

# ChStrip

## EQ / Compressor



## User Guide

Version 1.7

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# Introduction

Thank you for purchasing ChStrip. To help you get the most out of this product, please read this manual carefully.

ChStrip is an AudioUnit Extension channel strip plugin which contains an equalizer and a compressor for tracking and mixing. The equalizer is a three band EQ consists of low shelving filter, mid peak / notch filter and high shelving filter. The compressor is a dynamic range compression module uses feed-back topology for natural and musical sound. Both of the equalizer and compressor are not emulation of the particular hardware, but they are build by incorporating the techniques used for the analog circuit modeling.

## Features

ChStrip (AUv3)

Equalizer

3-band EQ, Low Shelving filter, Mid Peak / Notch filter and High Shelving filter.

Compressor

Stereo dynamic range compression

Feedback topology (Implemented by delay free feedback loop)

Side chain high pass filter

Soft clip / Peak Limiter

Auto fade in and auto fade out

Host Application

Host application uses system audio input as an audio source and processed audio signal is routed to the system audio output.

# User Interface



## Host Application

### 1. Audio Input Source Label

Display a name of the Audio input source

### 2. Audio Output Source Label

Display a name of the audio output source

### 3. Connect button

Tap this button to enable / disable connection from audio input source to AUv3 Extension.

## AudioUnit Extension

### 4. High Frequency

Adjust frequency of the high shelving filter.

### 5. High Gain

Adjust gain of the high shelving filter.

### 6. Mid Frequency

Adjust frequency of the mid peak / notch filter.

---

## 7. Mid Gain

Adjust gain of the mid peak / notch filter.

---

## 8. Low Frequency

Adjust frequency of the low shelving filter.

---

## 9. Low Gain

Adjust gain of the low shelving filter.

---

## 10. Gain Reduction Meter

Show amount of the gain reduction apply to the input signal.

---

## 11. Input Gain

Adjust gain of the input signal to the compressor.

---

## 12. Side Chain Highness Filter Frequency

Adjust frequency of the high pass filter for the side chain input signal.

---

## 13. Threshold

Adjust level of the threshold which gain reduction begins

---

## 14. Makeup Gain

Adjust amount of the makeup gain

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## 15. Ratio

Adjust compression ratio

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## 16. Attack

Adjust time to start compression

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## 17. Release

Adjust time to end compression

---

## 18. Clip

Tap this button to select clip off, soft clip or limiter.

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## 19. Ceiling

Adjust level of peak signal when soft clip or limiter is enabled

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## 20. Dry / Wet

Adjust amount of processed signal mixed with the original signal.

---

## 21. Output Gain

Adjust level of the output signal

---

## 22. Help Button

Tap this button to show user guide.



## **Host Application**

Host application uses system audio input as an audio source and processed audio signal is routed to the system audio output.

## **How to enable / disable effect unit**

1. Tap connect button to enable / disable connection from audio input source to AUv3 Extension.

## **Permission to access microphone**

When application is launched at the first time, it will ask permission to use built-in microphone. If the permission is denied, application can't access to audio input source.

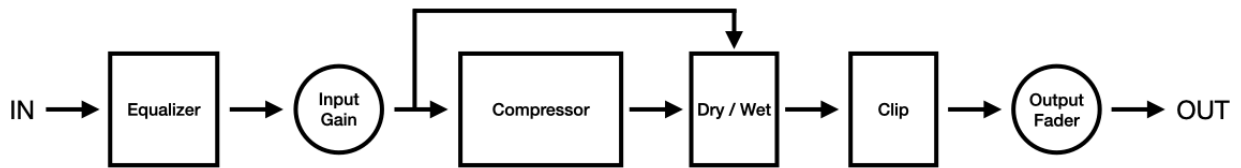
If you wish to set the permission manually, change preference under Settings -> Privacy -> Microphone.

## **Feedback Loop**

When audio input source is built-in microphone and audio output source is built-in speaker, connection from audio input source to AudioUnit Extension is disconnected to prevent audio feedback loop. If you want use built-in microphone as an audio input source, please connect headphone or line out.

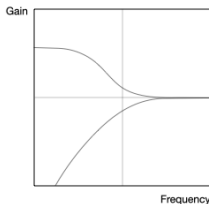
# AudioUnit Extension

## Signal Flow



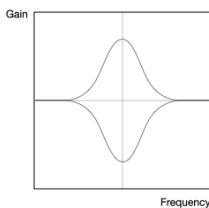
## Equalizer

### Low Shelving



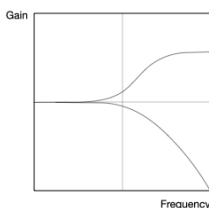
Adjust frequency of the filter from 21 Hz to 1092 Hz.  
Adjust gain from minus infinity to +12 dB  
When gain is turned fully anti clock wise, the filer becomes high pass filter.

