



Press release

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Above Symphony for the devil – iFi's iDSD Diablo 2 delivers a bewitching musical performance

iDSD Diablo 2: revel in the detail

Dressed in devilish red, iFi's new premium-level portable DAC/headphone amp sports a supremely powerful engine under the hood, expertly tuned to deliver an exhilarating sonic performance

Southport, England – In January 2021, iFi introduced its best-ever battery powered DAC/headphone amp: the indomitable iDSD Diablo. Engineered to sit proudly at the top of the company's illustrious range of mobile and transportable devices, the Diablo was built for purists – true headphone enthusiasts who crave pure, unadulterated sonic performance.

In the time since, iFi's industry-leading design team has continued to develop every facet to ensure that when the next-generation Diablo arrives, it raises the bar once again. The scene is set, and the time has come – the iDSD Diablo 2 is now among us, ready to capture the musical souls of headphone lovers everywhere with its devilish power and heavenly sound.

The iDSD Diablo 2 has been thoroughly redesigned inside and out, building on the performance-tuned design philosophy and prodigious power of its predecessor's amp stage with technical advances across the board. Its versatility has been enhanced too; while the original Diablo focused solely on cable connectivity from the source device – be it a PC or a Mac, a smartphone or a tablet – the Diablo 2 adds

the latest generation of iFi's famous Bluetooth engine, complete with aptX Lossless support. This makes it the world's first portable DAC/headphone amp capable of processing lossless Bluetooth audio – the convenience of wireless connectivity delivered with the best possible sound quality.

The iDSD Diablo 2 is similar in size to the original – 166x85x28.5mm – which makes it more 'transportable' than 'pocket-size'. Perfectly formed to sit on a desk or table, or sling in a bag and take travelling, its additional internal capacity compared to iFi's smallest portable devices is fully utilised to house the finest circuitry and highest-grade surface-mounted components. But while its size is similar to its predecessor and its aluminium enclosure still boldly coloured red – as befits its name – it sports an eye-catching new grooved design dressed in a new shade of metallic crimson.

The 22 grooves are not just for show; they aid thermal dissipation and double as fixing rails for the devilish 'wings' supplied with the iDSD Diablo 2. These detachable appendages act as a desk stand and can be positioned in different ways, allowing the Diablo 2 to be placed horizontally or vertically as its owner prefers. Versatile, desirable and fiendishly clever, the Diablo 2 makes a striking statement even before you switch it on.



Left The iDSD Diablo 2's grooved aluminium enclosure delivers distinctive form and practical function

DAC's entertainment

The iDSD Diablo 2's digital stage incorporates a Burr-Brown DAC chip that iFi uses extensively, selected for its natural-sounding 'musicality' and True Native architecture. Here, two of these chips are installed in a custom 'interleaved' configuration – this enables four pairs of differential signals (two pairs per channel) which lowers the noise floor, improves channel separation and enhances the DAC's ability to resolve fine musical detail and micro-dynamics.

iFi's experience with this Burr-Brown chipset means it knows how to make the most of it. But whilst intrinsic to the resulting sound, the creation of an exemplary digital stage involves much more than the selection of a particular DAC chip.

One such critical component is the XMOS chip that iFi uses to process audio data received over the digital inputs. The iDSD Diablo 2 incorporates a 32-bit, 16-core XMOS Cortex microcontroller, its processing power utilised by iFi to optimise sound quality and unlock the full potential of the Burr-Brown DAC chip. Extensive jitter-eradication technologies are also applied, including the latest version of

iFi's GMT (Global Master Timing) femtosecond-precision clock and smart storage cache. This combination of technologies forms the basis of a proprietary 'digital engine' that is unique to iFi.

Every format at the highest quality

Hi-res audio support is state-of-the-art, handling PCM data to 32-bit/768kHz and all levels of DSD to 22.5792MHz (DSD512). Thanks to the Burr-Brown DAC chip's four-channel True Native design, PCM and DSD take separate pathways – this enables DSD, as well as PCM, to remain 'bit-perfect' in its native form right through to analogue conversion.

MQA – the hi-res streaming technology, as used by Tidal's 'HiFi Plus' tier – is comprehensively supported, with full decoding/upsampling of MQA files right up to the format's highest 384kHz specification. Full decoding means that the full 'three unfold' decoding process is performed internally, as opposed to only the final unfold in the manner of an MQA 'renderer'.



Left Expertly engineered for pure performance, the iDSD Diablo 2 looks and feels unequivocally 'high end'

Bluetooth as you've never heard it before

iFi has earned a peerless reputation for its Bluetooth technology in recent years, with comprehensive format support and clever engineering delivering the convenience of device-to-device wireless audio transmission with far less sonic compromise than is commonly associated with Bluetooth. The company has now redesigned its Bluetooth module to further elevate its performance, and the iDSD Diablo 2 is the first portable device to include it (hot on the heels of the larger, mains-powered NEO iDSD 2, which launched last month).

