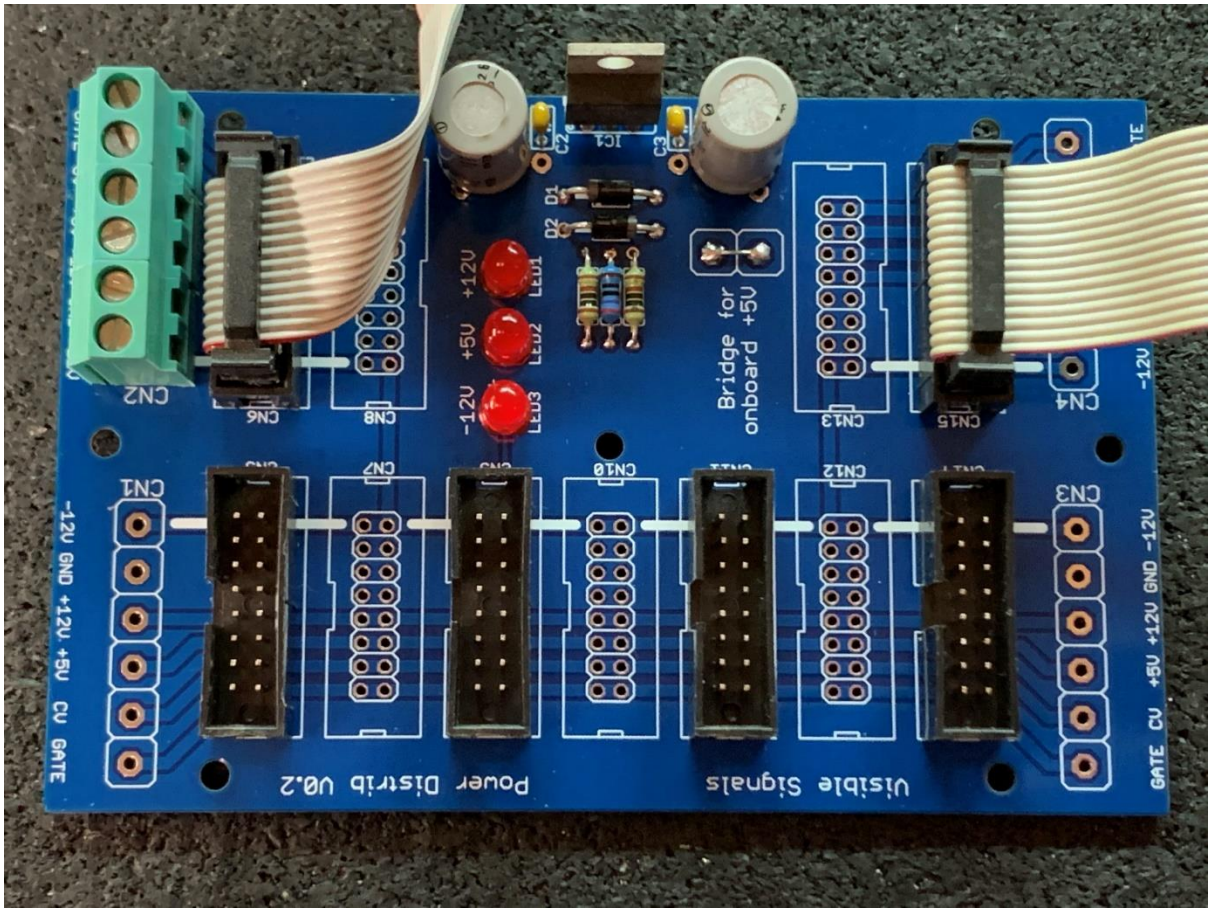
Visible Signals

Power Distrib

DIY Synthesizer PCB for eurorack

Manual V0.2a



Power Distrib is a bus board for power distribution in a eurorack modular system. It features eleven 16-pin power connector sockets, an optional on-board +5V regulator, power rail indicator LEDs and four heavy-duty screw or solder-type connection points to support star or chained power distribution topologies.

All Visible Signals manuals include a version number, which corresponds to the version number printed on the PCBs, plus a revision letter. Please make sure the manual you use has the same version number as your PCBs! Contact info@visiblesignals.net if you can't find the right manual.

Suggested Build Order

The capacitors (both types), diodes and regulator IC1 are all optional and are only required if you want an on-board +5V regulator derived from the +12V supply. See Design Considerations below for more information.
The resistors and LEDs are also optional and can be omitted if you don't want on-board indication for the power supply rails.

RESISTORS

	Part	Value		Part	Value
☐	R1	1K	☐	R2	240R
☐	R3	1K			

DIODES

Make sure the diodes are the right way around with the line matching the silkscreen.

