

Analog-Device Advances Breathe Flexibility into Design

Several interesting analog ICs making their debut in the first quarter of 2015 adapt to the exacting requirements of their targeted products.

EVERY DECEMBER, *Electronic Design* presents its big review of new analog products introduced during the past year. However, analog-semiconductor manufacturers announce new products every week, so it also makes sense to do a recap on a quarterly basis. Linear Technology, Texas Instruments, Analog Devices, and Maxim Integrated all unveiled analog ICs from January to the end of March.

LINEAR TECHNOLOGY

In mid-March, Linear Technology announced the LT6023, a low-power, enhanced slew rate, precision operational amplifier. It uses a proprietary input stage that allows the output to quickly slew to within 0.0015% of its final value, even when applying large signal input steps.

Specifically, by configuring the LT6023 in unity gain and applying a 10-V step to the input, an output will slew at 1.45 V/ μ s, a 5-V input step will slew the output at 0.65 V/ μ s, and a 0.7-V input step lowers the slew rate to 0.02 V/ μ s. Linear says achieving these slew rates presented a challenge while maintaining optimum input offset voltage, common-mode rejection, and noise. One target application is a multiplexer, which often experiences large input voltage transitions as the input cycles between input sources. The problem was solved by integrating 5.5-V Zener diodes.

A week or so earlier, Linear announced the LTC6752 family of very-high-speed comparators for high-frequency line drivers and clock-recovery circuits. “High speed” means they support toggle rates up to 280 MHz, thanks to propagation delays as low as 2.9 ns and rise and fall times on the order of 1.2 ns. The five family members include options for separate input and output supplies, shutdown, output latch, adjustable hysteresis, complementary outputs, and package configurations.

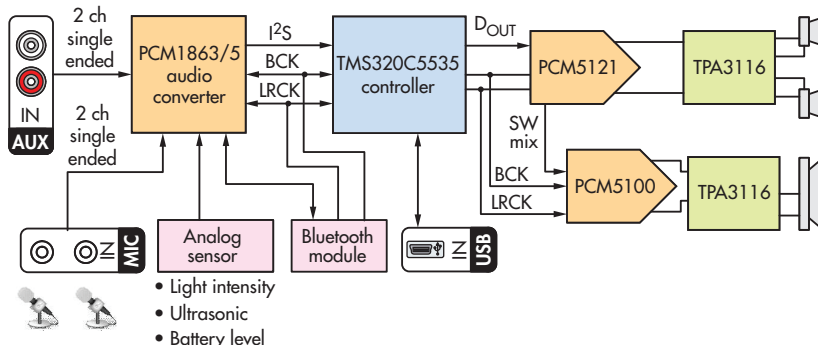
Rail-to-rail inputs operate from 2.45, 3.5, or 5.25 V, depending on the option. Outputs are CMOS and the separate sup-

ply options can operate down to 1.71 V, allowing for direct interfacing to 1.8-V logic. Other key specs, such as 1.8-ns overdrive variation (10 to 125 mV) and 4.5-ps jitter, make these comparators an excellent choice for critical timing applications.

February was a particularly big month for new analog arrivals from Linear (the company challenges its engineers to release one new product a week, across all its product lines). These include the LTC5564H, a 7-ns response time, 15-GHz RF detector with fast comparator; the LTC2875, a pair of 3.3- and 5-V, 4-Mb/s, CAN-bus transceivers that can handle ± 60 -V voltage strikes while operating at temperatures up to 25°C; and the LTC22373, an 18-bit, 1-Msample/s, 8-channel, multiplexed SAR ADC with a signal-to-noise ratio (SNR) of 100 dB.

TEXAS INSTRUMENTS

Q1 products from TI include the PCM1865 family of six high-performance audio ADCs (*see the figure*). They combine features typically found in portable audio codecs, with performance specifications found only in single-function, professional audio ADCs. The devices require only a single 3.3-V supply. This eliminates the need for a dedicated analog 5-V rail, opening the door to smaller, more efficient products. Targeted applications range from personal computers, sound bars, and



Using just a single 3.3-V power supply, TI's PCM1865 family of audio front-end devices balances European Ecodesign legislation with performance. Its audio front end supports input levels from small-millivolt microphone inputs to 2.1-V_{RMS} line inputs without external resistor dividers. Many system-level functions assist or replace some DSP functions.

audio docks to Bluetooth speakers, video-security systems, and automotive infotainment systems.

The six pin-to-pin compatible devices in the family have two- and four-channel options, with software- and hardware-controlled variants. Three of the devices can achieve up to 110-dB dynamic range, unheard of with only a single 3.3-V power supply. With direct, high-voltage 2.1- V_{RMS} support, the devices optimize audio quality and allow for a higher SNR. Software-controlled clipping-suppression helps optimize input sensitivity for maximum SNR.

The devices integrate a clock-generating phase-locked loop (PLL), programmable gain amplifier, and universal front end that supports various inputs from low-level microphones to 4.2- V_{RMS} differential inputs.

Unique to TI is proprietary "Energysense" technology—it helps designers meet operating requirements set by the European Union's (EU) Ecodesign Directive. According to TI, it's simple to set both sleep and wake-up thresholds, which can help equipment achieve the required energy-efficiency levels.