The headline addition for this next-generation iFi module is aptX Lossless – the first 'lossless' Bluetooth audio format. While other Bluetooth formats described as 'hi-res' already exist – for example, aptX Adaptive can stream audio up to 24-bit/96kHz and LDAC's specification stretches up to 32-bit/96kHz – these are 'lossy' formats. That means they compress the file by removing audio data that is considered less important to the end result. These 'hi-res' Bluetooth formats apply compression that is more efficient and less audibly detrimental than older codecs, but sound quality is still compromised.

aptX Lossless is the first Bluetooth audio format capable of streaming CD-quality (16-bit/44.1kHz) audio 'losslessly'. Technically it still applies a form of compression, but it 'zips' and 'unzips' the audio file in a way that preserves the original data. It achieves bitrates of up to 1.2Mbps at CD-quality – that's more

than twice the maximum bitrate of aptX Adaptive and aptX HD, and roughly 20 per cent higher than LDAC's maximum figure. The format's potential to further elevate the sound quality that can be achieved over Bluetooth is very significant indeed.

aptX Lossless is part of Qualcomm's Snapdragon Sound platform. To benefit from the format, both the source device (perhaps an Android smartphone) and the receiving device (Bluetooth headphones or earphones, a DAC or an audio system) must incorporate a suitably equipped Snapdragon chipset. iFi's NEO iDSD 2 was the world's first DAC to include aptX Lossless decoding; now, a month later, the iDSD Diablo 2 becomes the first portable DAC to do so, benefitting from iFi's close collaboration with Qualcomm to ensure the format's benefits are maximised.

In addition to aptX Lossless, a full suite of Bluetooth formats is supported, including aptX Adaptive (backwards compatible with aptX and aptX HD), LDAC, HWA/LHDC, AAC and SBC. This means that every source device is covered at the highest resolution its Bluetooth specification allows. iFi's Bluetooth module can also be updated over-the-air, so further codecs may be added as they emerge in future.

As well as being the first portable DAC to support aptX Lossless, the iDSD Diablo 2 is the first to include Bluetooth version 5.4 – the newest Bluetooth standard, announced earlier this year. This ensures the greatest wireless range and stability, highest speed and lowest latency between the source device and the DAC. The Diablo 2 stores up to eight paired Bluetooth source devices in its memory, making it easy to switch between them.



Left The iDSD Diablo 2's crimson aluminium enclosure sports a grey polymer end piece to aid Bluetooth signal reception

PureWave – exemplary circuit design for the purest sound

The digital stage is only half the story in any DAC/headphone amp; when it comes to the crucial analogue circuitry, many such devices fall short. Balanced, differential analogue circuit design has long been championed for its ability to reduce noise and crosstalk in the signal path, but its additional cost and complexity means it has traditionally remained the preserve of high-end hi-fi components.

Since launching the Pro iCAN headphone amplifier in 2016, iFi has gradually introduced balanced circuit designs of various levels of sophistication across its range. The original iDSD Diablo introduced a new twin-mono topology, fully balanced from input to output – iFi calls this level of circuit design 'PureWave', referring to the sonic purity it achieves thanks to exceptional linearity and infinitesimally low levels of noise and distortion.

PureWave circuits are highly sophisticated in design and implementation, incorporating premium-quality components, and are therefore reserved for the upper tiers of iFi's DAC and amplifier range. The iDSD Diablo 2 features the latest generation of iFi's PureWave design, further enhanced to elevate audio quality and headphone amp power.

Powerful amplification delivers musical gratification

Able to drive all manner of headphones with ease, from highly sensitive in-ear monitors to current-hungry planar headphones, the iDSD Diablo 2's amp stage delivers prodigious power, propulsive energy and engaging dynamics, coupled to a remarkable ability to resolve fine texture and detail. With output power of 5,180mW/12.9V into 32 ohms and 611mW/19.2V into 600 ohms through its 4.4mm balanced output, the Diablo 2 has more power to drive the toughest headphone loads than any other portable DAC/headphone amp on the planet.

The amp stage supplies three gain settings to suit the drive requirements of the connected headphones or IEMs. The default mode is Normal (0dB); from there you can step up to Turbo (+8dB) or Nitro (+16dB). There is also an IEMatch attenuation mode – this is particularly useful with super-sensitive IEMs, removing potential background noise and increasing the usable volume range. Volume is controlled by a high-quality analogue potentiometer, which delivers superior sonic transparency compared to chip-based volume controls and can be locked in place to avoid accidental adjustment.



