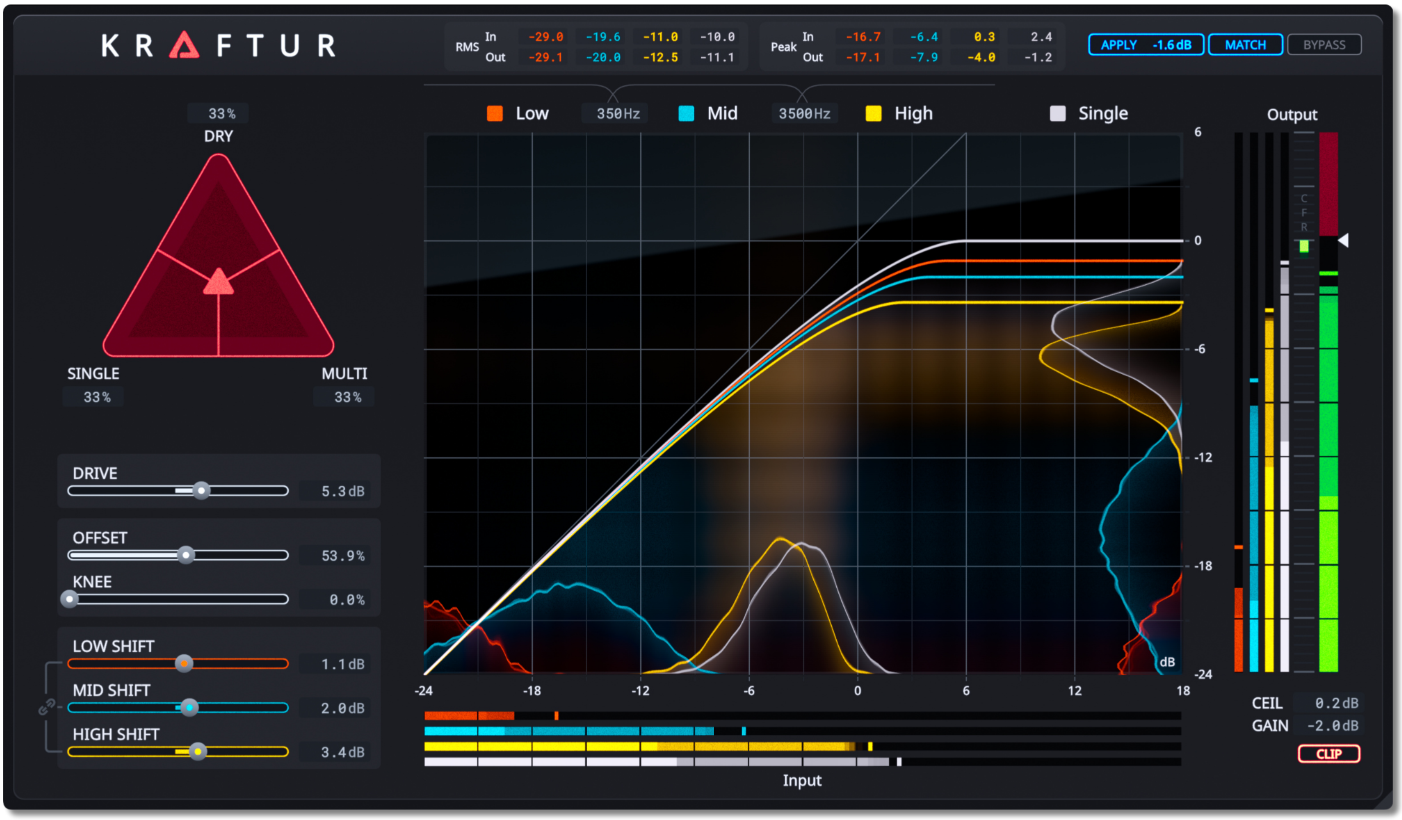
Operation Manual

Soundtheory Kraftur 1.2



Revision 1.0
2025-06-12

System Requirements

- macOS 10.13 or greater / Windows 10 or greater.
- Apple Silicon processor / Intel, AMD or compatible processor with support for AVX.
- Graphics processor with support for OpenGL 3.2 or later.
- iLok License Manager for activation (dongle is not required).
- 64 bit plug-in host with support for AU, VST, VST3 or AAX Native.

Specifications

- Supports any channel configuration with equal input/output channel count.
- Supported sample rates from 32 kHz to 384 kHz.
- Internal sample rate between 392 kHz and 768 kHz.
- No processing latency for Kraftur and approximately 40-50 ms for Kraftur Focus.

Trademarks

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Introduction

Soundtheory's Kraftur offers a unique approach to loudness enhancement and saturation. This tool has been carefully engineered to increase the loudness of your mix while preserving the original integrity of its dynamics. When pushed further, Kraftur can also enrich your sound with color and warmth by inducing subtle but pleasing distortion.

