

DSP improves sound without boosting cost

Texas Instruments has unveiled an audio digital signal processor that provides low cost with many features, addressing the mainstream market for radio head ends that have many speakers and accept input from many formats. The chip is aimed at high-value applications for which users want fairly high quality but have limited budgets, hitting the mainstream of a huge field. The audio market rose 29% to a record \$10.1 billion in 2005, according to the **Consumer Electronics Association** (CEA).

The eight-channel TAS3108 audio DSP has the audio processing capabilities necessary to enable multichannel processing in automotive head units and external amplifiers, while a consumer version focuses on digital TVs and home theater-in-a-box systems, boosting volumes by addressing both home and automotive markets. The DSP's eight I/O channels make it particularly attractive for automotive applications that have more than two speakers or have multiple inputs such as MP3 files. This multichannel processing augments the availability of low-power Class D amplifiers, which make it simpler for speakers to be added to compact radio head ends.

"With Class D amps and this chip, you can do more than four speakers from the head unit," Reynolds said. Having eight channels on a single chip lets engineers provide more channels while keeping size, cost, and heat generation low.

While MP3 players drove much of that growth, the CEA cited aftermarket automotive systems as an example of the increased quality consumers want. Even though electronic products normally fall in price, 2005 revenues defied that trend, rising to \$2.43 billion even though unit shipments hardly budged from the prior year.

Rear-seat entertainment systems are another hot market. They were included

in nearly 10% of new vehicles in 2004 and are showing solid growth, according to **Telematics Research Group**. In addition to processing MP3 files, the chip can also handle High Definition Radio, which is expected to gain acceptance in the auto industry in the short term.

It performs five simultaneous instructions per clock cycle and operates at 135 MHz, providing a maximum of 675 million instructions per second. This 135 million multiple accumulates per second rate (MAC) is important for meeting the needs of the audio market.

"We can do one MAC for every clock cycle, which is important because audio requires a lot of filtering and a lot of multiply-accumulate," said Ryan Reynolds, Car Audio Marketing Manager for TI. "If you can't do a MAC every clock cycle, you're only doing half the filtering."

The line has a 48-bit data path, which permits low-frequency processing without reducing the signal-to-noise ratio. It provides overhead needed to filter high-resolution data.

"Incoming DVD-quality audio is 24 bits, so you need additional room for processing," Reynolds said. "We provide 16 noise bits to do filtering and eliminate noise."

The AEC Q100-qualified chip offers sample rates from 32 to 192 kHz across 15 stereo/TDM (technical data management) data formats, so developers can target a broad range of markets with a single design.

The automotive-grade TAS3108AIDCP costs \$4.91 in 10,000 quantities. Its support-tool offerings are composed of two essential parts, the graphical development environment and the integrated development environment. Evaluation modules and code-development tools are also available.

Terry Costlow



TI's eight-channel audio chip addresses the push for better sound in mainstream markets.

Bosch sniffs the CO₂

Exhaust emissions of CO₂ are a constant issue for the motor industry, but CO₂ is also generated by passengers' respiration. Now, **Bosch** has developed a sensor that not only detects the gas in a car's cabin, but also uses the information to improve air-conditioning efficiency. Its Climate Control Sensor (CCS) has been designed to activate the air-conditioning system when CO₂ is detected.



Bosch's in-cabin CO₂ sensor is an aid to air-conditioning efficiency.

Bosch states that the CCS guarantees a supply of fresh air to passengers and provides more efficient operation. It also helps driver concentration as passengers sitting in close proximity deplete available oxygen and increase CO₂ levels.

The sensor uses spectroscopy to measure levels of the gas, with the ability to detect concentrations down to 0.2% by volume. The sensor is a two-channel device and incorporates a reference measurement. It is also available to detect carbon monoxide or natural gas, or as a multi-sensor supplying cabin temperature and humidity information.

With CO₂ being introduced as a coolant for some air-conditioning systems, the sensor has the added role of leakage detection.

Stuart Birch

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