Installation Instruction

Please note- The firmware only works with the ESP32S3 Lilygo t-displayS3 Touch.

Here are some links to related videos on YouTube.

https://youtu.be/HgioXrjpPSk?feature=shared

https://youtu.be/gyk2eq8ZymM?feature=shared

https://www.youtube.com/watch?v=cFctgusRfhY

Here is a link to the Espressif Flash Download Tools required for uploading the firmware:

https://www.espressif.com/en/support/download/other-tools

To upload the firmware please follow the following steps:

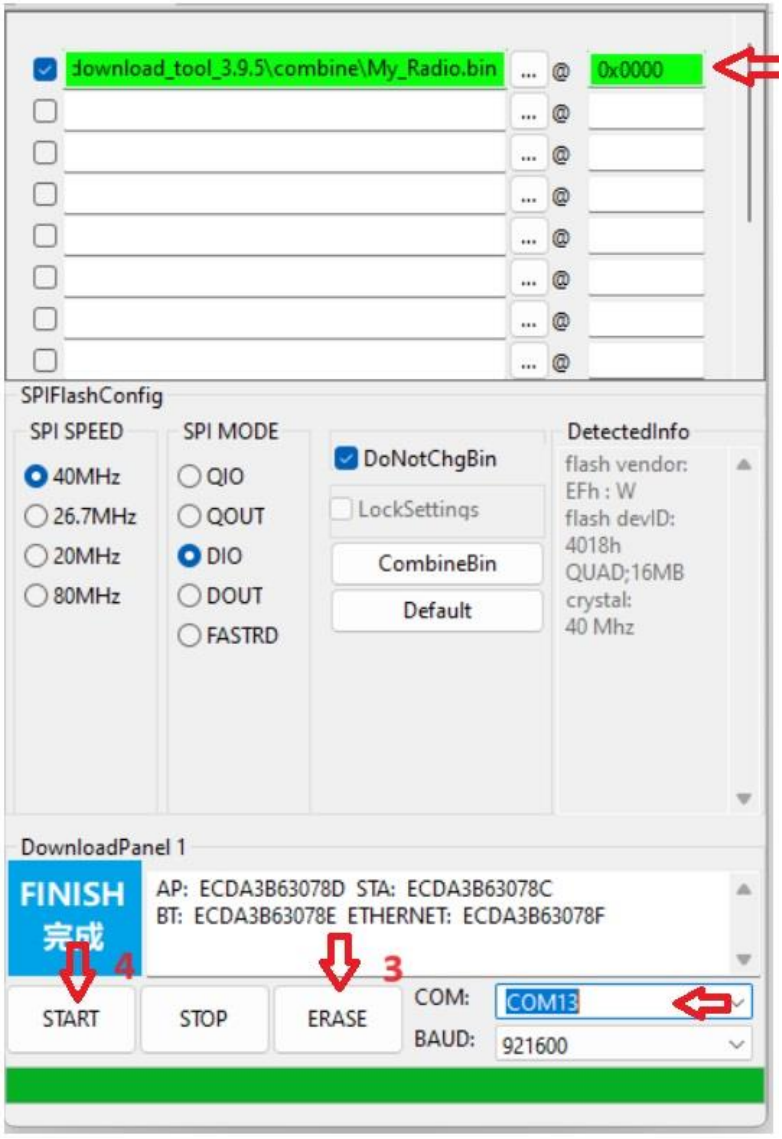
1. Download the Espressif Flash Tool or alternatively use the online tool https://espressif.github.io/esptool-js/
2. Choose Chip Type: ESP32-S3, WorkMode Develop and LoadMode USB
3. Press the tree dots to select the files as follows:

My_Radio.bin 0x0000

Make sure that all the lines are marked green. If not green use the check mark on the left side.

