Tech note

AURORA

The technologies

The Aurora, – iFi's new wireless music system, the Aurora, brings together a unique collection of proprietary technologies to deliver a sonic experience unlike any other table-top, all-in-one system.

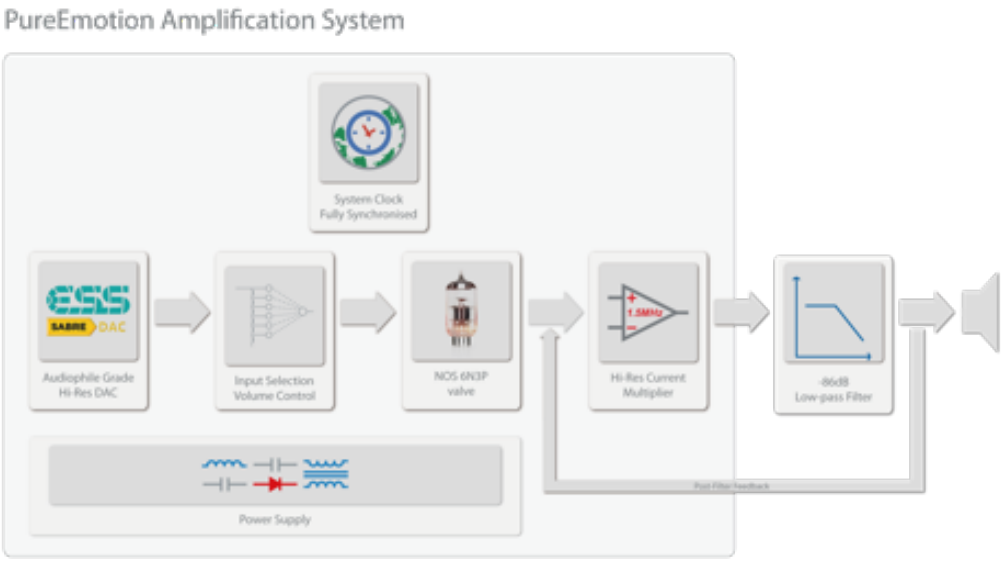
Music amplified by PureEmotion

PURE emotion

At the Aurora's heart lies proprietary amp technology that iFi calls 'PureEmotion' – a hybrid circuit design comprising several key stages.

The first of these – the preamp stage – incorporates a Russian 6N3P valve (visible through a window next to the OLED display). This takes the analogue audio signal delivered by the Aurora's DAC (Digital-to-Analogue Converter) circuitry – based around a chip from ESS Technology's renowned 32-bit Sabre DAC family – and adds gain in preparation for further

amplification, imbuing the sound with pure tonality, open imaging and natural fluidity. The resulting low-level signal then passes to the power amp stage – iFi's 'current multiplier circuit'. This is a highly efficient switching power amplifier, a description it has in common with Class D amplification – but there the similarity ends.



Class D amp modules are often used in audio products because they are energy efficient and able to generate relatively high current from a small device. However, in terms of sound quality, typical 'off-the shelf' Class D amps leave a lot to be desired, not least because switching occurs at varying frequencies which may be within the audible range – the higher the power level, the lower the switching frequency.

iFi's current multiplier circuit is entirely different because the switching frequency is fixed at an ultra-high level – around 1.5MHz, far beyond the audible frequency spectrum. This results in a high level of efficiency, multiplying the current supplied by the valve several thousand-fold, whilst maintaining far greater linearity and lower noise than typical switching amplifiers. Coupled to this is a low-pass circuit and a feedback loop, the latter ensuring the output frequency is ideal for the load, and everything is 'clock-locked' via iFi's GMT (Global Master Timing) circuit to ensure unerring precision.

This ingenious fusion of amp technologies enables a sound that combines purity of tone with a high level of engagement, speed and dynamic gusto, ensuring the emotive quality of music is delivered in full effect.

Custom drivers, uniquely configured

The PureEmotion amp stage delivers a total of 320W to power the Aurora's custom-made speaker drive units. The main drivers, of which there are four – two firing from the front and one from each side – sport a 120mm cone made from coated long-fibre paper, a material selected for its optimal balance between stiffness and self-damping. This is coupled to a large magnet, a basket that resonates above the audible range and extensive measures to ensure excursion is controlled and damped mechanically, so that clarity and control are

maintained even at high volume levels.

Unusually, these main drivers are deployed in a wide-bandwidth role to cover the vast majority of the audible frequency spectrum, rolling off towards very low and very high frequencies. The drive unit design, together with the inert nature of the Aurora's housing – stiff, well-braced, naturally sound-absorbent bamboo with strategically placed damping material – enables a flat frequency response from around 60Hz to 8kHz. Avoiding the need for a crossover to hand over from one drive unit to another at critical frequencies enables excellent phase response through the midrange.

