

# National Semiconductor Introduces Industry's Lowest-Noise Frequency Synthesizer

July 6 2009

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National Semiconductor today announced the industry's lowest-noise, fully integrated frequency synthesizer. The PowerWise LMX2541 provides less than 2 milli-radians (mrad) root-mean-square (rms) noise at 2.1 GHz and 3.5 mrad rms noise at 3.5 GHz, outperforming the nearest competitor by 10 dB in both in-band phase-locked loop (PLL) noise and spurious performance.

The LMX2541 is well-suited for local oscillator (LO) applications in next-generation basestation radio transceivers such as Long-Term Evolution (LTE), Worldwide Interoperability for Microwave Access (WiMAX), and multi-standard radios. When paired with the LMK04000

clock jitter cleaner, the LMX2541 significantly improves system error vector magnitude (EVM), resulting in enhanced receiver sensitivity and transmitter spectral purity.

The LMX2541 is offered in a family of six devices covering a wide range of frequencies from 31.6 MHz to 4000 MHz. The LMX2541 improves total link [power efficiency](#) and communication channel capacity when combined with National's ADC16V130 high-speed analog-to-digital converter (ADC), LMH6517 digital variable gain amplifier (DVGA) and LMK04000 clock jitter cleaner.

## **Key Features - LMX2541 Frequency Synthesizer with Integrated VCO**

The LMX2541 features a fully integrated, ultra-low-noise delta-sigma fractional-N PLL, voltage-controlled oscillator (VCO), divider and output driver. The PLL offers a normalized noise floor of -225 dBc/Hz and can be operated with up to 104 MHz of phase-detector rate (comparison frequency) in both integer and fractional modes. It also can be configured to work with an external VCO. The LMX2541 offers advanced features such as programmable output power, digital frequency-shift-keying (FSK) modulation, FastLock mode with cycle-slip reduction and a low-noise, integrated-input crystal oscillator circuit.

In addition, the LMX2541 integrates the necessary low-dropout (LDO) regulators and output-driver matching network to provide higher supply noise immunity and more consistent performance, while reducing the number of external components. The LMX2541's supply voltage range is 3.15V to 3.45V and device programming is facilitated using a three-wire MICROWIRE bus interface that can operate down to 1.8V.

The LMX2541 builds on the foundation of National's industry-leading

and proprietary PLLatinum architecture and packaging technology. National fabricates the LMX2541 on a high-performance silicon-germanium (SiGe) BiCMOS-8 process technology in its South Portland, Maine, facility.

The LMX2541 is sampling now in a 6 mm by 6 mm, 36-pin LLP package, with production volumes expected in the fourth quarter of 2009. The LMX2541 is priced at \$9.50 each in 1,000-unit quantities. For more information visit [www.national.com/pf/LM/LMX2541.html](http://www.national.com/pf/LM/LMX2541.html) .

Source: National Semiconductor

Citation: National Semiconductor Introduces Industry's Lowest-Noise Frequency Synthesizer (2009, July 6) retrieved 20 March 2024 from <https://phys.org/news/2009-07-national-semiconductor-industry-lowest-noise-frequency.html>

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