

MOONBASS

USER MANUAL

Version 1.0.0

An EDM bass-focused oscilloscope with features for analyzing and improving common issues with kick and bass.

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Activation and first start

Installation on Windows

- Download the latest installer executable from <https://accounts.tsuga.io/downloads>.
- Locate the downloaded installer and execute it.
- The installer and plugin have been code signed with a trusted IV certificate from Microsoft Azure and should install without problem.
- Follow through the installer screens and accept the license agreement.
- The VST3 plugins are installed at `C:\Program Files\Common Files\VST3\`

Installation on macOS

- Download the latest installer executable from <https://accounts.tsuga.io/downloads>.
- Locate the downloaded installer and execute it.
- The installer and executable have been code-signed and notarised by Apple and should install without problem.
- Follow through the installer screens and accept the license agreement.
- The AU format plugins are installed in `/Library/Audio/Plug-Ins/Components/`, and the VST3 plugins are installed in `/Library/Audio/Plug-Ins/VST3/`

Activation

Startup your DAW, and the first time you open up the plugin editor window you will be asked to login with your [tsuga.io](https://accounts.tsuga.io) login details. If you have purchased a license this will be installed otherwise you will be issued with a 30 day evaluation license.

Overview of Features

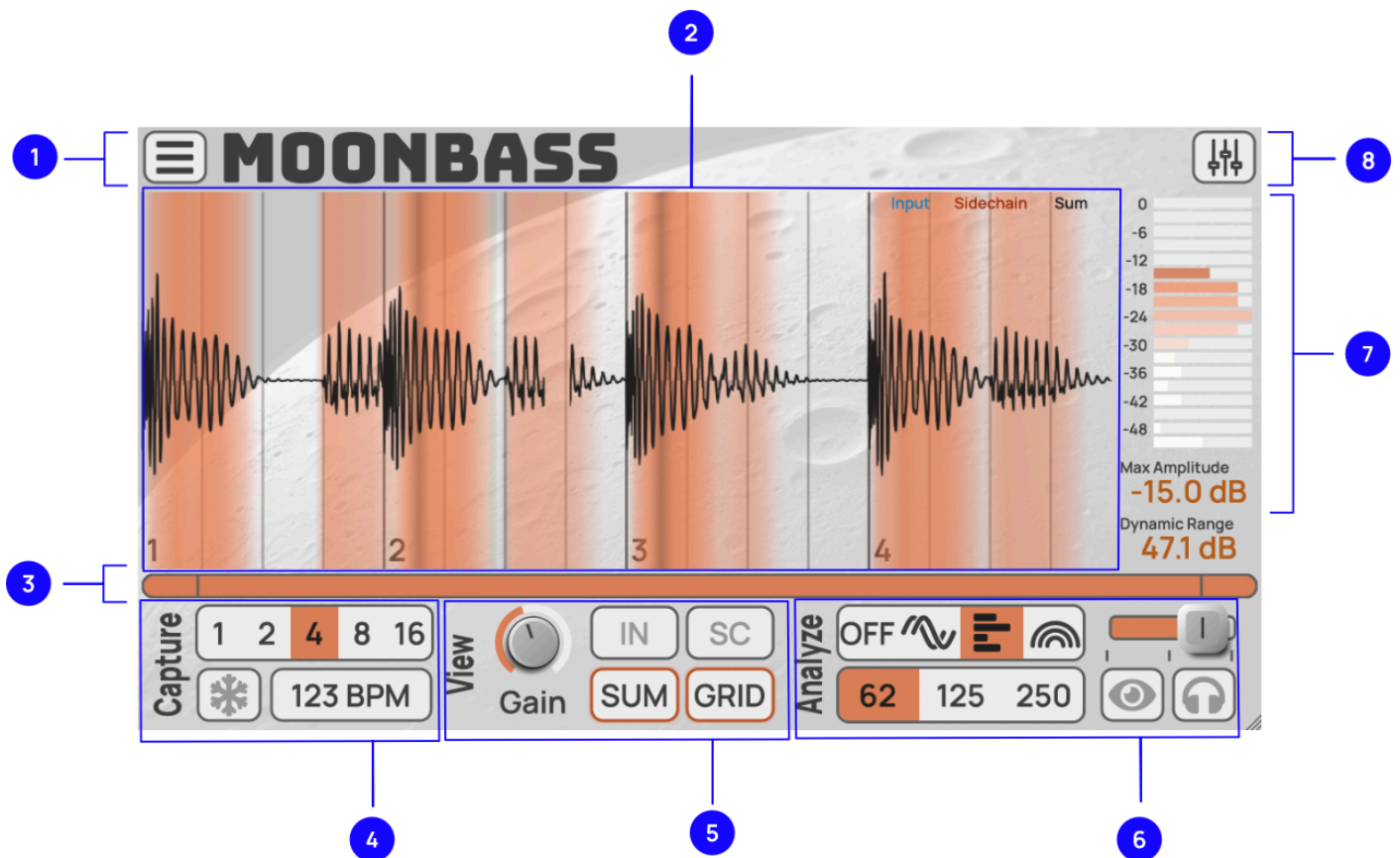
Moonbass is a beat-synchronized oscilloscope designed for in-depth bass analysis in EDM tracks. It captures two channels—typically bass and kick—and displays them side by side for easy comparison. Key features include **phase cancellation detection**, **bass dynamics analysis**, and a **high-resolution bass spectrogram**, helping you identify and resolve mix issues. You can also selectively analyze specific bass frequency ranges using a **zero-phase filter** for precise visual monitoring, ensuring an accurate signal representation without introducing phase distortion.

