v. 1.0.1

Sonic Mod Pack

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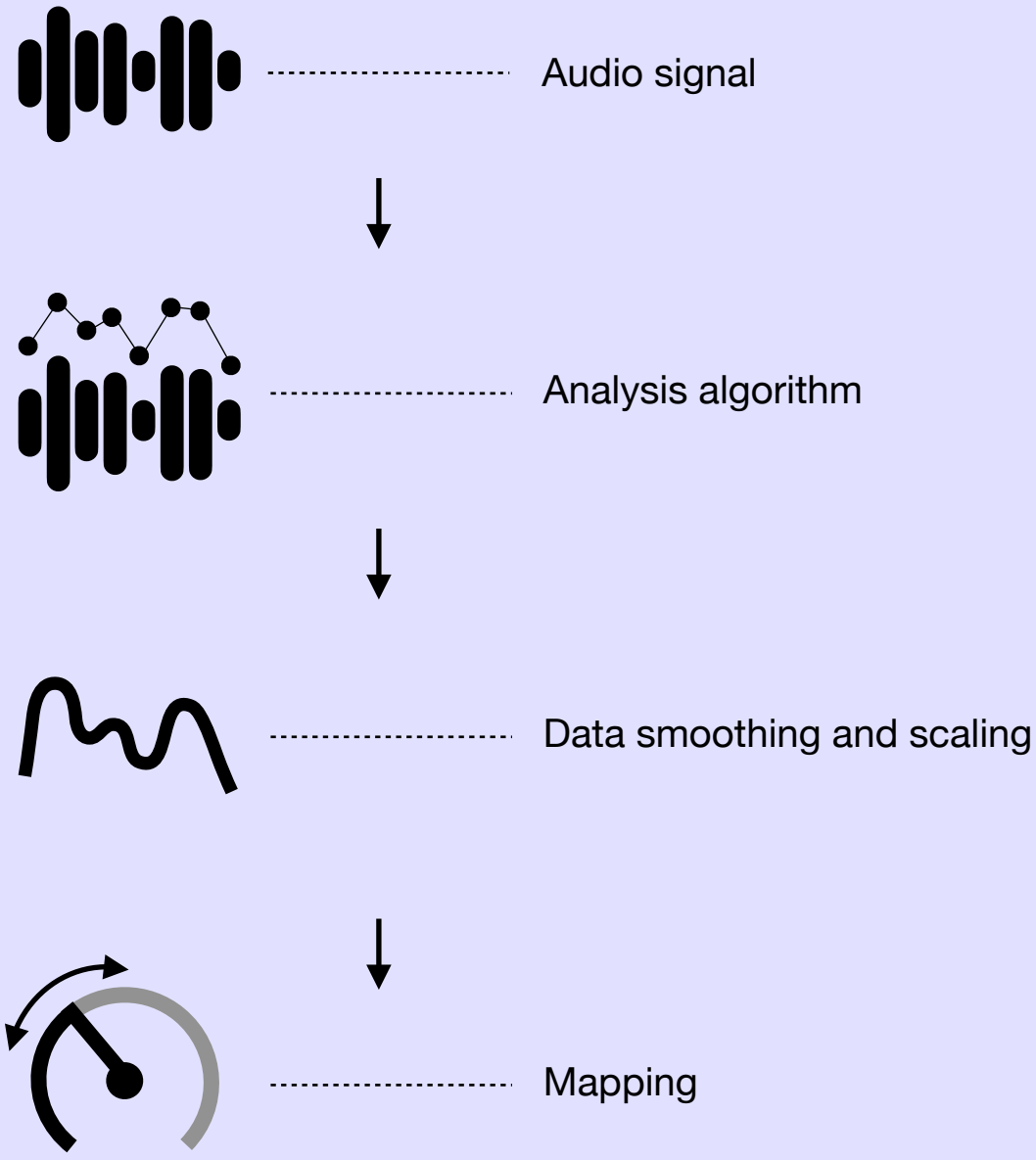
Contents

