HIFI AMP HAT User Manual

1、Overview

The Innomaker HiFi AMP Hat is the best optimized partner for RPI audio output, high-quality, highly efficient ,up to 25W Class-D power amplifier for the Raspberry Pi. Just plug it into Raspberry and do some simple configuration, You can get a same high-class music player, but only pay 1/10 to 1/100 of the market price. This is a good choice to DIY your home stereo theatre or broadcasting system.

2、Functions and Features

1. Compatible with Raspberry Pi Zero W/2W,3B,3B+ through the 40-pin connector. Connects directly to the Raspberry Pi board, no additional cables required,no soldering required. Easy to get more beautiful and fantastic sound by this RPI+AMP HIFI suits.

2. Absolutely perfect to support all Raspberry Pi music player system ,such as LibreELEC OSMC, Max2Play, RuneAudio, Volumio, Moode, Raspbian, Ubuntu etc. Support play music from a hard disk or over the network. Support DSD over PCM(DOP) mode.

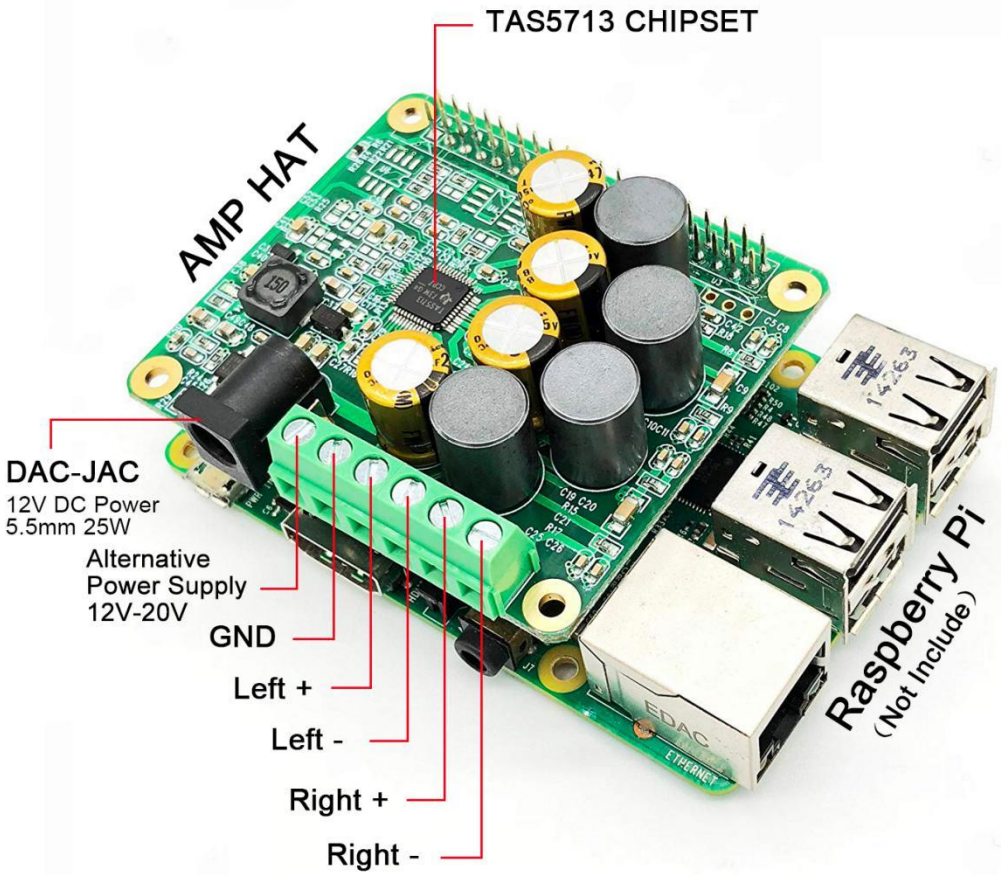
3. On-board TAS5713 is a 25-W Class-D digital-audio power amplifier for driving stereo bridge-tied speakers. Offers low distortion and acoustically accurate audio reproduction.

4. Accept a wide range of input data 8-Khz to 48-Khz, Up to 90% Efficient, Supports speakers 4 Ohm impedance allows you to enjoy high quality audio.

5. Comes with software, document and friendly technology support. For more information please refer to our wiki（view the link on color page comes with the goods)

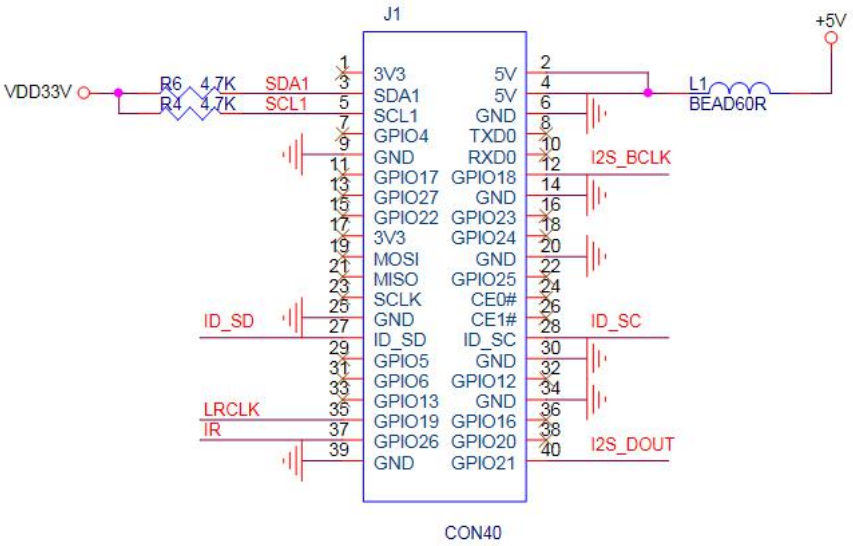
3.Hardware Description

3.1 Overview



3.2 PINOUT USAGE- FEMALE CONNECTOR

1)40 PIN Interface Schematic



2)40 PIN Interface Description

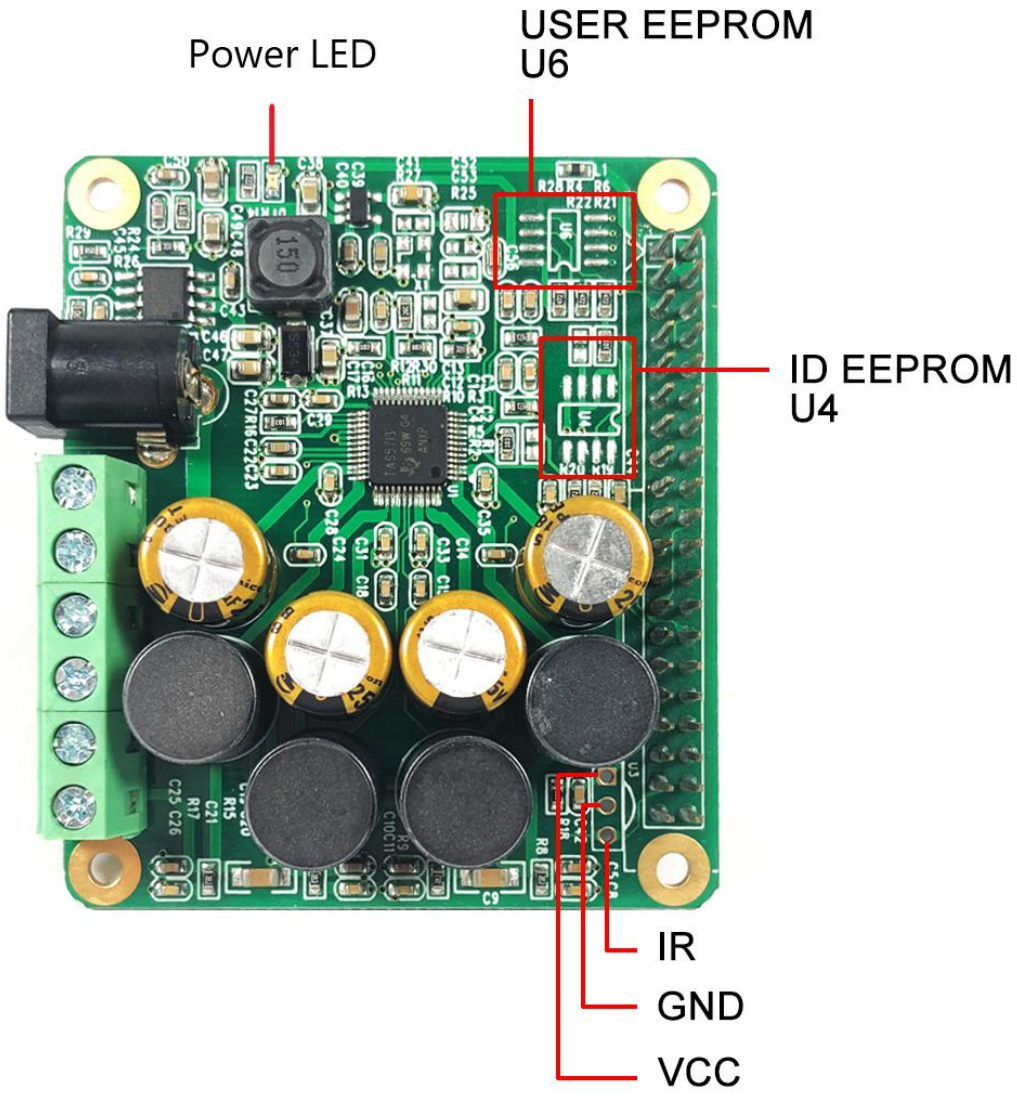
PIN	Symbol	Description
2, 4	+5V	+5V Supply Pin, connected to the main 5V supply of the Raspberry Pi
3	SDA1	SDA Used for AMP and EEPROM
5	SCL1	SCL Used for AMP and EEPROM
12	GPIO_18	IIS_BCLK
35	GPIO_19	IIS_LRCLK
37	GPIO_26	Infrared receiver reserved port
40	GPIO_21	IIS_DOUT
27, 28	ID SCL and ID SDA	Reserved for an ID EEPROM on the Raspberry Pi. These pins are always reserved and should never be used to connect external components
6, 9, 14, 20, 25, 30, 34, 39	GND	Ground Pin, connected to the main system Ground of the Raspberry Pi
The remaining pins are unused, You can use them for your other hardware boards.		

For more information about GPIO of Raspberry PI, please refer to below link:

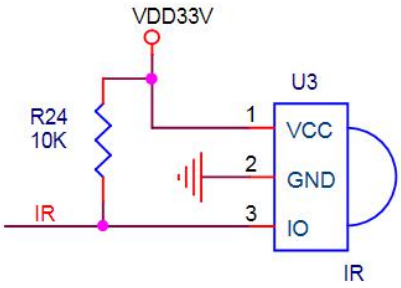
https://www.raspberrypi-spy.co.uk/2012/06/simple-guide-to-the-rpi-gpio-header-and-pins/#prettyPhoto

https://docs.microsoft.com/en-us/windows/iot-core/learn-about-hardware/pinmappings/pinmappingsrpi

3.3 Extended Function

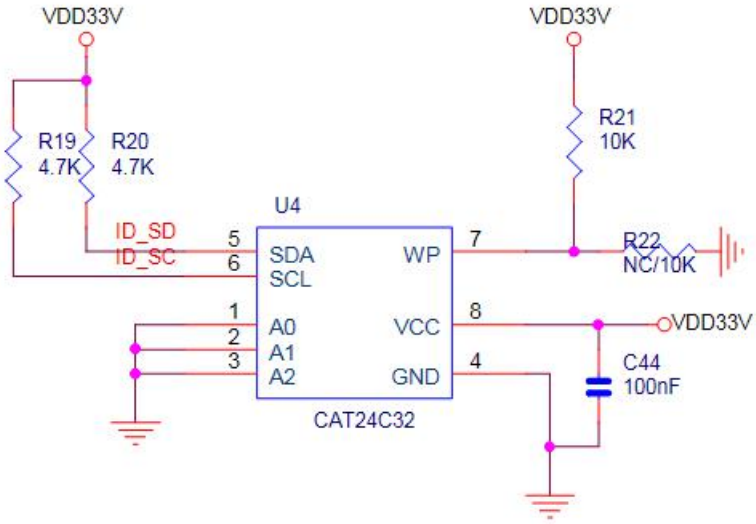


1) Infrared Receiver Function: (U3,No Soldering On-board)



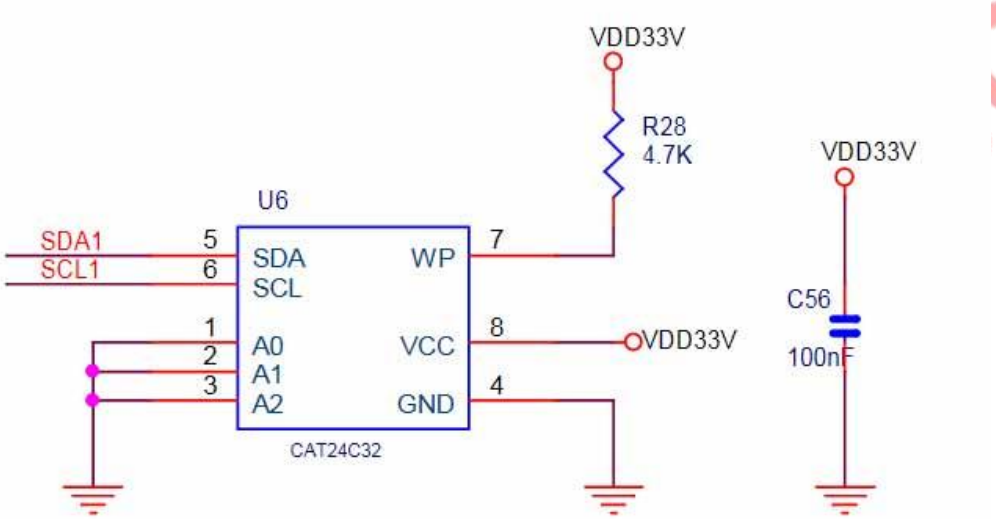
IR is connected to PIN37(GPIO_26) , But we have no software for it right now. We will release new software version after finish it. If you have any advices please feel free to E-mail to us.

2) ID EEPROM: (U4, No soldering on-board)



Pin 27 and 28 are always reserved for an ID EEPROM on the Raspberry Pi. Independently which card you use. It's useless for most application. If you want to use this function, you need to solder the IC, resistance and capacitance by yourself.

3) USER EEPROM: (U6 No soldering on-board)

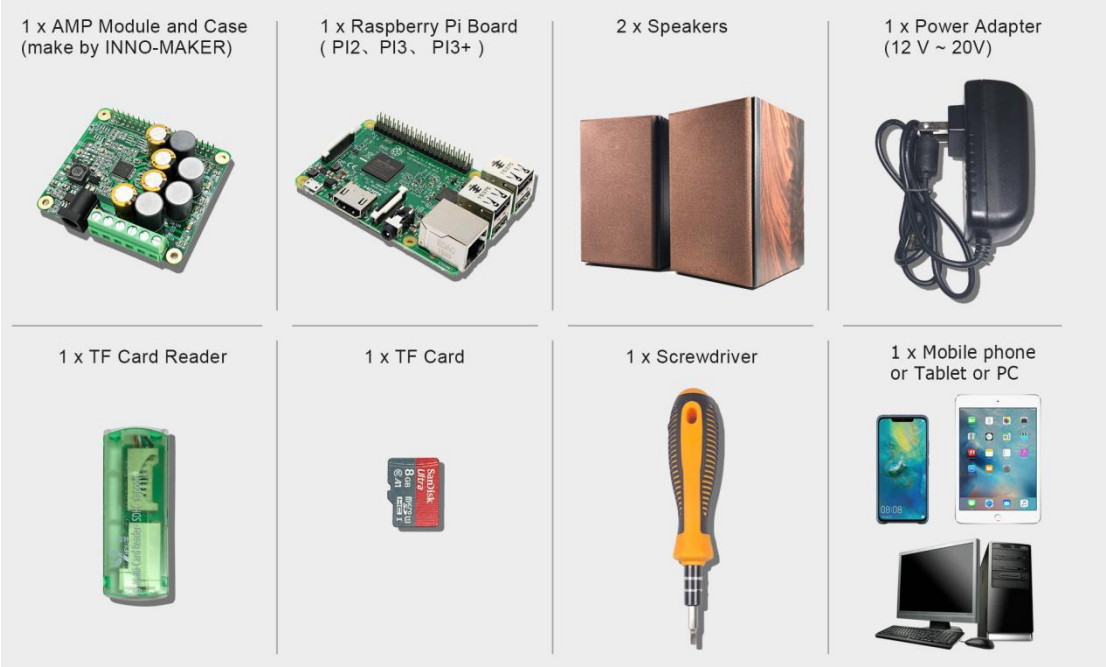


It connected to the same IIC port with AMP you need to solder the IC and Confirm IIC slave devices. If you a novice of Raspberry Pi, We really wouldn't advise do that.

