireless networks

Command: at+scan=<channel>,<ssid>\r\n
Description: Scan the surrounding wireless networks.
For example:
at+scan=0 \r\n----------Scanning all channels
at+scan=0,RAKwireless\r\n----------Scanning a wireless networkcalled "RAKwireless" in all channels in the network
at+scan=8,RAKwireless\r\n----------Scanning a wireless networkcalled "RAKwireless" in channel 8 in the network
at+scan=6 \r\n----------Scanning all SSID in channel 6
Return: OK<Num>\r\n
ERROR<code>\r\n

5.5.4 Get wireless network

Command: at+get_scan=<scan_num>\r\n
Description: Read the scanned information via command, the command must be usedafter"at + scan".

Note:

1. If user does not need to get the wireless network information, this command can be omitted!
2. All information scanned has been read. If read again, the module will return error -2, at this point, command "at + scan"is needed to rescan!
3. This command is invalid in the mode where at + ascii = 1 !

Table 5-3 Command Returns

参数	格式	长度(byte)	说明							
命令执行成功										
OK	ASCII	2	获取信息正确							
<SSID>	HEX	33	SSID							
<BSSID>	HEX	6	BSSID							
<CHANNEL>	HEX	1	信道							
<RSSI>	HEX	1	信号强度(负值)							
<Security Mode>	HEX	1	加密方式							
			bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
			WPA2	WPA	WEP	802.1X	PSK	WEP	TKIP	CCMP
\r\n	ASCII	2	结束符							
命令执行失败										
ERROR	ASCII	5	错误							
<CODE>	HEX	1	0XFE=-2				1、扫描信息已经全部读取			
\r\n	ASCII	2	结束符							
备注	*<Security Mode>中 bit=1 时加密方式有效，bit=0 时加密方式无效，如果多位同时为 1，则为混合加密方式*									

5.5.5 one-key networking command

Command: at+easy_config\r\n

Description:

If this command is sent, module enters into one-key configuration mode, waiting for the phone to send configuration information. Customers can check whether the connection is on via Query network status command.

Return:OK //enter configuration mode

5.5.6 WPS configuration commands

Command:at+wps\r\n

Description:

If this command is sent, module enters into WPS configuration mode, meanwhile press the WPS button on the router. Customers can check whether the connection is on via Query network status command.

Return: OK //enter the WPS configuration mode

5.5.7 Check IP status

Command: at+ipconfig\r\n

Description:

Query the current IP information of module, including MAC address, IP address, subnet mask, gateway, DNS server. If the DHCP is set, but IP is not assigned yet, check out the module address is 127.0.0.1.

Return:

Table 5-4 IP command returns

Parameter	Format	Length	Description
The command is completed successfully			
OK	ASCII	2	Query successfully
<MAC>	HEX	6	Module MAC address
<IP>	HEX	4	IP address
<NETMASK>	HEX	4	subnet mask
<GATEWAY>	HEX	4	Gateway
<DNS SERVER1>	HEX	4	DNS server 1
<DNS SERVER2>	HEX	4	DNS server 2
\r\n	ASCII	2	Terminator
Command execution error			
ERROR	ASCII	5	error
<CODE>	HEX	1	0XFE=-2 Query Failed
\r\n	ASCII	2	Terminator

Remark

5.5.8 Ping command

Commad: at+ping=<host>, <count>, <size>\r\n

Descrtiption: Run the ping command to test network connectivity.

Return: OK\r\n

ERROR<code>\r\n

Table 5-4 ping command returns

<HOST>	Specified host
<COUNT>	The number of packets, the default value is 1. (optional)
<SIZE>	Packet size, maximum packet is 1000bytes, default is 64bytes. (Optional)

5.5.9 Query TCP connection status

Command: at+tcp_status=uuid\r\n

Description: Check TCPClient connection status for the corresponding uuid. uuid = 0 indicates socketA; uuid = 1 means that socketB

Return: OK\r\n

code=0Not connected

code=1 Connected

5.5.10 AP Advanced Settings

Command:

at+apconfig=<contry code>\r\n

Description:

This command is used to set wireless AP parameters, including country code, inactive time, beacon frames interval, DTIM threshold.

Table 5-5 Parameter Description:

Parameter	Value	Description
<contry code >	Country code	Country code, i.e., China (CN) (US)

Return: OK\r\n

ERROR<code>\r\n

5.6 Send and Receive Data Commands

5.6.1 Sending data

Command:

at+send_data=uuid,dest_port,dest_ip,datalen,databuffer \r\n

Description: Send data uuid of the corresponding Socket (A, B).

