

409 OPTO COMPRESSOR

User Guide



MIA LABORATORIES ©2020

Greetings and Welcome!

Thank you for choosing MIA Laboratories.

Overview

The 409 is a powerful and versatile plugin with highly optimised dynamic response, based on the design and principles of analog Opto Compressors. Characterised by its natural and musical gain reduction, the 409 provides from gentle, transparent compression - to heavy deep-cutting limiting, suitable for a very wide range of applications.

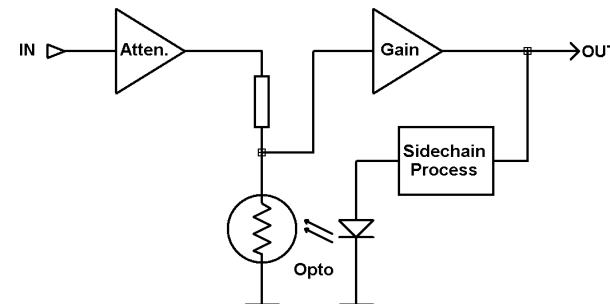
Like its predecessor 925 Compressor, the 409 Opto Compressor is developed using physical modelling principles recreating classic Optical-element compression characteristics, with a host of extra controls and features.

The main controls enable easy and precise tuning of compression response, with Attack and Release ranges up to 200ms and 787ms respectively. In contrast to fixed-value switch 'presets', the Ratio is controlled by a continuously adjustable dial allowing accurate and 'tunable' setting of the compression slope.

Complementing its dynamic process, an additional carefully selected set of features allows the user to unveil this unit's true power. Sidechain filtering & monitor, Dry/Wet Mix, Peak/RMS detection, Stereo Link, Lookahead, and the specially developed new parameters 'Damping' and 'Skew' which allow for smoothing and fine-tuning of the detector response, - these controls are what make the 409 truly versatile providing the user with exceptional control and shaping of the signal's envelope.

Key design features include:

- Highly optimised dynamic response
- 'Damping' and 'Skew' controls
- Feed-back type compressor/limiter topology
- Continuously adjustable Ratio control
- +Panel with extra features



Control Functions

Attack / Release

The key to great-sounding compression has always been careful adjustment and setting of the “Attack” and “Release” times.

They define how soon Gain Reduction is applied (Attack) or removed (Release) after the signal crosses the Threshold level, and allow the compression process to follow, or ‘home-in’ on the envelope or rhythmic content of the program material. Alternatively, narrow transients (eg. short percussive sounds), can instead be aimed-at by shorter time-constant settings, - or even a slow ‘Fader gain-ride’ on loud sections in a main-mix, by very long Release settings.

Figure 1 shows how the onset of compression changes as the Attack value is decreased, applying more gain reduction and in a shorter time to the signal.

At or near-zero Attack time, it is possible that the waveform itself is detected instead of the program’s envelope, especially low frequency audio (eg. bass, synth, kick) with long sustained bass notes. This can be a powerful and useful process, but at the same time is the reason most of us give a small nudge up to the Attack and Release knobs almost automatically as a first starting point - before even making any other adjustments.

In-line with this, but also for the practical and easier setting of the 409’s Attack and Release controls, both dial values initialize to ‘1’ allowing further lowering down to ‘0’ as needed. Maximum setting ‘10’ on dial provides *200ms* Attack and *787ms* Release times, minimum setting ‘0’ provides *0ms* and *25ms* respectively. - *As with all other controls, the actual parameter values appear in a rectangle graphic during adjustment.*

In **Figure 2** the dynamic response can be seen, with higher Release settings taking increasingly longer time to recover from the previously applied gain-reduction. Generally there are many ‘correct’ and desirable values depending on the context and source material at hand, and the ear’s final perceived judgement. Long Release times in combination with higher Threshold settings can significantly raise the average level of a buss or main mix, with that ‘impartial’ feeling and higher perceived loudness overall. On recorded instruments and drums, slowly lowering the Release control down to zero will reveal a soundscape of ‘snappy’, ambient character compression, which tightly follows the input.

Finally, the nominal level of the incoming audio will also play a big part in the dynamic process, as no amount of compression/limiting or make-up gain can actually make-up for poor resolution, or excessively low recorded waveforms. The 409 Opto is purposefully and carefully optimised to provide a wide range of musical/quality compression, while making full use of the headroom and available dynamic range. **Note, it is very important to ensure sufficient overall level of the recorded audio, where the process is focused and much more gain reduction can be applied. Lowering the Attack control will also make the detector more sensitive, allowing more gain reduction to be applied.*

Ratio

Sets the compression ratio of the process (dBin/dBout), which effectively adjusts how much gain reduction is applied as the signal's amplitude increases, changing the slope of the compression response.

[Figure 3](#) shows the compression knee response, and a separate “Infinity:1” setting at the end of the dial (also depicted in [Figure 4](#)) allows hard-limiting in a way not usually achievable with just ‘greater than 10’ Ratio, often considered as in-effect limiting.

- At its minimum setting of ‘1’, no compression is applied (1:1 response), leaving any Input Attenuation and Make-up Gain in place.

Threshold

This defines the level after which detection begins and compression is applied. It is really the ‘go-to’ control for tailoring and applying the overall process to the depth and extent required, or suits the material. Iteration (repeated re-adjustment after changing another parameter) and fine setting of “Threshold” level will greatly widen the scope and appropriate settings of all the other controls.

Skew

The “Skew” control is found under the Attack/Release controls and relates to both these functions, by changing the shape of the onset of compression, and during the release stage as gain ramps back up to nominal. It also nudges both timings together and [Figure 5](#) shows the stretching and more linear shape of the gain reduction applied during the Attack and Release stages of the process, with Skew applied.

This special function allows for the tweaking of the detector response and can drastically change the ‘phrasing’ of the compressed audio, esp. Rhythm parts, drums, loops etc. when the point is very ‘audible’ compression/limiting, not transparent.

**Note, the displayed Attack/Release values are not affected by the Skew adjustment, to simplify settings and avoid confusion.*

Damping

This control limits how quickly gain reduction is varied, according to the signal's envelope. “Damping” makes the sidechain detector follow the envelope of the program material less aggressively, producing smoother compression. Range from $25\mu s$ to $0.5ms$ controls the minimum rise-time of the detector output, which applies compression. This effectively damps any high frequency oscillations to the VCA, and reduces harmonic distortion. Increasing this control gradually thickens-up and ‘sets’ together the compression process, also changing the timbre and character of the actual content.