### Mid Peak / Notch



Adjust frequency of the filter from 151 Hz to 2389 Hz.  
Adjust gain from -14 dB to +14 dB  
Bandwidth is fixed to one octave.

### High Shelving

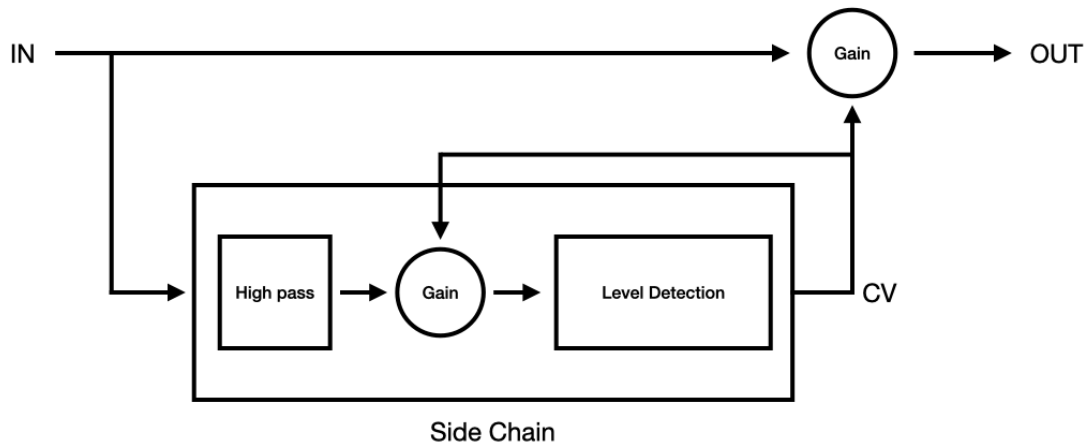


Adjust frequency of the filter from 296 Hz to 21096 Hz.  
Adjust gain from minus infinity to +12 dB  
When gain is turned fully anti clock wise, the filer becomes low pass filter.

# Compressor

## Overview

The compressor reduces dynamic range of audio signal. This is achieved by feedback topology as shown in the diagram below.

