Simple WiFi
Let's make WiFi simple

Overview

SimpleWiFi is the new generation embedded Uart-WiFi modules .

SimpleWiFi is an embedded module based on the Uart serial,according with the WiFi wireless WLAN standards, It accords with IEEE802.11 protocol stack and TCP / IP protocol stack，and it enables the data conversion between the serial and the wireless network module. through the Uart-WiFi module, the traditional serial devices can easily access to the wireless network.

BENEFITS:

✦ Support transparent transmission of serial completely,and achieve a plug and play serial.

✦ Support new AT+instruction set.

✦ Reduces development time, testing and certification acceleration time to market

FEATURES

Interface

✦ Multiple UART and SPI interfaces

‒ Up to 4.5 Mbps in SPI Slave Mode

‒ Up to 460.8 kbps on UART

‒ Up to 8 configure able general purpose I/Os.

✦ RTS / CTS Hardware flow control

✦ Single power source of 3.3V

Wireless

✦ Operates with standard 802.11 b/g

‒ Infrastructure or Adhoc mode

✦ support multiple security authentication mechanisms:

WEP64/WEP128/WPA-PSK/WPA2-PSK

✦ support quick networking

✦ support wireless roam

Οthers

✦ support multiple network protocols:

TCP/UDP/ICMP/DHCP/DNS/HTTP

✦ support two types of work modes:

auto and command

✦ Support transparent transmission mode

✦ support AT+ instruction set

✦ Rich interfaces: SPI, UART, GPIO,

Application

✦ Intellectual transportation system, such as wireless credit card machine

✦ Small financial payment network, such as wireless POS machine

✦ Industrial equipment networking, such as wireless sensor

✦ Internet of Things

Contents

1 **Introduction**

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 − Up to 460.8 kbps on UART
 − Dual Flat pack PCB Surface Mount Package.
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✧ Single power source of 3.3V

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✧ Internet of Things

2 Overview

2.1 Technical Specification

Table2-1 Technical Specifications

	Item	Parameters
wireless	Wireless standard	IEEE 802.11b/g Compatible
	Frequency range	2.412~2.462 GHz
	Receiver sensitivity	802.11b: -86 dBm @ 11Mbps （typical） 802.11g: -71 dBm @ 54Mbps（typical）
	Transfer rate	802.11b: 1,2,5.5,11 Mbps 802.11g: 6,9,12,18,24,36,48,54 Mbps
	Madulation	DSSS, OFDM, DBPSK, DQPSK, CCK, QAM16/64
	Output power	802.11b: 20±2 dBm（typical） 802.11g: 20±2 dBm（typical）
	Antenna Interface	PCB Trace and U.FL connector for external antenna
Hardware	Serial type	UART/SPI
	Serial rate	1200~460800 bps/Up 4.5 Mbps SPI Slave Mode
	Operating voltage	3.3±0.3 V
	Operating current	180mA （typical）
	Storage temperature	-40~+85 ℃
	Operating temperature	-20~75 ℃
	Dimensions	23*37*4mm
Software	Network type	Infra/Adhoc
	Security	WEP64/WEP128/ WPA-PSK/WPA2-PSK
	Work mode	auto/command
	Serial command	AT+instruction set
	Network protocol	TCP/UDP/ARP/ICMP/DHCP/DNS/HTTP
	Most sockets	15

TCP connection	the most connection：8 the most Client：8 the most Server：3~4 the most client to connect to server built in this module ：4
UDP connection	the most connection5~6