- Damping can be extremely useful on bass-heavy sounds where a fast detector might produce artefacts or other pitched-noise.

Output Level / Gain Reduction Meters

Analog type panel VU meters, provide accurate and realistic display of the compression process and levels. There are 3 preset reference levels for calibrating 0dB VU indication at -18, -14 and -8dBfs (dB Full-scale). This reference does not apply when the meters are displaying Gain Reduction directly in dB. **Note, the 'Peak' indicators are not affected by this setting, and always come on at 0dBfs. They refer to the input signal when the meters display Input level, and to the output signal when meters display Output level or Gain Reduction.*

External Sidechain

Use any other channel of your mix as an input to the side-chain of MIA 409 Opto Compressor, or to process the sidechain signal independently of the program material.

Sidechain Filter

Applies a 12dB/oct High Pass and Low Pass filter to the sidechain's input. The cutoff frequencies range from 10Hz to 6.3KHz for the High Pass Filter and from 63Hz to 20KHz for the Low Pass Filter. These filters are only applied to the sidechain of the compressor and do not affect the audio being processed directly. The actual filter response can be auditioned by pressing the "Sidechain Monitor".

Stereo Link Operation

In "Stereo Link" mode, the same amount of compression is applied to both Left and Right channels, based on the sum of the two. With Stereo Link disabled, compression takes place independently for each channel, whilst retaining common controls for both.

Peak / RMS mode

This changes the response of the detector between Peak and RMS level of the *sidechain* input, which results in compression being applied according to the Peak value, or the RMS equivalent respectively. Tracks with generally lower frequencies and plain-sine wave content (e.g. acoustic/electric/synth bass) can benefit greatly from RMS mode, achieving a more natural and better 'fit' in the final mix. [Figure 6](#) shows how response is affected in each case, also bearing in-mind that in practise it will greatly depend on the dynamics of the audio being processed.

Sidechain Monitor

Enabling "Sidechain Monitor" allows the user to actually hear and closely examine the input of the sidechain, by routing it to the output for audition. This is especially useful when filtering the sidechain input in order to hear and tune the filters according to the material, or even listen to an external 'keying' signal. Since the 409 is a feed-back type process compressor/limiter, the Sidechain Monitor audio will sound compressed.

**Note that while the red “Sidechain Monitor” is pressed, the lower +Panel section of the unit cannot be hidden/closed to make sure the user is aware of this and prevent confusion.*

Lookahead

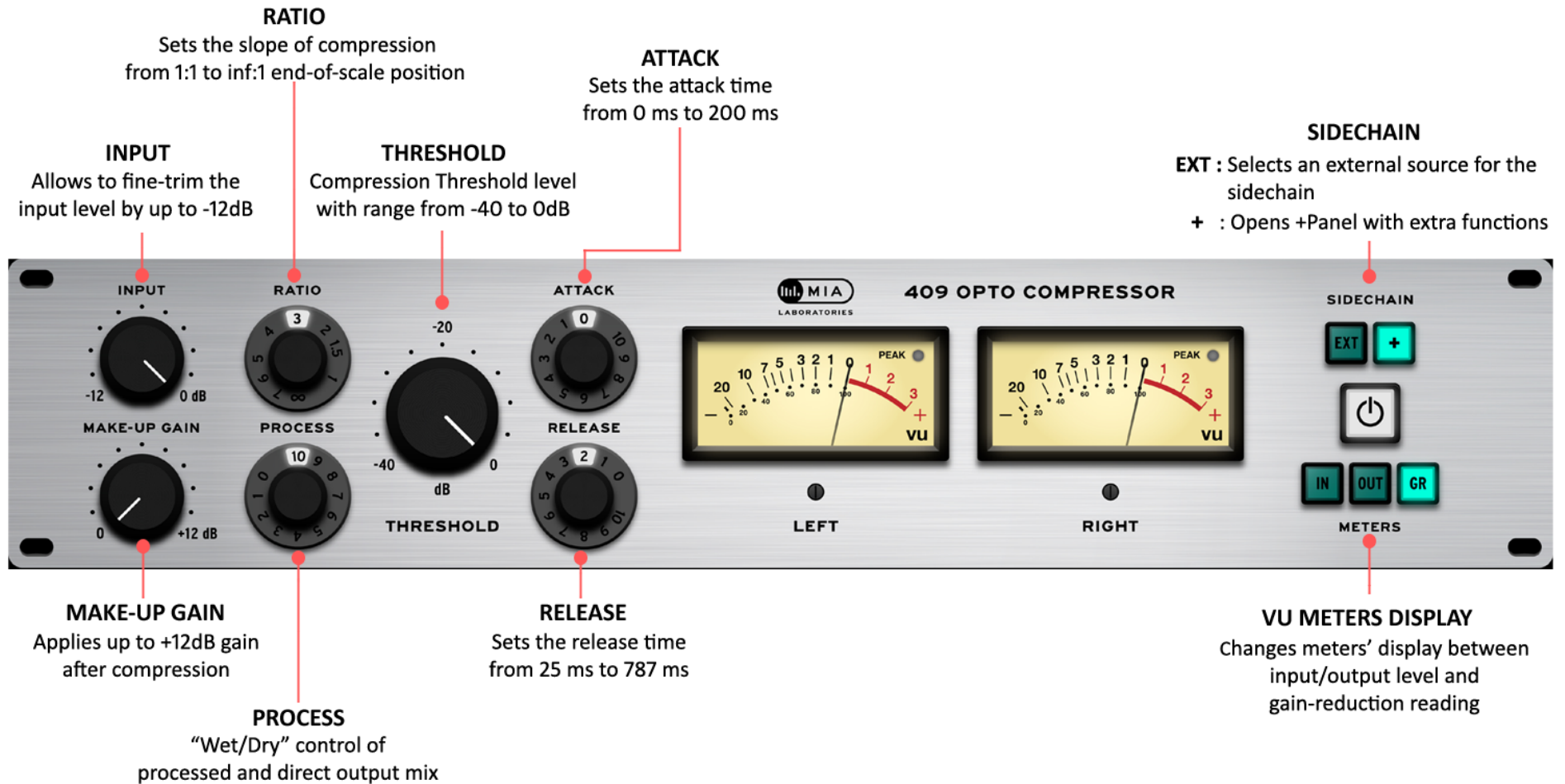
5 available settings of “Lookahead” time for precise transient control. Longer settings enable the compressor to react earlier to transients, catching peaks which would otherwise be impossible to control and which compromise headroom. In [Figure 7](#), the leading ‘spike’ or transient is controlled this way, allowing more make-up gain to be applied without clipping.

