

ON Semiconductor

Ezairo™ 5900 Series

High Precision Sound for Next-Generation Digital Hearing Aids

Key Features

- 24-bit open programmable DSP core with configurable accelerator signal processing engine
- Ultra high fidelity audio: 85dB system dynamic range extendable to 110dB
- Audio bandwidth up to 16kHz
- 4 parallel input channels for microphones, telecoil, direct audio (from music players)
- Supports advanced adaptive algorithms with extremely low group delay: < 1ms for 16 channels possible
- High power audio output option (up to 139dB SPL)
- Ultra-low power consumption: <1mA at full processing power (no transducers)
- Advanced encryption to protect manufacturer and user data
- Direct drive output for zero-biased receivers
- Selectable system clock speeds from 5.12MHz down to 1.28MHz for optimal computational performance and power consumption



Product Description

ON Semiconductor's Ezairo 5900 series of open programmable integrated DSP solutions enables manufacturers to build digital hearing aids with high precision sound. Ezairo delivers the necessary processing power to run several advanced software algorithms simultaneously. Its unique and patented system architecture optimally balances processing power and system power consumption.

The Ezairo 5900 series of circuits and hybrids are backed by a comprehensive suite of development tools, hands-on training and full technical support. ON Semiconductor's network of solution partners are capable of offering a range of options from software building blocks to full hearing aid algorithm suites and readily programmed hybrids — enabling manufacturers to quickly supplement and broaden their hearing aid product portfolio.

Product Benefits

Enabling high precision sound: 24-bit precision computing enables today's adaptive hearing aid algorithms, such as feedback cancellation or beamforming to be more efficient. Manufacturers can also take advantage of Ezairo's increased computing precision to develop more complex algorithms.

Optimized dual core computing power: Sophisticated algorithms can be partitioned to take advantage of two independent signal processing cores, each with unique attributes. Both cores ensure an evenly balanced work load, optimizing power consumption and processing efficiency.

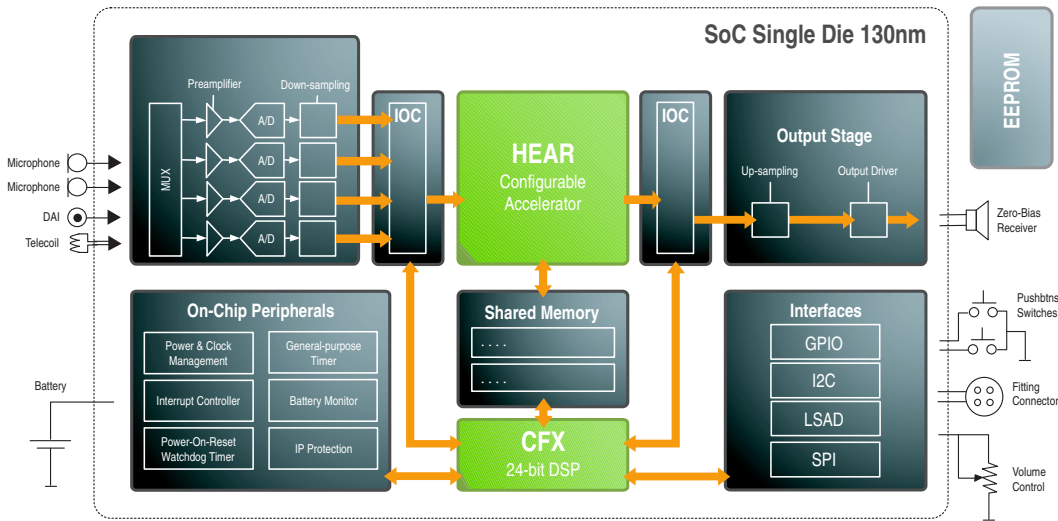
Ultra high audio fidelity: Configurations for an input dynamic range of up to 110dB can be realized. Combined with extremely low system noise and high precision signal processing, manufacturers can craft

state-of-the art hearing aid devices with substantially enhanced performance especially for mild hearing loss profiles demanding more natural sound.

Unmatched flexibility: The Ezairo 5900 architecture enables reconfiguration of the entire platform to suit a broad range of hearing profiles to address a different number of channels, higher fidelity for milder losses or maximum audio output for more profound losses.

Fast time-to-market: Best-in-class development tools, technical support and training enables swift development and customization for a rapid time-to-market. Complete hearing aid algorithm suites as well as specific algorithm blocks are also available through ON Semiconductor solution partners.

Architecture Diagram



Architecture Description

Input Stage - Provides signal selection, signal amplification, anti-alias filtering, analog-to-digital conversion (ADC), and sample rate decimation. Supports microphones, telecoil and direct audio input signals. Four independent 16-bit sigma-delta ADCs can be used simultaneously. Two ADCs can be combined to form one input channel with a dynamic range up to 110dB.

Input/Output Controller (IOC) - Dispatches the signals within the system (from input stage to processor cores and output stage). A smart access scheme ensures minimal address arithmetic is required, simplifying overall system programming.

On-chip Peripherals - Includes robust power management block to handle a variety of battery conditions such as battery insertion, removal, supply voltage spikes or near end of life; a clock generation and management block for an optimized computational efficiency/power consumption ratio; and an IP protection block to prevent unauthorized access to algorithm code. Timers and other system monitoring blocks are also included to further simplify programming.

HEAR Configurable Accelerator - Performs super efficient low-delay, high fidelity filterbank processing operations. Filtering can be programmed to operate in the time domain, frequency domain and set up in uniformed or non-uniformed bands. The HEAR accelerator is programmed via a macro language.

CFX DSP Core - The fully programmable 24-bit dual-MAC DSP core is the primary digital processor and is used to configure the system and coordinate the flow of signal data. Includes instruction sets enabling microcontroller functions.

Output Stage - Provides up-sampling and direct drive output to gluelessly interface with zero-biased receivers; programmable for normal or high-power audio output; powered through a separate DC decoupling filter to ensure best fidelity, even at the highest audio output power.

Interfaces - Enable seamless connections to hardware peripherals found in a typical hearing aid such as push buttons, control potentiometers, the battery and the electrical interface to the fitting connector.

Packaging - Ezairo 5910 Miniature Hybrid

- Suited for BTE, mini-BTEs, ITE and CIC hearing aids
- Reflowable to facilitate the manufacturing process
- RoHS-compliant
- 5.98mm (0.235") x 3.46mm (0.136") x 1.60mm (0.063") including solder balls
- 256kBit EEPROM

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