2.2 Hardware introduction

2.2.1 Mechanical Dimension

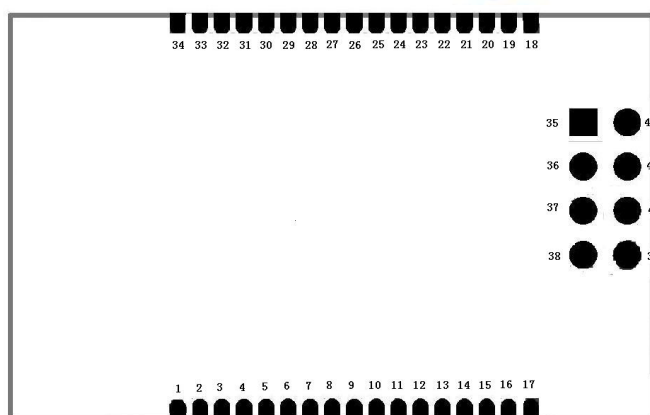The mechanical dimension of SimpleWiFi Module is shown as follow

Figure 2-1 module pinout

2.2.2 Pin-out and Signal Description：

Table 2-2 SimpleWiFi Module Pins Description

Pins	Name	Signal State	Description
1	GND	Analog Port	GND
2	SPI_SI	DigitalInput	SPI Slave Receive Data Input from the HOST
3	SPI_SO	DigitalOutput	SPI Slave Transmit Data Output to the HOST
4	SPI_SCK	DigitalInput	SPI Slave Clock Input from the Host
5	SPI_CS	DigitalInput	SPI Slave Chip Select Input from the Host
6	ISP	DigitalInput	ISP Select (Active High)
7	GPIO0	DigitalInput /Output	General Purpose InputOutput

8	GPIO1	DigitalInput /Output	General Purpose InputOutput
9	VCC	Analog Port	VCC 3.3V
10	NA	NA	NA
11	GPIO2	DigitalInput /Output	General Purpose InputOutput
12	SPI_INT	DigitalInput	SPI Slave Data Interruput Output to the Host （Negative edge）
13	GPIO3	DigitalInput /Output	General Purpose InputOutput
14	NA	NA	NA
15	TXRX	DigitalOutput	General Purpose Output
16	NA	NA	NA
17	GND	Analog Port	GND
18	GND	Analog Port	GND
19	NA	NA	NA
20	VCC	Analog Port	VCC 3.3V
21	UART2_CTS	DigitalInput	Universal Asynchronous Receiver Transmitter 2 Clear to Send Input (See Note 1)
22	UART2_RTS	DigitalOutput	Universal Asynchronous Receiver Transmitter 2 Request to Send Output (See Note 1)
23	UART2_RX	DigitalInput	Universal Asynchronous Receiver Transmitter 2 Receive Input
24	UART2_TX	DigitalOutput	Universal Asynchronous Receiver Transmitter 2 Transmitter Output
25	UART1_TX	DigitalOutput	Universal Asynchronous Receiver Transmitter 1 Transmitter Output
26	UART1_RTS	DigitalOutput	Universal Asynchronous Receiver Transmitter 1 Request to Send Output (See Note 1)
27	UART1_RX	DigitalInput	Universal Asynchronous Receiver Transmitter 1 Receive Input

28	UART1_CTS	DigitalInput	Universal Asynchronous Receiver Transmitter 1 Clear to Send Input (See Note 1)
29	RS485	DigitalInput	RS485 Data Receiver Transmitter Control (See Note 1)
30	CONFIG	DigitalInput	SmartConfig Enable Control (Active Low)
31	RESTORE	DigitalInput	Restore all options to their factory default states /Config Mode Select (See Note 2)
32	LINK	DigitalOutput	LED Control Pin Output
33	NRST	DigitalInput	WiFi Module System Reset (Active Low) (See Note 3)
34	GND	Analog Port	GND
35	UART1_RTS	DigitalOutput	Universal Asynchronous Receiver Transmitter 1 Request to Send Output (See Note 1)
36	UART1_CTS	DigitalInput	Universal Asynchronous Receiver Transmitter 1 Clear to Send Input (See Note 1)
37	LINK	DigitalOutput	LED Control Pin Output
38	NRST	DigitalInput	WiFi Module System Reset (Active Low) (See Note 3)
39	GND	Analog Port	GND
40	UART1_TX	DigitalOutput	Universal Asynchronous Receiver Transmitter 1 Transmitter Output
41	UART1_RX	DigitalInput	Universal Asynchronous Receiver Transmitter 1 Receive Input
42	VCC	Analog Port	VCC 3.3V

Notes:

1、CTS and RTS signals indicate it is clear to send or ready to send when they are LOW. If signals are high, indicates device is not ready. This is Need enable using Set parameters (Hardware contol)

2、After WiFi Module Power On, when the RESTORE Pin are LOW, The WiFi module will Restore all options to their

factory default states.

