

## LOCO-V2 DAC-AMP

The LOCO-V2 DAC-AMP is a HAT board for the Raspberry Pi 2, 3 and 4 model B/B+. It provides a high resolution D/A-converter and a class D power amplifier. Together with a Raspberry Pi it is your complete solution for a media player or music streamer with outstanding sound quality. All you need is to connect a power supply and to wire up your loudspeakers!



### Specifications:

- HAT board, compatible with Raspberry Pi 2, 3 and 4 model B/B+.
- No need to install drivers, the Raspberry Pi will detect the LOCO automatically.
- Unique multilayer PCB design.
- I2S audio from the Raspberry.
- Bit perfect D/A-converter up to 32 Bit/384 kHz.
- Hardware volume control via ALSA, so there is no loss in bit-depth.
- Fully symmetrical signal path for low distortion.
- <0,005% THD+N at 1 watt/4 ohm.
- SNR (A Weighted) >111 dB (LS output).
- DC Power supply from 19 V to 35 V.
- Back power up to 3 A for the Raspberry Pi.
- Up to 153 Watt/4 ohm.
- Fully protected against faults with short-circuit protection, and thermal protection as well as over-voltage, under-voltage, and DC protection.
- High quality components like low ESR capacitors, fully shielded coils and low noise regulators.
- Fully tested for functions and reliability.
- Designed and hand assembled in the Netherlands.

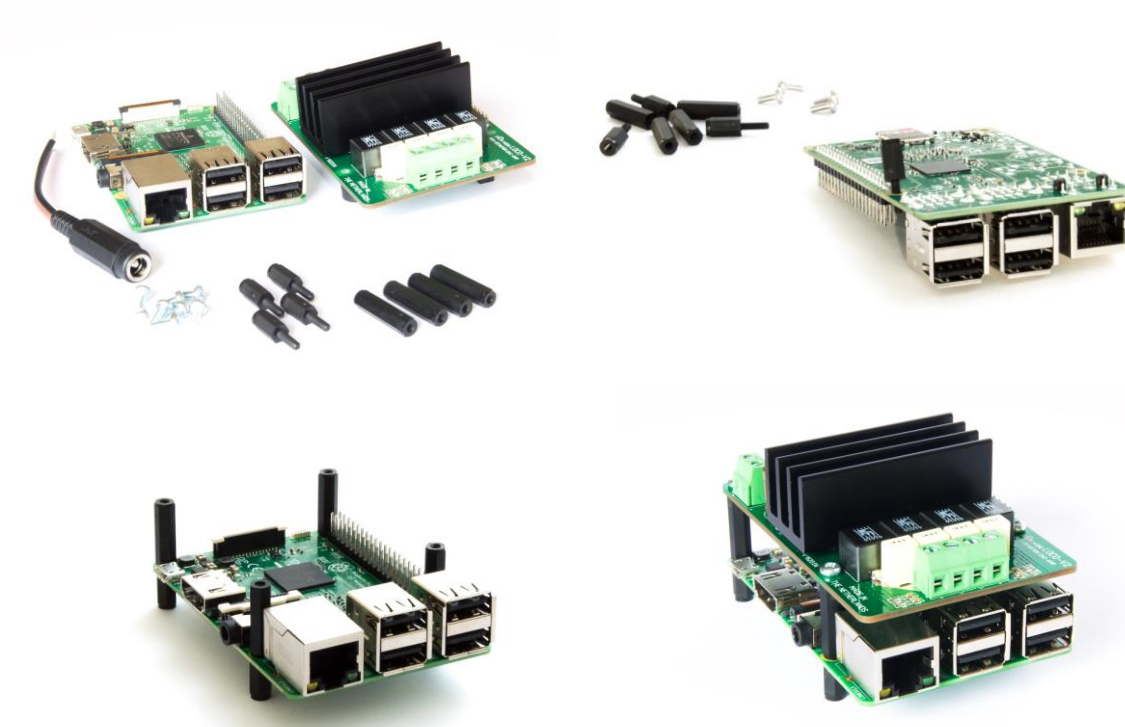
## Attaching the LOCO-V2 to the Raspberry Pi

The LOCO-V2 comes with standard accessories to mount it to the Raspberry Pi.