ANALOG DEVICES

ADI announced all of its pure analog devices for the quarter on February 15. Leading the way was the AD9154, a quad-channel, 2.4-Gsample/s, 16-bit digital-to-analog converter (DAC) with dynamic-range performance in the 100- to 300-MHz band for complex IF transmitters. In a different twist, the device incorporates an AD9154 quad, 16-bit DAC; an on-chip PLL; and an eight-lane JESD204B interface.

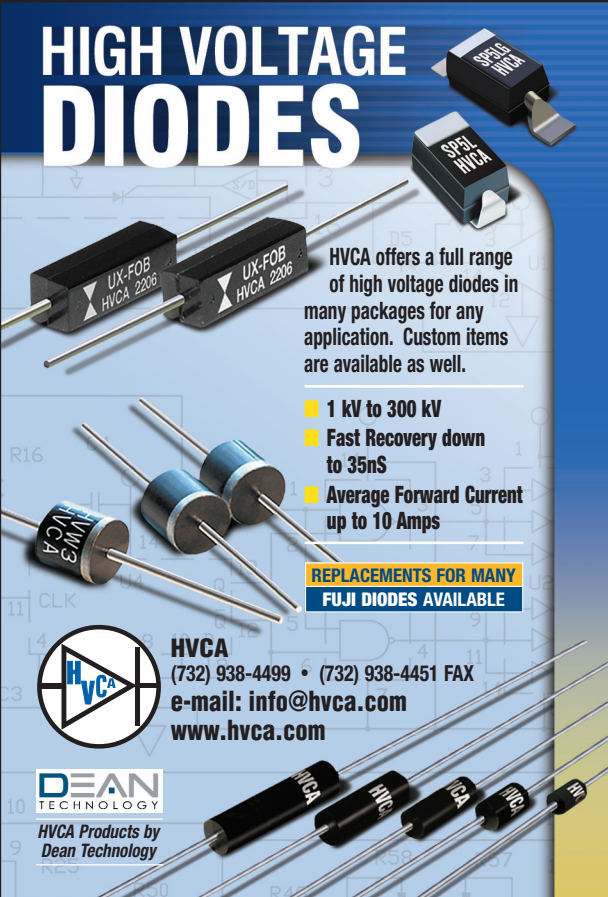
With that combination of features, a single device can be employed to meet all requirements in multicarrier GSM and LTE transmitters in a range of applications, such as wireless macro base stations, point-to-point microwave radios, military radios, and radio test equipment. The DACs offer a range of features for advanced IF transmit applications, too, including complex digital modulation; input-signal power detection; and gain, phase, and offset compensation.

That same day, Analog Devices introduced a new ADC/DAC/GPIO combination IC that gives designers a new level of flexibility in handling system monitoring and control: the 12-bit, 8-channel AD5592R. It includes a 400-ksample/s ADC, 6- μ s settling-time DAC digital inputs and outputs, and a reference on a single chip. It can be user-configured in any combination of up to eight devices, making it possible to use a single IC to complete multiple system monitoring and control functions.

MAXIM INTEGRATED

In February, Maxim Integrated demonstrated its MAX11300 "programmable analog family of devices for industrial control and automation, the IoT, base-station RF controllers, and power-supply monitoring." The device offers 20 mixed-signal high-voltage, bipolar ports, which are configurable as an ADC

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analog input, a DAC analog output, a general-purpose input port (GPI), a general-purpose output port (GPO), or an analog switch terminal. One internal and two external temperature sensors track junction and environmental temperature, respectively. Adjacent pairs of ports are configurable as a logic-level translator for open-drain devices or an analog switch.


Thanks to the mixed-signal PIXI I/O, the device essentially “brings programmability to high-integration analog applications.” According to Maxim, it’s “the industry’s first configurable, 20-channel, –10- to +10-V high-voltage mixed-signal IC.” PIXI ports provide highly flexible hardware configuration for 12-bit mixed-signal applications. The MAX11300 is best

suited for applications that demand a mixture of several analog and digital functions. Each port is individually configurable with up to four selectable voltage ranges within –10 to +10 V.

The device allows for the averaging of 2, 4, 8, 16, 32, 64, or 128 ADC samples from each ADC-configured port. A DAC-configured output port can drive up to 25 mA. The GPIO ports can be programmed to user-defined logic levels, and a GPI coupled with a GPO forms a logic-level translator.

Internal and external temperature measurements are able to monitor user-programmable conditions of minimum and maximum temperature limits, using the interrupt to notify the host when there’s an occurrence of one or more conditions. Temperature measurement results are made available through the serial interface.

On a more fundamental level, there is an internal, low-noise 2.5-V voltage reference. However, it’s also possible to use external voltage references with separate inputs for the DAC and ADC. For I/O, a four-wire, 20-MHz, SPI-compatible serial interface handles communication with the host.

On another front, Maxim says it has the industry’s only 1.8-V-capable isolators—the MAX14930, MAX14931/MAX14932, MAX14934, MAX14935, and MAX14936—that can deliver up to 30% better propagation delay and up to 50% lower pulse width distortion than competitors. Where needed, ultra-robust, 5-kV_{RMS}, four-channel digital isolators transfer digital signals between circuits with different power and ground domains, and where noise isolation, ground loop mitigation, and/or safety are of concern. 



11:48 AM
Why not try a different approach before you head to lunch?

1:03 PM
Your second board is ready to test.

10:05 AM
Your first board is ready to test.

9:00 AM
Your circuit design is done and you're ready to make a prototype.

3:14 PM
After a few tweaks, you're ready to make your finished board.

4:09 PM
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5:00 PM
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