




ifi

audio

ZEN CAN

User Guide

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Introducing the ZEN CAN

The TL; DR

The iFi audio ZEN CAN is a fully symmetric dual-mono headphone amp based on our Pro iCAN's circuit, with latest 4.4mm Pentaconn connections on input and output, and in-built 3D and XBass analogue signal circuits.



iFi audio ZEN CAN versus ZEN CAN Signature 6XX

The ZEN CAN Signature 6XX amp launched recently in the US market via the DROP platform was tailored specifically for Sennheiser 6XX headphones, whereas the ZEN CAN amp was designed to drive ALL headphones.

Connections

ZEN CAN

CONNECTIONS - STARTER GUIDE



Single-Ended Output - 6.3mm



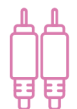
Balanced Output - 4.4mm



Balanced Input - 4.4mm



Single-Ended Input - 3.5mm



RCA Input



USB-C Charging
5V only*



Balanced Output - 4.4mm

*Do not use a charger higher than 5V



Technologies

Topology

iFi audio ZEN CAN's amplification circuit is the same as used in Pro iCAN. It features a balanced discrete Class A output buffer combined with a J-FET Op-Amp (OV2637A). Its FET input doesn't load volume control, which means exceptionally low distortion/noise, whereas low impedance feedback enhances overall performance and avoids resistor noise. The ZEN CAN's internal amp also fully protects itself and headphones from overloads/shorts. Its four-step output gain factor is set at +6dB.

XBass and 3D

XBass adds back lost bass for headphones (especially open-backed), whereas 3D provides in-room speaker alike listening sensation for them. Both these features are based on fully analogue circuits.



Power supply

The ZEN CAN's power supply is based on Pro iCAN's stealth mode voltage conversion circuit with heavy LC (resistor-inductor) filtering to separate the audio path from internal PSU. 4,000uF capacitance acts as huge 'power reservoir' for short transient (i.e. music) signals.

Inputs

The Fi audio ZEN CAN features two inputs; single-ended RCA (1M Ohm) and balanced 4.4mm (24k Ohm). The ZEN CAN's dedicated input stage adjusts its input levels to match connected sources, but at the same time it avoids loading them and allows for constant Class A operation and lowest distortion.

Technologies

MCU optimisations

To keep noise contamination to an absolute minimum, the ZEN CAN's MCU (a microcontroller unit to manage key functions of the product) and LEDs are in 'wake mode' only when actioned. Otherwise they're put into 'sleep mode', even during listening to music. All switches inside the product are FET-based for full sonic transparency, ability to handle enormously high peak signals, and distortion/noise levels below Audio Precision 2's measurements.

Premium components inside

The iFi audio ZEN CAN features the following boutique parts:

The logo for EPCU, consisting of the letters "EPCU" in white on a dark blue rectangular background.

Panasonic EPCU

Each EPCU capacitor consists of ~3,500 >0.5µm thick dielectric layers, and boasts class-leading Equivalent Series Resistance (ESR), low impedance, frequency stability and vanishingly low distortion. A total of 6 pieces are used.

The logo for TDK, featuring a blue geometric icon to the left of the letters "TDK" in a bold, blue, sans-serif font.

Class 1 ceramic TDK C0G

These highly stable low-loss capacitors are used in our LC circuit application to further reduce capacitor-induced distortion.



IFi/AMR 'OV' ICs

Four independent OV2637A J-FET op-amps are used in the ZEN CAN's internal 'folded cascode' design. Each IC is based on HCOFC copper lead-frames, 4N gold bond-wire, and features wide bandwidth, extremely low noise and distortion (0.0001%).

Technologies



Texas Instruments ICs

These low-noise/distortion parts offer great unity gain bandwidth, high output drive capability, Common-mode and Power Supply Rejection Ratios above 100 dB, wide maximum-output-swing bandwidth and high slew rate.

BiCMOS technology

To further reduce noise, and have excellent transient response and PSRR performance (rejection of power supply noise), the iFi audio ZEN CAN features Bipolar CMOS (BiCMOS) semiconductor technology, which integrates two separate semiconductor types and makes the best of them.



TOCOS potentiometer

Tokyo Cosmos Electric Co. (TOCOS) multi-track potentiometer provides close channel matching tolerance for optimal performance, even at quiet listening levels.

SMT (Surface Mount Technology)

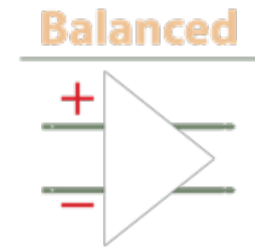
The SMT assembly eliminates lead outs and terminations as possible sources of noise and distortion. It also dramatically improves most mounted components' performance by minimising parasitic elements created by manual soldering.

Technologies

Why balanced?

