

## Loki Mk.IV

Named after the Norse god Loki, a shape shifter which corresponds well to how versatile this loudspeaker is. The Loki consists of an 18 cm coaxial driver. The woofer is made with a TPX cone and the tweeter is a 25 mm soft dome.

### WHY LOKI?

Loki is the result of many years of fine tuning and improvements. It's always been highly regarded as a versatile speaker that works well in almost any placement and setup. Currently in the Mk III version, this compact loudspeaker has proven as a good example on the benefits of our coaxial technology. The common acoustic centre of the woofer and tweeter makes it easy to marry the phase of the two drivers and avoid the common lobing issues. This results in a very large sweetspot and an astonishing soundstage. Whether it's used for stereo or in a home theatre this loudspeaker always delivers a true high-fidelity experience.



### ENCLOSURE AND STUFFING

The Loki uses a 12-litre vented cabinet to give it a nice roll-off with a good bass foundation. See attached drawing of the cabinet for details. Ask your local loudspeaker dealer if he can help you obtain this, if you are not thinking of building it yourself. The important thing to remember when you are building this, is to keep the baffle width and internal volume of the original enclosure. Adding braces to stiffen the cabinet is a good tip for the advanced builder to take the loudspeaker just a little bit further.

After thorough measurements and extensive listening, we found the optimal tuning frequency and amount of damping material. The cabinet is filled with 200 g of polyester foam. The damping material is distributed evenly in the box but kept away from the port opening to allow free movement of air. This to ensure that the airflow noise stays as low as possible. It's also recommended to line the walls with felt. The port length is 165 mm including both the inner and outer flanged end and the inner diameter is 50 mm. This gives a port tuning of 45 Hz providing a smooth low frequency roll-off.

### DRIVE UNIT

The PP/TPX based cone matches ideally with the adaptive rubber surround, resulting in an outstandingly smooth frequency response from the woofer. The coaxially arranged pre-coated fabric dome high frequency unit has a low resonance frequency and integrates with the cone driver to a point source. The cone of the woofer acts as a horn loading for the tweeter, and the chassis of the dome unit represents the throat of this horn. An extremely stiff and stable injection moulded metal basket keeps the critical components in perfect alignment, while large windows in the basket both above and below the spider reduce sound reflection, air flow noise and cavity resonance to a minimum.

For detailed technical parameters on the drive units see the datasheet:

[T18REX/XFC - H1353-08/06 datasheet](#)

## CROSSOVER

This update for the Loki uses a MiniDSP 2x4 HD unit- the crossover has been made using the MiniDSP software and is aimed to work well as a kit with adjustable modes or serve as a starting point for hobbyists who wish to take their own measurements and adjust this kit for their listening environment.

The crossover included in the kit utilises symmetrical 4th order Linkwitz-Riley roll-offs centred around 1.9kHz, a low crossover point has been chosen to utilise directivity of the tweeter in the upper mid frequencies, providing the body of the vocal range more power, off-axis. A fourth order has been used because of the low crossover point which means less strain on the tweeter below resonance and excellent phase alignment over the narrow crossover bandwidth that this order of filter provides.

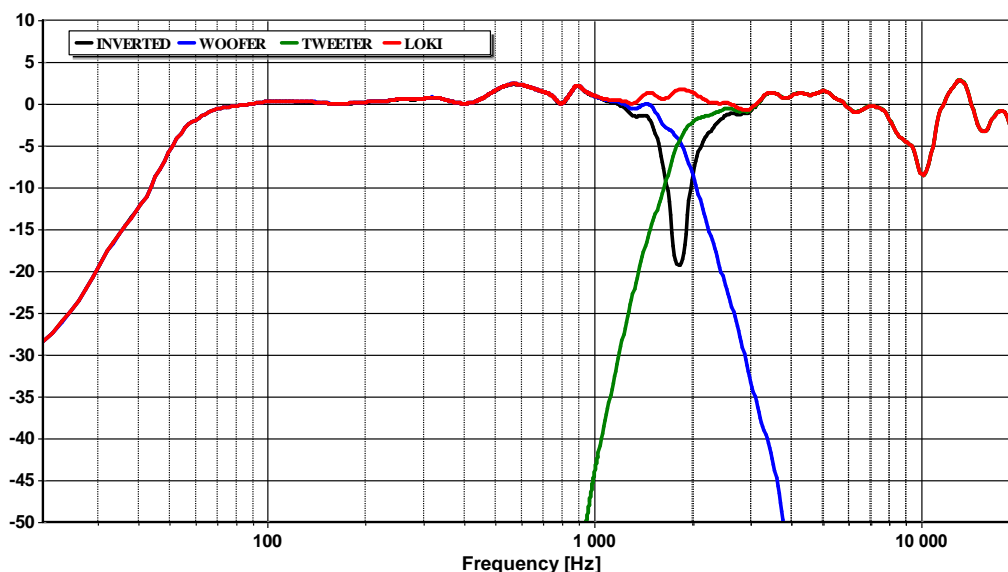
The design choices of the crossover have made for a smooth overall power response, this is bolstered by the use of EQ points to tackle resonances in the woofer's response.