While initially designed as a mastering tool, Kraftur is equally effective in adding frequency-specific saturation to individual mix elements such as vocals and drums. Kraftur is not implemented using standard DSP methods. Instead, it relies on innovative algorithms to avoid artifacts that come with more traditional approaches to soft clipping. However, Kraftur shares the same goal: increasing the power of the signal while containing signal peaks.

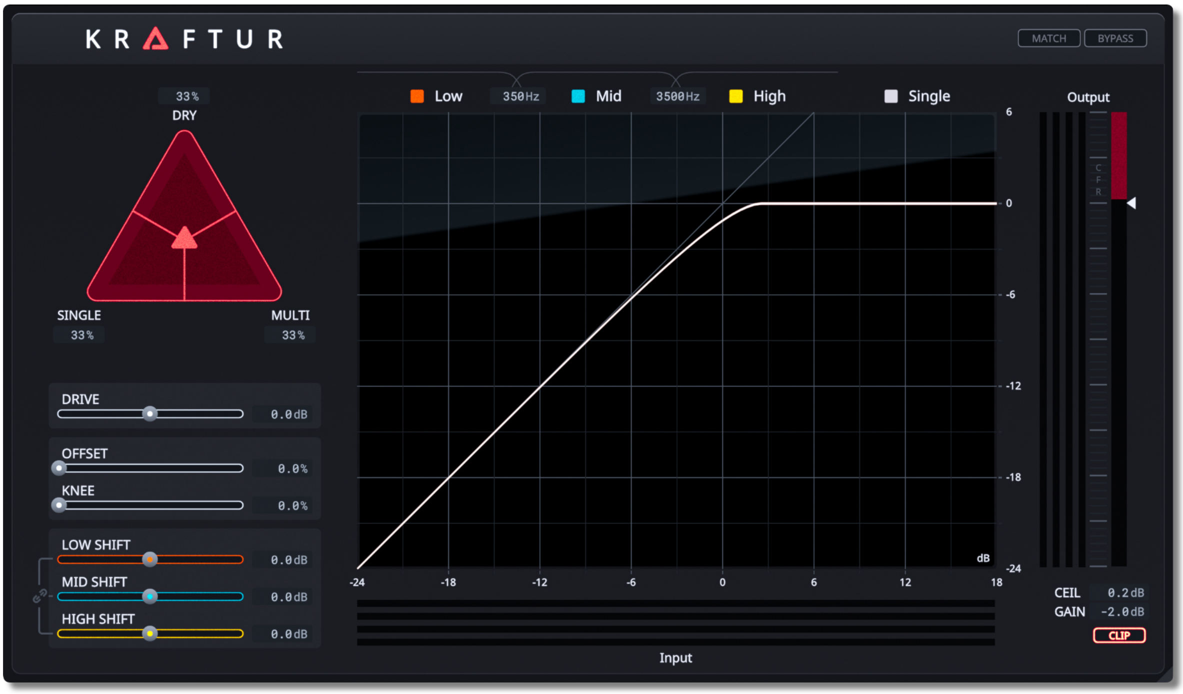
The user interface has been designed to provide an intuitive workflow that allows for complete control over the processing. Real-time visualization of the processed audio is provided in multiple ways to offer insight into what is going on under the hood. While your ears remain the most important tool for mixing decisions, Kraftur's visualizations are a great accompaniment to ensuring precise adjustments when exploring the parameter space.

This manual provides an extensive guide on how to make the most out of Kraftur, accompanied by technical explanations of its parameters and meters.

If you have any queries regarding Kraftur or Soundtheory Ltd, please email: info@soundtheory.com

Getting Started With Kraftur

We encourage you to explore and develop your own process when working with Kraftur. However, here are some useful tips to get you started with the plug-in.



Kraftur is not in a bypassed state upon instantiating the plug-in. However, there will likely be no audible difference if the incoming signal remains in the linear region of the processor. **True bypass** can only be achieved when engaging the **Bypass** button.

