DUAL UNDULA OSCILATOR
Build document

This kit is intended for experienced users. Not that the construction is difficult, but the module requires a calibration which is delicate.
The document therefore omits the soldering details that an experienced user will find unnecessary anyway!

Remember to read the doc. For the options: it's worth doing it during construction

KIT CONTENTS :

The kit contains :

- Aluminium front panel x1
- Main PCB x1
- Voice PCB x2

The kit does not contains screws to fixe your module into your case, and the PSU cable.

Soldering of components
Most of the components are already soldered to the PCB, there are only a few elements left to be soldered by you.

BOM

VOICE CARD (number for the two PCB)

- Trim 5K multitours. (3296P-1-502LF) x2
  Others version of the component can be used like vertical version : 3296W-1-502LF
  But choose only a 5K version (otherwise you won't be able to adjust properly 1V/Oct)
- 1.5nF (example : R82EC1150Z350J) x8
- 10uF (example : ECE-A1VKS100/160560) x4
- Pinheader 1X6 x2
- Pinheader 1X8 x2

You can ask for a PCB without the AS2164, if you prefer to put another component in it.
(V2164 or SSM2164, or other compatible clones)
The same goes for the 3 TL074, for those who want different Opamps.
But both (TL and AS) are soldered by default.

MAIN PCB :

- 10uF (example : ECE-A1VKS100/160560) x4
- 2x5 Pin Header (example : PH2-10-UA Adam Tech) x1
- Socket 1X6 (example : RS1-06-G) x2
- Socket 1X8 (example : RS1-08-G) x2
- Pinheader 1x3 x2
- JUMPERS (example : STC02SYAN) x2

- 220nF x1
- 470nF x1

For these two components, you can choose others values, feel free to test.

It changes the LFO frequency, and the AD envelope time range.
With pin spacing of 0,197po (5,00mm)

- 3,5mm MONO Jacks (**Thonkiconn**) x26
- LEDS WP424SURDTK Kingbright x2
  3mm, T-1
  1,95V, 20mA
  You can use other type of LED, other color or not with a flat tip,
  but the LED must have the same characteristic.
- SWITCH 2 Positions (SPDT ON-ON) x3
  Use small version, with 2,54mm (0,100 po) between pin.
  Depending on your tast, You can use long or small acivator :

  Type 200MSP1**T1**B1M2QEH, long activator: 200MSP1T1B1M2QEH
  Type 200MSP1**T2**B1M2QEH, short activator: 200MSP1T2B1M2QEH

- 100Kohm potentiometers - linear (ALPHA 9mm Pots, or compatible) x10
- 100Kohm potentiometers - linear (9mm Trimmer Pots) x10
- 1Mohm potentiometers - linear (9mm Trimmer Pots) x3
- Knobs x10
  Use same Shaft as your Pots : D-Shaft, T-18 or Round.
  Davies, SIFAM or others styles as you prefer.
  You can use the same diameter, or two different diameters, as the original module.
  Color as you prefer. (The original module uses whit, black and light grey)
- HEX STANDOFF M3X0.5 ALUM 11MM (M1258-3005-AL) x2
- M3 screw (the same you need to fix the moule into your case x4

