

SERGE

Dual Universal Slope Generator (DSG) mk2



The Serge Dual Universal Slope Generator DSG is one of the most versatile modules in the Serge system. The DSG mk2 by Random*Source is a licensed and authorized adaption of the original Serge design. Like the first R*S version of the DSG it offers **independent VC control over RISE and FALL**.

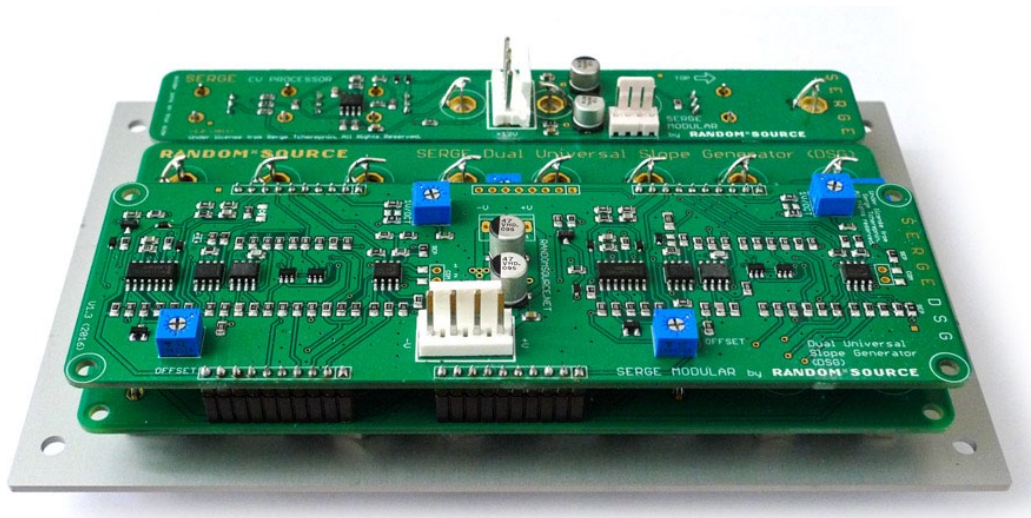
In addition, the Mk2 version has been optimized for audio performance and speed/precision. The top section covers a frequency range up to more than 10kHz. It also offers **improved tracking** and provides some temperature compensation.

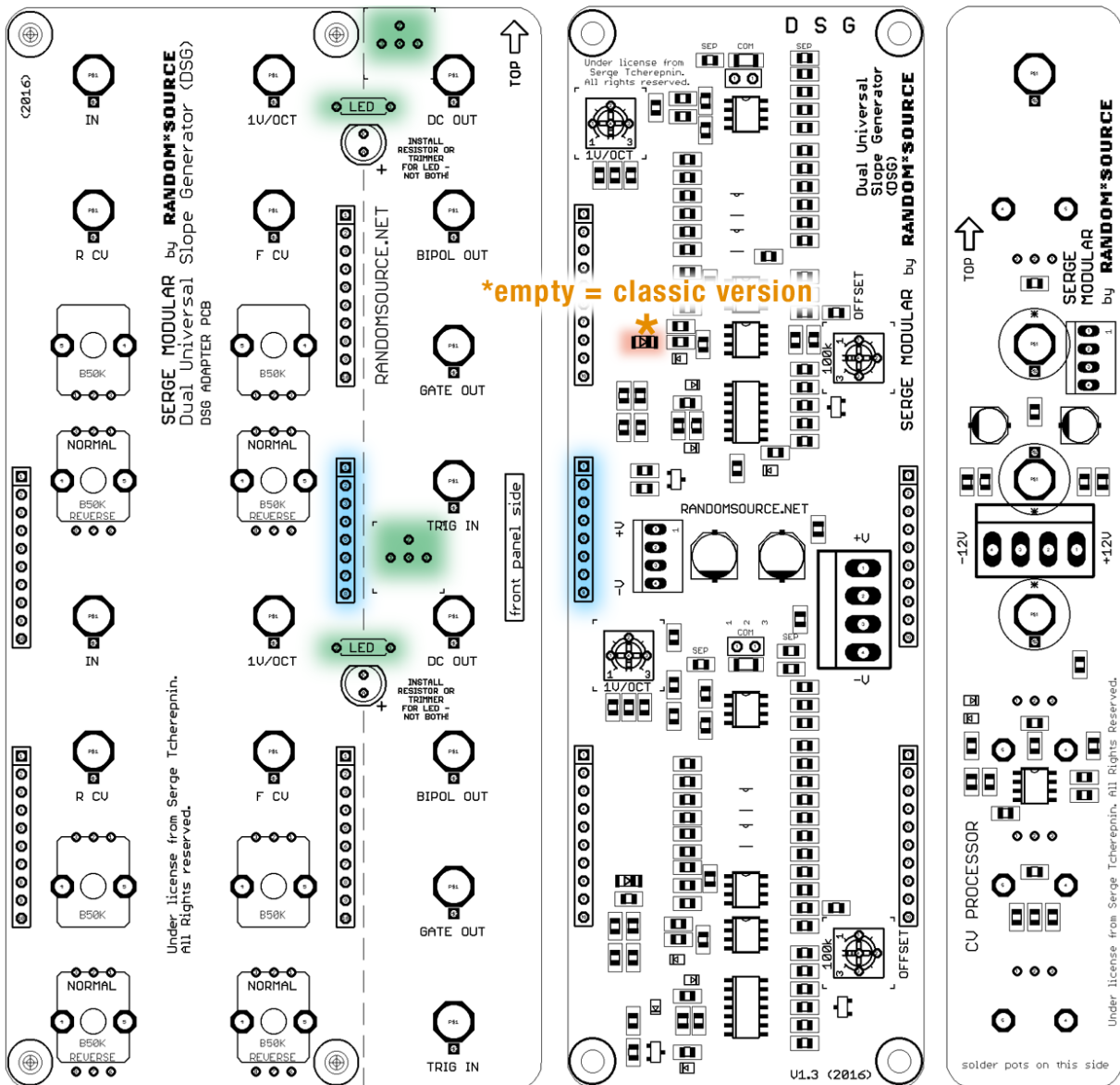
The kit consists of a front panel in 4U format, a main pcb that already contains most of the parts in surface-mount technology (SMT) and a 3" component pcb serving as an interface to the front panel.