The woofer has 4 EQ peaks balancing resonances in its response and a high-shelf EQ point which is used to tackle baffle step caused by the cabinet and cone break-up in the high frequency response of the woofer.

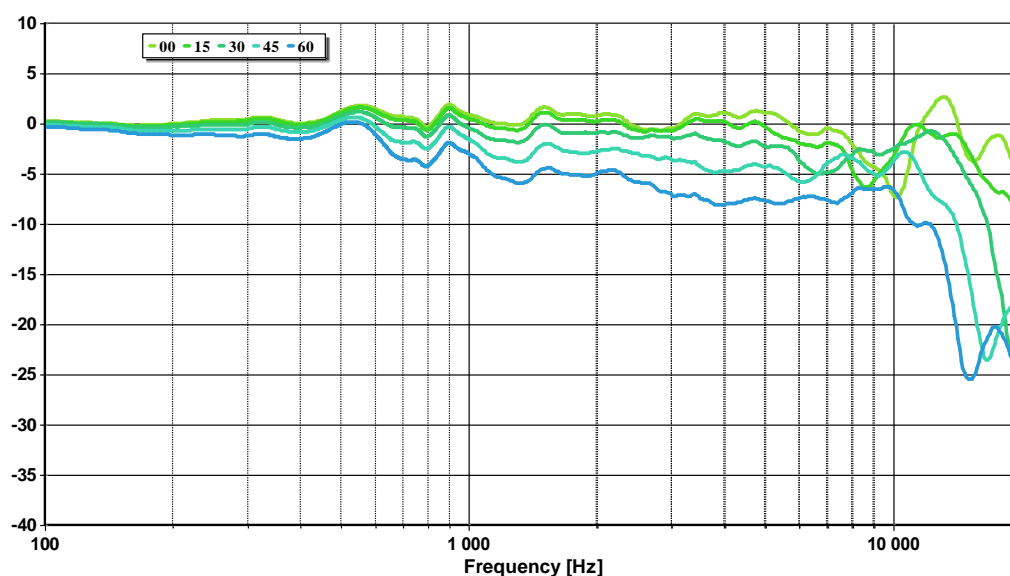
The tweeter required very minimal EQ, only having one high-shelf EQ point applied to give lift in the 10kHz+ region, balancing with the resonance in its natural roll-on.

## MEASUREMENT

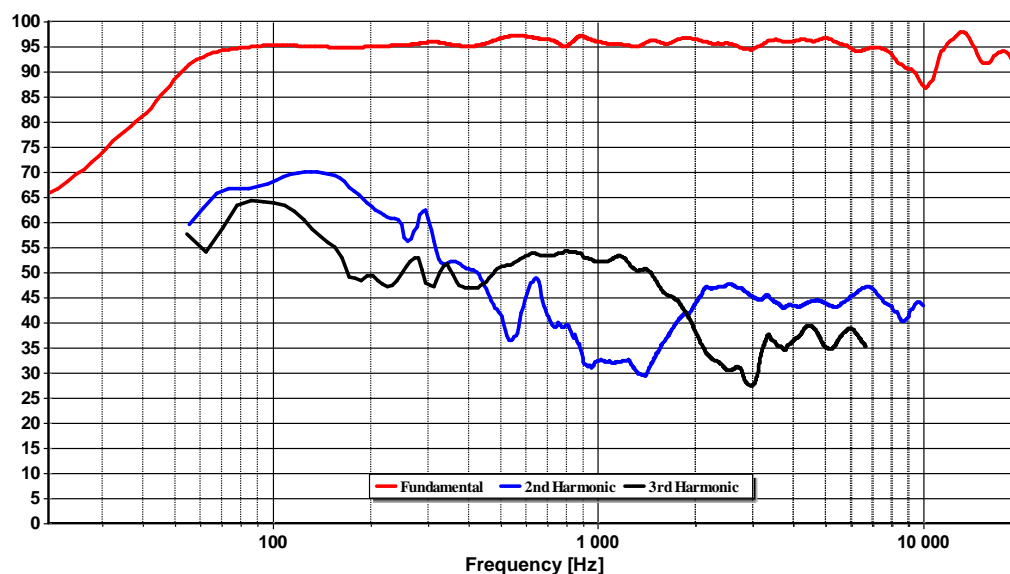
Measurements are taken on tweeter axis at 1m in free field. The measurements here have been offset to 0dB as the system is digital. The following figure shows the responses for the full system as well as woofer and tweeter independently, the black line is the full system with the tweeter running inverted polarity. The deep and symmetrical notch, when the tweeter is connected with inverse polarity, shows that the drivers are in-phase across the whole crossover region.