4.Hardware connection

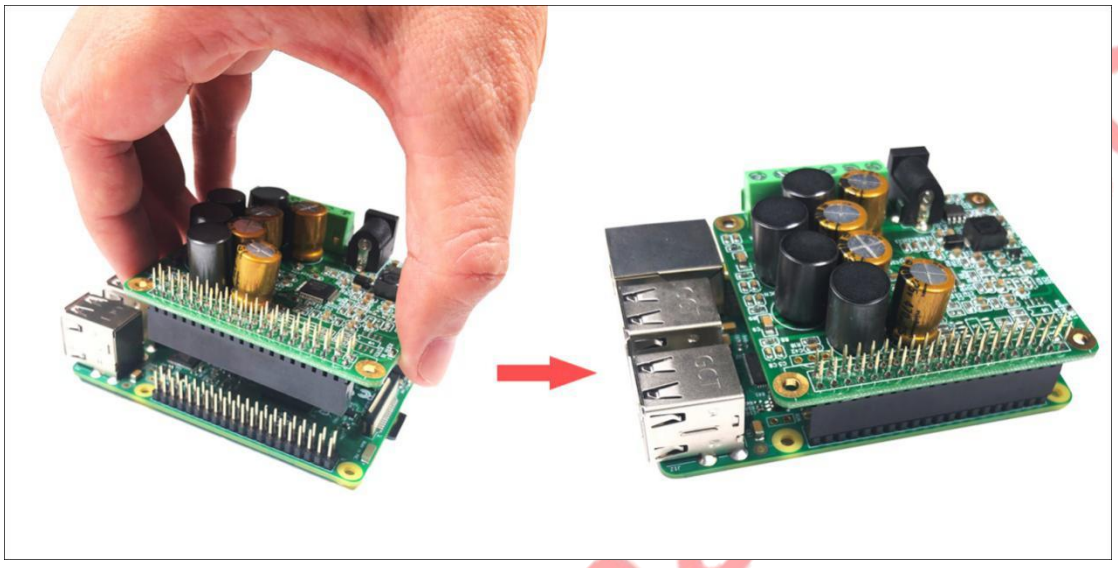
4.1 Prepare:

1、one Raspberry pi board (PI2,PI3,PI3+, PI Zero, PI Zero W)
2、one TF card (at least 8G)
3、one TF card reader
4、one AMP module and case (make by INNO-MAKER)
5、one Power Adapter (12 V ~ 20V)
6、2 Speakers
7、Screwdriver
8、One mobile phone o Tablet or PC

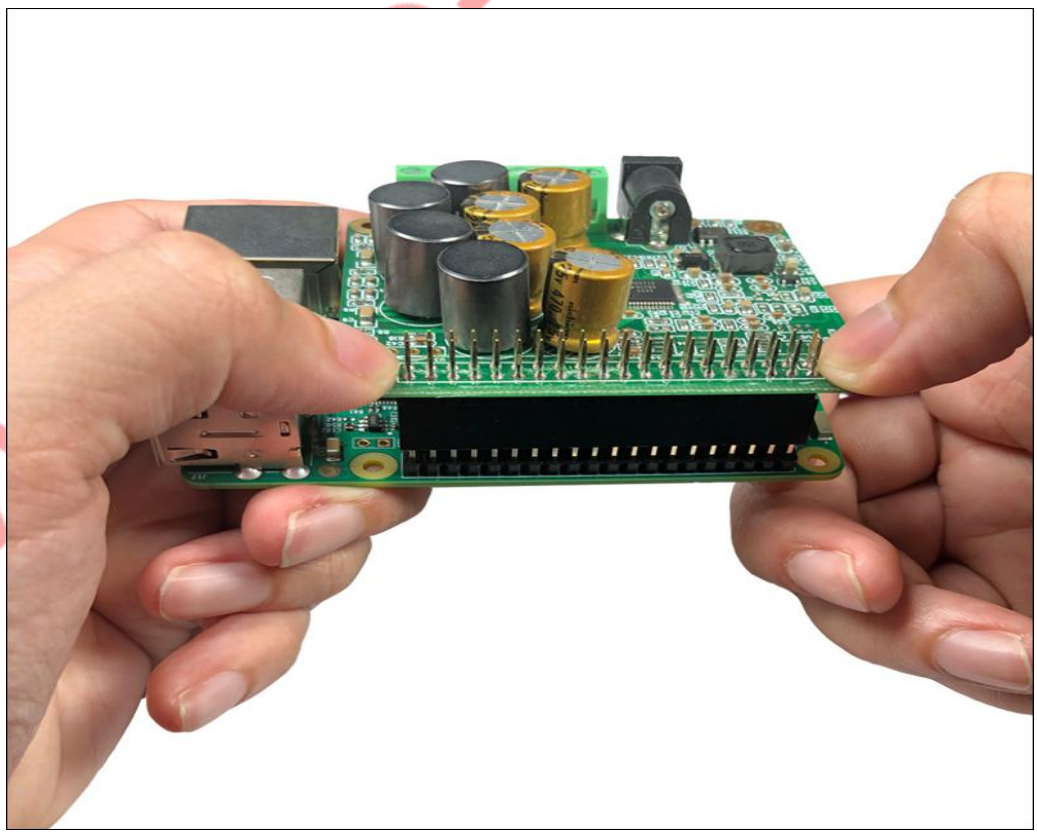


4.1 Plug it together

(1) Plug the AMP module into the 40 pin GPIO head, and make sure the four hole are aligned correctly.

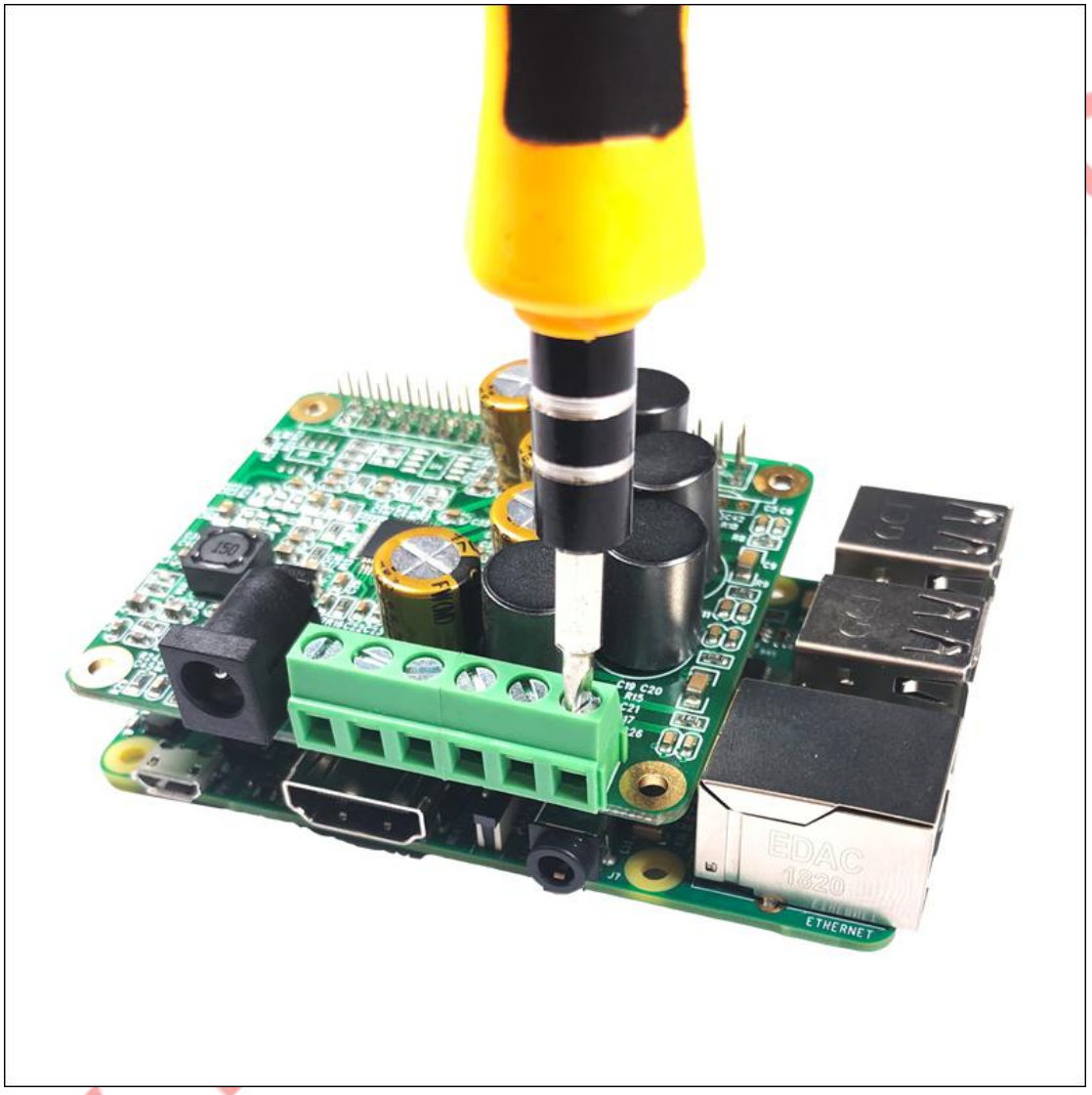


(2) And then push it down slowly with either thumb , but doesn't take much force.

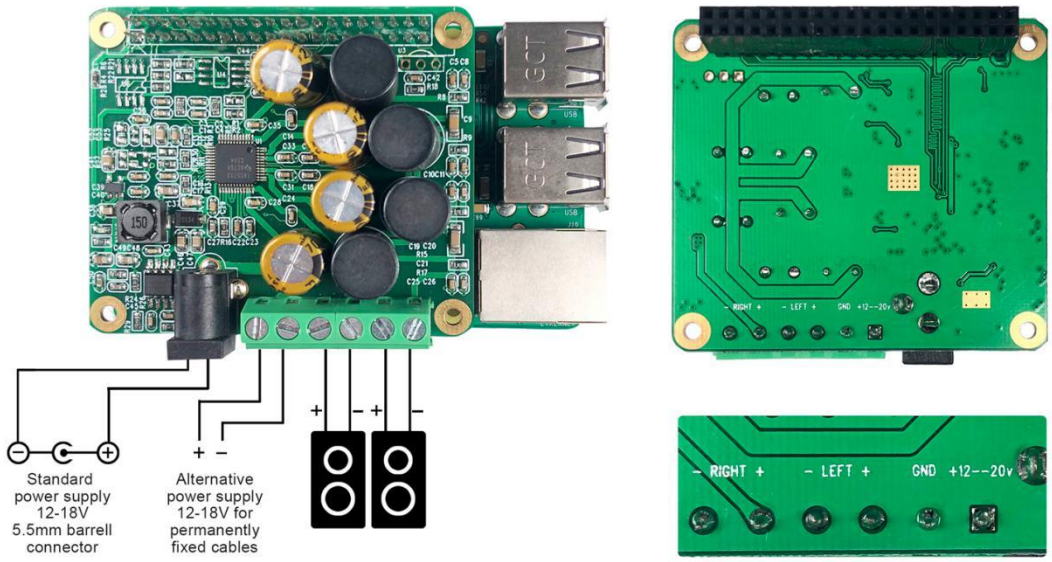


4.2 Wiring

(1) Unscrew the six cover screws



(2) And then plug the speaker cables into connector correctly and screw down. Please check the silk-screen on the back of the board.



(3) Please make sure your network is usable and plug in the LAN cable to Raspberry Pi. If you want to play local music files through USB, please plug it into Raspberry Pi port.

Warning : The Raspberry Pi will be powered by the Amp module only. It is not allowed to connect the 5V power supply to the Micro-USB port of the Raspberry Pi. Power supply is only one external 12-20V that will be connected directly to the Amp.

5. Software Description

5.1 Overview

HIFI AMP HAT module compatible with many Raspberry pi music playback system such as:
OSMC / Max2Play / RuneAudio / Volumio / Moode / PiCorePlayer / PiMusicBox / OpenELEC etc.
You can choose your favorite. We take **Volumio/MoOde/Max2play/Debian/LibreELEC** System for Example.

Note:

1) Because the third party will update the version unscheduled, so the actual UI may different from below user guide. But the configurations will be the same. If you meet any problem, you can Check the user help on the website of the third party or feel free to e-mail us.

2) The default setting is maximum volume of most system, it' will offensive your ears. So please turn down the volume before you enjoy it.

5.2 Download Image from website

Download the lastest image for Raspberry PI:

Volumio Image:
http://volumio.org/get-started/

MoOde Image:
http://www.moodeaudio.org/

Max2Play Image:
https://www.max2play.com/en/max2play-image/

LibreELEC:
https://libreelec.tv/downloads/raspberry/

Raspbian and Raspbian lite Image:
https://www.raspberrypi.com/software/operating-systems/

5.3 Load Image on to SD card.

Prepare a capacity of more than 8GB TF card and a card reader. Load the image file onto a SD card, using the instructions provided on the Raspberry Pi website for Linux, Mac or PC: https://www.raspberrypi.org/documentation/installation/installing-images/README.md

5.4 VOLUMIO Setup

Volumio is an entirely new music system. It is designed to play all your music, whether is an Hi-Res file or a Web Radio, with the highest quality. Control it with your favourite device, a smartphone, PC or tablet, and enjoy your music as you never did before.

Volumio is a Free and Open Source Linux Distribution, designed and fine-tuned exclusively for music playback. I supports all filetypes: FLAC, Alac, Aac, Vorbis, Mp3, DSD etc. and support

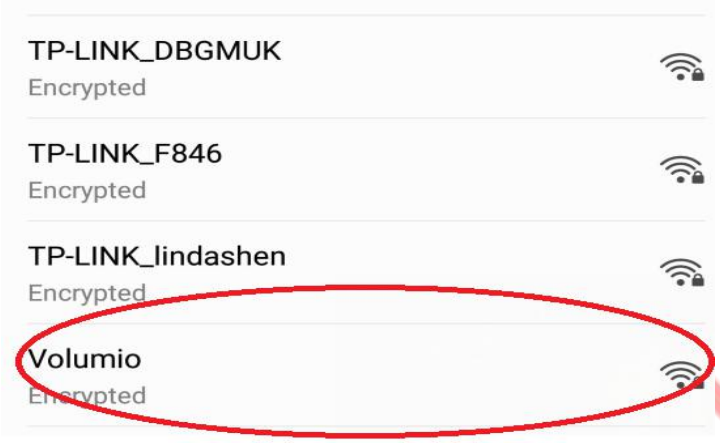
By flashing (installing) Volumio on any platforms, it will then become a headless Audiophile Music Player. Headless means that the only way to control it will be with another device, such as a Smartphone, Tablet, PC or anything that has a browser.

For more detail please refer to https://volumio.org/discover/.

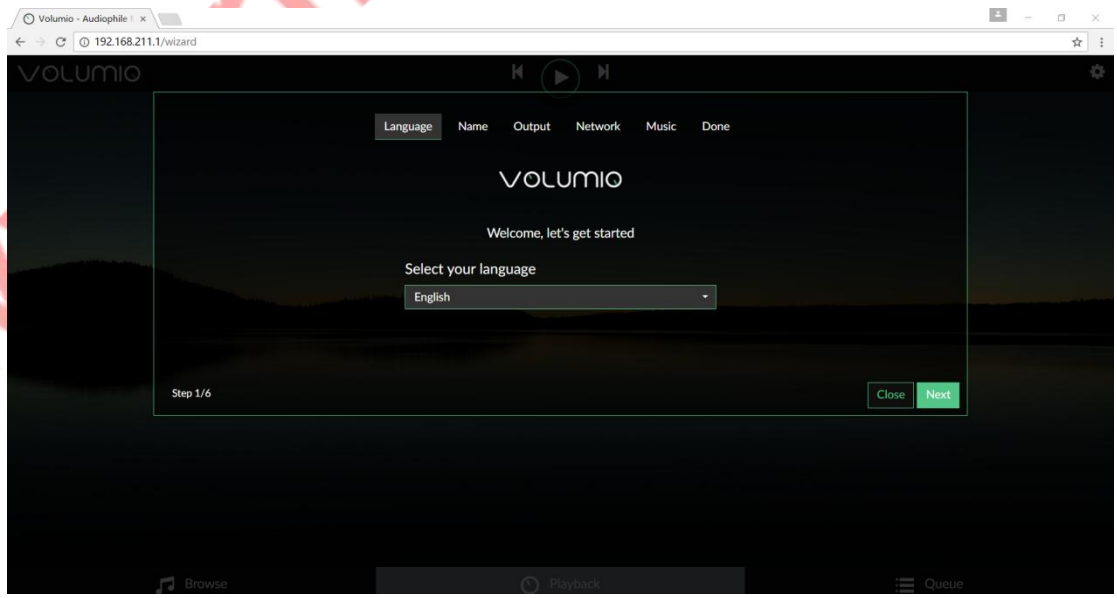
STEP:

1) Insert the TF card with volumio image into the Raspberry pi then power on.