Getting Started

Place Moonbass on the bass bus track of your project. Then connect the sidechain input to the kick track or kick bus.

For accurate analysis of the levels, the bass and kick inputs to Moonbass should be at the same level as they are in the final mix. If your for both channel faders are not set at the same level, you can compensate using gain stage correction sliders within Moonbass. In Ableton you can select where the sidechain is tapped at, so tap “post mixer” for easiest setup.

User interface



1. **Menu** The menu button provides access to various settings and the about box.
2. **Scope Display** This main display shows the various captured waveforms (input, sidechain, and sum) and any analysis visualizations.

3. **Scrollbar** The scrollbar allows zooming in on and navigating to various portions of the captured waveforms.
4. **Capture Panel** This section has the controls that control the capture buffer and how the incoming audio is stored for processing and visualization.
5. **View Panel** This section controls how the captured waveforms in the buffer are displayed on the scope.
6. **Analyze Panel** This section controls the analysis visualizations that can be overlaid onto the scope as well determining if the low-pass filtering is reflected in the rendered waveforms on the scope and in the audio output.
7. **Analysis Results** Besides overlaying the analysis on the scope display, this section displays aggregated data from the analysis across the captured buffer.
8. **Gain Stage Correction** Opens the gain stage correction panel to independently adjust the two input signals to match their level in the mix.

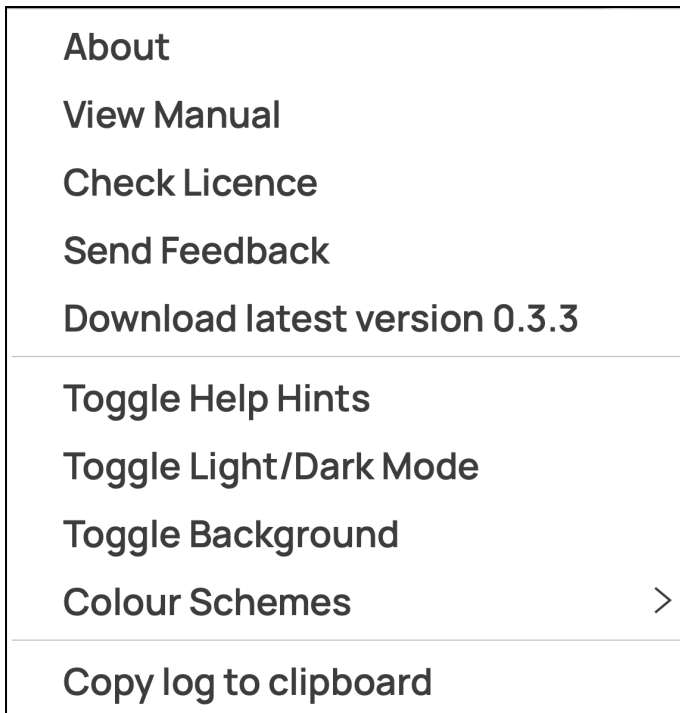
Principles of the User Interface

- Help text when hovering over a value (if enabled on menu)
- Drag up and down to change knob values

Menu

The menu provides quick access to less frequently used functionality:

