RPi-DAC-RCA

a cost effective solution for I2S audio

Features:

- uses PCM5102 DAC
- **112 dB SNR**
- **112 dB Dynamic Range**
- **-93 dB THD+N** (based on manufactures datasheet)
- up to **384KHz** sample rate
- direct stack-able with Raspberry Pi
- option to decouple power from Raspberry Pi (Option A), 3.3V LDO
- Options to power Raspberry Pi (Option B), from any AC transformer, SPS
- Option AB: LDO and SPS, 3.5mm stereo out, 2.1Vrms for power amp
- 3.5mm and RCA out for **Vrms = 2.1V** or stereo RCA out (Option C) for power amp

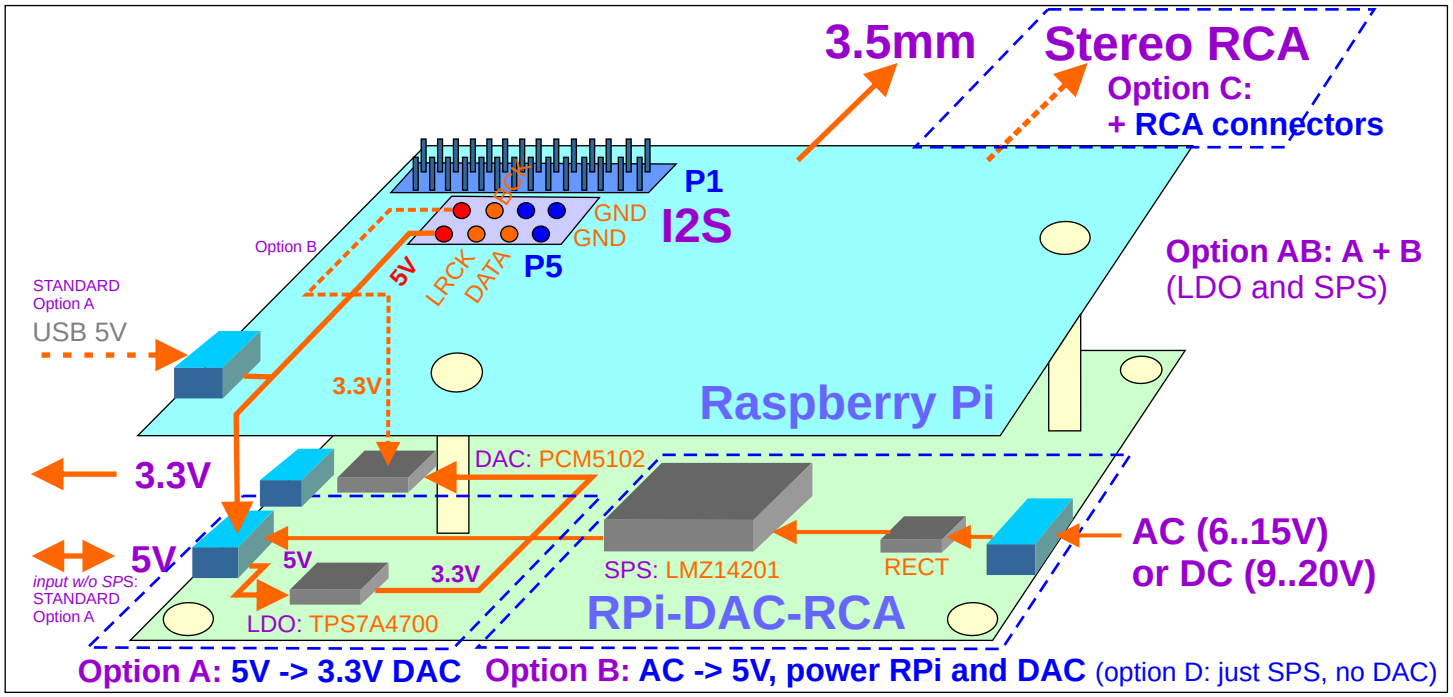
Overview:

The **RPi-DAC-RCA** is a module as part of the **RPi-DAC** system.
It provides a cost-effective RCA audio solution for the RPi or the RPi-DAC modules, similar to *HifiBerry* (for a lower price with additional features and options).
It provides 2.1Vrms on a stereo connector
(as 3.5mm phone plug or direct RCA, option C).
It can be stacked directly with the Raspberry Pi.