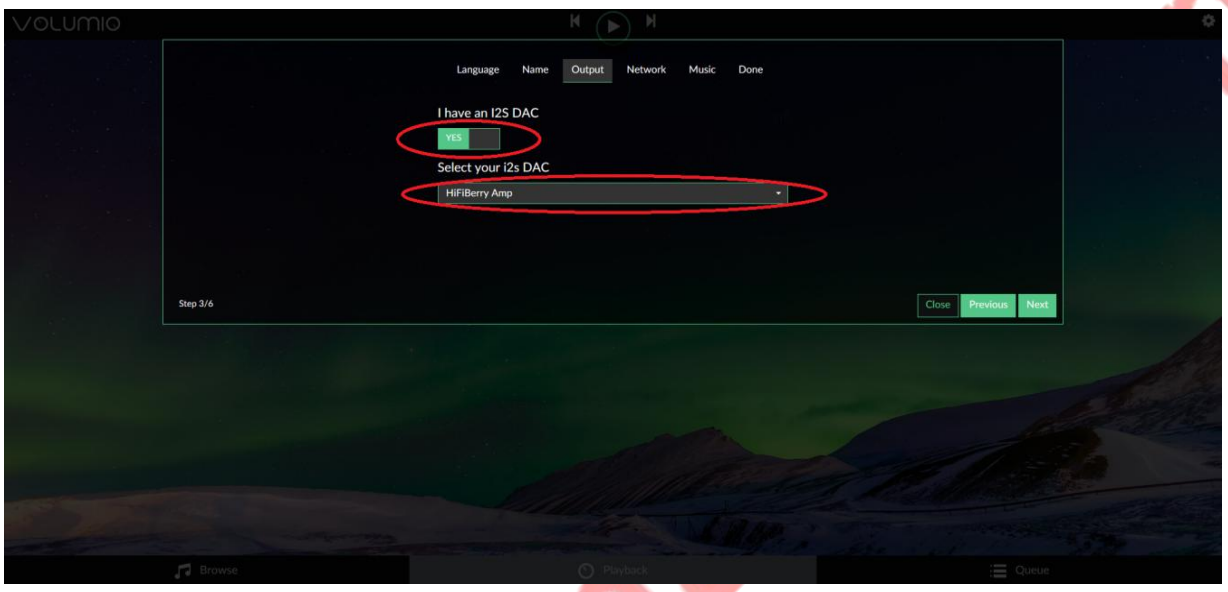
2) By using your smart phone, tablet or any device with WIFI and browser search for WIFI hotpots. You can see a ‘Volumio’ name in the search list. Connect this hotspot with password ‘volumio2’. You can change your password after login.



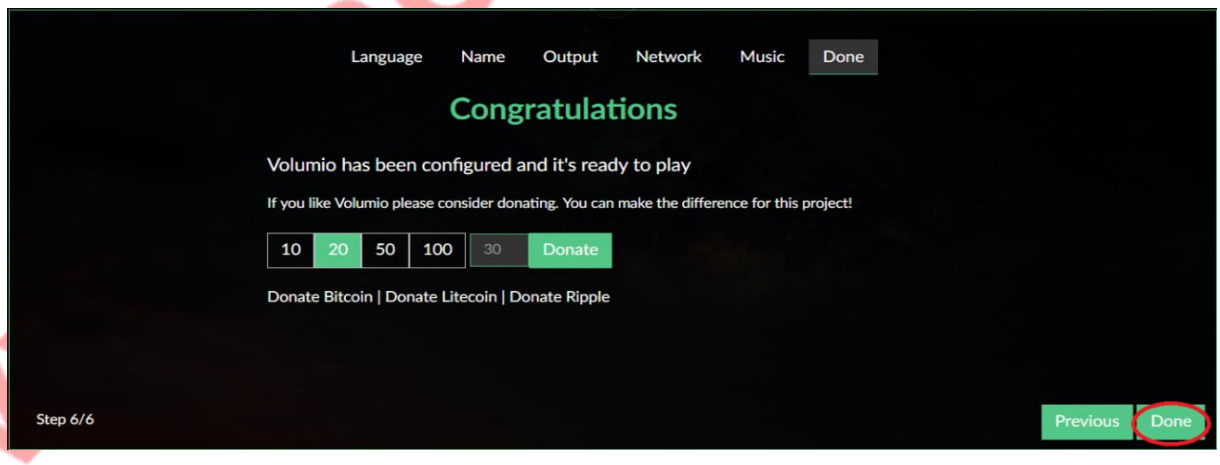
3)The browser will automatically eject playback software UI which is based on web interface (if you connect the hotspot successfully but for some reason browser can’t pop up the playback page automatically, you can using http://192.168.211.1 to login. You can see below wizard of Volumio. We only need to set “Language” , “Name” “Output” and “Done” for simple application.



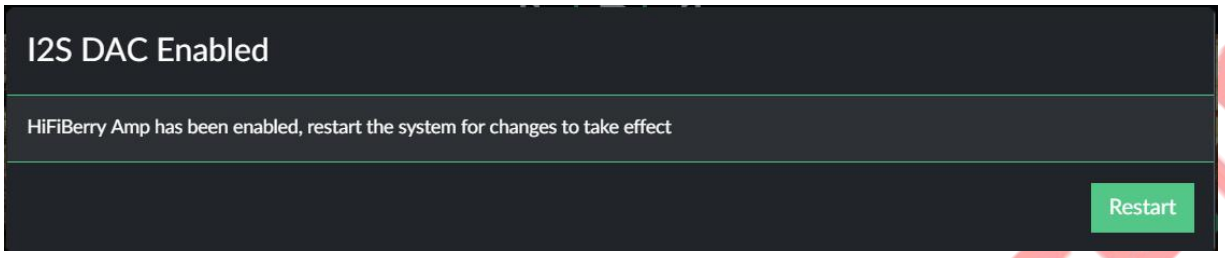
4)It should be noted that 'Output' page must set as below. This is an essential step, otherwise you can't hear anything.



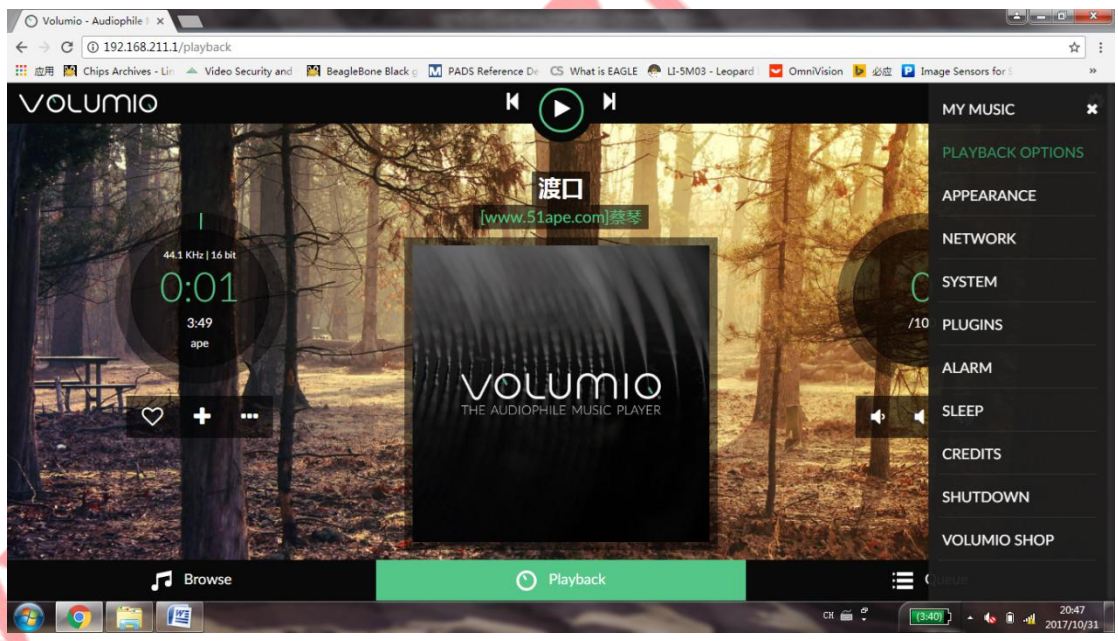
5)In 'Done' Page, you can see a request for donations from Volumio. It's depand on you. You can give them some help if you like this application. Gifts of roses, hand a fragrance.



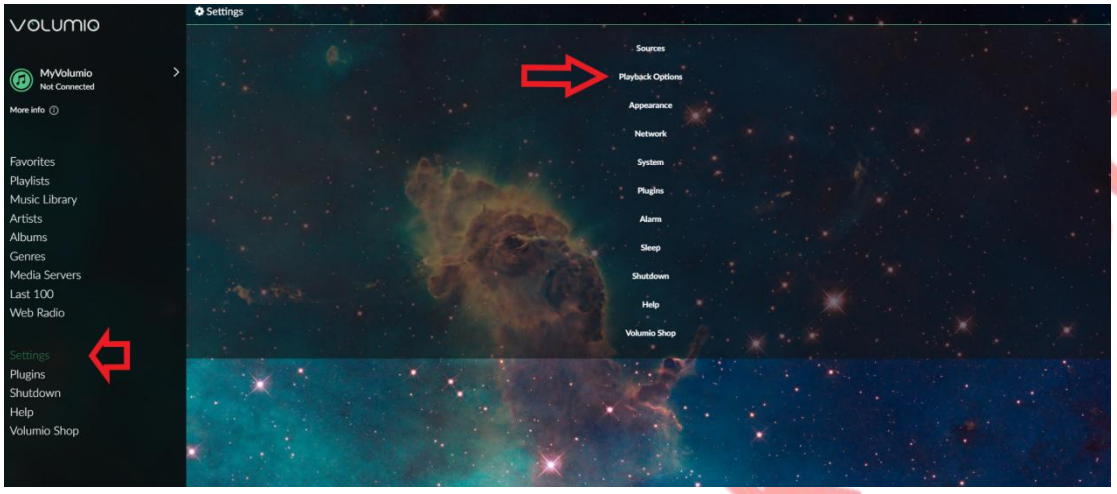
6)Click ‘Done’ to finish initialization of Volumio. And then restart Volumio.

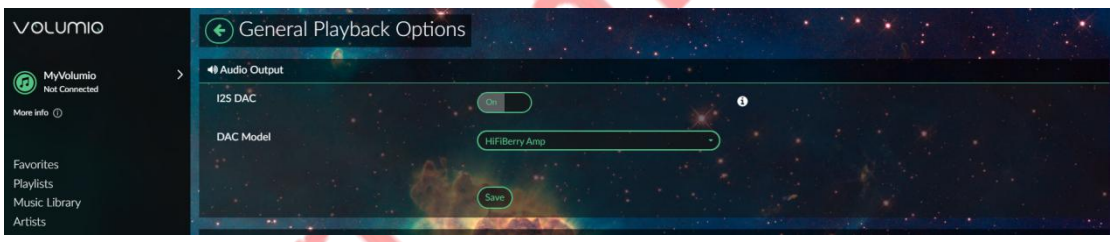


7)In this restart process, “Volumio” hotpot will turn off for a moment. Sometimes your mobile phone or Tablet or PC will automatic connect to other. You need to set back to ‘Volumio’ hotpot. After restart you can see the main page of Volumio.

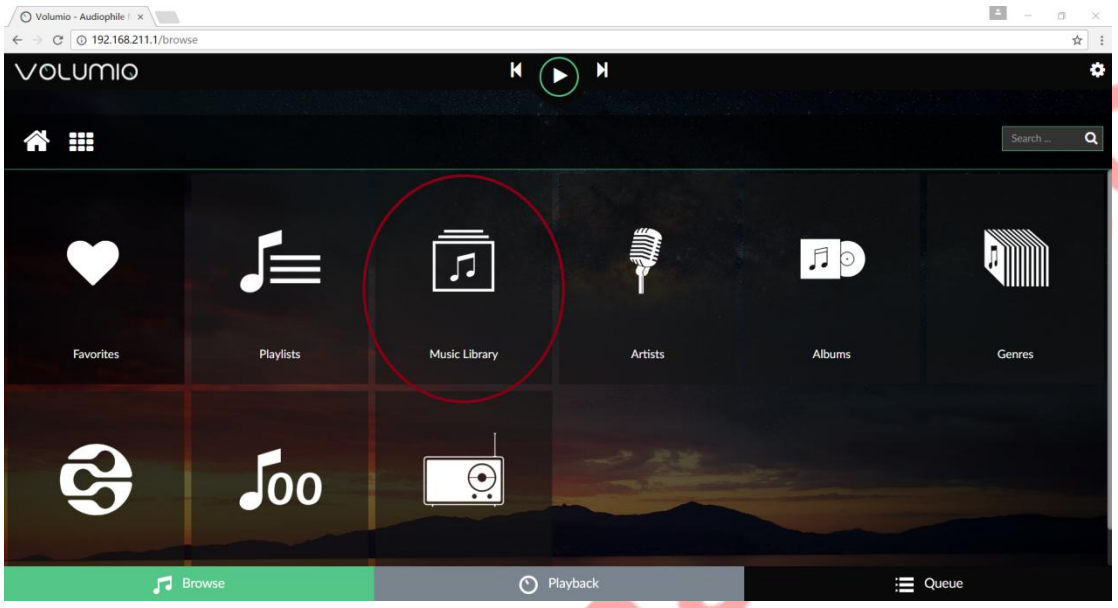


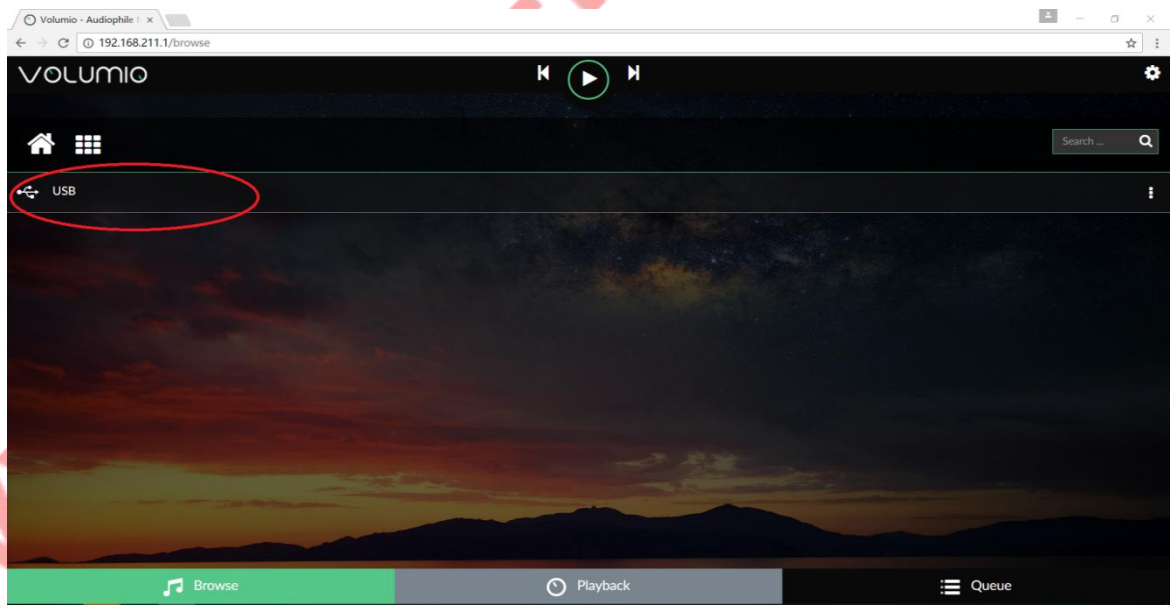
8)If you can't play music properly, please Click ‘Setting’ ➞ PLAYBACK OPTION, check the output setting as below picture. This is an essential step, otherwise you can't hear anything.