Concept

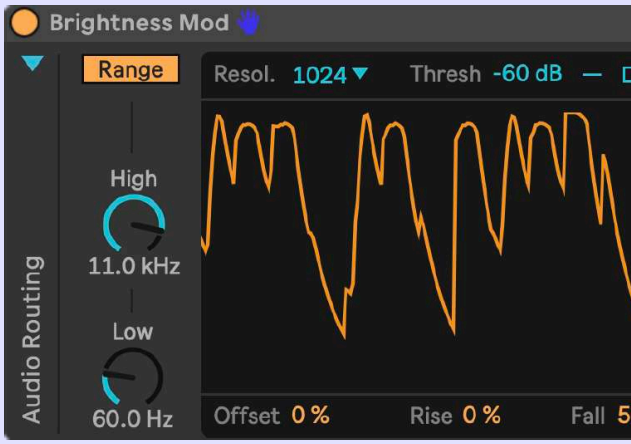
The **Sonic Mod Pack** was conceived to provide dynamic control over Live set parameters **by analyzing the intrinsic characteristics of sound**. The incoming audio signal is processed using various Music Information Retrieval (MIR) algorithms, which extract **real-time data** describing the sonic features of the signal. These data, once scaled and smoothed, can be **mapped** to one or more parameters in Ableton Live such as filter frequency, effect sends, and more. Additionally, the analyzed data can be transmitted via **OSC**, enabling control over parameters in external applications, including audio-visual interactions.



Overview

Let's take a quick look at the devices!

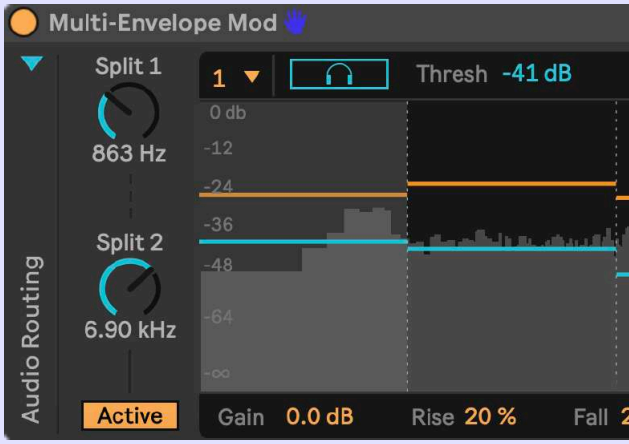
Brightness Mod



The **Brightness Mod** device analyzes the spectral content of an audio signal to determine its **brightness over time**. This is often referred to as the **spectral centroid** a measure that indicates where most of the signal's energy is concentrated within the frequency spectrum.

Use case:
- tracking harmonic changes;
- follow the movement of a filter;
- creative auto panning effects.

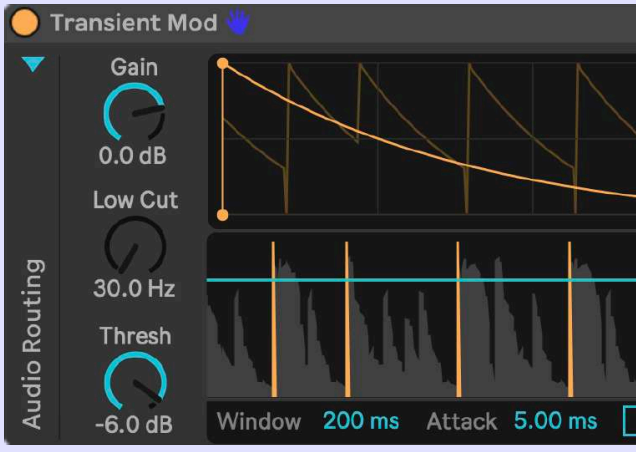
Multi-Envelope Mod



The **Multi-Envelope Mod** device analyzes the amplitude of three distinct spectral bands, providing an **independent envelope follower for each band**. The algorithm is based on **FFT**, allowing for highly precise and narrow frequency bands.

Use case:
- map using different spectral parts of a drum spectrum;
- create audio-reactive visual from a single track;
- trigger effects only when a specific part of the spectrum is active.

Transient Mod



The **Transient Mod** device **detects transients** in an audio signal and **triggers a custom envelope** shape that can be mapped to any parameter. It works similarly to Ableton's Shaper MIDI, but operates directly on audio input!

Use case:
- create custom sidechain effects;
- precisely controls your rhythmic A/V setup via OSC;
- sync parameter modulation when MIDI trigger aren't available.

Brightness Mod

As explained in the Overview, the Brightness Mod device analyzes the spectral content related to a sound's timbre. Before mapping the analyzed data to parameters, however, it's important to first set appropriate values for the analysis.
Don't worry, this process is mostly automatic and doesn't require much fine-tuning.

