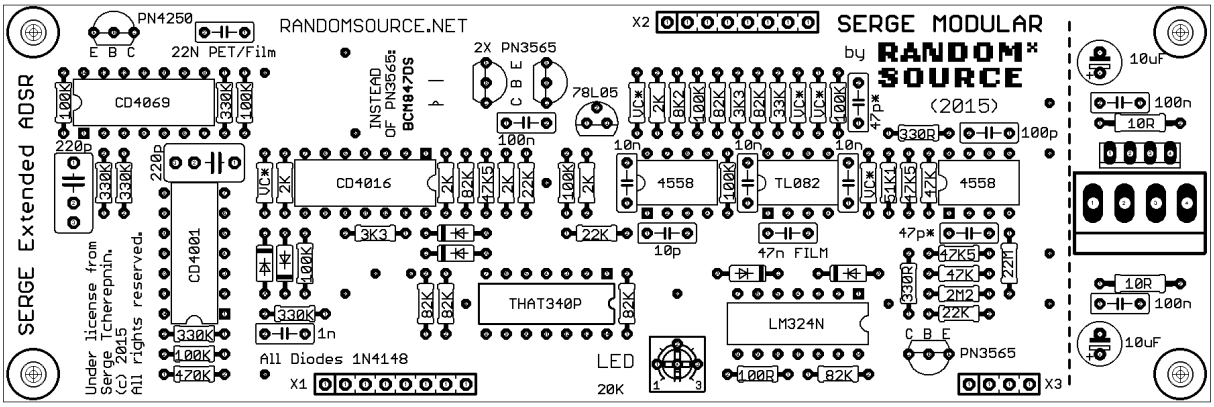
SERGE Dual Extended ADSR

The Serge Dual Extended ADSR module contains 2 identical Extended ADSR sections, each consisting of a main pcb and a component pcb.

Main pcb:



Please note:

- Orientation of the main pcb: **power header is at the bottom** (when looking at the module upright, e.g. in a rack). Board is designed to be powered by a +/-12V stabilized PSU.
- Spacing of the resistor pads is fairly narrow. It is recommended to bend the resistor legs right at the body of the resistor and then insert the resistor with the bent legs - it should then fit easily.
- The main pcb provides for a BCM847DS (matched transistor pair in SMT) **as an alternative** to the 2x PN3565 (or similar NPN transistors): that SMT chip is tiny and not easy to solder by hand - use this only if you're (very) experienced at soldering SMT (or have access to a reflow oven). The BCM847DS is symmetrical, so no need to look for pin 1. Use a BCM847DS **or** 2x PN3565 - **not both!** If delay does not work with a BCM847DS, the IC is most likely not properly soldered in.
- Be very **careful about the pinouts of any transistors** you use - mind the "C B E" markings on the pcb - the indicated outline should be correct for PN3565 and PN4250, but others like the BC550 have a different pinout and will face the opposite direction.
- LED: The trimpot ("LED"/20k) and the resistor next to pin 3 of the trimpot (marked 10R) determine the brightness of the LED. I'd recommend using low current (2mA) LEDs and (depending on brightness and color, I used red 100-130mcd, 60°) a **fixed resistor of 1k (instead of 100R)** plus a **trimpot of (only) 2k (instead of 20k)**. If you use ultra-bright LEDs, a 5k trimmer might make sense, higher values for the trimpot are probably not needed (but work also).

Bill of Materials (for 1 Ext ADSR - double for the Dual module)

Resistors (1%)

2	10R	F1, F2	alt: FERRIT BEAD
1	>= 100R (up to 1k)	RLED	Minimum resistance for the LED, determines maximum brightness
2	330R		
5	2K		
2	3K3		
1	8K2		
3	22K		
1	33K		
2	47K		
3	47K5		
1	51K1		
7	82K		
8	100K		
5	330K		
1	470K		
1	2M2		
1	22M		
5	VC*		Controls the CV behavior - see text. Original value is 110K for a 1V/Oct response (5V = 5 octaves, 1:32). For increased VC response use: 90k9 for 6 octaves (1:64) 78k7 for 7 octaves (1:128) 68k1 for 8 octaves (1:256) 61k1 for 9 octaves (1:512) 54k9 for 10 octaves (1:1024)
1	2K or more	TR-LED	Trimpot (Bourns 3362P or anything that matches the footprint) to adjust the LED brightness. Pick value depending on LED (see text).

