

# iFi Audio ZEN CAN

The giants of small-scale audio solutions have just expanded the ZEN range of BT and USB DACs with a beefier, all-analogue 'drive anything' headphone amp. A bargain?

Review: **Mark Craven** Lab: **Paul Miller**

There's an air of 'if it ain't broke, don't fix it' about iFi Audio's ZEN CAN. The third model in the Merseyside-based company's affordable range of (non-portable) desktop devices, it shares the physical chassis design of the earlier £129 ZEN DAC and ZEN Blue models [*HFN* Jul '20] and promises the same mix of 'high-performance audio' and value for money. Yet there's arguably more to this cost-conscious headphone amplifier than meets the eye.

While the previous ZEN DAC also doubled as a headphone amp, this new addition to the range is not simply a DAC-free iteration of that EISA Award-winning system add-on, as its slightly higher price tag of £149 implies. Instead, it borrows from the pure analogue design of iFi Audio's Pro iCAN headphone amp, which the company proudly reminds potential ZEN CAN buyers is '12 times the price'. It is also one of its first designs with input from respected audio engineer John Curl – formerly of Parasound and Mark Levinson, and now working with iFi Audio and sister company Abbingdon Music Research as a technical consultant.

## BACKSIDE STORY

As the ZEN CAN is entirely analogue, with no digital input, suggested sources are whatever you might find on a desktop – smartphone, laptop or digital audio player – plus a CD player or phono stage. For a partnering DAC, and to maintain the affordable ethos, iFi Audio naturally suggests its ZEN DAC or ZEN Blue.

For such a modestly-priced device, the ZEN CAN offers plenty of set-up flexibility. Rear-panel inputs are unbalanced on RCA and 3.5mm sockets, plus a 4.4mm balanced Pentaconn connection. There's also a

**RIGHT:** PCB topside [left pic] includes PSU regulation [top], TOCOS-branded volume pot [near left] with FET op-amp input stage [left] and balanced Class A output [centre]. Thin-film resistors, TDK and Panasonic 'audio' caps are among the SMCs on the underside [right pic]

4.4mm balanced preamp output to either feed a power amplifier or pair of active speakers. All connections are gold-plated for 'optimal conductivity'.

Joining these is a DC input for the ZEN CAN's external power supply. Note that for the first 1000 units, iFi Audio includes its iPower outboard PSU, which usually sells separately for £49, in a package price of £169. Otherwise the standard bundle is the £149 option tested and auditioned here.

Compared to the ZEN DAC, the ZEN CAN's front panel looks rather busy. There's a large centrally mounted volume control, and dual headphone outputs to the right – one 6.35mm (an adapter is included for 3.5mm cables), the other a 4.4mm Pentaconn hookup. Further right is a button to instigate XBass [see PM's boxout, p73] and '3D analogue' EQ settings.

The former is a self-explanatory feature found on other ZEN models, the latter, says iFi Audio, aims to replicate the wide, deep stereo imaging of speaker listening – both can be bypassed. On the lefthand side are power and source input buttons, plus a

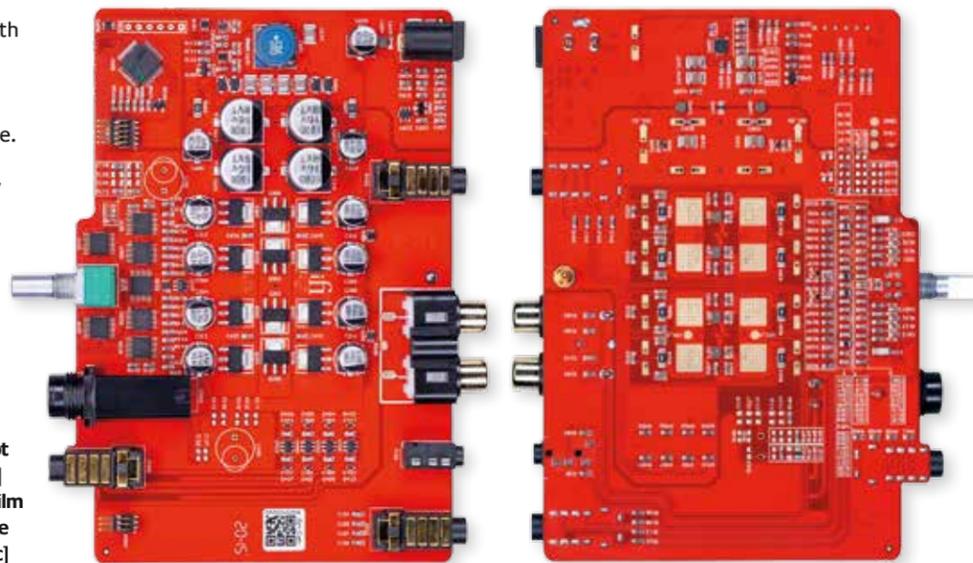
four-stage setting for the ZEN CAN's 0dB, +6dB, +12dB and +18dB gain control. Tiny white LED status lights denote operating mode, and it doesn't take more than a few minutes to master its functionality.

