Test Plan

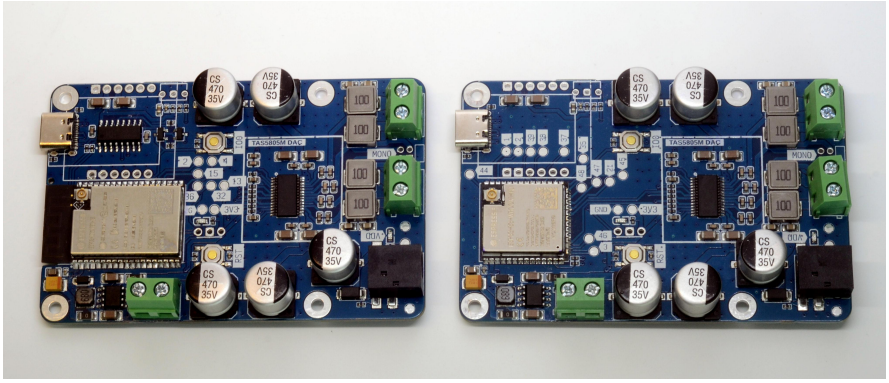
Louder-ESP32

(TD-ESP-AUDIO-LOUDER)

Louder-ESP32S3

(TD-ESP-AUDIO-LOUDER-S3)

Louder-ESP32 and Louder-ESP32S3



https://sonocotta.com/

https://github.com/sonocotta/esp32-audio-dock

Introduction

Louder-ESP32 and Louder-ESP32S3 are audio development boards based on Espressif ESP32 MCU and Texas Instruments TAS5805M I2S DAC. Core of the board is a combination of powerful MCU and capable DAC and all the power and auxilary circuitry to make it work. But on top of that boards have few external interfaces that extend usage scenarios of the boards.