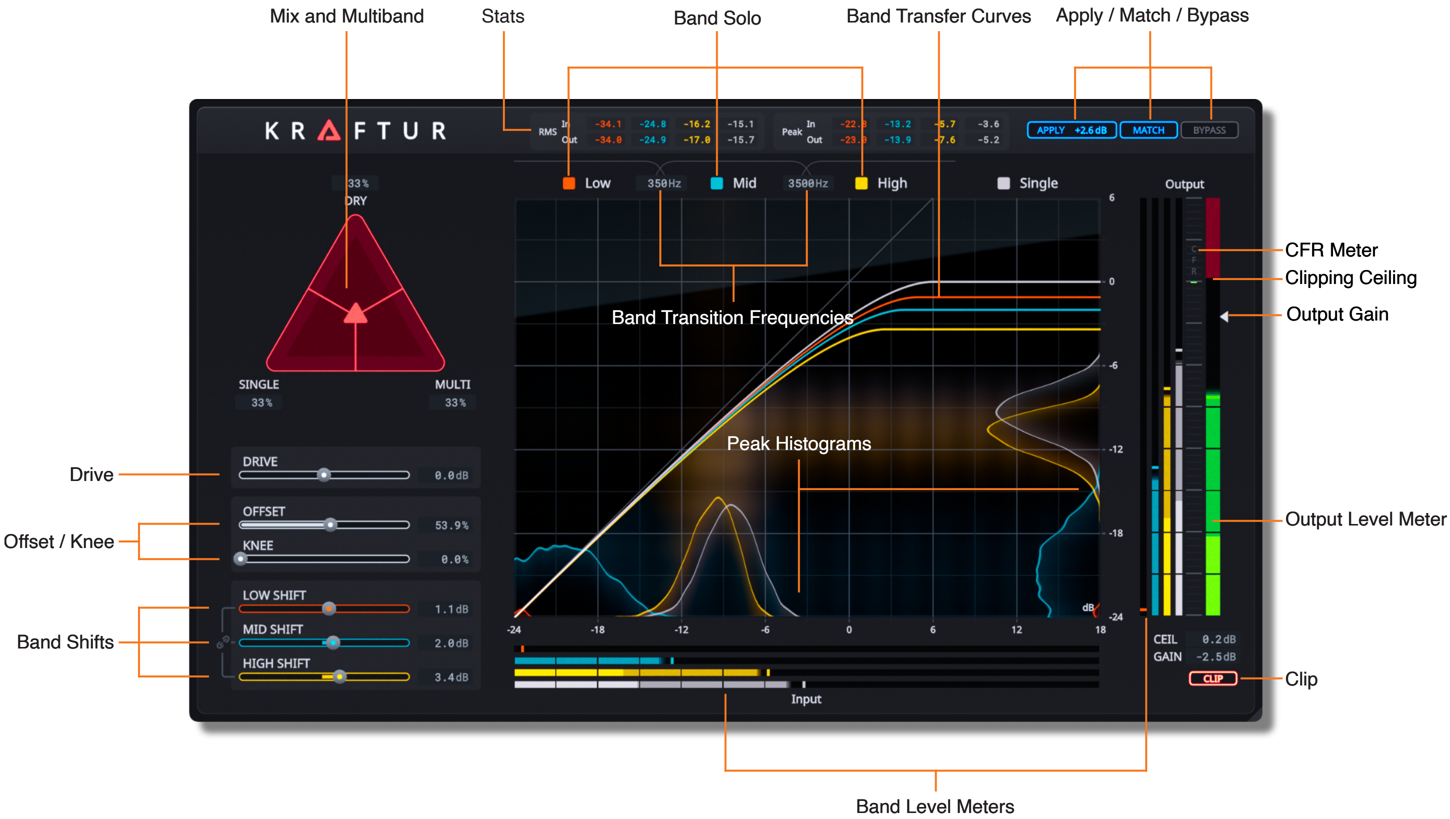
As Kraftur operates as a non-linear processor, **intermodulation distortion can** arise particularly when the source material contains competing elements from different frequency bands. To mitigate this, the incoming audio is divided into **three** separate bands (low, mid, high) and is processed individually, resulting in a **multi-band** output. The sonic qualities of **single band** processing could also be desirable, so a **triangular blend** control is provided to enable flexible blending between the two "wet" signals and the original "dry" signal. To isolate the effect of either single or multiband processing, simply click and drag the triangular head to the corresponding corner of the triangle.

The parameters which control the single/multiband processors are found on the **left-hand side** of the user interface, and it is recommended to traverse them in a top-down approach:

- The **Drive** parameter should be adjusted so that some of the input signal is entering the **saturation region**. How much of the signal should be in this region depends on whether Kraftur is being used as a loudness enhancer or as a saturation/distortion tool.
- The **Offset & Knee** parameters can be used to control how the processor treats the louder parts of the signal, namely the **transients**.
- The **Shift** parameters allow more flexible control over the amount of saturation applied to **each band** when operating in multiband.

Once the desired effect is achieved, the user can engage the **Match** button and toggle the **Bypass** button to compare the difference between the processed and unprocessed signal, without being influenced by any loudness differences. If everything sounds good, the **Match** and **Bypass** can be disengaged to complete the process. Further adjustments may be needed, and some users may find it useful to keep **Match** engaged while these adjustments are made. Note that **Match** should **not** be engaged permanently; use **Apply** for a fixed loudness match if needed.

Interface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DRY
SINGLE
MULTI
DRIVE
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KNEE
LOW SHIFT
MID SHIFT
HIGH SHIFT
Input
CEIL
GAIN
CLIP

Parameters

The interface allows **complete** control over Kraftur's **parameter space**. Parameters are either manipulated by **draggable components** (sliders, triangular blend control, etc.) or **buttons**. Draggable components are associated with a **number box** which displays the parameter's value. **Double-clicking on a slider** will reset the parameter to its default value. **Double-clicking on a number box** allows for keyboard input. **Alt-clicking on a slider or number box** will also reset the parameter to its default value. Holding the Shift key while dragging the number box allows for finer tuning of the associated parameter.

