L4 Ultramaximizer

More than Loud

User Guide

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Introduction

Thank you for choosing Waves! To get the most out of your new Waves plugin, please take a moment to read this user guide. To install software and manage your licenses, you'll need a free Waves account—sign up at www.waves.com.

We suggest that you become familiar with the Waves Support pages at www.waves.com/support. There, you'll find technical articles about installation, troubleshooting, specifications, and more. Plus, you'll find company contact information and Waves Support news.

L4 Ultramaximizer

L4 Ultramaximizer brings the immediacy, power, and clarity of modern mastering into a simple, musical, and transparent limiter — without sacrificing the trusted sound engineers love.

L4 pushes the boundaries of what a limiter can do in modern music production. While the classic L2 remains a trusted tool for its warm musical character, today's productions demand louder masters, stronger low-end integrity, and more nuanced transient handling.

L4's algorithms use a sophisticated real-time analysis engine that continuously evaluates the incoming signal, including transient density, crest factor, temporal and spectral features, and envelope behavior. Based on this weighted analysis, the engine determines optimal values for release timing, clipping allocation, lookahead, and attack. Every parameter adapts fluidly to the signal, ensuring precise, transparent limiting.

Quick Start

1. Insert **L4** on your track or master bus.
2. Adjust the **Threshold** to set how much limiting is applied.
3. Set the **Ceiling** to define your max output level.
4. Choose a Mode: **Modern**, **Smooth**, **Aggressive**, **Safe**, or **L2** Legacy.
5. Use the **Release** and Clipping faders to guide the limiter's behavior.
6. If needed, enable **True Peak** and set **Oversampling** for higher precision.
7. Use the **Loudness Meter** to monitor LUFS, True Peak, and Dynamic Range.

Interface – Main View

Controls:

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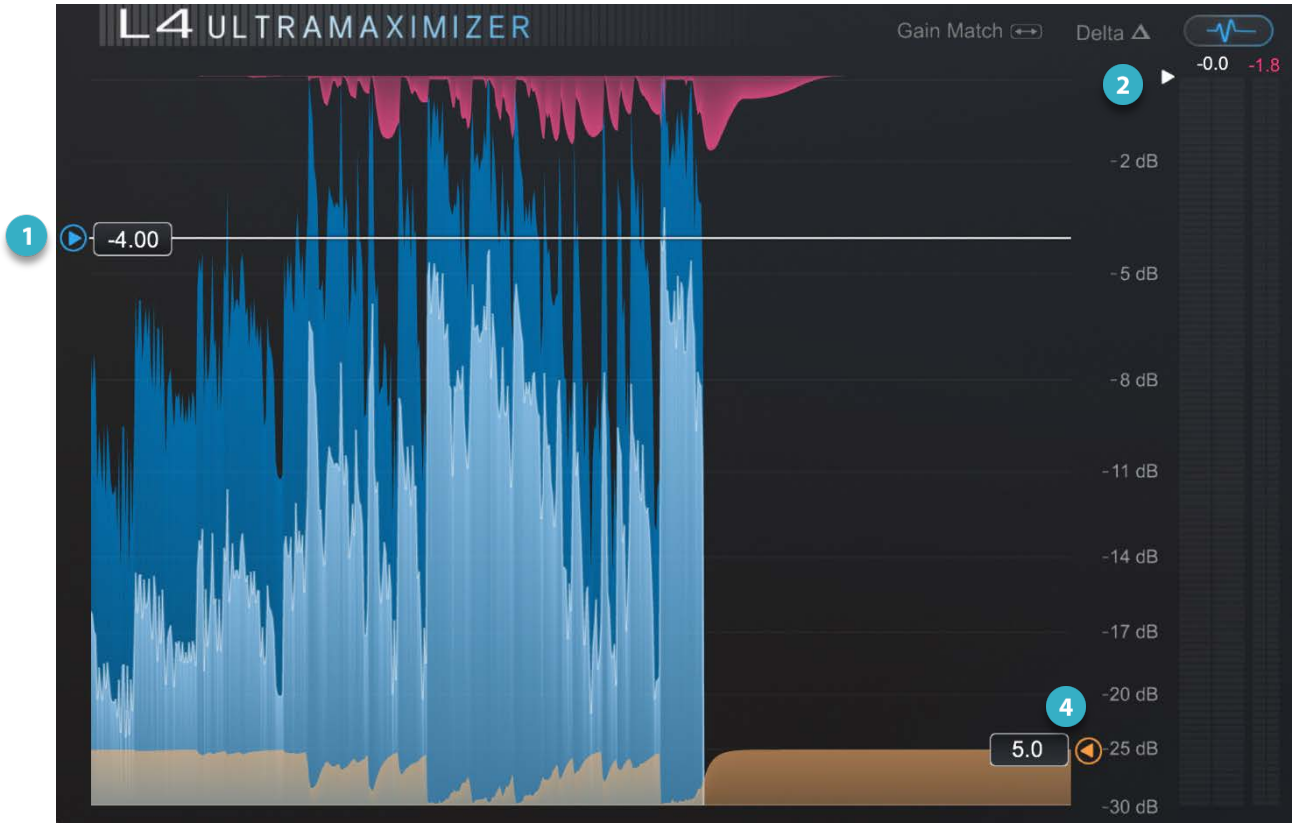
Interface – Graphic Display