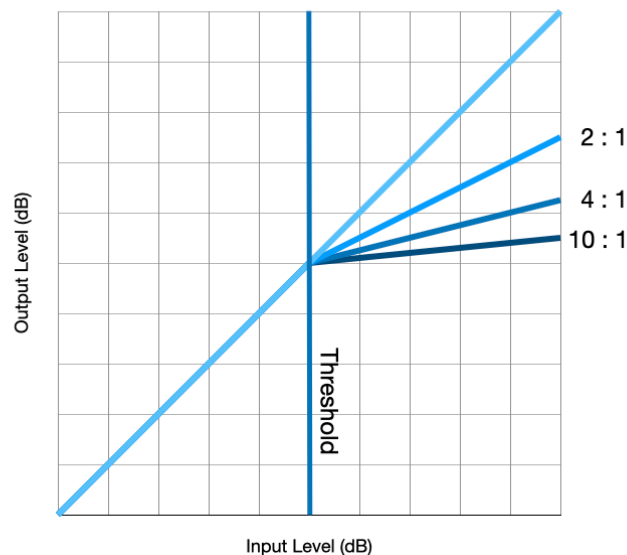


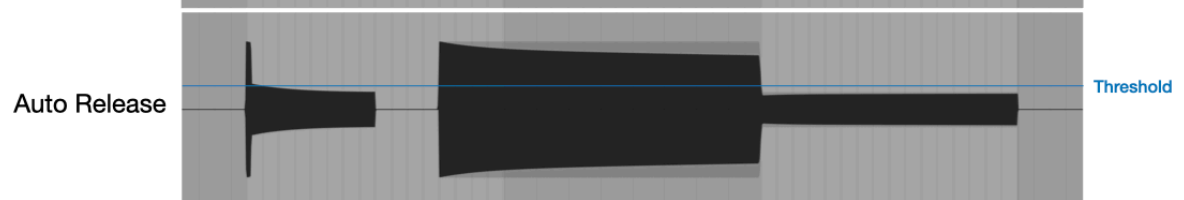
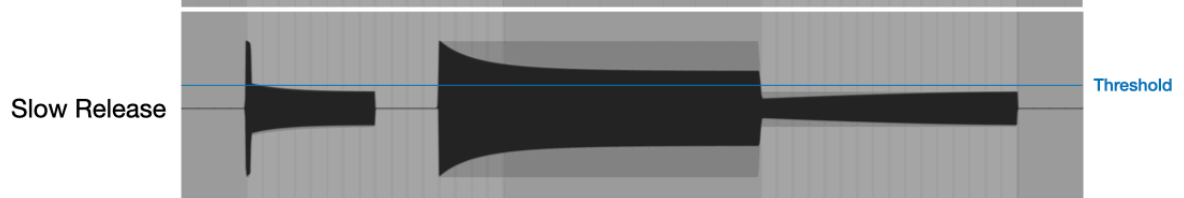
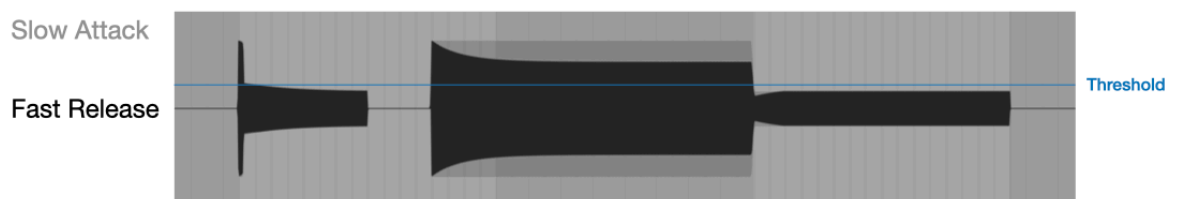
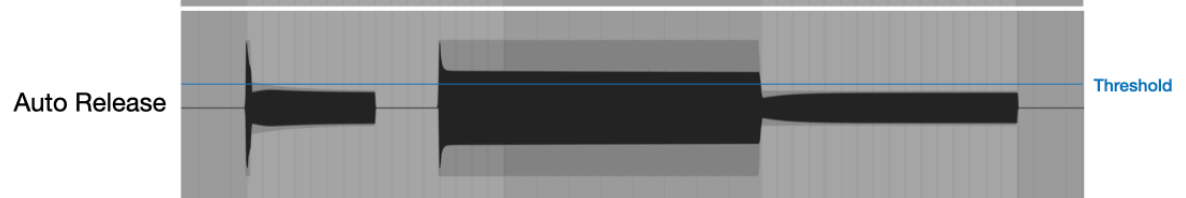
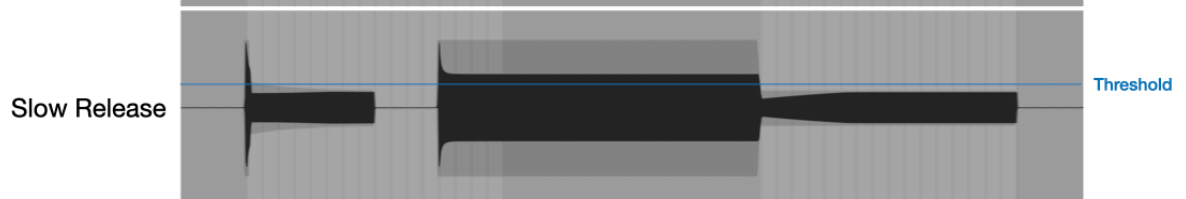
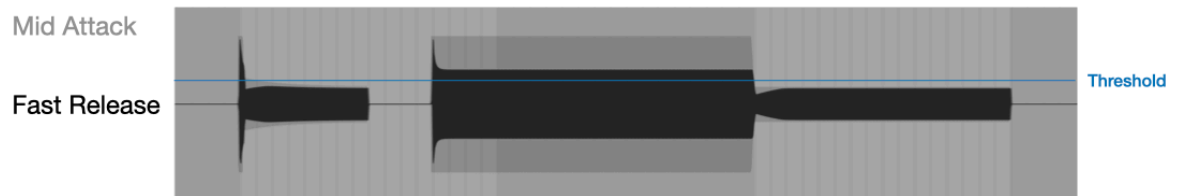
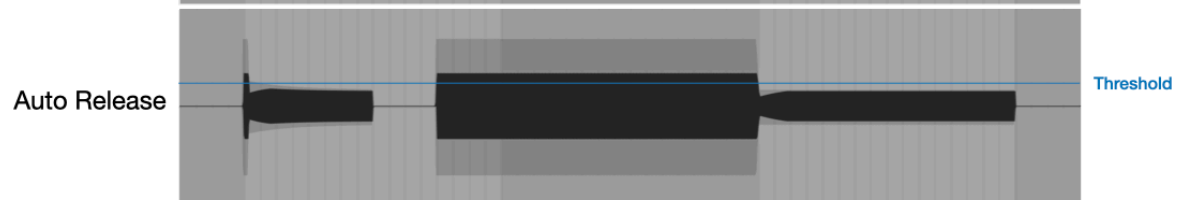
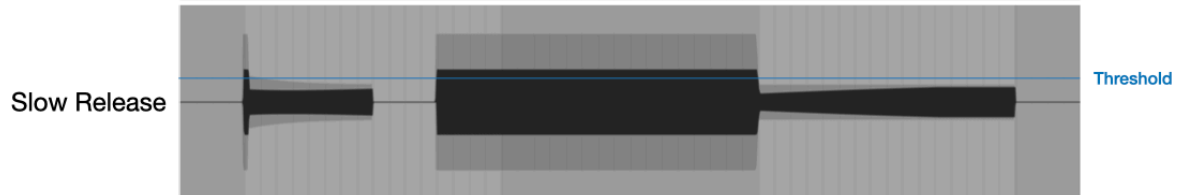
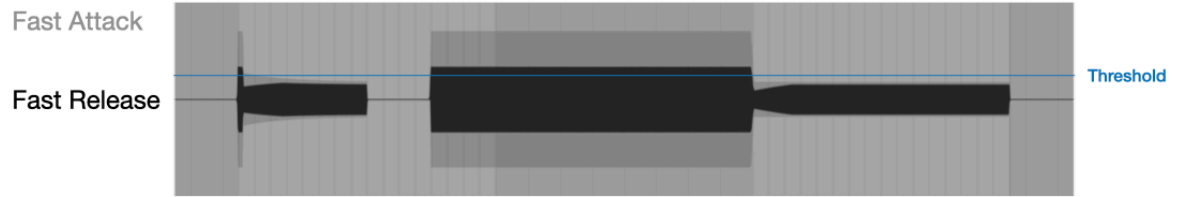
High pass filter is applied to the input of the side chain and the signal is routed to the gain stage in the side chain. The output of the gain stage is routed to the level detection. The level detector detects level of the input signal and generates control signal based on the level of the gain reduction required. The control signal is routed to the amplifier in the gain stage in the side chain to adjust level of the input signal from the high pass filter. The same control signal is also routed to the amplifier of the main gain stage to adjust level of the input signal.