Before WiFi Module Power On, the RESTORE Pin　are LOW, and then WiFi Module Power On, The WiFi module will enter config mode. All the wifi station may connet to the WiFi Module,and the modify the params using IE.

3、 Note, prohibit use NRST making the WiFi module system reset when setting parms.you can use AT+Z or the reboot button in theWebpage

2.2.3 External Interface

2.2.3.1 LED Light description

The following figure is the LED interface diagram of SimpleWiFi Module.

Table2-3 LED Description

	Description
LED	1、Low frequency bilinking indicates the WiFi Module unconnected to the wireless net.
	2、Frequency bilinking twice indicates the WiFi Module connected to the wireless net, But, the Socket unconnected to the Server.
	3、Frequency bilinking thrice indicates the WiFi Module be in Command setting mode.
	4、High frequency bilinking indicates the WiFi Module connected to the wireless net, And, the Socket connected to the Server.
	5、High frequency bilinking indicates the WiFi Module being in Restore all options to their factory default states

Note:

1、Low frequency bilinking:　　bilinking… … …bilinking… … …bilinking… … …

2、Frequency bilinking twice:　　bilinking bilinking … … …bilinking bilinking … … …bilinking bilinking … … …

3、Frequency bilinking thrice:　　bilinking bilinking bilinking… … …bilinking bilinking bilinking… … …bilinking bilinking bilinking… … …

4、 High frequency bilinking:　　bilinking…bilinking… bilinking…

2.2.3.2 Antenna interface

This product provides PCB Trace and U.FL connector for external antenna, If using the PCB Trace you need swap the capacitance location as follows:
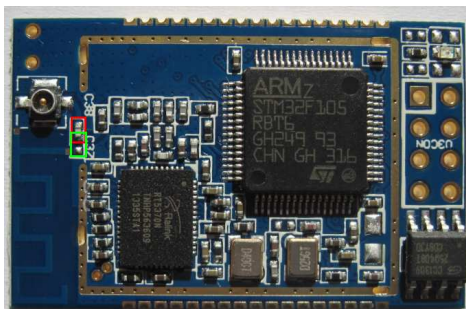