9)You can insert the USB Disk or mobile hard disk with your own audio file into Raspberry Pi USB connector, and find the music list of your USD disk in “Music Library”.

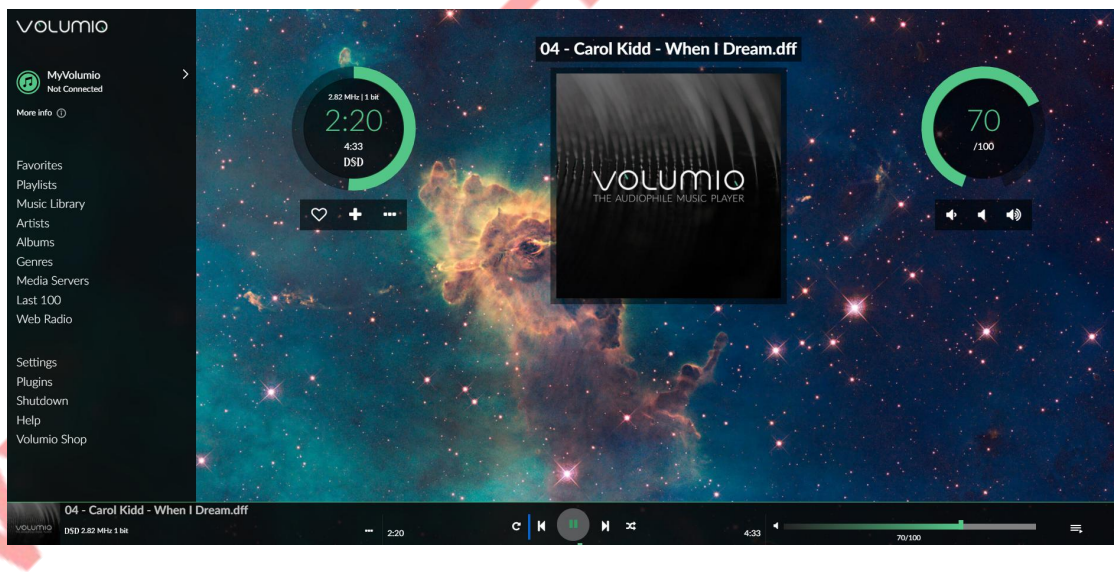




5.5 VOLUMIO Play DSD Music Files

DSD64, DSD128 AND DSD256 are now natively supported in direct DSD mode on Volumio.
For more DSD information please refer to Volumio link:
https://volumio.org/direct-dsd-support-volumio-dsd512/
Please set 'General Playback Options' mode as below picture:

Restart and enjoy DSD music.



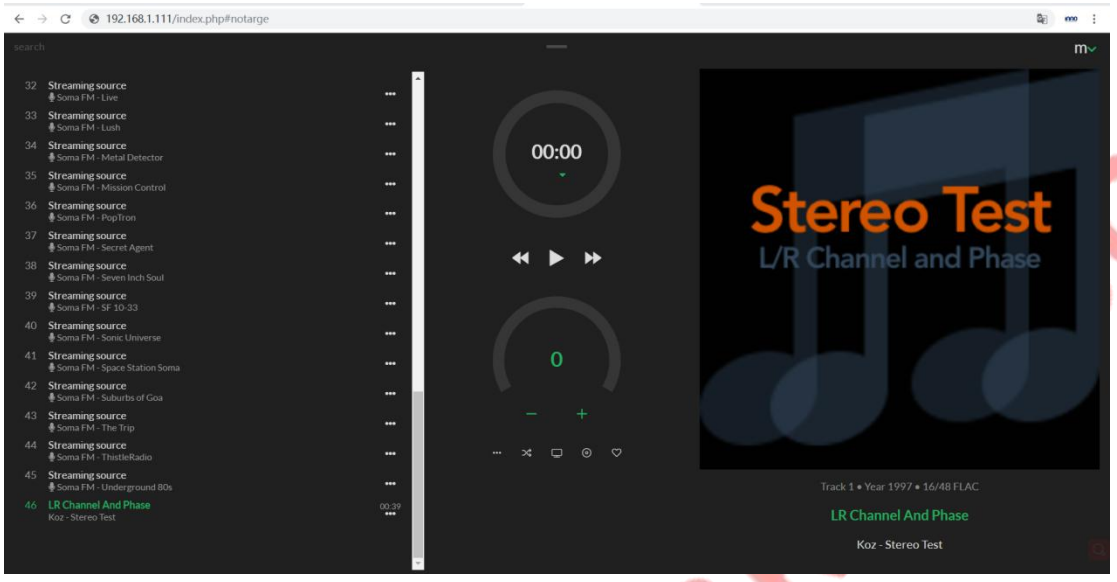
5.6 MoOde Setup

1)We just talk about the basics, for more Information please read the official user manual: https://github.com/moode-player/moode/blob/master/www/setup.txt

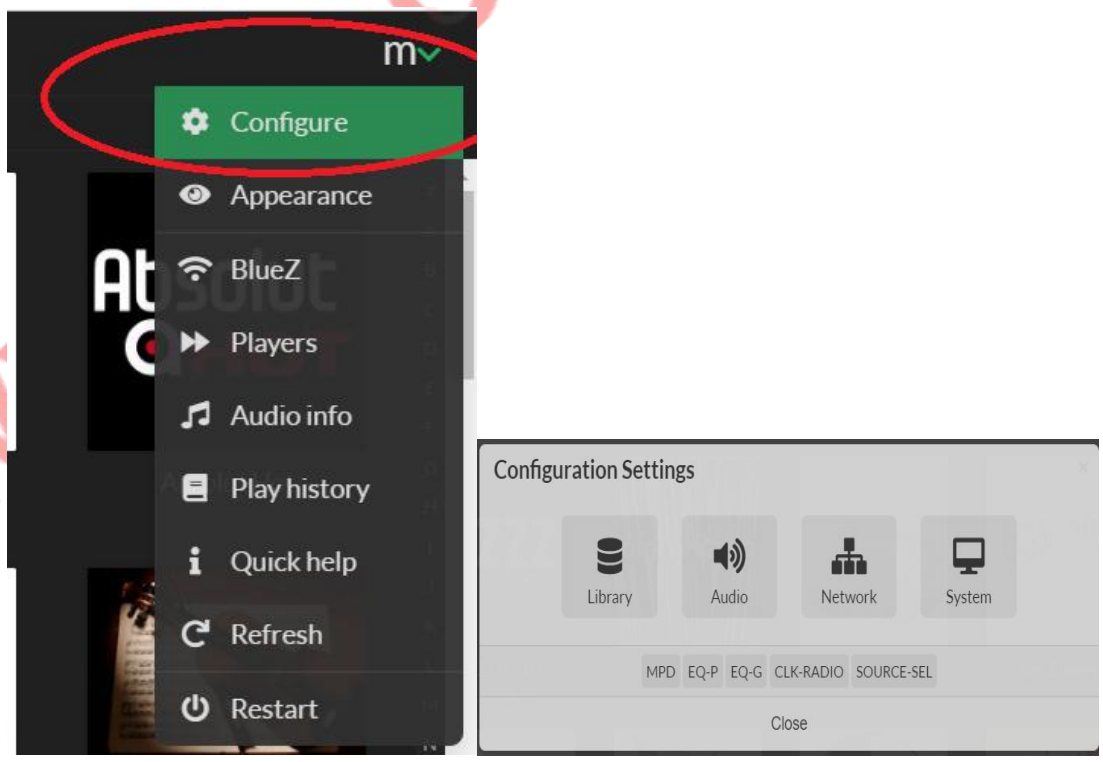
2) Insert the TF card with MoOde image into the Raspberry pi, and then connect to your router by LAN cable, Finally power on. Make sure your Raspberry Pi , Desktop (mobile phones, laptop, pad and so on) in the same local area network(LAN). Get the IP address of Raspberry PI through check up the router or use some IP checker tools.

3)You also use your device(mobile phones, laptop, pad and so on) to connect the hotspot of moode. Named: ‘Moode’, and Password is ‘moodeaudio’. Login page: http://172.24.1.1/

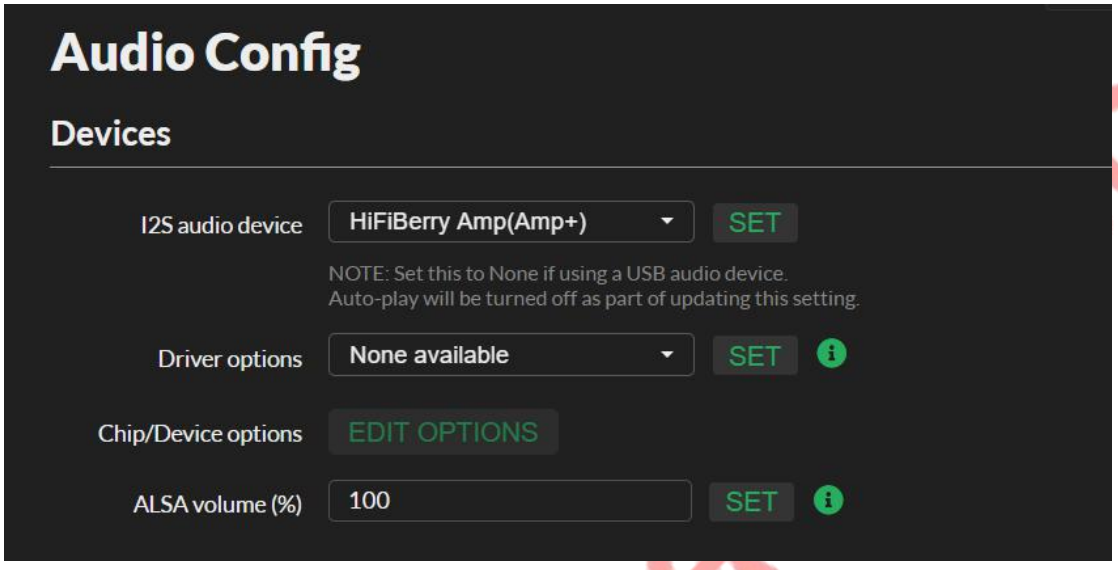
4) Connected the Raspberry Pi through browser. You get the display of Moode.

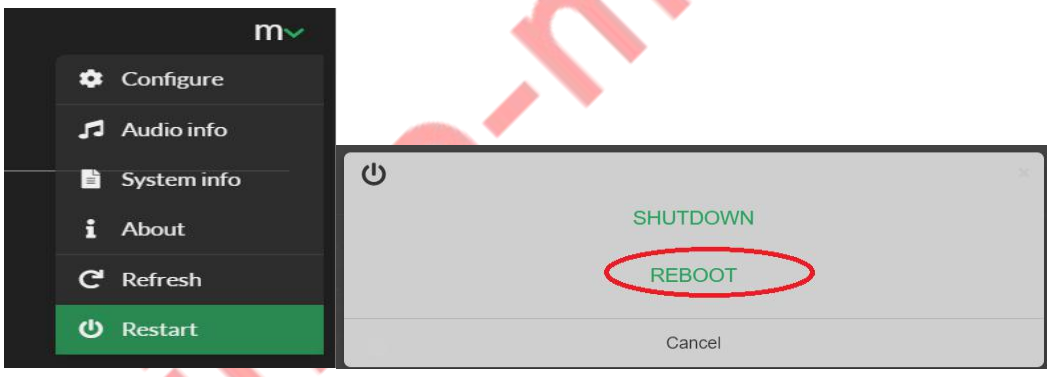


5)Click the icon in the upper righ for setting the system.

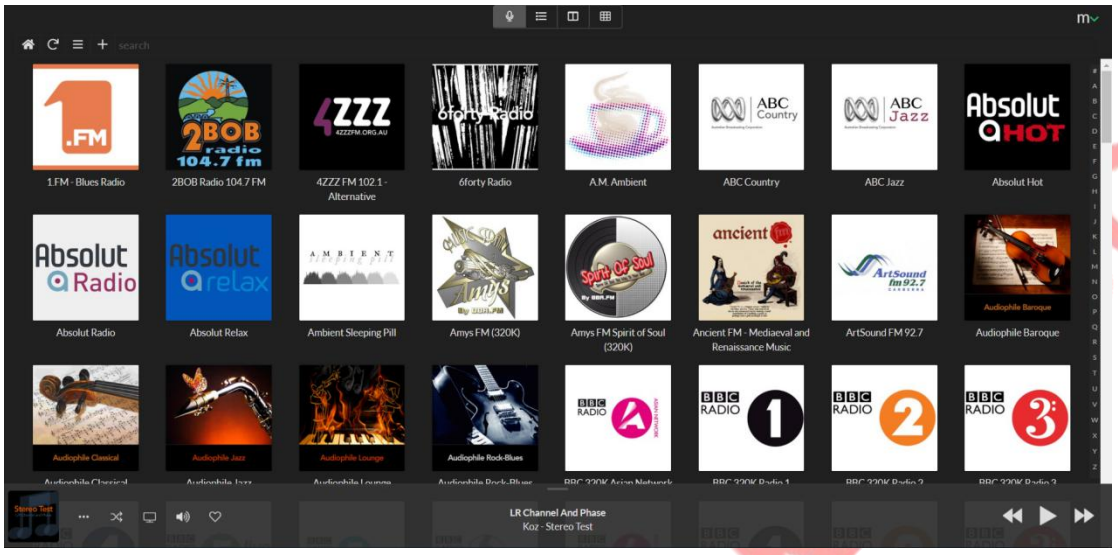


6) Click ‘Audio’, set as below and save and restart. This is an essential step, otherwise you can't hear anything.

