

## Pre Box S2 Digital

### Digital micro preamplifier with MQA and DSD512 support

- Dual mono construction
- High end ESS Sabre ESS9038 dual DAC
- Proprietary clock circuitry design
- Organic polymer capacitors and thin film miniMELF resistors
- MQA hardware decoding
- DSD64, DSD128, DSD256 & DSD512 (DSD over PCM)
- Up to 24bit/192kHz for optical & coax inputs
- 7 selectable digital filter characteristics
- 1 proprietary optimum transient digital filter
- Headphone output on the front (6.3mm)
- Synchronization of all internal oscillators
- Jitter as low as 100 Femtoseconds!
- Gold plated four layer PCB
- Full alu/metal sandwich casing in silver or black

#### Technical data

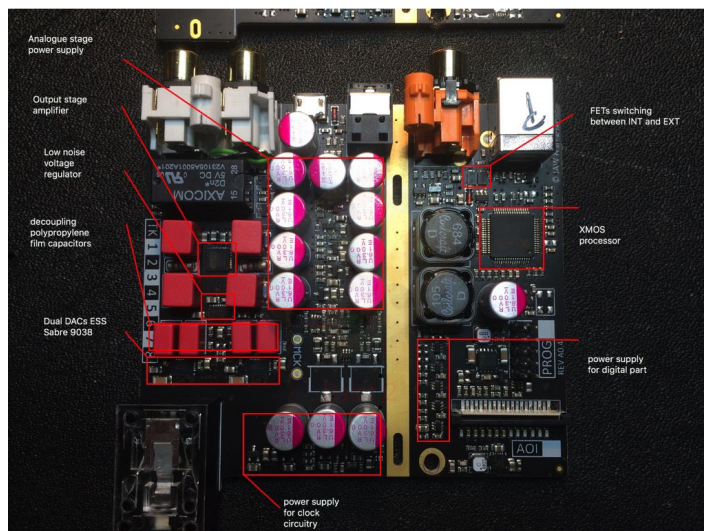
3 digital inputs	1x coax (S/PDIF), 1x optical (TOSlink®), USB B
D/A-converter	2x ESS9038Q2M 32-bit PCM 768kHz / DSD512
Headphone amplifier chip	ESS9063
Sampling rates	32/44, 1/48/88, 2/96/176, 2/192/352, 8/384/768 kHz
DSD support	DSD64, DSD128, DSD256 and DSD512
MQA support	full MQA unfolding by hardware
Filter settings	7 different selectable on front
Frequency response	20Hz - 20kHz
Analogue out	6.3mm Headphone Out (front), 1x Variable Out (RCA)
Output voltage	2,05 Veff
Headphone output power	68mW (32Ohms)
THD	0,0003%
Dynamic Range	124dBA
Powerconsumption	5V, micro USB
Dimensions W x H x D	103 x 36 x 103 mm
Weight	600g without power supply



### Pre Box S2 Digital - a performance revolution in a small package!

Pre Box S2 Digital marks a new era for our S-series components, for the very first time we are using a dual mono configuration with the highest class D/A converters of ESS Sabre, their flagship DAC chip ensures highest class audio in a small and affordable package. This DAC is capable of high resolution audio up to 32bit 768kHz PCM and DSD512! Pre Box S2 Digital is also the very first of our devices to support hardware MQA unfolding. It's also the premiere of our proprietary *Optimum transient digital filter* and our proprietary clock circuitry design. Digital audio is the art of time, with our new proprietary clock design we have managed jitter rates of unrivalled 100 Femtoseconds, this easily outperforms many renowned and respected audiophile clock generators! With organic polymer capacitors and thin film miniMELF resistors we were able to create a tiny device that will blow away even much bigger components for a much higher price. With a total of seven digital filters the sound can be shaped precisely to the listeners liking. Pre Box S2 Digital is fully remoteable, it can also control the playback software of a computer. You can use Play, Pause, Forward and Rewind straight with your Pre Box S2 Digital!





## First class components from first class manufacturers!

We are using dual DAC 2 x **ESS9038Q2M** - the newest generation of SABRE Digital to Analog Converter. The new benchmark in audio excellence. The ES9038 SABRE DAC is a high-performance 32-bit digital to analog converter and uses ESS's patented 32-bit Hyperstream II modulator architecture and Time Domain Jitter Eliminator. It is the first SABRE DAC to use new Dual-DAC architecture to further enhance performance. It also delivers an unprecedented dynamic range of up to 129dB and total harmonic distortion plus noise of -120dB (THD+N) – a performance level that will satisfy the most demanding audio enthusiasts.

**ESS9063** - headphone amplifier and output buffer. Supports a dynamic range of up to 122dB and THD+N of -117dB with 600ohm loads. Additionally, we implemented a unique feature that improves THD+N with 32ohm loads to -112dB in Best Performance mode.

