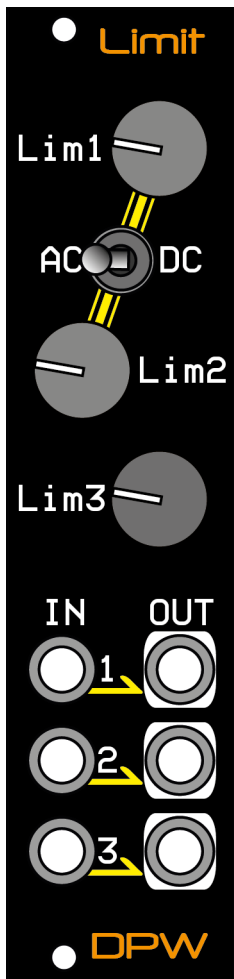


# Limit L-1

The L-1 is a three individual soft knee limiter module in Eurorack format. An all analog unit. It can be used for audio signal manipulation or as a utility module for control voltages. The three channels can be AC or DC coupled. It can be used for normal limiting/compression but also for creative waveshaping.

The soft knee of the limiter is actually 8 consecutive soft knees for each channel starting at -3dB and spread evenly up to 0dB. The limiter will brick wall limit to +/- 5V both in AC and DC mode.



## Controls

For each channel there is a volume control that controls how hard the limiter is driven.

When the knob is at 9 o'clock what passes through is almost unaffected. Turning the the knob to full will give 5 times amplification drive in to the limiter, giving a rounded distorted sound.

The three channels are completely independent.

AC/DC coupling for Lim1 and Lim2 is done with the switch on the panel.

AC/DC coupling for Lim3 is done by a jumper on the back of the module. When the jumper is mounted Lim3 is DC coupled. The module is delivered with the jumper mounted.

If you need more compression than one limiter can do just connect OUT from one limiter to IN on the next.

## Device specs

Module size: 6 hp wide, 25 mm deep with power connector.  
Input impedance: 20 kohm  
Output impedance: 1 kohm

Power requirements: +/- 12V. Max power consumption +/- 20 mA  
Connect the power cable with the red stripe (-12V) down.  
The unit is protected for reverse power.

# Use case examples

A few examples, just to get your imagination going.

## Normal limiting/compression

As there are three limiters two of them can for instance be used for a stereo drum bus and you still have one more for an additional effect.

The limiter can be used to add more weight to sounds like for instance a kick. Or a way to bring out the tails of plucky sounds by compressing the transients and amplifying the rest of the sound.

## Waveshaping AC mode

Can be used in AC mode to drive any signal to shape it through the limiter. Mild settings will add a bit of harmonics and hard drive will add a mild distortion.

## Waveshaping DC mode

In DC mode, if you offset your audio signal with a voltage you can drive the signal harder in to one side of the limiter to give an asymmetric wave.

This can be done by connecting an AV-1 before the L-1, using channel A for audio and the B knob for voltage offset. SUM connects to the input of L-1.

You don't have to use an AV-1. Any DC coupled mixer will do.

## PWM of any signal

As in the example "waveshaping DC mode" but connect an LFO to the B input of the AV-1.

LFO will carry the audio and drive it harder in to the positive and negative limits of the L-1.

This will give the possibility to do some kind of PWM of sine waves or any other signal.

## Keeping control signals to max +/-5V

By mixing several LFOs you can get a result higher than +/-5V. The L-1 can be used in DC mode to guarantee that the result never will be above +/- 5V.

Can also be useful if you use envelopes that are +8V as control voltages and you want them to be max 5V.

## Waveshaping example

As in the example "waveshaping DC mode" but connect a sine wave to A on the AV-1 and a kick drum to the B input of the AV-1. Let your gate for the sound also control the kick drum.

Turn up the limiter till you get a nice compression of the sine wave.

As the kick drum will be added on the sine wave before the limiter you will get a harder driven sound with a lot of extra harmonics when the gate is triggered.

If you think the effect is too little. Run the kick drum through an other channel on the L-1 before adding it to mix via the AV-1 going in to the limiter.

By adding a clock multiplier on the gate signal to the kick the kick will fire multiple times during the envelope of the sound. This will trigger bursts of harmonics with an effect similar to an echo.