Analysis parameters

Auto/Range: In Auto mode, the analysis range is automatically scaled based on the incoming audio signal. To reset the range, simply press the **R** button (see Reset).
When **Range** mode is active, you can manually set the **Low** and **High** values using the two knobs below.
Reset (R): Press to reset the analysis range when in **Auto** mode.
High: Adjusts the upper bound of the range in **Range** mode. The current value is also shown on the scope.
Low: Adjusts the lower bound of the range in **Range** mode. The current value is also shown on the scope.

Resolution (Resol.):
The Resolution parameter determines the precision of the frequency analysis. Lower values result in faster, more responsive analysis but offer less frequency detail. Higher values provide more accurate spectral resolution at the cost of responsiveness. Available values are 256, 512, 1024, 2048, and 4096. Because this is a spectral (FFT-based) analysis, some processing time is involved. Here are the corresponding internal sample counts for each resolution setting: 256 (192 samples), 512 (384 samples), 1024 (768 samples), 2048 (1536 samples), and 4096 (3072 samples). Note that these values are measured in samples. To convert them into seconds or milliseconds, you'll need to account for the project's sample rate. *Do the math if needed!*

$$t(s) = \frac{1}{SR} * samples$$

Thresh: This sets the analysis threshold in decibels. The algorithm will only consider portions of the spectrum that exceed this value. When the signal drops below the threshold, the output will fall to 0 *(…Hz!)*.
S&H: When enabled, **Sample & Hold** works in conjunction with the **Threshold**. Instead of dropping to 0 Hz when the signal goes below the threshold, the output will hold the last valid value above the threshold until a new valid value is detected.

Tips: *Starting in **Auto** mode is a good strategy, especially if the audio input is expected to fluctuate. If the audio stabilizes and remains fairly consistent, you can switch to **Range** mode for more precise control. Remember to adjust the parameters accordingly as needed. Additionally, always reset or adjust the range when switching to a different audio source to ensure accurate analysis and mapping.*

Scaling data

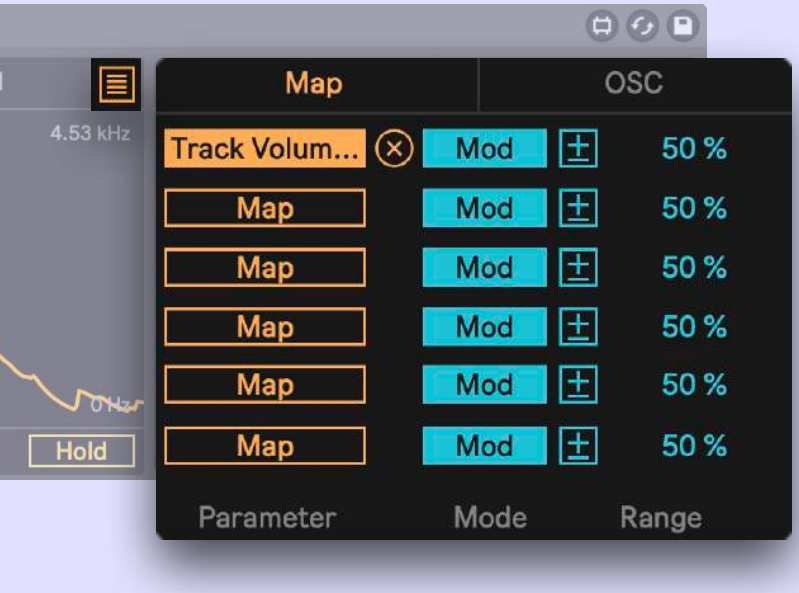
Now, after collecting some samples and performing the necessary calculations, it's time to get what you need!

Offset: Shifts the baseline of the analysis up or down (yes, that yellow line!).
Rise: That's the rise smoothing factor on the attack when the value goes from low to high.
Fall: That's the fall smoothing factor on the release when the value goes from high to low.
Hold: Press to momentarily freeze the current value.

That was easy!

Mapping

*Now you can start mapping the data! Open the **Multi Map** window by clicking the yellow square button in the top-right corner. The Multi Map window allows you to map brightness data to Live parameters, plugin parameters, or even to external applications via OSC.*



Map Tab: Choose **Map** or **OSC** to control how the data is mapped.