**ESS9311** - is the industry's first low-noise, low-dropout regulator designed specifically for high-performance audio systems. It is optimized for high resolution audio thanks to its revolutionary dual regulator architecture. This innovative architecture contains series-voltage and shunt-voltage elements, eliminating the need for output decoupling capacitors – an industry first in audio system design. The ESS9311 provides the extremely low-noise outputs that are necessary for driving the reference inputs of audio converters and offers significant value-add for audio system designers.

Organic polymer capacitors are used in critical positions like the analogue power supply. These capacitors are very low thermal drift which result in consistent playback performance. Precision Thin Film MELF resistors - such resistors has very low voltage coefficient. It results in perfect sounds without impurities. 16-core XMOS USB chip for asynchronous USB data transfer and MQA unfolding. Gold plated four layer PCB with extra shielding for achieving optimal audio performance. Full colour OLED display for indication of volume level, selected input, sample rate and type of input digital signal.

## Synchronization of all oscillators

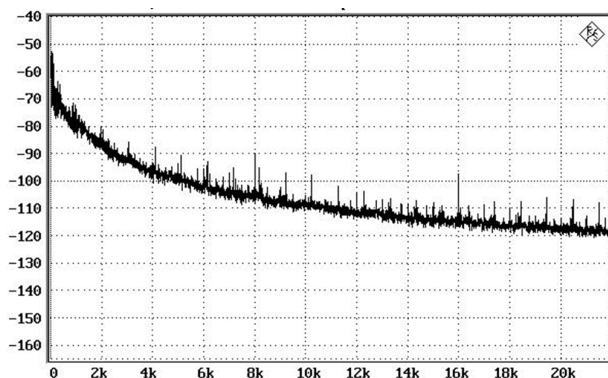
This extremely important feature is almost always overseen. Imagine an orchestra without a drummer or a conductor. Every musician plays in his own rhythm and tempo. The result is chaos which nobody can listen to. The same applies to oscillators in a DAC. There are a lot of oscillators with different frequencies and they start to talk chaotically - what could the result be? The complete opposite happens when all the oscillators are perfectly synchronized and work like an orchestra with the perfect conductor. This results in low jitter, minimizing of interference and it is very important for good sound.



## Double filtering for a noise free USB input

One of the major problems for USB DACs is the transmission of unwanted noise coming through the USB output. A lot of research of Pre Box S2 Digital went into how to make this noisy connection more quiet. After a lot of headscratching trial and error we found the solution to lie in active and passive filtering of the output.

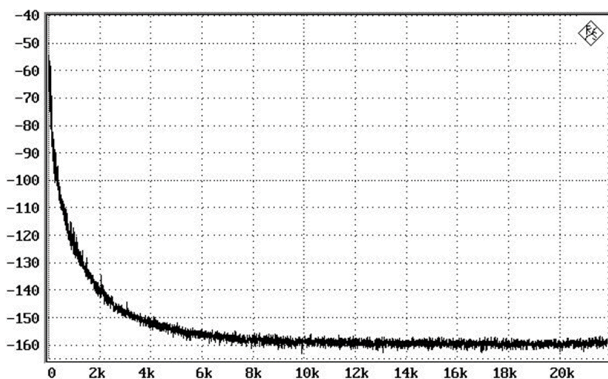
Typical USB output from personal computers:



We can see that the noise floor at 1kHz is about  $-75\text{dB}$  and at 10kHz it is about  $-110\text{dB}$ .

The results can be seen here:

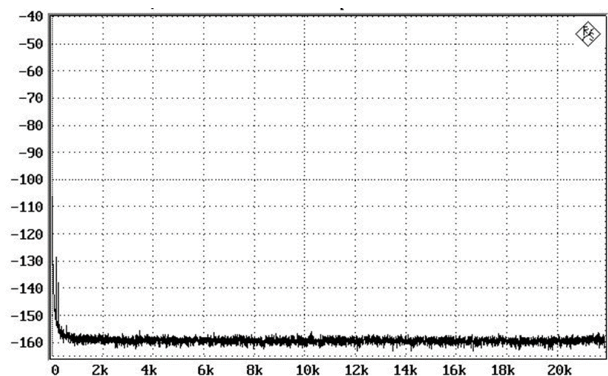
USB output after passive filtering:



After applying passive RF interference filtering the results are already remarkable. Noise on 1kHz drops to  $-125\text{dB}$ , at 10kHz Noise comes even close to  $-160\text{dB}$ . But they improve even further when applying an active filter after the passive filtering.

This is the USB output noise after double filtering:

USB output after active filtering:



The results are limited by the capabilities of the measuring equipment and noise floor lays at  $-160\text{dB}$  or even lower. There are visible peaks at 50Hz and 100Hz which are caused by limits of the measuring instruments. However, they are at a level of  $-130\text{dB}$  and  $-140\text{dB}$ .