OpAmpX4

General Description

You can make various standard opamp circuits based on this PCB. It is hence not fixed to be used with one opamp circuit only, and you can add components according to your circuit.

With the PCB board you can build electronics for real applications, next to extending a potential test circuit from a breadboard. The PCB gives you a more reliable and stable circuit than a breadboard, lasting long time without wires dropping off or wire connections failing, as often with breadboards.

Technical Specification

Pinout	LM324
# OpAmps	4
Rails	+Vcc Ground -Vcc

Opamps are generally used for frequencies below 1 MHz. If you want to use frequencies above 1 MHz, you would normally not use opamps, but transistors in your circuit. - See our selection if boards with transistors for those alternatives.

The PCB design is not specifically limited to 1 MHz, but the long traces between the IC and the additional components can potentially limit some use cases.

The PCB is based on a IC with 4 opamps build in. Hence the X4.

The pinout follows the LM324 quad opamp: Datasheet - (LMx24, LMx24x, LMx24xx, LM2902, LM2902x, LM2902xx, LM2902xxx)

Shop, version 2: ufelectronics.eu/product/opampx4-v2/

Figure 1: Top side of the PCB

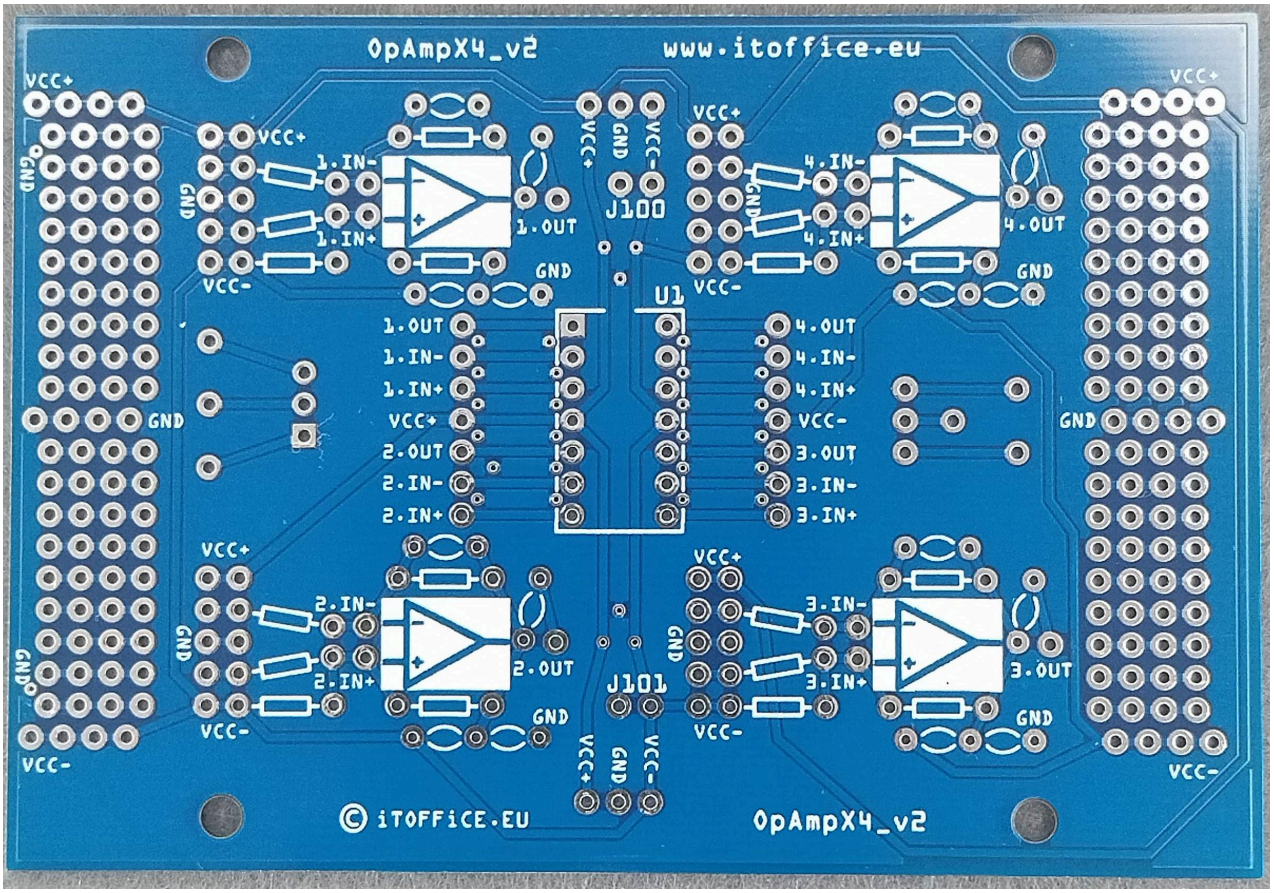

Fig. 1; Top side of the PCB. The image shows version 2.

Other pinouts than the LM324

Should you by accident have an opamp with another pinout, you're still covered.

You can use the pin rows left and right to the footprint of the opamp, together with an additional board that rewires the pins. This would probably be a perf board you cut out yourself. On it you would rewire the pins so they fit those on the main PCB.

This procedure opens up for using ICs with less numbers of opamps too, in case of you not having an IC with the LM324 pinout.

