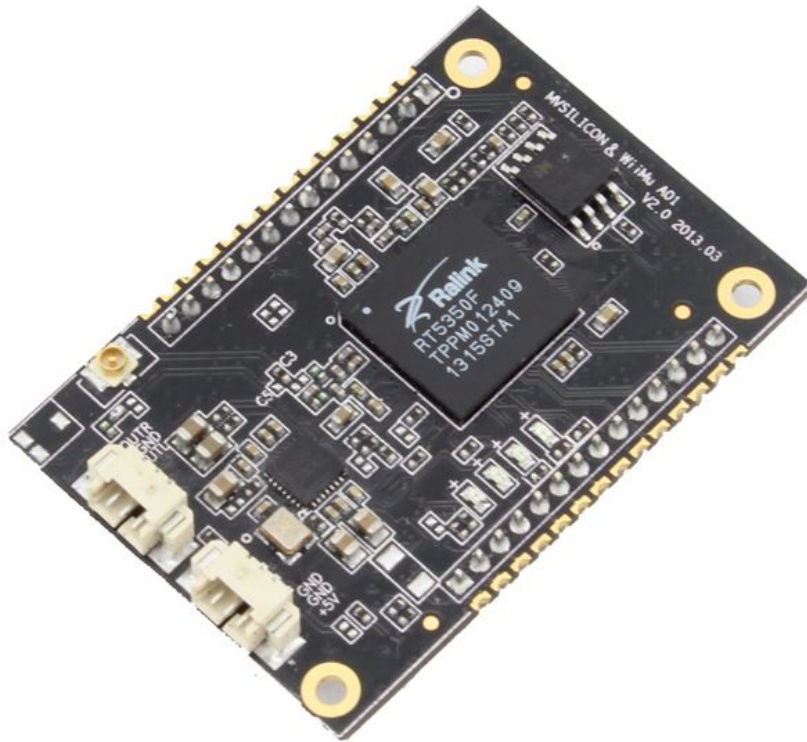


WiFi Audio Module (USR-S12)

File version: 1.0.1



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1. Product Instructions

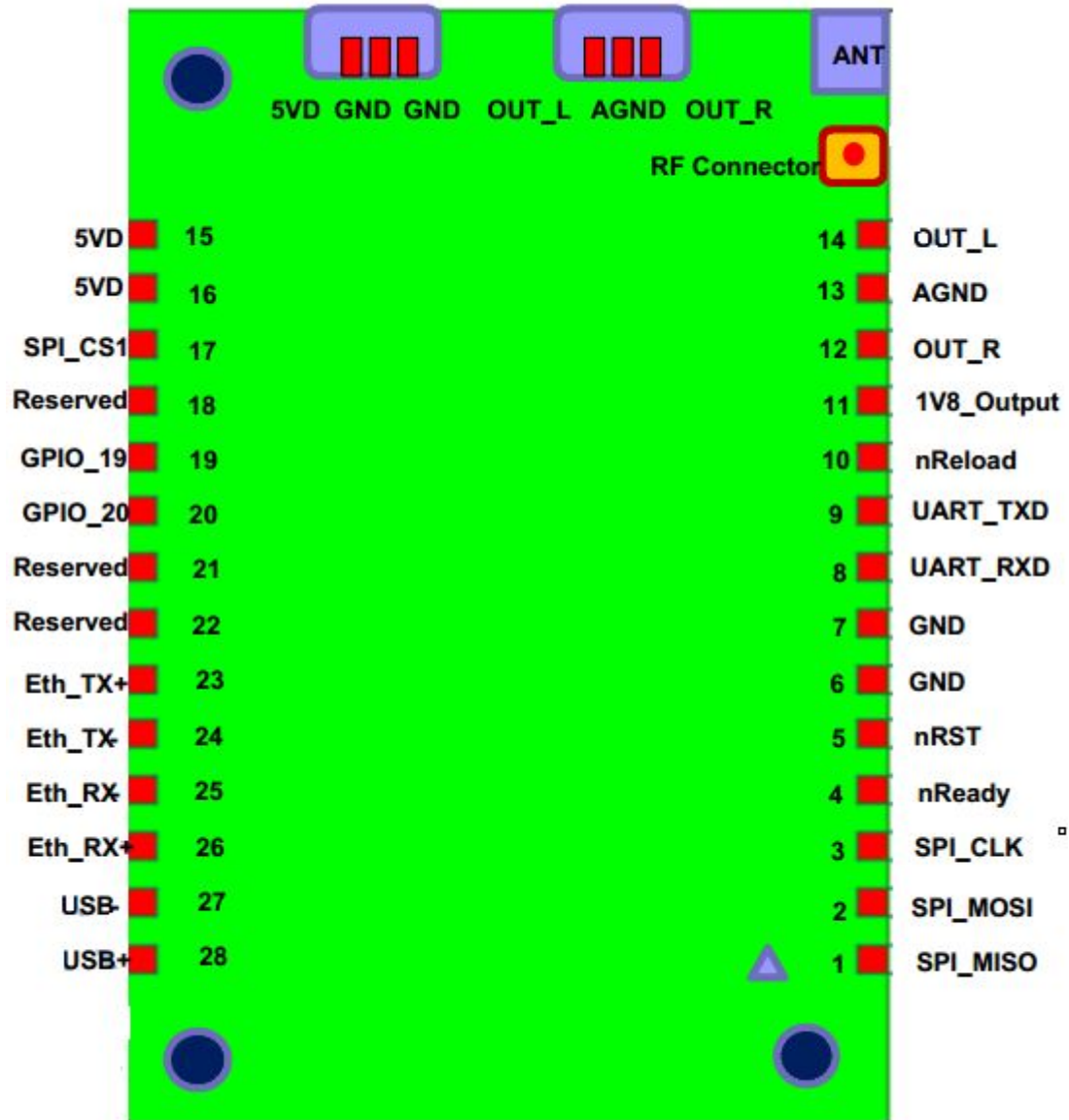
This USR-S12 module is used to develop wifi audio player and smart Home Appliances. Support 802.11b/g/n, can work in AP/AP client/STA mode. Audio is compatible with the AirPlay function which is launched by Apple Inc. and industry equipment interconnected DLNA standard DLNA. Can play the music on iPhone, iPad or iPod touch by AirPlay function. Can also use the third-party player which matches DLNA standard to play music on the Android device or PC.