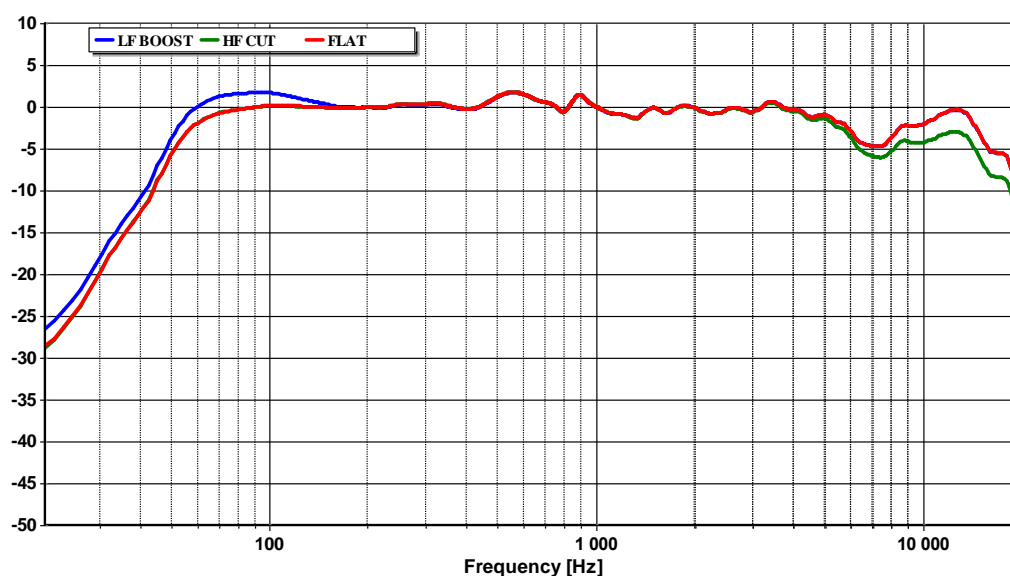
In the next figure we can observe the off-axis response of the Loki system with the MiniDSP crossover. Here we can see that even 60 degrees off axis there is a smooth decay of around 3dB between 1kHz and 10kHz then limited by tweeter directivity beyond this. The High shelving added in the tweeters EQ stage here has made a marked improvement upon the passive crossovers power response smoothness off-axis. There are still some of the on-axis resonances inherent to coaxial drivers however these become smoother off axis and an ideal listening position between 15 and 30 degrees can be estimated from this figure.



The next figure shows the 2nd and 3rd order harmonic distortion with an output of 96dB at 1kHz. The overall distortion is low and without any large peaks. This makes the reproduced music very clean and without colouration.



The following figure shows the three MiniDSP crossover configurations included with this kit measured at 30 degrees off-axis, this is around the recommended listening angle for the Loki system so should give a fair indication of the power response at listening position. There are two alternative settings included with the MiniDSP kit which are meant for use as room correction effects, a low frequency boost and a high frequency cut for brighter rooms. These are meant as starting positions and a quick guide to adjusting these presets will follow.



## MINIDSP CONFIGURATION

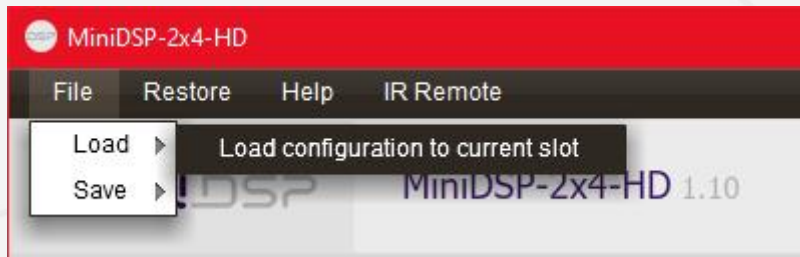
The MiniDSP 2x4 HD software has a great, user friendly interface which updates in real-time while the hardware is connected.