Left Like a sprinter about to explode from the blocks, the iDSD Diablo 2 raised on its desk stand is a vision of compact power and poise

High-quality components are used throughout the iDSD Diablo 2's circuitry, utilising its larger form factor in comparison to smaller, pocket-sized DAC/amps. Custom ultra-low-distortion MOSFET op-amps feature in both the digital and analogue stages, together with a hand-selected range of capacitors including the silk fibre electrolytic Elna Silmic II, aluminium-polymer Panasonic OS-CON, and multilayer ceramic types from Murata and TDK.

These circuit components are all more costly than commonly used devices, but class-leading qualities such as low ESR (Equivalent Series Resistance), high stability and low distortion pay great dividends in terms of sound quality. Another important aspect is the iDSD Diablo 2's direct-coupled circuit design, achieved without a conventionally applied DC servo – iFi calls this design Servoless Direct Drive. Many hours of listening tests, alongside rigorous analysis in the lab, has determined the optimum circuit design to deliver maximum musical enjoyment.

OptimaLoop – negative feedback that is purely positive

'Negative feedback' is used in amplifier circuits to compare the output signal with the input signal and correct errors, in order to control gain and reduce distortion. For sound quality, this is positive; but commonly applied, one-size-fits-all 'global negative feedback' can highlight different problems whilst solving others – corruption of the error signal, phase shifts, group delay and so on can all have a negative impact on sound quality.

Recognising that different parts of a circuit benefit from specifically optimised feedback loops, iFi has developed a negative feedback system that is much more accurate than the usual approach. This incorporates multiple feedback paths instead of one global loop, each path optimised for a particular function and working synergistically with the others to deliver optimal overall performance. Developed for the original iDSD Diablo and further refined for the Diablo 2, iFi calls this configuration OptimaLoop.



Left The iDSD Diablo 2's balanced, twin-mono circuitry is packed with top-quality components and clever, uncompromising design

This power does not corrupt

In keeping with the iDSD Diablo 2's focus on pure, unadulterated performance, much attention has been applied to the power supply circuitry. As well as providing portability, battery power gives a theoretical performance advantage over mains power, with ultra-clean and stable DC current avoiding the issues that can be introduced by mains electricity with its dips, spikes and noise-inducing RFI/EMI pollution. There can be sonic downsides too, resulting from low output voltage and inconsistent output impedance as batteries discharge, but these issues are fully tackled by the Diablo 2's design.

To enable the iDSD Diablo 2's powerful amplification and a long life between charges, a high-capacity 4800mAh lithium-ion battery is built in. The Diablo 2 can also be used when connected to the mains via the bundled iPower 2 – much more than just a mains charger, this AC/DC adapter contains active noise cancellation circuitry that benefits the Diablo 2's sonic performance when powered by mains electricity.

High-bandwidth power supply circuitry is dedicated to each critical part of the iDSD Diablo 2's design, with independent linear regulation delivering excellent PSRR (Power Supply Rejection Ratio) performance. The headphone amp stage eschews IC regulators in favour of Panasonic OS-CON capacitors, delivering 2320uF between them. The DAC section benefits from an ultra-low-noise regulator with additional passive filtering, reducing high order harmonic distortion and, in turn, jitter. Even the USB input stage benefits from dedicated regulation and multi-stage filtering, and the microprocessor control circuitry (often a local source of digital noise) has separate regulation too.

To make less efficient headphone types sing – planar magnetic designs, for example – the voltage needs to be stepped up from 3.7V to +/- 15V. This is achieved using a step-up converter running at 1.2MHz – a frequency far beyond audibility that is easier to filter than a typical switch-mode supply, enabling high linearity and ultra-low noise.

Excelling with xMEMS

xMEMS is a new solid-state micro-speaker technology with the potential to revolutionise the headphone/IEM market, utilising a micro-electromechanical systems (MEMS) manufacturing process that blends semiconductor technology with moving parts. A silicon diaphragm combines with a piezoelectric layer, creating a tiny speaker capable of phase and transient response far superior to conventional moving-coil drivers, with remarkable high-frequency fidelity.

xMEMS micro-speakers are voltage-driven, rather than current-driven, which means they have special requirements of an amplifier. Earlier this year, iFi released the world's first DAC/headphone amp with an output mode optimised for xMEMS – a limited-edition version of the original iDSD Diablo called the Diablo-X. This technology has transferred to the next-generation iDSD Diablo 2, with bias voltage, EQ and amp circuits dedicated to make the most of headphones/earphones that use xMEMS drivers – the first of these are now arriving (such as Singularity's ONI IEM) and more will emerge over time, so this mode is all about cutting-edge futureproofing.



Left Despite its compact size, the iDSD Diablo 2 is a versatile powerhouse that can drive the toughest headphone loads

Making connections

As well as wirelessly over Bluetooth, source devices such as PCs/Macs, smartphones, tablets and other digital entertainment devices can connect asynchronously to the iDSD Diablo 2's USB-C port (certified to 5 Gbps). A 3.5mm S/PDIF input is also provided; this accepts both coaxial and optical connections (a 3.5mm to Toslink adapter is supplied). Both digital inputs reside at the rear, alongside a separate USB-C port for mains power/charging.