1.1 Parameters

	Item	Parameters
Wireless parameter	Certification	FCC/CE
	Wireless standard	802.11.b/g/n
	Frequency	2.4.12GHz-2.484GHz
	Transmit Power	802.11b: +20dBm(Max.)
		802.11g: +18dBm(Max.)
		802.11n: +15dBm(Max.)
	Receive sensitivity	802.11b: -89dBm
802.11g: -81dBm		
802.11n: -71dBm		
Antenna	External I-PEX antenna	
Hardware parameter	Working voltage	5.0V (+/-5%)
	Working current	170mA~300mA
	Working temperature	-25℃ - 85℃
	Storage temperature	-40℃ - 135℃
	Size	33×48×3mm 28-pin SMT
Software parameter	Wireless network type	AP Client mode
	Security type	WEP/WPA-PSK/WPA2-PSK /W API
	Encryption type	WEP64/WEP128/TKIP/AES
	User configuration	Web Server
	User upgrade	Web Server
	Audio protocol	AirPlay DLNA

2. Module dimensions

2.1 Pin definition



Instructions:

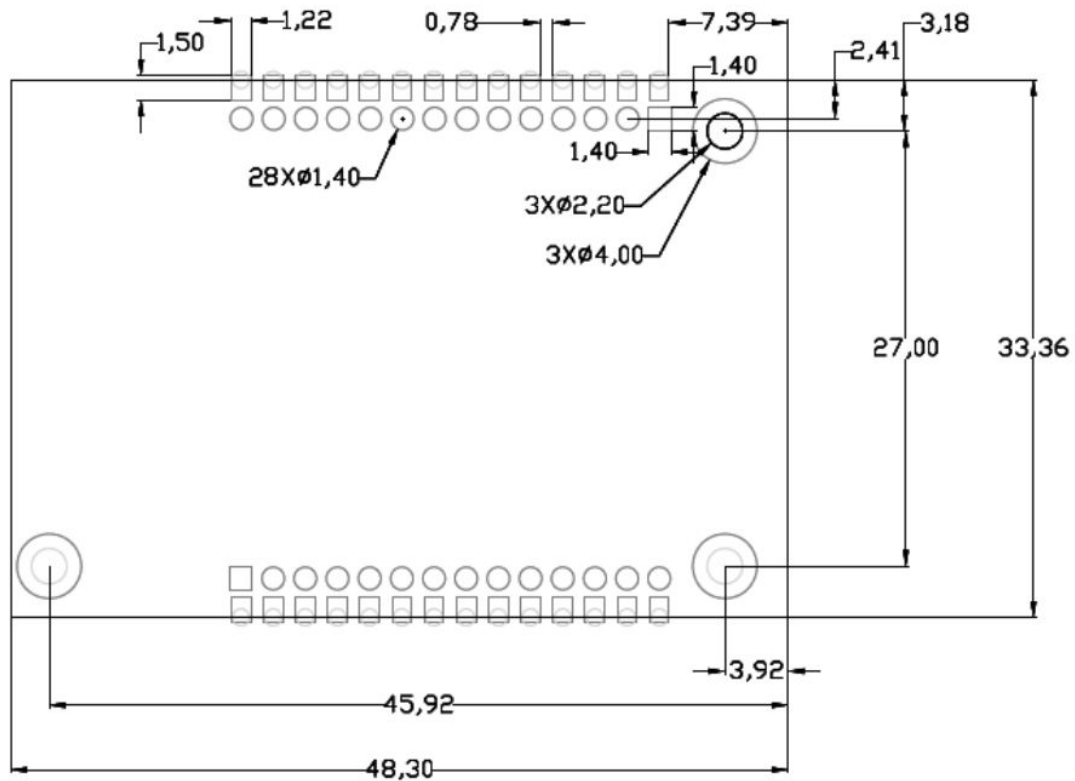
Pin	Description	Name	Type	Instruction
6, 7	GND	GND	Power	Ground
15, 16	5VD	5VD	Power	+5V@350mA
1	SPI interface data	SPI_MISO	I/O	SPI interface, used to connect with SDcard
2	SPI interface data	SPI_MOSI	I/O	
3	SPI interface clock	SPI_CLK	I/O	
17	SPI interface 片选	SPI_CS1	I/O	
4	Module start status indicator	nReady	O, IPU	Module boot up, output "0", otherwise output "1"
5	Module reset	nRST	I, IPD	Low level reset, reset time >300ms
8	UART receive data	UART_RXD	I, IPD	UART function
9	UART send data	UART_TXD	O, IPD	
10	Restore factory defaults	nReload	I, IPD	Input low level "0", pull high after 5s, module restore
11	Out put 1.8V	1V8_Output	O	1.8V@300mA, applied to Ethernet
12	Audio output -R	OUT_R	A	Audio output interface, connect with speakers