Installation

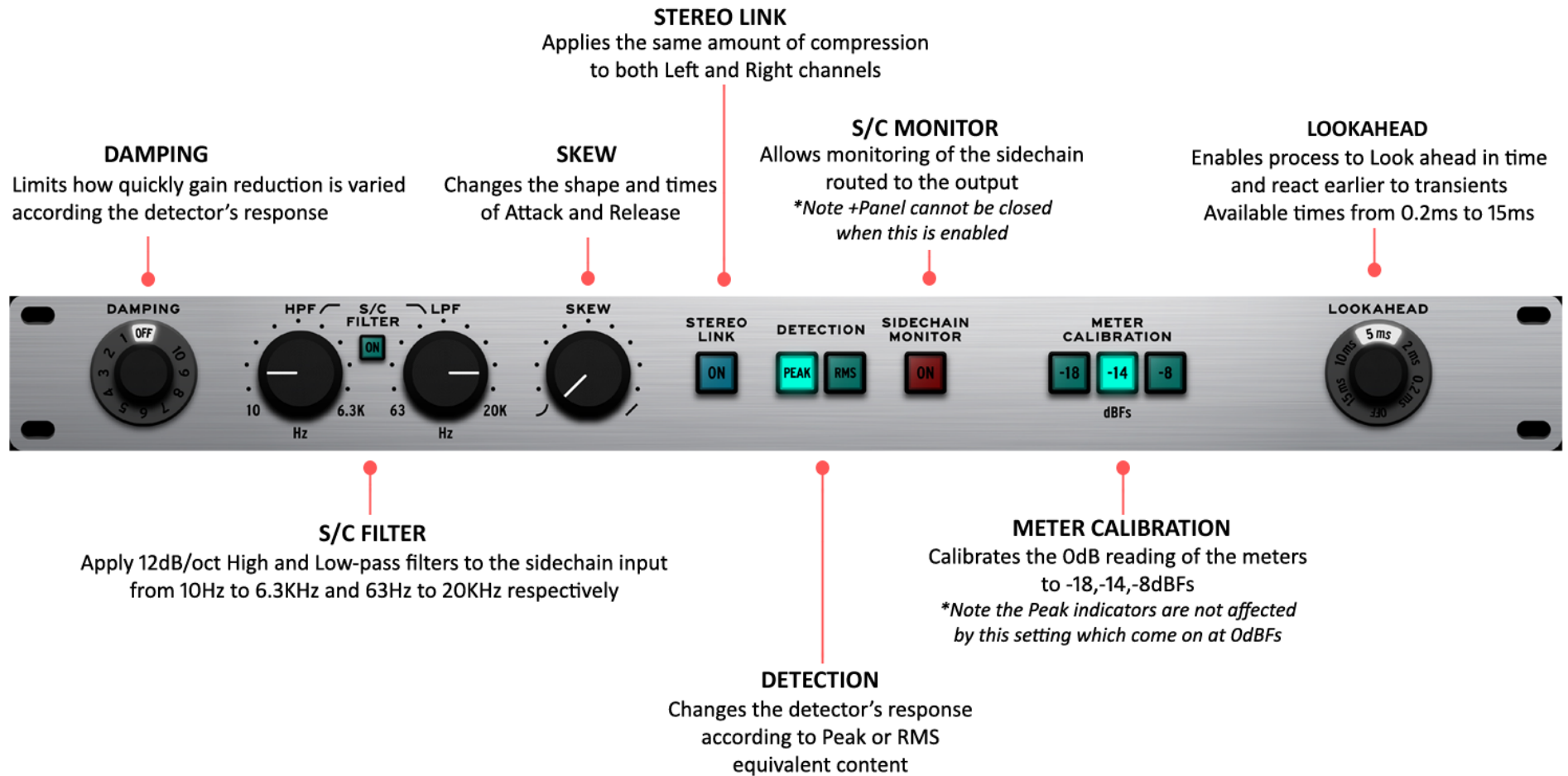
Installing 409 Opto Compressor is fairly easy, just download and run the appropriate installer for your operating system. The license for this plugin requires the use of iLok license manager software and an iLok account. The license can be deposited on a physical iLok (2nd generation or higher) or on iLok Cloud. For further information regarding the activation process, please refer to the activation guide provided. In case that you do not have the iLok License Manager, or you have an outdated version, you can download it for free here: [license-manager](#)

Note for Windows users: 409 Opto Compressor will be installed by default on the following directory - C:\Program Files\VSTPlugins. (If this directory is not included in the search path list for vst plugins of your DAW, you can add it manually or change the installation location from the Browse menu of the installer to the one you are using).

409 Controls layout



+Panel controls layout



409 Plots:

Figure 1: Attack-time dynamic response. Output for different Attack settings. *Note 0ms waveform-following