These are the only drive units, however. Two 28mm silk-dome tweeters, one at each side, cover frequencies from 8kHz to 35kHz. As the treble region is considered to begin at around 5kHz, and the limits of human hearing extend to about 20kHz, the Aurora's high-frequency drivers behave more like super-tweeters than traditional tweeters. With a simple first-order crossover for the smoothest-possible transition and a shallow waveguide to provide time-alignment, these tweeters not only deliver high-frequency sounds such as cymbals but are also critical to the Aurora's spacious soundstage.

Two further drivers – a pair of rectangular passive bass radiators – fire downwards from the underside of the cabinet. The diaphragm used by these drivers is formed from a composite of carbon, iron and ethylene-vinyl acetate, a well-damped material enabling the correct resonant frequency to be obtained from a diaphragm of appropriate thickness. This is combined with a self-centring, double-ribbed rubber surround, negating the need for a basket.

The net result is a seamlessly coherent performance with silky-smooth frequency response, an out-of-the box soundstage and bass that delves far deeper than most all-in-one systems can muster.

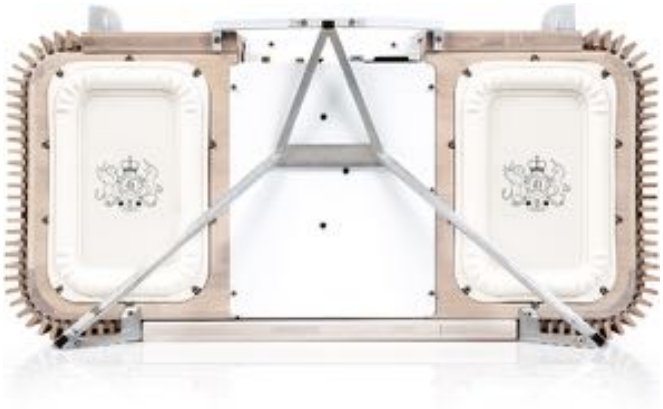
Left: Three of the four main drivers and one tweeter are visible in this image, within their bamboo enclosure. The Aurora's outer enclosure, with its distinctive bamboo fins, sits over the top of this.

Soundspace and TrueBass – analogue signal processing

There are plenty of audio products on the market that claim to deliver a big, spacious, three-dimensional performance from a single box. Many of these use DSP (Digital Signal Processing) to manipulate the digital data in order to achieve this effect; this is a 'lossy' process that has an adverse effect on the purity and resolution of sound.

iFi does not use DSP of this kind in any of its products; instead, the Aurora incorporates sound-tuning technologies that operate entirely in the analogue domain. SoundSpace is one such technology – this combines the drive unit array with a proprietary matrix, which adjusts the output from specific drivers at certain frequencies. SoundSpace is fundamental to the Aurora's immersive, room-filling performance, enabling the soundstage to extend beyond the confines of the cabinet with expansive width, height and depth. This gives music a palpable sense of scale and space you simply wouldn't expect from an all-in-one music system.

TrueBass is another proprietary sound-tuning technology that operates strictly in the analogue domain. The depth and quality of bass supplied by all-in-one lifestyle systems often leaves a lot to be desired; the TrueBass system, incorporating the two downward-firing bass radiators, ensures the Aurora delivers genuine bass with realistic depth and definition. Dual-level depth control means you can adjust the bass response according to taste – down to a deeply impressive 27Hz – so that everything from timpani, to a bass guitar, to an electronic bassline is conveyed with power and poise.



Left: Two passive bass drivers fire downward from the base of the Aurora

ART (Automatic Room Tailoring)

AUTOMATIC
ROOM
TAILORING

The Aurora incorporates a 'room correction' system called ART (Automatic Room Tailoring), entirely developed in-house.

At the press of a button, six ultrasonic sensors measure the distance to the surrounding walls using ultrasound. Then, a 32-bit ARM Cortex microprocessor adjusts the output from the driver array to precisely tailor Aurora's performance. The effect is similar to the adjustments made by a live sound engineer at a mixing desk when adapting sound to suit different venues.

All the adjustments are made strictly in the analogue domain, without relying on DSP or feedback in the manner of many other room correction systems. This enables much finer and more accurate tailoring of the sound, reacting to room modes and reflections from walls without attempting to 'neutralise' the sound in an unnatural way. Wherever the Aurora is placed – in a large room or a smaller one, in a corner, against a wall or in free space – it always performs at its best.

Left: Six microphones at the back of the Aurora – two facing backwards, two left and two right – measure the distance to walls using ultrasonic sound

Built to be versatile

Aided by ART, the Aurora adapts to the way you want to use it. You might place it on a table or sideboard and stream your favourite music playlists, radio stations and podcasts. You might site it under a wall-mounted TV and connect it via Bluetooth or optical cable, thereby delivering TV sound far better than any soundbar. Or, you might purchase a rechargeable battery pack and attach it to the Aurora's 12v input, so you can take it outside for a garden party. Wherever you place it, the ART system ensures the Aurora is calibrated to perform at its best.