## HUNGRY FOR POWER

Internally, the ZEN CAN is a symmetrical, balanced analogue design, with a quartet of FET op-amps, plus a single custom op-amp on the input stage, utilising discrete 'high-grade' surface-mounted components. Specifically adopted from the Pro iCAN model are elements of the power supply circuitry, including noise filtering, plus the Class A buffer driving the ZEN CAN's output stage.

The headline promise of the ZEN CAN is of power '52x greater' than a laptop's standard headphone out, which iFi Audio equates to 1600mW into 32ohm loads via its single-ended 6.35mm output. This is a figure within spitting distance of PM's own measurements [see Lab Report, p75], albeit via the highest gain setting. By way of comparison, the company rates the output

'The Aussie rockers had woken up from a nap'



of its ZEN DAC at a more modest 230mW into 32ohm.

All this functionality comes wrapped in the now familiar ZEN bodywork, which means an easy-on-the-eye, curvaceous chassis that looks altogether more stylish than some of the square-cornered competition. Styling is two-tone, with much of the aluminium casing a dark grey, which gives way to a lighter brushed aluminium for front and rear panels. With dimensions of 158x35x117mm (whd), the ZEN CAN takes up little space on a desktop or hi-fi rack. Four small feet provide a solid foundation, and overall the build quality and styling is exceptional given the budget price tag.

## FIZZ FACTOR

Compact it may be, but there's obvious potency under the ZEN CAN's hood, and iFi Audio's power claims don't feel unrealistic. Indeed, if you value your

hearing, experimentation

with the gain setting should be approached with caution, as sensitive earbuds warrant nothing beyond the default 0dB. When it comes to more premium headphones, it's hard to imagine anyone not being impressed by the ZEN CAN's driving ability, and yet this doesn't come with any sense of being over-aggressive. This amplifier sounded clean and sprightly to go with its punchy nature.

Even with the most basic of set-ups, the ZEN CAN swiftly looks like value for money. Paired with some affordable Denon AH-MM200 headphones and an Android smartphone running Tidal, INXS's 'Need You Tonight' [*Kick*; Tidal 44.1kHz/16-bit] fizzed with a dynamic energy that the combination simply couldn't muster without the headphone amp in play. This skin-tight medley of jangling guitars,

**ABOVE:** Familiar formed alloy case is fronted by a smooth-action volume, balanced 'Pentaconn' (4.4mm) and single-ended (6.35mm) 'phone outs with bass boost (XBass), three-way input selection and four gain options (0dB to +18dB)

funk bass, rapid percussion and Michael Hutchence's insouciant vocals sounded more immediate and lively, the ZEN CAN not only showing its impact with regard to the low-end, but across the music as a whole. It was as if the Aussie rockers had woken up from an afternoon nap.

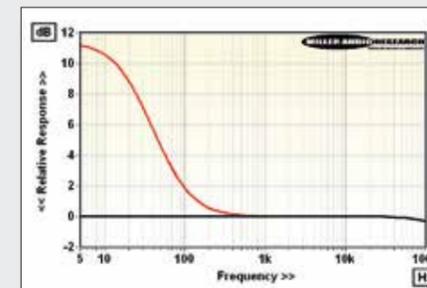
## LIGHT TOUCH

Of course, you'll get more out of the ZEN CAN if you put more into it. With the back end of a ZEN DAC connected to a MacBook Pro, and the amp laced to Bowers & Wilkins' P7 over-ear headphones [*HFN* Aug '14], the performance level stepped up considerably. Kraftwerk's 'The Man Machine' [*3-D The Catalogue*; Tidal Master] offered a captivating balance between ↪

