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Hottest building blocks for tomorrow's systems

Analog ICs

Codecs ante up for better audio

By Ismini Scouras

Analog IC makers are heeding the call from consumer electronics manufacturers for audio chips that offer lower power consumption, enhanced noise filtering and other features that enable high-fidelity sound.

Audio codecs are performing additional tasks in digital televisions, such as digital equalization and dynamics processing. And in portable electronics, codecs are being built to offer extreme integration for manufacturers looking to reduce costs as well as enhance sound quality.

Analog Devices Inc. recently introduced the ADAV4101, ADAV4312 and ADAV4322 audio processors, which incorporate a powerful embedded processing engine to compensate for the space-constrained speakers in today's thin, flat LCD and plasma TV designs. The audio processors consist of a sound IF demodulator and broadcast stereo decoder. As part of ADI's Advantiv product line, the processors are coupled with ADI's Class-D audio power amps to deliver advanced TV audio subsystems meeting a range of performance and price targets. The subsystem also includes analog interfaces for line I/Os; analog broadcast audio decoding and speaker output; flexible, multiformat digital interfaces for HDMI sources and all digital terrestrial and satellite broadcasts; and lip-synch delay correction and synchronization.

"The engineering required for the audio processor and Class-D power stage amplifier to work well together is significant," said Martin Cotter, product line director for the Advanced Television Segment at Analog Devices. "ADI has solved the design difficulties associated with this open-loop interface, eliminating system-level concerns such as pop/click reduction and physical interfacing challenges. This reduces design cycle time, minimizes system cost and delivers a quality audio experience for consumers—key benefits for TV manufacturers with defined 12-month new product refresh cycles."

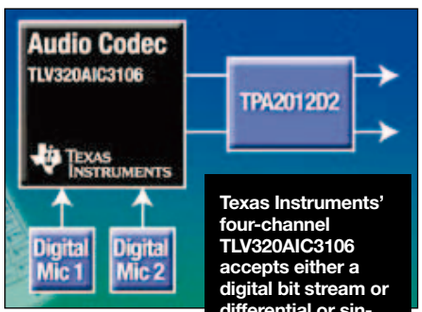
The ADAV4101, ADAV4312 and ADAV4322 do all the processing necessary to deliver the big sound required to match high-definition video quality. That capability is coupled with high-performance, multichannel, 24-bit A/D and D/A converters that accept analog line inputs from DVD or VCR players and set-top boxes and that drive analog audio to power amplifiers for speakers or auxiliary outputs.

While providing standard TV audio processing, the devices can also be designed to enable advanced audio features, such as full-room equalization, surround-sound virtualization and bass-frequency enhancement.

Cirrus Logic Inc. (Austin, Texas) believes it has simplified the challenge of audio signal management within complex digital television system designs with the introduction of the CS42324 and CS42325 DTV codecs.

In their need to accommodate audio signals from numerous incoming sources, many DTV audio systems incorporate complex circuitry, including external multiplexers, operational amplifiers and input buffers. The highly integrated CS42324 and CS42325 provide system designers a single IC product that manages all audio-signal routing, eliminating the need for many of these separate components, according to Cirrus.

Analog Devices' audio processors have an embedded processing engine to compensate for space-constrained speakers.



Texas Instruments' four-channel TLV320AIC3106 accepts either a digital bit stream or differential or single-ended inputs.

The CS42324 includes a stereo A/D converter, a four-channel D/A converter, an I/O multiplexer, line-level input buffers and output drivers, and the ability to run the A/D and D/A converters at asynchronous sample rates. On the analog front end, its 5:1 stereo input multiplexer allows for the selected audio source signal to be passed either through a data converter or to the output drivers directly. The CS42324 accepts line-level inputs up to 2 Vrms, ensuring compliance with the SCART European standard. The six 2-Vrms output drivers can be driven by either of the stereo D/A converters or by the inputs directly. Each output channel uses Cirrus Logic's Popguard technology, which is said to minimize the effects of output transients associated with single-ended, single-supply converters.

The CS42324's independent serial ports allow for the on-board A/D and D/A converters to operate at different, asynchronous sample rates. That capability is said to simplify system-level design issues related to managing multiple audio streams, such as from S/PDIF receivers, memory card interfaces, HDMI inputs and TV tuners. The codec operates from a single 3.3-V digital supply and a 9- or 12-V analog supply for 2-Vrms I/O drive capability, while performing advanced multibit delta-sigma data conversion at up to 24-bit resolution and sample rates up to 96 kHz.

Texas Instruments (Dallas) last month announced three audio codecs for portable consumer devices that can interface directly to digital or analog microphones. The quad-channel TLV320AIC34 and the stereo TLV320AIC33 and TLV320AIC3106 can accept either a digital bit stream from a digital microphone or differential or single-ended inputs from a traditional analog microphone.

The devices support the trend toward the use of digital microphones, minimizing susceptibility to electrical noise and allowing greater flexibility in codec placement on the circuit board relative to the microphone. Other features include integrated PLLs; low-power headphone, speaker and playback modes; and programmable digital effects, including 3-D sound, bass, treble and de-emphasis.

Key specs include support of sampling rates from 8 to 96 kHz; SNR of 102 dB and 92 dB for D/A and A/D conversion, respectively; and power consumption of 14 mW (for the TLV320AIC33) and 15 mW (for the TLV320AIC3106 and TLV320AIC34) for stereo 48-kHz playback with a 3.3-V analog supply. The TLV320AIC34 is available in a 6 x 6-mm BGA package. The TLV320AIC33 and TLV320AIC3106 are available in 5 x 5-mm BGAs and 7 x 7-mm QFN packages.