- Map window -

Map: Use the *Map* button to select the parameter you want to control with the Brightness Mod.

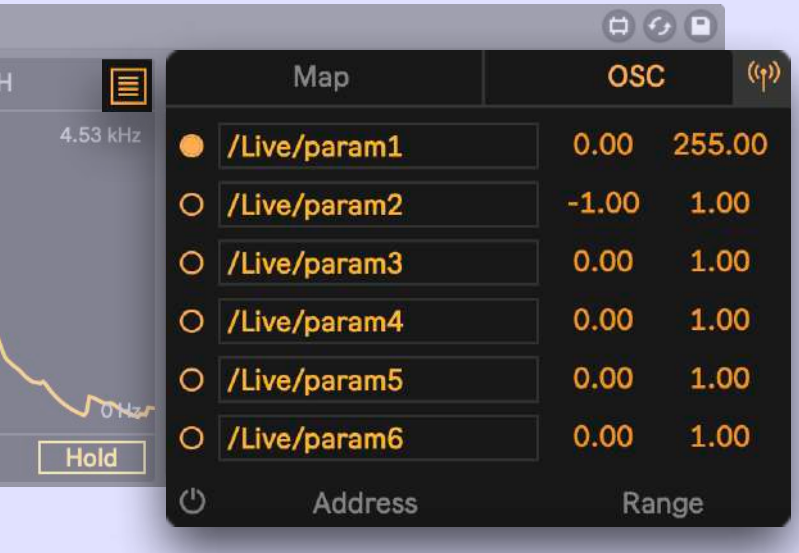
Mod/Rem.: this button toggles between **Modulation** and **Remote** control of a mapped parameter. When a parameter is being modulated, its base value can still be adjusted with the mouse; when a parameter is remote controlled other interaction is disabled.

Mod-Modulation Polarity: In **Bipolar** mode, the modulation is centered around the base parameter value. In **Unipolar** mode, modulation is added to the parameter value.

Mod-Modulation Amount: defines the depth for the modulation value.

Rem.-Min: It's the minimum value generated when the analysis data is at its minimum. Note that this value can be higher than **Max**.

Rem.-Max: It's the maximum value generated when the analysis data is at its maximum. Note that this value can be lower than **Min**.



- OSC window -

OSC Setting: Click the antenna icon in the top-right corner to configure the receiver's **IP address**, **port**, and **message rate**.

OSC Active: Toggle to enable or disable the OSC sender.

Address: write the address for a specific parameter.

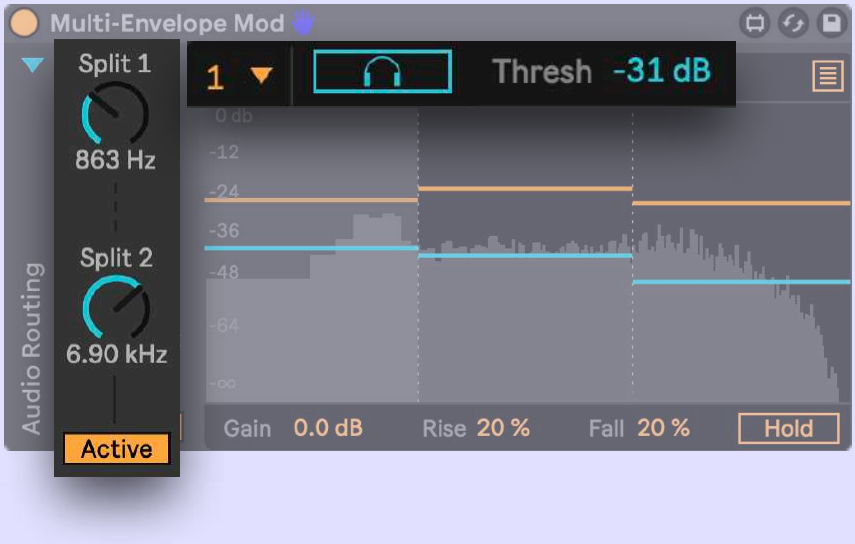
Min: It's the minimum value generated when the analysis data is at its minimum. Note that this value can be higher than Max.

Max: It's the maximum value generated when the analysis data is at its maximum. Note that this value can be lower than Min.