Hardware highlights

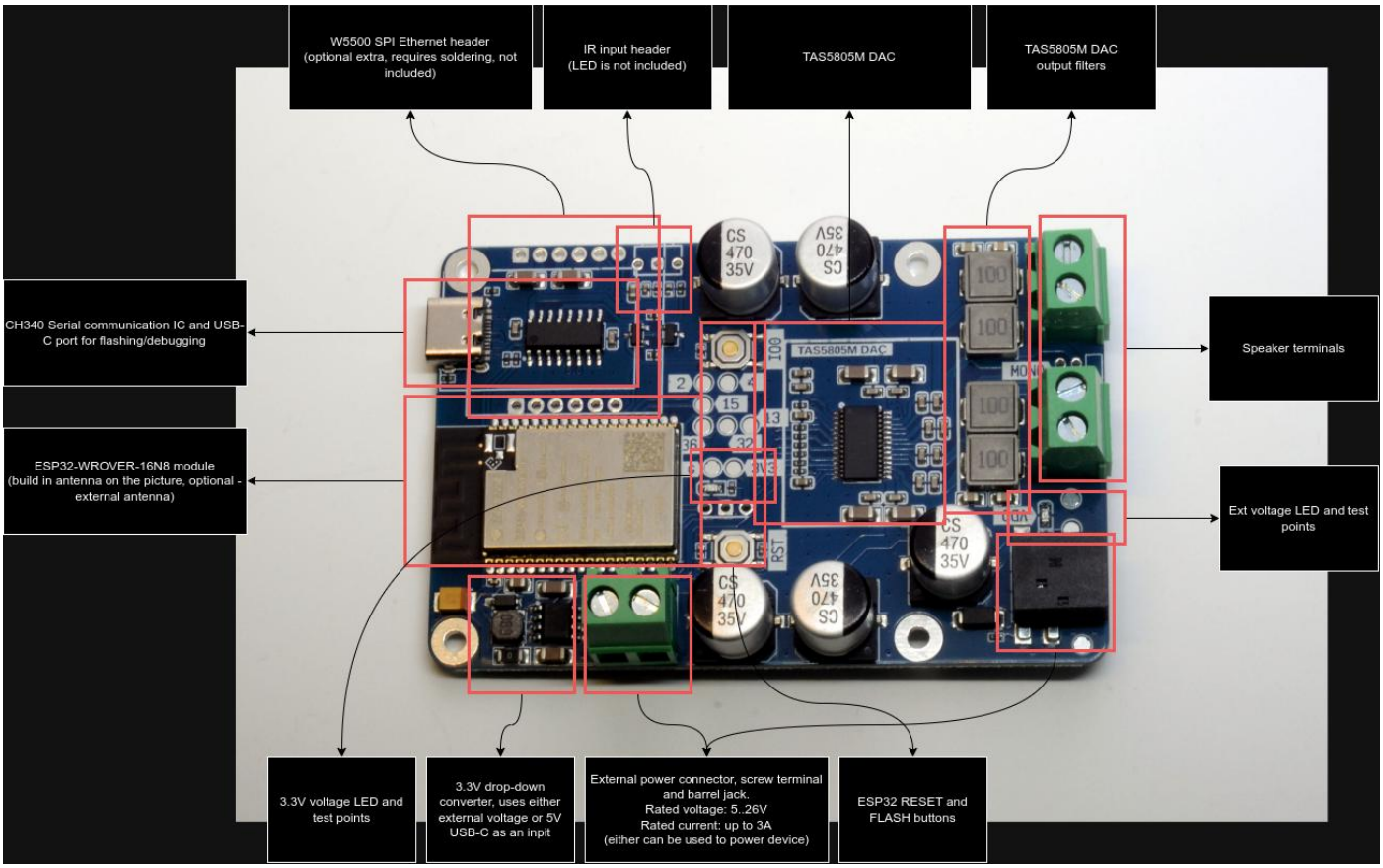
MCU Core and audio

- ESP32 Dual Core 32-bit LX6/LX7 microprocessor running at 240 MHz
- 16MB (Louder) of flash storage
- 8MB of PSRAM
- Stereo I2S DAC TAS5805M with built in D-Class amp