- The P1 extension header remains completely free and accessable.
- The RPi-DAC-RCA module will be plugged under the RPi.

It provides several options, e.g.:

- power the DAC from the 3.3V RPi rail (Standard)
- power the DAC with a decoupling LDO for 3.3V from 5V (Option A)
- power also the RPi from an AC transformer via SPS (no USB power supply, Option B), LDO and SPS as Option AB
- It can be used also as Power Supply for the Rpi and to power user extensions/boards (Option D)



Options:

Standard:

- powered by 3.3V from Raspberry Pi (via P5), not decoupled

A:

- with 3.3V LDO from 5V Raspberry Pi
- decoupled from Raspberry Pi, separated DAC supply via low-noise LDO

B:

- with 5V SPS
- Raspberry Pi powered from DAC, decoupled and just one wide range AC input
- no need for USB power supply, using a SPS (2A)
- 3.3V for DAC via RPi

AB:

- option A + B: LDO and SPS, all decoupled from RPi

C:

- instead of 3.5mm Stereo additional RCA out
- option A + B, complete setup

D:

- used as Power Supply for RPi and extension boards, no DAC and LDO
- no DAC and LDO soldered

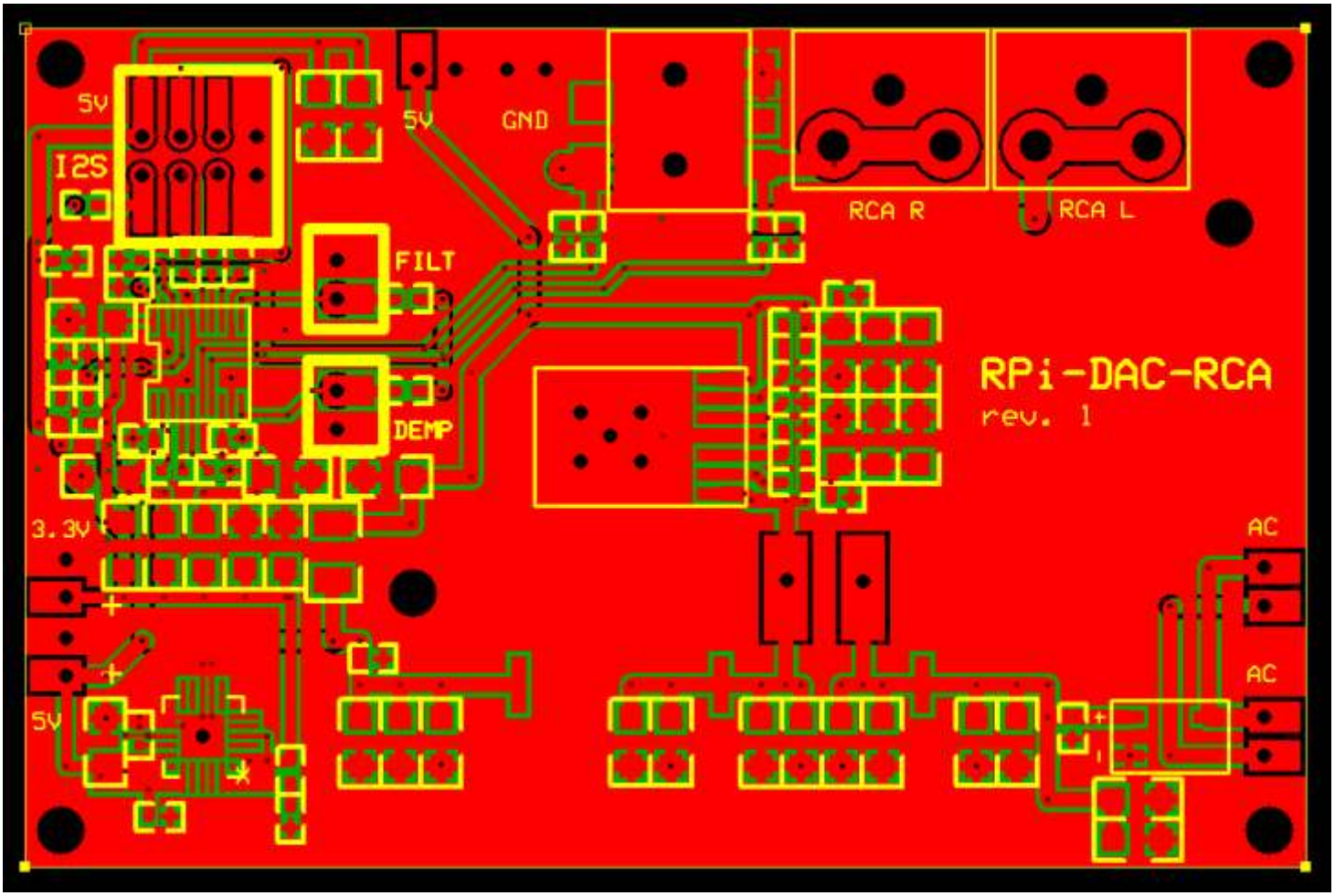


Figure 1: RPi-DAC-RCA PCB

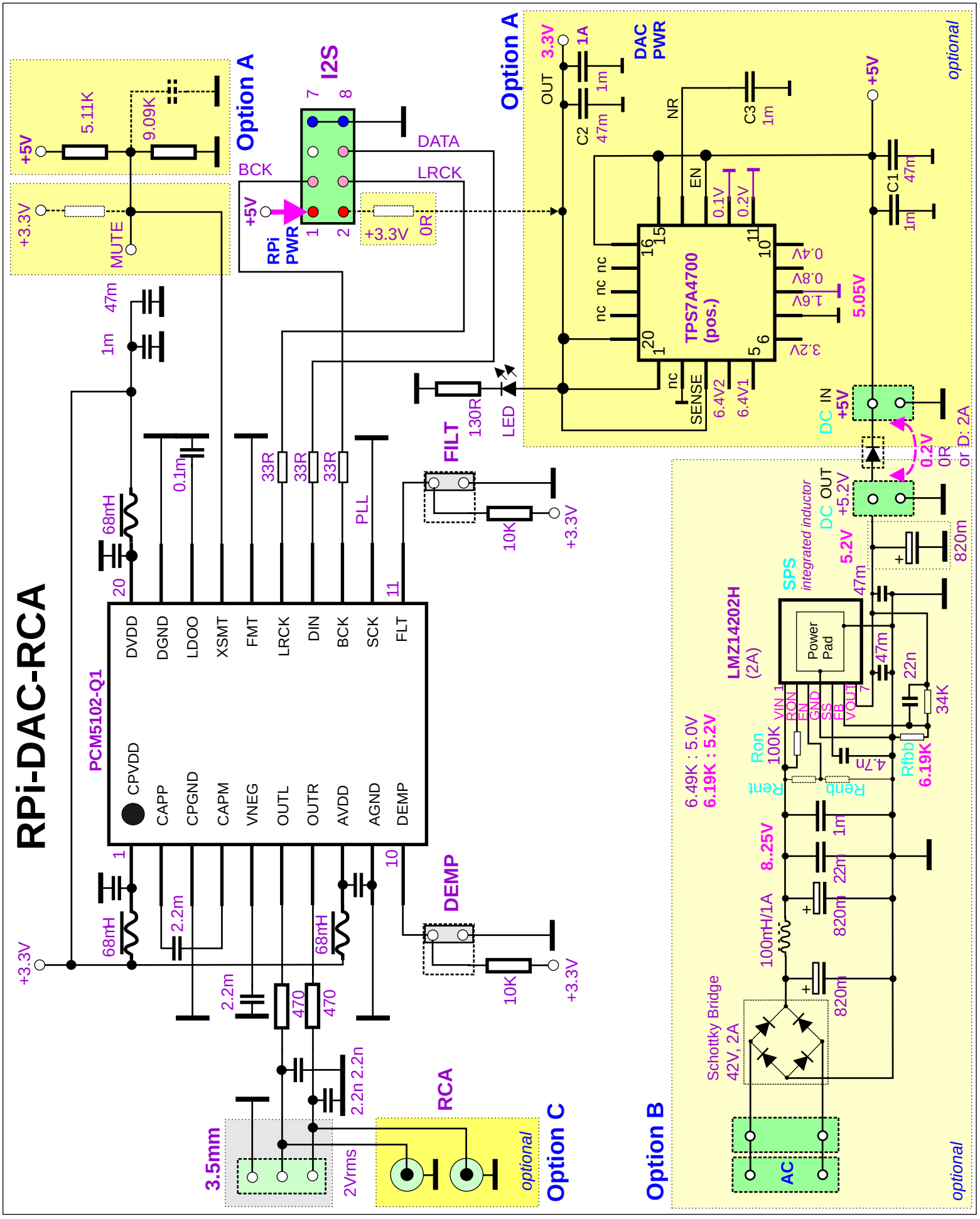
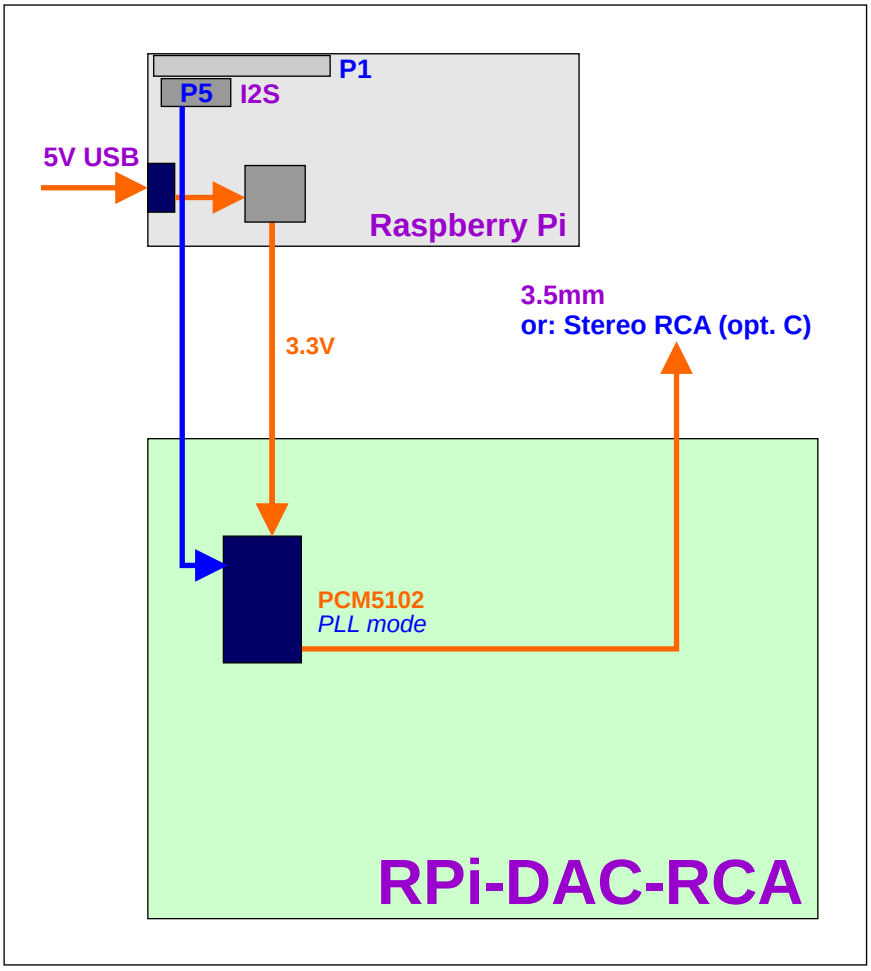
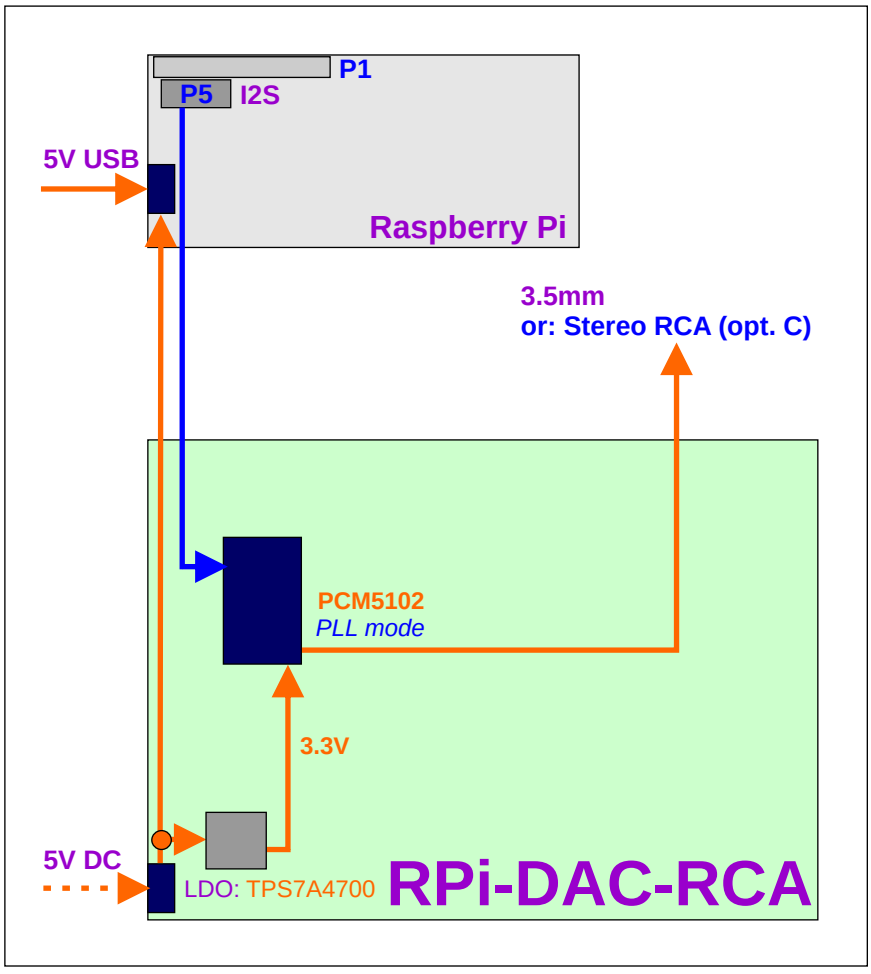


