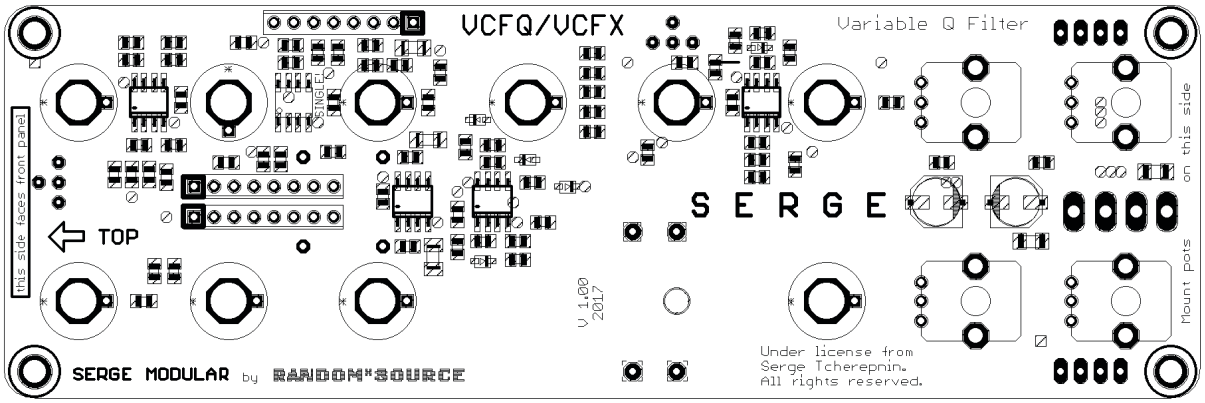
SERGE Variable Resonance Filter (VCFQ) - Special Edition (SMT)

The Random*Source version of the filter is an updated design that uses 3 **high-end THAT2180 VCAs** for superior audio performance - a change that has been approved by Serge Tcherepnin.

This module is the “Extended Range” version (VCFX) - a switch (“LOW”) extends the range of the filter into the sub-audio range. The filter may then be used to filter low-frequency control voltages. Triggers applied to the TRIG in will cause the filter to go into damped low frequency oscillations, controlled by the Q and the filter’s FREQUENCY.

This document describes the SMT version (Special Edition, “SE”) - the VCFQ is also available as a through-hole pcb set - please refer to the standard VCFQ building manual for that version. **The SE version has been adjusted so that there is no resonance at all when VC Q is turned down** - the classic Serge design has a little bit of resonance even when turned all the way down. When you turn au the Q knob by about 8%, you get exactly the response you get from the classic version at minimum. This means the SE version extends the sonic range to cover a very soft and smooth (resonance-free) area.

The SMT version of the Serge Variable Resonance Filter consists of a single pcb that also serves as an interface to the front panel.



Please note:

- The 2180 is available in 3 different versions - A being the most selected (and most expensive) while C has slightly lower specifications, B being in between. Each version has far better audio quality than the VCAs in the original circuit, so any differences between A, B or C are neglectible.
- The TR-MOD trimpot determine the behavior of the AGC (Automatic Gain Control) input - originally a fixed 1 Meg resistor was used, in more recent builds much lower values are common. Turning TR-MOD to minimum (zero Ohm) leads to a higher level, but also decreases the headroom, leading to more clipping when resonance is turned up. Adjust TR_MOD according to taste (and desired headroom).
- By design, the VCFQ has a quite drastic resonance when turned up, easily (and typically) leading to clipping, especially at low frequencies. Lowering the GAIN when using the normal input and increasing RMOD (trimmer) for the AGC input reduces the clipping that might occur. However, please beware that the output level can be very high, leading to clipping in other gear where the filter is routed into (especially ADC converters, mixers). You may have to adjust the input levels on that equipment to handle the level coming from the VCFQ.
- The SMT version comes with alls SMT parts reflow-soldered in. You only have to install the Styroflex caps and the THAT2180 chips.
- Orientation of the pcb: SMT parts are facing toward the front panel. Styroflex and THAT2180s are meant to face backwards.
- Board is designed to be powered by a +/-12V stabilized PSU only
(+/-15V is untested/unsupported and will require some value changes to not kill the THAT2180s).

Bill of Materials

Trimpots

1	1M	TR-MOD	Trimpot (Bourns 3362P or whatever fits)
1	100R	T1 (1V/OCT)	Trimpot (Bourns 3362P or anything that matches the foot-print) to adjust the tracking of the 1V/Oct input.

Capacitors

2	220p STYRO	C16, C17	Styrene/Styroflex alternatively you could experiment with Polypropylen (e.g. WIMA FKP)

ICs

3	THAT2180	P1, P2, UG	THAT2180C (or THAT2180B or A) Sockets recommended (cut precision DIP16 sockets in halves)

Misc

1	Switch DPST or DPDT	HI / LO mode	NKK M2022SS1W01
1	MTA-156		MTA-156 power connector
1	Banana Jacks	TRIG IN (red)	Emerson-Johnson Mouser: 530-108-0902-1 (red) or Thonk
6	Banana Jacks	Outputs, (audio) Inputs, BIPOLAR (black)	Emerson-Johnson Thonk / Mouser: 530-108-0903-1 (black)
3	Banana Jacks	CV / unipolar (blue or white) VC Q, VC F, 1V/Oct	Emerson-Johnson Thonk / Mouser: 530-108-0910-1 (blue), 530-108-0901-1 (white)
4	Potentionmeter 50k or 100k	linear (B50K or B100K)	Alpha 9mm vertical pcb mount available from Thonk, Tayda

Building

This is simply a suggestion - you might find a different workflow more practical:

1. **Mount the Banana jacks and the switch onto the front panel.**

2. **Solder the sockets for the THAT2180s, the Styroflex caps and the power connector to the pcb.**

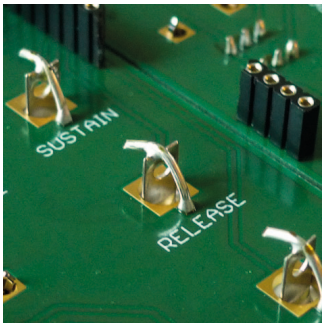
3. **Mount the pots onto the pcb. Pots should sit on the side facing the front panel (as marked on the board). Don‘t solder them in yet.**

4. **Carefully mount the pcb (with the pots inserted) onto the front panel. You may then have to wiggle each pot a bit to get the pots through. Make sure the threads of the pots go through completely and the pots sit right at the front panel. Screw the pots to the panel to make sure of that.**

5. **Once everything is nicely in place, solder the pots in (while the front panel is attached).**

6. **Solder short pieces of (stiff) wire - about 10mm long - into the pads for the switch. These should stick up in the air (on the side facing the main pcb). These wires should only go through the pcb as much as required to solder them in (i.e. should not stick out much on the other side, especially not touch the front panel or anything else!).**

7. **Solder the banana jacks in. You can either solder them directly to the surrounding vias (i.e. the ring around) or - which makes removing easier should you ever need to do that - by inserting a stiff (bare) wire into the little hole (via) and solder that wire to the top of the banana jack:**



8. **Solder the wires for the switch onto the corresponding switch terminals.**

9. **Connect a power cord supplying +12V, GND, GND, -12V to the MTA-header on the main board and you should be ready to go :-)**

Calibration

Using T1 the **1V/Oct tracking** can be adjusted. Patch the filter to self-oscillate (HI out to IN jack and turn up GAIN pot and Q pot) to do so. You can also use BAND out but the wave will probably not as round / clip. Be aware that there's no temperature compensation.

(Version 1 February 2017)

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