

# Press release

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*Above iFi's iCAN Phantom headphone amp – distinctive design, peerless versatility, unbeatable sound*

## A new reference: introducing the iCAN Phantom

**iFi's new flagship analogue headphone amplifier delivers reference-quality sound with everything from hyper-sensitive in-ear monitors to the most power-hungry electrostatic headphones**

*Southport, England* – Since its formation in 2012, iFi has consistently delivered headphone amplifiers that are rated at the top of their class, from small and affordable portable devices to high-performance amps to use at home.

For the past seven years, the Pro iCAN and subsequent Pro iCAN Signature have represented the pinnacle of iFi's range, widely recognised to be among the finest headphone amps on the planet owing to their mix of useful versatility, excellent circuit design and supremely engaging performance. But summer 2023 sees the Pro's crown usurped by an even mightier headphone amp champ – the new iCAN Phantom.

iFi's new reference-class analogue headphone amp takes the Pro iCAN, refines and enhances every element of its circuitry to further elevate its performance, incorporates technology from the Pro iESL – previously a separate component – for electrostatic headphones, and adds a new, advanced user interface and network-connected control system.

The result is a headphone amp truly worthy of its flagship status, with exemplary build quality, sophisticated technology, an unrivalled specification and remarkable versatility, expertly engineered to drive every headphone type to its full sonic potential. From ultra-sensitive IEMs, to the finest dynamic driver and planar magnetic headphones, to the most power-hungry electrostatic designs, the iCAN Phantom delivers a truly exceptional headphone experience – exquisitely tailored to the requirements of the listener.

Another string to the iCAN Phantom’s bow is its ability to perform as a high-end hi-fi preamplifier, enabling headphones and speakers to be combined in a single high-performance audio system. Whether you use your favourite headphones to plug yourself into an intoxicating private musical universe or engage your speakers to fill the room with glorious sound, the iCAN Phantom is brilliantly engineered to place at the heart of a home audio system for the most discerning of music lovers.

### What’s in a name?

Ever since the press dubbed a newly developed Rolls-Royce “Silver Ghost” in the early 20th century, the famous automobile marque has given its models ghostly names, evoking qualities that are so extraordinary as to seem supernatural. There has been a “Phantom” in the Rolls-Royce range since 1925, always revered for the remarkable quality of its engineering, its distinguished appearance and eerily smooth, quiet ride.

These are qualities that iFi sought to reflect in its new flagship headphone amp, which is why the company named it the iCAN Phantom – the Rolls-Royce of headphone amplifiers. It exemplifies engineering excellence to deliver exceptional, ultra-low-noise audio performance, coupled with a distinctive external design and dual-level black and silver finish that echoes the two-tone colour schemes adorning many Rolls-Royce cars for decades.



*Left* Supremely built with a dual-level black and silver finish, the iCAN Phantom is the Rolls-Royce of headphone amps

### Building a flagship

A flagship audio component should be built and finished to an exceptional standard and the iCAN Phantom certainly fits the bill. It looks unlike any other headphone amp; its design gives the appearance of two units, but it is in fact a single, dual-level device, the full height of which is fully utilised by its multi-layer circuit design. Its enclosure measures 256x120x185mm (WxHxD) and is

sturdily constructed from aluminium, with the bottom layer sporting cable connections front and back, and the top layer offering tactile controls and a colourful OLED display.

The top of the iCAN Phantom incorporates a flush-fitting smoked glass panel, through which the amp's circuitry – including its glowing audio valves – can be glimpsed. Circular aluminium vents protrude from the glass, ensuring the circuitry within does not overheat. Clever design touches abound; for example, when not in use the sockets at the front or back can be hidden by a neat aluminium panel that attaches magnetically. (This panel also holds the data cards for the electrostatic bias voltage settings – these are described later in the press release.) The iCAN Phantom also comes with an attractive, easy to use aluminium remote control that puts the handsets supplied with many audio components to shame.

### Valve or solid state – a tale of two input stages

Like the Pro iCAN before it, the iCAN Phantom sports several unique features that set it apart from other headphone amps. One such facility is the incorporation of two input stages – one valve/tube-based, the other solid state – enabling the user to switch between the two in real time. These input stages are entirely separate, which means they can be kept short and direct for optimal purity rather than complicating the signal path (for example, by switching tubes in and out of a single circuit).