13	Audio gnd	AGND	Power	
14	Audio output -L	OUT_L	A	
18	Reserved	Reserved	I/O,IPD	Reserved, vacant
19	General programmable IO	GPIO_19	I/O,IPD	
20	General programmable IO	GPIO_20	I/O,IPD	
21	Reserved	Reserved	I/O,IPD	Reserved, vacant
22	Reserved	Reserved	I/O,IPD	Reserved, vacant
23	Ethernet output+	PHY_TX+	O	1.8V level interface (supply circumscribed 1.8V , reference voltage , Pin11)
24	Ethernet output-	PHY_TX-	O	
25	Ethernet input-	PHY_RX-	I	
26	Ethernet input+	PHY_RX+	I	
27	USB input-	USB-	I	USB interface, connect with USB flash disk
28	USB input+	USB+	I	

Note:

1.I-Input, O-Output, P-Power, IPU-Internal Pull Up, IPD: Internal Pull Down, A:Analog
 Meanwhile, S12 configurate two 3 pin SMD connect interface socket, respectively is 5V power input and audio stereo output.

2.2 Dimensions

S12 module size approximately (33×48mm), see following picture:



2.3 Audio output

USR-S12 module internal Audio Codec relevant parameters shown as picture 2-3

If module periphery need to expand the Audio parts, design suggestions:

1. The power supply path should be as thick as possible. The filter and energy storage capacitance close to the chip pin as much as possible.
2. All analog component in an area, all digital component in another area.
3. Make sure digital signal clock or other high speed signal far away from analog signal and reference voltage
4. Make sure the high speed signal of digital signal has completed reference plane

5. The audio signal should be around with GND, and far away from RF signal.
6. When layout “AGND” single point connect to GND