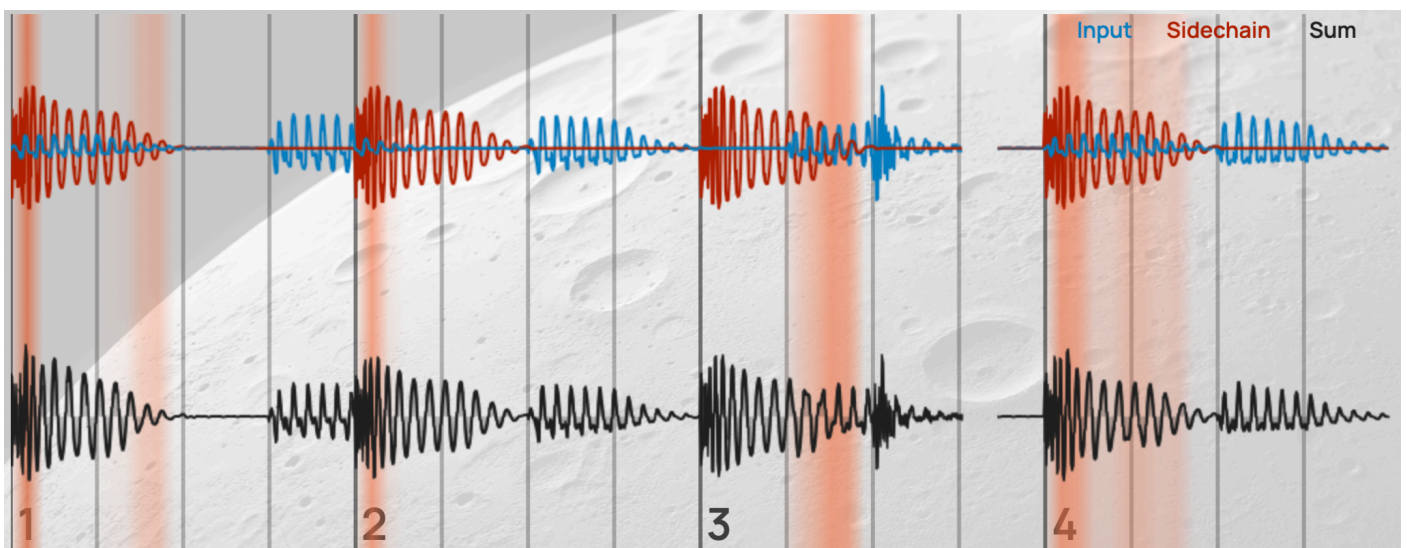
1. **About box** with information on the plugin version..
2. View this PDF **manual**
3. Check the **license**. The dialog will allow you to check your evaluation period or install a purchased license by logging in using your tsuga.io credentials.
4. Send us **feedback** if you have any problems, need help, or any suggestions on how Moonbase could be enhanced to work better for you.
5. Shows if there is a **new version available**, and clicking will take you to the downloads page.
6. Toggling the popup **help hints** for each of the main controls on the user interface. These pop-ups appear on the scope display, so once you are more familiar with using the plugin you'll probably want to disable the hints.
7. Toggle **light/dark mode**. Moonbase has a light and dark theme to suit your desired working environment.
8. Toggle **background** to enable or disable the logo and moonscape from the background of the scope.
9. **Colour Schemes** > to select a colour scheme for the scope traces and visualizations.
10. **Copy log to clipboard**. To support this plugin, the debug log can be copied into the clipboard. This will be useful if you need to contact product support.



Scope Display

The scope display is the primary output area on the user interface. Its purpose is to display the waveforms for the captured audio. It can display up to three waveforms; the main plugin audio input, the sidechain input, and the sum of the main and sidechain inputs. Each of these can be individually selected on the view panel. Although the plugin accepts stereo audio, it is always summed to mono in the scope - after all that is the crucial part when considering bass frequencies.

When one of the analysis modes is enabled on the Analyze panel, the scope will also display an overlay showing additional information about temporal regions of the waveform. This is discussed in more detail later in the manual.

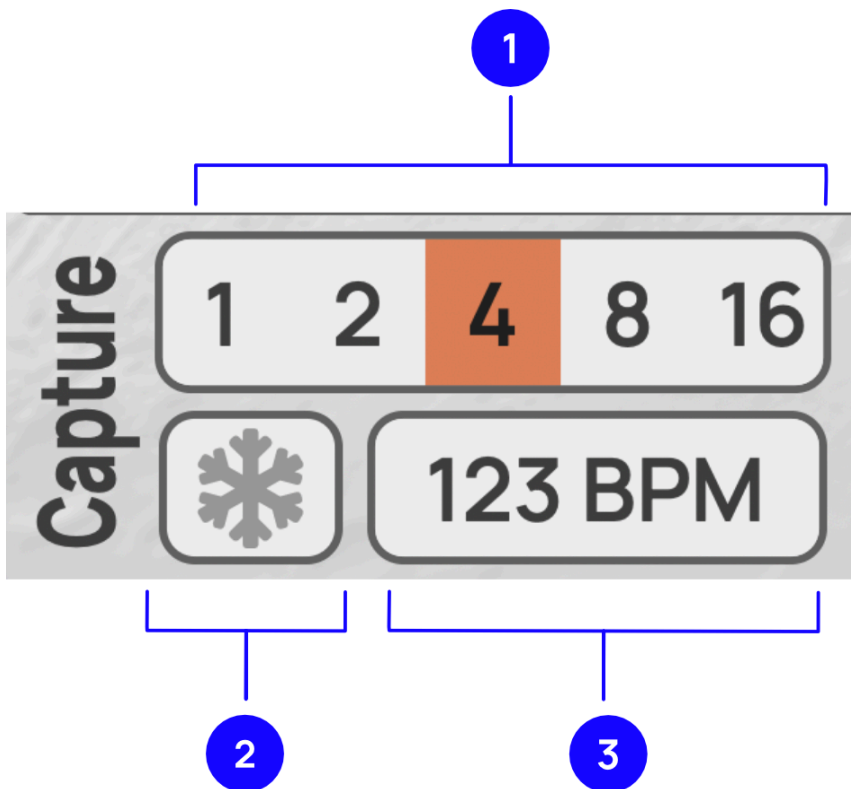


Scrollbar

The scrollbar has two purposes: first, it zooms in on the waveform, and second, it moves the viewport when zoomed in. Drag the end handles of the scrollbar to zoom in, and the central handle to move the viewport.

