

CS43130

Next Generation, Low Power, High-Fidelity
Audio D/A Converter with Headphone Amplifier
Featuring Cirrus Logic's MasterHIFI for Mobile Playback



Product Overview

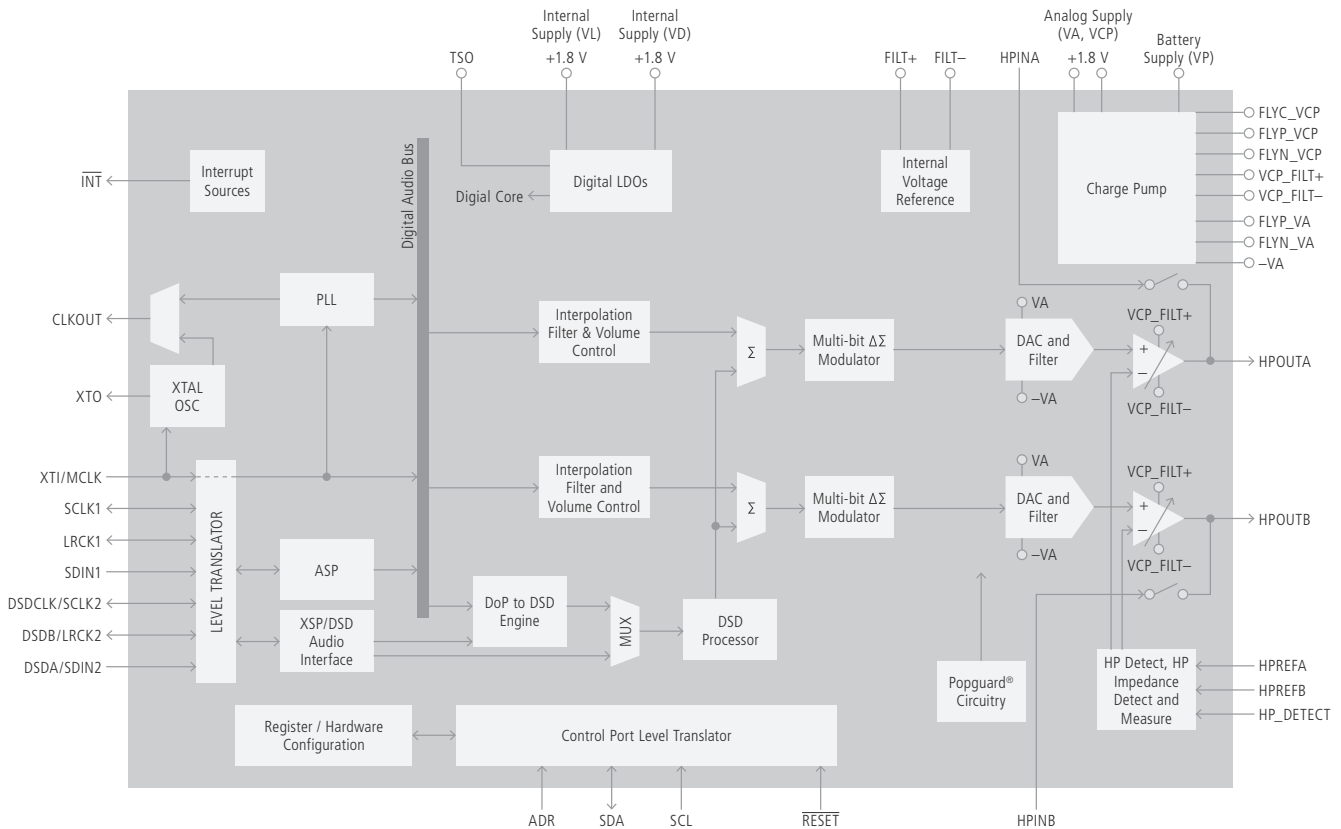
The Cirrus Logic CS43130 is a 32-bit D/A converter with integrated high-fidelity headphone amplifier that delivers best-in-class, system-level audio performance while maximizing battery performance. For the designer, the CS43130 provides the ability to differentiate through performance and features, including high impedance (600 Ω), a 130 dBA dynamic range, an impressive THD+N rating of -108 dB, and interchannel isolation of >110 dB. This DAC supports sampling frequencies up to 384 kHz while consuming just 23 mW of power and requiring minimal board space.