The fully discrete Class A solid-state input stage uses J-FETs, while the all-valve Class A circuit features a hand-selected, computer-matched pair of General Electric 5670 tubes (a premium variant of the 6922). This stage has two selectable modes – Tube and Tube+. The latter minimises overall loop-gain and thus negative feedback, giving a different trade-off between the tube's natural harmonics and the transient performance. The effect is like three amplifiers in one, each with a different sonic presentation.



*Left* The switch to the left of the OLED display is used to select between Solid State, Tube and Tube+

While it's certainly fun to be able to compare the differences between vacuum tube and solid-state sound in real time, the inclusion of these two separate input stages is much more than a gimmick. With different source devices, varying music styles and an abundance of headphone and speaker types available to listeners, each of these circuits come into their own and may be preferred at different times. For example, the solid-state stage offers pace and immediacy; the Tube mode adds fluidity and a free-breathing dynamic quality; and Tube+ accentuates the sonic influence of the valves, delivering a spellbinding romantic warmth that may suit, for example, acoustic and vocal musical styles.

The supplied GE 5670 tubes have an expected lifespan of around 100,000 hours. When eventually the time comes to replace them, the iCAN Phantom's glass top is easily removed to provide access. The amp is also compatible with 6922 tubes (an adapter for the 6922's pinout is included).

### **PureWavePRO – reference-class fully balanced circuit design for the purest sound**

Balanced circuit design has long been considered a righteous path to audio excellence in high-end amp design, but the term 'balanced' is used in different ways and does not always mean the same thing. The iCAN Phantom takes balanced circuit design to the extreme – fully differential from input to output, minimising noise and crosstalk in the signal path for ultimate sonic purity.

Essentially, 'fully differential' circuit design – or True Differential Balanced, as iFi calls it – means that each channel (left and right) is fully separated in the circuit design, and each of these channels has two separate signals of equal level but opposite polarity (positive and negative). This requires four separate amp circuits, two for the left channel and two for the right channel – much more costly and complex to implement than single-ended circuit designs, but the sonic dividends are hugely worthwhile.



*Left* The iCAN Phantom's meticulous, multi-level circuit board layout features True Differential Balanced design

The iCAN Phantom's True Differential Balanced circuitry is coupled to a volume control with six decks – two decks for each channel (positive and negative) with the final two decks used for monitoring the volume control operation. The motorised volume control potentiometer is custom-made by ALPS in Japan and is of exceptional quality.

Because the two halves of the volume control and the two halves of the amplification operate differentially, they effectively become a single stage. So, although the circuitry is elaborately implemented, it boils down to the simplest design possible for a headphone amplifier – a volume control, a gain stage and a current buffer.

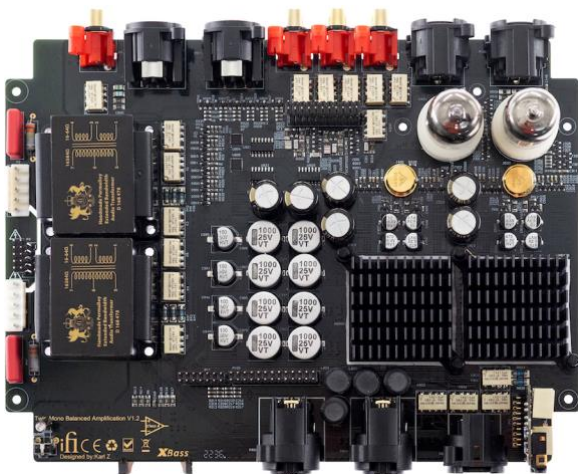
iFi has championed balanced circuit design for years and many of its current amp devices at all manner of prices incorporate balanced circuit principles. Since 2020, iFi's most advanced balanced circuit concepts have been collectively dubbed PureWave, referring to the sonic purity they achieve thanks to exceptional linearity and infinitesimally low levels of noise and distortion. The iCAN Phantom's True Differential Balanced circuit design, utilising the highest quality circuit components, is the ultimate expression of these principles – that's why iFi calls it PureWavePRO.