PARAMETER	MIN	TYP	MAX	UNIT
<i>DAC Performance</i>				
Dynamic Range (Note 1)	83	96	98	dB
THD+N	-85	-83	-75	dB
Channel Separation (1KHz)	80	85	90	dB
Signal to Noise ratio	83	96	98	dB
Interchannel Gain Mismatch		0.05		dB
<i>Filter Frequency Response – Single Speed</i>				
Passband	0		0.4535	Fs
Stopband	0.5465			Fs
Passband Ripple			±0.05	dB
Stopband Attenuation	40			dB
<i>Filter Frequency Response – Double Speed</i>				
Passband	0		0.4167	Fs
Stopband	0.5833			Fs
Passband Ripple			±0.005	dB
Stopband Attenuation	40			dB
<i>De-emphasis Error at 1 KHz (Single Speed Mode Only)</i>				
Fs = 32KHz			0.002	dB
Fs = 44.1KHz			0.013	
Fs = 48KHz			0.0009	
<i>Analog Output</i>				
Full Scale Output Level		AVDD/3.3		Vrms

2.4 Power

S12 adopts univoltage 5V power supply, peak current about 350mA, working current is 200mA, sleeping mode(wifi disabled) is 100mA

Power filtering suggest to be near the connector of customer board, recommend 100uF and 100uF two parallel decoupling capacitor, can supply system stability and wireless function

2.5 Indicator

S12 module has 4 status indicator in total, see follows:

1. Power
2. AP
3. Client
4. WIFI data transmitter

The following table explains the S12 indicator order and its instruction

Indicator status	Instructions
Ap off	WIFI AP waiting connect
AP on	WIFI AP connected
Client off	WIFI AP Client did not connect with router
Client on	WIFI AP Client connected to router, but can not connect to internet through router
Client flash	WIFI AP Client connected to router, can connect to internet through router
Power on	System starting
Power flash (on 1s, off 1s)	System succeed to start, normal working
Power quick flash (on 0.3s, off 0.3s)	System in upgrading or restoring to factory default, MUSTN'T stop the power, or it may cause module broken
WIFI data on	Wifi data transmission

2.6 Software instruction

USR-S12 support Apple Airplay and standard DLNA

Item	instruction
iOS version	iOS 4.2 ++ iPhone, iPad, iPod Touch, iPad Mini
iTune version	iTunes 10.2 ++ PC, iMac
Support operation	Airplay Play, pause, Seek, volume, previous, next
Support program	Airplay Apple Music (local) QQ Music (local and on-line) iTunes
Support operation	DLNA Play, pause, Seek, volume, previous, next
support DLNA program	Compatible with the third-party player which pass the DLNA certification, such as: Skifta BubbleUPnP QQ Music
Support browser	PC: IE9/10, Chrome, Firefox

	iOS/MAC OS: Safari
Web server support language	Chinese English
Web server support operation	set USR-WA3 network set USR-WA3 device name, add password protection update USR-WA3 firmware and restore factory default

2.7 WPS settings

WPS (Wi-Fi Protected Setup) is used to simplify the wireless LAN install and safety performance configuration. WPS will help to automatically set SSID, set powerful WPA data encoding and authentication function. Customer just click press the button(button set, or we say PBC), then can connect to WLAN safely.

S12 module pin10 “nReload” short time low level pulse (300ms < t < 5s) to open WPS function

2.8 Restore defaults

S12 module pin10 “nReload” long time low level pulse (t>5s) to restore. System will restart automatically after restore.

3. Web configuration

USR-S12 module support Web server function, support setup by browser.