Mix & Multiband

The **Mix & Multiband** parameters are combined into a **triangular control**, adjusting the balance between the outputs of the single/multiband processors and the dry signal. By horizontally adjusting the position of the triangle handle, users can manipulate the balance between single band and multiband while maintaining the same amount of dry signal. Moving the triangle handle towards/away from the top corner alters the balance between the processed signals and the dry signal.

Drive

The **Drive** parameter adjusts the level of the input into the single band and multiband processors. Increasing the **Drive** will result in increased loudness of the processed signals, while potentially inducing saturation. Note that this parameter does not influence the level of the dry signal.

Offset & Knee

The **Offset & Knee** parameters adjust the shape of the transfer curves across all bands. Increasing either parameter increases the "softness" of the curve. **Offset** influences a broader segment of the curve, whereas **Knee** concentrates around the saturation region.

Offset and **Knee** can additionally be modified by dragging on regions of the graph which do not intersect with the transfer curves.

Low/Mid/High Shift

When processing in multiband mode, the position of the transfer curves for each band can be adjusted with the respective **Shift** parameter. Gradually increasing this value can drive the associated band into saturation while preserving its loudness. Engaging the **link toggle** synchronizes the movement of all bands, ensuring they adjust collectively when one of the **Shift** sliders is modified. The band **Shift** parameters can additionally be modified by dragging vertically on their respective transfer curve.

Although there is no dedicated **Shift** parameter for the **single band**, it is possible to achieve a **Virtual Single Shift** by dragging vertically on the **single band's** transfer curve. This modifies **Drive** while automatically compensating the **Low/Mid/High Shift** to ensure the multiband processing remains unchanged. Note that **Virtual Single Shift** can affect the overall level, so **Match** will need to be engaged if level matching is required.

Low/High Band Transition Frequencies

The two **Band Transition Frequency** parameters control the crossover frequencies of the band splitting filters used in multiband mode.

Band Solo

Solo allows the individual multiband outputs (Low/Mid/High) to be heard exclusively. This can be especially useful when the **Band Transition** and **Shift** parameters need to be adjusted.

Clip

Linearly combining the outputs of the multiband and single band processors with the dry signal may result in a signal that exceeds **0 dBFS** (decibels relative to full scale). However, with **Clip** enabled, the output undergoes a final soft clipping stage which effectively limits the signal to remain below the **clipping ceiling**. Note that this final clipper is not affected by **Offset/Knee**.

Clipping Ceiling

This sets the ceiling (relative to 0 dBFS) on the output signal. This parameter can be used to provide the headroom that is often required in various mixing and mastering stages.

Output Gain

The **Output Gain** parameter adjusts the level of the output signal. The gain precedes the processing governed by **Clip**, so it can be considered as a **Secondary Drive** when **Clip** is engaged. Note that this parameter is not in effect **when** either **Match** or **Bypass** is engaged. Note that by default, the triangle handle controls “links” **Output Gain** and **Clipping Ceiling** so that it effectively controls the output of Kraftur without changing its sound.

Match

When the **Match** button is engaged, the processed signal is gain compensated to align with the loudness of the dry signal. This feature enables the user to toggle the **Bypass** button to compare both signals transparently, eliminating the influence of loudness discrepancies. Note that the gain compensation is a dynamic process, and it can some time for the compensation to take effect when a parameter is modified or the source material changes in level. Therefore, **Match should not be permanently engaged**.

Apply

Unlike **Match**, which applies a dynamic gain to the output for loudness matching, **Apply** modifies both the **Output Gain** and **Clipping Ceiling** to provide a static loudness match. Note that clicking **Apply** will disengage **Match**.

Bypass

The **Bypass** button allows the user to toggle between the processed and unprocessed signal. Note that when engaged, the processing engine is not disabled, so you won't see any reduction in the CPU load caused by Kraftur.

Main Display and Meters

Band Transfer Curves

The band transfer curves show how the input maps to the output for each band (Low/Mid/High/Single). It's important to note that since the transformations in Kraftur aren't memoryless functions, these are approximate representations of what Kraftur is doing under the hood. Both axes are measured in **dBFS**.

Note that the **shape** of the transfer curve is **solely** affected by **Offset** and **Knee**. The **position** of the Low/Mid/High curves is **exclusively** affected by their corresponding **Shift** parameter. The **transparency** of the curves depend on how much the corresponding band is contributing to the output of the signal. For instance, setting **Blend** to the **Dry** corner of the triangle renders all curves barely visible. When the triangle head is dragged along the edge connecting the **Dry** and **Multi** corners, the relevant bands become more opaque as they begin to contribute more to the output signal. By default the **Shift** values are set to 0 dB, so initially the transfer curves are overlaid over each other.

Band Level Meter

Each level meter displays the **root mean square (RMS) level** and the **peak level** (local minima and maxima) of the signal, both measured in **dBFS**. The RMS level (opaque bar) measures the **average energy** of the signal, whereas the peak level (translucent bar), reveals the momentary **local maxima/minima**. A **peak hold** indicator (thick opaque line) is also displayed to help identify the maximum peak level over a two second period. Note that the RMS level is averaged over all channels, whereas the highest peak level is selected from all channels.