## iESL technology – for electrostatic headphones and more

Most headphones create sound by using dynamic (or moving coil) drivers to move air. A smaller number use planar magnetic diaphragms, which are different in form and operation, but still use magnetic fields to cause motion. At the high end of the headphone scene there is another, rare but fabulous sounding driver type – electrostatic headphones. These incorporate an electrically charged diaphragm placed between two conductive plates or electrodes; whilst dynamic and planar headphones tend to deliver stronger bass response, nothing can beat the open soundstaging and magical high frequencies of a top-quality electrostatic design.

For many headphone users there is a significant drawback – electrostatic drivers have extremely high impedance, which means they need specialised amplifiers to boost the voltage of the audio signal far, far higher than that required by other headphone types whilst also dropping the current of the signal to safe levels. One way of doing this is to add a separate unit called an electrostatic ‘energiser’ to a regular amplifier; this is the approach iFi took with its previous-generation Pro Series, which gave the option of adding the Pro iESL energiser to the Pro iCAN headphone amp.

iFi has chosen to incorporate its iESL energiser technology within the iCAN Phantom, thereby making a single amplifier that can handle every headphone type with aplomb. But it’s not only owners of electrostatic headphones who benefit from this endeavour – the component quality and clever circuit design required to deliver such a high level of performance with electrostatic headphones elevates the amp’s performance with other headphone types too.



*Left* The bottom level of the multi-layer PCB layout contains the PPCTs – seen here on the left in their shielded enclosures

Transformer quality is critical to sound quality, which is why the iCAN Phantom incorporates custom-made PPCTs (Pinstripe Permalloy Core Transformer). These incorporate a GOSS/Mu-Metal hybrid core and complicated multi-section winding with both vertical and horizontal sectioning, using extremely thin wire that is hand-wound with great precision. This transformer is capable of exceptionally wide bandwidth, ultra-low distortion and perfect linearity.

The attention to every circuit detail is extreme, from input to output. For example, gold-plated silver contact relays, filled with an inert gas, ensure perfect performance over a long lifespan, and

meticulously engineered semiconductors, shielded from noise in gold-plated copper cases, deliver consistent, distortion-free sound.

### Powerful amplification delivers musical gratification

The iCAN Phantom is an extraordinarily powerful headphone amplifier, capable of delivering more than 15,000mW from its balanced outputs and more than 5,760mW from its single-ended outputs into 16 ohms. In terms of voltage, it can supply more than 27V into a 600-ohm load; when it comes to electrostatic headphones, it delivers up to 640V.

The iCAN Phantom's capacitive battery power supply, originally developed for the Pro iESL and further enhanced here, is intrinsic to its high level of performance. Rather than relying on a mains-powered switched-mode step-up circuit, a large battery of custom-made film capacitors rated at 1,000V DC is charged and occasionally topped up using mains power. This 'virtual battery pack' delivers pure DC, completely free of AC and switching noise – the ideal high-voltage supply for electrostatic headphones.

Two independent circuits deliver the electrostatic bias voltage – one for 230V 'normal' bias and the other adjustable between 500V and 640V to deliver a perfect fit for every electrostatic headphone on the planet. (There's more information about selecting 'custom' bias voltages below.)



*Left* A neat selection of switches, buttons and dials allow the user to custom-tune the amp's performance

### Sonic tailoring for an immaculate fit

The choice between solid-state and valve-based input stages isn't the only way to ensure the iCAN Phantom's performance perfectly matches your headphone selection and the music you play. A range of adjustable settings let you dial in the perfect performance – here's a summary:

For dynamic and planar magnetic headphones and IEMs:

- **Adjustable gain**  
Three settings – 0dB, 9dB and 18dB – enable the amp to precisely match the connected headphones. Unity gain (0dB) is useful to ensure low noise with more sensitive headphones and IEMs, while the higher gain settings make the most of tougher headphone loads, delivering excellent dynamic headroom.

- **IEMatch**

This proprietary iFi circuit attenuates the output to better suit high-sensitivity IEMs (in-ear monitors), removing potential background noise and increasing the usable volume range. This can be optionally applied to the 3.5mm and balanced 4.4mm outputs.

- **XBass analogue processing**

This proprietary circuit can be engaged to enhance low frequencies, its sophistication enabling it to do so whilst maintaining bass definition and without muddying the midrange. This is useful with, for example, some open-back headphones that sound bass-light; it 'corrects' the bass so that the listener hears low frequencies as the artist intended. The iCAN Phantom offers three XBass steps – 10Hz, 20Hz and 40Hz – or it can be switched out of the signal path altogether.