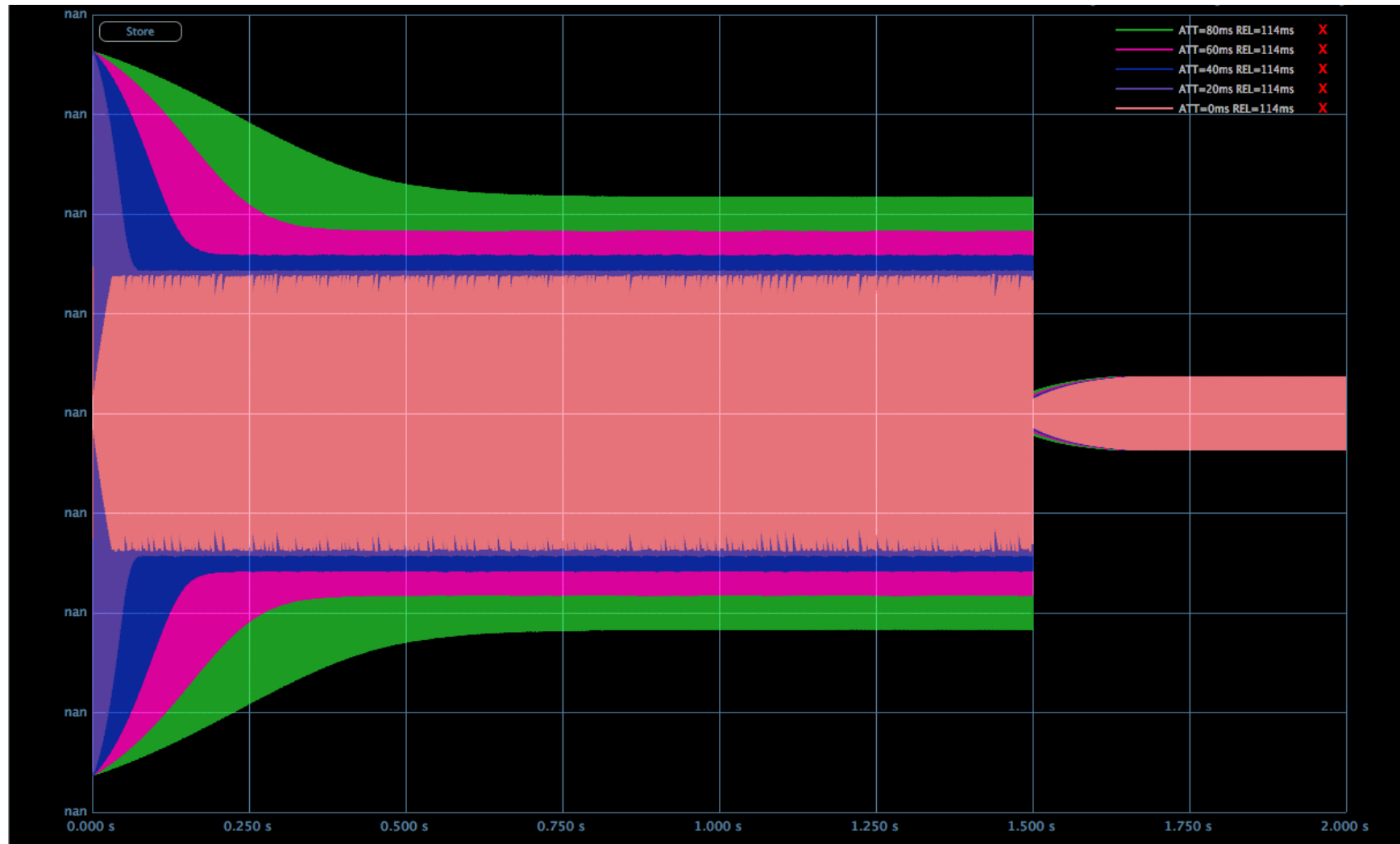


Figure 2: Release-time dynamic response. Output for different Release settings.

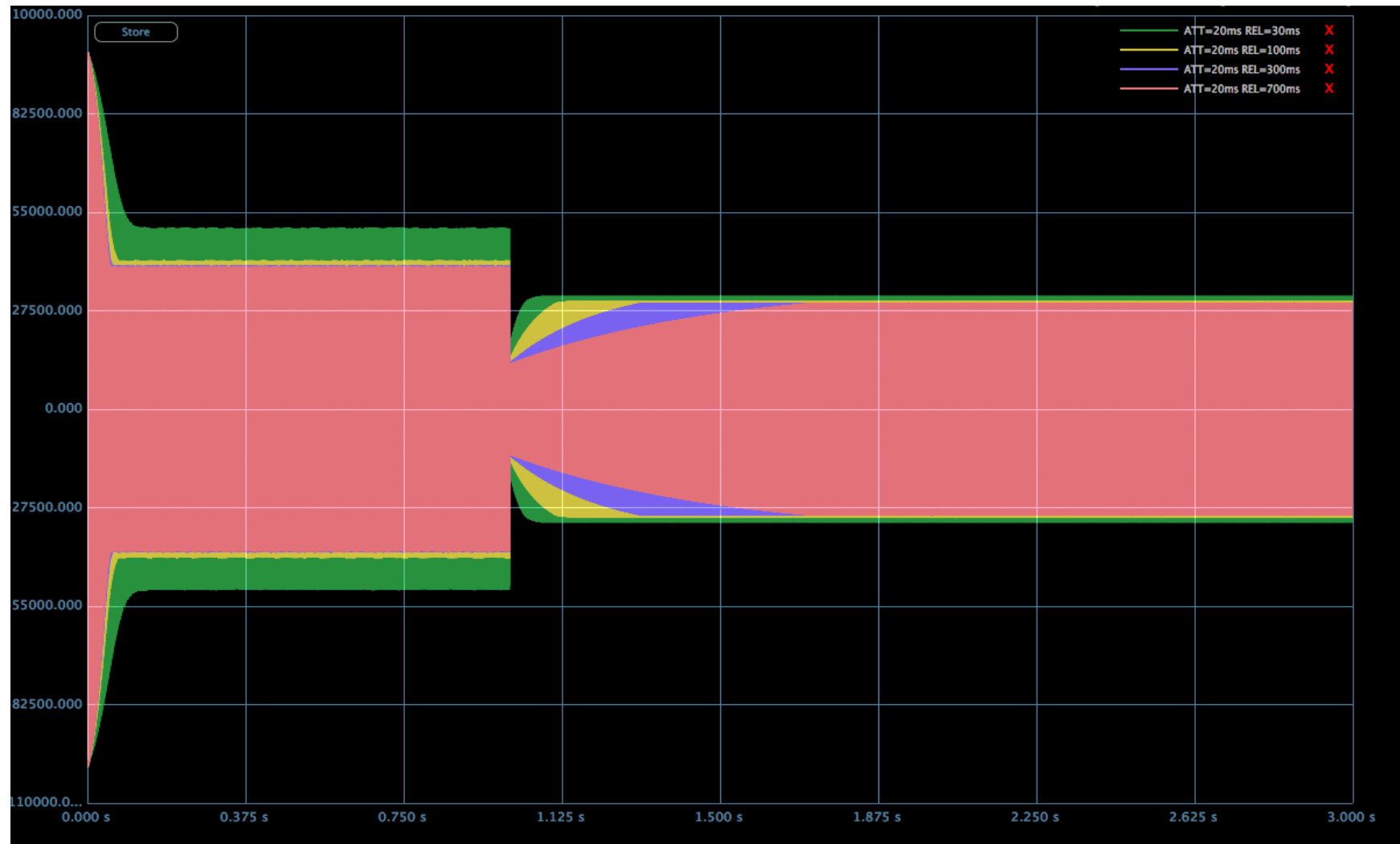


Figure 3: Compression knee Response. Input / Output curve for different Ratio settings. Threshold= -11 dB