Figure 2: RPi-DAC-RCA Schematics



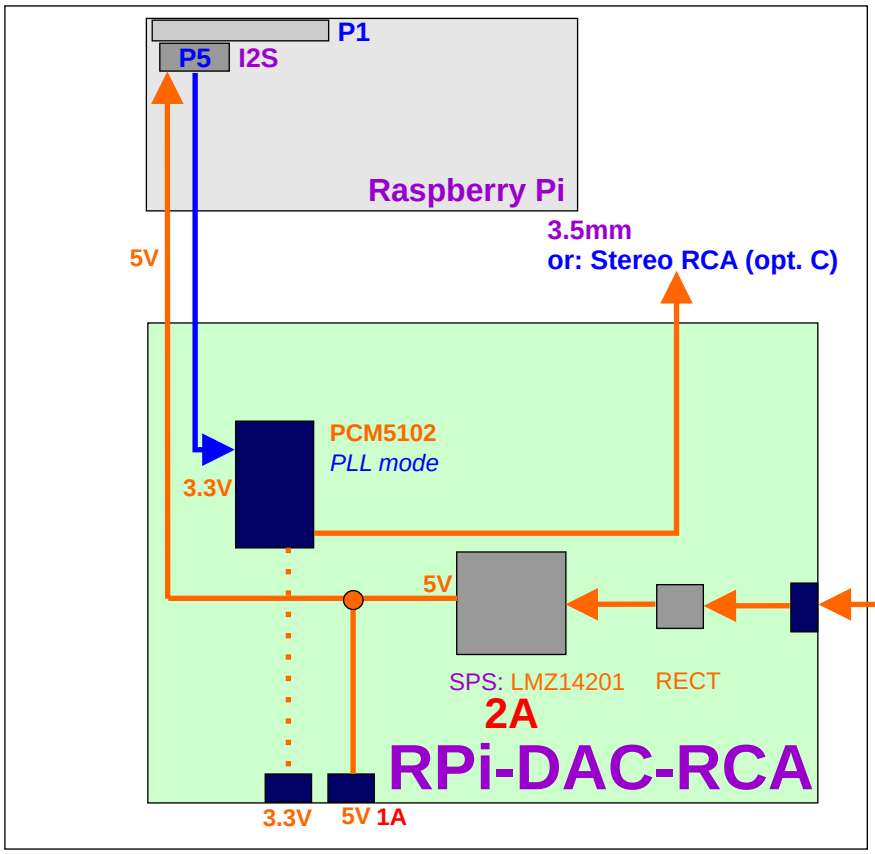
STANDARD:
Power 3.3V DAC from PR,
Rpi is powered by USB 5V power supply

Figure 3: **RPi-DAC-RCA** STANDARD



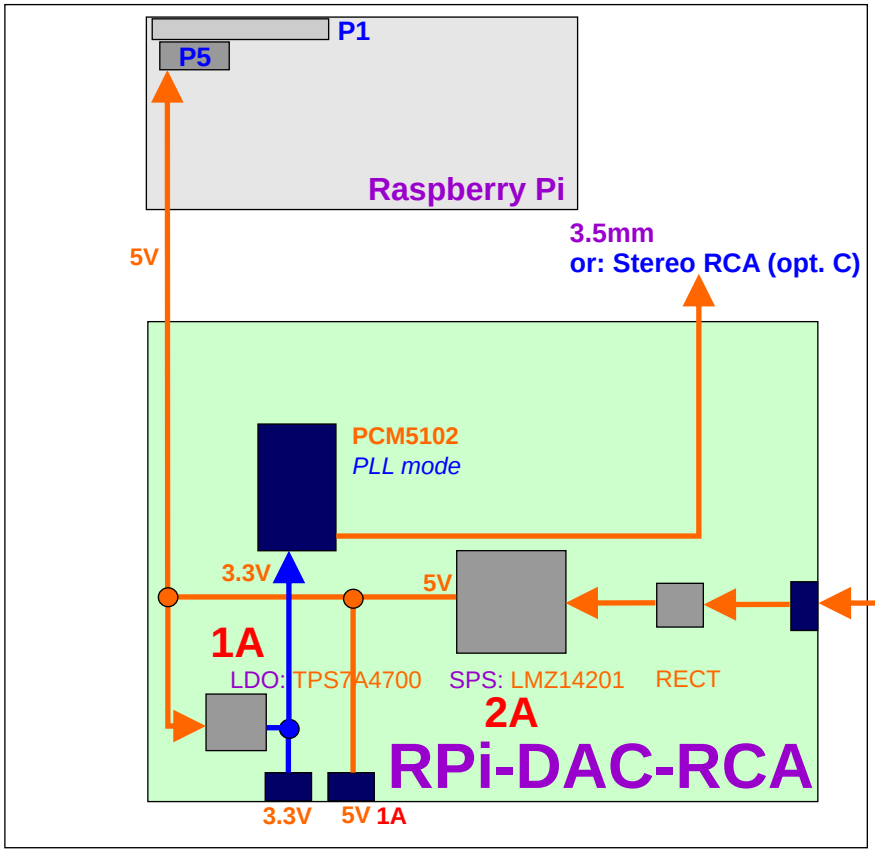
Option A:
Power 3.3V DAC via LDO from 5V RPi
(decoupled DAC power),
RPi still powered by USB 5V power supply