Figure 2-2 module the PCB Trace

Note: Please follow Layout Guidelines

2.2.3.3　SimpleWiFi Recommended PCB Footprint and Dimensions
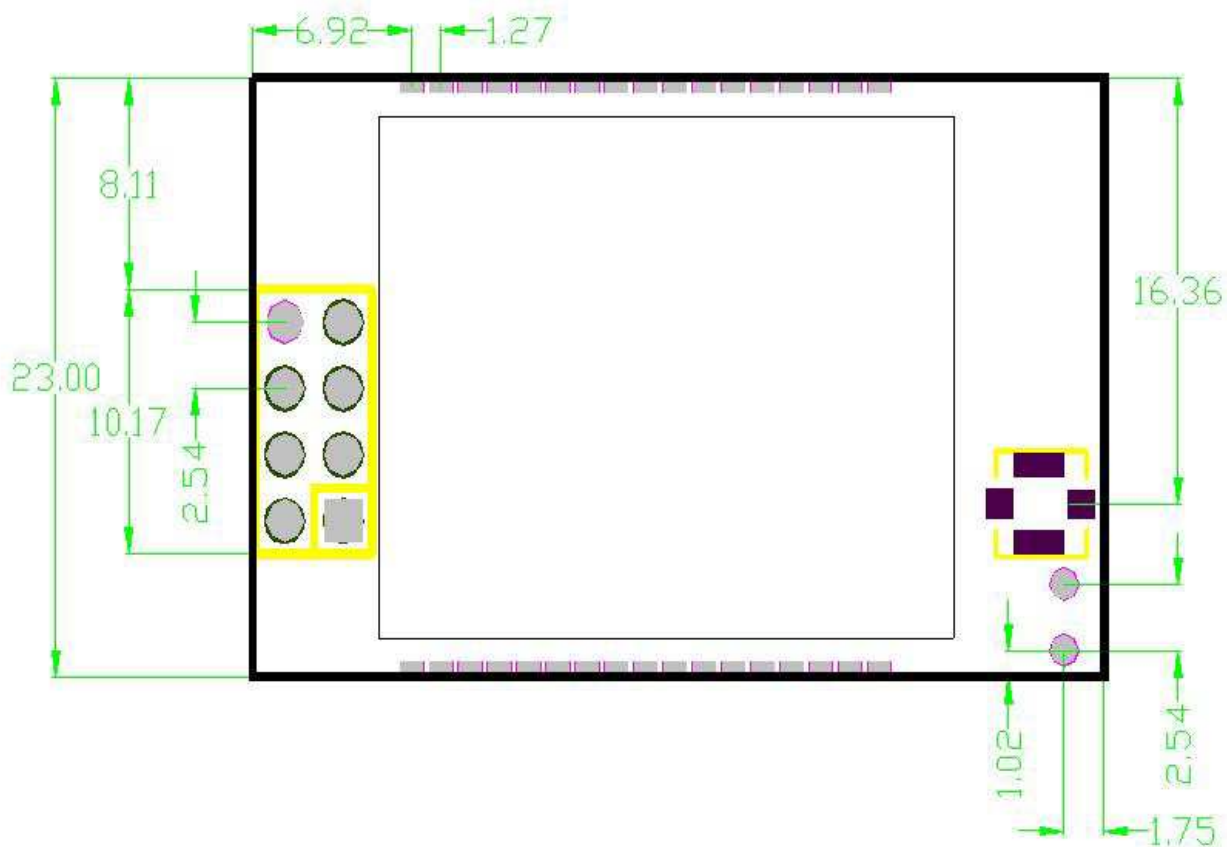

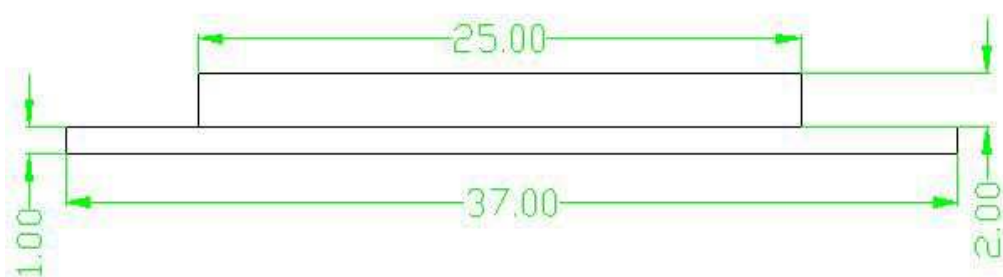Figure 2-3 top view(dimensions are in millimetre)

Figure 2-4 side view (dimensions are in millimetre)

2.2.3.4　Layout Guidelines

1、External Bypass capacitors for all module supplies should be as close as possible to the module pins.

2、Never place the antenna very close to metallic objects.

3、The external dipole antennas need a reasonable ground plane area for antenna efficiency.

Note： onboard PCB antenna specific ：

1、The PCB antenna keep out area, must be adhered to (i.e. No ground, power trace/plane, traces; all layers of PCB, in the keep out area, must be clear), or the over the air range of the Module will be compromised.

