Bipolar current driver

A bipolar current driver that can output up to 8A continouosly if you can cool it. It is based on the opa549 OPamp. The idea comes from the paper “Ultra-low noise and high bandwidth bipolar current driver for precise magnetic field control”, https://doi.org/10.1063/1.5046484. Have fun.

Up to now it has only been tested for current up to 1A and in the electronic workshop.

Date

Start of the project: Middle of 2021

Author

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Anwender

None, so far.

Schematic and layout

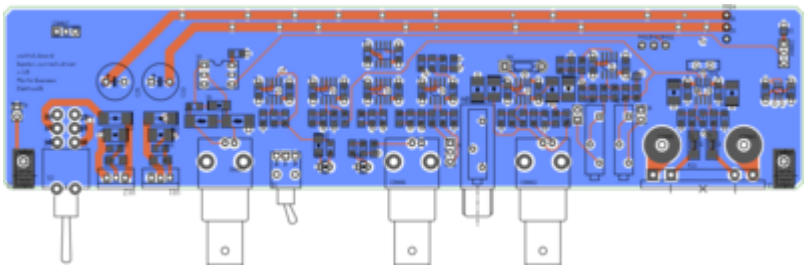
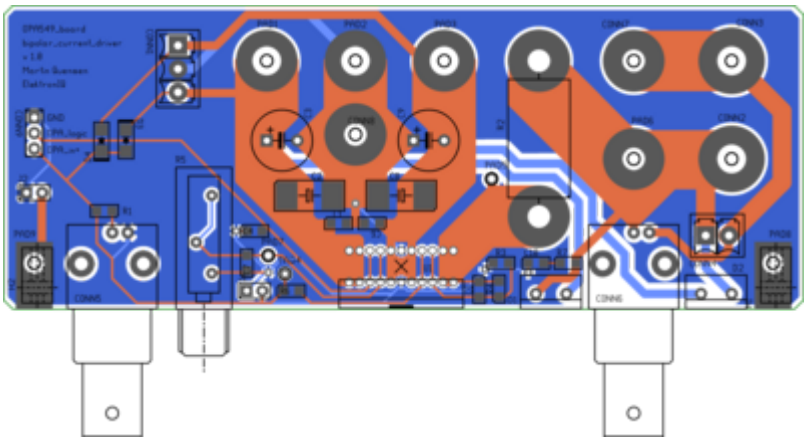
A OPA549 gives out some current that is send through some device (e.g. a coil) and finally a reference resistor. The voltage drop there is measured with an instrumentation amplifier. At an OPamp in PI-controller circuit it is compared to a setpoint signal and the “error signal” is then proportionally amplified and integrated over. The resulted voltage is now applied at the OPA549, that is in non-inverting amplifier configuration. The setpoint signal can be applied via BNC, and there is also the option to use a trimmer for a constant offset.

The OPA549 features a logic signal to shut it down, and a pin for setting a current limit. Both functions are implemented.

The layout is designed as two boards. One for the control (reference resistor, PI OPamp, instr. amps …) and the other for the OPA549.

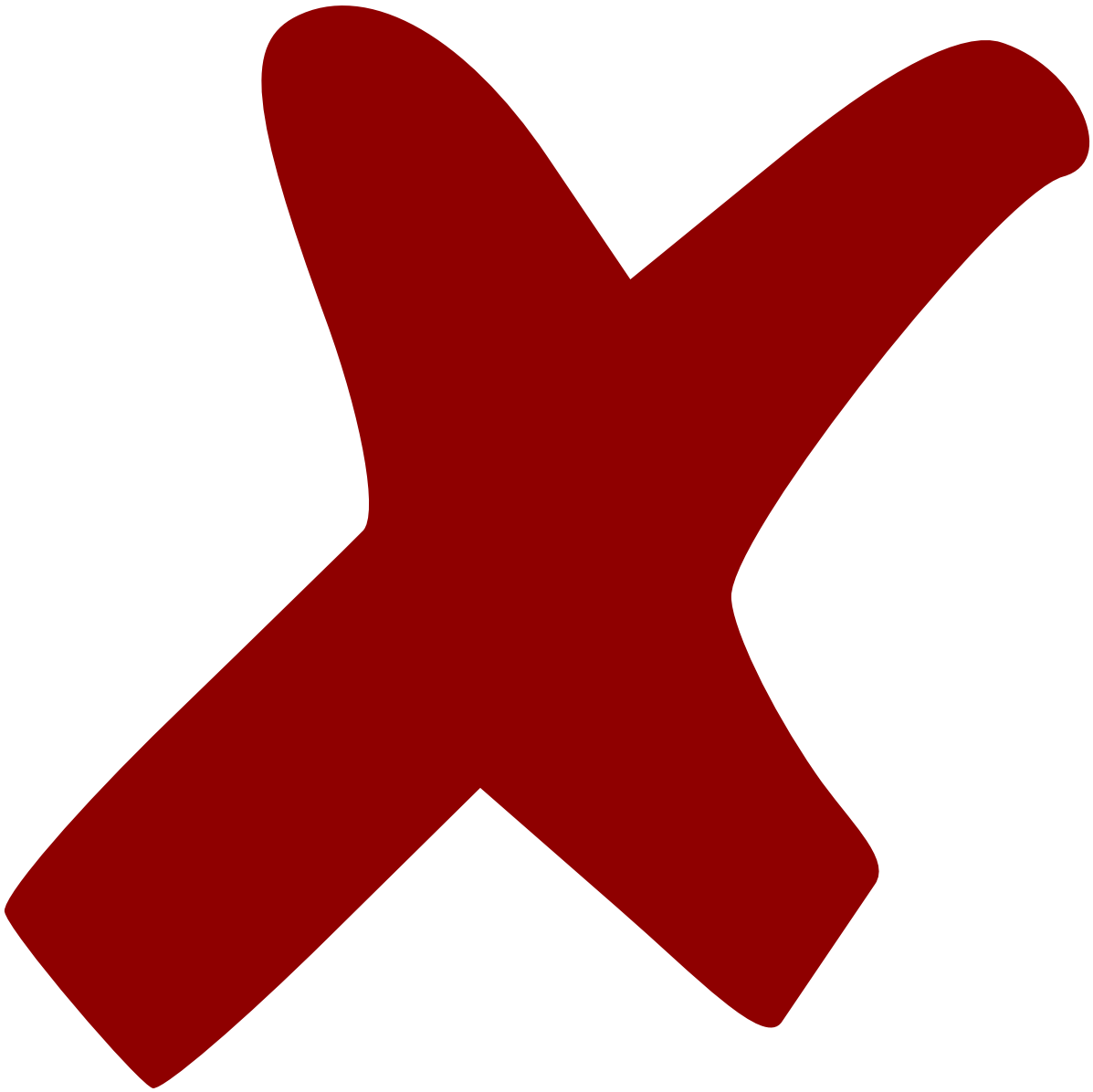
It is meant to fit inside a standard 19“ 1 HE casing.

- Schematic of control board
- Schematic of OPA549 board

- 
- 
- Git: Here

Issue list

What to improve: (



: discarded,

: at work,

: done

😎)

- There are too many pads for the output current. Not needed.
- The PI-controller OPamp has a pin distribution that does not fit to its footprint, I think.