Here is a screenshot of the flash tool:

Make sure to select the right com port (located at the right bottom side)

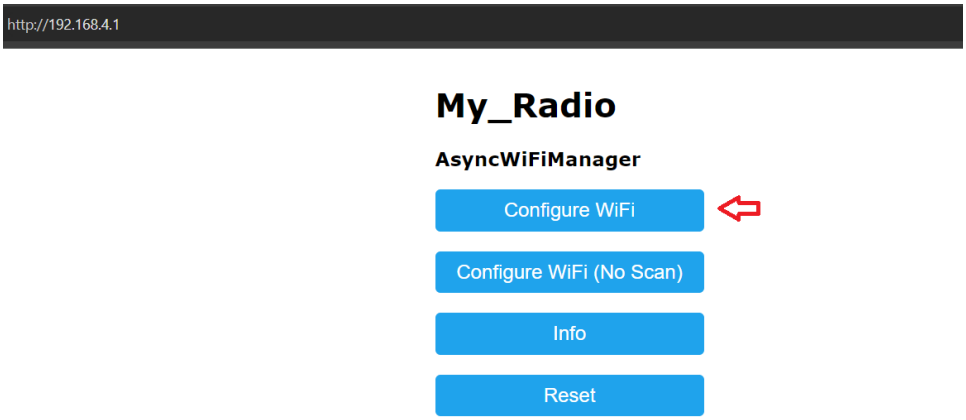


It is recommended to press first on Erase to clean the memory (not mandatory).

To upload the firmware, press the start button for uploading the firmware.

One time connecting process:

1. After successful upload press the reset button on the ESP32 or disconnect the USB cable and reconnect it.
2. Wait for around 3 min until network scanning is completed.
3. Open the Wi-Fi settings in your phone or computer browser and search for My_Radio network.
4. Go to the following address **192.168.4.1.**



5. Press "Configure Wi-Fi", Find your network and connect to that network using your internet password and press the "Save" button. This will connect the radio permanently to your home network.
6. Press the reset button of the ESP32 controller and wait until the Spiff file system formatting is completed (you will get a message on the LCD Screen).
    a. When completed, looking at the RADIO LCD, you should be able to see the IP address that was assigned to your radio by your home router.
    b. Open your computer web browser and type that IP address.
    c. Upload a single station or list of stations using the following format:

(example file with various stations can be found in the documentation folder, for testing just copy and paste that list).

Station Name 1, Station Address 1

Station Name 2, Station Address 2

Radio Ibiza, http://ibiza-smooth-jazz.vip-radios.fm:8033/stream-128kmp3-IbizaSmooth

Roma Radio, http://nr9.newradio.it:9371/stream

You can find and copy station URL's in the following web sites:

- https://streamurl.link/
- https://fmstream.org/ (search for the desired station, click on it to start playing and copy the link from the player located at the bottom of the page)
- https://www.radio-browser.info/

or alternatively search YouTube for instruction video on how to get live radio streaming URLs. You can also have a look at https://radio.garden/ .

7. The last step - Open the web page. At the bottom left corner of the page, you will see the following.

Please send me your RADIO ID to the following email **themicromaker@yahoo.com**

I will email you back the required License Key.

Web Interface Radio Station Manager access VIA Mobile Phone or PC/MAC

Radio Station Manager

Play Station

Enter Station Number:
PLAY

Play Previous Play Next

Current Station

Station Number: 114

Station Name: Exclusively Italy

Volume Control

Volume: 79

Audio Equalizer

Bass (dB): -1
Mid (dB): -1
Treble (dB): 6
Save

Audio Mode

Mono
Stereo
Apply

Screen Saver

Enable Screen Saver
Save

Total Stations Stored: 115

Enter Station Name:
Enter Station Address (URL):
Save

Enter Station Number to Erase:
Erase

Station 149
Station Name: Classical Music
Station Address: https://stream.epic-classical.com/classical-n

Station 150
Station Name: WFMT Classical
Station Address: https://wfmt.streamguys1.com/main-mp3

Station 151
Station Name: Radio Italy
Station Address: https://sphera.fluidstream.eu/rpd_hita.mp3

Station 152
Station Name: Top Italia
Station Address: http://streaming.cst98.com:8000/tir320.mp3

Station 153
Station Name: Nostalgia Italia
Station Address: https://scdn.nrjaudio.fm/adwz1/fr/30663/mp