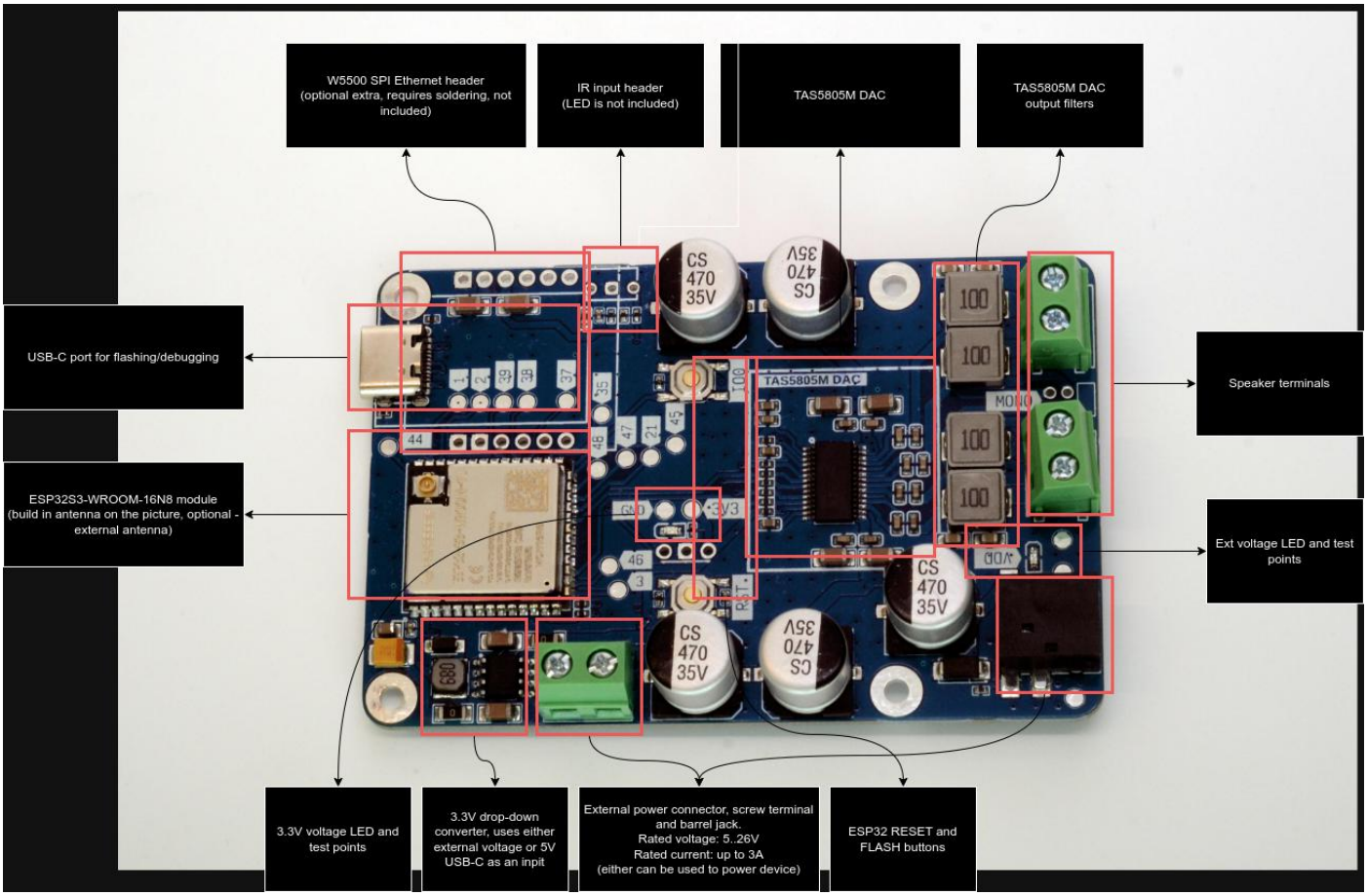
Peripheral

- Wi-Fi: 802.11 b/g/n
- Bluetooth: v4.2 (ESP32) and Bluetooth 5 (LE) (ESP32-S3)
- External 2.4G Antenna for better perception
- IR reader header (optional via header)
- RGB led header (optional via header)
- Wiznet W5500 SPI Ethernet (optional via header)
- SSD1306 128x64 OLED screen connector (soldering required, screen is not included)

Louder- ESP32



Louder-ESP32S3



Test tools

- Louder-ESP32 / Louder-ESP32S3 board

- DC Power Supply 12..20V/3A with barrel jack output (5.5mm/2.5mm pin positive)

- USB cable type C

- Pair of 4-8 Ohm speakers, 3W or above

- Ubuntu Laptop with esp-idf tools installed (refer to Espressif getting started documentation)

To test the boards connectivity you need an WiFi access point with PSA/PSA2 security and appropriate credentials