Bare in mind that we have a PCB for a single opamp too, based on the pinout of the LM741. This is PCB is named OpAmpX1.

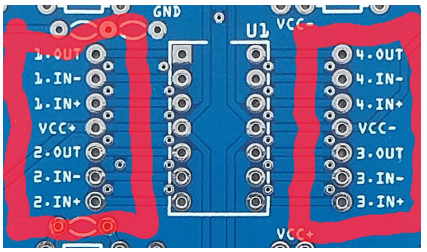

Fig. 3: Headers left and right to the IC, encircled by a red.

Single or double rail powered.

The board can be powered with a single or double power rail.

Around the IC you can see the symbol of four opamps depicted. The single opamps are numbered counter clock wise, starting with number 1 in the top left corner.

Between the opamp symbols number 1 and number 4 (top-right corner), you can find the pins for adding power to the board. That's where you can connect +Vcc, ground, and if wanted, -Vcc.

Between opamp number 2 and 3, you can find another power header. Both are connected with each other. Which one you use, is up to you and your preferences. - Maybe you want to use two PCBs and connect the power from the one to the second? - Maybe you have something else close by you want to power?

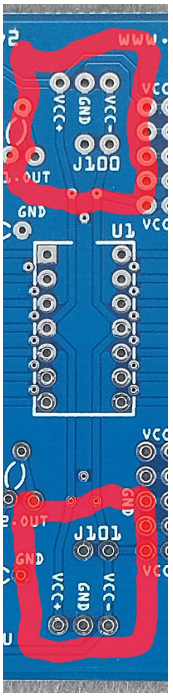

Fig. 4: Position of power pins above and below the IC, marked by red.

Double rail powering

Just follow the labeling of the pin headers +Vcc, GND and -Vcc.

Single rail powering

If you work with a single power rail only, you must take a look at the pin header J100, or the corresponding J101. Both are found just next to the power pin headers.

With these two pin headers, you can make a short between ground and minus Vcc. This makes -Vcc the ground.

The opamp pads / symbols

Around the IC you can see the symbol of four opamps depicted.

Each of those are equal in wiring around the symbol depicted. The single opamps are numbered counter clock wise, starting with number 1 in the top left corner of the IC.

The 10 holes on the left are horizontally connected.

