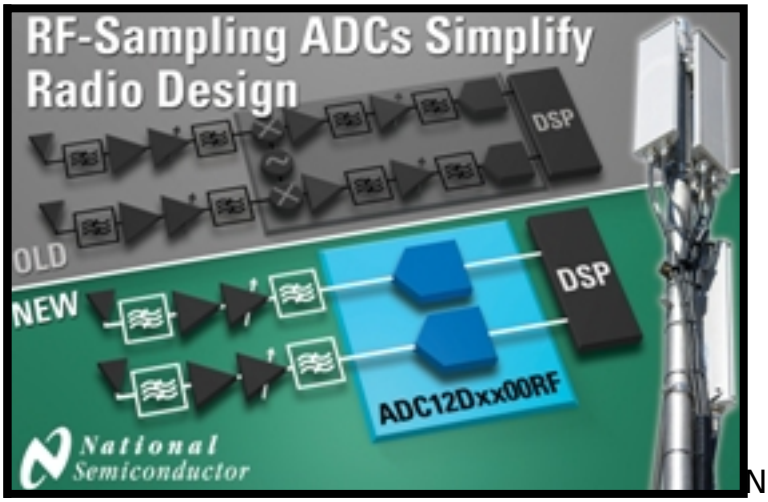
# Breakthrough Direct RF-Sampling ADCs Revolutionize Radio Architectures




National Semiconductor introduced a family of analog-to-digital converters (ADCs) that are the industry's first to directly sample RF signals beyond 2.7 GHz, with third-order intermodulation distortion (IMD3) up to -71 dBc and sampling at up to 3.6 Giga-samples per second (GSPS). Watch a demonstration video at http://www.national.com/rfadc [1].

The ADC12Dxx00RF family includes five 12-bit ADCs that enable system designers to eliminate multiple intermediate frequency (IF) down-conversion stages including amplifiers, mixers and filters. A single ADC12Dxx00RF replaces entire radio signal path subsystems, drastically reducing bill of materials (BOM) cost, board size and weight in 3G/4G wireless basestations as well as microwave backhaul, military and wideband software-defined radio (SDR) applications.

"Radio designers are seeking new ways to increase radio capacity while reducing cost, size and weight. Architectures based on RF sampling ADCs provide these benefits, but it has long been believed that this technology was years away from reality," said Jon Baldwin, marketing director for National's High-Speed Signal Path Division. "With its combination of unparalleled high frequency dynamic range and industry's highest sampling rates, the ADC12Dxx00RF family of ADCs provides the core technology that enables our customers to begin development of direct RF-sampling radios today."

**The footprint-compatible ADC12Dxx00RF ADCs join National's industry-leading GSPS ADC family, allowing an easy upgrade path from 500 Mega-samples per second (MSPS) to 3.6 GSPS:**

• The ADC12D1800RF provides interleaved single-channel sampling rates up to 3.6 GSPS, or dual-channel rates up to 1.8 GSPS, with IMD3 of -64 dBc at 2.7 GHz. More information is available at http://www.national.com/pf/DC/ADC12D1800RF.html [2].

• The ADC12D1600RF provides interleaved single-channel sampling rates up to 3.2

GSPS, or dual-channel rates up to 1.6 GSPS, with IMD3 of -70 dBc at 2.7 GHz. More information is available at http://www.national.com/pf/DC/ADC12D1600RF.html [3].

• The ADC12D1000RF provides interleaved single-channel sampling rates up to 2.0 GSPS, or dual-channel rates up to 1.0 GSPS, with IMD3 of -69 dBc at 2.7 GHz. More information is available at http://www.national.com/pf/DC/ADC12D1000RF.html [4].

• The ADC12D800RF provides interleaved single-channel sampling rates up to 1.6 GSPS, or dual-channel rates up to 800 MSPS, with IMD3 of -71 dBc at 2.7 GHz. More information is available at http://www.national.com/pf/DC/ADC12D800RF.html [5].

• The ADC12D500RF provides interleaved single-channel sampling rates up to 1.0 GSPS, or dual-channel rates up to 500 MSPS, with IMD3 of -69 dBc at 2.7 GHz. More information is available at http://www.national.com/pf/DC/ADC12D500RF.html [6].

The excellent linearity of these direct RF-sampling ADCs across all frequencies allows more system margin to be shifted to other components, easing their performance requirements and providing additional cost and design time savings. To form a complete signal path solution, the ADC12Dxx00RF ADC can be teamed with one of National's dual-channel, digitally-controlled variable gain amplifiers (DVGA) or the LMH6554 fully differential amplifier, and LMX2541 frequency synthesizer or one of National's LMK04800 clock jitter cleaners.

**Pricing and Availability**
Available now, all five 12-bit RF-sampling ADCs are offered in pin-compatible, thermally-enhanced 292-ball BGA packages. For more information on pricing, samples and evaluation boards, visit http://www.national.com/rfadc#products [7].

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