Capacitors

1	10p	Mica or C0G/NPO
2	47p*	*only if needed
1	100p	C0G/NPO (or Styroflex...)
2	220p	C0G/NPO (or Styroflex...)
1	1n	C0G/NPO (or Styroflex...)
3	10n	Bypass Caps
1	22n	C0G/NPO, Film (or Styroflex...)
1	47n	C0G/NPO, Film
3	100n	Decoupling caps (X7R, C0G/NPO, film ...)
2	10uF	Electrolytic

ICs

1	CD4001BE		or MC14001B, HEF4001B
1	CD4016BE		or MC14016B, HEF4016B
1	CD4069		or MC14069, HEF4069UB
1	78L05		Positive VOLTAGE REGULATOR
2	PN3565		NPN Transistor, alt: BC550C - INSTEAD OF BCM847DS
1	BCM847DS		NXP BCM847DS (SMT) INSTEAD OF 2x PN3567
1	PN3565		NPN Transistror, alt: BC550C
1	PN4250		PNP Transistror
1	THAT340P		Super-matched transistor array
1	LM324N		
2	4558		
1	TL082		or OPA2134
6	1N4148		

Misc

1	MTA-156		MTA-156 power connector
2	SIL header 8pol		8-pin connector, links main pcb to component pcb
1	SIL header 4pol		6-pin connector, links main pcb to component pcb
3	DIP-8 sockets		
4	DIP-14 sockets		
1	Banana Jack	Gate In (red)	Emerson-Johnson Mouser: 530-108-0902-1 (red) or Thonk
1	Banana Jacks	Trigger In (yellow or gray or ...)	Emerson-Johnson Thonk / Mouser: 530-108-0913-1 (gray)
7	Banana Jacks	CV / unipolar (blue or white)	Emerson-Johnson Thonk / Mouser: 530-108-0910-1 (blue), 530-108-0901-1 (white)
1	LED 5mm	low current 2mA recommended	pick color to suit LED lens
1	LED lens 5mm		VCC, Mouser 593-3000R (red), 593-3000A (amber) ...
1	SPDT switch	(ON - OFF - ON)	NKK M2013SS1W01 (no cap) or NKK M2013SS1W01-BE (yellow cap)
5	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, the LED lens and the switch onto the front panel. If you use a retention ring for the LED lens, attach the ring to the lens.

2. Mount the pots onto the component pcb. Pots should sit on the printed side - this side faces the front panel. Don‘t solder them in yet. Stick the LED into the component pcb - the long leg must be at the + side.

3. Carefully mount component pcb (with the pots and LED inserted) onto the front panel. First slide / push the LED into the LED lens - all the way, this may take a bit of force. 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. You can even screw the pots to the panel to make sure of that, but you have to unscrew them again later (for Step 5).

4. Once everything is nicely in place, especially the LED sitting inside (and not on top) of the LED lens, solder the LED and the pots onto the component pcb (while the front panel is attached). DO NOT SOLDER THE BANANA JACKS YET!

5. Remove the component pcb again. Solder short pieces of (stiff) wire - about 10mm long - into the pads for the switch. These should stick up in the air on the printed side (same direction as the pots) and 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).

6. Stuff the main board, beginning with the resistors, then caps etc.

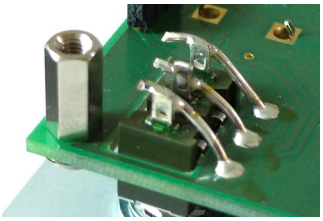
7. Main pcb and component pcb are to be connected through precision DIP socket and pins. It is recommended to use the pins on the main pcb (facing down, soldered from above) and the pin sockets on the component pcb (standing up, soldered from the front panel side). Break or cut off the pieces you need and stick them together so that main pcb and component pcb form a nice sandwich (don‘t solder yet). Check that you didn‘t leave out any pins / holes and that the sockets are all on the same side (component pcb). Solder all the pins in while keeping the sandwich together - this avoids any misalignments.

8. Carefully separate the sandwich - if you used precision sockets, this may not to too easy - they stick together nicely (giving a good connection).

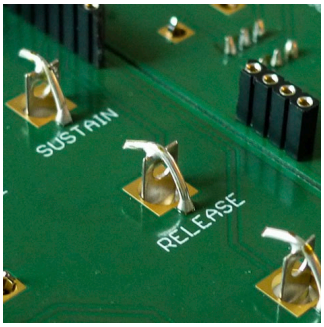
9. Mount the component pcb onto the front panel again and screw on the pots from the front side.

10. Make sure everything is in place.

11. Solder the switch in by soldering the air-wires onto the correcponding contacts:



12. Solder the banana jacks in. You can either solder them directly to the surrounding vias (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:



13. Attach any screws / spacers if desired and mount the main pcb onto the component pcb.

14. 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

Module does not require any calibration. Adjust LED brightness according to taste.

Tips

The Extended ADSR can be (ab)used at lower audio rates as kind of a wave shaper.

Should find yourself in a situation where the module seems to do nothing when a Gate or Trigger signal is applied, check the position of the pots and try turning all pots (except SUSTAIN) towards or to the max (CW = fast), long delay times etc. can bring the outout to a static level, making the module appear dead.

(Version 30 November 2015)