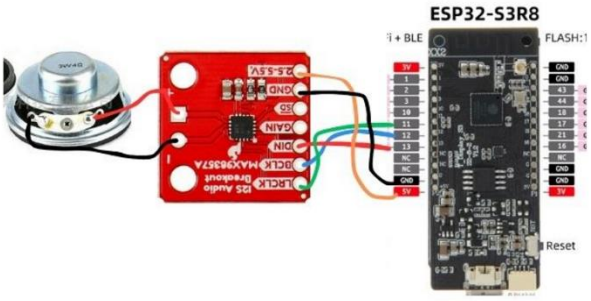
Enter Station List (one entry per line in the format 'Station N

Use the following format:
Station Name 1,Station Address 1
Station Name 2,Station Address 2
My Favorite Station,http://123.456.789.0/stream
Awesome Hits Radio,http://stream.awesomehitsradio.com

Update Stations

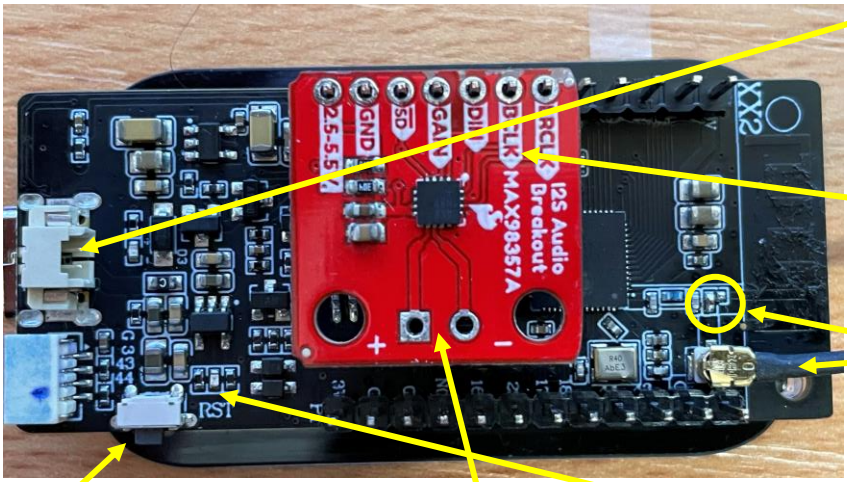
Connection Diagram

Following is the connection diagram for using the Max98357a chip (if you use pin header you don't need to connect wires as the pins are arranged correctly). Connect the I2S DAC to the following pins as shown in the picture: BCLK to pin 12, LRC to pin 11, DOUT to pin 13, VCC to 5V, GND to GND (Required by some other DACs - MCLK to pin 10).



Refer to the below photo: it is possible to solder the DAC directly to the ESP32 in the following way (the pins are already aligned)

After soldering the DAC to the pins you only need to connect a speaker to the + and - signs (speaker pins) on the DAC module.



Battery connector. Female connector can be found inside the microcontroller box.

DAC+AMP Solder that way, no need for wires

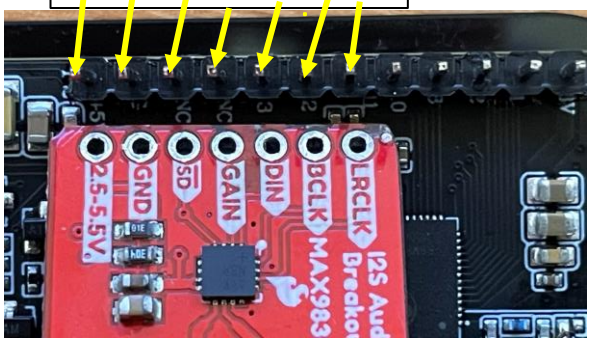
External Antenna - Optional requires switching jumper to external antenna