The color of each band's output level meter (on the vertical axis) is determined by its corresponding band color. However, the bands' input level meters (on the horizontal axis) also display a saturating **"hotness"**. Hotness is defined as the region where the band's transfer curve deviates from linearity, and it can be used as a visual guide to determine the amount of saturation applied to each band. The hotter the input signal is, the more the color of the input meter saturates near its peak values. The easiest way to apply hotness is to increase **Drive**.

Peak Histogram Graphs

The **distributions** of the **peak levels** are visualized for the input and output of each band's processor, with the relevant coloring for each band. For the input signals, the horizontal axis denotes the **peak level** in units **dBFS**, while the vertical axis represents the **statistical density** (how often a peak of that amplitude has been momentarily observed), which is **unitless**. Conversely, the output histogram's vertical axis represents the peak level whereas the horizontal axis represents the statistical density.

Note that the histograms also emit vertical/horizontal light beams to facilitate tracing the mapping of the peak levels via the transfer curves. Similar to the band transfer curves, the transparency of the histograms depends on their contribution to the output signal. Also note that the histograms sample the peaks from all channels equally.

CFR Meter

Crest Factor Reduction (CFR) quantifies the difference in the crest factor (ratio of the signal's **peak** to **RMS**) of the processed signal with the dry signal. The higher the reduction, the more **"work"** Kraftur is doing to the signal. This meter is similar to a **Gain Reduction** meter found in traditional compressors and limiters. Note that setting Kraftur at **100% Dry** and **Clip** disengaged, the meter would show no reduction.

Output Level Meter

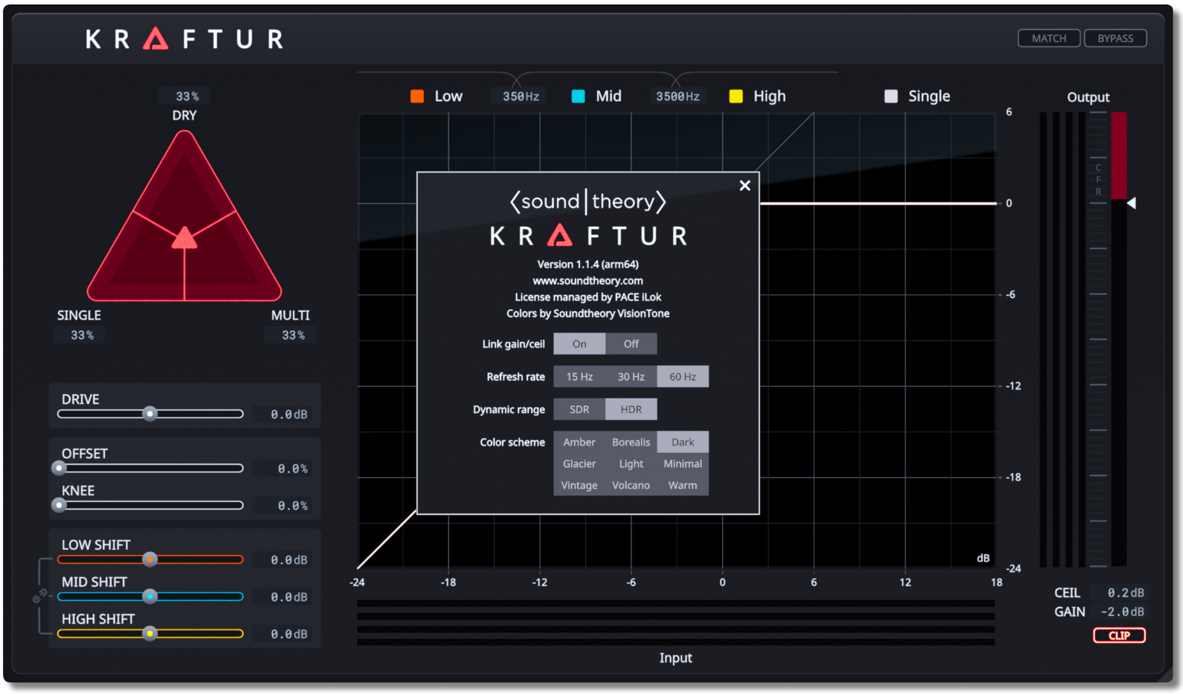
The output meter is similar to the input meter but includes additional features. The meters indicate as **red** when the signal exceeds 0 dBFS. Furthermore, a **pre-clip peak meter** is provided to help visualize where the signal's peak would be if the clipper is not engaged. Note that the pre-clip meter is not visible if **Clip** is disengaged.

Stats

The stats panels can be made visible by clicking the space within the portion of the **title bar** that sits between the Kraftur logo and the **Match**/**Apply** buttons. The stats panel reveals **numeric readouts** for the meters displayed in the GUI. The stats are divided into two panels; the first stats panel shows the **band levels** before and after the initial saturation stage. Clicking the stats panel again reveals the second panel, which displays the **overall levels** as well as the **CFR**.