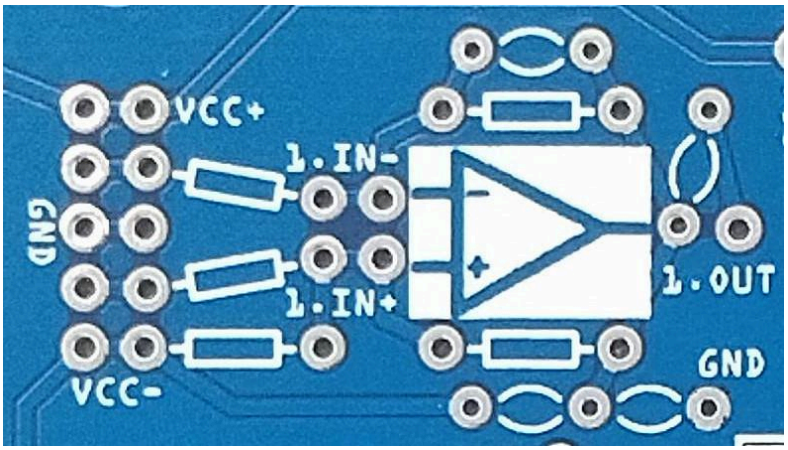

Fig. 5: Opamp pads.

- The two top are +Vcc.
- The next two are independent from anything, and serve for connecting any component.
- The next two are marked with GND.
- The next two are independent from anything, and serve for connecting any component.
- The last two are -Vcc. - Or if J100 / J101 is shorted, it will be ground.

In the middle of the image, just to the left if the opamp symbol, you will find five holes.

- The upper two are horizontally connected and represent the inverted input.
- The lower three are connected and represents the non-inverting input.

Just above the opamp symbol, you will find the space for a resistor, connecting the the output of the opamp with the inverting input. In parallel, above that, also a space for a capacitor. Again connecting the the output of the opamp with the inverting input.

Just below the opamp symbol, you will find the space for a resistor, connecting the the output of the opamp with the non-inverting input.

In parallel, below this resistor, also a space for a capacitor, connecting the the output of the opamp with either -Vcc or ground.

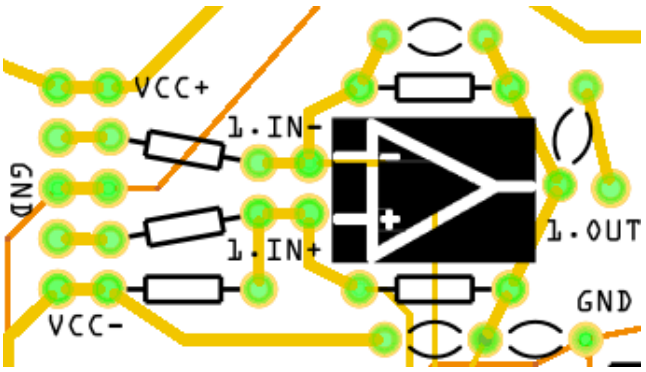

Fig. 6: Tracing around opamp padds

To the right of the opamp symbol, you will find space for adding a capacitor or resistor to the output of the opamp.

"Free Style" Area

To the left and right side of the PCB board you will find a "free style" area.

Here you can connect any components you like.

The holes are horizontally connected in groups of 4.

These two areas can for example serve for filters, or to group inputs and output into a connector / header for applications external to the PCB board.

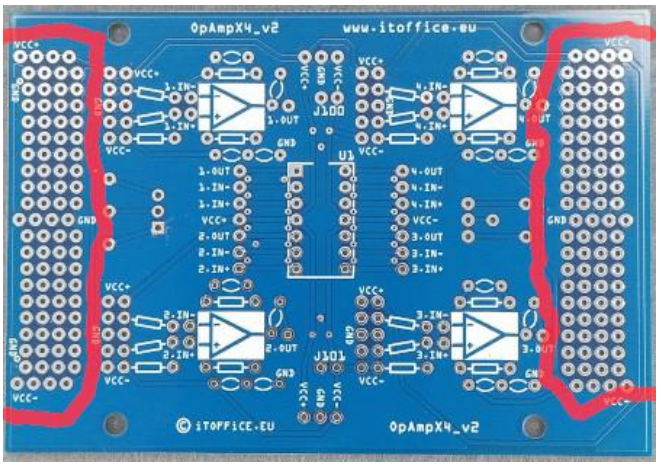

Fig. 7: The free style areas, marked with red.