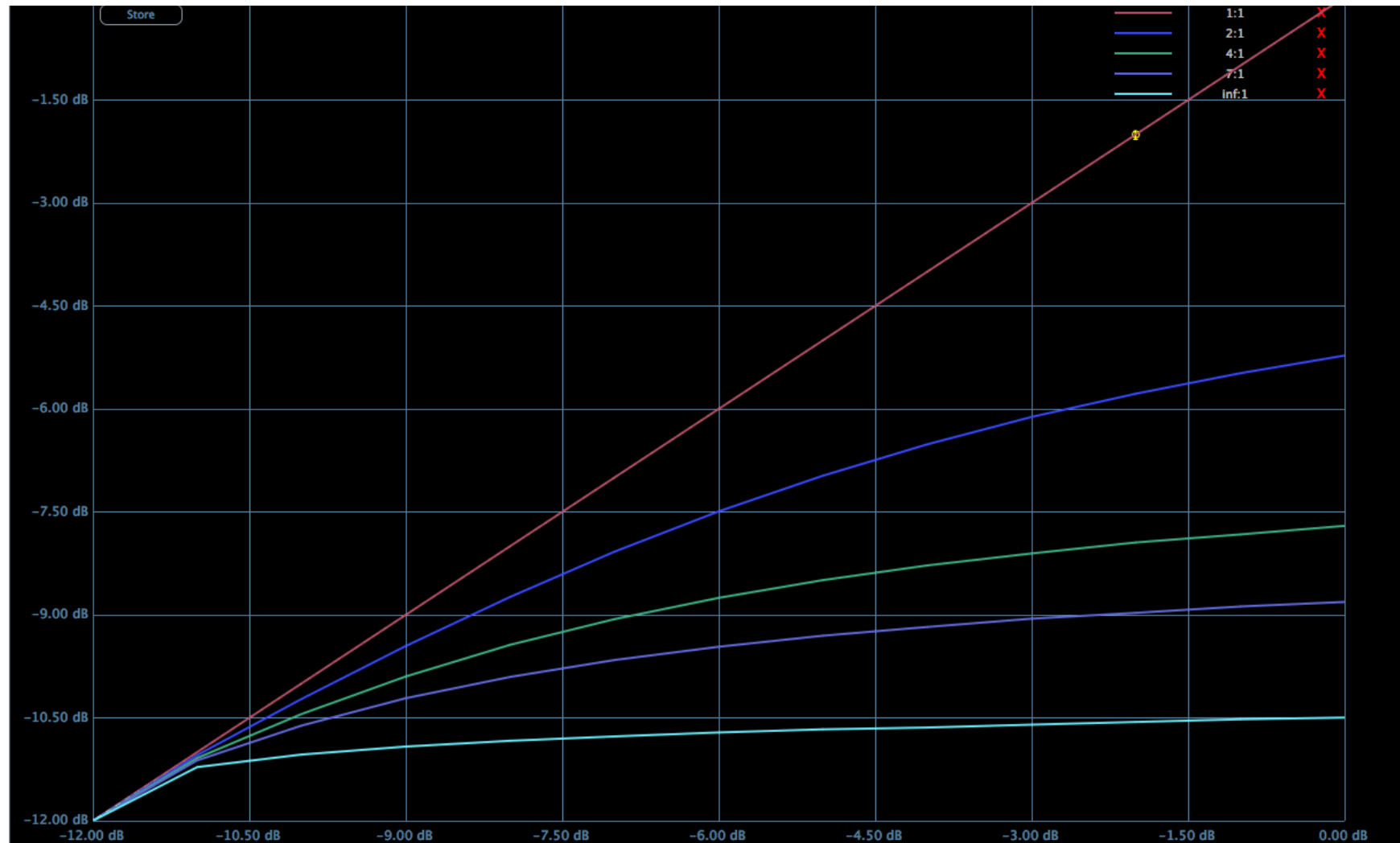


Figure 4: Limiting Response. Input / Output curve showing limiting gradient. Threshold= -23 dB