2、Do not use a metallic or metalized plastic for the end product enclosure.

3、Keep Plastic enclosure 1cm min height above the Module PCB antenna while maintaining the keep-out area.

2.2.3.5   Antenna（external antenna）

This product must be connected with the 2.4G antenna according to IEEE 802.11g / 802.11b standards, the parameters are required as follows:

Table 2-4 antenna parameters

No	description
Frequency range	2.4~2.4825 GHz
Impedance	50 Ω
VSWR	≦1.5

2.2.4 The evaluation board（optional）

Figure 2-5 The evaluation board

Evaluation Board Specifications

1、Board supply voltage: 4.85–5.25 Vdc from DC power jack

2、Button description as follows:

No	Name	Description
S1	RESTORE	Restore all options to their factory default states /Config Mode Select
S3	ISP	ISP Select
S4	CONFIG	SmartConfig Enable Control

3、LED light description

Table 2-6 LED light description

No	description
D2	Power
D4	LINK signal
D6	NA
D7	GPIO0
D8	GPIO1
D9	GPIO2
D10	GPIO3

2.3 Parameters Settings

The SimpleWiFi module provide four methods to set Parameters

2.3.1 Configuration through WEB server

SimpleWiFi module can be modified the Parameters using the inside WEB server.The factory default mode is AP(Access Point). The IEEE 802.11b/g/n Compatible STA can find the SSID(SimpleWiFi_XXXX) after scan,and then,the STA can connet to the Wireless network.

The WEB Server can be visited by the following two kinds of methods:

The first: After SimpleWiFi moudel connected to wireless router or created wirless net work(AP mode),you can visit a web site using web browser.

The Second: Using the Send Command ,you can force the SimpleWiFi module entry to configer mode(AP mode).

2.3.1.1 Configuration steps

1、Input the IP address of the SimpleWiFi module in your WEB browser.(Default ip:192.168.2.1).as follow Figure:(Default Login name:admin Password: 123456).
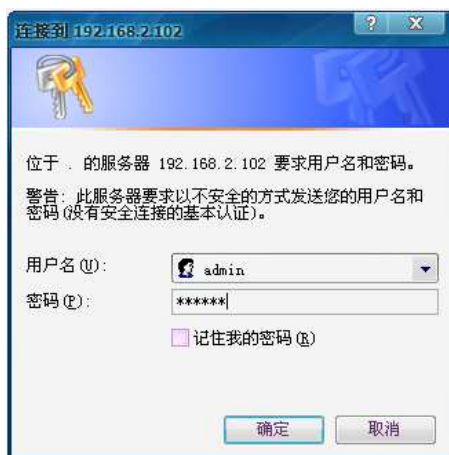
Figure 3-1   modules login web pages

2、The configuration web pages shown as follow:
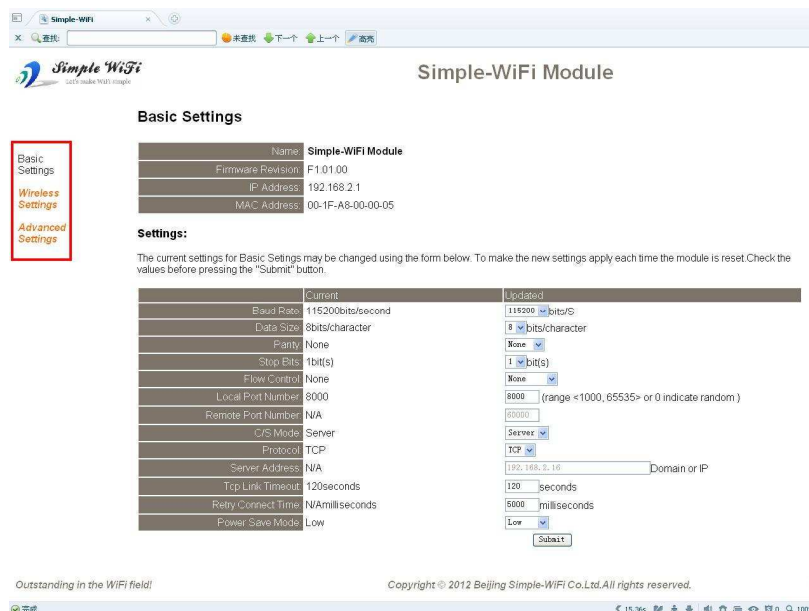

