

TI's DirectPath™ Amplifier Delivers Industry's Highest Audio Performance And Lowest Quiescent Current For Cell Phones And Portable Audio Players

First Differential Input, Charge Pump-based Headphone Amplifier with I2C Volume Control Provides Exceptional Sound Quality

DALLAS (Dec. 13, 2006) -- Texas Instruments Incorporated (TI) (NYSE: TXN) today introduced a new headphone amplifier optimized for cellular handsets and other portable audio applications. The TPA6130A2, which is part of the DirectPath™ line of amplifiers, outperforms other charge pump-based headphone drivers on the market today, offering a power supply rejection ratio (PSRR) of 109 dB, the lowest quiescent current at 4 milliamp (mA), the first differential stereo inputs and 64-step software-based volume control. These features of the TPA6130A2 make it possible for manufacturers to minimize noise disturbances, extend battery life and maximize audio quality in their cell phones, personal digital assistants (PDA), portable media players and portable audio players. (See www.ti.com/tpa6130a2.)

The new TPA6130A2 marks the debut of TI's new DirectPath product line, TI's patented charge-pump based headphone amplifiers. Providing a direct path between the amplifier and speaker simplifies amplifier design and eliminates the need for large, expensive DC blocking capacitors. With its differential inputs, the TPA6130A2 eliminates any unwanted common-mode noise present on the inputs of the amplifier.

"The new DirectPath technology implemented in the TPA6130A2 enables our customers to improve low frequency performance and reduce the total solution footprint," said Nicholas Holland, high performance analog marketing manager at TI. "The TPA6130A2 includes a feature set that meets the demanding requirements of the portable audio market."

Bringing Together Design and Audio Quality

Maximizing PSRR is crucial to audio quality, as any noise ripples on the power supply can directly translate into audible buzzes over headphone speakers. In cell phones, for example, other system components, such as the radio transmitter, can create noise on the battery power supply. A high PSRR ensures that such artifacts are eliminated, resulting in better audio quality.

Traditional headphone amplifiers require large-output direct current (DC) blocking capacitors that typically require significant board space and have a high profile. To reduce this solution size, manufacturers might use smaller, lower quality capacitors, which impact the low frequency response of headphones and limit the overall base content.

TI's DirectPath charge-pump architecture generates a negative supply rail, so that the amplifier can reference true ground. This provides a direct path from the amplifier outputs to the headphone speakers and eliminates the need for any DC blocking capacitors. This enables developers to create a more elegant and compact headphone driver solution that improves low frequency response, while lowering system cost and PCB space requirements.

The TPA6130A2 offers a quiescent current of 4 mA, the lowest in the industry, and shutdown current of less than 1 microamp (μA). This efficiency enables developers to create headphones that maximize battery life and extend listening time.

Cost is a major consideration in headphone design, and TI has integrated volume control into the TPA6130A2, eliminating the need for an additional potentiometer to control volume. Because the 64-step volume control is managed via software over an I2C control bus, it also has the added benefit of maximizing the headphone signal to noise ratio (SNR). Since volume is controlled via software, developers can drive the audio source at its maximum output and reduce or increase volume within the amplifier, enabling the highest possible SNR and the highest audio quality.

TI is focused on maximizing the user experience at all levels and has implemented its high-performance depop circuitry in the TPA6130A2, which suppresses pop noise to an inaudible level. Other features of this device include 138 mW of output power per channel into standard 16-ohm headphone speakers at 5 V, 0.0055 percent THD+N (35 mW at 1 KHz) and 8-kV ESD protection. Its wide voltage rail of 2.5 V to 5.5 V enables developers to connect the headphone amplifier directly to the power supply, simplifying overall design by eliminating the need for a dedicated power management device, such as a low dropout regulator (LDO).

The TPA6130A2 complements TI's portfolio of high-performance analog and DSP products for the portable audio signal chain, including DSPs, audio data converters, clocks, Class-D audio power amplifiers and audio codecs. TI provides the silicon, software, systems expertise and support that enable customers to get to market quickly. For more information see the Audio Solutions Guide at ti.com/audio. In addition, see TI's power management products for portable consumer applications at power.ti.com.

Availability and Pricing

The TPA6130A2 is available now in production volumes in a lead-free 2 mm x 2 mm WCSP package and costs \$1.55 each in 1,000-unit quantities. QFN 4 mm x 4 mm packaging an evaluation module and software are planned for release in early 2007.