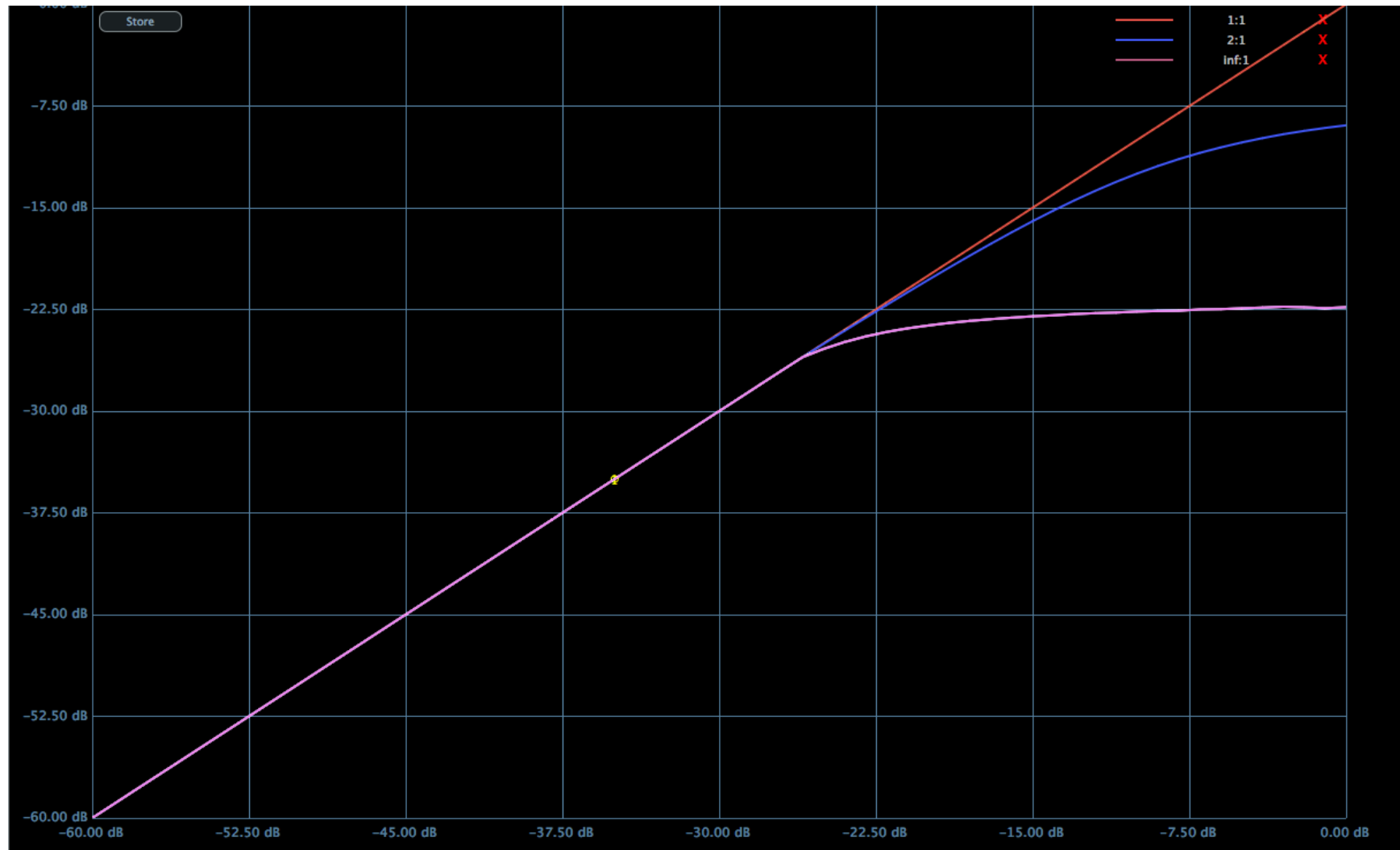


Figure 5: Skew Response

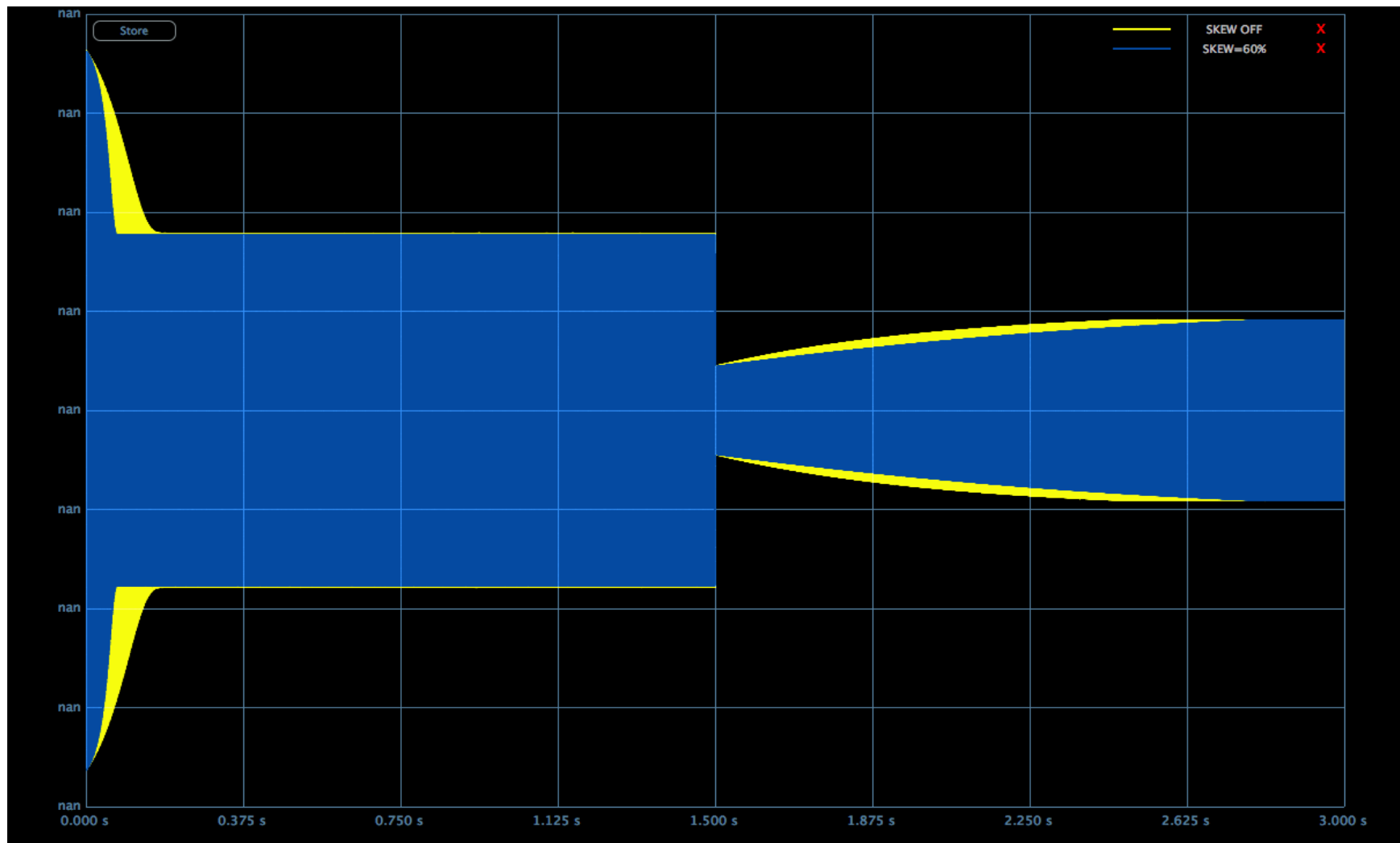