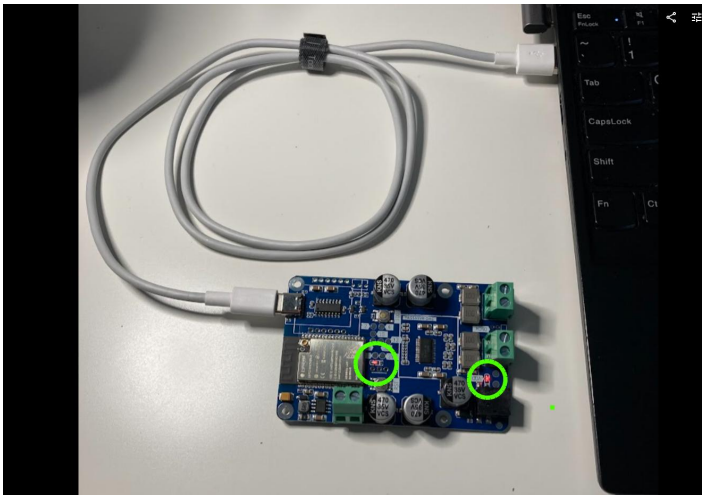
Test Plan

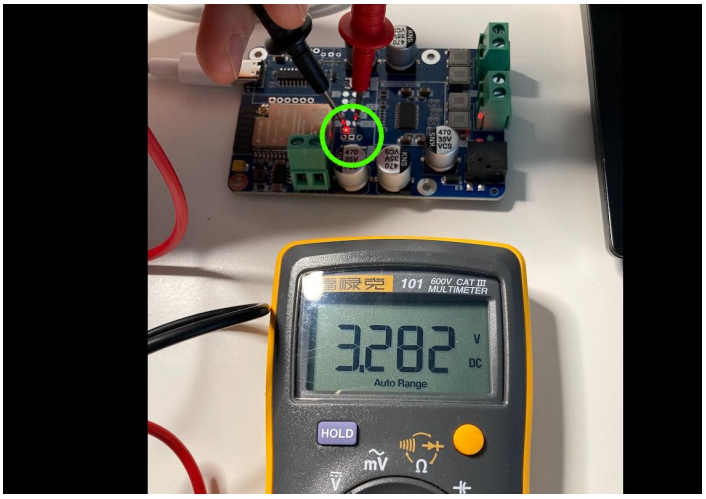
0. Visual inspection

- Inspect boards for fabrication defects, specifically to monitor solder bridges, bad soldering, misplaced or missing components.

Boards with any of the above defects can be considered for repair (whenever possible) and re-testing.

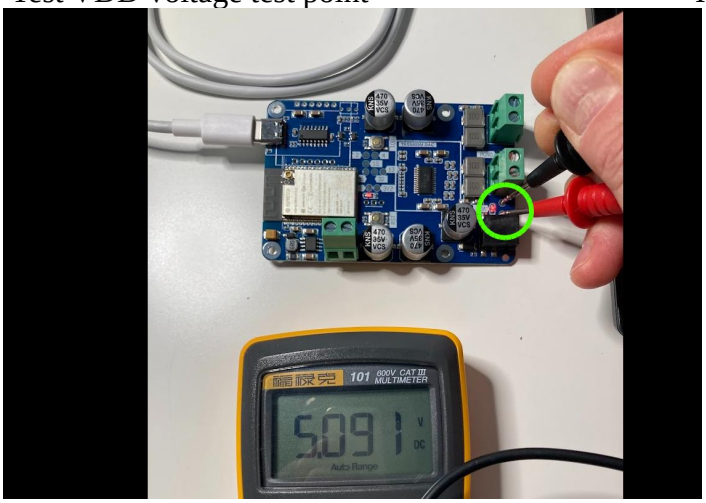
1. Basic voltage tests

Setup	**Assert**
Connect the board to the laptop using the USB-C cable 	3.3V LED should light up red VDD voltage Led should light up red
Test 3.3V line	It should measure 3.3V with 5% tolerance



Test VDD voltage test point

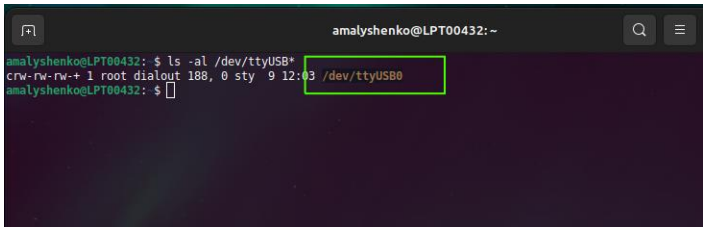
It should measure 3.3V with 5% tolerance



Verify Serial connection over USB by running command in the console

```
ls -al /dev/ttyUSB*
```