Once the user has downloaded the presets provided by SEAS for this kit and the relevant MiniDSP software and drivers for the 2x4 HD hardware the user can open the software and hit the 'connect' icon in the top right corner of the main window.



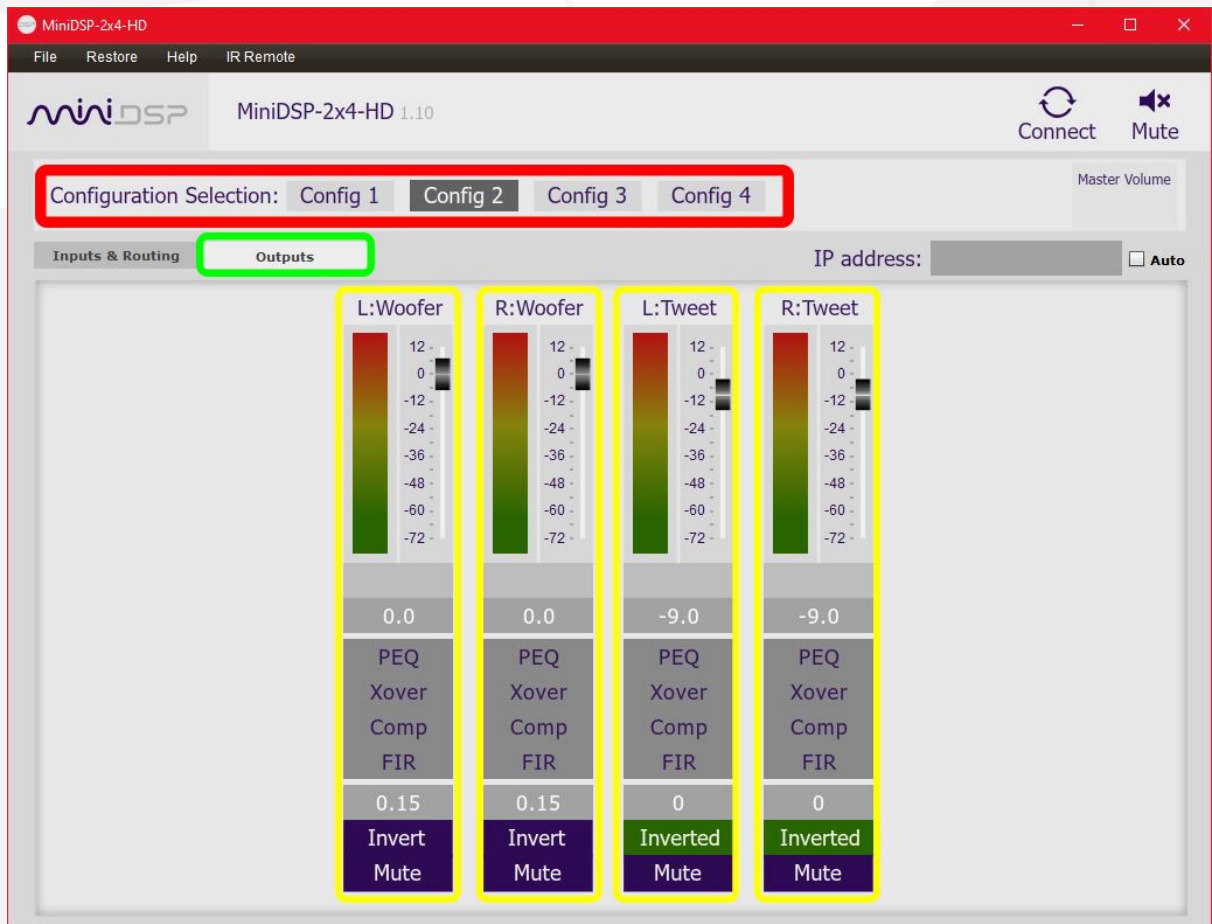
This will open a separate window monitoring communication between hardware and software and allow the user to start making changes to the configuration on the hardware through the software user interface.

Initially the presets included with this kit can be loaded into the MiniDSP software by selecting:



Then navigating to wherever the user has downloaded the presets and selecting one.

Once you have loaded one of the presets you should see a configuration load which resembles closely the next figure. In this figure the red highlighted section is the configuration selection- the software can hold up to four configurations at once (meaning you could load each of the settings included in this kit and still have a slot spare), these can be switched between by clicking, useful for AB testing.