In a single-ended three-wire headphone connection, ground is shared between left and right channels. That's why both channels' wires and connectors have extra resistance, which causes unwanted crosstalk between them. A four-wire balanced connection eliminates this issue completely.

The iFi audio ZEN CAN's balanced circuitry completely separates both channels, and its line inputs will work with balanced output sources and professional equipment. It features Pentaconn connector type because of its high-quality build and low contact resistance.



XBass

Many open-backed headphones have sub-100Hz bass invariably rolled off due to their open ear cups which let out all frequencies instead of trapping and redirecting them back to our ears, just as as closed headphones with good bass response do. Open-backed products also don't cup up the midrange as their closed types, hence the former is famed for natural sound, but bass extension was never a strong suit.

The ZEN CAN's XBass equalisation benefits all headphone types, consists of active and passive components, and its frequency response curve corrects low-end response problems with precision and exclusively in the analogue domain. The correction process itself shapes the output without altering the midrange, worsening SNR or increasing distortion. The result moves any headphones closer to a neutral presentation with less midrange over-emphasis, with a full and natural bass and no veil over the treble.

XBass[®]

Technologies

3D for Headphones

In most cases music recordings are mixed and mastered for speakers. Played through headphones it results in a sound-field perspective of playback inside our heads, which leads to an unnatural, fatiguing and stressful listening experience.



If heard by one ear only, sounds from the left and right stage result in extreme stereo separation that shrinks the perceived soundstage width to right over or even in-between the ears. Distance cues intended by inter-ear delay of even sounds that do make it to both ears are also destroyed. Using a suitable correction system, the music can be relocated outside our heads and projected in front of us spatially wide *and* high, to introduce a listening experience comparable to what a good pair of speakers does.

iFi audio ZEN CAN incorporates 3D analogue filtering technology that:

- creates stereo image truly out of your head, with spatially realistic depth and width
- doesn't introduce any colouration or resolution loss
- is based solely on analogue circuitry (no DSP!)
- works regardless of a listener's anatomy and hearing.



Components

DIODES
INCORPORATED
Ultra low-noise polar input transistor

TDK
COG capacitors
For audio use with extremely low distortion

TEXAS INSTRUMENTS
Low-noise, high-bandwidth PSRR, low-dropout, linear regulator

Panasonic ECPU
Panasonic film capacitors



MOSFET

Advanced trench technology MOSFET as muting switch

TOCOS
Tokyo Cosmos Electric Co., Ltd.
Tokyo Cosmos Electric potentiometer



High-precision(1.2MHz) high-current power supply controller



Low noise/distortion OV2637A (0.0001%)
Performance equals/surpasses many high-end headphone amplifiers

FAQs

I see three inputs on the ZEN CAN's rear. Which one does what?

Those inputs are balanced 4.4mm Pentaconn, a single-ended 3.5mm and single-ended RCA. If your DAC has balanced outputs, then ZEN DAC's balanced input is the one to use. Otherwise each ZEN DAC's single-ended input will do just fine.

Why does the ZEN CAN feature only one output?

To take the full advantage of ZEN CAN's balanced architecture, it features only a 4.4mm Pentaconn output.

What type of power supply will work with the ZEN CAN?

Any external power supply able to provide DC 5V/2.5A will work. For optimal results please use our iPower X/iPower. If USB outputs in your computer/laptop are within listed specs, it's possible to power the ZEN CAN from these ports as well, and thus avoid the usage of external power supply.

It's worth knowing that the ZEN CAN appreciates more than 2.5A, and can handle up to 4A peaks.

I see no switch to have the ZEN CAN's balanced output fixed. Why?

The ZEN CAN was designed to operate as a high-quality headphone amplifier, but also as a fully-balanced preamplifier, which is why its balanced output is regulated.

FAQs

How do I use the ZEN CAN's inputs?

Please connect a cable of choice from your DAC to the ZEN CAN's suitable input, and engage via the input selector button on the product's front. Single-ended cables will work with 3.5mm and RCA inputs, whereas a balanced cable will work with 4.4mm Pentaconn input.

Can all three inputs connected at the same time?

You can have cables connected into each ZEN CAN's input, but only one can be active.

How do I know which of the ZEN CAN's inputs is currently engaged?

All available inputs are labeled respectively and can be seen just below the input selection button on the ZEN CAN's front. A currently engaged input will be highlighted by a white LED.

Can I cycle between inputs while the product is powered?

Yes, you can.

What does the gain button do?

It matches the headphone amplifier gain to the headphone. Headphones have very widely varying sensitivity, so a good match in gain is important, too low gain and headphones will not play loud enough, too much gain and there will be excessive noise and distortion with very little usable volume range.

FAQs

How do I know which gain setting is right for me?