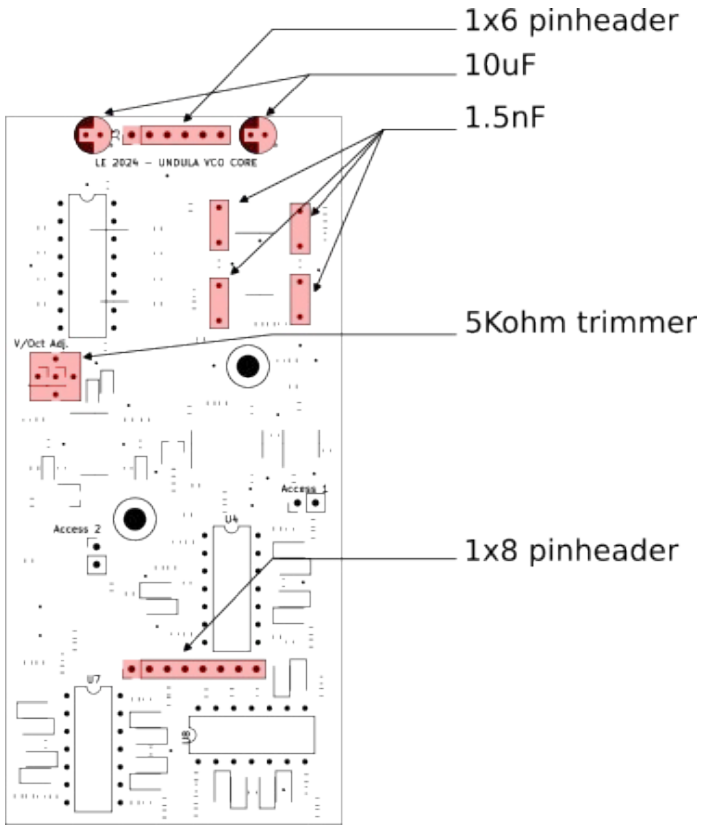
(Standoff are optional, but recommended, especially if you will travel with your case)

Note :
1Mohm pots : *I prefer linear, but you can choose log instead.*
These pots controles the LFO frequency and the attack and decay of the envelope, that are often controlled by log. Pots.

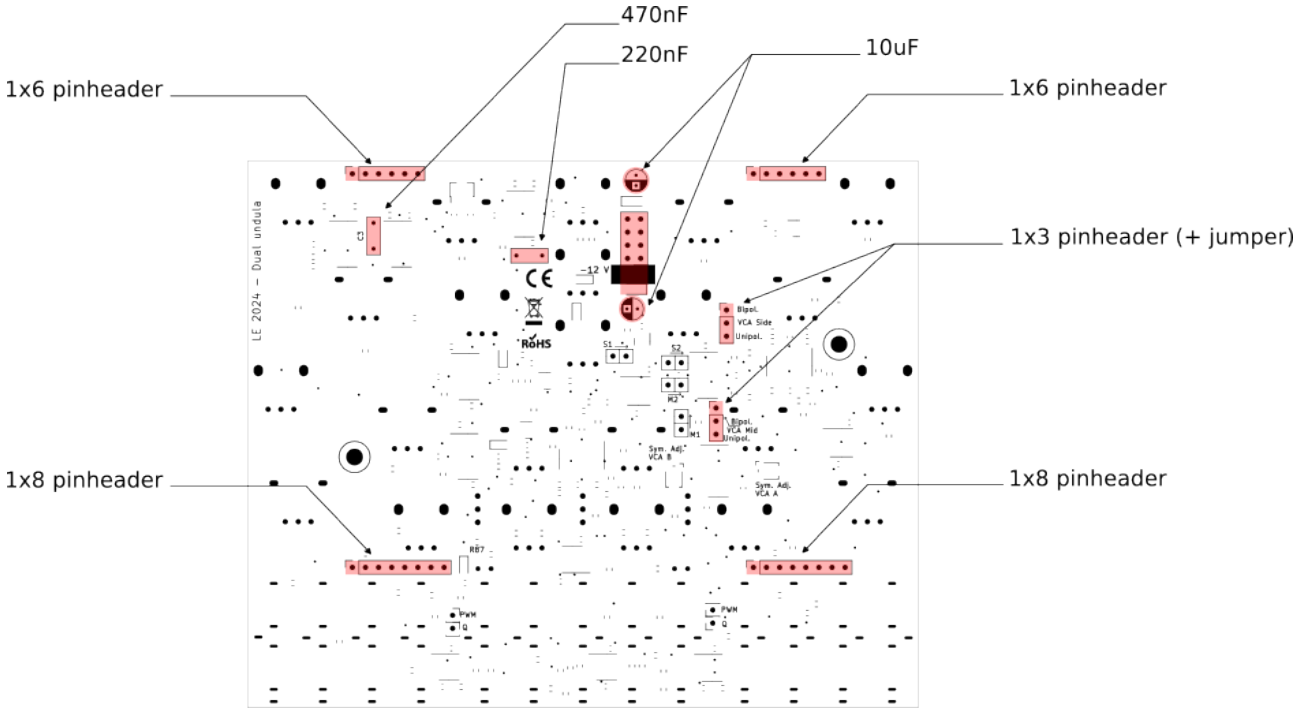
All trimmmer Pots : *You can use ALPHA pots, with small caps instead. It will fit the PCB and from panel holes.*