Leadis Technology Inc. (Sunnyvale, Calif.) has rolled out a family of audio codecs using its Gmax amplifier technology, which is said to increase power efficiency, maintain best-in-class signal-to-noise ratio (SNR) and extend battery life in portable audio applications. The LDS9350 and LDS9302L target smart mobile phones, portable media players, portable gaming, GPS systems and digital still cameras.

The Gmax-enabled codecs only need 4 mW of power for quiescent playback, said Leadis, and offer about a 50 percent lower system power consumption at typical listening levels, while doubling the battery life in portable audio apps.

The LDS9350 integrates a

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3. Spice circuit simulator targets 1M transistor circuits
   Article ID: 202801291
4. 1-W LEDs deliver low thermal resistance, high luminous intensity
   Article ID: 202803608
5. 8-bit MCU leader jumps to 32 bits
   Article ID: 202802512
6. Probing solution delivers oscilloscope measurements in extreme temperatures
   Article ID: 202602989
7. Tensilica touts industry's smallest licensable 32-bit processor core
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8. Buck-boost dc/dc module boasts 97 percent efficiency
   Article ID: 202805399
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10. Smaller than a kernel of corn: FPGA available in 4 x 4-mm package
    Article ID: 202805846

HW/SW bundle simplifies embedded device design

National Instruments and QNX Software Systems have announced an OEM evaluation bundle of software and hardware for engineers and scientists using graphical system design to create embedded devices that require measurement-quality analog I/O. The hardware/software bundle features a low-cost USB data acquisition device from NI, a single-board computer and drivers, as well as evaluation versions of the QNX Momentics development suite and the NI LabView microprocessor software development kit.

The OEM bundle contains a Power Architecture-based single-board computer with up to 400 MHz of processing power and an NI USB-6009 data acquisition device. The USB-6009 offers eight analog inputs, with 14-bit resolution and a 48-ksample/second sampling rate, and two analog outputs, with 12-bit resolution and 150-ksample/s performance. The included NI measurement hardware driver development kit features tools and a register-level programming interface for controlling the NI data acquisition hardware. Users can

inch optical format with 1024 x 1024-pixel progressive-scan interline transfer, uses a 5.5-micron pixel that is 45 percent smaller than the previous generation but retains the dynamic range, quantum efficiency and responsivity of the larger pixel, according to DeLuca.

Availability: Engineering-grade versions of the KAI-01050 are currently available, with volume production planned for early 2008.

Eastman Kodak Image Sensor Solutions
www.kodak.com/go/imagers

Switcher offers four cooling options

XP Power's SDC320 ac/dc power supply comes in four formats—two using convection cooling or system airflow, and two with internal fans.

The compact 320-W units, measuring 4 x 6 x 1.5 inches for the U-channel model, have a power density of 8.9 watts/cubic inch. The low-profile model, suitable for 1U applications, is also available with a vented cover if required.

For applications where there is insufficient airflow, two fan-cooled models are available. These versions mount the fan on the end or the top

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low-power and low-noise stereo codec, a Gmax stereo headphone amp, an integrated stereo FM transmitter, and a dc/dc converter. The 3.3-V, two-channel, 24-bit D/A exceeds portable audio noise requirements, with SNR of up to 102 dB, and supports rates between 8 to 192 ksamples/second. The codec provides multiple analog inputs, including stereo microphone, stereo line and a fully differential mono microphone. Other features include programmable gain, line and microphone inputs, microphone bias, and a low-power analog bypass mode.

The LDS9350 also provides an FM transmitter function with no additional external components. The FM radio bands are selectable for worldwide operation. Audio to the transmitter can be digital via I^2S or analog via line-in and stereo microphone inputs. The on-chip dc/dc converter can be configured as a voltage booster or divider to generate system voltages and eliminate the need for external voltage regulators.

The LDS9302L includes the Gmax headphone amps and provides the same codec functionality and performance as the LDS9350, but without the on-chip FM transmitter. The LDS9302L requires only a 1.8-V power supply for applications with lower supply voltage.

The WM8350 audio codec from Wolfson Microelectronics (Edinburgh, Scotland) integrates a high-fidelity audio codec and power management subsystem to provide a single-chip product for portable audio and multimedia systems. The first product in Wolfson's AudioPlus power management product line, the WM8350 is compatible with leading multimedia processors and is designed to offer a highly integrated solution without compromising audio performance, according to the company.

On-chip functions include a low-power audio codec, clock generator, four 2-MHz and two 1-MHz dc/dc converters, four LDOs, a battery charger, two white-LED drivers and an auxiliary A/D converter. The WM8350 can save up to 25 percent on the bill-of-materials cost and 50 percent on the board footprint compared with using separate codec and power management chips, Wolfson said.

Specs include SNR of 98 dB (DAC) and 95 dB (ADC) and total harmonic distortion of –84 dB (DAC) and –80 dB (ADC). Features include a programmable high-pass filter for the ADC, six analog inputs, two stereo analog outputs, two mono line outputs and a headphone output.

The WM8350 includes 13 GPIO pins that can be programmed for alternate system functions, including system wake-ups and low-power operation. The device can be optimized to control power-up, power-down and low-power sequences for different system requirements. ■