Figure 6: Peak / RMS Response. Ratio= 5:1

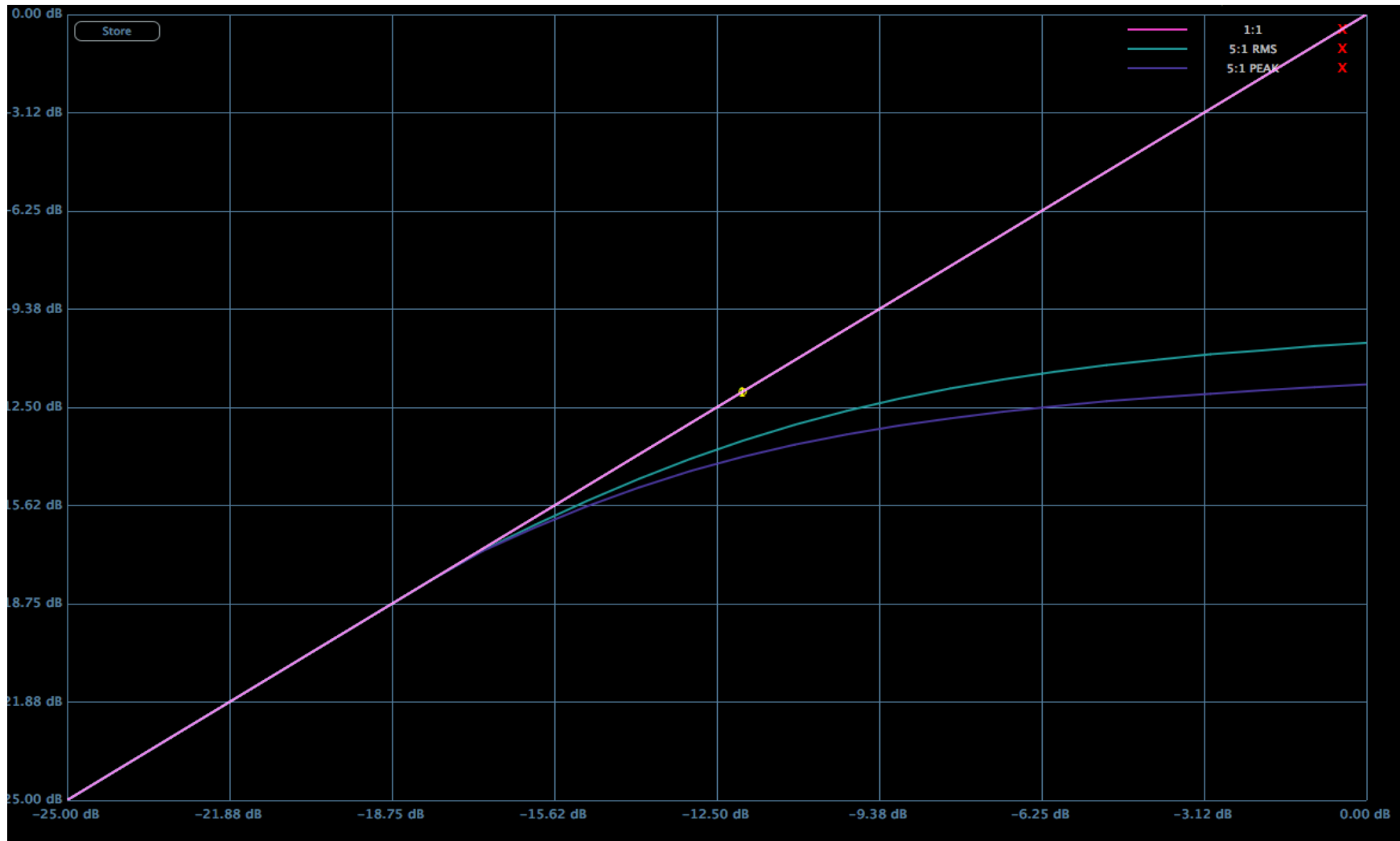
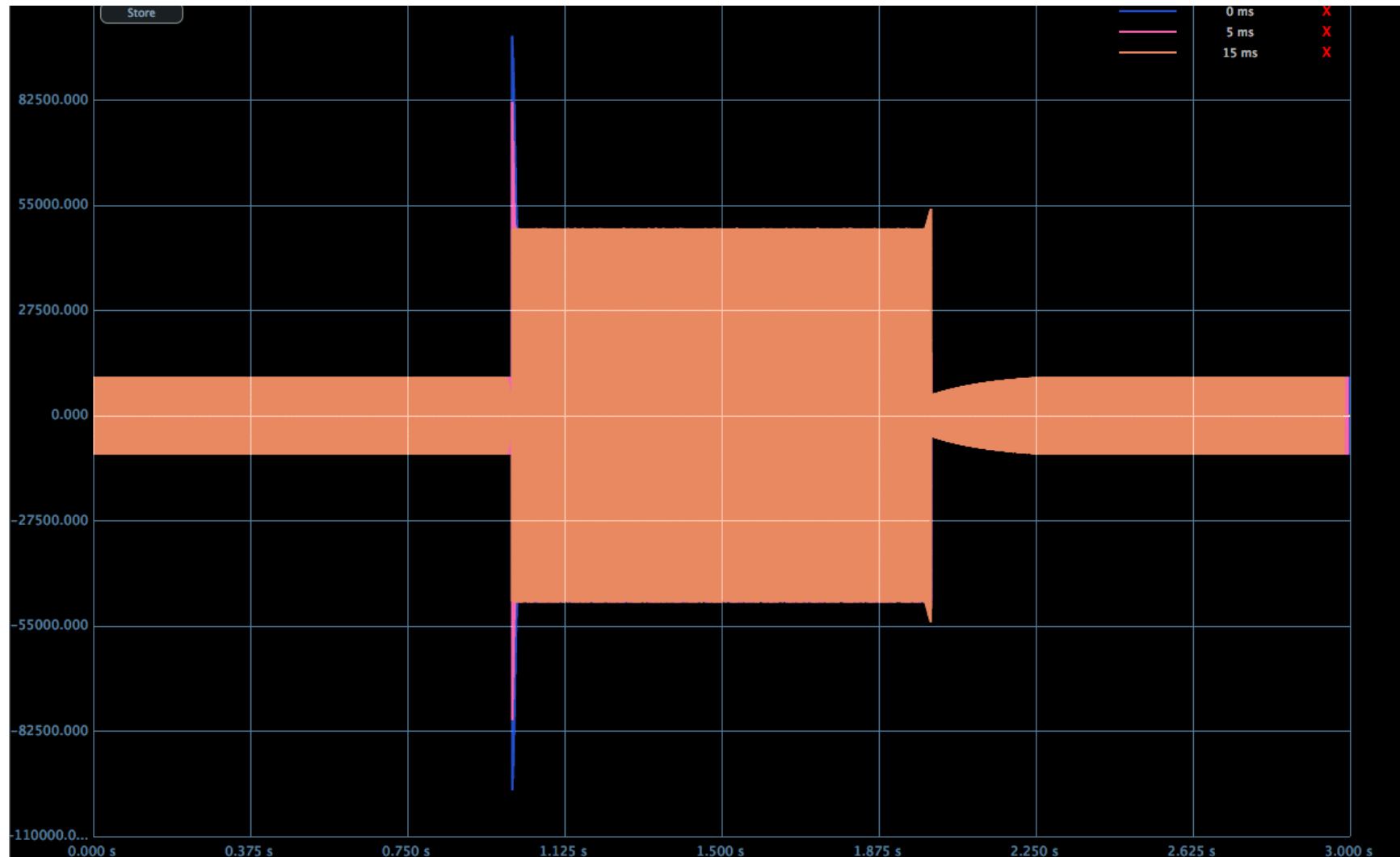