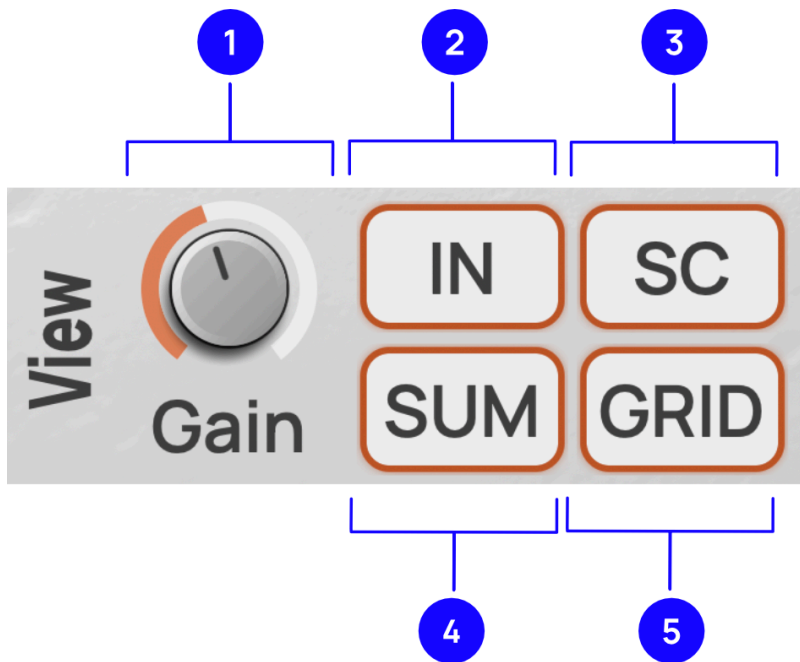
Double-click the scrollbar to reset it to view the whole capture buffer.

Capture Panel



1. **Capture buffer period** chooses the length of the capture buffer in beats.
2. **Freeze button** stops the capture buffer at a point in time, allowing a more leisurely exploration of the waveforms and visualisations. Clicking again will unfreeze.
3. The **tempo control** displays and allows overriding of the host BPM (beats per minute). This is useful for reference purposes when streaming external audio or in a host such as Rogue Ameoba Audio Hijack where no BPM is set. Dragging up and down on the control adjusts the BPM in whole number increments. Double clicking resets the BPM back to host control.

View Panel



1. The **gain knob** is used to increase or decrease the amplitude of the waveforms in the scope.
2. The **IN toggle** enables viewing of the main input audio waveform.
3. The **SC toggle** enables viewing of the sidechain audio waveform.
4. The **SUM toggle** enables viewing of the SUM of the main input and sidechain waveforms.
5. The **GRID toggle** enables the beat grid display on the scope.

Analyze Panel

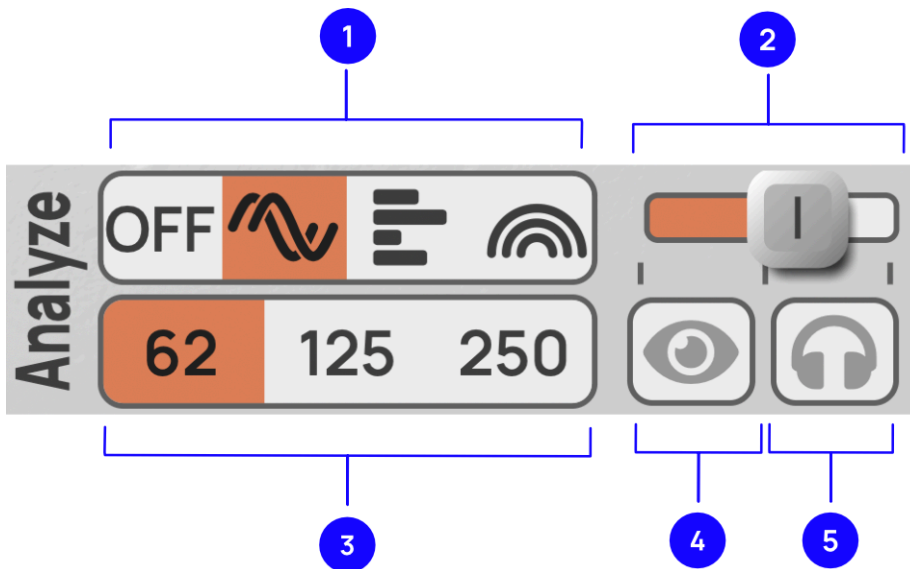
This panel allows you to control the advanced bass-focused analysis modes of Moonbass. When enabled the scope display shows a visualization overlay and the analysis results panel gives additional information.

The **phase cancellation mode** analyses the main input (usually bass) and the sidechain (usually kick) together, looking for regions in the capture buffer where phase cancellation occurs. It uses a proprietary algorithm that compares the phases and amplitudes of each signal. It is vital to eliminate phase cancellation between bass elements as it can lead to a loss of bass energy and inconsistent and unexpected amplitude changes that are hard to compensate for.