## BRING ON THE BASS

Matching the measured frequency response of a headphone via an artificial ear with the subjective experience of listeners remains a rich source of debate, particularly in respect of bass and presence. Some (uncorrected) responses published online fail to account for the 'real world' impact of the swirls of the ear's pinna and ear canal – and correlation with listening tests is typically poor. Our headphone reviews usually include three weighted traces, starting with a simple free-field target response that emulates the perceived soundfield from a pair of stereo speakers. Then there's the standard diffuse-field response that targets a soundfield with no particular point source, an option 'tweaked' by researchers at Harman who are promoting an additional boost below ~200Hz.

However they are weighted, our own headphone tests continue to show big variations between the responses of many models. More specifically, a brief trawl of the forums suggests many listeners prefer a cranked up bass, perhaps compensating for the poor head/ear seal of their chosen capsules. Perhaps this is why iFi Audio, with its own ear tuned to the headphone community, continues to offer its 'XBass' EQ adjustment to 'rebalance bass-light 'phones'. This delivers a bass uplift below 100Hz, reaching a substantial +9dB/20Hz and +11dB at subsonic frequencies [red trace, inset Graph]. With no subtle trim offered here, this 'binary' bass boost should be applied with caution. PM



## HEADPHONE AMP



**ABOVE:** Powered via an external 5V wall-wart, the ZEN CAN includes balanced (4.4mm Pentaconn), single-ended (3.5mm and RCA) inputs and one balanced (4.4mm) output

dynamism and a light touch, with the ZEN CAN sounding unflustered by the track's drop-deep bass swells and playful imaging. There was clear space between the various synthesiser effects, while the computerised vocals emanated from a central position in the soundstage. Best of all, perhaps, was the clarity of its presentation and subjective absence of unwanted noise or grit.

### PLEASED AS PUNCH

Switching to CD playback from an Oppo UDP-205 universal disc player [HFN Jul '17], yielded more of the same. 'God Only Knows' by The Beach Boys [20 Golden Greats; Capitol CDP 7 46738 2] enjoyed a fulsome tone, and Brian Wilson's eclectic orchestra – from sleigh bells to clarinet – had clear definition.

The closing coda features a swirling round of vocal harmonies that was spread sufficiently wide to bring home the intended sonic immersion. Yes, there was a limit to the breadth of the soundstaging, and higher frequencies missed that sense of air and sparkle, but given the ZEN CAN's price I was pleased.

This bijou amp also proved an ideal partner for the Phil Spector-esque wall-of-sound production of 'Good Vibrations', bringing out the track's foot-tapping rhythm without letting its layered instrumentation sound unduly congested.

Of iFi Audio's two analogue processing modes, I found XBass to be the more beneficial. As noted in PM's boxout [p73], there's a degree of blunt force about the way this EQ setting increases output in the sub-100Hz domain, but returning to the relatively bass-light Denon headphones, and some found-in-the-bottom-of-a-drawer Panasonic in-ears, it brought an added punch to certain material that was welcome.

Iron Maiden's 'Wasted Years' [Somewhere In Time; Tidal 44.1kHz/16-bit] is a mid '80s rock track with

a thin overall production, and it appreciated the rounding out of the bottom end, with bass drums in particular gaining extra presence. However, with 'Born On The Bayou', a Creedence Clearwater Revival boogie with a robust, rolling bassline [Bayou Country; Tidal 44.1kHz/16-bit], the effect was overly thickened, akin to adding too much flour to your Sunday roast gravy.

I found the 3D setting to have a less tangible impact. Across a variety of material, the effect was a very slight reorganisation of the soundstage, although the cyclical nature of the setting – off, XBass, 3D, XBass and 3D combined – isn't conducive to A/B comparisons.

Running the ZEN CAN in its default 'flat' mode with all widgets disabled didn't leave me feeling short-changed, as this keenly-priced amp simply doesn't need to resort to bonus EQ modes to impress. Straight out of the box it sounds purposeful – it had a transformative effect on my day-to-day private listening, both in terms of performance and its plug-and-play nature. This will slot seamlessly into your system and seemingly handle whatever headphones you throw at it – and for a bargain price, too. ☺

### HI-FI NEWS VERDICT

Mixing style and ease-of-use with performance prowess and a double-take price tag, this headphone amp proves that the third time's a charm for iFi Audio's ZEN lineup. Many rivals in this market add DAC functionality, but the ZEN CAN seems to benefit from its singular focus, and enables system-building flexibility. The 'can-do attitude' pun is obvious, but entirely apt. This is a little amp that delivers a lot!