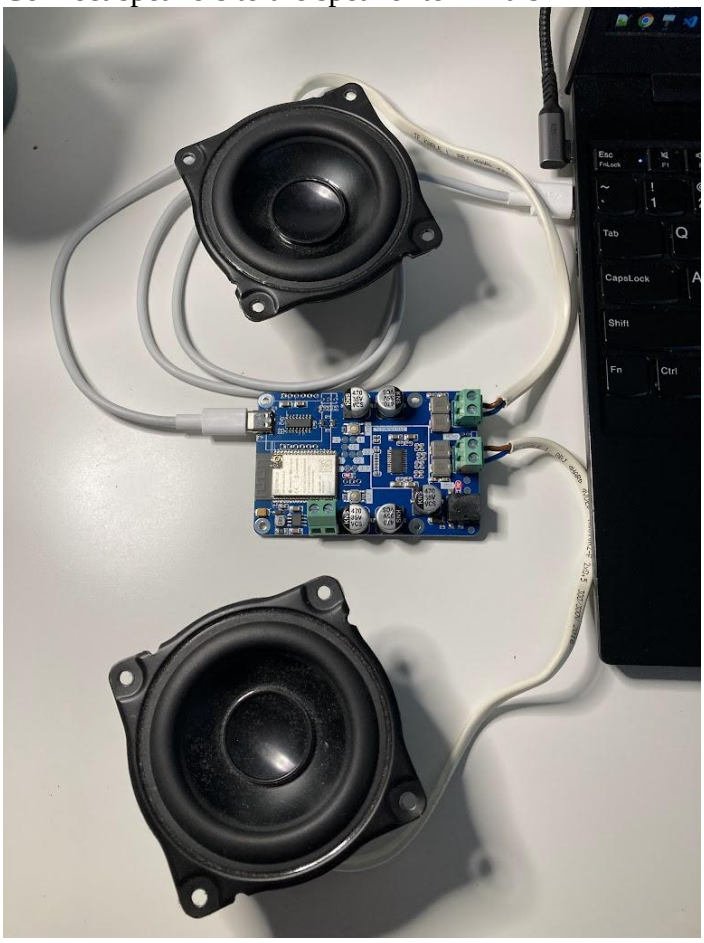
Device should be detected by laptop as serial device



2. Audio tests

Setup

Connect speakers to the speaker terminals



Flash test firmware package using the following command

```
esptool.py --chip esp32 --port "/dev/ttyUSB0" --baud 460800 --before default_reset --after hard_reset write_flash -z --flash_mode dio --flash_freq 40m --flash_size 4MB 0x1000 bootloader.bin 0x8000 partitions.bin 0xe000 boot_app0.bin 0x10000 firmware.bin
```

