



Breakthrough 0.5ppm INL, 1Msps, No Latency SAR ADC Achieves True 20-Bit Precision

MILPITAS, CA – May 28, 2013 – Linear Technology Corporation introduces the [LTC2378-20](#), a 20-bit 1Msps no latency successive approximation register (SAR) analog-to-digital converter (ADC) with exceptionally low 0.5ppm (typ) and 2ppm (max) Integral Non-Linearity (INL) error. INL is a key specification in precision applications, such as seismic monitoring and semiconductor fabrication, indicating how much the ADC transfer function deviates from its ideal. Since linearity effectively cannot be calibrated at the system level, the ADC's INL specification often sets the overall system accuracy. The best-in-class 0.5ppm INL of the LTC2378-20 enables a new generation of precision systems with true 20-bit accuracy. The proprietary architecture leads to an extremely stable 2ppm (max) INL and -114dB THD (max) over the device's entire operating range of -40°C to 85°C.

The LTC2378-20 achieves the industry's highest signal-to-noise ratio (SNR) of 104dB for a 1Msps no latency ADC. The wide dynamic range and true 20-bit resolution reduce or eliminate the need for additional gain in the signal chain, thereby improving total system accuracy and noise. Fast 1Msps throughput with no latency enables the use of multiplexers to replace costly, independent ADCs with slower throughputs, thus reducing system cost and complexity.

The LTC2378-20 is the leadership product in a pin- and software-compatible family of 20/18/16-bit SAR ADCs with speeds ranging from 250ksps up to 2Msps with serial SPI interfaces. The 20-bit 250ksps (LTC2376-20) and 500ksps (LTC2377-20) versions will be released in May. The family operates from a 2.5V supply, with a $\pm 5V$ fully differential input range using an external 5V reference. At 1Msps, the device achieves low power dissipation of 21mW, which scales linearly with sample rate. A shutdown mode further reduces power dissipation to 2.5 μ W when idle. The LTC2378-20 family offers a unique digital gain compression (DGC) feature, eliminating the need for a negative ADC driver supply and

preserving the full resolution of the ADC, to achieve lower total power consumption of the signal chain with only a small reduction in SNR performance.

The [DC1925A](#) evaluation kit demonstrates the 0.5ppm INL and 104dB SNR performance of the LTC2378-20. The board features the flexible LT6203 ADC driver for interfacing differential or single-ended input signals and the 5V LTC6655-5 precision, low noise, low power reference. For a truly low power signal chain solution using the digital gain compression feature, we recommend the LTC6362 fully differential driver operating from a single 5V supply (1mA), which achieves up to 100dB SNR performance when combined with the LTC2378-20 and the 4.096V LTC6655-4.096 reference.

The LTC2378-20, LTC2377-20 and the LTC2376-20 are available in small MSOP-16 and 4mm x 3mm DFN-16 packages, priced starting at \$29.50, \$25.50 and \$18.17 each, respectively, in 1,000 piece quantities. For more information, visit www.linear.com/product/LTC2378-20.

Photo Caption: 20-Bit No-Latency Serial SAR ADC with 1Msps Throughput & 0.5ppm INL

Summary of Features: LTC2378-20

- 1Msps Throughput Rate
- ± 0.5 ppm INL (Typ), ± 2 ppm INL (Max)
- Guaranteed 20-Bit No Missing Codes
- Low Power: 21mW at 1Msps, 21 μ W at 1ksps
- 104dB SNR (Typ) at $f_{IN} = 2$ kHz
- -125 dB THD (Typ) at $f_{IN} = 2$ kHz
- Digital Gain Compression (DGC)
- Guaranteed Operation to 85°C
- 2.5V Supply
- Fully Differential Input Range $\pm V_{REF}$
- V_{REF} Input Range from 2.5V to 5.1V
- No Pipeline Delay, No Cycle Latency
- 1.8V to 5V I/O Voltages
- SPI-Compatible Serial I/O with Daisy-Chain Mode
- Internal Conversion Clock
- 16-Lead MSOP & 4mm x 3mm DFN Packages

About Linear Technology

Linear Technology Corporation, a member of the S&P 500, has been designing, manufacturing and marketing a broad line of high performance analog integrated circuits for major companies worldwide for three decades. The Company's products provide an essential bridge between our analog world and the digital electronics in communications, networking, industrial, automotive, computer, medical, instrumentation, consumer, and military and aerospace systems. Linear Technology produces power management, data conversion, signal conditioning, RF and interface ICs, μ Module[®] subsystems, and wireless sensor network products. For more information, visit www.linear.com

 , LT, LTC, LTM, Linear Technology, the Linear logo and μ Module are registered trademarks of Linear Technology Corp. All other trademarks are the property of their respective owners.

Press Contacts:

North America / Worldwide

John Hamburger, Director Marketing
Communications
jhamburger@linear.com
Tel: 408-432-1900 ext 2419

Doug Dickinson, Media Relations Manager
ddickinson@linear.com
Tel: 408-432-1900 ext 2233

UK & Nordic

Alan Timmins
alan@ezwire.com
Tel: +44-1-252-629937