	Part	Value		Part	Value
☐	D1	1N400x	☐	D2	1N400x

MLCC CAPACITORS

	Part	Value		Part	Value
☐	C2	100n	☐	C3	100n

LEDs

	Part	Value		Part	Value
☐	LED1	Red	☐	LED3	Red
☐	LED2	Red			

EURO POWER CONNECTORS

Make sure to align the connectors to match the silkscreen. The two rows of connectors do not have the same orientation! You can populate as many or as few as you want or need in your system.

	Parts	Value
☐	CN5 – CN15	16-pin headers (shrouded)

ELECTROLYTIC CAPACITORS

Make sure the long legs go in the hole marked with a '+' (closest to the centre of the PCB). The PCB supports various pin spacing from 0.1" (2.54mm) upwards.

	Part	Value		Part	Value
☐	C1	10uF+	☐	C4	10uF+

TERMINAL BLOCKS

The terminal blocks shown in the photo are optional – you can solder wires directly if you prefer. Usually one or two terminal blocks will be enough, unless this board is the hub of a 'star' distribution topology.

	Parts	Value
☐	CN1 – CN4	6-pin, 5.08mm spacing

IC REGULATOR

The +5V regulator will almost certainly need a heatsink.

	Part	Value
☐	IC1	7805 TO-220 (or TO-3 mounted off-board)

Design Considerations

Before you even buy the components to populate this board it's a good idea to plan how the power distribution will be organised in your case.

How many boards?

In general, one board per 84HP/3U is recommended, but if there are a lot of 4HP (or smaller) modules then two (one on each side of the case) may be advisable to help reduce power cable clutter. Work out how many shrouded power headers will be required on each board, then add a couple more as spares for the future 😊

On-board +5V regulation

The VSig power distribution board's +5V regulator is a basic linear design that is suitable for low to medium demands (up to around 500mA). If your modules draw significant current from the +5V rail then a dedicated external supply will be necessary.

NOTE
Unless you're drawing 100mA or less on the +5V supply rail the TO-220 7805 regulator will get hot and a heatsink is required to stop it from failing prematurely.

If the on-board +5V regulation is not required then you can omit the capacitors (C1-C4), the diodes (D1/D2) and the 7805 regulator (IC1) altogether.

If you do use the on-board +5V regulator then you must solder a wire across the +5V Bridge pins to connect the regulator to the +5V pins on the board's euro power connectors.

WARNING!
Do NOT connect the +5V regulators of two distribution boards to each other, or to a power supply that already has a +5V supply! Each board must only get +5V power from one source!

Distribution topology

If you have a bigger system with multiple distribution boards all connected to one supply then a star topology or a hub-and-spoke topology might be required. Work out how the boards will be connected to each other and to the main supply, and this will help determine how many terminal blocks each board will need to have for connecting to other power distribution boards. It's also often fine to put multiple wires into the same terminal block.

When wiring boards together you will always need +12V, Ground and -12V connected. Whether or not you connect +5V between boards will depend on how the +5V rails are set up (see above).

WARNING!
Do NOT connect the +5V regulators on two distribution boards to each other, or to a power supply that already has a +5V supply! Each board must only get +5V power from one source!

The last two pins on the eurorack power connector are used sometimes used for Gate and CV (in an audio system) or horizontal and vertical video sync (in a video system). Depending on how you want your system to work you may or may not decide to connect these signals between distribution boards.

Supply Rail Indicator LEDs

In a bigger system it's unlikely every board will need its own supply indicator LEDs, but they can be handy to see immediately if something is wrong on one board. The choice is up to you 😊

Bill of Materials

Parts marked with an asterisk are frequently used in Visible Signals modules, so consider stocking up if there's a quantity discount available.

Type	Value/Description	Qty	Vendor	Part Number	*	Notes
Terminal Block	6-pin 5.08mm spacing	4	Mouser	490-TB002-500-06BE		(optional) Or similar
Pin Header	Pin Header 8x2	11	Mouser	710-61201621621		Shrouded
PCB	Power Distrib PCB	1	Visible Signals	PDST		
Capacitor	100n	2	Mouser	594-K104K15X7RF53K2	*	(optional)
Electro Capacitor	10uF	2	Mouser	80-ESL106M050AC3AA	*	(optional)
IC	7805	1	Mouser	833-MC7805CT-BP		(optional) TO-220 package (or TO-3 mounted off-board)
LED	Red	3	Mouser	941-C503BRCNCW0Z0AA2		(optional) Choose your own colour and size!
Resistor	1K	2	Mouser	603-MFR-25FBF52-1K	*	(optional) Or pick a value to suit the LED
Resistor	390R	1	Mouser	603-MFR-25FBF52-390R		(optional) About 40% of the other resistor's value
Diode	1N400x	2	Mouser	750-1N4001-G	*	(optional) Any part like 1N4001, 1N4004, etc is fine

Don't forget you'll need some way to mount the distribution board(s) in your rack. The stand-offs I use are Mouser 855-R30-9401000.