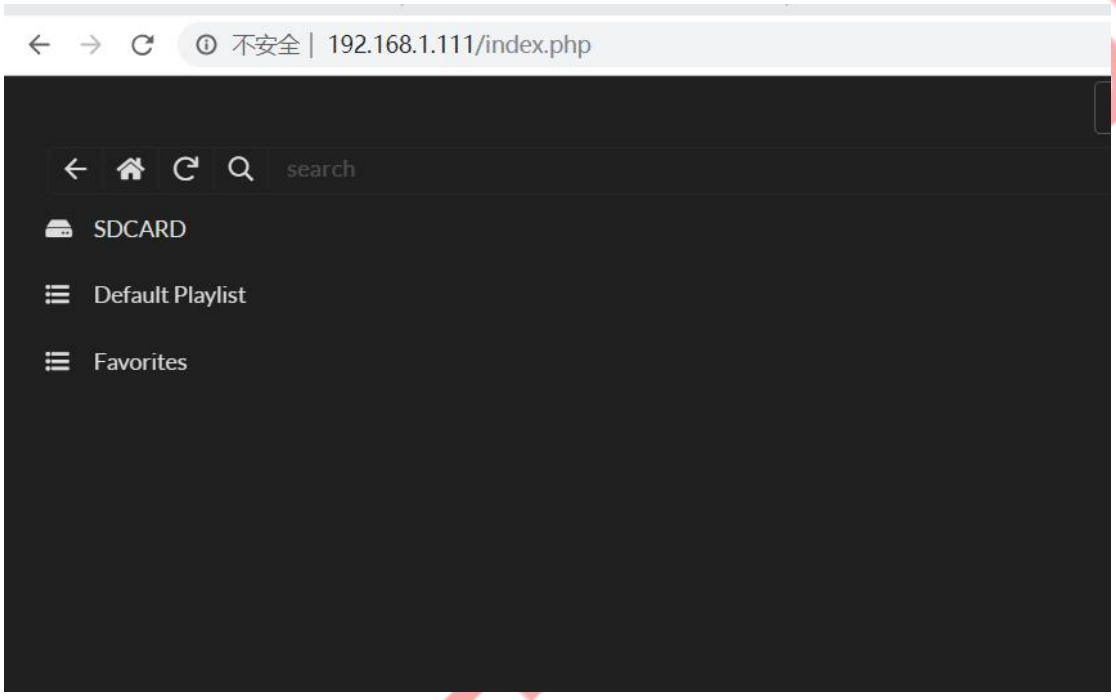


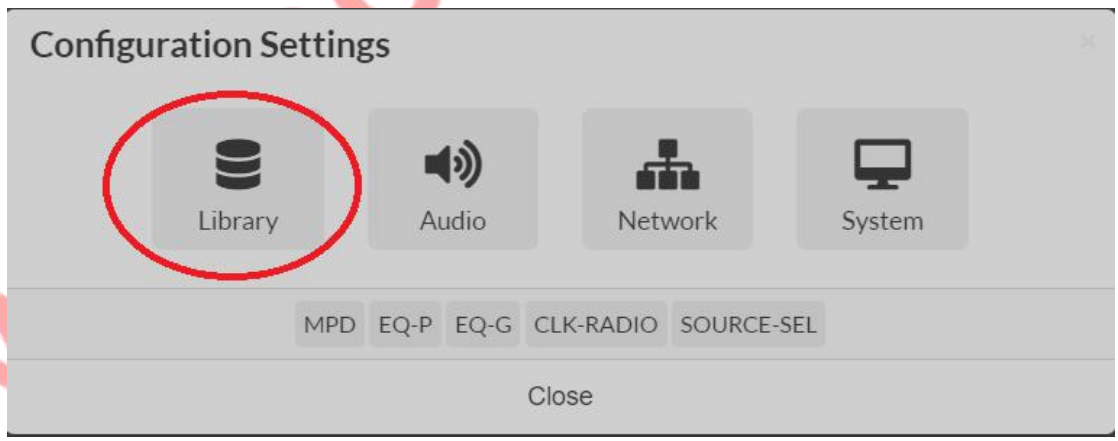


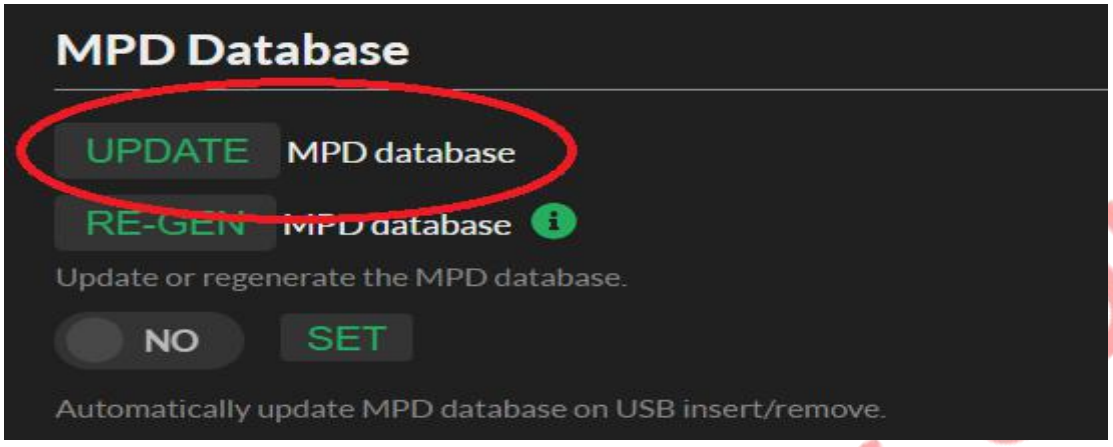
7)Now you can enjoy your music.

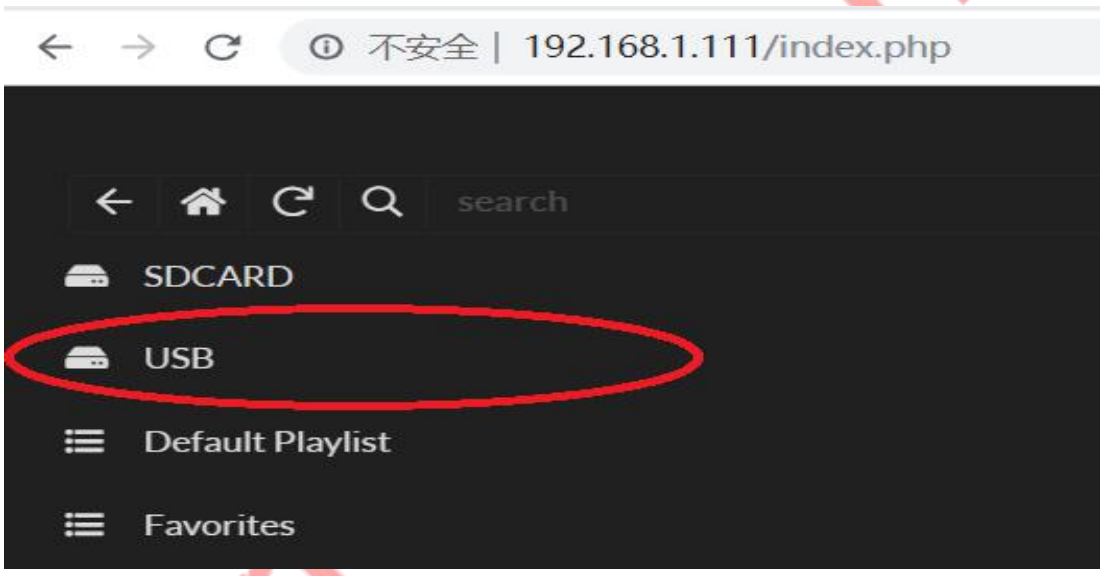


8)You can play music in the SD/MMC card, U disk which connected with Raspberry Pi. But Moode may not automatic update disk default, so you need to update by yourself follow these steps.



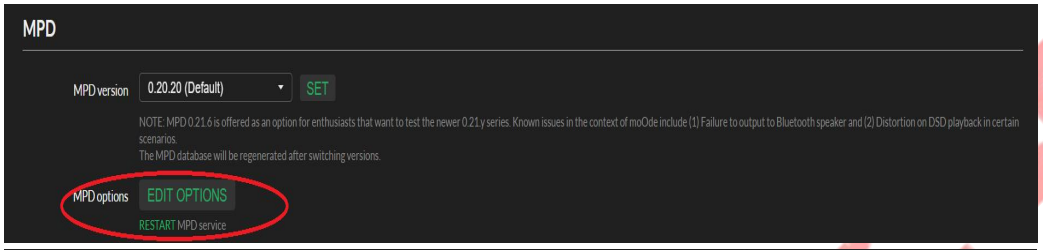


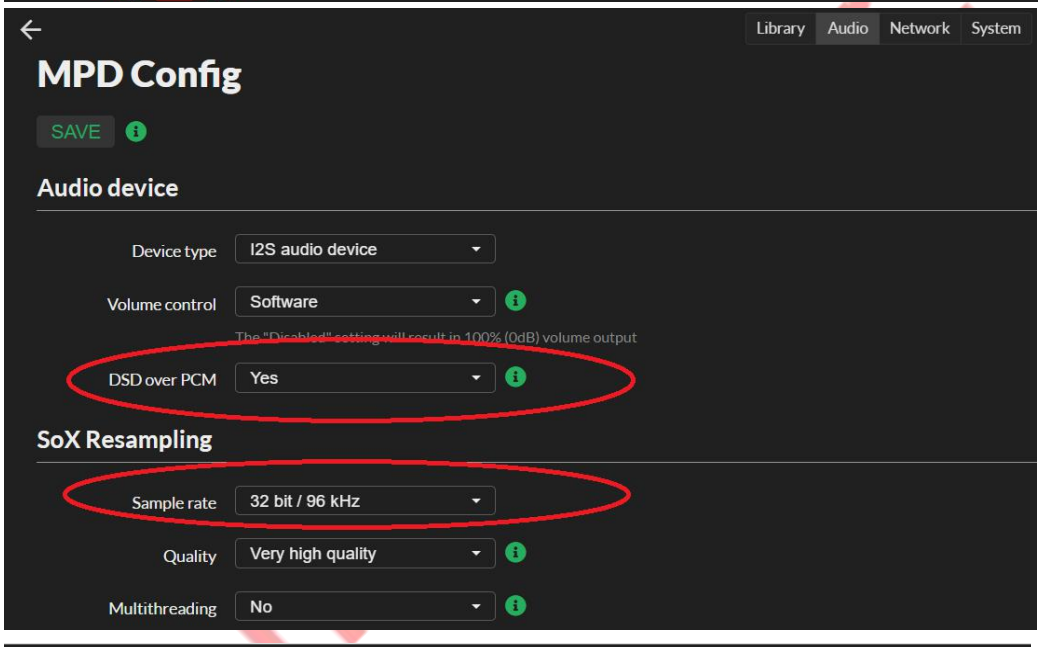

MPD Database
UPDATE MPD database
RE-GEN MPD database
Update or regenerate the MPD database.
NO
SET
Automatically update MPD database on USB insert/remove.

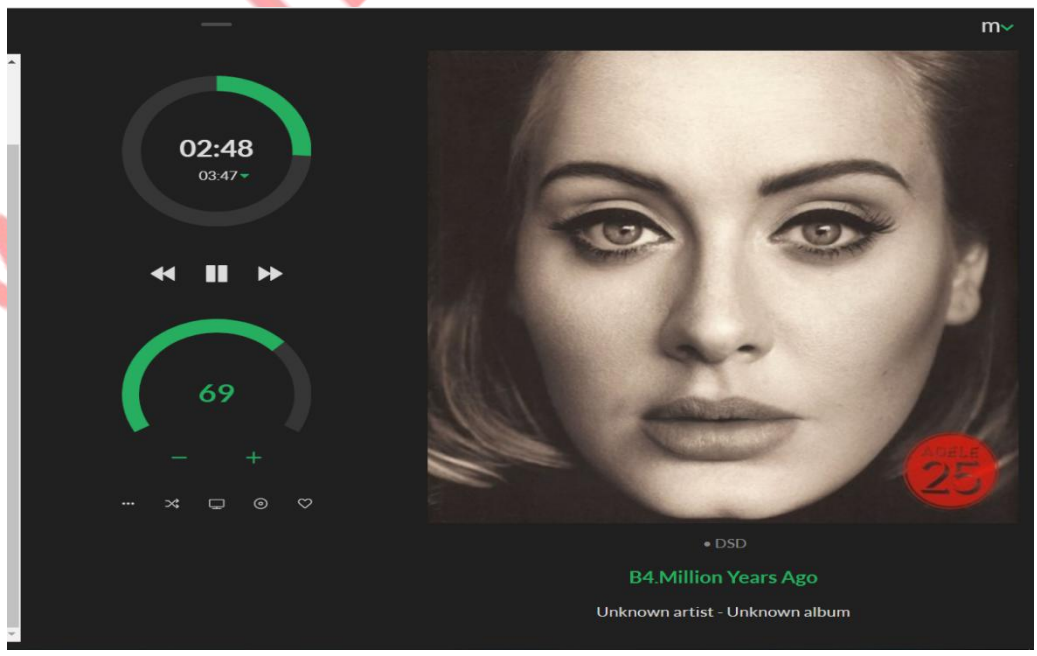

不安全 | 192.168.1.111/index.php
search
SDCARD
USB
Default Playlist
Favorites

5.7 MoOde Play DSD Music Files

Moode is very excellent in play DSD music files.If you want toplay DSD music. In MPD settings, you need to set ”DSD over PCM’ to ‘YES’, and then it’s very important to select the proper Sox resampling rate. Otherwise It dosen’t work well for play DSD music.

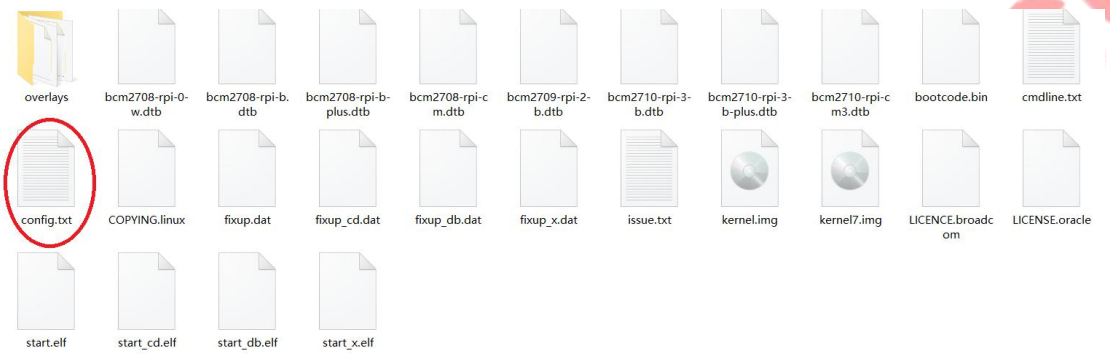






5.8 Raspbian Setup

1)After load the image onto TF card, Open TF disk directory and Find the file named **config.txt.**For more information about this file please refer to :https://www.raspberrypi.org/documentation/configuration/config-txt/



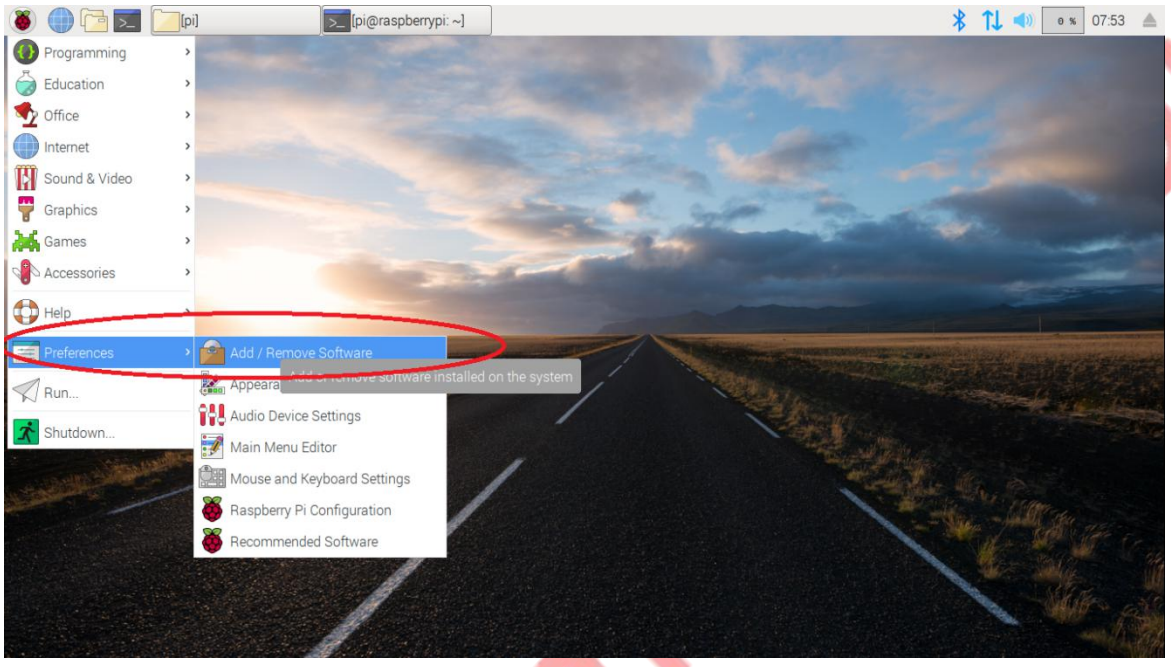
2)Append the following lines to the end of the file,enable the audio module.Notice the format Otherwise it doesn't work.

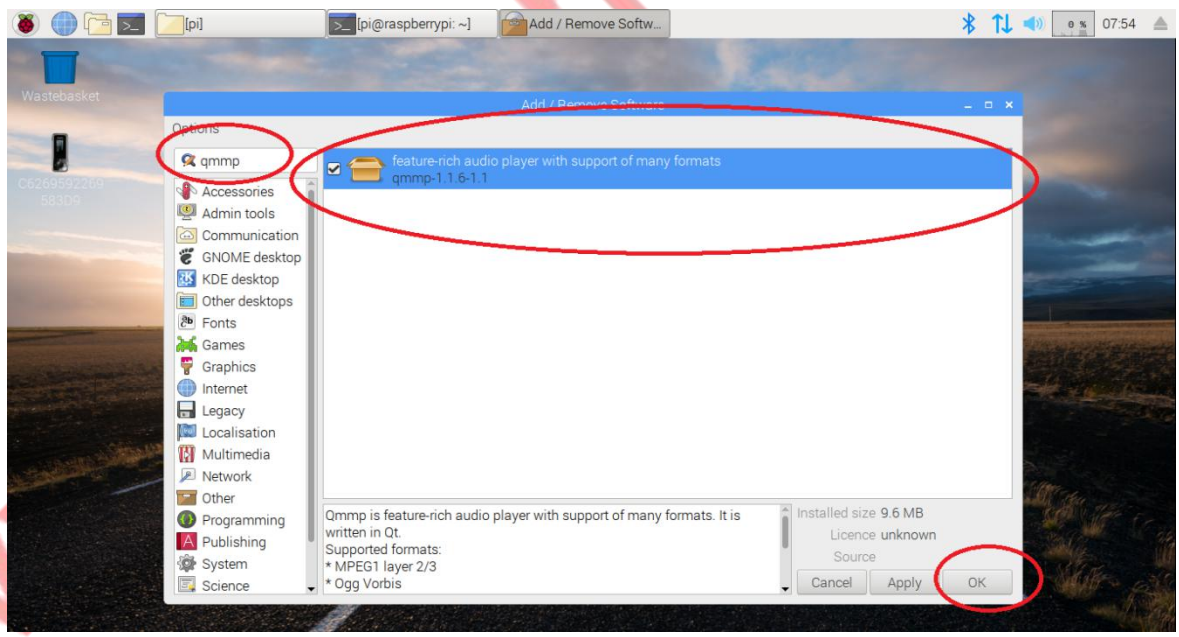
```
dtoverlay=hifiberry-amp
```

```
# Uncomment this to enable the lirc-rpi module
#dtoverlay=lirc-rpi

# Additional overlays and parameters are documented /boot/overlays/README

# Enable audio (loads snd_bcm2835)
dtparam=audio=on

dtoverlay=hifiberry-amp
```

3)Insert the TF card with volumio image into the Raspberry pi then power on. Default user name is **pi**, and password is **raspberry**;

4)After login, Install the qmmp music player. Before that please make sure your raspberry already connected to the internet.