There are 2 versions which differ in the top section:

- **"contemporary"** provides a (red = gate) **Pulse output** with a fixed duty cycle of appr. 50% (instead of the bipolar out). How does this differ from the normal Gate out? The duty cycle of the normal Gate out depends on the Rise and Fall settings and ranges from appr. 5% to 95%. The DSG achieves the best tracking when Rise is set to maximum and Fall is variable (to determine the pitch), thus producing a negative Sawtooth. At this setting, the Gate out pulse is very thin, not ideal for all audio uses. The new pulse out is a great alternative generating a nice square wave without having any negative effects on tracking. Also, as the edges of that Pulse wave are different from the ones of the Gate out, the Pulse out is great to generate complex waveforms by patching it into the various CV inputs.
- **"classic"** version has the (black) **Bipolar output**. It is essentially the regular output, but **inverted** and centered around 0V. Please note that since it is inverted, the Rise and Fall settings also have inverted effect, i.e. Rise will control the fall of the bipolar output.

- Tracking: The classic DSG is an incredibly versatile module and while it can act as a great oscillator, it has not been designed as a dedicated oscillator. Traditionally its 1V/Oct tracking is rather limited compared to oscillators like the Serge PCO/NTO, covering about 1-2 octaves in the bass range. Also the DSG by design has no temperature compensation. The DSG mk2 provides improved tracking, allowing it to - under ideal circumstances and using specific settings - to cover a range of up to 4 octaves (up to 440Hz). This requires the Rise to be set as fast as possible (maximum/clockwise) and calibration as well as warmup. Please note that up to 4 octaves is the best case - depending on the frequency range, temperature and other factors it will more likely be less, e.g. 2-3 octaves. The mk2 offers **some** basic temperature compensation, to partially compensate for the influence of temperature changes - but this is only intended to improve the susceptibility to temperature changes and by no means to completely offset them.
- Tracking and LED brightness can be adjusted with trimpots.





Technical Aspects:

- Use antistatic precaution when handling the DSG pcb - don't touch the small SMD parts and ICs with your hands.
- Only these parts have to be soldered in: 4 trimpots on the main pcb, 2 trimpots or fixed resistors on the panel pcb to set the LED brightness (marked in green in the picture above), 4 pin stripes to connect the main pcb to the panel pcb - omit the middle 8-pin connector (marked in blue in the picture above) -, MTA power.
- LED: The trimpots (together with an on-board resistor) determine the brightness of the LED. It is essential to use low current (max 2mA) LEDs - otherwise the LED action might affect the operation of the module (depending on brightness and color). Use at least 100-130mcd or ultrabright LEDs (60°) plus a trimpot of (only) 2k or 5k for (fairly) bright LEDs (100-150mcd). If you use ultra-bright LEDs, a 5k or more trimmer might make sense, higher values for the trimpot are probably not needed (but work also).

