

# THE ANALOGUE VIEW OF A DIGITAL WORLD

**Analogue technology has a place in mobile comms and multimedia-on-the-move. CAROLINE HAYES reports from California on the technology's use in medical, robotics and consumer goods**

**A**nalogue device designers are applauding the digital revolution. In fact, Lewis Counts, vice president of technology at Analog Devices, told the GlobalPress summit that the growth of analogue ICs outpaced that of the semiconductor industry in the decade from 1995 to 2005. Analogue ICs saw 32 per cent faster growth, achieving 155.3 per cent compared to the semiconductor industry's 83.6 per cent growth in the period.

New digital devices, such as medical, robotics and consumer products all include more analogue technology. They all use the analogue signal which is variable, continuous in time and amplitude and which carries information in the small fluctuations. Add to this the increase in wireless products, which use analogue and mixed signal devices, the future is looking secure for analogue design.

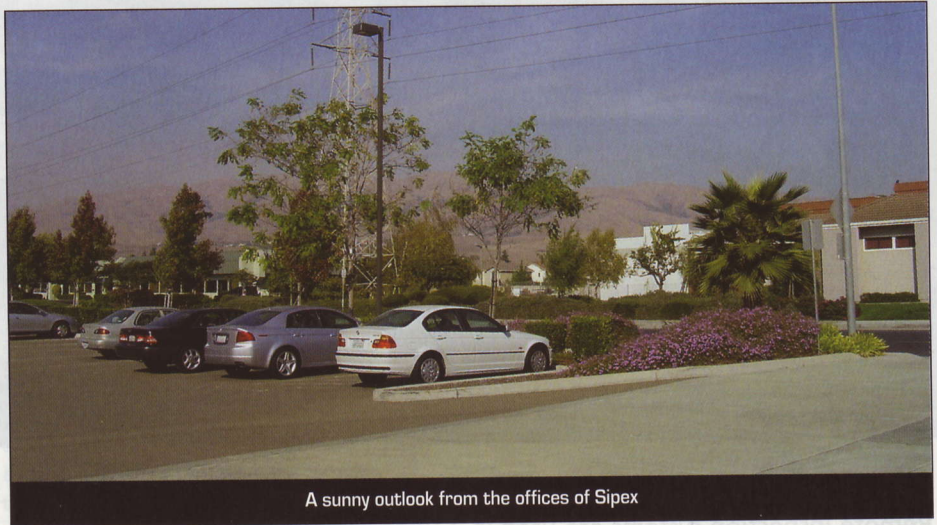
Counts outlined some application areas that optimise analogue technology. The first example was for advanced TV, where Counts predicts image quality and audio quality will be high on a consumer's wishlist, together with wireless video and seamless interconnectivity to other appliances and networks around the home.

## Future vision

For this, analogue's true 12bit data conversion capability will lend itself to video format compatibility. Similarly, class D amplifiers will be used for audio definition to accompany the visual format. Audio will have to be synchronised with the latency in processing high-quality video.

Up to 100 connections could be possible on an audio/video receiver, which means integrating up to 100 ports. Some of the connected parts will be legacy devices, bringing the true 12bit conversion and 100dB SNR (signal to noise ratio) into play.

Another analogue technology is JPEG2000, a standard for digital cinema, which can be embedded into ICs. It offers four times the resolution of next-generation



A sunny outlook from the offices of Sipex

HDTV and is already available.

The very name digital camera belies the analogue content used within them. Counts believes that the power management features offered by analogue technology will be a great boom to digital cameras. He points out that all battery quality and charging depend on analogue technology.

For digital cameras, he estimates that the present \$5 value of analogue content will increase to \$15 in the next-generation of cameras. Analogue will also provide for the display drivers to control LCDs and screens. Taking the picture will rely on analogue, controlling as it does, the lens driver which is used to sharpen images.

## Mobile phones

Mobile phones continue to grow, experiencing 15 to 20 per cent growth last year to reach 800million mobile phones manufactured last year and with an estimated 2billion phones in use around the world.

Analogue, explained Counts in his keynote speech analogue will contribute 14bit ADCs at 190MHz to facilitate the internet, gaming and TV reception that is expected to be

delivered to the handset. Analogue will also power the low-power display drivers which will be required for the anticipated 24bit colour in these applications. Here also, class D amplifiers will provide the audio quality required for when a mobile phone doubles up as an MP3 player. Finally, with all of these functions, the power management of a phone will be a key factor.

## The right medicine

Counts revealed that the analogue content in 2D/3D imaging is worth around \$1.5billion, which sets the stage for analogue's use in digital imaging and medical applications in particular. As well as enhancing image quality, increasing productivity and the speed of scans, analogue technology's signal processing capabilities will produce less radiation and so reduce confinement of patients.

True 18bit ADCs will provide the low noise, high speed amp performance and beam forming demodulators which can be used in 3D CT scans, 4D cardiac images and Doppler ultrasound respectively.

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Although automotive analogue content is not a new concept, Counts was able to offer some insight into new ways that cars could use analogue devices. As well as the expected RF ICs and baseband processors, amplifiers, position sensors and audio DACs to be expected in car infotainment systems, Counts shared the analogue view of the automotive future. RF detectors can be used in satellite radio receivers. He also spoke of keyless entry, made possible by CDC converters as well as cinema-quality sound through the use of audio codecs.