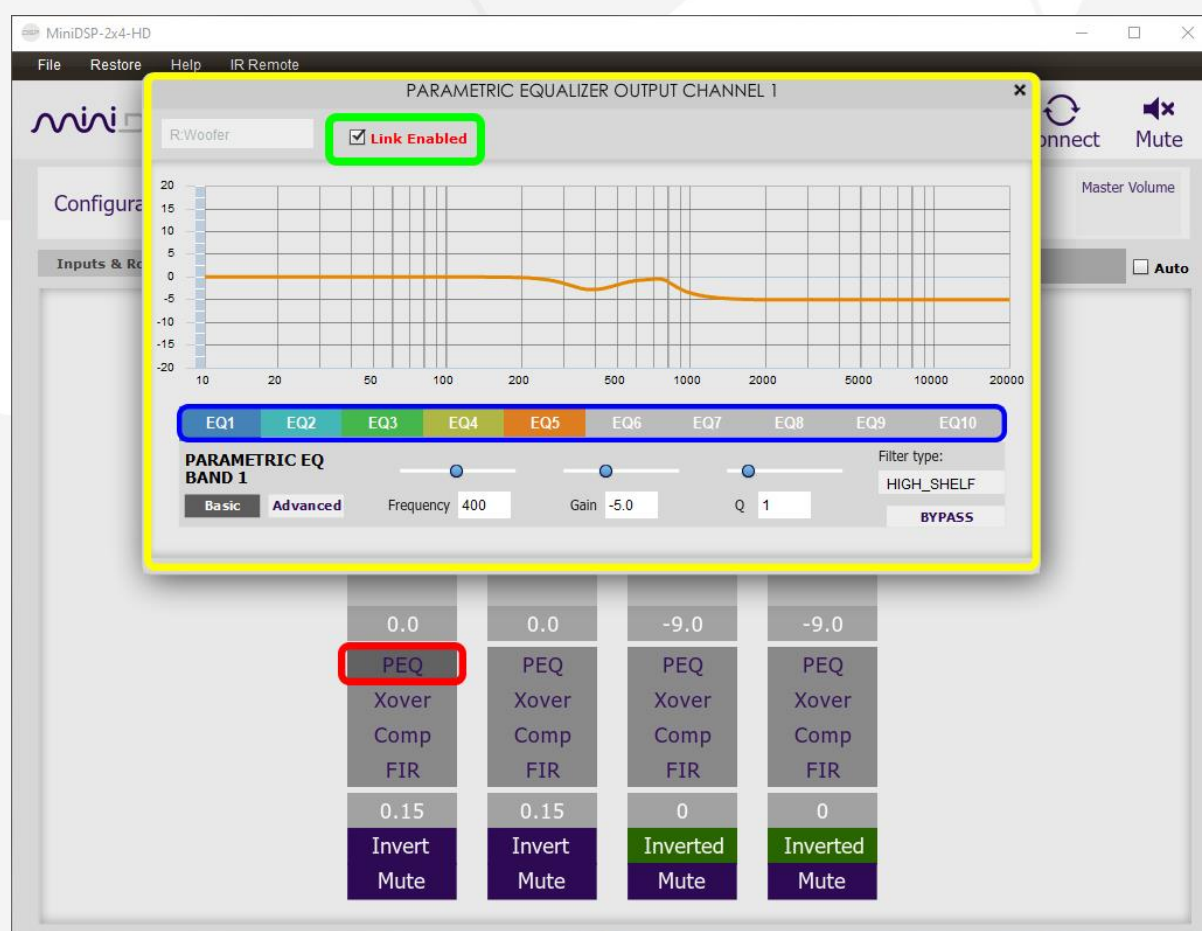


Clicking the 'Outputs' button (highlighted green) opens the panel monitoring the outputs of the MiniDSP hardware, the yellow highlighted trays each represent 'OUT1', 'OUT2', 'OUT3', 'OUT4' on the hardware (left to right).

To edit a channels EQ the user can click the 'PEQ' button, highlighted red in the next screenshot, this will open the Parametric Equalizer window. In this window the user can select EQ points, numbered 'EQ1' to 'EQ10' (highlighted blue with active points showing colour and bypassed (inactive) points greyed out), then edit their properties in the tray below.

\*NOTE: the 'link enabled' check box (green) means any changes made to this EQ selection will be mirrored by the channel displayed in the greyed text box to the left of the check box.

Users can edit values by using the sliders, typing or using the navigation arrows on their keyboard to move in the smallest increments available and the results of changes will be displayed in the visualisation above as soon as the changes are made.



For the Low Boost preset included with this kit the boost is provided by EQ point 'EQ6' on the woofers.

For the High Cut preset the cut is provided by EQ point 'EQ1' on the tweeters.

A good starting point would be to simply adjust the gain of these EQ points to a level which works well for the listening environment.