The feedback topology is common in early analog compressors. Although there are several disadvantages to this topology, it is considered more musical than feed-forward design used in modern compressors. The feedback loop is implemented without unit delay to emulate behavior of the analog circuit.

## Threshold and Ratio

When level of the input signal passes above the threshold, the input signal is compressed by the ratio.

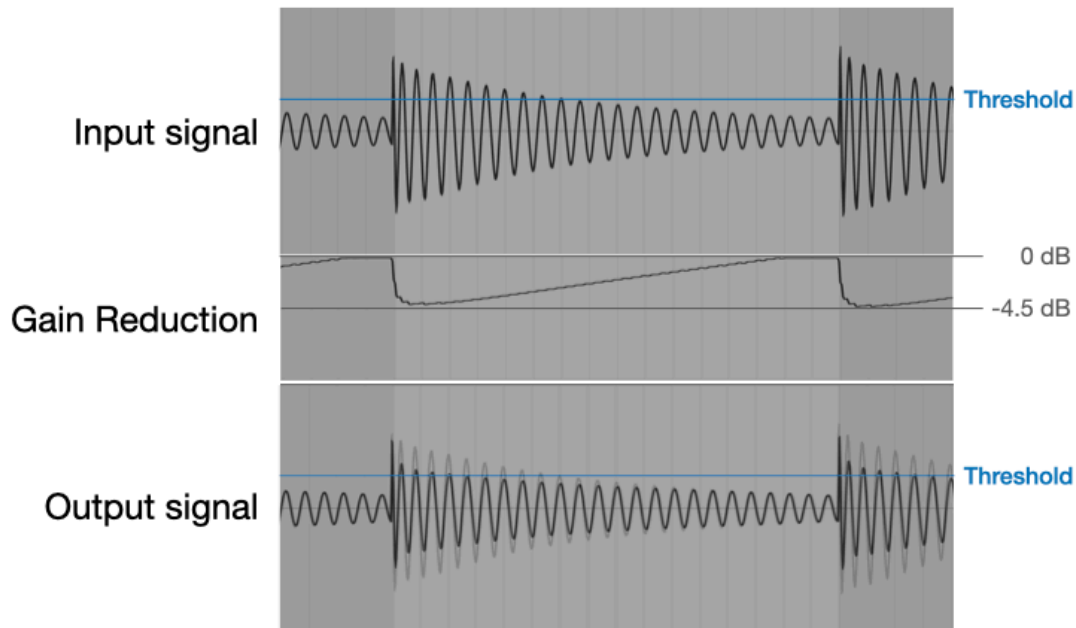




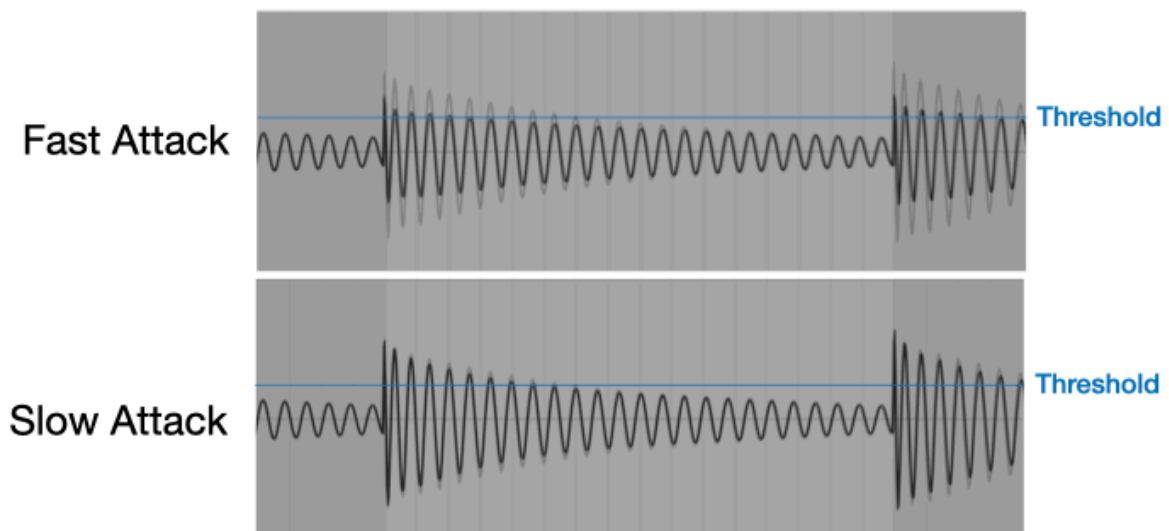
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## Attack and Release

Attack is the time it takes for the signal to be compressed by the given ratio. Release is the time it takes the gain reduction to return to zero.



In this example, attack is 1 ms and release is 0.6 s. The initial transient pass through the compressor without gain reduction. It takes a while for the gain reduction to return to 0 dB after the input signal goes below the threshold.



Fast attack makes compressor to start gain reduction immediately after the input signal passes above the threshold. Slow attack, on the other hand, allows many of the transients to pass through compressor without gain reduction.

The figures below illustrate characteristic of the attack and the release. 1KHz Sine wave is used as an input signal (shown as transparent background images). It shows how compressor reacts with various combination of the attack and release settings.

Auto Release uses two time constants for the peak detector. It will react differently for the short transients and the long sustained sound.

Fast attack reduces the level of the transients and make sound soft, slow attack allows transients to pass through and gives a punch to the sound.

Fast release causes pumping and breathing effects. Slow release continues to reduce level for a long period of time after compressing louder part of the sound.

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## Side Chain High Pass Filter

-6 dB / octave high pass filter is applied to the input signal of the side chain. Frequency range is from 20 Hz to 185 Hz. This filter removes low frequency information from the input signal for the level detector to control excessive gain reduction and pumping effect.

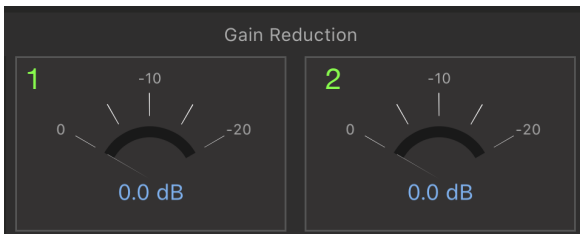
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## Makeup Gain

Use Makeup to compensate the gain reduced by the compressor. The range is from 0 dB to 20 dB. Gain reduction meters show the amount of the gain reduction. You can use the information to adjust level of the makeup gain.