about the pin headers :
You can use right-sized components, or cuttable bars like these ones :
https://www.digikey.fr/fr/products/detail/te-connectivity-amp-connectors/146851-2/5008965
https://www.digikey.fr/fr/products/detail/te-connectivity-amp-connectors/5-146850-1/2275964
Even more : For the PSU connector. Instead of buying two row pinheaders, you can by only the one row. The two row is simply two time the one row !

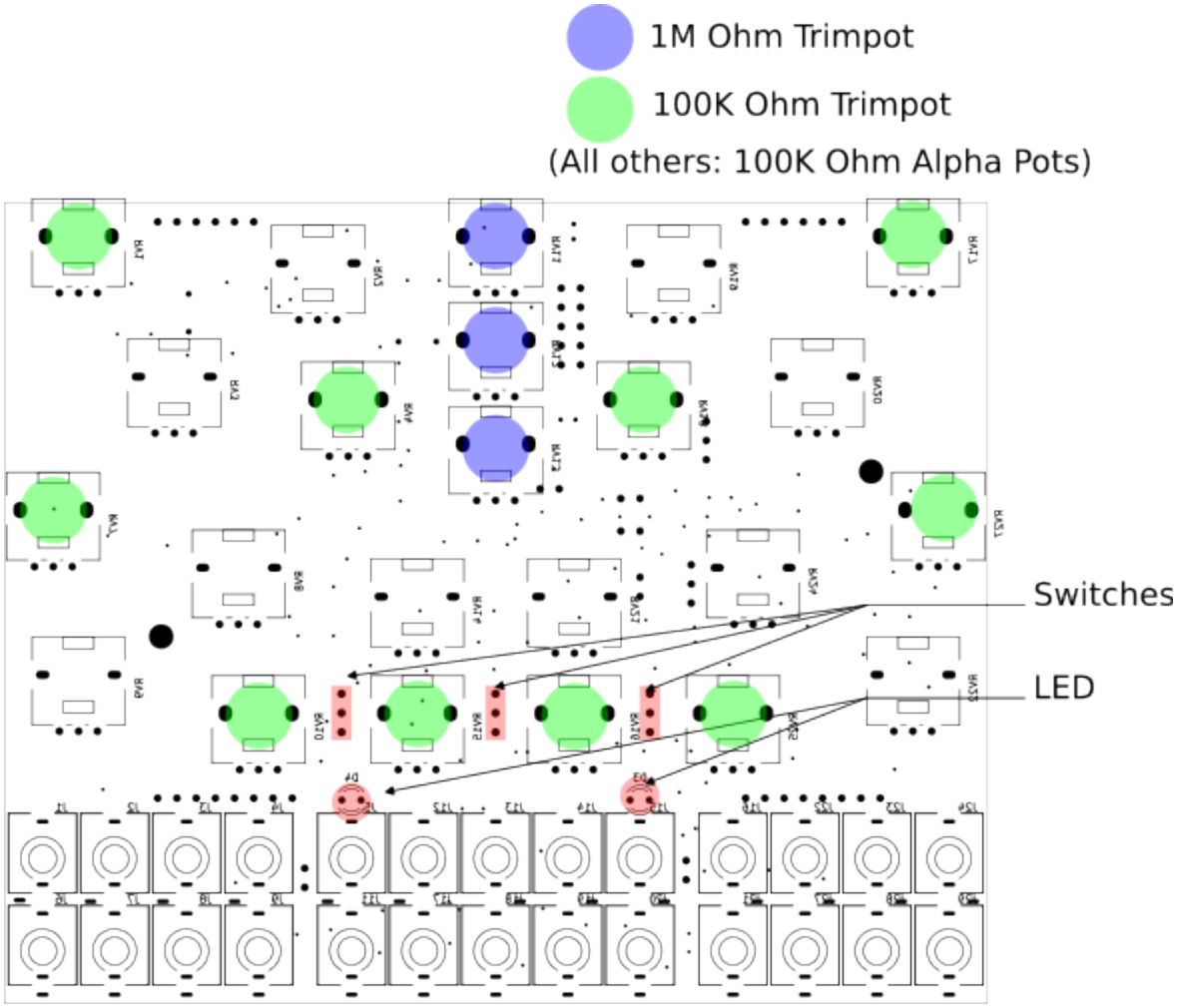
THE TWO VOICE PCB :