Figure 4: **RPi-DAC-RCA** Option A : DAC 3.3V decoupled



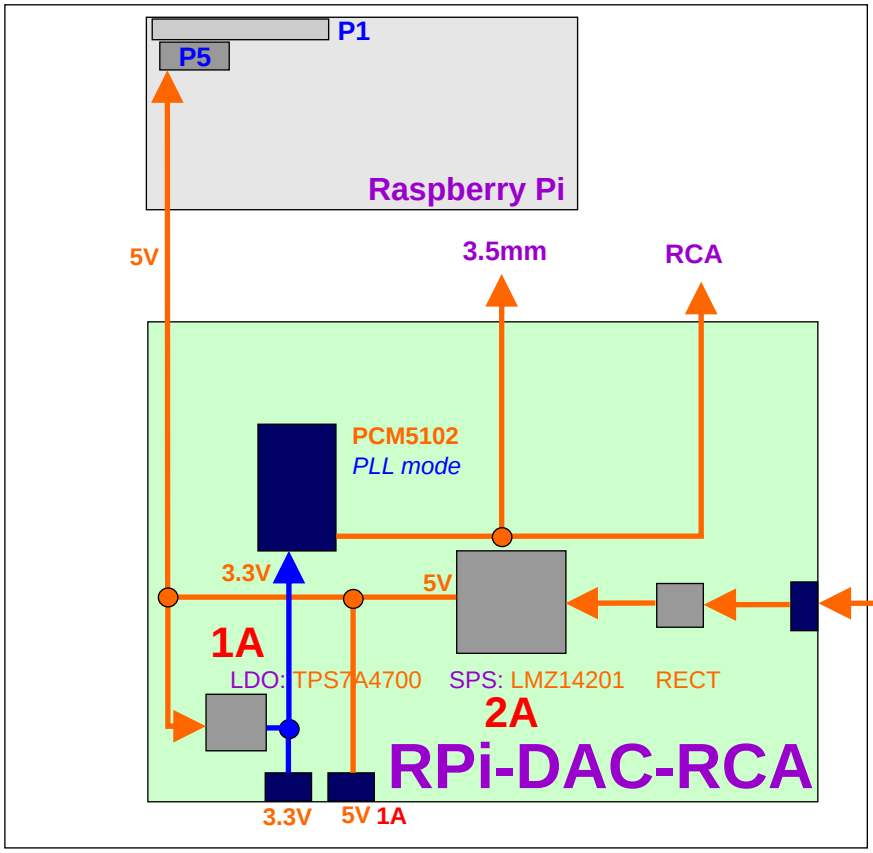
Option B:
Power via AC transformer
(no USB power supply needed),
generate +5V for Raspberry Pi

Figure 5: **RPi-DAC-RCA** Option B : decoupled power rails,
power with any AC transformer, no need for USB power supply