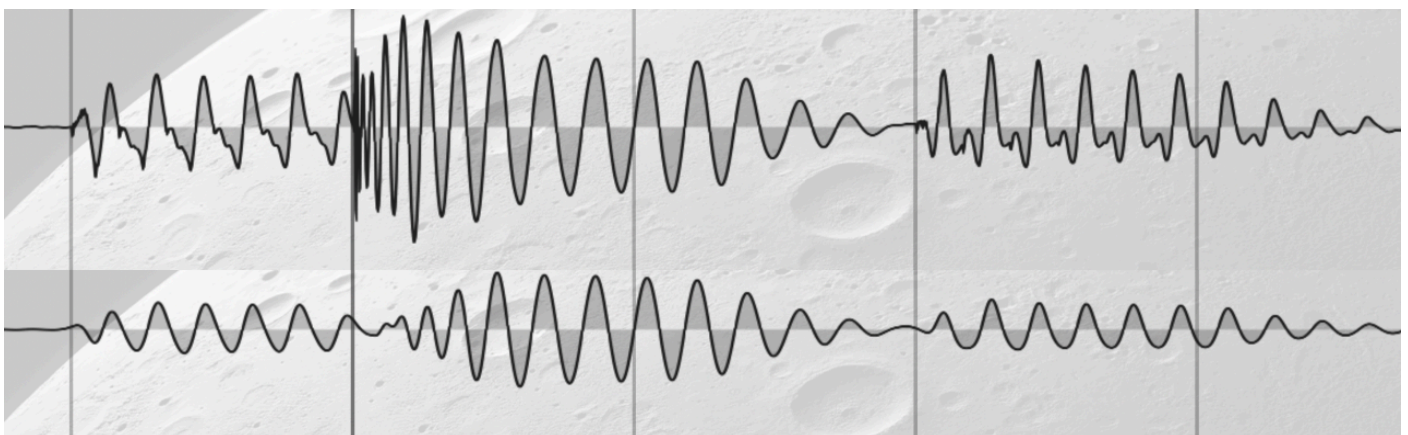
The **base dynamics mode** analyses the amplitude of the sum of both inputs across the capture window. The dynamic range in the bass frequency range is an artistic choice but there are various considerations to be aware of. Clearly seeing the distribution of energy is important for making informed decisions.

The **spectrogram mode** analyses either the sum, or the two inputs independently breaking down the signal into its frequency components. Its unique approach enables both high resolution frequency

and high resolution temporal information to be preserved in the low frequencies down to 25Hz.



1. The **analysis mode selector** lets you choose one of the bass analysis modes: phase cancellation, dynamics, or spectrogram.
2. The **contrast slider** lets you adjust the contrast of the analysis visualization on the scope. Depending upon the characteristics of the input signal you may want to adjust this to get the clearest view of the analysis.
3. Both phase cancellation, and bass dynamics modes employ a **low-pass filter** to eliminate frequencies above the cutoff. The three frequencies correspond to three octaves roughly sub-bass, low-bass, and high-bass.
4. The **filter view button** employs a zero-phase low-pass filter on the displayed waveforms on the scope, allowing to clearly see the relevant frequencies without any phase skew.
5. When enabled, the **filter listen button** employs a 24dB per octave on the combined input and sidechain signals and sends it to the plugin output. This is most useful if you solo the track containing Moonbase so you can preview just the bass frequencies. When disabled, the plugin just directly outputs the input signal with no processing.



This figure shows the same audio displayed on the scope, both with the low-pass visual filter disabled and enabled. On the lower scope you can see how the filter has removed higher harmonics in the bass and the click at the start of the kick.

Analysis Results Panel

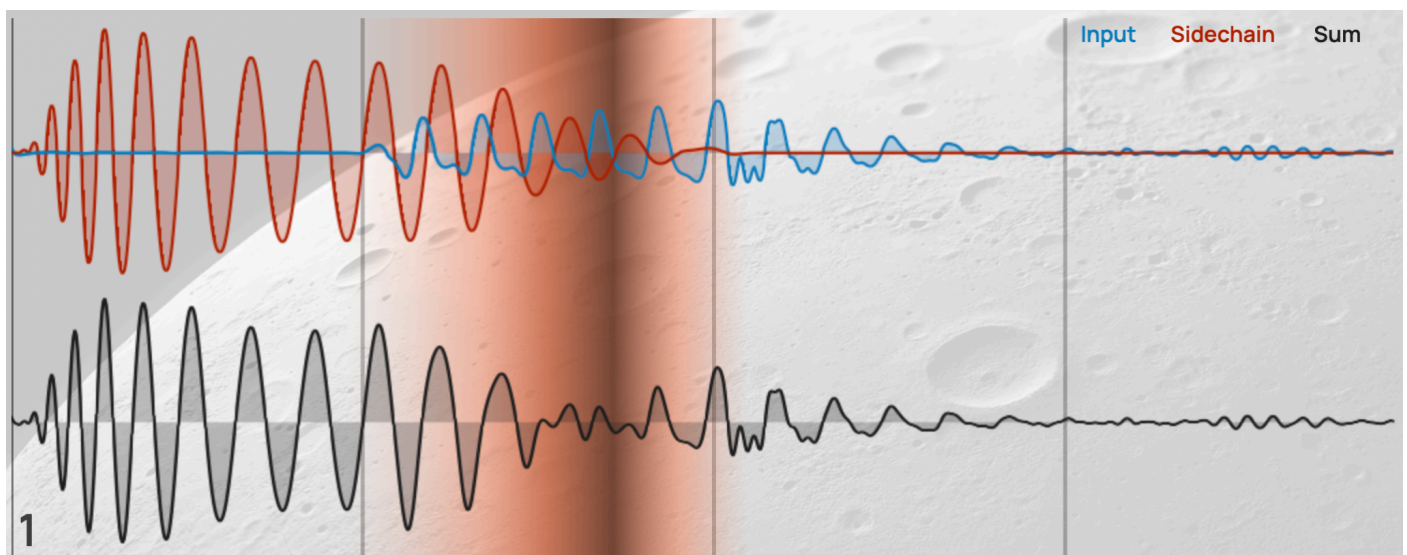
The analysis results panel displays different information depending upon the selected analysis mode.