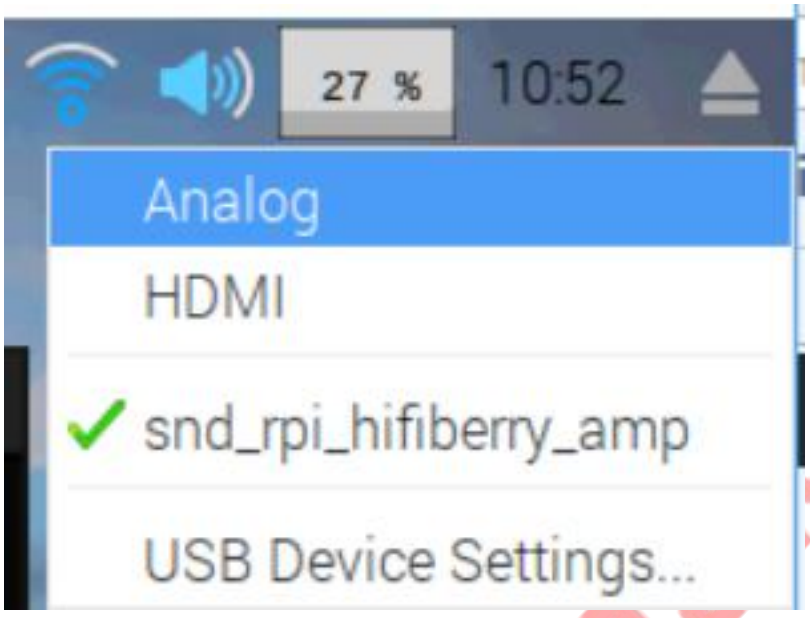


5)You can also install it by below command to setup qmmp.

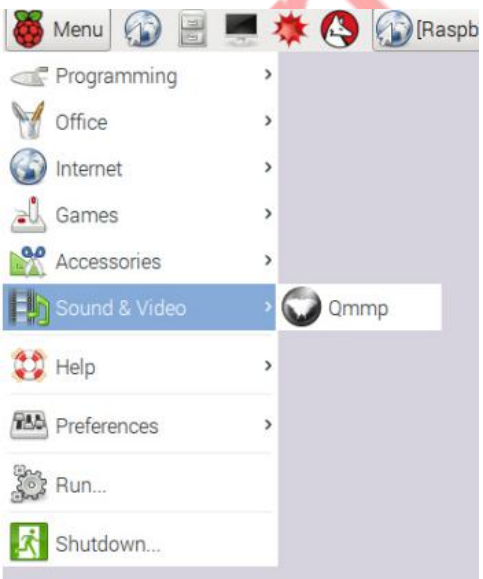
```
sudo apt-get install qmmp.
```

6)Right click the sound icon on the top right corner, set the raspberry pi audio output as Below.

This is an essential step, otherwise you can't hear anything.



7)After the installation is,we can find the player under the menu bar. You can Install other linux music player as same step. Such as Rhythmbox, Amarok,VLC,Cmus and so on.



5.9 Raspbian Lite Setup

1) Modify the config.txt

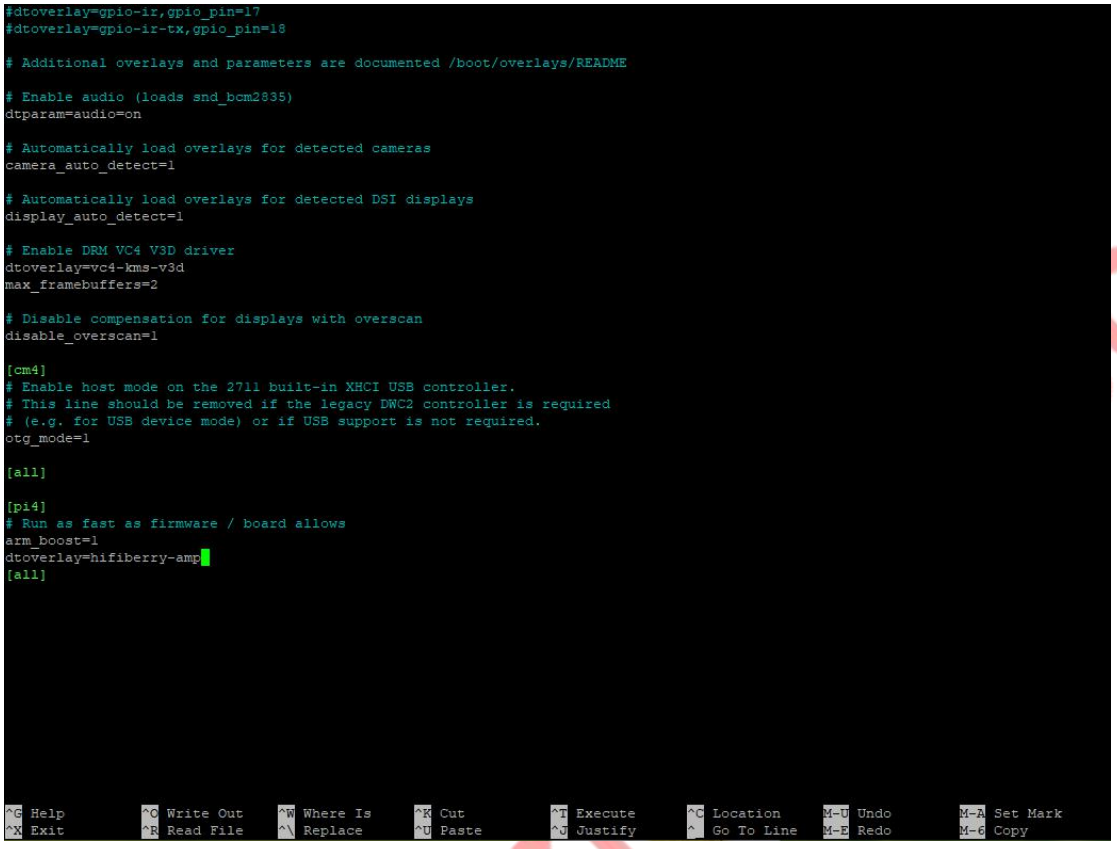
Open the config.txt in system.

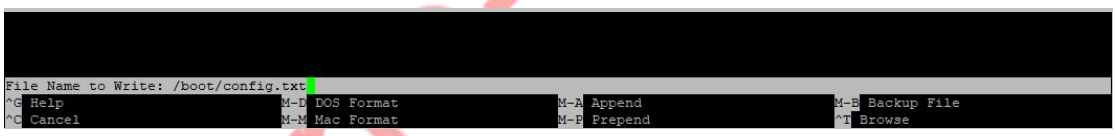
```
sudo nano /boot/config.txt
```

```
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Fri Nov 12 10:15:35 2021 from 192.168.0.124

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set
 a new password.

pi@raspberrypi:~ $ sudo nano /boot/config.txt
```

Append the following lines to the end of the file,enable the audio module.Draw attention to the format , Otherwise it doesn't work. press "ctrl+o" and press "Enter" to save the file. Reboot the system.

```
dtoverlay=hifiberry-amp
```





2)Check the AMP module

Type in the commands that are shown below. You can see the , the **3** is the AMP device number.

```
aplay -l
cat /proc/asound/cards
```

```
pi@raspberrypi:~ $ aplay -l
**** List of PLAYBACK Hardware Devices ****
card 0: Headphones [bcm2835 Headphones], device 0: bcm2835 Headphones [bcm2835 H
eadphones]
  Subdevices: 8/8
  Subdevice #0: subdevice #0
  Subdevice #1: subdevice #1
  Subdevice #2: subdevice #2
  Subdevice #3: subdevice #3
  Subdevice #4: subdevice #4
  Subdevice #5: subdevice #5
  Subdevice #6: subdevice #6
  Subdevice #7: subdevice #7
card 1: vc4hdmi0 [vc4-hdmi-0], device 0: MAI PCM i2s-hifi-0 [MAI PCM i2s-hifi-0]
  Subdevices: 1/1
  Subdevice #0: subdevice #0
card 2: vc4hdmi1 [vc4-hdmi-1], device 0: MAI PCM i2s-hifi-0 [MAI PCM i2s-hifi-0]
  Subdevices: 1/1
  Subdevice #0: subdevice #0
card 3: sndrpihifiberry [snd_rpi_hifiberry_amp], device 0: HifiBerry AMP HiFi ta
s5713.1-001b-0 [HifiBerry AMP HiFi tas5713.1-001b-0]
  Subdevices: 1/1
  Subdevice #0: subdevice #0
```

```
pi@raspberrypi:~ $ cat /proc/asound/cards
 0 [Headphones     ]: bcm2835_headpho - bcm2835 Headphones
                      bcm2835 Headphones
 1 [vc4hdmi0       ]: vc4-hdmi - vc4-hdmi-0
                      vc4-hdmi-0
 2 [vc4hdmi1       ]: vc4-hdmi - vc4-hdmi-1
                      vc4-hdmi-1
 3 [sndrpihifiberry]: RPi-simple - snd_rpi_hifiberry_amp
                      snd_rpi_hifiberry_amp
```

3) Set as default sound card.

Create /etc/asound.conf

sudo nano /etc/asound.conf

```
pi@raspberrypi:~ $ sudo nano /etc/asound.conf
```

Type in the following content and then press "ctrl+o" and press "Enter" to save the file. Reboot again. 3 is the DAC module device number.

4) Alsamixer

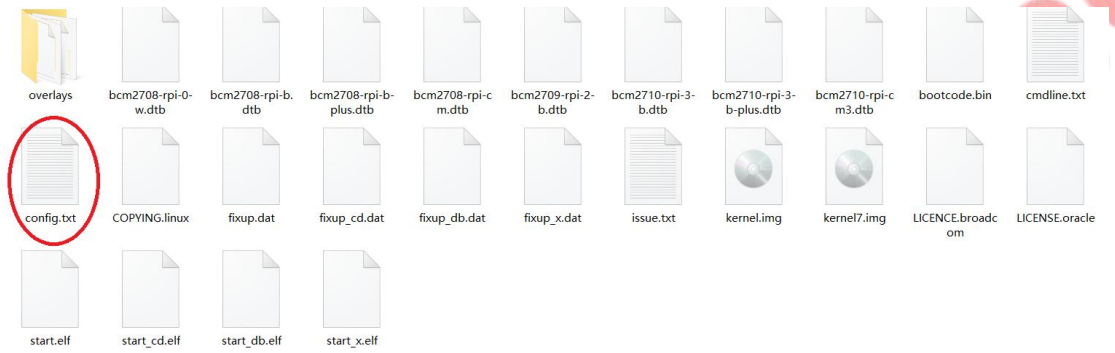
Type in the commands that are shown below, you can see the alsamixer tool.

```
alsamixer
```

5.10 LibreELEC Setup

1) Modify the config.txt

After load the LibreELEC image into the TF card, Open TF disk directory on your computer and check the file named config.txt. For more information about this file please refer to : https://www.raspberrypi.org/documentation/configuration/config-txt/

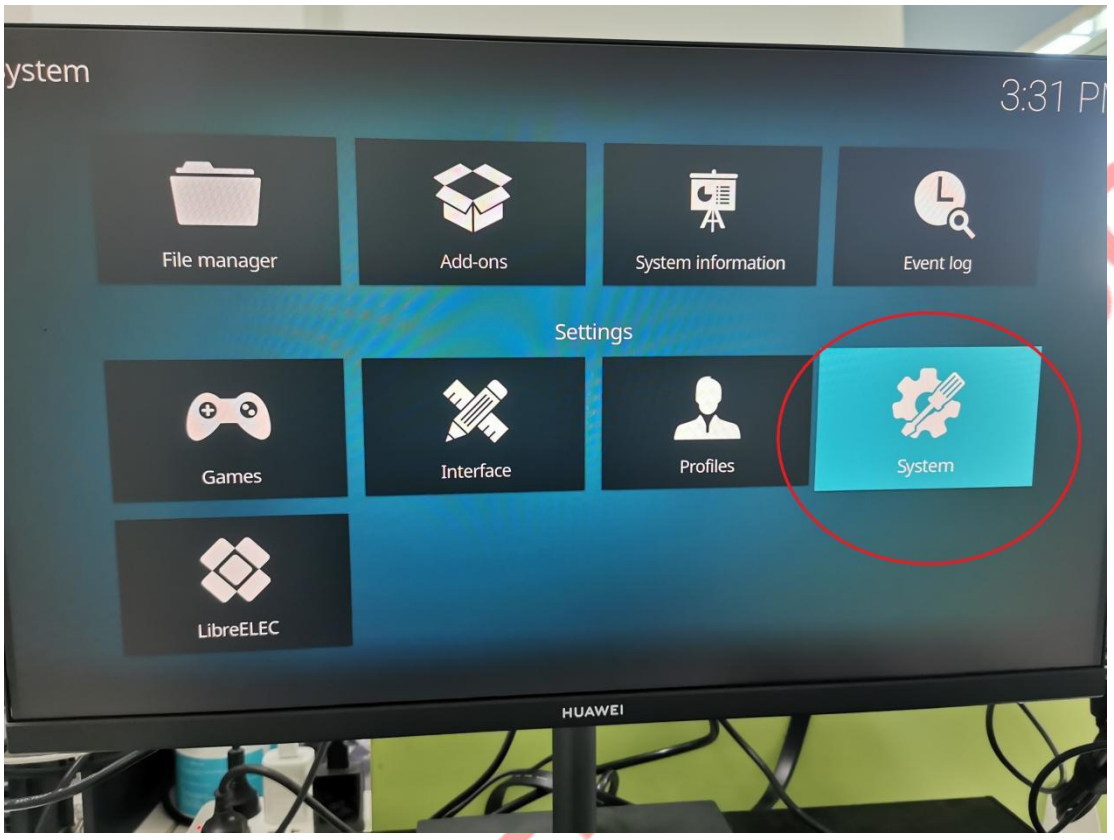


Append the following lines to the end of the file,enable the audio module.Draw attention to the format , Otherwise it doesn't work.