Info Page

Clicking on the Kraftur Logo in the top left corner reveals the **Info Page**. It provides information about your Kraftur version as well as options to customize the **visual appearance and behavior** of the interface.



The **Soundtheory VisionTone** color and rendering pipeline is based on **human color perception**. It allows for **display-independent** color reproduction and supports both **high dynamic range (HDR)** rendering and **wide-gamut output** on supported displays.

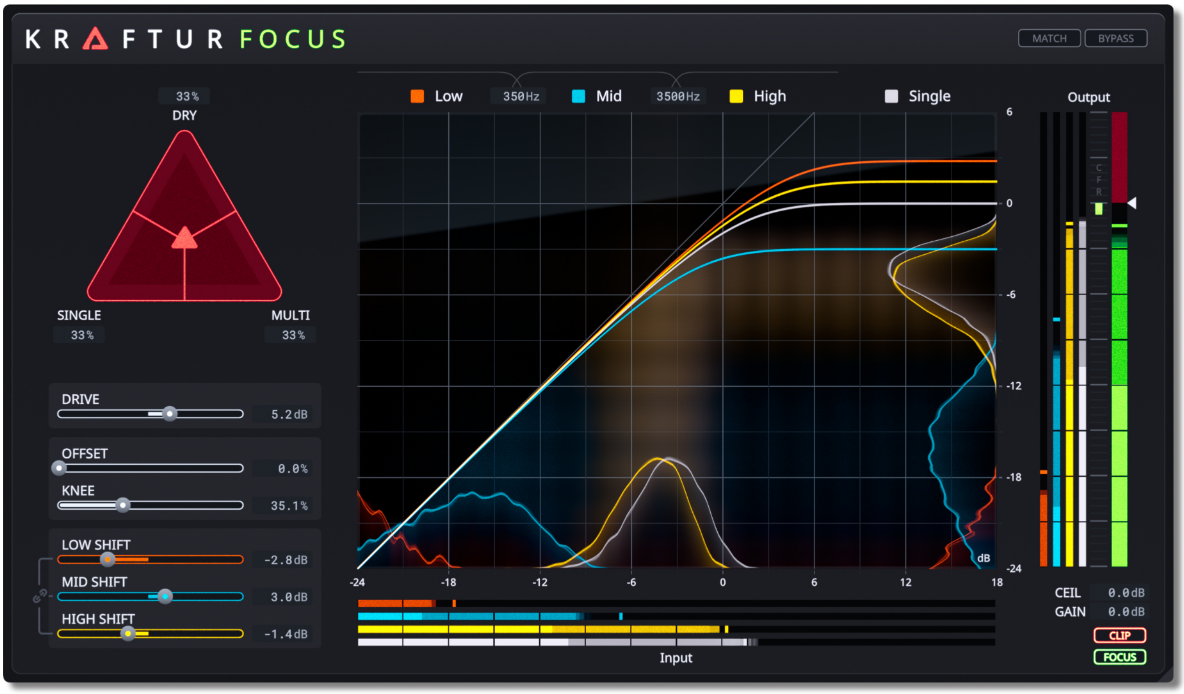
HDR rendering is currently supported on **macOS** starting with **version 11**. On unsupported platforms, the **Dynamic range** selection will not be shown. Enabling **HDR** will use the maximum dynamic range of the display screen on which the plugin is showing. The available dynamic range depends on the capabilities of the display screen and the selected screen brightness. **Standard dynamic range (SDR)** is also provided, which can be useful when using certain screen recordings applications that may not support **HDR** capture.

A variety of **Color schemes** are provided to suit your personal taste on the visual aesthetic of the GUI.

The **Link gain/ceil** option enables control over the coupling of the **Output Gain** and **Clipping Ceiling** parameters. This is **On** by default, which means that the triangle handle applies the change to both parameters. Turning this **Off** allows you to independently control each parameter as the triangle handle only applies the change to the **Output Gain**.

The **Refresh rate** of the GUI can be set to **15, 30, or 60 Hz**. By default, it is at the highest setting, however, it can be lowered to cater towards older graphics hardware that may exhibit sluggish graphics.

