

## **ifi audio ZEN CAN**



### **Executive Summary**

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A revolutionary analogue headphone amplifier. Your headphones will sound like never before.

- Passionately designed balanced amp with latest 4.4mm Pentaconn connectors for input and output
- Circuit design derived from our \$1,799 flagship Pro iCAN
- Proven 3D and XBass analogue signal processing circuits

Introducing a new headphone/pre-amp that will punch well above its price class.

*The ZEN CAN is not to be confused with our ZEN CAN Signature 6XX amp which was launched recently in the US market via the DROP platform. The Signature version was specially designed to drive the Sennheiser 6XX headphone range so is a specialist match made in heaven. Our ZEN CAN headphone amp is designed to drive ALL manner of headphones.*

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## Designing an OK headphone amplifier is easy.

Boutique Op-Amp + Output Stage + Vol control + power supply = voila!

But this is approach is not ideal.

- Fixed gain creates more noise
- Single signal input with lack of load matching means limited source flexibility
- Lack of EQ & sound-field corrections hampers listening enjoyment

## Designing a one-of-a-kind balanced headphone amplifier like the ZEN CAN is not.

### Inputs

- o A dedicated input circuit stage pairs sources & adjusts levels to match eg Pentaconn 4.4. at 24k Ohm/high impedance and a 1M Ohm for SE input avoids loading the source, the amplifier remains in Class A operation for lowest distortion

### Class A Balanced/SE amplifier

- o Draws heavily from the iFi's flagship Pro iCAN, using the same discrete Class A output buffer combined with a J-FET Op-Amp (OV2637A)
- o Super-low loading means exceptionally low distortion
- o FET input avoids loading volume control – low distortion/noise
- o Low impedance feedback circuit enhances circuit performance and totally avoids resistor noise
- o Output amplifier gain of four steps in +6dB perfect for headphone matching
- o Output stage drives headphones effortlessly and least noise/distortion
- o Full protection of headphones/amplifier from overload/shorts

### Equalisation and sound-field know-how

- XBass for adding back the lost bass for headphones, most especially open-backed headphones
- 3D for 'in-room speaker listening' as opposed to 'in-head listening'

### Power Supply

- 'Pro' series Stealth mode voltage conversion circuit
- Large inductor/capacitor filtering and 'isolation' power supply means separate audio to power circuit
- 4,000uF power supply capacitance acts as huge 'power reservoir' for short transient signals (ie: music signals)

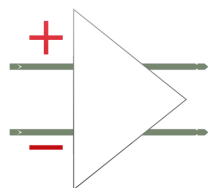
### MCU Control

- FET-based switching to avoid distortion/noise which is measured below limit of Audio Precision2
- FET-based switches are 100% sonically transparent and handle 'beyond rails' peak signals
- MCU and LED do not pollute music signal as they are in 'wake mode' only when actioned. If not in use they default to 'sleep mode' even during listening to music

All these factors and ground-up custom designs mean—that the ZEN CAN looks different and is different by offering outstanding performance in a compact platform

### Maxed out with audiophile components.

#### Balanced



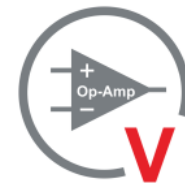
Beneath the ZEN CAN is a discrete Class A amplifier circuit taken from the flagship \$1,799 Pro iCAN, with a full symmetric dual-mono headphone amplifier and integrated gold-plated 4.4mm balanced connections.

Each Panasonic ECPU capacitor features some 3,500 layers of ultra-thin dielectrics less than 0.5µm thickness. This gives class-leading Equivalent Series Resistance (ESR), low impedance (other than at the desired capacitance) as well as frequency stability and vanishingly low distortion. A total of 6 pieces are used.



TDK C0G (Class 1 ceramic) capacitors offer high stability and low losses for resonant circuit applications. They are pricey but are a perfect addition to our products. Getting ever closer to the theoretical ideal of pure, frequency-constant capacitance, these capacitors reduce capacitor-induced distortion to vanishingly low levels.

iFi/AMR 'OV' series stands for 'Operationsverstärker' (German for Operational Amplifier). The 'OV' range ICs use HCOFC (High Content Oxygen Free Connectors) copper lead-frames and 4N gold bond-wire which are streets ahead of mainstream commercial chips that use inexpensive aluminum bond-wire and low-grade/low-cost copper in the lead-frames. Containing four independent FET op-amps in a 'folded cascode' internal design as also found in the 'HDAM' circuitry of certain high end speaker amplifiers,

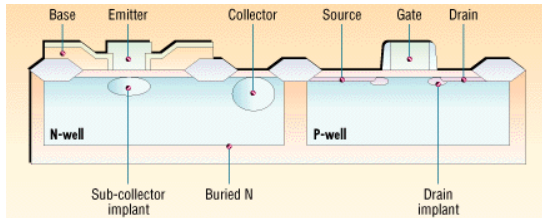


*(HDAMs consists of discrete surface mount components with short mirror image L/R signal paths. Those devices are doing exactly the same thing as the op-amps, but outperform the regular IC op-amps dramatically in terms of the Slew Rate and reduced noise level, resulting in a much more dynamic, accurate and detailed sound.)*

The OV2637A J-FET op-amp used in the ZEN CAN boasts an extremely low noise, low distortion (0.0001%) and wide bandwidth.