Validate tone sound from both speakers

Assert

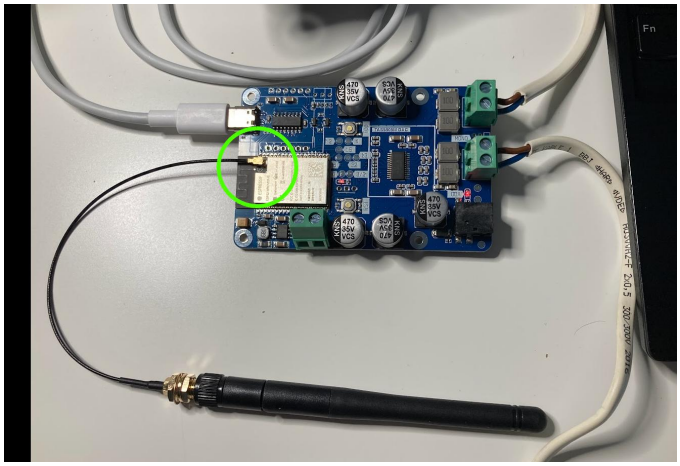
Flashing should run without error

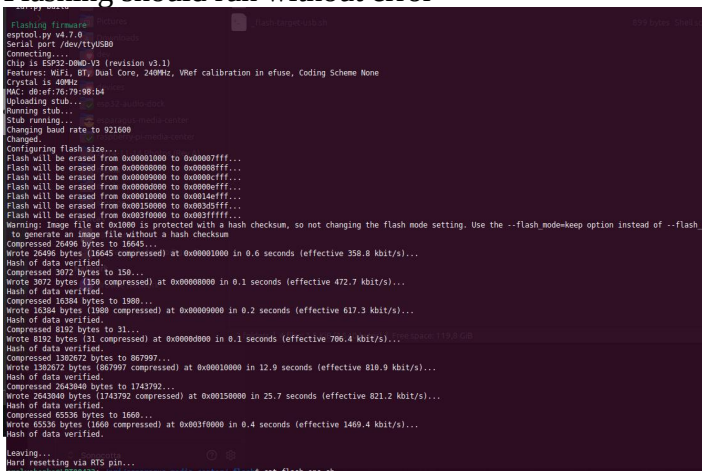
```
Auto-detected: /dev/ttyUSB0
"/home/amalyshenko/.platformio/penv/bin/python" "/home/amalyshenko/.platformio/packages/tool-esptoolpy/esptool.py" --chip esp32 --por
-flash_mode dio --flash_freq 40m --flash_size 4MB 0x1000 /home/amalyshenko/prj/esp32-audio-dock/esp32-audio-dock/firmware/esp32-i2s-b
audio-dock/esp32-audio-dock/firmware/esp32-i2s-bare/.pio/build/louder-lolin_d1_mini_32/partitions.bin 0xe000 /home/amalyshenko/.platf
uild/louder-lolin_d1_mini_32/firmware.bin
esptool.py v4.5.1
Serial port /dev/ttyUSB0
Connecting.....
Chip is ESP32-D0WD-V3 (revision v3.1)
Features: WiFi, BT, Dual Core, 240MHz, VRef calibration in efuse, Coding Scheme None
Crystal is 40MHz
MAC: d0:ef:76:79:98:b4
Uploading stub...
Running stub...
Stub running...
Changing baud rate to 460800
Changed.
Configuring flash size...
Flash will be erased from 0x00001000 to 0x00005fff...
Flash will be erased from 0x00008000 to 0x00008fff...
Flash will be erased from 0x0000e000 to 0x0000ffff...
Flash will be erased from 0x00010000 to 0x0005cfff...
Compressed 17488 bytes to 12168...
Writing at 0x00001000... (100 %)
Wrote 17488 bytes (12168 compressed) at 0x00001000 in 0.5 seconds (effective 256.3 kbit/s)...
Hash of data verified.
Compressed 3072 bytes to 146...
Writing at 0x00008000... (100 %)
Wrote 3072 bytes (146 compressed) at 0x00008000 in 0.1 seconds (effective 441.0 kbit/s)...
Hash of data verified.
Compressed 8192 bytes to 47...
Writing at 0x0000e000... (100 %)
Wrote 8192 bytes (47 compressed) at 0x0000e000 in 0.1 seconds (effective 610.2 kbit/s)...
Hash of data verified.
Compressed 313360 bytes to 174265...
Writing at 0x00010000... (9 %)
Writing at 0x0001c033... (18 %)
Writing at 0x00024204... (27 %)
Writing at 0x00029948... (36 %)
Writing at 0x0002eec8... (45 %)
Writing at 0x00034885... (54 %)
Writing at 0x00039f84... (63 %)
Writing at 0x000424aa... (72 %)
Writing at 0x0004e294... (81 %)
Writing at 0x000537c0... (90 %)
Writing at 0x00058d00... (100 %)
Wrote 313360 bytes (174265 compressed) at 0x00010000 in 4.0 seconds (effective 631.6 kbit/s)...
Hash of data verified.

Leaving...
Hard resetting via RTS pin...
========== [SUCCESS] Took 9.27 seconds ==========
```

Speakers should emit clean tone sound at 500 Hz (square wave).

3. Firmware flashing and connectivity validation

Setup	Assert
[ONLY EXTERNAL ANTENNA VERSION] Connect external antenna to the board 	