Figure 7: Lookahead time response, showing leading-peak transient controlled.



Appendix:

External Sidechain

External Sidechain in Cubase:

1. Open the **Devices** menu in Cubase and choose the entry **VST Connections**.
2. In the VST Connections window, click the button **Add Group**.
3. Open the **Configuration** menu and click on **More....** From the menu that opens, choose **Quadro**. Click the **Add Track** button.
4. Right-click on the group you just created. In the menu that opens, select **Add Child Bus to *Group Name***. In the sub menu, choose **Stereo**.
5. Repeat step 4 and choose **Stereo (Ls Rs)**. You should now see two sub busses below the group - **Stereo** and **Stereo (Ls Rs)**.
6. Go to the channel settings of the group track you just created and load MiaCompressorOne into an insert.
7. Set the output of the track you want to process with MiaCompressorOne to the **Stereo** output of the group track you created before.
8. Set the output of the track you want to use as a sidechain to the **Stereo (Ls Rs)** output of the group track.
9. Open the MiaCompressorOne window and activate the **EXT. SIDECHAIN** button.

(Source: <https://support.native-instruments.com/hc/en-us/articles/209592229>)

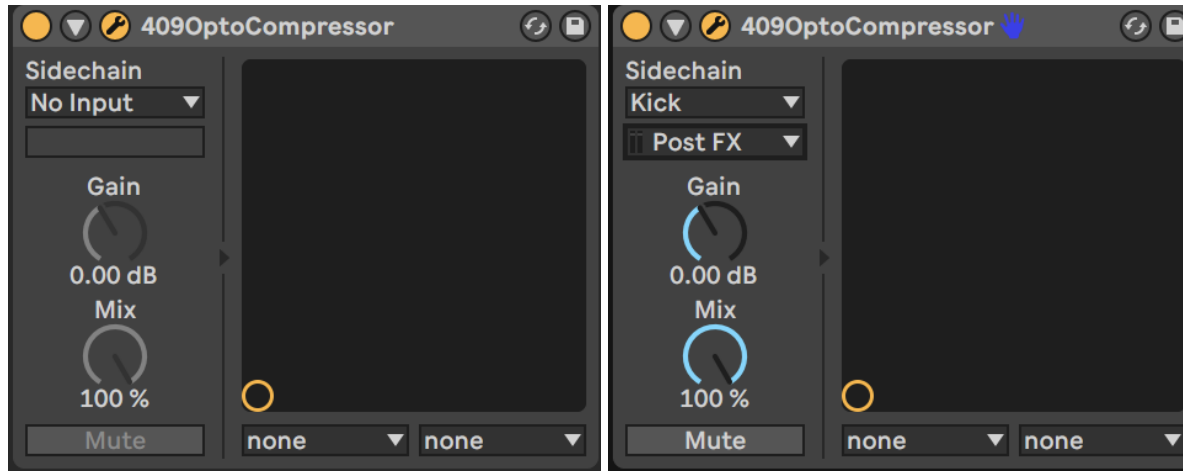
External Sidechain in Ableton Live:

Sidechaining in Live 10.1 and later

1. Add 409 Opto Compressor to a track.
2. Enable **External Sidechain** within the plug-in GUI.
3. Create a track with a sound source to be used as the sidechain trigger.
4. In Live's plug-in GUI, enable "Sidechain". Then choose the sidechain trigger source in the "Audio From" dropdown
5. Adjust the gain and mix as required.

OR

1. Add 409 Opto Compressor to a track.
2. Select the desired "Sidechain" input within the Ableton's GUI.
3. Enable **External Sidechain** within the plug-in GUI.



Sidechaining in all versions of Live until 10.0.6

In order to prepare for this, you should set up the following tracks:

- A Track with 409 Opto Compressor. Enable External Sidechain within the plug-in GUI.
- A second Track with the source for the sidechain signal trigger (Sidechain Trigger Track)
- An additional Audio Track which is used to route the audio signal (Audio Signal Routing Track).
- In case the Track's In/Out section is hidden press [cmd][alt][I] on Mac or [ctrl][alt][I] on PC.

How to route the sidechain signal from the sidechain trigger Track to the plug-in in the other Track

1. Make sure that the Monitor of the Audio Signal Routing Track is set to "In".
2. In the Input Type chooser of the Audio Signal Routing Track, select the Sidechain Trigger Track. The Input Type chooser is the top "Audio From" chooser.

3. In the Output Type chooser of the Audio Signal Routing Track, select the Track with the 409 Opto Compressor. The Output Type chooser is the top "Audio To" chooser.

4. In the Output Channel chooser of the Audio Signal Routing Track, select 409 Opto Compressor. The Output Channel chooser is the bottom "Audio From" chooser

(Source: <https://help.ableton.com/hc/en-us/articles/209775325-Sidechaining-a-third-party-plugin-in>)

External Sidechain in Reaper:

1. Insert 409 Opto Compressor to the channel you want to compress and enable EXTERNAL SIDECHAIN
2. Go to the mixer, select the channel you want as the sidechain input
3. Go to the routing section of the channel



4. Drag and drop this to 409 Opto Compressor

(Source: <http://reaper.fm/guides/ReaEffectsGuide.pdf>)

***All diagrams created using [plugin Doctor](#)**



Thank You!

MIA Laboratories

