SEISMIC INDUSTRIES

IPS

DIY Workshop – Interruptible Power Supply

Raffael Segmüller - © by Seismic Industries
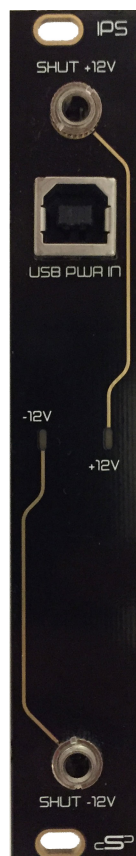
Table of Contents

1 Module Description

The IPS Module is basically a small eurorack powersupply that comes with its own babybusboard. It can convert any incoming 5V Voltage Source to +/- 12V for eurorack.

Additionally the shutdown inputs of it's switching regulators are accessible on the frontpanel if the according jacks are mounted.

The board can also be mounted inside a case with It's mounting holes, so you don't have to spend the 4HP for the PSU. In this case just don't solder the Jacks and the USB connector. There are solderpads on the IPS board that allow you to directly connect wires for the 5V to the board.

Then you can easily mount the IPS board somewhere inside your case.

SHUT +12V: if a signal higher than 1V is present here then the positive regulator will be shut down. (note: it's a boost regulator, the incoming 5V will still be present at the output)

USB PWR IN: Input for powering the IPS via USB.

SHUT -12V: is the equivalent shutown input for the negative voltage regulator.

2 Circuit Description

The circuits on the IPS consist of two independent switching regulators from "Linear Technologies", LT1930 & LT1931.

These regulators deliver the "high" output powers out of a SOT-23 case. Fast switching frequencies of 1.2MHz allow the usage of small inductors and capacitors around them.
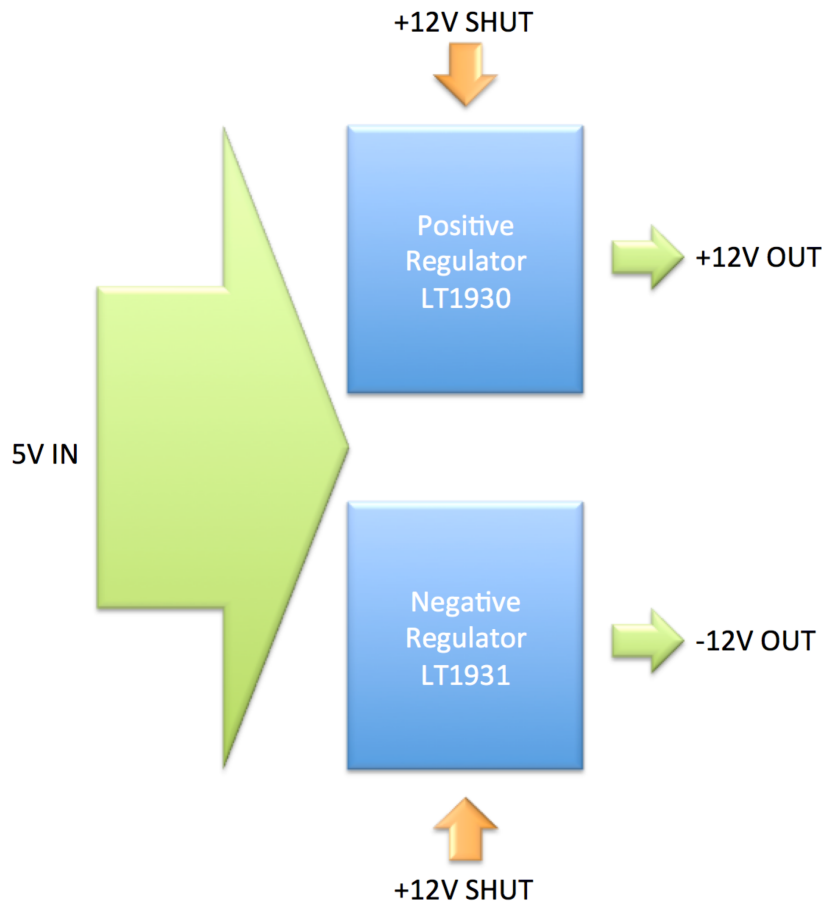
2.1 Positive Regulator with LT1930

The positiv regulator is made with the LT1930 from Linear technologies. This Is a small and modern regulator that needs only a few external components.

A BC847 is connected to invert the active low input condition of the shutdown terminal. And to provide access to this feature via the frontpanel.

2.2 Negative Regulator with LT1931

The LT1931 is the companion of the LT1930 to realize inverting power supplies. The circuit uses a 10uH Sumida Transformer to generate it's output voltage.