Multi-Envelope Mod

As explained in the Overview, the Multi-Envelope Mod device analyzes amplitude information across three distinct frequency bands. The analysis is based on an FFT algorithm, resulting in sharp boundaries between bands. This device is particularly useful when you want to map different parts of the spectrum separately.

Analysis parameters

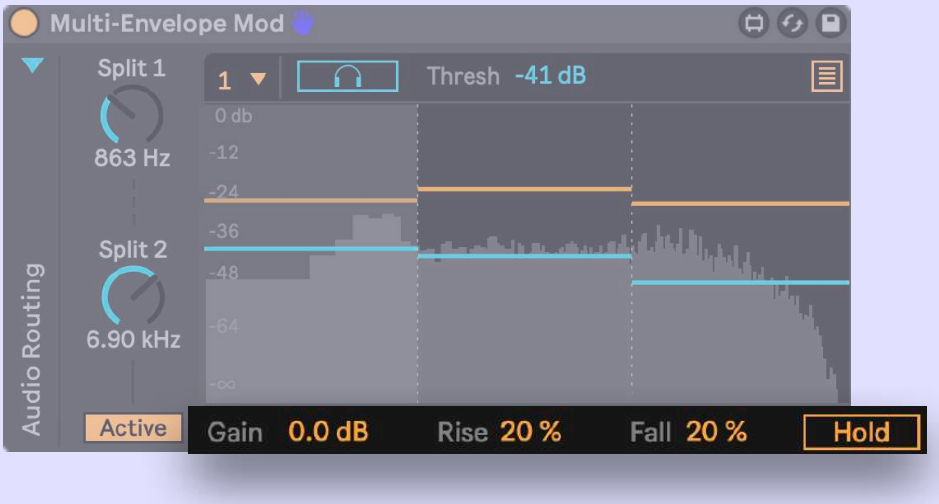


Split 1: Sets the crossover frequency between Band 1 and Band 2.
Split 2: Sets the crossover frequency between Band 2 and Band 3 (in case **Split 2** is Active).
Active: Toggles the use of the third band. When deactivated, the spectrum is split into just two bands.

Band selector: Use this menu to select and highlight the band you want to edit. You can also select a band directly by clicking on it in the visual spectrum.
Headphone: Temporarily disables the output signal and allows to hear the current selected band. Useful as a diagnostic tool to fine-tune the split frequency points
Thresh: That's the **Threshold** in decibels for the analysis, so the analysis of amplitude will start only if the band selected is above that value of decibels. It's also possible to adjust the value by dragging the blue lines on the spectrum.

Scaling data

Now it's time for scaling! The yellow lines represent the amplitude of each frequency band, think of them as three independent envelope followers.

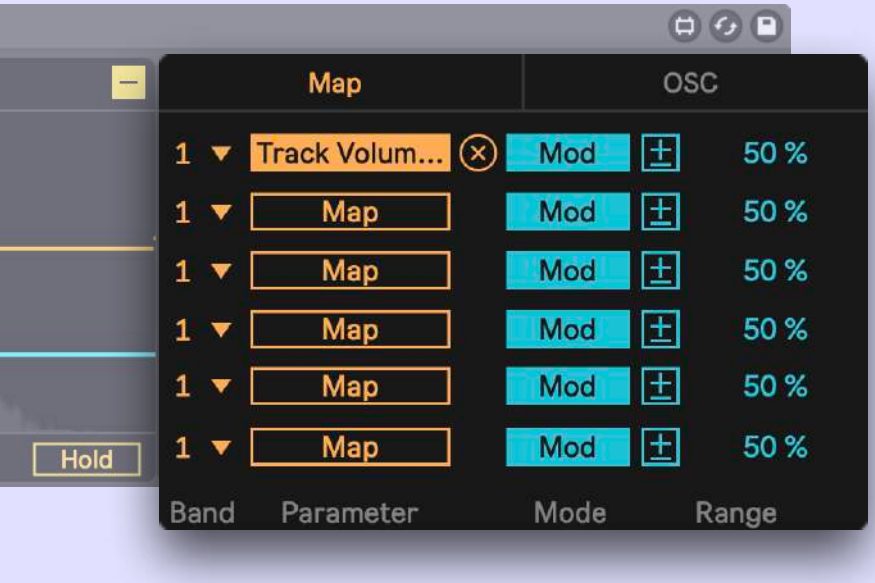


Gain: Sets the gain applied to the analysis signal of the selected band.
Rise: That's the rise smoothing factor on the attack when the value goes from low to high.
Fall: That's the fall smoothing factor on the release when the value goes from high to low.
Hold: press it for a momentary hold of the current value.