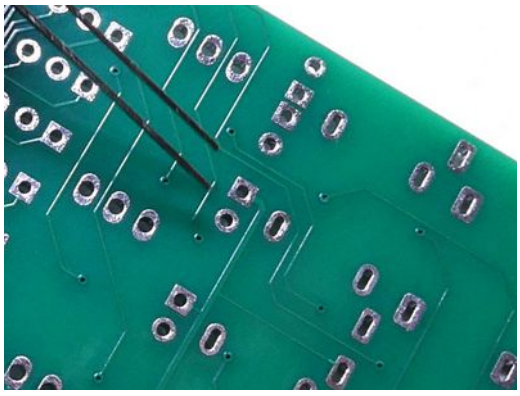
THE MAIN PCB (component side) :



THE MAIN PCB (Front panel side) :



Notes :
LED insertion . The smallest PIN into the square hole



Don't forget to screw the two Standoff before inserting the front panel.
(If you want to add the standoff, of course)

Calibration
1V/Oct. Tracking: for each voice card.

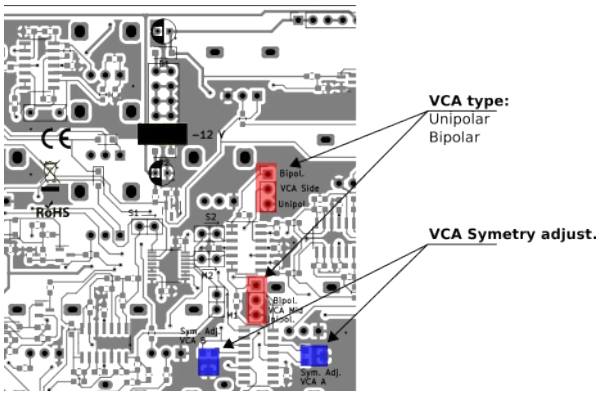
0- Wait for 15minutes before starting the calibration.
1- Turn the 5k trim in the center. (30 turns, so count 15)
2- 1V/Oct. Input : insert 1V
Set pitch to have 500Hz.
3- 1V/Oct. Input : insert 0V
Set pitch to have less than 250Hz (we can go to 220Hz)
4- 1V/Oct. Input : insert 1V
Set pitch to have 500Hz.
5- 1V/Oct. Input : insert 0V
Set pitch to have around 250Hz.
6- Repeat 4 and 5 to get 1V=500Hz, and 0V=250Hz.
Don't worry, You will have to repeat them lot of time...

NOTE :
250/500Hz : You can choose other values. Simply double the second one.
Insert 0V / 1V : The idea is to have two values with a difference of 1V = 1 octave.
You can use a MIDI to CV converter, a keyboard with 1V/Oct output, for example.
You can also use a difference of 2V. In this case, multiply your frequency by 4.

Example :	***Octave 0***		***Octave 1***		***Octave 3***
	100Hz	→	*200Hz*	→	*400Hz*
	0V	→	*1V*	→	*2V*

Calibration
Dual VCA trim:

1- Place the volume potar of the 2 VCA at 12 o'clock (center).
2- Remove the card above the settings. (VOICE 1)
We just need one VCO, that we will conncet to INA then INB (on the front panel, of course)
We will measure OUTA and OUTB.
WARNING : Remember that if nothing is connected to OUTB, then OUTB is added to OUTA
(Simply insert a cable to OUTB to remove this connexion)
3- Adjust each trim to have a minimum of signal output. (There's always something...)



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