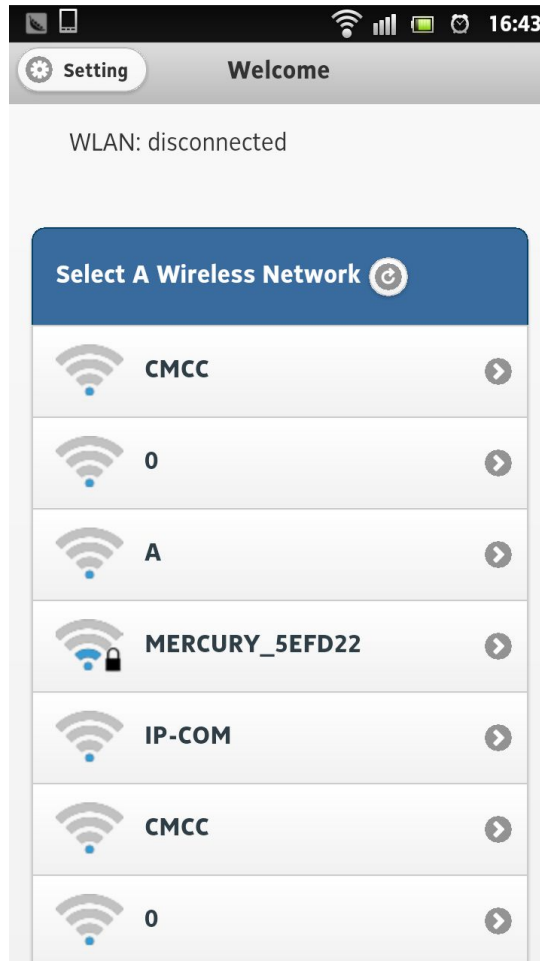
In default settings, S12 AP interface SSID is WIFIAudio_XXXX, XXXX represent 4 numbers. IP address, user name and password as follows:

Parameters	Default
ssid	WIFIAudio_XXXX
IP address	10.10.10.254
Sub net mask	255.255.255.0
Username	admin
Password	admin

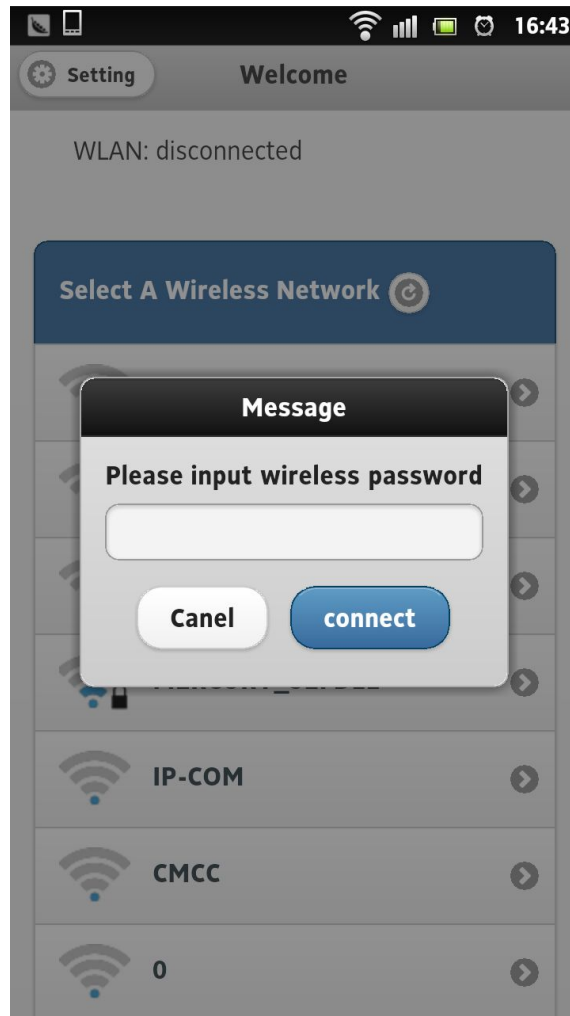
Can connect S12 AP interface through PC, and configurate by webpage.

3.1 WIFI page

When your device in the same LAN with S12, type in “10.10.10.254” in browser, then this interface:



It shows the APs surrounded, click the router name then you can join it.