Tips: *Always make sure you've selected the correct band before adjusting any parameters!*

Mapping

Now it's possible to take those data from the bands and map them to something!



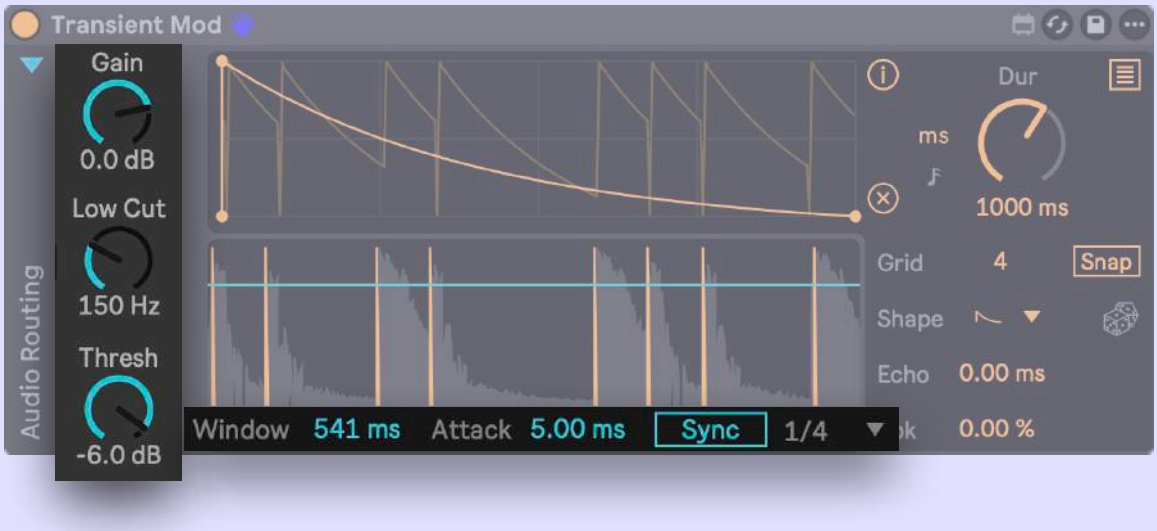
It works the same way as **Brightness Mod**, except for the **Band selector**. Choose the band from which to take the amplitude data and map it to a Live parameter or send it via OSC.

Please refer to the Map section of Brightness Mod for an explanation of the Map window.

Transient Mod

As explained in the Overview, the Transient Mod device functions as a transient detector, allowing you to trigger shape modulations for Live parameters. With the right analysis settings, it's possible to shape the sound effectively.

Analysis parameters

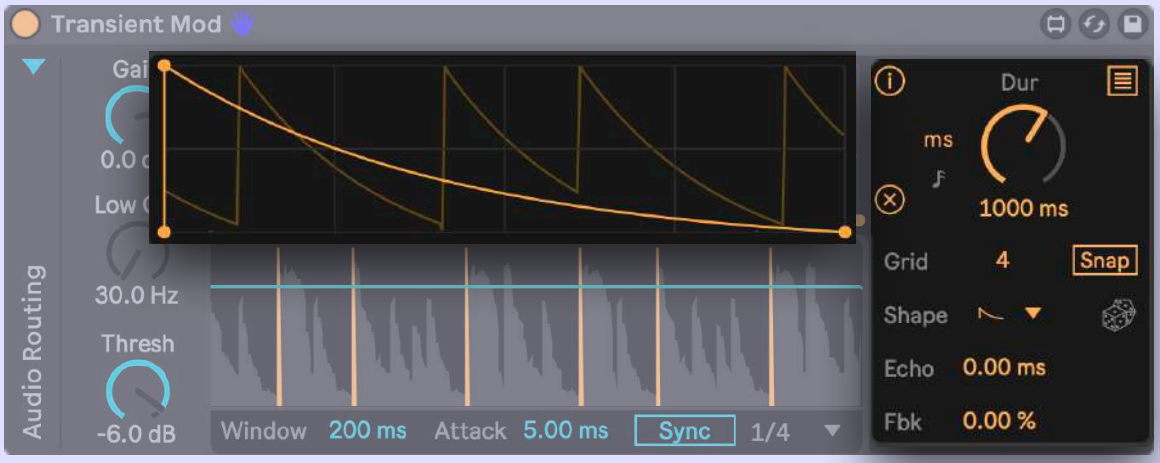


Gain: Boosts or attenuates the input signal level.
Low Cut: Filters out low frequencies to improve signal clarity for analysis.
Thresh: Sets the threshold above which transient detection occurs. You can also adjust this by dragging the blue lines on the waveform.