Phase Cancellation Analysis

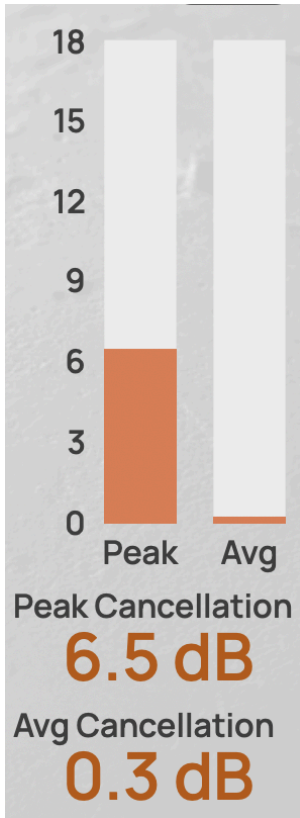
Phase cancellation can occur when bass and kick frequencies overlap. This is particularly problematic in the bass range, where frequency differences between notes are smaller. If both parts contain similar or identical frequencies but their phases don't align perfectly, destructive interference will occur, reducing the amplitude of those frequencies. In the worst case, complete cancellation happens when the signals are 180 degrees out of phase and at the same amplitude.

Without *Moonbase*, identifying phase cancellation can be challenging. Viewing two waveforms on an oscilloscope is difficult because multiple frequencies coexist, making visual detection of phase issues nearly impossible. While even an untrained ear can perceive a loss of energy due to phase cancellation, pinpointing the exact moment is tedious. Additionally, some sound sources, such as older synthesizers, cannot lock or reset oscillator phase, leading to inconsistent interference.

To detect phase cancellation using *Moonbase*, connect both bass and kick as inputs, then enable Phase Cancellation Mode. Start with the lowest cutoff frequency setting (62Hz). Play a representative section of your track and adjust the contrast control. If cancellation occurs, *Moonbase* will highlight the affected periods. Hover over the scope to display a pop-up showing the instantaneous cancellation level at that point.



This example shows a kick and a sub starting on the beat. The sub has been shaped to build in amplitude so that it reaches its peak as the kick fades out. Unfortunately the phase of the sub means that it destructively interferes, and the cancellation reaches a maximum where the two signals have equal amplitude. The cancellation is visible in the summed waveform. Cancellation mode identifies where the cancellation occurs with the solid blue band on the scope.



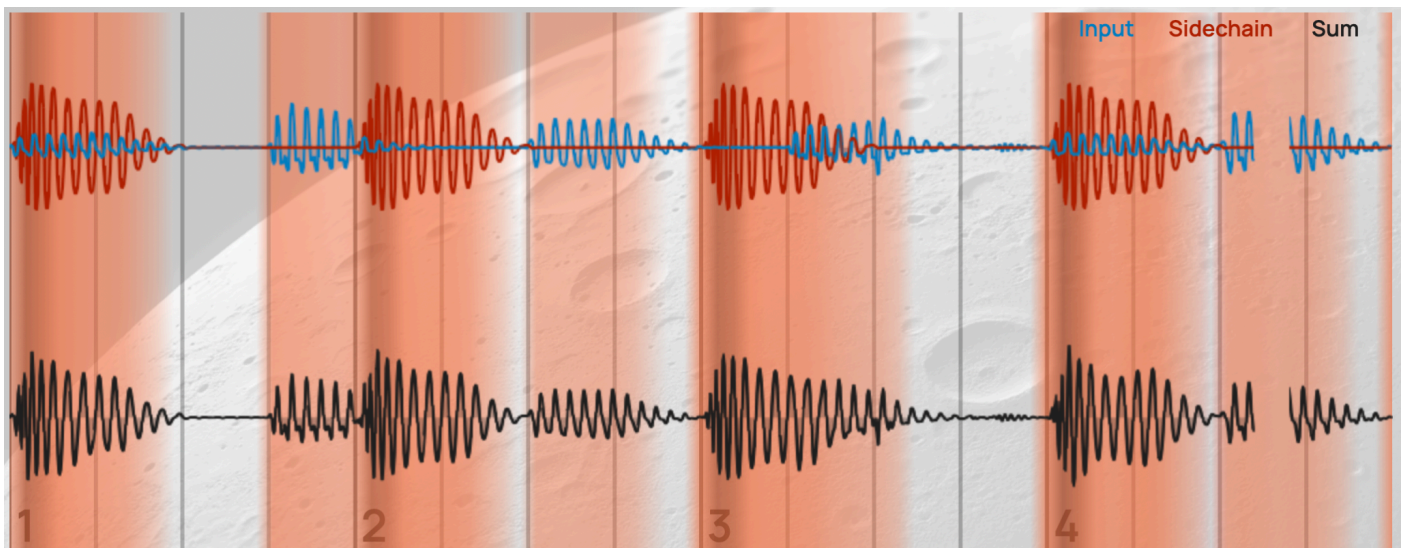
The analysis results panel shows the peak and average reduction in dB.