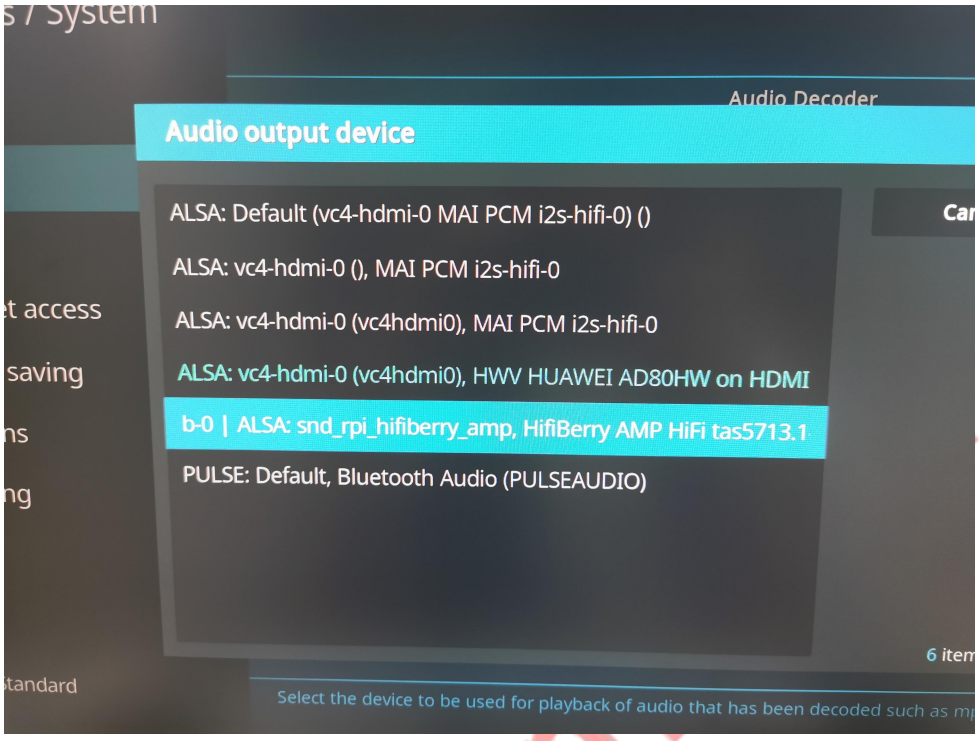
```
dtoverlay=hifiberry-amp
```

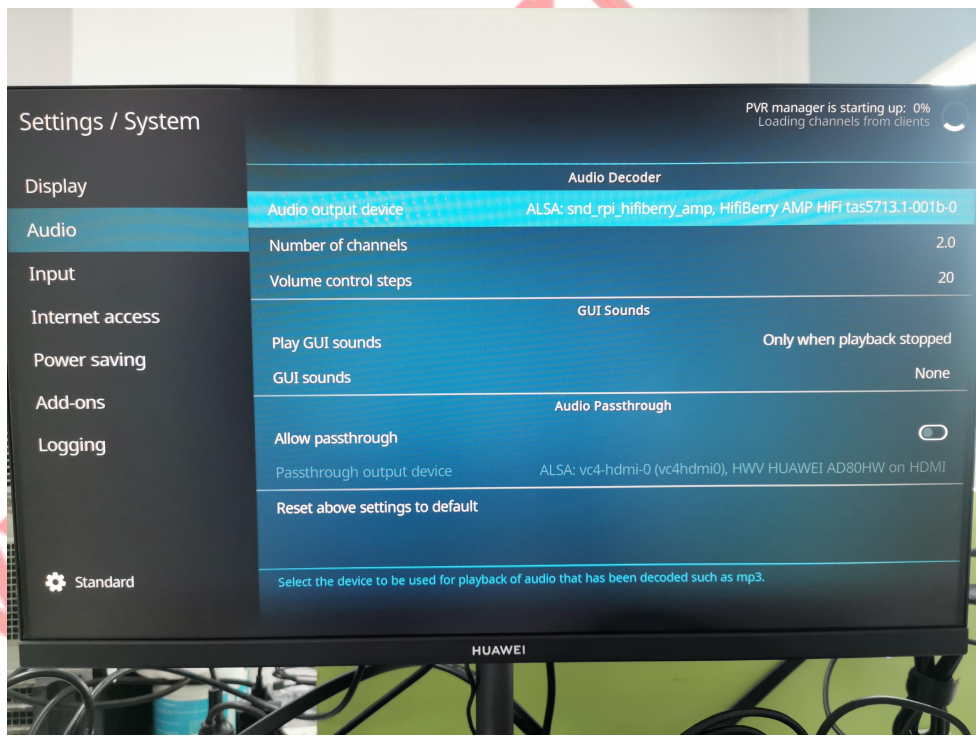
```
################################################################################
# Include distribution specific config file if it exists.
################################################################################
[all]
include distroconfig.txt

# uncomment to enable infrared remote recevier connected to GPIO 18
#dtoverlay=gpio-ir,gpio_pin=18
dtoverlay=hifiberry-amp
```

2)Open the system page on LibreELEC



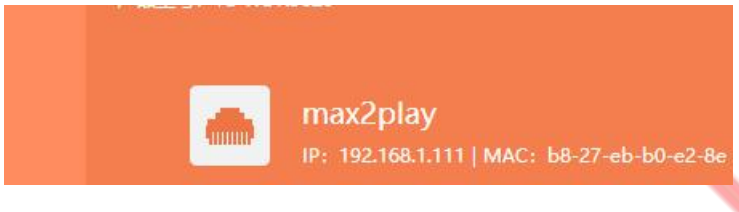
3) Set the Audio output device as AMP HIFI.



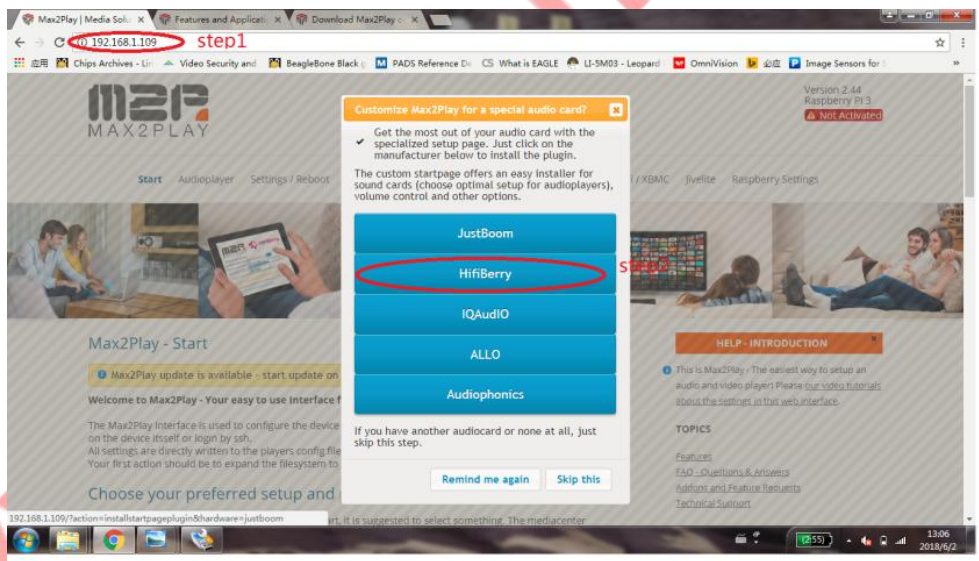


5.11 For Max2player

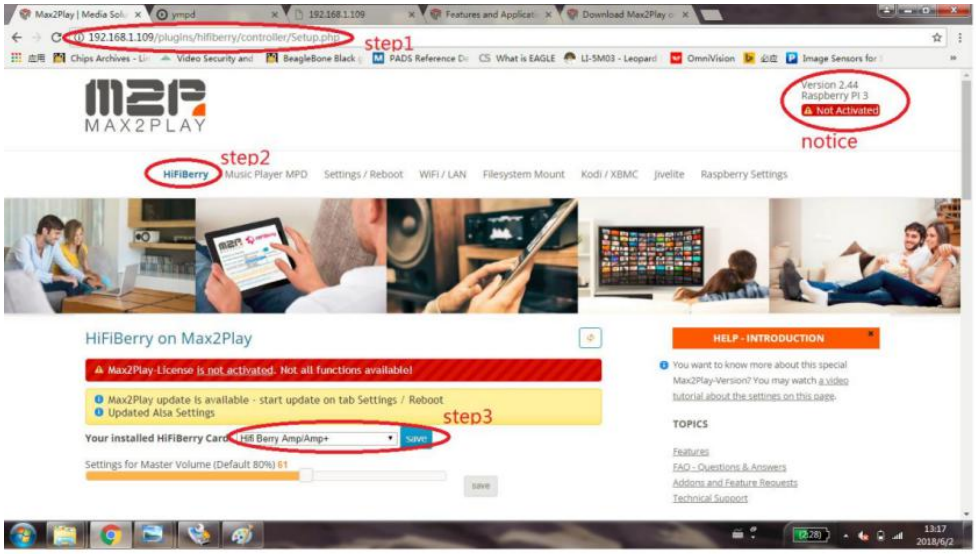
1) Insert the TF card with Max2player image into the Raspberry pi, and then connect to your router by LAN cable, Finally power on. Make sure your Raspberry Pi , Desktop (mobile phones, laptop, pad and so on) are in the same local area network(LAN). Get the IP address of Raspberry PI through check up the router or use some IP checker tools.



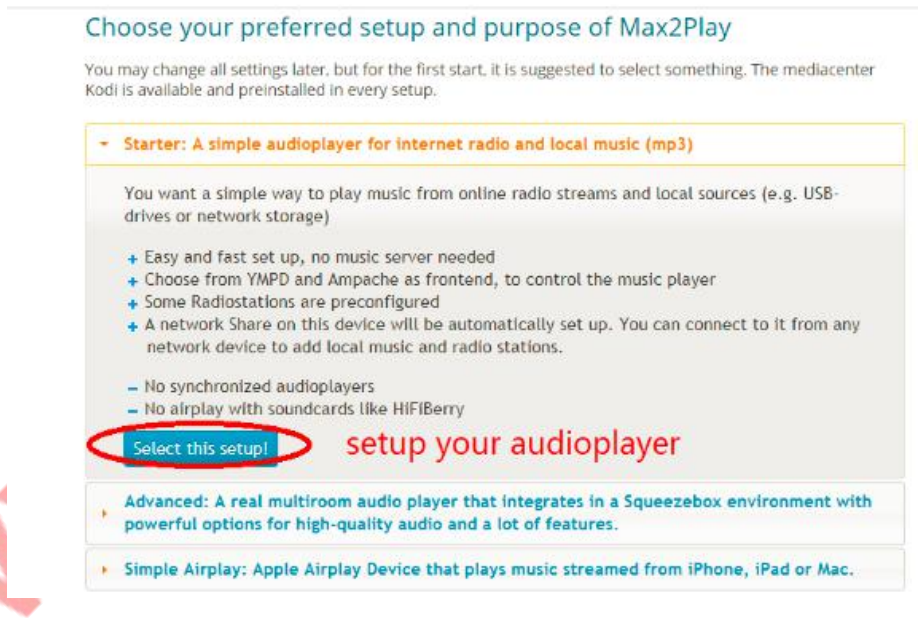
2) Choose the Card option as HifiBerry.

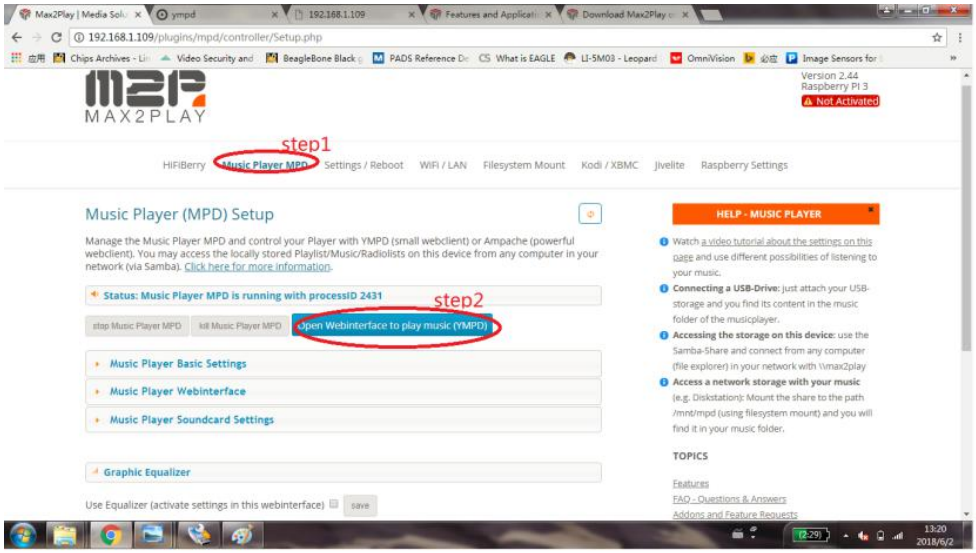


3) setup the audio card type as below, then save and reboot the system.

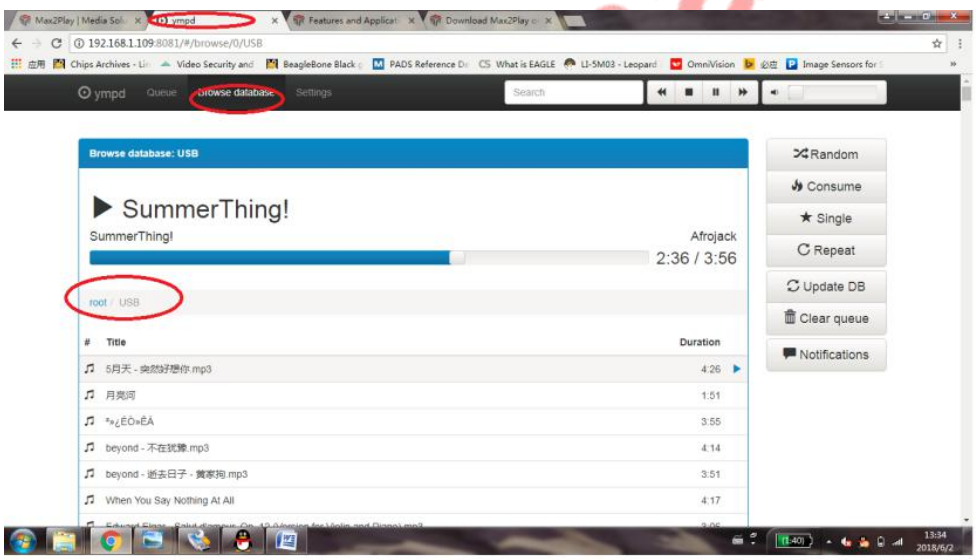


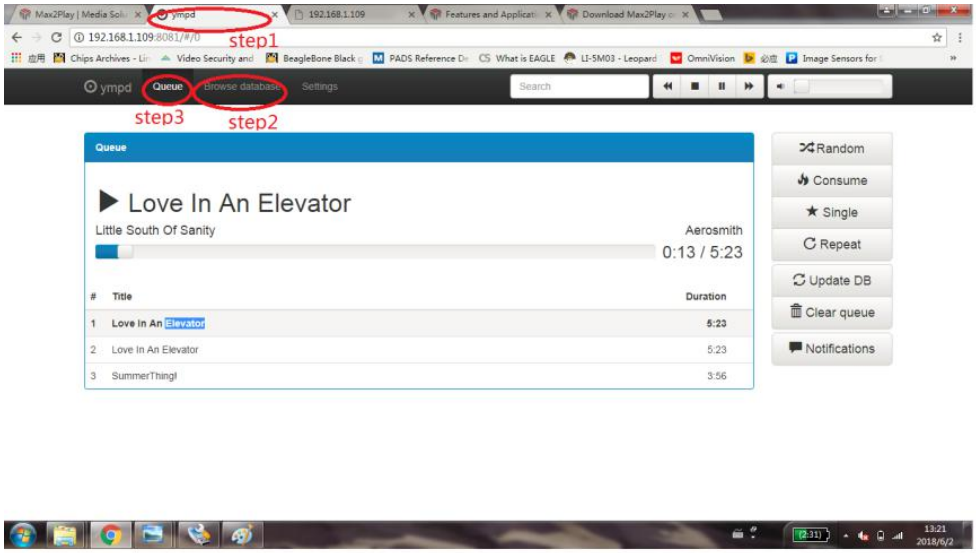
4) Setup your audio player.