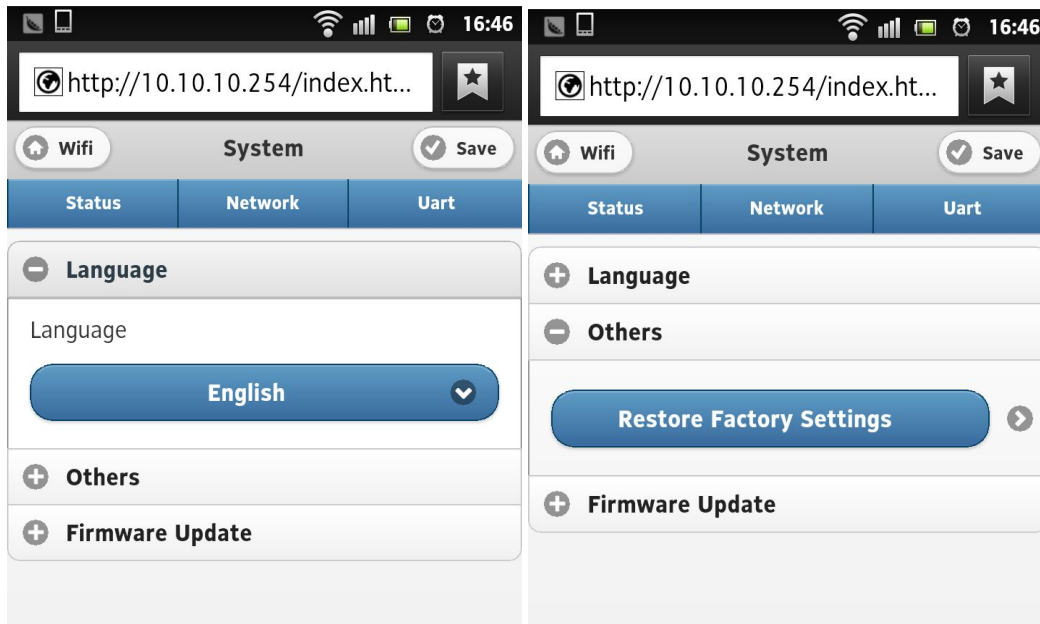


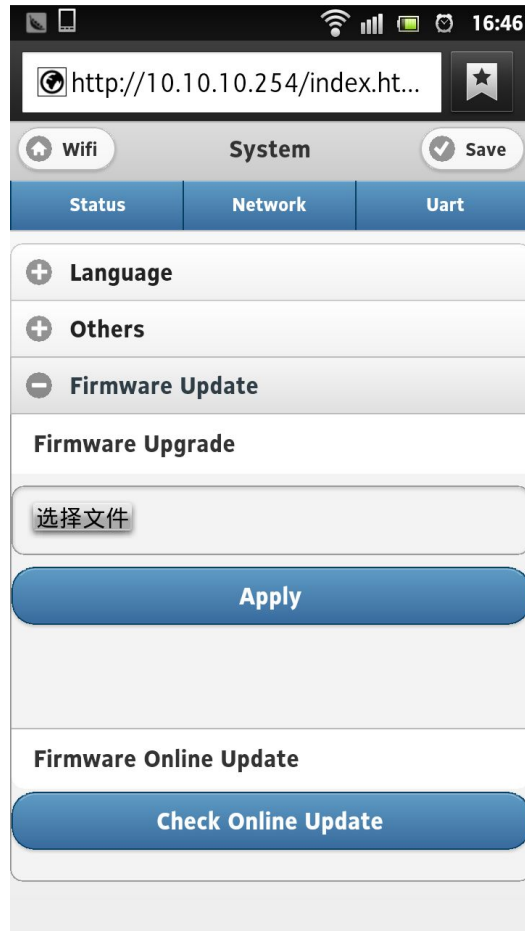
3.2 click “Settings” on the top left conner, we can see S12 module basic information



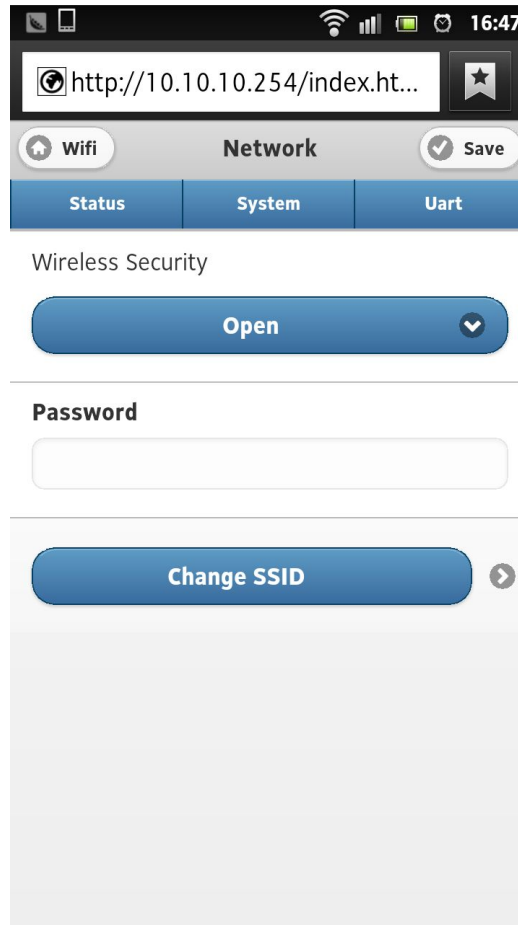
3.3 click “system” button, you can choose language, restore and firmware update selection.