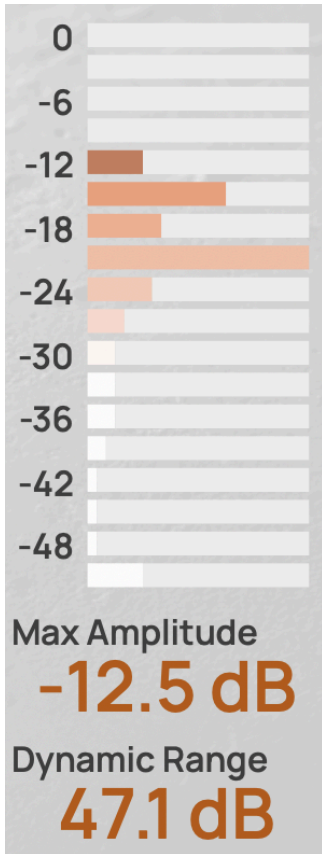
Resolving phase cancellation issues is a complex topic and a full exploration is outside the scope of this manual. Here a few pointers for potential fixes:

1. Minimise overlap of kick and bass by using sidechain compression or a shaper tool over the bass to duck when the kick plays.
2. Ensure that you tune the kick to the key of the track.
3. Separate the sub frequencies of the bass and take control over the phase using a modern synthesiser where you can precisely control the phase.

Bass Dynamics Analysis

Bass Dynamics Analysis Mode helps you understand how bass energy evolves throughout a track. By analyzing well-mixed reference tracks, you can observe how energy and complexity change over time, guiding you in shaping your own mix.





- **Scope Display:** Visualizes bass energy patterns across beats and bars, allowing you to identify trends and inconsistencies.

- **Analysis Results Panel:** Displays a histogram of amplitude levels across the capture buffer, highlighting how bass energy is distributed over time. It also provides key metrics, including **maximum amplitude** (the peak energy level) and **dynamic range** (the difference between the loudest and quietest moments), helping you assess whether your bass dynamics are well-balanced or need adjustment.

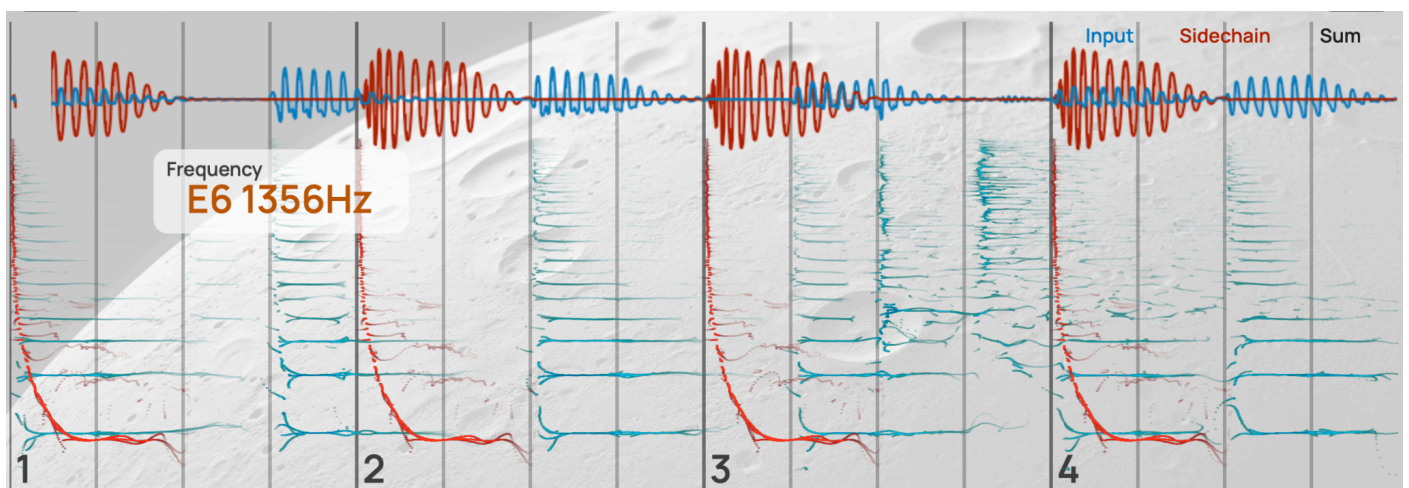
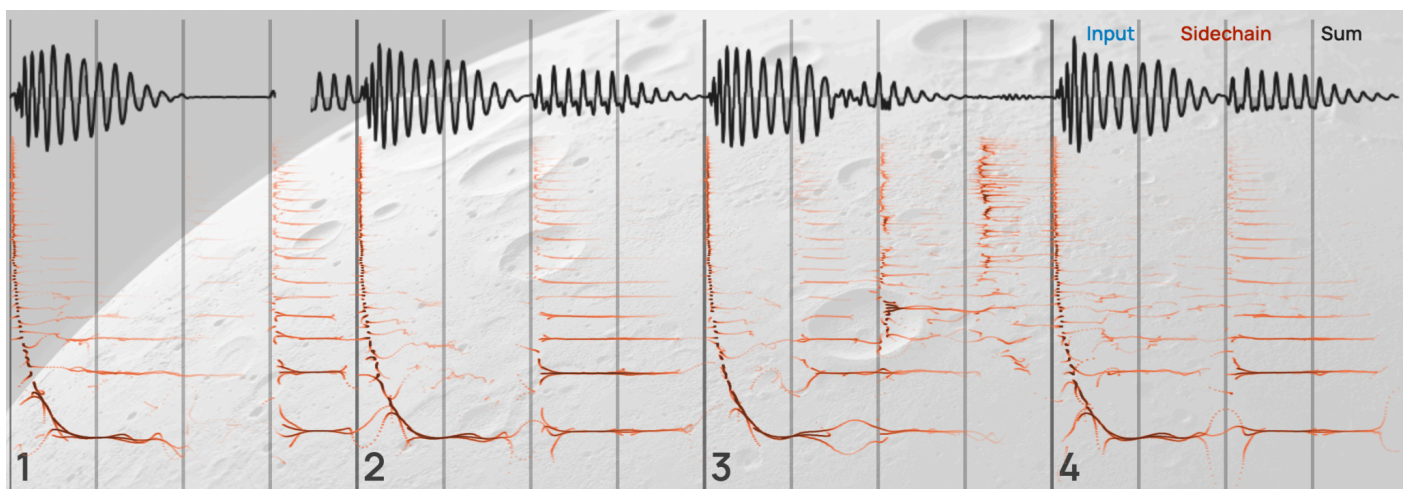
By comparing your track's bass dynamics to reference tracks, you can make more informed mixing decisions, ensuring clarity, consistency, and impact in the low end.

