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Low Noise Power Module

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LIGO Scientific Collaboration

This is an internal working note  
of the LIGO Laboratory.

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## 1 Introduction

The low noise power module is a standard power entry module for chassis designs. It generates  $\pm 15\text{V}$  from  $\pm 16.5\text{V}$  (or higher) of up to 1A. It also provides a +5V for supporting a TTL and CMOS interface.

This is meant to be a three board solution:

1. The first board implements the actual function and is attached to the front panel. The board gets its power and controls through flat ribbon header(s) with a board specific pin-out.
2. The second board is the low noise power module. It uses Paul's low noise and low drop-out design to generate  $\pm 15\text{V}$  from  $\pm 16.5\text{V}$  or higher. It only requires a voltage drop of 100mV for an output current of 1A. It has a side connector of type C DIN. The power transistors are mounted to the rear panel for cooling. It also provides VCC for supporting TTL and CMOS logic gates. Noise measurements are in Figure 1. The schematics and PCB files can be found at [D0901846-C](#). The results of an earlier evaluation of different types of power supplies can be found at [T070034-A](#).
3. The third board is an interface board which connects to the power board through the DIN connector and takes the right half of the rear panel. It includes rear panel D-sub connectors for controls and monitoring as well as the corresponding flat ribbon header(s).

Pros:

- "Standard solution." All common voltages are readily available.
- Regulators are accurate, quiet, low drop and fast.
- Chassis serves as heatsink. Can supply relatively high currents.
- Leads to a very simple chassis assembly. The interface board is typically just wiring, so one can solder one by hand quickly.
- Access to a low noise, medium current voltage reference; both  $\pm 10\text{V}$  are available.
- Under-voltage monitor, LEDs, and crossbar diodes for reverse polarity "protection".

Cons:

- The power board needs  $\pm 24\text{V}$  and  $\pm 16.5\text{V}$  to take advantage of the low drop out design. In reality, anything above 15.1V will work, assuming the thermal envelop is not exceeded. However, single supply rail supply can be achieved by applying  $\pm 18\text{V}$  or higher to the  $\pm 16.5\text{V}$  inputs only.
- The power board takes half the rear panel in a 1U chassis. One can still fit two 37 pin D-sub in the remaining right half, so.
- Probably overkill in most cases.
- Currently no switches nor fuses.

## 2 Performance

The noise performance is summarized in Figure 1.

# Low Noise Power Supply