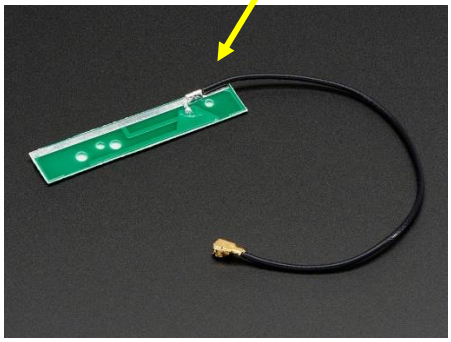
Reset Button

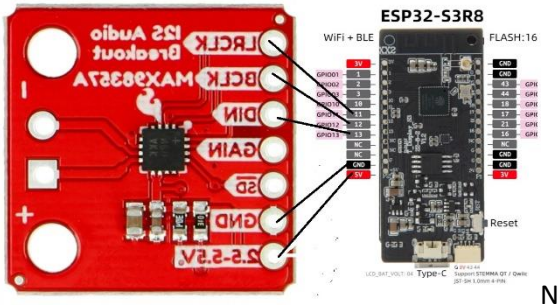
Speaker 5W Preferable

Battery charging LED. Can be replaced with external LED but required some micro soldering skills

5V GND NC NC 13 12 11



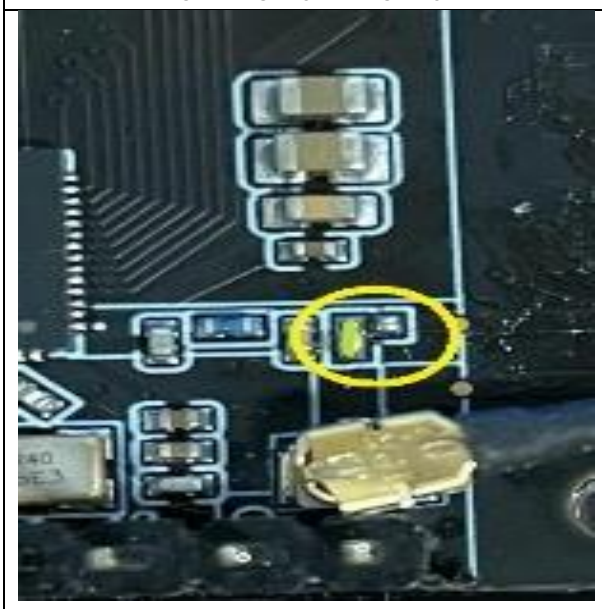




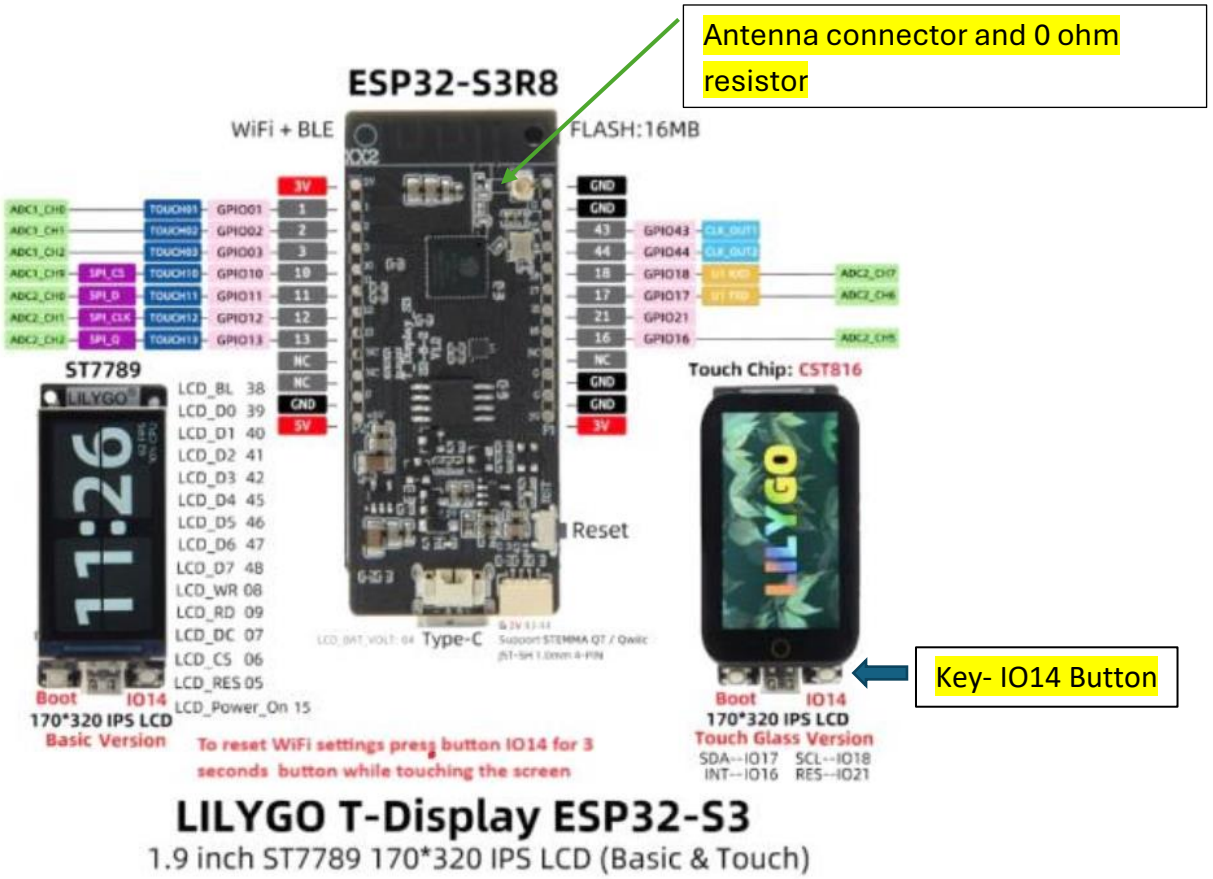
Note:

Notes:

1. The boot_app0.bin file is included with the Lilygo flash tool in the bin directory.
2. An I2S DAC is required for this project, Amplifier is optional. In general, all 16 bit DACs that have the DIN, BLCK and LRC pins. PCM5102A delivers good results.
3. For some stations that don't play, and their URL starts with https:// try changing it to http:// and check if it is working.
4. **Note: It is recommended to use antenna to enhance the Radio Reception range.**
   For the antenna to work you will need to move on the PCB the 0 ohm resistor (short) from external antenna to internal antenna. You can refer to this article for detailed explanation: https://randomnerdtutorials.com/esp32-cam-connect-external-antenna/
   Or YouTube video https://www.youtube.com/watch?v=aBTZuvg5sM8
   Fsadfsa
5. Note: to fast scroll stations you should press left or right arrows on the LCD for more than 3 seconds

For External Antenna	For Internal Antenna
	

6. To reset Wi-Fi settings, press the reset button and IO14 button together. Release the reset button while keep pressing IO14 for at least 3 seconds until you get a message on the LCD that Wi-Fi setting has been erased (The Key - IO14 button is located on the left bottom side- see photo).

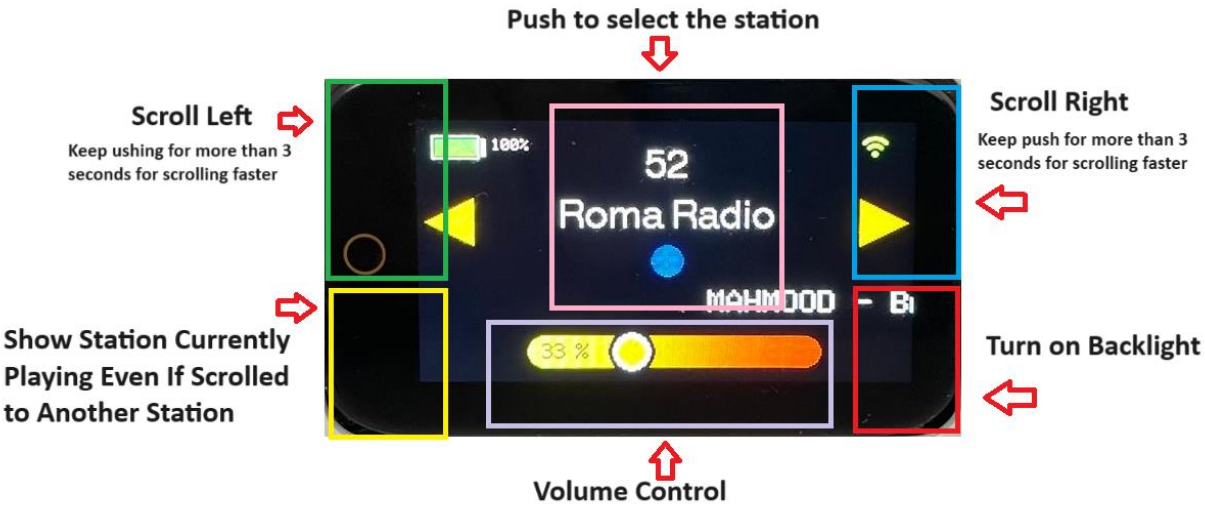


Installation & Components Layout

After uploading the firmware and soldering the Max98357a as described above and testing that the radio is working you can start mounting all the components inside the enclosure.

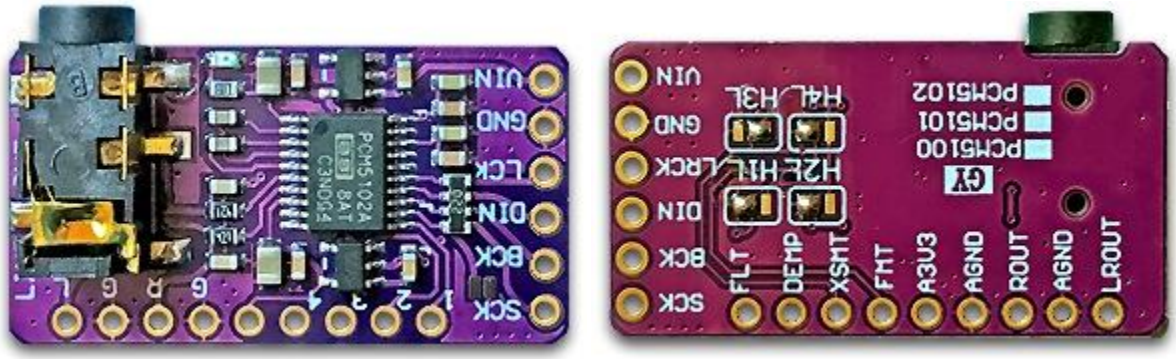
1. If you decided to install the charging indicator LED you should insert it now to the designated hole and glue it using hot glue or superglue. (using this LED is not mandatory, you can still use the charging indicator LED which exist on the board by default. Replacing the LED which exist on the board with this LED involves a bit of micro soldering skills which not everyone has).
2. Place the enclosure on a flat surface face down. Place the LCD screen in its designated location with the LCD facing down making sure it is flashed with the enclosure surface.
3. Using a hot glue gun drop a little glue on each corner of the LCD back side to secure it to the enclosure.
4. Place the speaker on the left corner of the enclosure and use the hot glue to secure it. Make sure not to drop glue inside the speaker as it will affect its performance.
5. Place and glue the battery holder on the bottom of the enclosure (red wire + , should be on the left side).
6. Place and glue the antenna on the inside top of the enclosure by pealing the glue cover sticker of the antenna. Now you can connect it to the microcontroller board using the UTX connector (make sure to follow the instructions above on how to switch from internal antenna to external antenna). Using external antenna is not mandatory as you can still use the internal antenna and completely skip this process.
7. Place the switch inside the enclosure and connect it between the microcontroller and the battery. (you can find the required connector inside the microcontroller box).
8. After making sure all the components are secured closed the lid by popping it in.

