

Visible Signals

1LV LeVel

DIY Video Synthesizer module for eurorack

Manual V0.2a

1LV LeVel is a 6HP 1U tile for manually scaling the level of video-rate signals in a eurorack video synth anywhere from zero (0V) up to double the input voltage.

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.

Recommended Build Order

Start with the rear board: first the IC, then the smaller (unlabelled) capacitors, then the inner-most resistors and ferrite bead.

<input type="checkbox"/>	<u>Part</u>	<u>Value</u>	<input type="checkbox"/>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/>	IC1	LM6172	<input type="checkbox"/>	R2	1K
<input type="checkbox"/>	C3	100n	<input type="checkbox"/>	R3	1K
<input type="checkbox"/>	C4	100n	<input type="checkbox"/>	L2	Ferrite bead

The diodes (unlabelled) and the last resistor and ferrite bead. Make sure the diodes are the right way around – the arrow points towards the end of the diode which has the line on it.

<input type="checkbox"/>	<u>Part</u>	<u>Value</u>	<input type="checkbox"/>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/>	D1	1N400x	<input type="checkbox"/>	R4	1K
<input type="checkbox"/>	D2	1N400x	<input type="checkbox"/>	L1	Ferrite bead

NOTE! Do not populate (solder) R1. It is not needed!

Solder the power header. See below for a note about the Pulp power connector.

<input type="checkbox"/>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/>	J1	5x2

Electrolytic capacitors. Make sure they are orientated correctly, with the longer leg in the hole marked with a “+”.

<input type="checkbox"/>	<u>Part</u>	<u>Value</u>	<input type="checkbox"/>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/>	C1	10uF	<input type="checkbox"/>	C2	10uF

Leave the interconnect pin headers for now and move to the front board instead.

<input type="checkbox"/>	<u>Part</u>	<u>Value</u>	<input type="checkbox"/>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/>	R5	100K	<input type="checkbox"/>	R7	499R
<input type="checkbox"/>	R6	499R			

Sockets and the tall trimmer pot. Insert them into the front panel before soldering, to make sure they are properly lined up – especially the shaft of the pot which ideally should not rub against the sides of the hole in the front panel.

<input type="checkbox"/>	<u>Part</u>	<u>Value</u>	<input type="checkbox"/>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/>	S1	PJ301M	<input type="checkbox"/>	VR1	B10K ~ B100K
<input type="checkbox"/>	S2	PJ301M			

Finally plug the three interconnect header/socket pairs together and fit them into the boards as you solder them (I usually use a small rubber band to hold the boards and interconnects together until I have soldered a couple of pins on each board). The headers/sockets are soldered on the opposite sides of the PCBs to all of the other components, so when the boards are done the ‘solder’ sides of the boards are on the inside, facing towards each other.

<input type="checkbox"/>	<u>Part</u>	<u>Value</u>	<input type="checkbox"/>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/>	J1	4x1	<input type="checkbox"/>	H1	4x1
<input type="checkbox"/>	J2	4x1	<input type="checkbox"/>	H2	4x1
<input type="checkbox"/>	J3	4x1	<input type="checkbox"/>	H3	4x1

Module Use

The 1LV is a simple attenuator/booster circuit, used for manually scaling a video CV between 0V (off) and 2x gain (doubling). This is very handy when you have a module with an input with no level control, or when you want a quick and easy way to take a non-video signal and convert it down for use with video modules.

Circuit Details

The circuit for the 1LV is a pair of non-inverting op-amps, with the level adjust pot acting as a voltage divider in between them. The second op-amp has a boost resistor (R4, 1K) which doubles the input voltage after it has been attenuated by the level pot. If you want to change the gain the formula to use is $\text{Gain} = 1 + (R4 / 1K)$. If you leave out R4 altogether then the module gives unity gain at the fully clockwise position.

R1 Clipper Mod

R1 controls the boost of the input op-amp which appears in the circuit before the variable resistor. To configure 1LV as a (fixed voltage) clipper then populate R1 instead of R4, to result in an amplified the input signal that will be clipped when it reaches the op-amp's voltage rails (less about 1.4V, equal to two diodes). The variable resistor can then be used to attenuate this clipped signal back down to a more usable level.

The formula for the input gain is $\text{Gain} = 1 + (R1 / 1K)$, so the most usable clipping results are for values between about 1K and 20K.

Pulp Power Connector

Oops... the three power pins for the Pulp power connector (a "Futaba J" type) are in the wrong order on the version 0.2 1LV rear PCB. Sorry about that – I didn't have access to a Pulp case for testing 😞 Please use the standard eurorack 5x2 power connector and cable instead. This will be fixed on a future board revision.

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.

<u>Type</u>	<u>Value/Description</u>	<u>Qty</u>	<u>Vendor</u>	<u>Part Number</u>	<u>*</u>	<u>Notes</u>
Capacitor	100n	2	Mouser	594-K104K15X7RF53H5	*	
Diode	1N400x	2	Mouser	750-1N4001-G	*	Any part like 1N4001, 1N4004, etc is fine
Electro Capacitor	10uF	2	Mouser	80-ESL106M050AC3AA	*	
Ferrite bead	Ferrite bead	2	Mouser	623-2743001111	*	
IC	LM6172	1	Mouser	926-LM6172IN/NOPB	*	
PCBs	1LV PCB set	1	Visible Signals	1LV		
Pin Header	Pin header 5x2	1	Mouser	855-M22-2020546	*	Not Shrouded (won't fit!)
Pin Header	Pin header 4x1	3	Mouser	523-G800W304018EU		Or get a single 40x1 and snap off just what you need
Pin Socket	Pin socket 4x1	3	Mouser	200-SSQ10404TS		These are much, much cheaper from Tayda!
Resistor	1K	3	Mouser	603-MFR-25FBF52-1K	*	
Resistor	499R	2	Mouser	594-5063JD499R0F	*	
Resistor	100K	1	Mouser	603-MFR-25FBF52-100K	*	
3.5mm socket	PJ301M	2	Thonk	PJ301M	*	Thonkiconn Vertical mount. With washers and nuts!
Variable Resistor	B10K/B25K/B50K/B100K	1	Thonk	Tall Trimmer 9mm Pot		Any of those values are fine!
Knob	Tall Trimmer Topper	1	Thonk	Tall Trimmer Topper		Choose your own colour