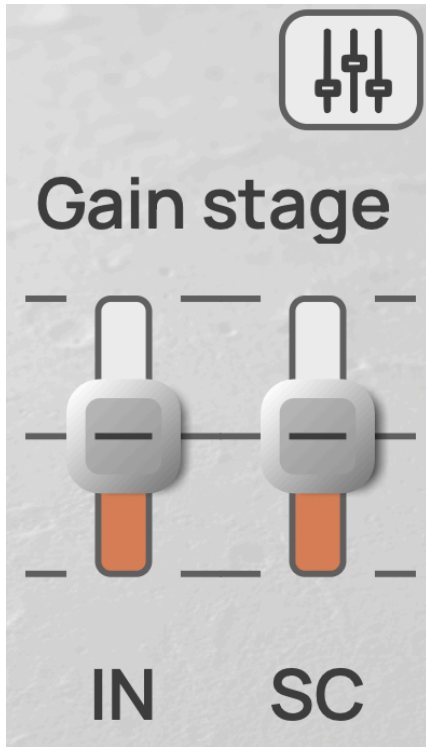
Spectral Analysis (Spectrogram)

The spectral analysis mode breaks down the input signal into its frequency components and displays those alongside the scope. It is useful for seeing exactly what frequencies are present in the signal at any point in time. It focuses on the low frequencies between 25 Hz and 1600 Hz which covers the whole sub-bass range and up into first few harmonics of bass notes (to help give a clear context). You can choose between showing analysis of the sum of the inputs, or to show each input separately - this is super useful for observing the space and interplay between kick and bass.

The spectrogram uses an advanced analysis approach which attempts to extract maximum information both in the frequency and time domains concurrently whilst minimising any artifacts. There is a lot of tuning behind the scenes and future release will improve user configurability.

Hover over the scope to show a popup showing the note and frequency at that position.





Gain Stage Correction

Clicking on the settings toggle opens the settings panel which contains the gain stage correction sliders. This allows independent correction of both the input and sidechain signals to compensate for any faders in the signal flow after input and sidechain are tapped and fed into Moonbass. Many DAWs tap the signal before the channel fader hence the amplitude of the signal Moonbase sees is different to what may eventually reach the master channel. Ableton Live gives you the choice. Any difference between input is especially important because analysis modes rely on analysing two signals at the correct relative amplitudes.

Timing Offset



Also on the settings panel is the timing offset used for correcting synchronization of the capture window with the beat. On some hosts it might be necessary to adjust this value to get the start of the beat at the start of the capture window. This can happen when some hosts apply latency compensation but don't correctly report this compensation time to Moonbass.

Uninstall

This section describes the manual steps to completely remove Moonbass from your system.

Windows

- Delete the VST3 plugin which is installed at <C:\Program Files\Common Files\VST3\Moonbass.vst3>

macOS

- Delete AU format plugin which is installed at: </Macintosh HD/Library/Audio/Plug-Ins/Components/Moonbass.component>
- Delete the VST3 plugins which is installed in </Macintosh HD/Library/Audio/Plug-Ins/VST3/Moonbass.vst3>