Figure 3-2   modules configuration web pages

The Parameters Description shown in the following table：

➢ Basic Settings web page

Table3-1 Basic Settings Parameters

Name	Vlue	Description
Band Rate	X bits/second	UART Band Rate
Data Size	X bits/character	Transmitter Data Sizes
Paity	None	No Paity
	odd	Odd Paity

	Even	Even Paity
	Mark	Mark Paity
	Space	Space Paity
Stop bits	x bits	Stop bits number
Flow control	None/Hardware	Flow control status
Local Port Number	N/A	Not Applicable
	X	Local Port Number，0 indacte auto
Remote Port Number	N/A	Not Applicable
	X	Remote Port Number
Mode	Server	Socket mode
	Client	Socket mode
Protocol	TCP	networking protocol
	UDP	networking protocol
Server IP	x.x.x.x	Server IP Adress or the DNS name
TCP Link Timeout	x seconds	When WiFi module work in TCP server mode, the WiFi module will disconnect with the TCP client, if there is not data Transmitter in this TCP Link Timeout. You can disable the TCP Link Timeout using set it to 0.
Retry connect time	x seconds	The WiFi mode will automatic connect WiFi Router if the status is disconnection, in this Retry connect time. You can disable the Retry connect time using set it to 0.
Power Save Mode	Low	The WiFi mode will automatic connect WiFi Router if the status is disconnection, in Retry connect time. And the connection is not disconnect forever.
	Medium	The WiFi mode will automatic connect WiFi Router if the status

		is disconnection.If the disconnettion is not ready,the WiFi module will Shutdown RF.
	High	The WiFi mode will automatic connect WiFi Router,when the UART has user data.And then WiFi module will disconnect with WiFi Router,when the data has been Transmitted.

➢ Wireless Settings web page

Table3-2 WirelessSettings Parameters

Name	Vlue	Description
Ssid	maximum 32 characters	The ssid of Wireless Router Or the name of WiFi module will create in AP mode.
Channel	1-14/Auto	Channel number，0-Auto
NetWork Mode	Infra（STA）	Station mode(STA)
	Adhoc	Adhoc mode
	Infra（Ap）	Access point mode(Ap)
	AdhocCreate	Not Applicable
Wireless Mode	B/G Mode	Wireless Phy mode
Rate	Auto/1-54M	Wireless Rate
Encryption	Disabled	Open mode
	WEP64	64 bits WEP Encryption
	WEP128	128 bits WEP Encryption
	WPA1PSK/WPA2PSK（AUTO）	WPA1-Personal/WPA2-Personal
Key Index	N/A	Not Applicable
	1-4	Key Index in WEP Encryption mode
Encryption Key	N/A	Not Applicable
	Key	Encryption Key
AP BSSID Filter	Auto/AP BSSID	Enable or Disable with the MAC address of the Wireless Router,

		0--Auto
Wireless Roam	Disable/Enable	Enable or Disable Wireless Roam

➢ Advanced Settings web page

Table3-3 Advanced Settings Parameters

Name	Vlue	Description
Address Type	Static IP	Static IP Address Note：In AP mode must use Static IP Address
	DHCP	DHCP Enable
Static IP Address	x.x.x.x	IP Address
SubnetMask	x.x.x.x	SubnetMask
Default gateway	x.x.x.x	Default gateway Address
DNS Server	x.x.x.x	DNS Server Address
Data trigger length	x bytes	The Length of Data trigger,the data received from UART reaches the length this parameter specifys,module will force to frame a network frame and trigger the sending process. range：32-1024 Experts strongly suggest Use the default value.
Login password	xxxxxx	Login password,Must be 6 characters
Restore Factory Defaults	Factory	Restore Factory Button
System Reboot	Reboot	System Reboot button. Note：The module will use the Parameters after System REBOOT！