Balanced analogue outputs are supplied, making the most of the iDSD Diablo 2's fully balanced PureWave circuitry. At the front, alongside a standard 6.3mm single-ended headphone socket, resides a 4.4mm output for headphones offering balanced connection – an increasing number of high-quality

headphones and IEMs either come so equipped or give the option of detaching the cable and upgrading to a 4.4mm balanced connector.

A second 4.4mm socket resides at the back; this can be used as a fixed-level line output, bypassing the headphone amp to connect the iDSD Diablo 2 to an external amp/speakers in 'pure DAC' mode. This enables a fully balanced connection to high-end amps and powered speakers with balanced inputs, while single-ended connections can be made via an adapter. This 4.4mm socket also doubles as a balanced analogue input, bypassing the DAC stage so that source devices with an analogue output can connect to the Diablo 2's headphone amp.

A premium portable package

The iDSD Diablo 2 comes with a generous accessories pack, as befits its premium status. Along with the ultra-low-noise iPower 2 AC/DC adapter and associated USB-C charging cable, three digital audio cables are supplied: a USB-C OTG cable for smartphones and other portable devices, a longer USB-C cable for PCs/Macs, and a Lightning to USB-C cable for iOS devices equipped with Apple's proprietary connector.

Various adapters are included for different connector types: USB-C to USB-A (to connect the USB-C cable to source devices with USB-A outputs); 3.5mm to Toslink (to convert the iDSD Diablo 2's S/PDIF input to Toslink optical); and a 3.5mm to 6.3mm headphone adapter. The wing-style appendages that serve as a devilishly clever desktop stand are also supplied, together with a premium-quality travel case to protect the Diablo 2 and keep everything neat and tidy.

Use it at home, in the office, take it with you when you travel – the iDSD Diablo 2 is the definitive portable DAC/headphone amp for the most discerning of music lovers, available from selected retailers from Friday 10th November at an RRP of £1,299.



Above The detachable 'wings' can be positioned in various ways, allowing the iDSD Diablo 2 to stand vertically or horizontally

AT A GLANCE – iDSD DIABLO 2 KEY FEATURES	
GENERAL	
Powerful, responsive, fluid and detailed – the iDSD Diablo 2 delivers a bewitching sonic performance	
Multiple operational modes: DAC/headphone amp, pure DAC, analogue headphone amp	
Powered by battery or mains – iPower 2 power supply with active noise cancellation included	
High-capacity lithium-ion battery permits remarkable amp power and hours of portable use between charges	
Supplied with multi-position desktop stand, custom-made travel case and an array of cables and adapters	
DIGITAL SECTION	
Custom ultra-resolution DAC stage with dual interleaved True Native DAC configuration and advanced XMOS processing	
Extensive jitter reduction – enhanced GMT femto-precision clock and smart storage cache	
State-of-the-art HD Bluetooth 5.4 with aptX Lossless – fully optimised performance, whatever your source device	
ANALOGUE SECTION	
Enhanced PureWave fully balanced twin-mono circuit design delivers ultra-low noise and distortion	
Remarkable amp power – drives the toughest headphone loads with consummate ease	
Technologies such as Servoless Direct Drive and OptimaLoop elevate performance to the highest level	
Top-grade audiophile circuit components and sophisticated power supply design ensure exceptional sonic purity	
Three gain settings and IEMatch – tailor amp power and performance to match your headphones or IEMs	
Custom bias, EQ and amp circuits for next-generation xMEMS headphone driver technology	

AT A GLANCE – iDSD DIABLO 2 KEY SPECIFICATIONS	
Maximum file resolution	32-bit/768kHz PCM; native DSD512; full MQA decoding to 384kHz
Bluetooth format support	aptX Lossless; aptX Adaptive (aptX, aptX HD, aptX LL); LDAC; HWA/LHDC; AAC; SBC
Audio inputs	USB-C; coaxial/optical S/PDIF; 4.4mm balanced analogue
Audio outputs	4.4mm balanced headphone; 6.3mm headphone; 4.4mm balanced line-level
Headphone gain settings	0dB; +8dB; +16dB; -12dB (IEMatch)
Headphone power – 4.4mm	>19.2V/611mW (@600Ω); >12.9V/5180mW (@32Ω)
Headphone power – 6.3mm	>9.6V/153mW (@600Ω); >8.9V/2450mW (@32Ω)
Headphone power – xMEMS mode	28Vpp, 22Ω, 10-14V DC bias
Battery life (4800mAh)	6-12 hours, depending on headphone sensitivity, volume and gain mode
Dimensions and net weight	166x85x28.5mm; 455g



iFi is the sister-brand of Abbingdon 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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