In the world of telecomms, the drive is to pack in more features and maximise power consumption efficiency. A single chip, single power supply that can integrate telecomms protocols can save on board space and increase feature and efficiency levels.

Californian company, Sipex ([www.sipex.com](http://www.sipex.com)), has produced the SP509 multi-protocol line driver/receiver that is just that. It raises performance levels, explains Chris Lee, Sipex's technical marketing manager, power management, with up to 40Mbit/sec gate arrays and a built-in line termination, as well as voltage conversion



Lewis Counts, Analog Devices

and electromagnetic protection.

The eight-driver/eight-receiver device is electrically configurable for V.11, V.35, V.10 or V.28 operation. It can be used to complete DCE/DTE serial ports. The single 5V power supply provides integrated bus termination and high ESD protection of  $\pm 15\text{kV}$  in a 100pin LQFP. The company claims to have the only single-chip three and 5V solutions available today. Data rates for the company's portfolio of multi-protocol line devices are five, 10, 20 or 40Mbit/sec. The transceivers can be used with a programmable serial comms controller to enable a single serial port to be reconfigurable into a variety of serial protocols. Integration simplifies system design and enhances performance,

decreases footprints and lowers the component count.

Power management products from the company address the handset manufacture market, approximately 720 to 750million worldwide, in 2005. The company designs and produces white LED drivers, camera flash drivers, buck regulators and LDO (low drop out) regulators.

### Bucking the trend

The company owns a fab in Milpitas, California, which is to be moved entirely to China by the middle of this year. This follows an agreement with Chinese fab operator, Silan, who makes ICs for the games industry in China, to make it a fabless company.

Buck regulators integrate power FETs (field effect transistor) into the IC to form a monolithic power converter, able to step down input voltage, to improve efficiency. According to Lee, the efficiency level means that the Sipex offerings provide a credible alternative to linear regulators where battery life is an important factor.

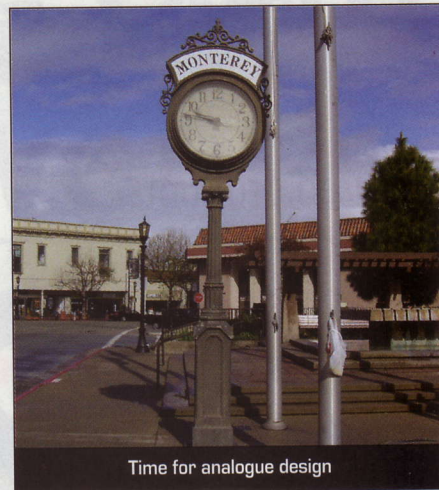
The power management features mean they are used in computing and portable devices. As more multimedia applications are becoming portable, often incorporated into mobile phones as well as free-standing products, such as portable DVDs, they are finding more diverse end uses.

### High current range

To illustrate some of these applications areas, Lee outlines some of the design developments in his branch of the company. For portable DVD players, for example, there is the SP6654 buck regulator. This 2.7 to 5.5V device, is rated at 97 per cent efficiency and has an output range of 0.75 to 5V. It is packaged in either a 10pin DFN or MSOP. The mode pin can be used to choose PWM or PWM/PFM operation. One particular feature, which illustrates the variety of designs it can be used in, is that it can accommodate temperature drops of up to 50°C.

Sipex's PowerBlox is a range of high current, high voltage, ultra miniature buck regulators. Design engineers can use the modular solutions in the range to reduce the number of external components in a power system. The custom DFN packaging incorporates three heatsinks to provide on-chip thermal management. As a result, the company claims that its 8A component, measuring 7 x 4mm, is the smallest of its kind in the industry. Lead-free packaging is available.

There are six members of the family to date, ranging from three to 12A and a wide voltage range of 2.5 to 28V. The devices



Time for analogue design

have integral RDS(ON) FETs, as low as 15m<sup>2</sup>. Output control voltage can be as low as 0.8V. According to the company, the parts offer the world's only high current synchronous buck regulators with support for input voltages greater than 6V. Frequencies range from 300kHz to 1.3Mz, making them suitable for use in set top boxes, cable modems, and plasma TVs as well as industrial power supplies.

The company's range of conventional buck regulators, which offer up to 1.5MHz frequency and a quiescent current as low as 20µA and dual mode PWM/PFM operation, are for use in mobile phones, PDAs and MP3 players. These relatively-new application areas have brought a new lease of life to analogue design.

For example, the 20µA current consumption levels of the SP6651 make it suitable for use in PDAs, as it features logic level shutdown, digitally programmable UVLO threshold and battery low indicator. Similarly, the device can be used effectively in MP3/4 players as the power management extends the playtime in these portable devices. For use in portable DVD players, for example, the SP6654, with 98 per cent efficiency, 800mA and a choice of 10pin DFN and MSOP, can withstand a drop in temperature by 50°C.

Simultaneous power-up, where all converters begin the soft start cycle simultaneously with the same slew rate; sequential power-up, where VOUT1 powers up first and triggers the others in sequence; and ratiometric power-up where supplies are turned on simultaneously and reach output voltages at the same time, are all protocols supported by PowerBlox regulators. All of these power-up methods can be selected with a proprietary chip-to-chip interface to eliminate sequencing control ICs. This elimination can reduce costs, as well as simplify the design. **EPD**