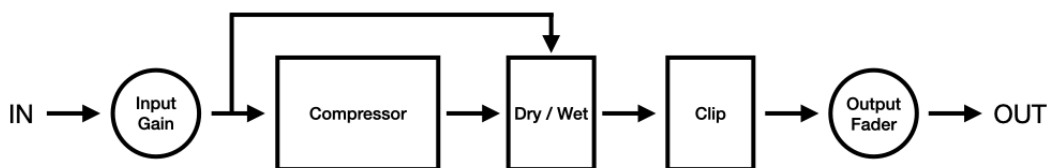
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## Gain Reduction Meter



Gain reduction meters shows peak level of the gain reductions in dB.

1. Gain reduction for the left channel
2. Gain reduction for the right channel



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## Input Gain

Adjust gain of the input signal routed to the compressor. The range is from -20 dB to 20 dB. When level of input signal is increased, GR meters show gain reductions even if threshold is set to 0 dB.

---

## Dry / Wet

Use Dry / Wet to mix uncompressed signal (dry) and compressed signal (wet). Parallel compression technique, also known as New York compression can be achieved by adjusting amount of the wet signal mixed with the dry signal. When set to 0%, output is the dry signal. When set to 100%, output is the wet signal. When set to 50%, equal amount of the dry and the wet signal are mixed for the output.

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## Clip

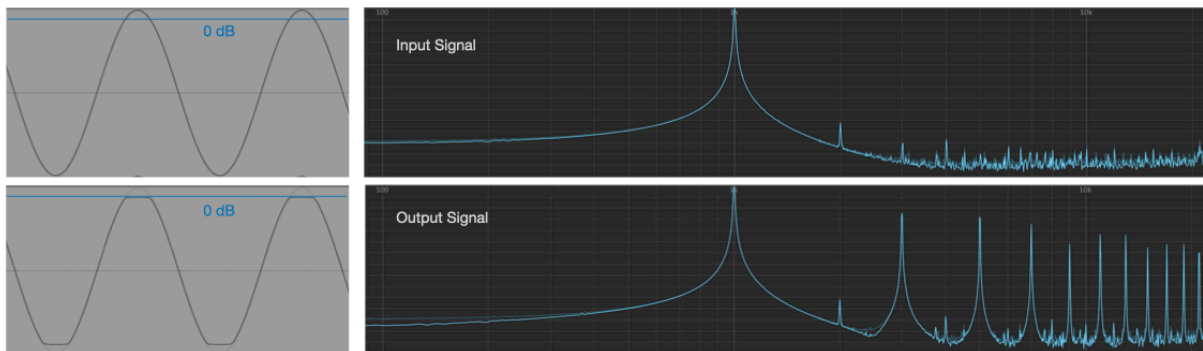
Clip type can be selected from soft clipper or peak limiter.

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### Soft Clip

Soft Clip is designed to protect very fast transients, which pass through the compressor, from clipping. It uses wave shaper to reduce level of the signal above -1 dB. Signal below -1 dB is not affected.

Characteristic of the wave shaper and its frequency response is illustrated in the figure below. Because of the non-linear gain used for the wave shaper, output signal is distorted and contains extra harmonic contents.

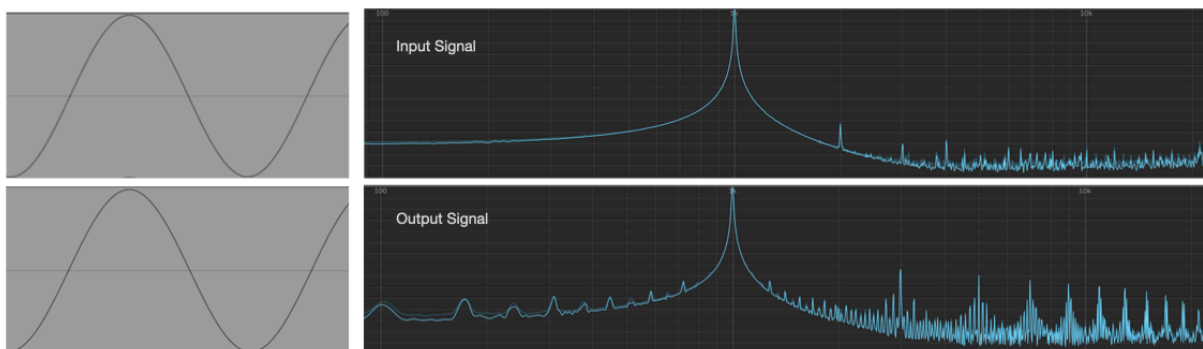


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### Peak Limiter

Peak Limiter is an analog style limiter and provides clean sounding output signal compares to the output of the soft clipper. This limiter is not a lookahead brick wall limiter, so that it can't offer brick wall limiting. However it does not introduced any latency to the output signal. Ceiling can be used to attenuate processed signal when the output signal goes above 0 dB. Please be aware that peak limiter alters dynamics of input signal and may results in producing unwanted effect.