Color Index:

Red	Attenuation
Blue	Outgoing Signal (Output)
Cyan	Incoming Signal (Input)
Yellow	Upward Compression

Controls – In-Depth View

1 Threshold

Sets the value above which the audio energy will be limited. When the energy goes over that value, gain attenuation will be applied.

Range: 0 to -30 dBfs; Default: 0

2 Ceiling

Sets the output of the peak limiter.

Range: 0 to -30 dBfs; Default: 0

3 Link

When holding and dragging this button up or down, Threshold and Ceiling parameters will move together.

4 Upward Compression

Lifts quieter content. This helps bring out detail, warmth, and presence—especially in intros, verses, or breakdowns.

On modern streaming platforms, loudness is measured by the loudest sections of a track (LUFS short-term). This means that increasing the volume of quieter sections gives you more perceived loudness, without penalty.

Upward compression lets you "fill in" low-level areas without pushing the entire mix harder into the limiter, making it a powerful tool for dynamic balance. Its behavior is mode-aware and adapts accordingly.

Range: 0 to 10.0; Default 0

5 Modes

The modes in L4 were designed to offer a range of sonic behaviors suited to different musical needs. Each mode strikes a different balance between loudness, punch, transparency, and safety, enabling you to choose between maximum impact, clean broadcast-friendly output, or classic behavior. While some modes are optimized for achieving high loudness and forward sound, others prioritize clarity, subtlety, or preservation of tone under heavy limiting.

L4 includes five distinct modes, each optimized for a different sonic approach:

- **Modern**: Balanced and punchy; great for most material.
- **Smooth**: Transparent and cohesive; similar to Modern, but with a slightly rounder and more relaxed feel.
- **Aggressive**: Loud and forward; suited for gritty, hard-hitting mixes.
- **Safe**: Clean and controlled; ideal for delicate or broadcast material. This mode is designed to never introduce audible distortion, even under heavy limiting.
- **L2 Legacy**: Emulates the original Waves L2 response for those who prefer its classic behavior.

6 Release

Adjusts the scaling of the release time of the limiter.

The actual release time is determined automatically, based on the input signal and selected mode. This control acts as a multiplier on that internal value.

Range: x0.10 (faster) to x10.00 (slower); Default x1.00

7 Clip

Controls the amount of adaptive clipping applied to enhance loudness.

Clipping is triggered automatically by the engine, depending on the signal and selected mode. This control sets how much clipping is allowed.

Range: x0.10 (no clipping) to x10.00 (more aggressive clipping), Default x1.00

8 Stereo Link

Controls how the limiter reacts across stereo channels.
Using lower link values can sometimes yield greater loudness, especially when one side is more dynamically active than the other. Higher values preserve stereo image consistency.

100%: Fully linked— identical gain reduction on both sides (clipping remains per-channel).

0%: Fully unlinked— each channel reacts independently (similar to multi-mono).

9 Oversampling

Controls the internal processing sample rate of the limiter.
Oversampling helps reduce aliasing and improve the accuracy of the limiter and clipping stages, especially when pushing for high loudness.
L4 processes audio at a higher internal rate and then down-samples back to the session rate. Use higher oversampling when working with aggressive limiting or clipping, or when mastering material that demands maximum fidelity.