Here also a BC847 is inserted to invert the shutdown criteria for the regulator, and also the according jack to access this function via the frontpanel.

3 Build Instructions (generic)

3.1 Tools

Make sure you have the following tools ready:

- Soldering Iron
- Solder wire, solder wick
- Tweezers
- Side cutting plier (to cutout the PCB and frontpanel)
- Sanding Paper (for smoothing the cut edges of the PCB and frontpanel)

3.2 Build up sequence

To build the kit you preferably start with the SMT components and then move on to the bigger THT ones. Mount the SMT components from the inside of the board towards the outside.

A possible (generic) build up sequence is:

1. Semiconductors (like IC's, Transistors, …) **(Warning: the LT19xx regulators cannot take a lot of heat, so solder them carefully and not to long)**
2. Ceramic Capacitors
3. Resistors
4. Inductors
5. Electrolytic Capacitors
6. Power Connector
7. Jacks
8. LED's
   a. Cutout the frontpanel and "premount" it with loosely tightened knurled nuts to define the length of the LED's legs
   b. Solder and cut the legs
   c. Remove the frontpanel
9. Potentiometers
10. Mechanical   (test your module first before mounting the frontpanel))
    a. Mount the frontpanel
    b. Tighten the knurled nuts of the jacks
    c. Fasten the knobs of the potentiometers

3.3 Power Connection

Connect the 10-pin ribbon cable like this:
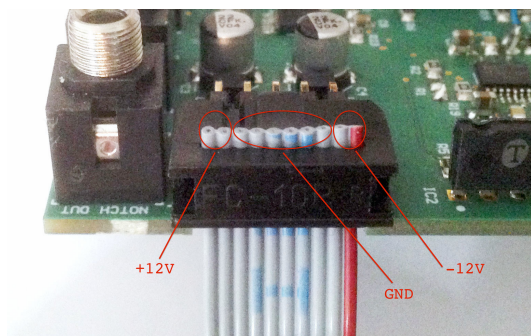
IMPORTANT:

The red wire usually carries the -12V Signal in Eurorack synthesizers. Doublecheck your power rails before powering the module up. **Power inversion will destroy your module.**

4 Calibration / Test Procedure

4.1 Calibration

No calibration is needed for the IPS.

4.2 Solder Bridges

The two solderbridges on the bottomside of the IPS board determine wheter the input signal from the jacks is fed to the shutdown terminals of the regulator or not.

- Solder the middle terminal with the one with the dot to use the jacks. (normal)
- Solder the middle terminal to the other pad to bypass the jack and always ground the shutdown input.

4.3 Test module inputs

- Check if +/-12V are present on the output with a voltmeter.
- To check to shutdown inputs of the IPS board connect some voltage greater than 1V to them (for example: Squarewave with PWM possibility of an LFO)
    - o The LED of the positive regulator will dim (5V still present)
    - o The LED of the negative regulator will turn off.

4.4 Modulation / Power starving

It is a very experimental approach to alter/modulate the power rails of a connected module. However it can give you very experimental results.

We suggest you to use a squarewave with control over it's pulsewidth to modulate to switching regulators. This allows you to choose a modulation frequency that does not introduce to much ringing, and also allows you to regulate the output voltage continuosly with the pulsewidth.

The modulation of the supply voltages is "relatively" a save operation as long as you don't raise the voltages over the nominal level. And also as long as you do not invert any voltage levels. The IPS does neither of this. It only allows you to switch on/off the voltages, or regulate them downwards.

But we do not take any responability of the effect that the modulation of the outputvoltages can have over your modules.