Bill of Materials

Trimmers

2	100k	Offset	Trimpot (Bourns 3362P, Vishay T73YP104KT20 or anything that matches the footprint) to adjust the uni-polar output and the symmetry of the bi-polar output.
2	5k	1V/Oct	Trimpot (Bourns 3362P, Vishay T73YP502KT20 or anything that matches the footprint) to adjust the tracking of the 1V/Oct input. Single turn is sufficient.
2	2K or more	LED - on panel pcb -	Trimpot (Bourns 3362P or Vishay T73YP202KT20 or anything that matches the footprint) to adjust the LED brightness. Pick value depending on LED (see text). Optional - use trimpot or LED resistors (not both!)

Misc

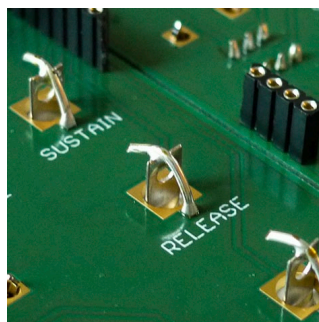
1	MTA-156		MTA-156 power connector
-	SIL header 8pol	OMIT - NOT NEEDED!	(8-pin connector, links main pcb to component pcb)
4	SIL header 10pol		10-pin connector, links main pcb to component pcb
5* or 4	Banana Jacks	TRIG IN, GATE OUT (red), *top PULSE = BIPOLAR out for contemporary version	Emerson-Johnson Mouser: 530-108-0902-1 (red) or Thonk
3 or 4*	Banana Jacks	IN, BIPOLAR (black) *classic version	Emerson-Johnson Thonk / Mouser: 530-108-0903-1 (black)
8 (+4*)	Banana Jacks	CV / unipolar (blue or white) (* for the CV Processor depending on module)	Emerson-Johnson Thonk / Mouser: 530-108-0910-1 (blue), 530-108-0901-1 (white)
2	LED 5mm	low current (max) 2mA	pick color to suit LED lens
2	LED lens 5mm		VCC, Mouser 593-3000R (red), 593-3000A (amber) ...
8	Potentionmeter	linear (B50K or B100K)	Alpha 9mm vertical pcb mount
(+4*)	50k or 100k	(* for the CV Processor)	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 onto the front panel. If you use retention rings for the LED lenses, attach the rings to the lenses.

2. Main pcb and panel 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 panel 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 (panel pcb). Also make sure the pcbs have the right orientation (so that the pots will sit outside!). Solder all the pins in while keeping the sandwich together - this avoids any misalignments.
3. Carefully separate the sandwich - if you used precision sockets, this may not be too easy - they stick together nicely (giving a good connection).
4. Solder the LED trimpots or resistors onto the panel pcb.
5. 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 LEDs into the panel pcb - the long leg must be at the + side.
6. Optional: Attach 10mm spacers to the panel pcb - when using precision pin connectors, spacers are not really necessary as the connectors firmly hold the main pcb anyway, but if you choose to add them, this is a good time.
7. 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. Screw the pots to the panel.
8. 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).
9. Solder the banana jacks in. You can either solder them directly to the surrounding vias (ring round) 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:



10. Solder the 4 trimpots and the power connector onto the main board.
11. Mount the main pcb onto the component pcb and fasten it using screws / spacers if desired.
12. 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

Patch GATE OUT into TRIG IN on each side of the module. This should put the module in CYCLE mode (acting like an oscillator). From the original kit instructions:

Turn the RISE and FALL knobs to center position or above. Patch the OUT(put) into an audio mixer or Output Module to monitor the output. There should be a triangle wave present which can be changed to a sawtooth wave of lower frequency by turning down either the RISE or FALL knob. The frequency and timbre will depend upon the settings and the shape as set by the relationship between the Rise and Fall times.

Starting from a middle position, adjust the **OFFSET trimmer** so that the OUTput is in the range of 0V to 5V. The module will most likely stop cycling towards either end of the trimmer - if this happens, move the trimmer a bit back towards the center, unplug the patch cord between GATE OUT and TRIG IN and plug it in again - that should bring the cycle back.

Adjust **LED brightness** according to taste - make sure you don't turn the brightness up too much (i.e. trimmer setting should be at least 1k unless you use white or blue LEDs).

Using the trimpots on the main pcb the **1V/Oct tracking** can be adjusted. However, be aware that by design the tracking of this module will not reach the range covered by dedicated oscillators. To adjust the tracking, set the wave to an inverted Sawtooth (negative ramp, Rise is as steep as possible) and calibrate for the lower range (up to 440Hz).

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