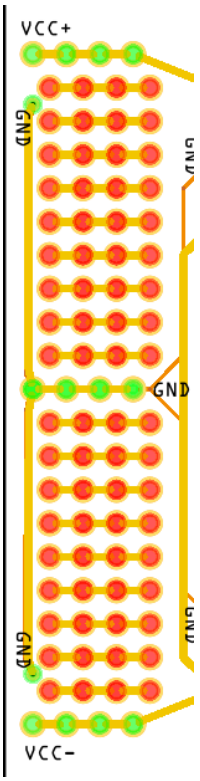

Fig. 8: Left side tracing.

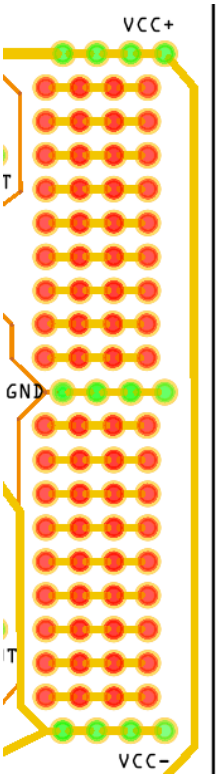

Fig. 9: Right side tracing.

Pads for pots / trim pots

In between on the board is there the possibility to adds trimpots or potentiometers of various footprints.

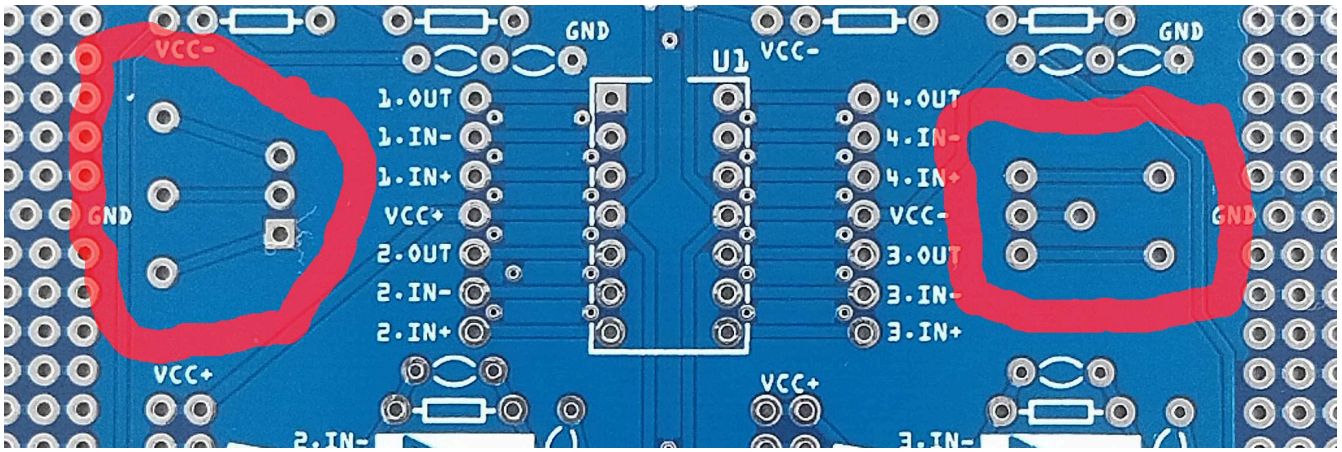

Fig. 10: The two areas for pots, marked with red.

Version 2 Notes

The ground plane is placed on the front side, which was not intended.

Version 3 Notes

The ground layer is on the backside.