Frequency response of the peak limiter is illustrated in the figure below. Output signal shows the result of 1 dB gain reduction.



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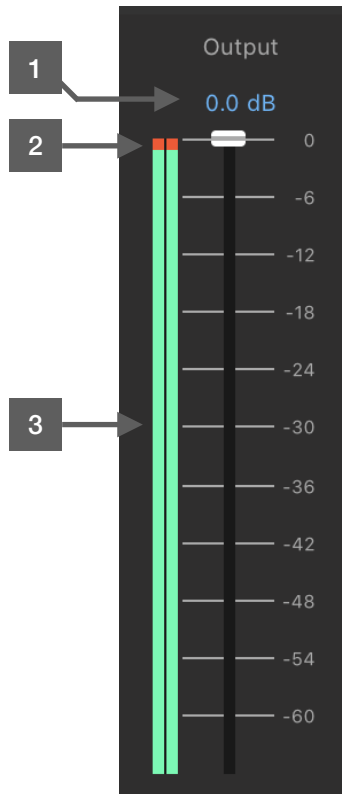
### Ceiling

Ceiling can be used to attenuate clipped signal. The range is from -1 dB to 0 dB. Default setting is -0.3 dB.

---

## Output Fader

Adjust gain of the output signal. The range is from -66 dB to 0 dB.



### 1. Peak Level

It shows peak level of the signal in dB.

### 2. Clip Indicator

It indicates that signal is greater than 0 dB. The indicator resets automatically in 2 seconds.

### 3. Level Meter

It shows peak level of the signal in dB.

## Auto Fade In and Auto Fade Out

If tapped position is away from the position of the thumb more than plus/minus 1 dB, thumb of the fader moves to the tapped position automatically with speed of 60 dB per second.

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## Fine Adjustment and Reset (Dial UI)

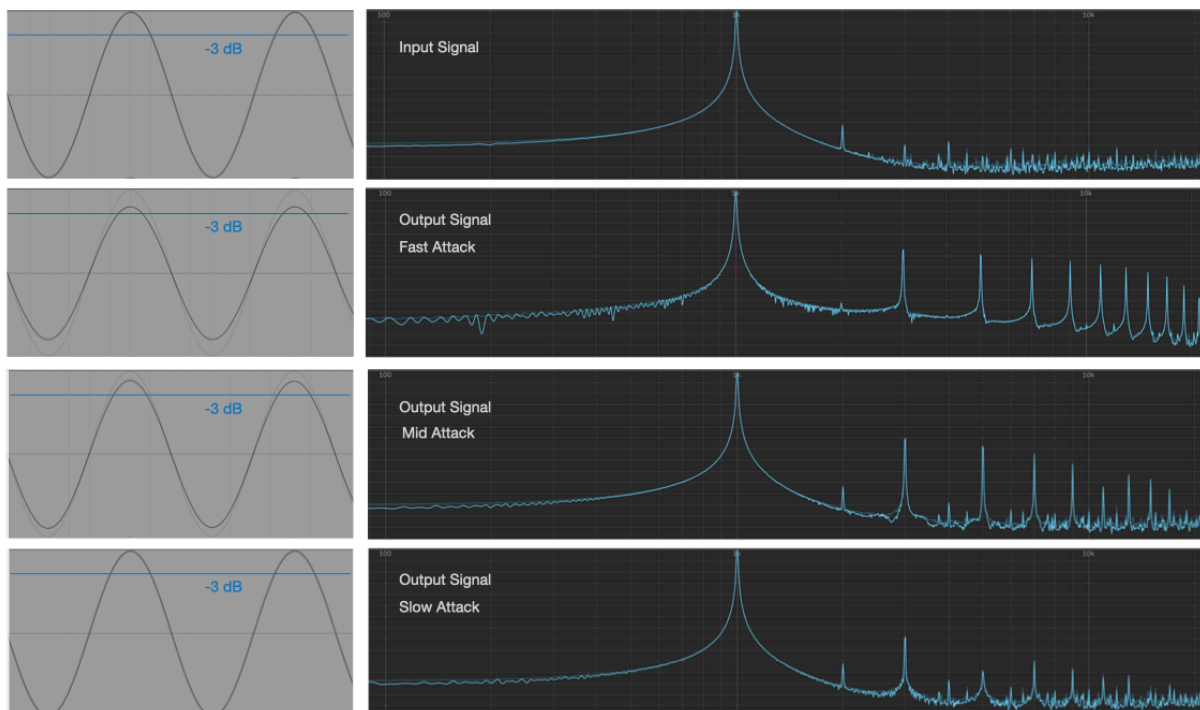
Use + and - buttons to adjust parameter values. Double tap on dial UI resets the dial to the default position.