3 Product Design Guide
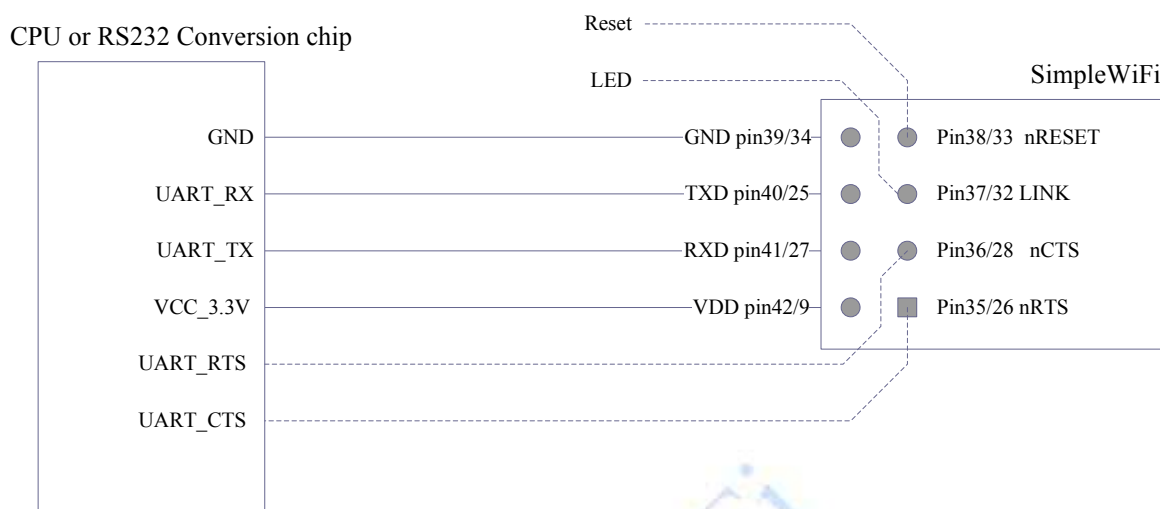
3.1　Hardware Connection

figure4-1 Hardware Connection

SImpleWiFi module provides 8-pin dual in-line or Dual Flat pack PCB Surface Mount Package, as shown above .

FCC WARNNG

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

（1）Reorient or relocate the receiving antenna.

（2）Increase the separation between the equipment and receiver.

（3）Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

（4）Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed and operated to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. Installers must ensure that 20cm separation distance will be maintained between the device (excluding its handset) and users.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module like the sample "Contains transmitter module FCCID: 2ADWI-S2W-M02".

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

Appendix A   Frequent Questions and Answers

Q1: Why can not the module search for the specified network?

A: The channel list user set doesn't contain the channel which the specified network work in.

Q2: Why can not the module join in the network?

A: Please go through the following reasons,
Whether the parameters SSID,Key,Channel and so on are consistent with the AP sets or not.
Whether the module is specified BSSID ,and the BSSID is not consistent with the AP sets.

Q3: The module has connected to the network successfully,why can't it show "Destination host unreachable" or "Request timed out" after doing the operation ping between the module and PC.

A: Please check the network setting, check whether the IP address and so on is correct or not.
Check whether the encryption mode is consistent with the AP sets or not, because in certain encryption mode, such asWEP encryption with open authentication,even if the key is not correct,module will join in the AP,but they can't communicate.
Maybe certain operating program or Windows Firewall prevents from the operation ping.

Appendix B Revision History of the document

Version	Revised scope	Date
1.00	Draft	Sep 10th 2013