5 Schematic
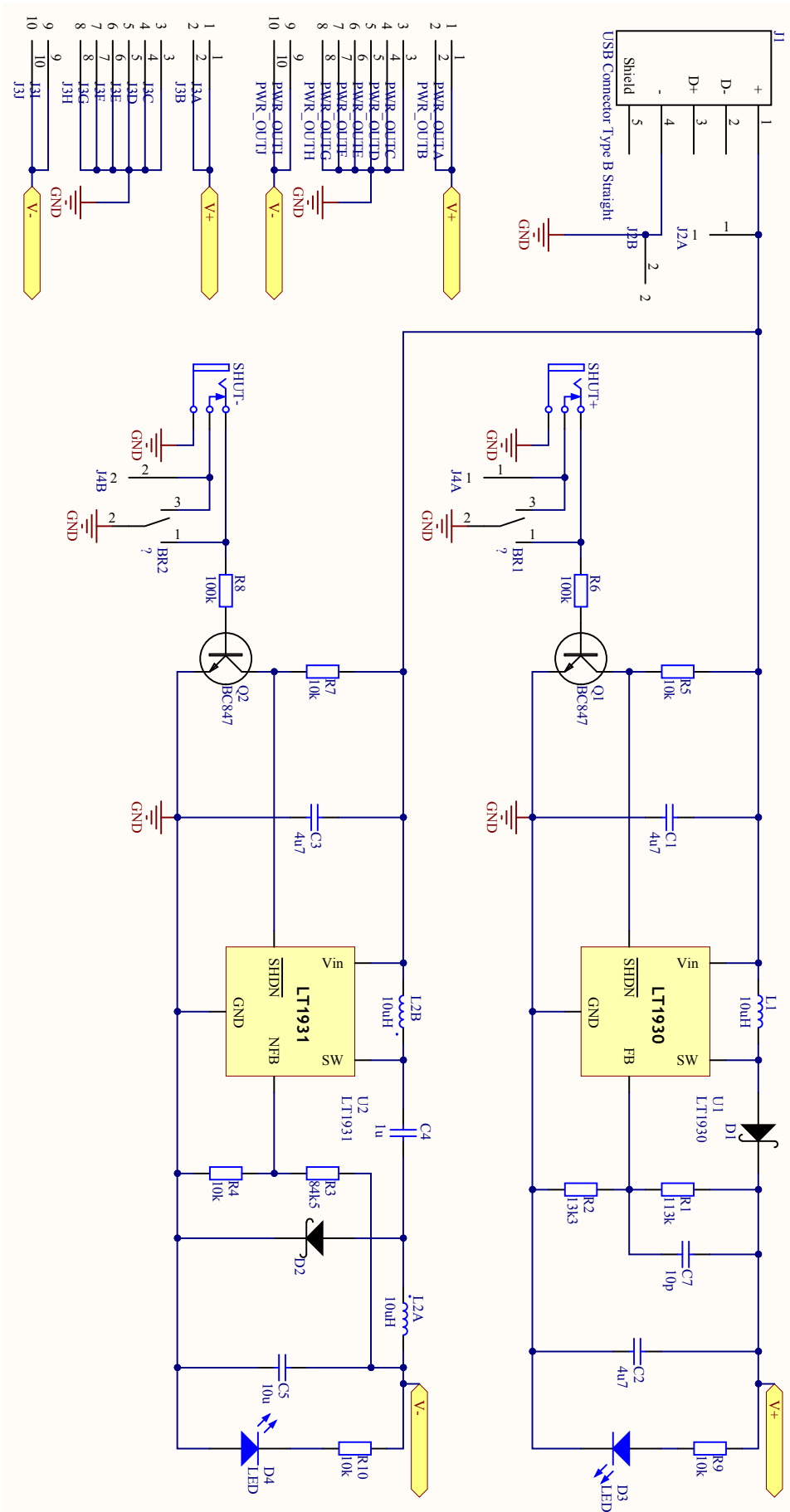
6 BOM

Comment	Designator	Qty	Value	Supplier	Farnell Part Nr	Mouser Part Nr
LT1931	U2	1		Farnell	1663807	
LT1930	U1	1		Farnell	1663805	
Phonejack	SHUT+, SHUT-	2		Qinpu		
Resistor	R6, R8	2	100k	?		
Resistor	R4, R5, R7, R9, R10	5	10k	?		
Resistor	R3	1	84k5	?		
Resistor	R2	1	13k3	?		
Resistor	R1	1	113k	?		
BC847	Q1, Q2	2		Mouser		512-BC847BMTF
Pinhead 10Pole	PWR_OUT	1		Farnell	1593451	
Inductor SUMIDA CLS62 100	L2	1	10uH	Mouser		851-CLS62NP-100NC
Inductor SUMIDA CR43 100	L1	1	10uH	Mouser		851-CR43NP-100MC
Pinhead 10PoleSMD	J3	8		Farnell	2381223	
Pinhead 2Pole	J2, J4	2		Farnell	1593451	
USB Connector Type B	J1	1		Mouser		806-KUSBVX-BS1N-B
LED	D3, D4	2		Mouser	1716696 old part	859-LTW-420D7
MBR0520	D1, D2	2		Mouser		863-MBR0520LT1G
Capacitor 0805	C7	1	10p			
Capacitor 1210	C5	1	10u			
Capacitor 1210	C4	1	1u			
Capacitor 1210	C1, C2, C3	3	4u7			

7 Pick & Place