Sound Quality: 86%

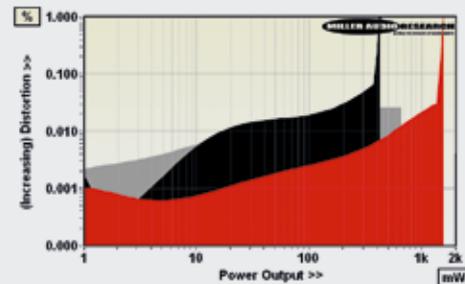


## IFI AUDIO ZEN CAN

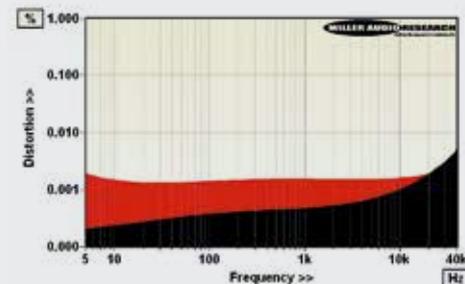
We've tested numerous iterations of iFi Audio's portable headphone amps, including the nano iDSD [HFN Dec '14], the 'Black Label' variant [HFN Apr '18], the 'original' xCAN [HFN Feb '19] and EISA Award-winning xDSD [HFN Jul '18], and ZEN DAC [HFN Jul '20] – all, except the xCAN, incorporating DAC and headphone amp functions. The new ZEN-shaped CAN, like the xCAN, is a purely 'analogue' headphone preamp but, by some margin, is its most capable to date, exceeding the output of all its predecessors by delivering up to 1580mW (1.6W)/32ohm and a not insubstantial 655mW/8ohm. However, power output is influenced by the CAN's gain setting, falling to 425mW/32ohm in its 0dB mode [see Graph 1, below].

Other factors, including distortion and the A-wtd S/N are also skewed by your choice of gain setting, not least because the ZEN CAN's auto level-matching op-amp input sees a marked increase in THD with inputs beyond 550mV (from 0.001% at 400mV in, to 0.02% at 900mV in). The input clips at 3.7V. With the gain set to +12dB or +18dB, THD falls to as low as 0.00025-0.0017% (0dBV/600ohm), increasing under load (10mW/32ohm) to 0.0013-0.0019% [see Graph 2, below]. In practice the 0dB mode is ideal for high sensitivity earbuds as it offers the widest 100.5dB A-wtd S/N ratio (re. 0dBV) and lowest –100dBV residual noise. The +18dB gain setting offers 93.9dB and –97dBV, respectively.

Output impedance is impressively low at 510-800mohm in the 0dB setting, reducing still further to 415-605mohm in the +18dB mode, while the response is flat to within ±0.1dB from 1Hz-60kHz [see boxout, p73]. So, in practice, the ZEN CAN will cause very little modification to the overall system response regardless of the impedance of the attached headphones. PM



**ABOVE:** Continuous power output vs. THD into 32ohm (0dB gain, black; 18dB, red) and 8ohm (18dB; grey)



**ABOVE:** Distortion versus frequency from 5Hz-40kHz (black, 1V into 600ohm; red, 40mW into 25ohm load)

### HI-FI NEWS SPECIFICATIONS

Maximum output (<1% THD into 47kohm)	7577mV
Maximum power output (<1% THD)	1580mW/32ohm
Output Impedance (20Hz-20kHz)	415-605mohm (0.42-0.61ohm)
A-wtd S/N ratio (+18dB/0dB gain)	93.9dB / 100.5dB (all re. 0dBV)
Distortion (20Hz-20kHz, re. 10mW/0dBV)	0.001-0.002%/0.0003-0.002%
Frequency resp. (20Hz-20kHz/100kHz)	+0.00dB to –0.01dB / –0.33dB
Stereo separation (20Hz-20kHz)	60dB to 30dB
Power consumption	6W
Dimensions (WHD) / Weight	158x35x117mm / 515g