electronic design

PUTTING NEW TECHNOLOGY IN PERSPECTIVE

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# THRIFTY ICs TAME MULTICHANNEL-AUDIO I/O

## A series of codecs and class-D drivers provides a gaggle of inputs and outputs for car and home audio systems without resorting to fistfuls of ADCs and DSPs.

New home and auto audio systems handle a host of input and output channels. Home A/V receivers interface with set-top boxes, VCRs, and Dolby 5.1. A new car's audio inputs include navigation systems, mobile phones, CD/DVD players, and conventional and satellite radio tuners.

For big spenders, designers could handle all that with multiple analog-to-digital converter (ADC) and DSP chips. But they also must minimize component count and system engineering overhead for entry- and mid-level pocketbooks. That's why Cirrus Logic has introduced two 24-bit codec families and a class-D digital-amplifier driver family.

Cirrus' input-multiplexed codec family consists of the basic chip, the CS4245; the CS4265, which adds a S/PDIF digital audio transmitter; and the CS5345, which has the same pin-out as the CS4265 but without the digital-to-analog converter (DAC), leaving only the ADC from the basic chip. The multiplexer in all three accommodates up to six stereo audio sources. An included programmable gain amplifier (PGA) has a range of ±12 dB in 0.5-dB steps, with zero-crossing click-free transitions. One pair of inputs has a 32-dB microphone preamplifier and a low-noise microphone bias supply.

The second codec family—the CS42436, CS42438, and CS42448—allows up to eight single-ended or six differential inputs and up to eight single-ended or differential outputs. The CS42448 has eight DACs with a complete serial port that supports all standard audio data formats plus a time-domain multiplexing (TDM) mode. The eight-DAC CS42438 and the six-DAC CS42436 provide only TDM serial ports.

Both codec families use 24-bit DACs, with sample rates to 192 kHz and up to 108 dB of dynamic range. The chips' 24-bit, 192-kHz delta-sigma ADCs provide up to 105-dB dynamic range. The codecs also implement Cirrus' Popguard power-up/down technology to minimize clicks and pops. They can operate from 3.3 or 5 V and interface directly to logic levels from 1.8 to 5 V.

Complementing the codecs, six- and eight-channel pulse-width-modulation (PWM) class-D audio controllers provide interpolation, sample-rate conversion, and half- and full-bridge PWM driver outputs. A direct-to-digital approach maintains digital signal integrity all the way to the final output filter.

The six- and eight-channel CS44600 and CS44800 provide 40 dB of power-supply noise rejection at 60 Hz and 15 dB at 1 kHz. A sample-rate converter minimizes the effects of clock jitter, enabling more than 100-dB system dynamic range.

The multiplexed CS4245 and CS5345 cost $2.45 and $1.95, respectively, in 10,000-unit quantities. The CS4265 costs $3.20.

Now sampling, the multichannel CS42436 and CS42438 should cost $4.80 and $5.04, respectively, and the ADC-only CS42448 should cost $5.11 in quantity.

Cirrus' CS44600 and CS44800 class-D drivers are also sampling. The CS44600 will be quantity-priced at $3.27, and the CS44800 will cost $3.55. ED

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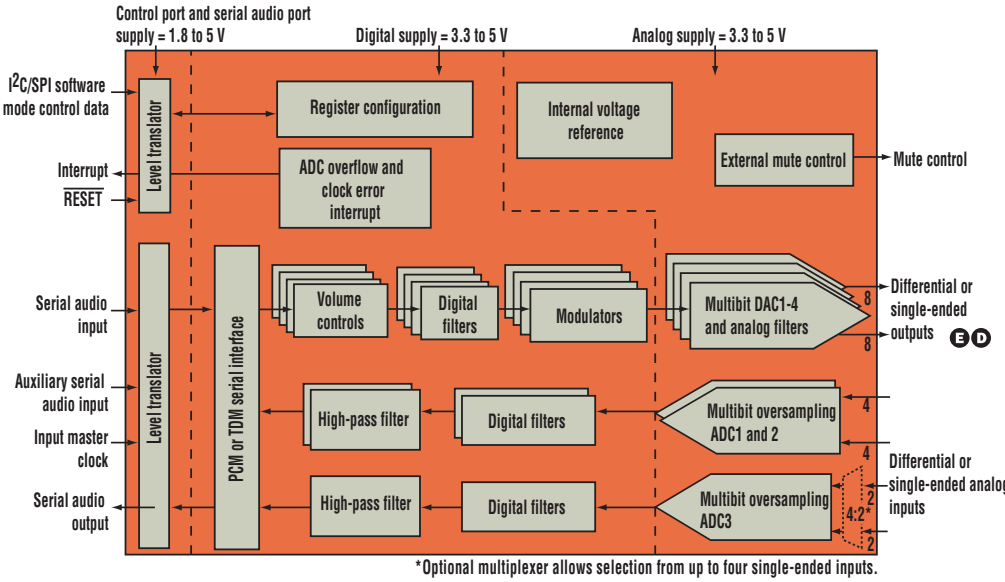


**Of the six codecs, the CS42448 eight-channel audio codec is the most complex. It handles all standard audio outputs. Also available are a TDM-only version, a six-channel TDM-only version, and three similar codecs that use multiplexing in lieu of multiple channels.**