Use the lowest gain setting that gives you a good comfortable listening level with the volume control at around 12 o'clock. If you can't go higher in volume as music becomes too loud before reaching 12 o'clock at the lowest gain setting, you may want to test the iFi iEMatch product to see if this helps to match your headphones better to the ZEN CAN's headphone output.

How are the ZEN CAN's two headphone outputs different?

The ZEN CAN's 6.3mm socket is meant to be used with unbalanced headphone cables, whereas its 4.4mm Pentaconn headphone output will work with balanced cables.

What happens when a DAC is connected with the ZEN CAN via RCA cable, but I use the product's 4.4mm headphone socket?

The ZEN CAN will convert the unbalanced input into a balanced signal and drive connected headphones in balanced mode.

Can I have two headphones connected at the same time?

It is not recommended.

What does the XBass/3D button do?

This button cycles between two analogue features inside of the ZEN CAN. Please see <https://bit.ly/3DHolographic> and <https://bit.ly/TotallyAddictedToBass>

FAQs

Can both filters be applied at the same time?

Yes, they can. Simply press the 3D/XBass button until both white LEDs are on.

Can ZEN CAN be powered all the time?

Yes, it can. But if not used it should be powered off. Let's go a bit easier on the planet!

What kind of headphones can I use with the ZEN CAN?

Several exceptions and electrostatic products aside, the ZEN CAN's internal amplifier circuit is powerful enough to effortlessly drive the vast majority of headphones available on the market.

What kind of cables I need to get the best out of the ZEN CAN?

The ZEN CAN works well with standard RCA cables, but to get the very best out of it, you'll need to use the 4.4mm Pentaconn input on its rear.

Upon connecting everything there is no sound. What to do?

- 1) Check all connections, power, input, headphone.
- 2) Make sure the ZEN CAN is turned on (input & gain LEDs will light up).
- 3) Make sure the correct input is selected (check number on the back).
- 4) Make sure music is actually being played via your source.

Lifestyle desktop systems

Standalone

- Analogue x 3 sources
- BALANCED 4.4mm > 4.4mm line out
- BALANCED 4.4mm headphones
- SE 6.3mm headphones



With ZEN DAC

- DAC input for digital
- Analogue x 2 extra sources
- BALANCED 4.4mm > 4.4mm interconnect



Lifestyle desktop systems

With ZEN Blue

- Bluetooth streamer input
- Analogue x 2 extra sources
- BALANCED 4.4mm > 4.4mm interconnect
- BALANCED 4.4mm > Pre amp Output



With ZEN Phono

- Creates a lifestyle vinyl system
- Compact desktop headphone system
- Future expansion with active speakers
- BALANCED 4.4mm > Pre amp output
- MM & MC compatible RIAA Phono input
- BALANCED 4.4mm > 4.4mm interconnect



Lifestyle desktop systems

With ZEN DAC & ZEN Blue

Creates a 'semi-pro' BALANCED system for under £500

- Bluetooth streamer input
- DAC input for Hi-Res 44.1/16 – 192/24 and DXD
- Analogue x 2 extra sources
- BALANCED 4.4mm > 4.4mm interconnect
- BALANCED 4.4mm headphone output
- 6.3mm Pro gauge headphone output
- BALANCED 4.4mm > Pre amp Output
- 3D for non-fatiguing extended listening



Specifications

Inputs	4.4mm Pentacon BAL	4.0V nominal @ 0dBFS, 24 kOhm Zin
	RCA L/R Socket SE	2.0V nominal @ 0dBFS, 1 MegOhm Zin
	3.5mm Jack SE	1.0V nominal @ 0dBFS, 1 MegOhm Zin
Max Output	Balanced	>15.1V/385 mW (@ 600 Ohm)
		>11.0V/1890 mW (@ 64 Ohm)
	SE	>7.6V/196 mW (@ 300 Ohm)
		>7.2V/1600 mW (@ 32 Ohm)
THD & N	Balanced	< 0.0007% (4V out, 600 Ohm, 1kHz)
	SE	<0.006% (@ 100 mW/1.27V 16 Ohm)
SNR	Balanced	>120dBA (@ 15.2V)
	SE	>118dBA (@ 7.6V)
Max Input	Balanced	7.4V RMS
	RCA	3.8V RMS
	3.5mm	1.92V RMS
Gain		0dB, 6dB, 12dB and 18dB

Specifications

Frequency Response		20Hz - 20kHz (+0dB / -0.03dB)
Power consumption	No Signal	~5W
	Max Signal	~13W
Input voltage		DC 5V/2.5A AC 100 -240V 50/60Hz
Dimensions		158 x117 x35 mm 6.2" x 4.6" x 1.4"
Net weight		515g 1.14 lbs

ZEN CAN

ifi-audio.com/products/zen-can