



Digital Predistortion uModule Receiver Simplifies Basestation Design

MILPITAS, CA – July 13, 2009 – Linear Technology introduces the LTM9003, a wideband RF-to-digital receiver subsystem that includes a high performance 12-bit, 250MSPS analog-to-digital converter (ADC), a bandpass filter, intermediate frequency (IF) amplifier and a high linearity RF downconverting mixer. The integrated uModule[®] receiver significantly reduces board space and development time for wireless basestations implementing PA linearization with digital predistortion (DPD). The LTM9003 harnesses years of signal chain design experience and offers it in an easy-to-use 11.25mm × 15mm µModule package.

DPD addresses the most significant source of power consumption in a basestation: the PA. Powerful digital algorithms correct for nonlinearity in the power amplifier, allowing it to operate at a higher average power level without generating excessive distortion. A single 20W PA without DPD may run at less than 10% efficiency, meaning greater than 200W of power consumption. Due to the number of power amplifiers in a basestation, the savings are significant to the operating expense (OPEX) of the service provider. Digitizing the fifth or even seventh order harmonics requires a very wide bandwidth, low noise receiver with an exceptionally flat passband. The LTM9003 includes a 125MHz bandpass filter that exhibits less than 0.5dB passband ripple across the entire band. The noise floor of the receiver chain from the RF input to the LVDS digital output is just -147.3dBm/Hz, which is well below that of the PA. Since DPD is a feedback loop, the receiver (also called a transmit observation path receiver) benefits from low latency; a faster loop leads to better efficiency in the PA and therefore even lower power consumption. The ADC in the LTM9003 has just 5 clock cycles of latency and the absolute delay through the filter is only 2.7ns.

The LTM9003 is packaged in a space-saving 11.25mm × 15mm LGA package, utilizing a multilayer substrate that shields sensitive analog lines from the digital traces to minimize digital feedback. Supply and reference bypass capacitance is placed inside the uModule, tightly coupled to the die, providing a space, cost and performance advantage over traditional

packaging. With no external capacitance required, the LTM9003 consumes approximately one-fourth the space of discrete implementations.

The LTM9003 is priced at \$45.00 each in 1,000 piece quantities. Demo boards, samples and more information are available at www.linear.com.


Photo Caption: 12-Bit, 250Msps Digital Predistortion uModule® Receiver

Summary of Features: LTM9003

- Fully Integrated Receiver for Digital Predistortion Applications
- Downconverting Mixer with Wide RF Frequency Range: 400MHz to 3.8GHz
- 125MHz Wide Bandpass Filter with <0.5dB Passband Ripple
- Low Power 12-Bit, 250Msps ADC
- -147.3dBm/Hz Input Noise Floor, 25dBm IIP3
- Internal Bypass Capacitance, No External Components Required
- ADC Clock Duty Cycle Stabilizer
- 1.5W Total Power Consumption
- 11.25mm x 15mm LGA Package

About Linear Technology

Linear Technology Corporation, a manufacturer of high performance linear integrated circuits, was founded in 1981, became a public company in 1986 and joined the S&P 500 index of major public companies in 2000. Linear Technology products include high performance amplifiers, comparators, voltage references, monolithic filters, linear regulators, DC-DC converters, battery chargers, data converters, communications interface circuits, RF signal conditioning circuits, uModule® products, and many other analog functions. Applications for Linear Technology's high performance circuits include telecommunications, cellular telephones, networking products such as optical switches, notebook and desktop computers, computer peripherals, video/multimedia, industrial instrumentation, security monitoring devices, high-end consumer products such as digital cameras and MP3 players, complex medical devices, automotive electronics, factory automation, process control, and military and space systems.

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