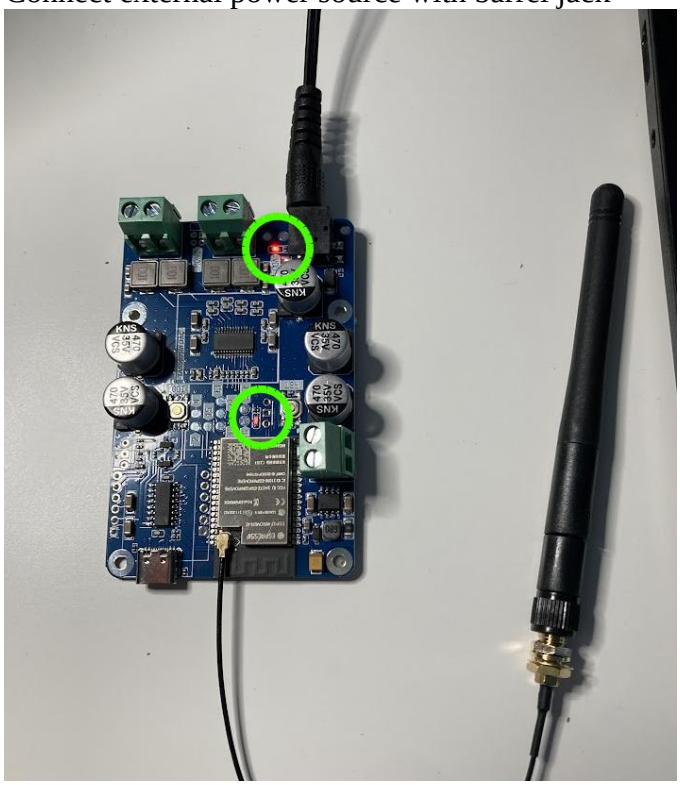
Flash squeezelite-esp32 firmware with hardware configuration and WiFi credentials baked into firmware using following command
`esptool.py 460800 /dev/ttyUSB0 --chip esp32 --before=default_reset --after=hard_reset write_flash --flash_mode qio --flash_freq 80m --flash_size 4MB \`
`0x1000 firmware/master-v4.3-I2S-4MFlash-2.1670-16-bootloader.bin \`
`0x8000 firmware/master-v4.3-I2S-4MFlash-2.1670-16-partition-table.bin \`
`0x9000 firmware/common-esp-nvs.bin \`
`0xd000 firmware/master-v4.3-I2S-4MFlash-2.1670-16-ota_data_initial.bin \`
`0x10000 firmware/master-v4.3-I2S-4MFlash-2.1670-16-recovery.bin \`
`0x150000 firmware/master-v4.3-I2S-4MFlash-2.1670-16-squeezelite.bin \`
`0x3f0000 firmware/louder-esp32-settings.bin`
	Flashing should run without error
	 

Connect serial console to the board check the output logs. Reboot the board by pressing the RESET button	Board should boot up within around 3 seconds. It should not go into boot loop. In few seconds it should connect to the WiFi network and receive IP address automatically from DHCP server

4. External power test

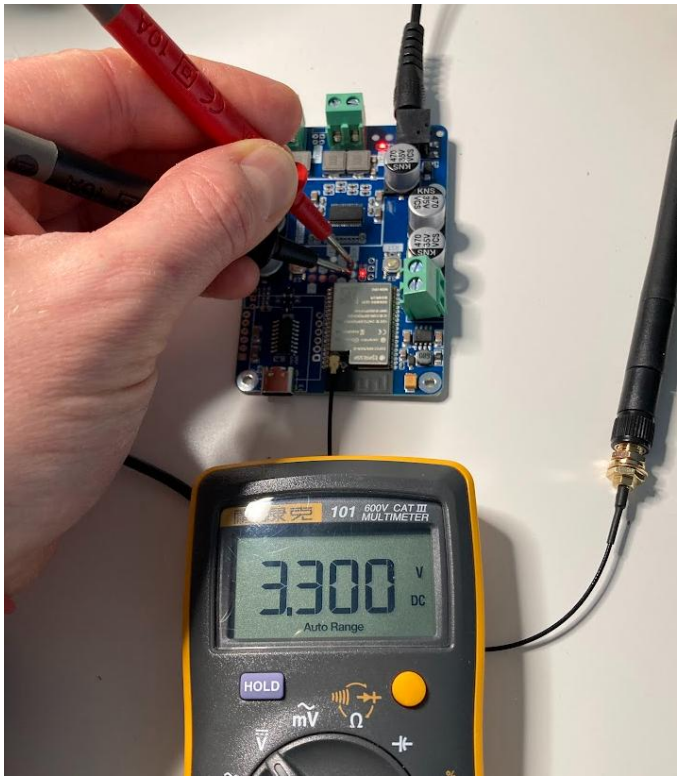
Setup
Disconnect speakers and USB cable.
Connect external power source with barrel jack

Assert
3.3V LED should light up red
VDD voltage LED should light up bright red



Check 3.3V voltage level

It should measure 3.3V with 5% tolerance



Check VDD voltage line

It should show external voltage (12V..20V)