JAKES Custom Shop

Quad ADSR Envelope Generator

Revision A
Sep 6, 2024

Harness the power of four independent envelopes in a compact 12HP module. Fine-tune your sound with macro editing, scaling multiple envelopes simultaneously. Choose from exponential, ramp, or logarithmic curves to shape your audio. Dive deep into attack, decay, sustain, and release parameters for unparalleled control. Using advanced Rotary Encoder technology, you can make precise changes to shorter time scales, and macro changes to long envelopes.

Why four envelopes in 1 module? Any standard synth voice requires both a filter and an amplifier. These two elements require independent envelope gates to perform at their best. By implementing 4 envelopes into one module, you can pump out 2 fully independent voices in a quarter of the HP.

- Generate 4 unique curves with four independent envelope outputs.
- Scale multiple envelopes at once with Multi-Envelope Selection.
- Customize your sound with three Curve Types: Ramp, Log, Exponential.
- Synchronize gates with normalized inputs for multi-stage synth voices.
- Switch to LFO mode for independent operation.
- Stage length from 7mS to 7 days.

SECTION I - Electrical Characteristics

Attribute	Min	Typ. [mA]	Max
Current Draw [mA] +12V +5V -12V		 200mA 0 100mA	
Gate Input [V]	0		10
Envelope Output [V]	0		5.12
Stage time	7ms		7 days

SECTION II – Functionality

Input and Outputs	
Attribute	**Data**
GATE 1, 2, 3, 4	Input for an external square wave to trigger the ADSR. Each Gate input is normalized to the previous.
OUT	Modulated waveform
Power	Eurorack standard 10-Pin shrouded IDC
Rear Slide Switches	Turn On/ off LFO mode, CV Expansion Module operation mode.

SECTION III –Controls

Envelope Selection: Short press of the rotary encoder selects the corresponding envelope for editing.

Multi-Envelope Scaling: Multiple envelope gates (EG) can be selected at once by simultaneously pressing their buttons. With multiple EGs selected, parameter changes are scaled linearly per EG. LED rings show the first selected envelope (even though you press the buttons at the same time, there is always a slight human error). This is extremely useful when one Gate input is modulating two or more other modules.

LED Rings: Show the envelope stage level of the current selected envelope channel. 16 levels of resolution are shown per turn. Envelope stage time length is exponential. You have fine adjustment over short envelopes, and macro adjustment over longer envelopes. The "zero" level is at 7 o'clock and as the encoder is turned up (a clockwise motion) the LEDs respond in kind — i.e. the LEDs light in a clockwise rotation around the dial for two rotations.

Curve Selection: Press and hold a rotary encoder for 2 seconds to toggle through curve types. The rotary encoder will change color to indicate the curve type.

LINEAR: Green
LOG: Red
EXPONENTIAL: Blue

Gate Inputs: Gates are internally normalled. Meaning a gate signal on input 1 will be copied to inputs 2, 3, 4 if no patch cable is inserted. All four envelope outputs are now in time sync yet are independently controlled.

SECTION IV - Theory

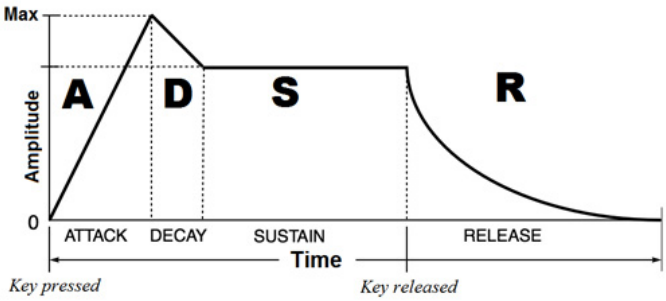

Figure 1. A typical ADSR envelope waveform. Source: https://www.daviddarling.info/encyclopedia_of_music/A/ADSR.html

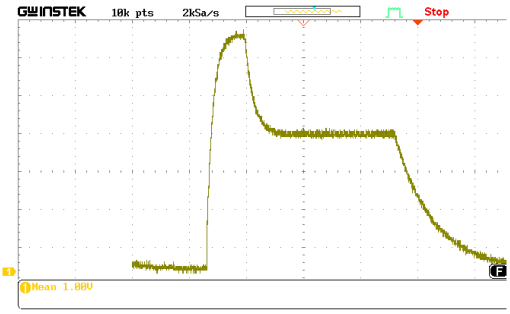

Figure 2. Oscilloscope capture of Logarithmic envelope curve type.

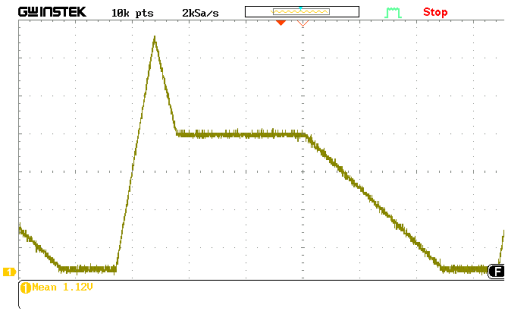

Figure 3. Oscilloscope capture of Ramp envelope curve type.

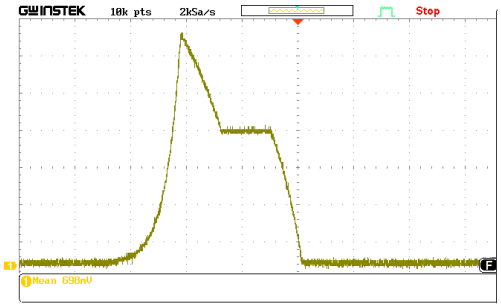

Figure 2. Oscilloscope capture of Exponential envelope curve type.

SECTION V – Software and Hardware Updates

Hey! I love making modules that people love. Got ideas? I wanna hear ‘em!

My biggest regret on this module is not including the required hardware for field updates. If you are crafty, it is possible to build an ISP from an Arduino and you can mod the code yourself. Otherwise, you can send the module back home and we will run the SW updates.

Request a change here: https://jakescustomshop.com/contact.html

This project was designed in collaboration with Mr. Frank Plughoff. Big Thanks! Be sure to check out our previous FP signature module, the Precision Buffered Multiplier

SECTION VI – Mechanical Data

Attribute	Data
PCB dimensions	29mm x 59 mm
Panel dimensions	12hp x 3U (61mm x 128.5mm)
Depth of panel	15 mm