Parameter Description:

uuid=0 Indicates socket A； uuid=1 Indicates socket B

dest_port Indicates the target port (UDP server module as the initiative to send data to the target host)

dest_ip Indicates the target IP (When other types,you can fill 0)

datalen Indicates the received data length

databuffer Indicates the received data content

Example：

at+send_data=0,12345,192.168.1.100,10,1234567890 \r\n

Or at+send_data=0,0,0,10,1234567890 \r\n

Return:

OK\r\n

ERROR<code>\r\n

5.6.2 Receiving Data

Command:at+recv_data=uuid,dest_port,dest_ip,datalen,databuffer \r\n

Description: Received the uuid data of corresponding Socket (A, B) , when ASCII display is not opened, the received data is in hexadecimal and arranged in the same

order.When programming is recommended to use ASCII display disabled mode.

Parameter Description:

uuid=0 Indicates socket A； uuid=1 Indicates socket B

dest_port Indicates the target port

dest_ip Indicates the target IP

datalen Indicates the received data length

databuffer Indicates the received data content

5.7 Appendix

Read/write module configuration of keywords and parameters

keywords	parameters
Mode select	
wifi_mode	AP mode： AP STA mode： STA
power_mode	Full power： full Auto save： save Deep sleep：deep
AP mode parameters	
ap_ssid	RAK_AP_SSID (32B ASCII)
ap_channel	6 (1-13)
ap_secu_en	open: 0 security: 1
ap_psk	1234567890
ap_ipaddr	192.168.7.1
ap_netmask	255.255.255.0
ap_bdcast_en	Not broadcast: 0 (hide) broadcast: 1
STA mode parameters	
sta_ssid	RAK_AP_STA
sta_secu_en	open: 0

	security: 1
sta_psk	1234567890
sta_dhcp_en	static: 0 dhcp: 1
sta_ipaddr	192.168.1.100
sta_netmask	255.255.255.0
sta_gateway	192.168.1.1
sta_dnssever1	192.68.1.1
sta_dnssever2	0.0.0.0
UART parameters	
uart_baudrate	9600,19200,38400,57600,115200,230400,460800,921600
uart_datalen	8 (5-8)
uart_parity_en	none: 0 odd: 1 Even: 3
uart_stoplen	1 (1-2)
uart_rtscts_en	forbidden: 0 enable: 1 RS485/RTS: 2 (RTS as a transceiver pin, switch High level to send）
Socket parameters	
socket_multi_en	One Socket: 0 Two Socket: 1
SocketA parameters	
socketA_type	tcp,ltcp,udp,ludp (TCPclient，TCPsever，UDPclient，UDPsever)
socketA_localport	25000 (1-65535)
socketA_destip	192.168.1.101
socketA_destport	25000 (1-65535)
socketA_tcp_timeout	disable: 0 enable: 1-600 (S)
SocketB parameters	

socketB_type	tcp,ltcp,udp,ludp (TCPclient，TCPsever，UDPclient，UDPsever)
socketB_localport	25001 (1-65535)
socketB_destip	192.168.1.101
socketB_destport	25001 (1-65535)
socketB_tcp_timeout	disable: 0 enable: 1-600 (S)
Module name	
module_name	RAK_01 (16B)
module_group	RAK (16B)
WEB Setting	
user_name	admin (16B)
user_password	admin (16B)
web_en	0: english default 1: Chinese default
Additional features (optional)	
mode_pin	Wps function: wps Cmd function: easy
net_switch	disable: 0 enable: 1 (when the net connection is loss ,module switching network on the factory and user parameters Every minute)
web_switch	Use rak web: 0 Use customer web: 1
web_func_en	Disable WEB config: 0 Enable WEB config: 1
udp_func_en	Disable UDP discover: 0 enable UDP discover: 1

RAKWIFI

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RAKWIFI

7 Revision History

Revision History and Modification

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V1.0	Initial Draft	2014-02-14
V1.1	Add user parameters　appendix factory	2014-07-01
V1.2	Update the contact way，Update the document format	2014-08-22
V1.3	Update the Physical picture	2014-08-28
V1.4	Deletes chematics and height picture, add notes ASCII display, Modify transmit and receive data descriptions	2014-09-12

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