TI low-noise ICs offer great unity gain bandwidth, very low noise and distortion, high output drive capability, Common-mode and Power Supply Rejection Ratios of over 100 dB, wide maximum-output-swing bandwidths and high slew rates.





To reduce noise even further we decided to upgrade our design by introducing Bipolar CMOS (BiCMOS), a semiconductor technology that integrates the two formerly separate semiconductor technologies to make the best of both. As a result, ZEN CAN achieves very low noise, excellent transient response, and excellent PSRR performance (rejection of power supply noise).

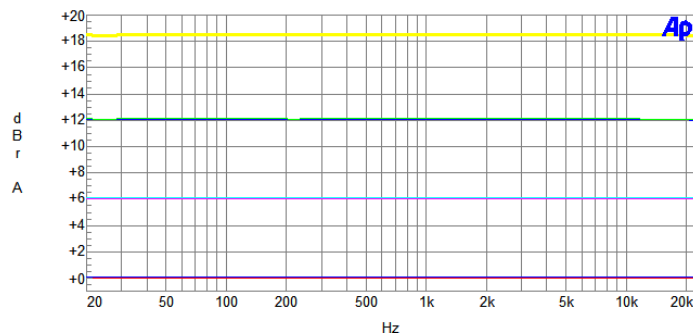


Tokyo Cosmos Electric Co. (TOCOS) multi-track potentiometer used, with close channel matching tolerance for optimal performance even at quiet listening levels (low positions of pot).

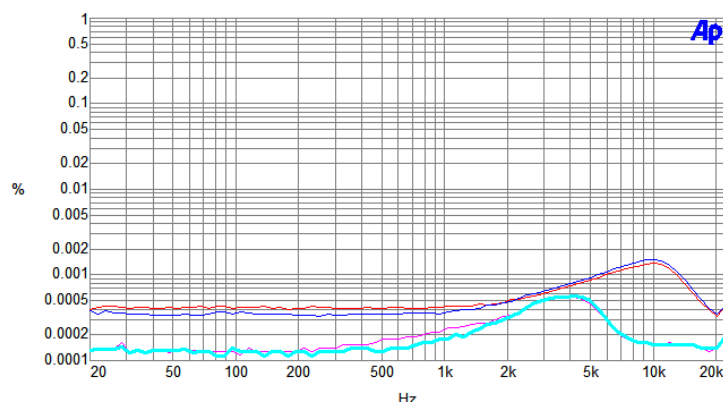
SMT (Surface Mount Technology) galore: adopting SMT technology as much as possible eliminates loadouts and terminations as possible sources of noise and distortion. It also minimizes parasitic elements created by manual soldering, for dramatic improvements over most mounted components.

## Technical Specifications

- Power Output Balanced: 756mW (15.1V) @ 300 Ohm, <1% THD (per channel)  
385mW (15.2V) @ 600 Ohm, <1% THD (per channel)
- Power Output SE: 1,000mW (4.0V) @ 16 Ohm, <1% THD (per channel)  
1,600mW (7.20V) @32 Ohm, <1% THD (per channel)  
196mW (7.6V) @ 300 Ohm, <1% THD (per channel)  
98mW (7.6V) @ 600 Ohm, <1% THD (per channel)
- Frequency response: 20Hz-20kHz (+0dB / -0.03dB)  
< 10Hz – 200kHz (-3dB)



- SNR: - 120dB (BAL) (@ maximum output, A weighted)
- Dynamic range: 120dB (BAL) (@ maximum output, A weighted)
- THD & Noise: < 0.0069% (BAL) (4V out, 16 Ohm, 1kHz, A weighted)



- Output Imp. (HP): SE <1ohm;  
BAL <2ohm
- Output Imp. (Line): 200 Ω BAL
- Gain: 2X/6dB; 4X/12dB; 8X/18dB; 16X/24dB (BAL out)



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ZEN CAN

1X/0dB; 2X/6dB; 4X/12dB; 8X/18dB (SE out)

- Crosstalk : -90db
- Inputs: 4.4mm Pentaconn BAL (4.0V)  
RCA L/R Socket SE (2.0V)  
3.5mm jack SE (1.0V)



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#### About iFi

iFi audio is part of AGL and is headquartered in Southport, UK. It owns the hi-fi brand Abbingdon Music Research (AMR). They respectively design and manufacture portable and desktop 'ultra-fidelity' audio products and high-end audio 'home-based' components. The combined in-house hardware and software development team enables iFi audio and AMR to bring to market advanced audio products.