The on-board low noise, ground-centered headphone amplifier delivers more than 30 mW per channel into a 32 Ω load, or 5 mW into a 600 Ω load, and provides proprietary AC impedance detection to support headphone fingerprinting. This capability allows for a consistent and transparent audio experience for the end user regardless of transducer impedances or frequency responses. The amplifier also supports adaptive post processing for customer bundled and third party headphones/headsets. An integrated auxiliary audio input and "click-less" switch is provided for non-high-fidelity use cases.

To minimize pre-echos and ringing artifacts, the CS43130 is designed with proprietary digital-interpolation filters that support five selectable digital filter responses. Filtering options include low group delay with pseudo-linear phase and a fast or slow roll-off to preserve audio integrity. A patented on-chip DSD processor supports up to DSD128 in direct mode while providing non-decimating volume control with soft ramp and 50 kHz filtering as recommended by Scarlet Book. Volume matching of the analog output levels and channel mixing enable a seamless transition between the DSD and PCM playback paths.

Block Diagram Schematic



Target Applications

The CS43130 is targeted at mobile and portable applications, including smartphones, tablets, multimedia handsets, laptops, digital headphones and powered speakers.

System Features

Advanced 32-bit oversampled multi-bit modulator with mismatch shaping technology

- Eliminates distortion due to on-chip component mismatch
- Supports up to 384 kHz sampling frequency

Patented dedicated DSD processor featuring high resolution audio format support

- DirectStream Digital (DSD)
- DSD over PCM (DSD DoP), up to DSD128
- Handles switching between DSD and PCM audio streams, matching the analog audio output level

Integrated GND-centered, Class H headphone driver

- 130 dB dynamic range (A weighted)
- 108 dB THD+N
- Output power
 - 30 mW per channel into 32 Ω load
 - 5 mW per channel into 600 Ω load
- Headphone Detection
 - DC and AC impedance measurement
 - Plug-in detection
 - Popguard® technology eliminates pop noise

Serial audio input

- I²S, right-justified, left-justified, DoP, DSD and TDM interface
- Master or slave operation
- Volume control with 0.5 dB step size and soft ramp
- 44.1 kHz de-emphasis and inverting feature

Alternate headphone input

- Seamless switching between high performance and low power playback

Supply Voltages

- VA = 1.8 V
- VP = 3 V to 5 V
- VD/VL = 1.8 V

Integrated PLL

- Reference clock sourced from MCLK pin
- System clock output

1 MHz I²C and hardware mode control

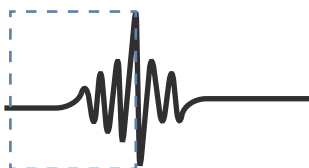
Popguard® technology eliminates pop noise

42-ball WLCSP or 40-pin QFN (0.4 mm pitch)

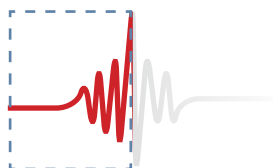
CS43130 with MasterHIFI

Achieving high-fidelity audio with high quality DACs and headphone amplifiers can be easy but it typically requires using excessive power, the mortal enemy of battery life. Our next generation DACs have multi-level output technology that actively adjusts the output signals to match the music being played. A good DAC should not unintentionally ‘color’ the material it plays. Our headphone amplifiers have a dynamic fast response feature that adapts power supplies to the amplifier based on the audio signal. So what do you get from this? High quality audio that sounds amazing for longer with the lowest power consumption possible.

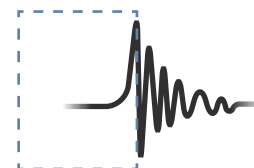
- Supports high-fidelity audio for headphones and line out
- Sample rate up to 384 kHz, 32 bit
- Up sampling filters from 44.1 kHz to 96 kHz, 16 bit and 24 bit
- Minimum phase apodizing low pass DAC filter to reduce pre-ringing for cleaner, less muddy audio
- FLAC and ALAC supported



Conventional
Linear Phase Filter



Pre-ringing of a Conventional
Linear Phase Filter



Playback Filter Response



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