Window: Sets the minimum time interval before the next transient can be detected.
Attack: Filters detected transients based on their attack duration. Short values detect transients with a sharp attack, while larger values detect transients with a smoother attack
Sync: When Off, transient detection runs freely. When On, only transients synchronized with Ableton Live's transport are detected. Use the **Beat Division** parameter to set the detection precision.

Shaping data

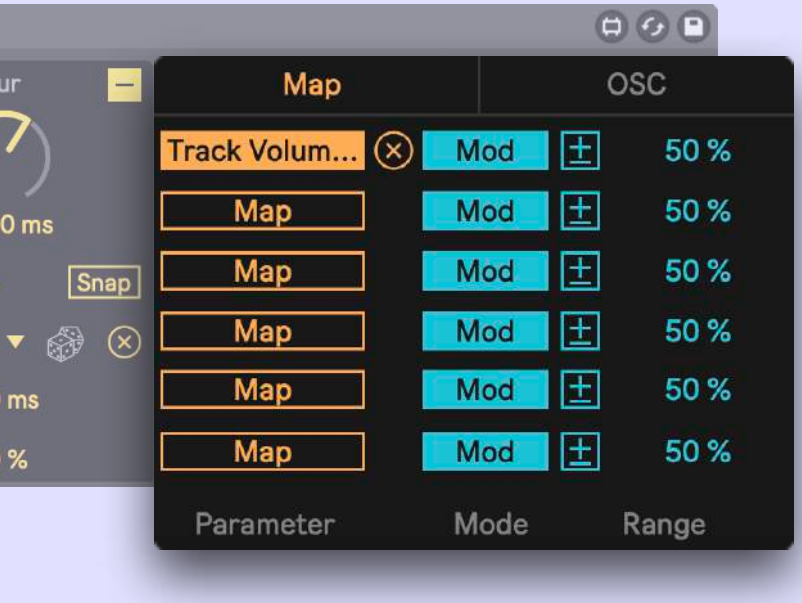
Now it's time to shape your triggered envelope! Draw points by clicking in the envelope window, then adjust the parameters in the panel on the right.



Shaper window: click to create points, shift+click to delete, alt+click to create a curve.
Duration: Sets the time length of the envelope shape. It's possible to choose between synced and non-synced values with **Time Mode**.
Snap: Enables snapping to the grid while drawing the shape.
Gride Size: Adjust the Grid Size for **Snap** mode.
Shape Presets: Select shaper forms from the existing presets, or save custom ones (a "+" will appear when empty slots are selected).
Random Shape: Generate a random envelope shape by clicking.
Clear: clear the envelope shape.
Echo: Add an echo to the shape after some milliseconds.
Feedback: Add a feedback percentage of the **Echo**.

Mapping

Now it's possibile to shape our Live Set!



Please refer to the Map section of Brightness Mod for an explanation of the Map window.

Sidechain

All three devices include a **Sidechain** function, which lets you use the audio signal from another track, useful when you want to place the device elsewhere in your set.

Troubleshooting

Ableton crash when a device is opened (Win, Mac)
Make sure Ableton is using the latest version of Max. Follow these steps to use the latest version
https://help.ableton.com/hc/en-us/articles/209070309

The device looks strange (Win, Mac)
Make sure Ableton is using the latest version of Max. Follow these steps to use the latest version
https://help.ableton.com/hc/en-us/articles/209070309

Minimum System Requirements

Mac
- Intel® Core™2 Duo processor. Intel® Core™ i5 processor or faster recommended (it works with M1 and others following)
- 4 GB RAM (8 GB or more recommended)
- 1280x800 display resolution
- Core Audio compliant audio interface recommended

Windows
- 64-bit Intel® (Intel® Core™ i5 processor or faster recommended) or AMD multi-core processor.
- 4 GB RAM (8 GB or more recommended)
- 1366x768 display resolution
- ASIO compatible audio hardware for Link support (also recommended for optimal audio performance)