- LOCO with gold plated 40 pin header.
- 4x nylon m2,5 female – female spacer 18 mm.
- 4x nylon m2,5 male – female spacer 10 mm.
- 8x m2,5 screws.
- 5.5mm /2.1mm DC adapter plug

The full range of Dion Audio LOCO-V2 accessories are available directly from our website: [www.dionaudio.nl](http://www.dionaudio.nl)

The following pictures shows how to mount the LOCO-V2 to the Raspberry Pi.



## Connecting The loudspeakers

The LOCO-V2 is able to deliver up to 153 Watt at 4 ohm per channel, and the power amplifier is protected against faults with short-circuit protection, thermal protection, as well as over-voltage, under-voltage, and DC protection. However, be careful when connecting the wires. Avoid short-circuiting the loudspeaker outputs because it can result in COMPLETELY DAMAGING THE LOCO-V2.

If you look at the loudspeaker output header J2 like the 4<sup>th</sup> picture above you will see +/- | -/+ on the PCB. The left +/- is the output for the left loudspeaker and the right -/+ is the output for the right loudspeaker.

## Connecting the power-supply

The LOCO-V2 powers up the Raspberry Pi, so DO NOT power the Raspberry Pi via the 5 volts USB supply as well.

We recommend to use a power-supply of 24 volts at 120VA. It is the right balance between output power, back power for the Raspberry Pi and safety. See the list for more power options.

- Use minimal 19 volts at 90VA, the output power will be 45 Watt at 4 ohm.
- Use 24 volts at 120 VA, the output power will be 72 Watt at 4 ohm.
- Use 32 Volts at 200 VA, the output power will be 128 Watt at 4 ohm.
- Use maximal 35 Volts at 300 VA to run the LOCO at its maximum output power. The output power will be 153 Watt at 4 ohm.

When using the DC adapter plug, connect the red wire to the + (right site), and the black wire to the - (left site) of the terminal block J3. When connecting the power-supply directly to the LOCO-V2, make sure that the + is connected to the right site, and the - is connected to the left site of the terminal block J3. WIRING THE POWER-SUPPLY THE WRONG WAY CAN DAMAGE THE LOCO-V2 AND THE POWERSUPPLY, so take precautions.

## Powering up the LOCO-V2

If the loudspeakers and the power-supply is connected correctly than it is time to power up the LOCO-V2. When the LOCO-V2 is powered up, the blue LED D1 will light up. If D1 will not light up, disconnect the power supply directly and double check the wires and connections. If the blue LED does light up, than the LOCO-V2 will work correctly.

These GPIO pins are used for the LOCO and can not be used for other purposes.

- GPIO 02 (pin 3) for I2C
- GPIO 03 (pin 5) for I2C
- GPIO 18 (pin 12) for I2S
- GPIO 19 (pin 35) for I2S
- GPIO 21 (pin 40) for I2S
- GPIO 27 (pin 27) for EEPROM
- GPIO 28 (pin 28) for EEPROM

## And play!

One important step to take is to TURN DOWN THE VOLUME before first use!

## List of software that include the LOCO-V2 drivers in the kernel

These distributors will auto-detect the LOCO-V2 for plug and play use, and there are more to come.

- Raspbian <https://www.raspberrypi.org/>
- OSMC <https://osmc.tv/>
- LibreELEC <https://libreelec.tv/>
- OpenELEC <http://openelec.tv/>
- Moode <http://moodeaudio.org/>
- piCorePlayer <https://sites.google.com/site/picoreplayer/home>
- Roon <https://roonlabs.com/>
- RetroPie <https://retropie.org.uk/>
- Xbian <http://www.xbian.org/>
- DietPi <http://dietpi.com/>
- RoPieee <https://www.ropieee.org/>

## Test procedure

Before a LOCO-V2 board is sold, it is tested on functionality and reliability. The LOCO-V2 is connected to a 24 V/120 VA power-supply, and the output power is measured by loading the LOCO-V2 with a white noise signal at 10 watts for 1 hour, and at 72 watts for ten minutes. If the LOCO-V2 passes these tests, all voltages are being measured at the regulators, at the filters, and at the capacitors. The output signal is being tested on noise and distortion. As finishing touch, music is played through the LOCO-V2 for one hour.

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