Kraftur Focus



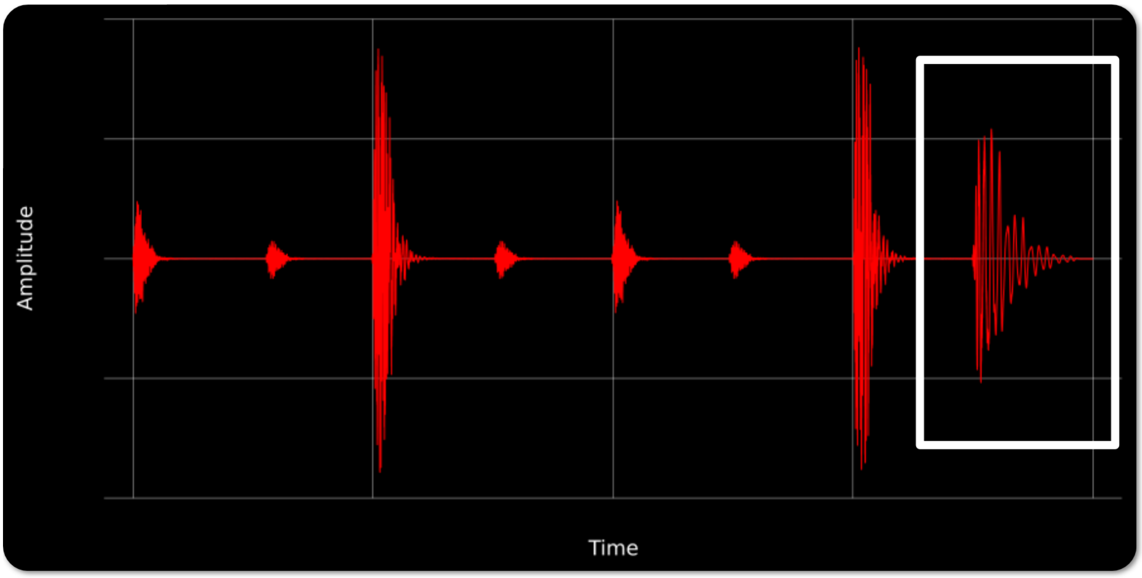
Kraftur Focus is a special **edition** of Kraftur that has been designed for **parallel processing applications. Kraftur Focus** applies an additional **phase alignment** stage to the signal **after** the saturation stages, allowing for increased **phase coherency** between the **processed** and **bypassed** signal, while **preserving** the unique **character** of Kraftur's saturation. Note that the **phase alignment** stage requires approximately **40-50 ms** of **processing latency.**

Kraftur Focus is designed to be used as a **send effect**. This facilitates **blending** of the output of **Kraftur Focus** with the original (**bypassed**) source material, or even other processed **phase coherent** signals derived from the same source. Moreover, multiple channels can also blend into the same instance of **Kraftur Focus** without the need for creating multiple instances, saving **CPU resources**.

Kraftur Focus comes with an additional **Focus** parameter (located at the bottom right of the GUI) which can be used to engage/ disengage the **phase alignment stage.** Note that by default **Kraftur Focus** has **Focus** engaged, and disengaging **Focus** will cause **Kraftur Focus** to be identical to **Kraftur**, albeit with the additional **processing latency**. Toggling **Focus** allows the user to listen to any difference the **phase alignment stage** may induce. In most cases, this difference is minimal, however, disengaging **Focus** can sometimes allow increasing the loudness without affecting the perceived signal integrity. Therefore, we recommend that you use **Kraftur** if used as an **insert effect.**

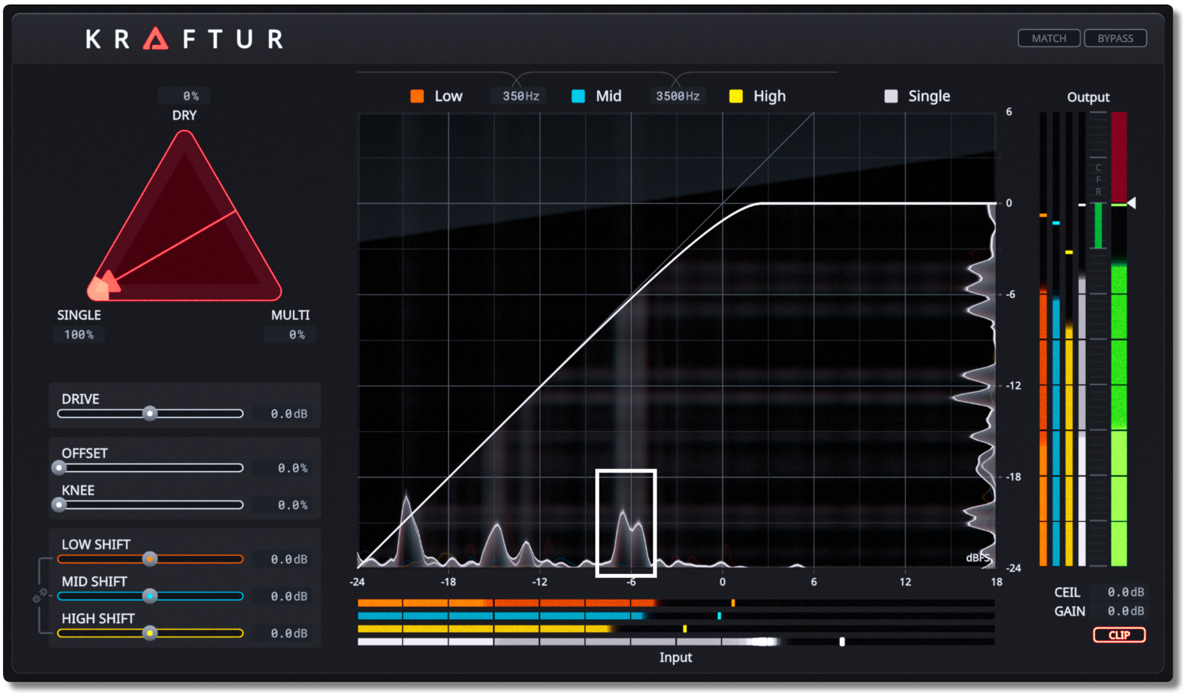
Using the Peak Histogram

The peak and peak hold meters are useful in determining the momentary intensity of a signal. However, in some cases, the information displayed by these meters may not be sufficient. For example, consider the following audio example:



We may want to know the intensity of the signal occurring on the final transient (white square). Unfortunately, the level meters do not respond fast enough, and the displayed peak hold line has its own inertia. Therefore, it's difficult to identify the intensity of the signal at that point in time. In general, any quiet transient following a louder transient can be concealed in the level meters.