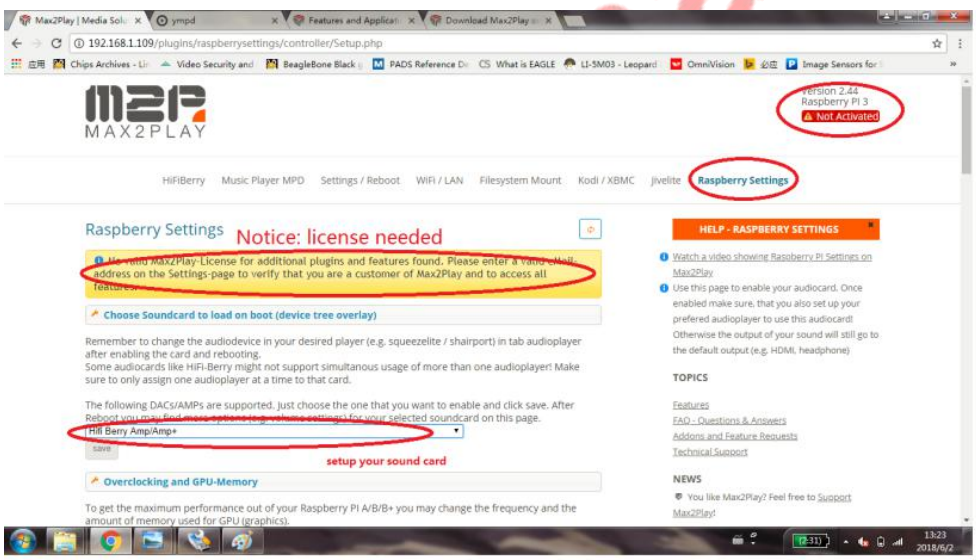

step1
step2
Music Player (MPD) Setup
Open Webinterface to play music (YMPD)

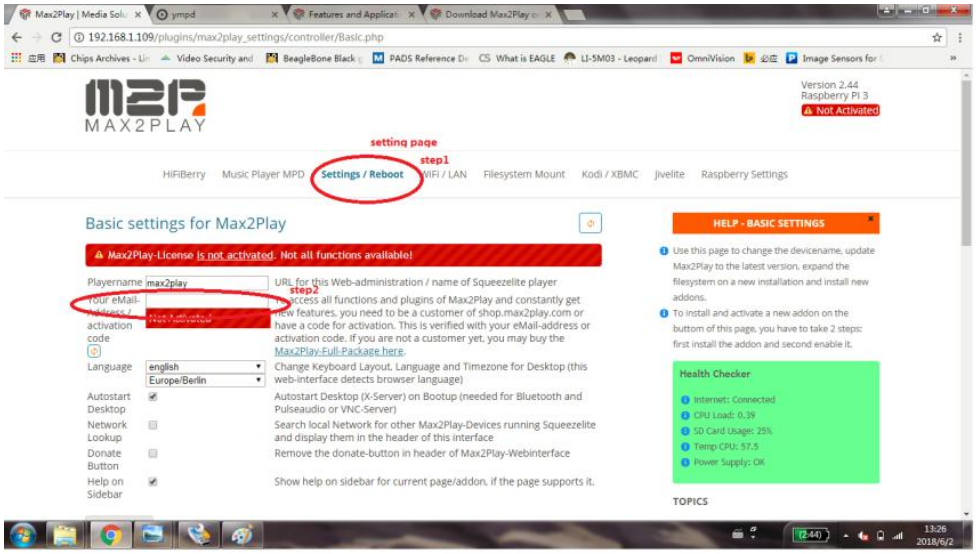
5) Add music


Browse database: USB
SummerThing!
Random
Consume
Single
Repeat
Update DB
Clear queue
Notifications



6) Enjoy. By default Max2play License is not activated . not all functions available!





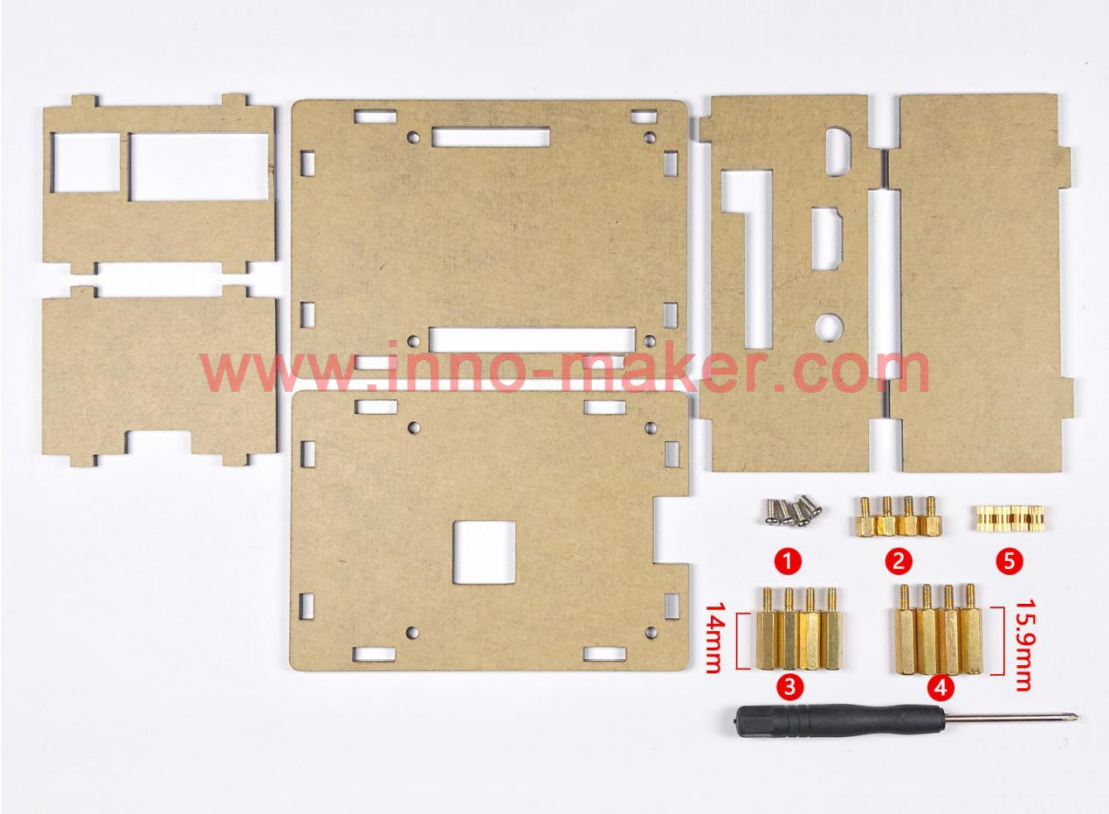
6. HIFI AMP Case Assembly

We provide case as an optional accessory if interested.

5.1 Unpack it.

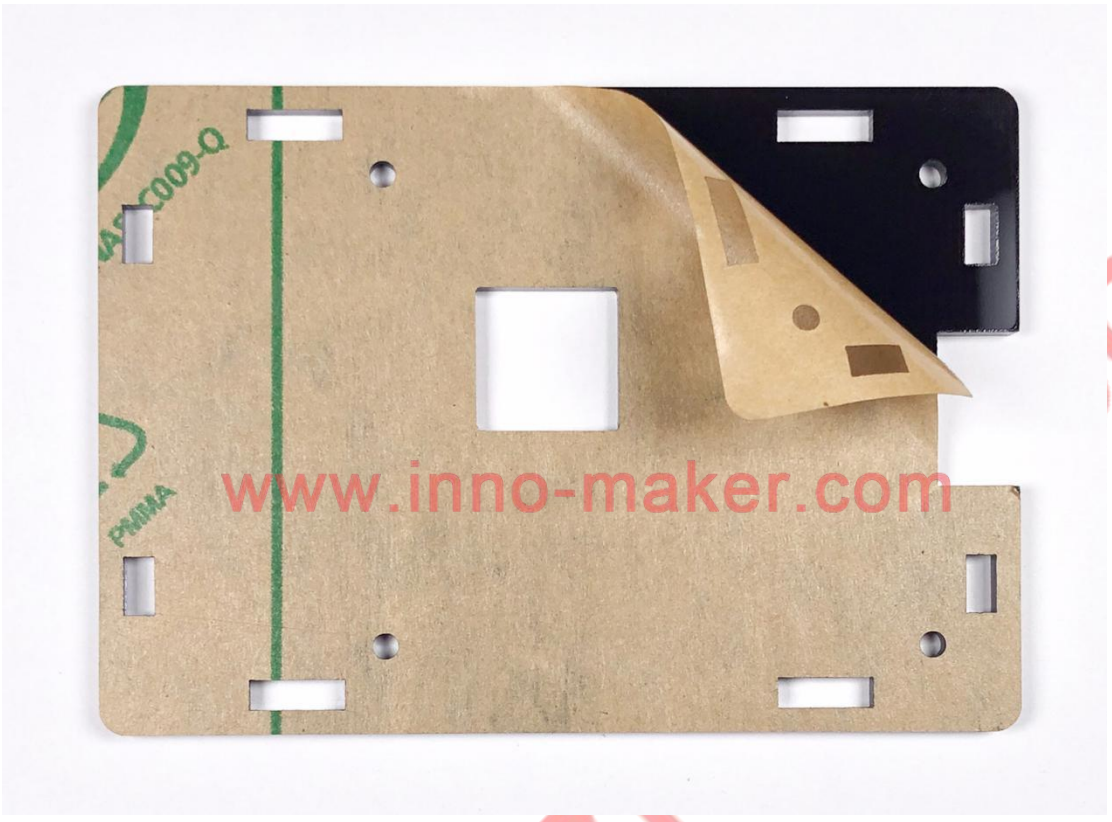
Package contain :

1. 6 pcs acrylic plate
2. 5 groups of screw
3. 1 screwdriver

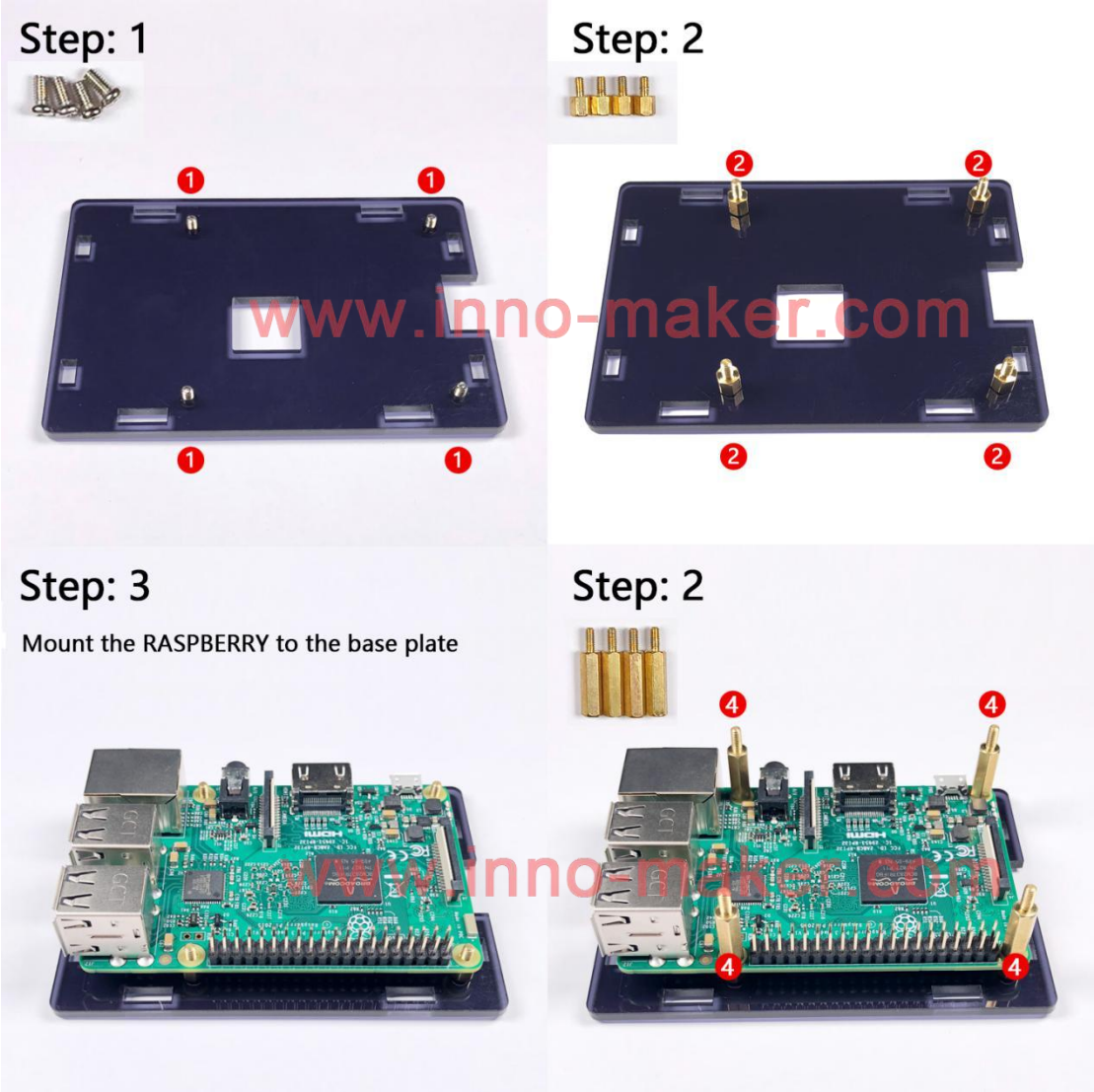


5.2 Peel the protection film

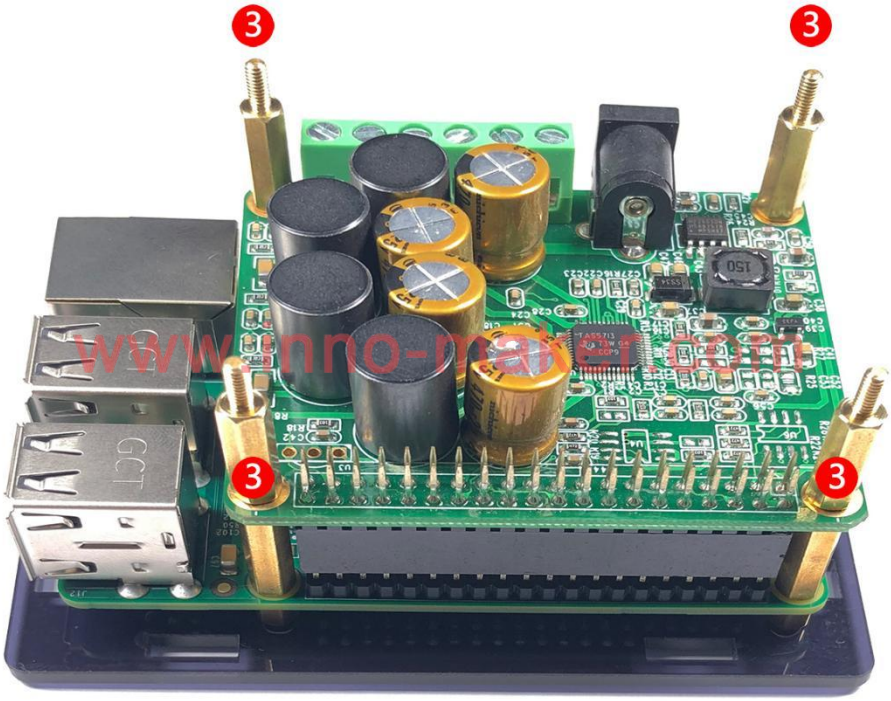
There is a protection film on both sides of all acrylic plate. You need to peel it off before assembling the case.



5.3 Mount the RASPBERRY to the base plate.Please pay attention to the groud number.

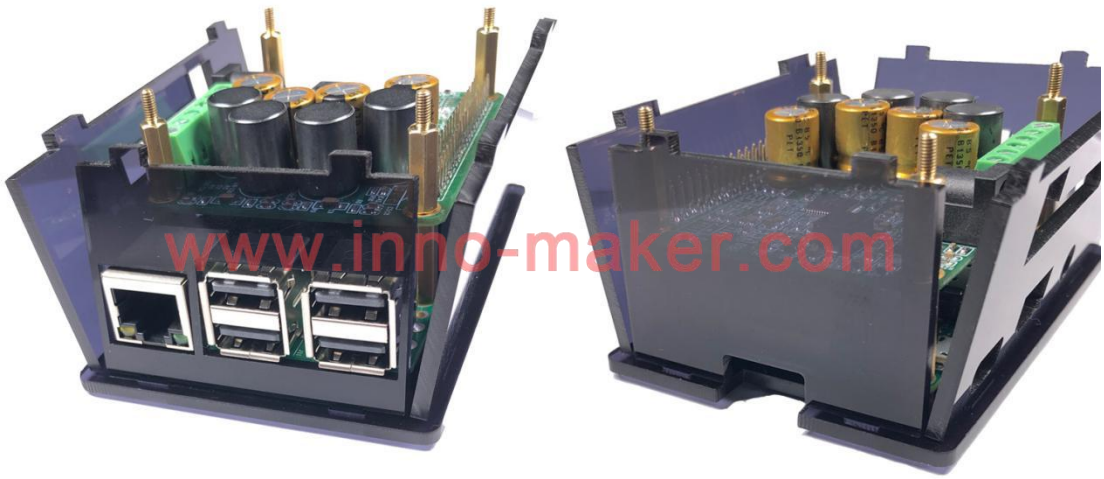


5.4 Plug the AMP module into the 40 pin GPIO head.



5.5 Add two long side plates.

5.6 Add two short side plates.



5.7 Add top plate and screw down.