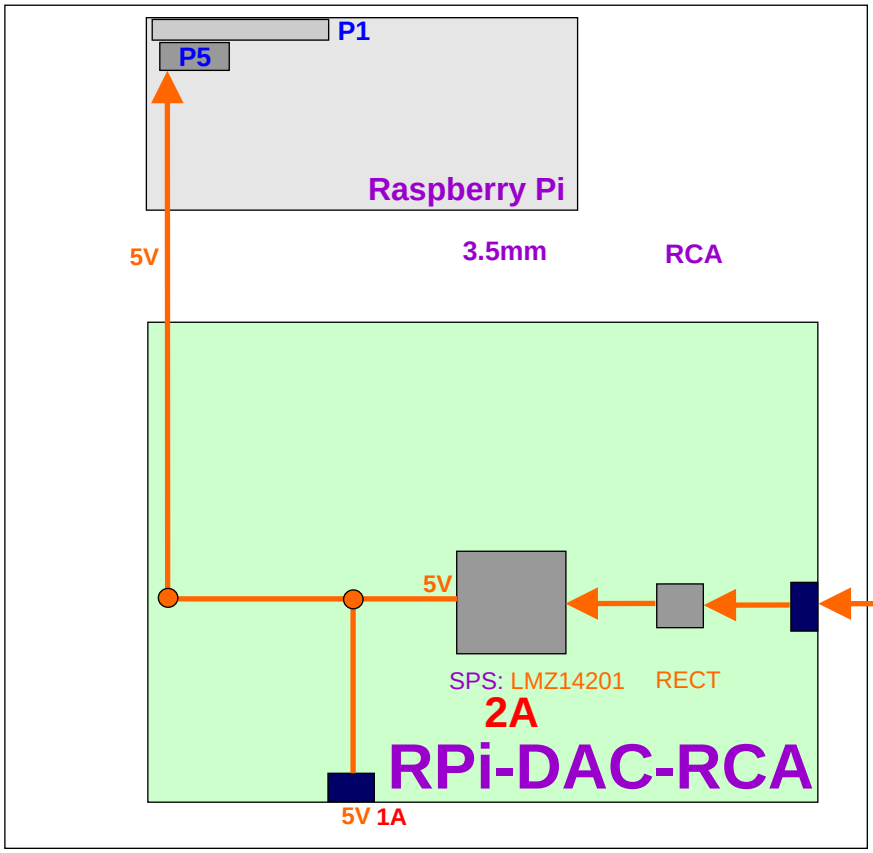
Option AB:
Power via AC transformer
(no USB power supply needed),
generate +5V for Raspberry Pi
and provide 3.3V and 5V for
extensions

Figur 6: **RPi-DAC-RCA** Option AB : decoupled power rails,
power with any AC transformer, no need for USB power supply



Option C:
Power via AC transformer
(no USB power supply needed),
generate +5V for Raspberry Pi
and provide 3.3V and 5V for
extensions, with RCA connectors

Figure 7: **RPi-DAC-RCA** Option C : decoupled power rails,
power with any AC transformer, no need for USB power supply, 3.5mm stereo and RCA connectors for power amp



Option D:
Power via AC transformer
(no USB power supply needed),
generate +5V for Raspberry Pi
and extensions (5V)

Figure 8: **RPi-DAC-RCA** Option D : just SPS to power
the RPi, no DAC, power RPi and extensions

Remarks:

- The **RPi-DAC-RCA** is intended to be used as **2Vrms out** for a following **power amp**.
- It might be possible to use also headphones but please do not expect good quality (not an intended usage)
- The board has AC rectifier so that an AC transformer can be used directly.
  Suggestion: AC 110/230V primary, 1x 6...15V AC, >=20VA, >= 1.5A
- The AC power transformer, power inlet, fuse etc. has to be managed by the customer.
- It is possible to use also a DC wall adapter, e.g. 1x 9..20V, >= 1.5A
  On latest PCB version is also a solder option for a DC plug.
  Instead of AC also a DC can be provided (and it is safe in terms of polarity).
- RPi extensions can be powered by the DAC, the SPS with 5V out (total 2A) or if LDO is soldered also 3.3V, <1A.
  The extension power is provided by (unsoldered) headers or forwarded to the RPi, P1.

- The PCB can have some parts not soldered (operation not affected).
- Parts can be changed without any notification (operation not affected).

- If intended to be used with AC transformer: **the transformer, power inlet, fuse etc. has to managed by the customer.**
  Please be carful when soldering 110/230V power input modules and transformer!
- Suggestion: **use a DC wall adapter, e.g. 9V, 1.5..2A**