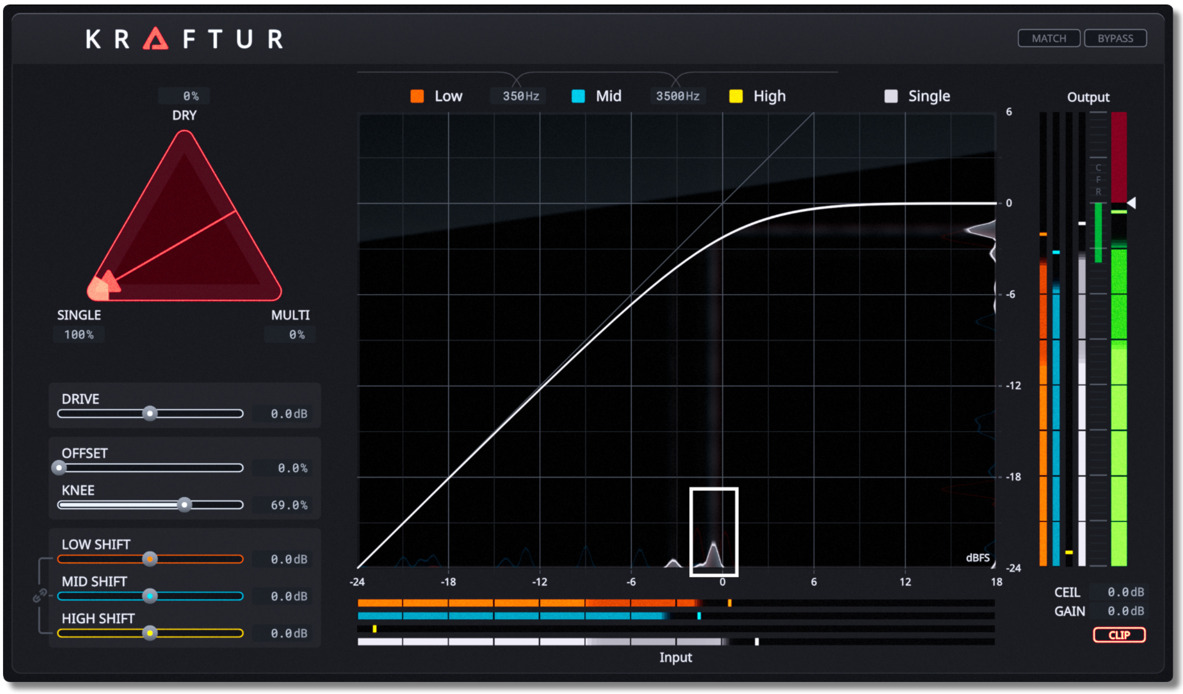
The peak histogram provides an alternative way of determining the intensity of the signal. The histogram displays a real-time count for each peak bin over a short segment of time. It is similar to a spectrum plot, but instead of the signal being binned by frequency (Hz), the signal is binned across peak intensity (dBFS). Viewing the (single band) histogram for the audio example above reveals the intensity of the final transient.



This screenshot is taken just after the final transient is played. The white rectangle highlights a peak in the histogram that only appears when the final transient is played. This reveals the true peak intensity of the final transient. Note that the single band's peak hold meter is still displaying the intensity of the preceding louder peaks. Additionally, the peak meter is not falling fast enough to identify the final transient.

We can use the peak histogram to determine more accurately how much the processor affects each transient (more technically, each peak). In the previous example, the final transient will rarely be affected by the processing as it remains within the linear region of the transfer curve. If we wish such a transient to be processed, then **Drive**, **Offset**, and **Knee**, can be adjusted so that it sits in the desired region of the transfer curve.

The peak histogram meter is also useful in identifying high intensity, short duration peaks that precede a transient. These peaks can exist within the original audio, or they can be a result of the overshoot triggered by the internal anti-aliasing and crossover filters.



As an example, the momentary peak histogram for a single kick drum is shown above. The main bulk of the kick's peak intensity is centered around 0 dBFS (white square) even though the peak hold meter shows that the signal has higher peaks. In many cases, the high intensity short duration peaks can be saturated without degrading the signal's integrity. Increasing **Drive** would therefore transparently increase the loudness of the kick while inducing minimal distortion. This holds true until the main bulk of the kick's peak intensity is heavily saturated (in the region where the transfer curve is horizontal).