Higher settings provide better audio quality but require more CPU power.

Range: Off, x2, x4, x8, x16

10 True Peak Mode

Enables protection against inter-sample peaks: signal levels that may exceed the limiter ceiling during digital-to-analog conversion or sample rate changes.

When this mode is enabled, L4 uses oversampling to detect and limit peaks that occur between the actual digital samples, helping ensure your output remains below the target ceiling in all playback scenarios.

This is especially important for streaming platforms or mastering to strict loudness specs (e.g. -1.0 dBTP), where overshooting the ceiling—even by a tiny margin—can cause distortion or rejection.

Keep an eye on the True Peak activity indicator located in the Loudness Meter window: It provides real-time feedback on whether clipping is occurring, helping you fine-tune the Clip control for optimal results.

11 Dithering

When you reduce a high-quality digital audio file to streaming size, digital-quantization noise is introduced. On very quiet sounds (fades, reverbs, soft piano notes), this can turn into a gritty “zipper” noise.

Dithering adds a pinch of super-quiet (inaudible) hiss that smooths those rough edges.

- It randomizes rounding errors, so the grit disappears.
- Smart “noise-shaping” pushes most of the hiss up above 15 kHz, where human ears barely notice it.

Result: The softest parts of your music stay clean and natural after you export.

Quantize

Click to cycle through 24 / 22 / 20 / 18 / 16-bit (or **Option-click-hold** for a pop-up list).

Dithering Types

- **Type 1**: “Purist” option—no low-level distortion, cascades cleanly through multiple processing stages.
- **Type 2:** Adds the least amount of noise (auto-mutes when input is digital black) but introduces slight low-level distortion. Use when absolute minimum hiss is a top priority.

Noise-Shaping

Shifts noise above 15 kHz, where it’s least audible:

- **Moderate**— Light shaping.
- **Normal**—Recommended general setting.
- **Ultra**—Maximum shaping; use only on final master to avoid possible HF issues in later edits or on poor DACs.

12 Loudness Meter

L4 includes a full loudness panel calibrated to industry standards (EBU R128, ITU-R BS.1770).

- Integrated LUFS (long-term average)
- Short-Term LUFS (3-second window)
- True Peak (dBTP)
- Loudness Range (LRA)

These numerical readouts help ensure compliance with delivery targets for streaming and broadcast.

13 Gain Match

When enabled, L4 disables the Ceiling control and removes output gain compensation. This allows you to hear the limiting effect without the added loudness - ideal for transparent A/B comparisons.

14 Delta Button (Δ)

Solos the difference between the processed signal and input signal; hear the difference (reduced signal) between the *total* processing of the plugin and the input signal.

15 Graphic Display

Toggles the user interface to show an Analyzer view.
The Threshold, Ceiling and Upward controls in this mode are Logarithmically scaled for finer control near 0 dBFS (at the top).

Gain vs. Artifacts – The Real Tradeoff

Achieving loudness is never free. In any limiter (including L4), you're constantly balancing between **three forces**:

- **Clipping** introduces loudness with surgical precision. It doesn't affect the movement of the music (no pumping), and it can be very transparent. But when pushed too far, it may cause harsh or obvious **distortion**—especially on bright or percussive material.
- **Release** controls how quickly the limiter recovers after gain reduction:
  - A **shorter release** time brings back the level faster, which can increase **loudness and perceived punch**—but may also cause **pumping** or unnatural envelope movement, as the gain jumps back mid-phrase.
  - A **longer release** time smooths things out and reduces artifacts. The result may sound less energetic, and there may be a limit on how loud the signal can get.
- **Gain** is the goal, but the more you push for it, the more you'll feel the **tradeoff** between clipping and release artifacts. Want more level? You'll have to choose how to pay for it: with distortion, with pumping, or by finding the sweet spot between them.

How L4 Handles It

L4's adaptive engine intelligently manages this triangle, adjusting its behavior in real time based on your selected mode and the incoming signal.
You, the user, keep simple control via just two sliders:

- **Release** – Scales the limiter's internal release time (faster = more punch, slower = more control)
- **Clip** – Controls how much adaptive clipping is allowed (more = louder and tighter, but riskier)

Each mode in L4 has its own internal tuning for how much it leans on release or clipping, which you can **fine-tune** for your material and taste.