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## Frequency Response

Figure below shows frequency response of the compressor. Input signal is 1KHz sine wave. Threshold is -3 dB. Ratio is 4. Release is auto.



Fast attack adds more harmonics to the output signal compared to the output signal of the slow attack. The distortion occurs due to the non-linear gain applied to the input signal.

---

## General Procedure

Below is an example of the basic procedure to get you started.

1. Make sure that the input signal is not clipped. If it is clipping reduce amplitude of the signal.
2. Set Dry/Wet to 0% to hear dry signal.
3. Adjust EQ and input gain. Peak level should be around 0 dB. Occasional clipping is okay.
4. Set Dry/Wet to 100% to hear wet signal.
5. Set attack to mid (1 ms or 3 ms) and set release to the position of the auto.
6. Set ratio to 4 and set threshold to -40 dB
7. Set makeup to around 3 dB or less.
8. Turn threshold to clockwise and find position that the signal is present without distortion.
9. If kick drum or bass is triggering compression, adjust side chain high pass filter frequency.
10. Adjust ratio, attack, and release.
11. If fast transients are clipping, turn on soft clip.
12. Use Dry/Wet to compare the compressed and uncompressed signal.
13. Adjust level of the output signal.

# Export / Import User Presets

Utility functions to copy user presets from one device to the other device.

## Export User Presets

Export user presets which are stored in plugin on the device to iCloud, so that presets can be imported to ChStrip installed on the other device.

1. Launch ChStrip as Stand Alone.
2. Tap and hold Connect Button to show export/import menu.
3. Select "Export User Presets".
4. Press "OK" when an alert is displayed when exporting presets is completed.

## Import User Presets

Import user presets, which are exported in iCloud, to ChStrip installed on the other device.

1. Launch ChStrip as Stand Alone.
2. Tap and hold Connect Button to show export/import menu.
3. Select "Import User Presets".
4. Press "OK" when an alert is displayed when importing presets is completed.

# Specification

## Equalizer

Low Shelving	Frequency Range	Range from 21Hz to 1092Hz
	Gain	Range from -INF to +12dB
	High Pass Filter response	12dB / Oct
Mid Peak / Notch	Frequency Range	Range from 151Hz to 2389Hz
	Gain	Range from -14dB to +14dB
	Bandwidth	1 octave
High Shelving	Frequency Range	Range from 296Hz to 21096Hz
	Gain	Range from -INF to +12dB
	Low Pass Filter response	12dB / Oct

## Compressor

Input Gain	Range from -20dB to 20dB
Side Chain Highness Frequency	Range from 20Hz to 185Hz
Threshold	Range from -40dB to 0dB
Makeup Gain	Range from 0dB to 20dB
Ratio	2, 4, 10
Attack	0.01ms, 0.1ms, 0.3ms, 1ms, 3ms, 10ms, 30ms
Release	0.1s, 0.3s, 0.6s, 1.2s, Auto
Clip	Soft Clip, Peak Limiter
Ceiling	Range from -1dB to 0dB
Dry / Wet	Range from 0% to 100%
Output Gain	Range from -66dB to 0dB

## What's new in version 1.0

- Initial release

## What's new in version 1.1

Version 1.1 contains new features and bug fixes.

- Clip type can be selected from soft clipper or peak limiter. Peak Limiter provides clean sounding signal compares to the output of the soft clipper. Peak Limiter is an analog style limiter. It is not

a lookahead brick wall limiter, so that it can't offer brick wall limiting. However it does not introduced any latency to the output signal.

- Added fine tune buttons to dial UIs.
- Extended touchable area of slider UI.

## **What's new in version 1.1.1**

- Version 1.1.1 contains minor bug fixes.

## **What's new in version 1.2**

- Support iOS 14 / iPadOS 14.

## **What's new in version 1.3**

- Support iOS 15 / iPadOS 15.

## **What's new in version 1.4**

- Support iOS 16 / iPadOS 16.

## **What's new in version 1.5**

- Fix the problem that AudioUnit Extension doesn't load.

## **What's new in version 1.6**

- Support iOS 17 / iPadOS 17.

## **What's new in version 1.7**

- Added functions to export/import user presets to iCloud in order to copy the presets from one device to the other device.