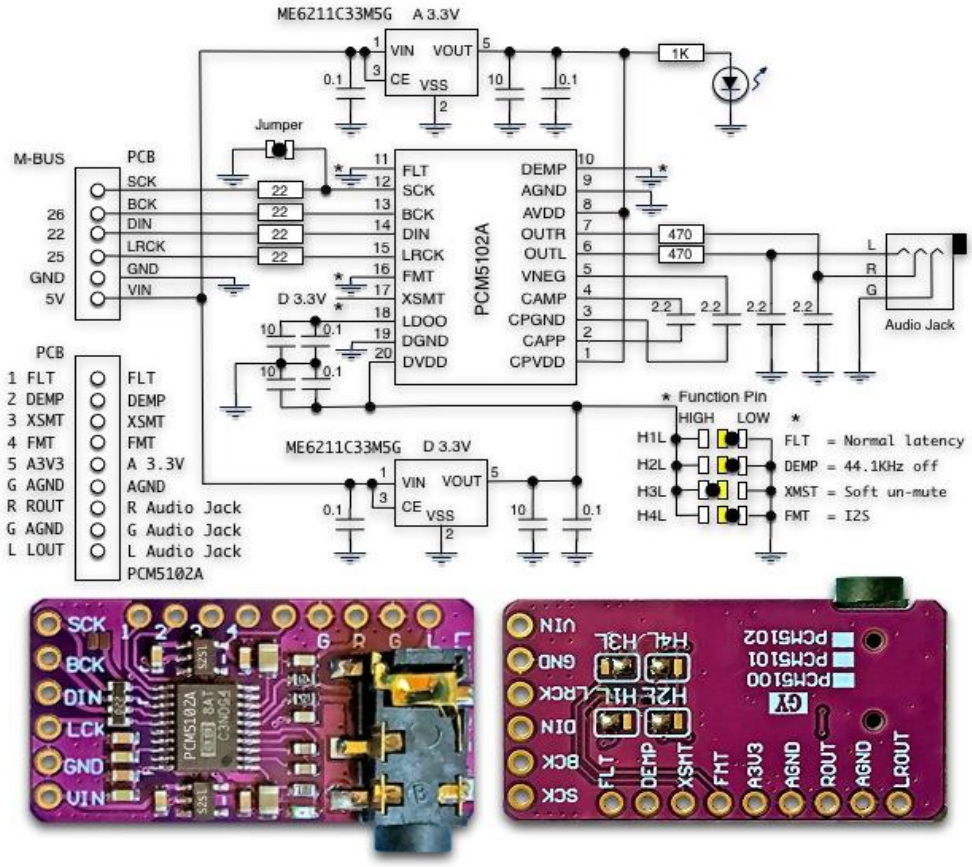
Screen Functions



General info

If you decide to use the PCM5102A I2S DAC Module here is the info you need to know:
Power supply (VIN) is 5Vdc or connect A3.3v to 3V3 Pin.

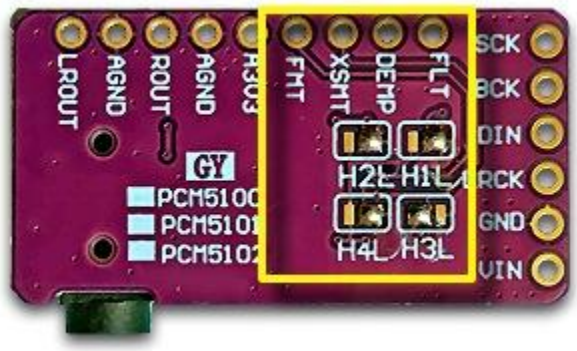




PIN FUNCTIONS: Select = RED: Selected state at time of purchase.

Make sure the soldered jumpers are set as in the photo below.

H	Name	Description	LOW (GND)	HIGH (D 3.3V)
H1L	FLT	Filter select	**Normal latency**	Low latency
H2L	MUTE	De-emphasis control for 44.1kHz sampling rate	**Off**	On
H3L	XMST	Soft mute control	Soft mute	**soft un-mute**
H4L	FMT	Audio format selection	**I2S**	Left justified



Connecting SCK-GND on the board with the wiring below.
Generate the system clock using the PCM5102A's internal PLL.
this is required to Prevents dielectric noise (if exist).
It might work fine even if not connected.