Language support Chinese and English, remember to click “save” on the top right conner





3.4 system settings



In this page, you can set S12 wireless network security and password. This module support WPA PSK. Click open to switch to WPA PSK, input password. Don't forget to click "save" on the top right conner.

Also you can change module SSID here.

4. Airplay

4.1 Airplay instruction

AirPlay is developed by Apple, a play technology added in iOS4.2 and OS X Mountain Lion. Can transmit the audio on iPhone, iPod touch, iPad and Mac (need OS X Mountain Lion) to the devices which support Airplay. Need the iOS4.2 version device or iTunes10.1 ++ version on MAC computer

When customer device (Mac, PC, iPod touch, iPhone, iPad) in the same LAN with speaker that support Airplay, users open iTunes 10 or higher version on MAC or PC, will



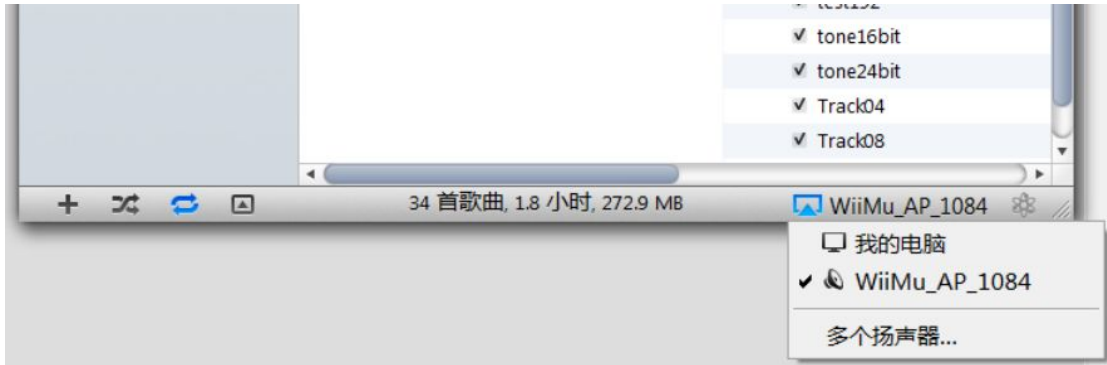
see this button beside the volume bar. Click it, then choose device, then will synchronous musics to devices for playing. While the iPod touch, iPhone and iPad customers can find Airplay button in music interface, operation is the same as MAC and PC.

4.2 Airplay application on PC

1. To use Airplay on PC, you need to install iTunes first.
2. As shown below: log PC WIFI into S12 device, or log PC and S12 in a same wireless LAN.



3. Choose WiiMu-AP in iTunes software play interface asplay device.



4.3 Airplay application on iOS

iOS device native support Airplay

1. Shown as follows: log the iOS WIFI into S12 device, or log the iOS device and S12 to a same wireless LAN.



2. Open the music application program, choose WiiMu-AP as play device



3. Then, the third-party music player will play through Airplay

5. DLNA



DLNA (Digital Living Network Alliance)

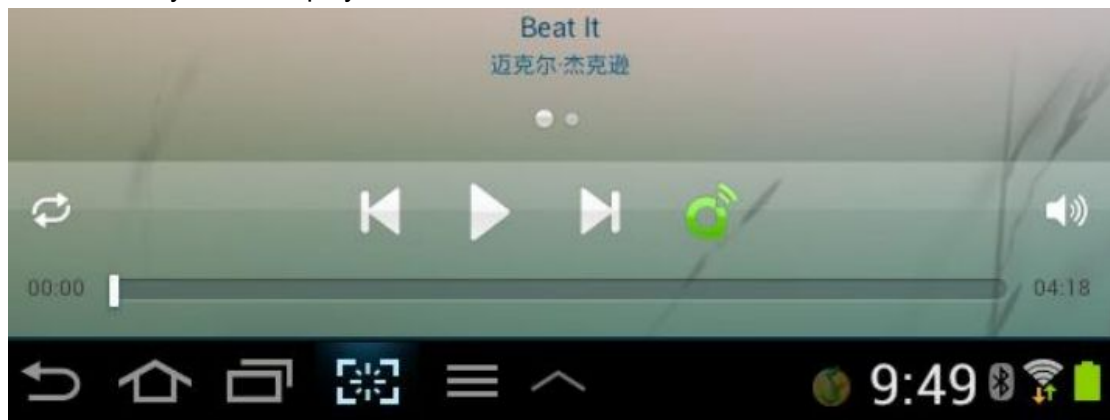
5.1 DLNA application on Android

Android system has many third-party music players which support DLNA, we take QQ music as example:

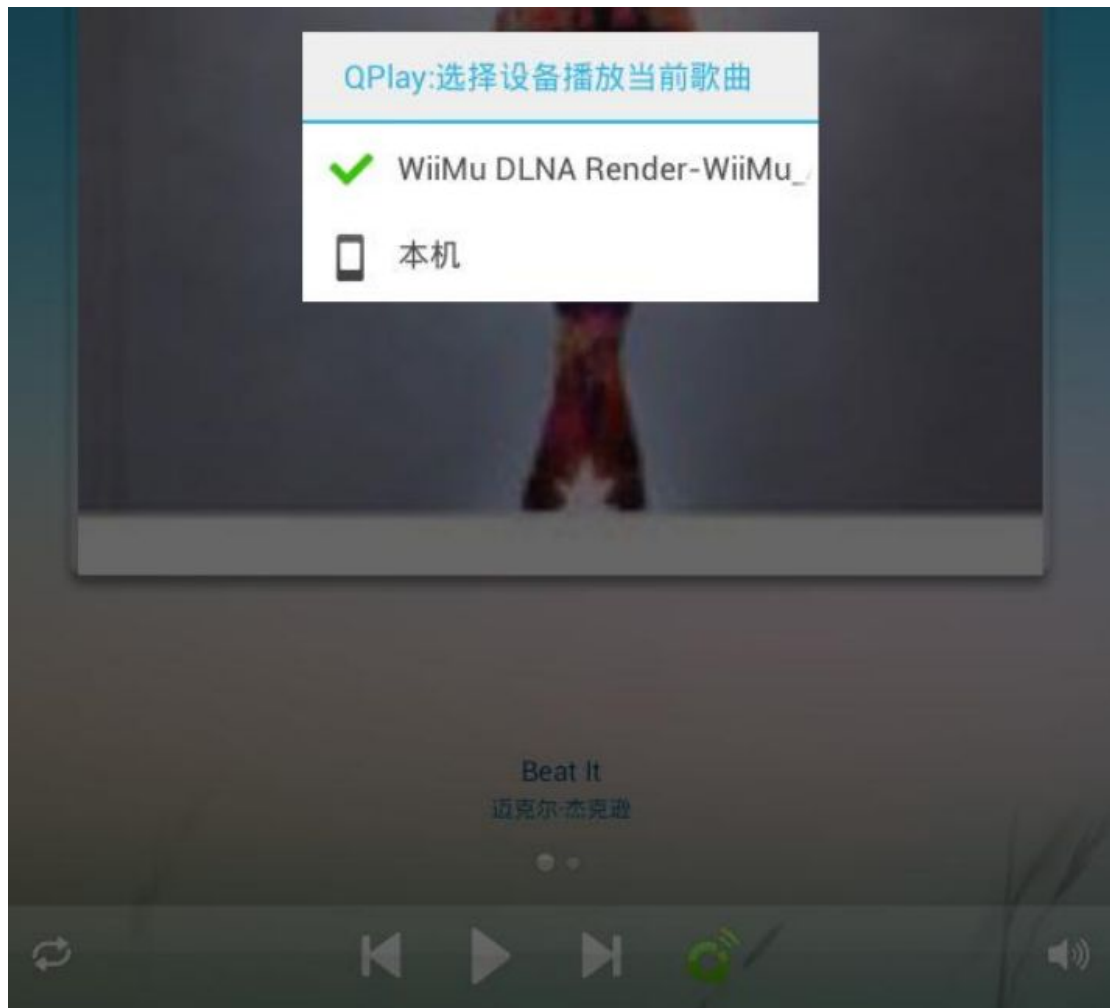
1. Shown as following picture, log the Android device to S12 or log Android and S12 to a same wireless LAN



2. Open QQ music, choose music to play
3. Click QPlay button in player interface



4. Choose WiiMu-AP as output, WiiMu-AP start to play



Other DLNA player operation similar to this.

6. Contact

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