- **XSpace analogue processing**

Another proprietary analogue processing mode, XSpace is designed to enhance soundstage width and depth. The iCAN Phantom includes two XSpace matrices, one for headphones and the other for speakers, with automatic switching between the two. XSpace for Headphones compensates for the 'in-head localisation' effect that can occur when listening to music that was mixed using speakers, widening the headphone soundstage to deliver a more spacious and speaker-like experience. XSpace for Speakers increases the width of the apparent soundstage beyond the width dictated by speaker placement. Both forms of XSpace feature multiple levels that may be selected according to preference or switched out of the signal path completely.



*Left* Six data cards allow bias voltage to be set precisely for every pair of electrostatic headphones

For electrostatic headphones:

- **Custom bias voltage cards**

Electrostatic headphones have varying requirement when it comes to bias voltage. The iCAN Phantom has two outputs for electrostatics – one set at the 'normal' bias voltage of 230V, the other offering variable bias voltage between 500V and 640V, selected by the user. It is possible to damage the headphones if the wrong voltage is selected; to make this far less likely, iFi has created a series of data cards that specify different bias voltages (these are supplied with the amp). Simply select the card that matches the headphone's specification and pop it in the card slot – there are cards for 500V, 540V, 580V, 600V, 620V and 640V, each with a handy guide on the back showing which headphone brand is compatible with that voltage.

- **Load impedance**

The impedance response can be adjusted from 16 ohms to 96 ohms. Lower impedance settings create a greater step-up and will produce a louder sound level at the same volume setting.

- **AC termination**

This low- and high-impedance setting for the shared node between the channels for bias affects a complex set of parameters, but most noticeably the width and depth of the soundstage.

### **iFi Nexus – network-connected control**

The iCAN Phantom is the first product to incorporate iFi's Nexus module, which combines with an app to provide a comprehensive, scalable network-connected control system. The features that Nexus offers will grow over time; at launch, the Nexus app enables your Android or iOS device to act as a 'super remote control' for the iCAN Phantom, providing access to additional features not accessible via the amp's fascia or standard remote control.

The app can display diagnostic information and allow the user to monitor the iCAN Phantom's operational condition in real time – for example, voltages, the condition and projected life span of the vacuum tubes and so on. It can also be used to apply over-the-air updates to the iCAN Phantom's firmware, downloading and installing update files via your home Wi-Fi network.

Nexus will be incorporated into more iFi devices over time – for example, several new mid- and top-tier DAC/amps set to arrive later this year will support it. As the number of Nexus-compatible iFi devices grows and the app's functionality expands, a network-connected iFi 'ecosystem' will develop – one app for all your requirements, like a concierge service for iFi customers. It will enable additional software-driven functionality to be delivered and shared across existing iFi devices, as well as providing a direct technical support service and even potentially an online store within the app.



*Left* The iCAN Phantom's black lower section offers a plethora of connection options front and back

### **Every connection – iFi's got it covered**

The iCAN Phantom supplies an array of balanced and single-ended connection options. The headphone outputs are at the front, with the source inputs and preamp outputs at the rear. Here's a summary:



Headphone outputs (dynamic/planar)	Source inputs
1x 3-pin balanced XLR (L/R)	1x balanced XLR (L/R)
1x 4-pin balanced XLR	3x RCA (L/R)
1x 4.4mm balanced	Preamp outputs
1x 6.3mm (positive phase)	1x balanced XLR (L/R)
1x 6.3mm (inverted phase)	1x RCA (L/R)
1x 3.5mm (S-Balanced)	
Headphone outputs (electrostatic)	
1x 5-pin normal bias	
1x 5-pin custom bias	

### Price and availability

The iCAN Phantom is available from selected retailers at an RRP of £3,749. Pre-orders are now open, with retail stock expected to arrive at the end of June.



iFi is the sister-brand of Abingdon Music Research (AMR) and is headquartered in Southport, UK. The two brands respectively design and manufacture portable, desktop and lifestyle audio products and high-end hi-fi components. Combined in-house hardware and software development teams and a 'music first' approach enable iFi and AMR to create advanced audio products that deliver new levels of design, functionality and performance at their respective price points. Since iFi's formation in 2012, its products have earned many awards around the world, helping it to become one of the fastest-growing brands in its field.

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