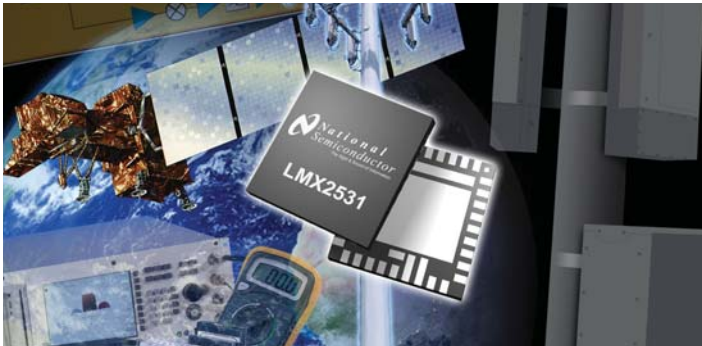


# Low-Noise Frequency Synthesizers Enable Next Generation Wireless Applications

## LMX2531 Enhances Radio Performance and Frequency Coverage for Mobile WiMax and LTE



### Introduction

National's LMX2531 family of PLLatinum® frequency synthesizers provides superior phase noise performance at low-power consumption. Featuring a fully integrated fractional-N Phase-Locked Loop (PLL), the LMX2531 is the ideal choice for low-power Radio Frequency (RF) and high-speed data converter applications.

### Fractional-N PLLatinum Architecture

The integrated PLLatinum architecture consists of a fractional-N PLL, a fully integrated low-noise VCO followed by an optional divide-by-two circuit and a low-noise high output-power driver. Also integrated are several low-noise Low-DropOut (LDO) regulators.

### Fractional-N PLL

The fractional-N PLL is equipped with a high-performance delta-sigma engine that drastically reduces spurious emissions. The PLL charge pump includes a FastLock circuit with cycle-slip reduction, and is followed by a loop filter featuring integrated and programmable 3rd and 4th poles.

### Integrated Low-Noise VCO

The low-noise VCO is implemented using a fully integrated and high-Q tank inductor, and followed by a high-performance isolation buffer to reduce frequency pulling. The VCO output is delivered through a low-noise driver and filtered by a low-pass filter for harmonic suppression.

### Integrated Low-Noise LDOs

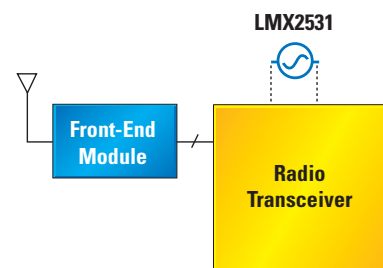
The LMX2531 is equipped with several low-noise LDOs to provide supply noise rejection and consistent performance over supply variation.

### Wireless Base Station Applications

Used as a local oscillator for up and down convert mixers in the radio, the LMX2531 can reduce synthesizer footprint and current consumption while improving the overall signal-to-noise ratio. The LMX2531 is suitable for variety of wireless standards including Long Term Evolution (LTE), Universal Mobile Telecommunications System (UMTS), Worldwide interoperability for Microwave Access (WiMAX) and Code Division Multiple Access (CDMA).

### Mobile Radio and Handset Applications

As a low power but high performance RF synthesizer, the LMX2531 can bring the much needed flexibility and performance to enhance integrated RF transceivers. In LTE or WiMax mobile applications, the LMX2531 can not only improve the radio performance in the mobile device but also enable frequency bands not normally supported by the RF transceiver.



LMX2531 Enhances Performance and Frequency Coverage

### Wireless Meter Reading Applications

Featuring an agile fractional-N PLL, the LMX2531 can be programmed to emulate frequency-shift-keying modulation for wireless concentrators in meter-reading applications.

### High-Speed Data Converter Clocking

As a high-speed frequency clock source for giga sample data converters such as the ADC081500, the LMX2531 can maximize the Effective Number of Bits (ENOB) and enhance overall system performance.

For more information on the LMX2531 family and other clock and timing products, visit: [national.com/timing](http://national.com/timing)

# Low-Noise Frequency Synthesizers Enable Next Generation Wireless Applications

## LMX2531 – PLLatinum® Frequency Synthesizer System with Integrated VCO

### Features

- 553 to 2790 MHz range in multiple frequency options
- Up to 10 dB improvement over next best monolithic competitor
- Significant cost savings over discrete and module solutions
- Fractional-N PLL programmable up to 4th order
- Low 34 mA typ power consumption
- High 4 dBm typ output power simplifies external matching circuitry and buffering
- Fast lock, cycle slip reduction with timeout counter
- Partially integrated adjustable loop filter
- Very low phase noise and spurs
- Low phase noise VCO with integrated tank inductor and programmable output power level
- 2.8 to 3.2V operation
- Very low power down current
- 1.8V MICROWIRE™ support
- Available in tiny 6 x 6 mm LLP-36 packaging

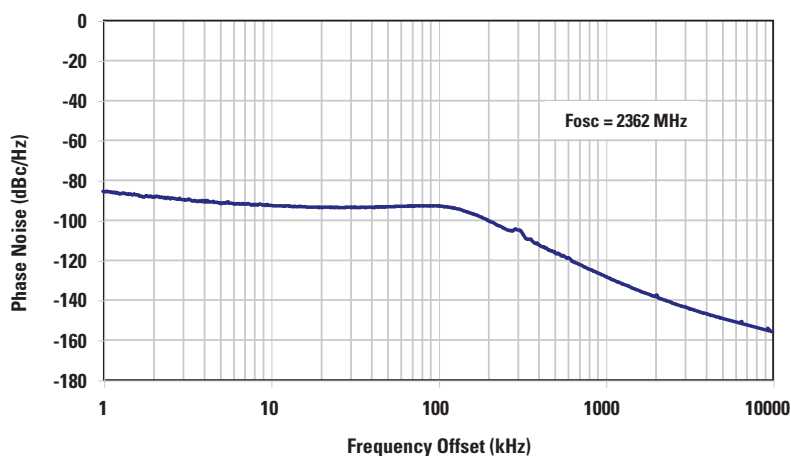
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**For more information, send email to:**  
[support@nsc.com](mailto:support@nsc.com)

LMX2531 Phase Noise



Product ID	Low Band (MHz)	High Band (MHz)
<b>NEW!</b> LMX2531LQ1146E	553 to 592	1106 to 1184
<b>NEW!</b> LMX2531LQ1226E	592 to 634	1184 to 1268
<b>NEW!</b> LMX2531LQ1314E	634 to 680	1268 to 1360
<b>NEW!</b> LMX2531LQ1415E	680 to 735	1360 to 1470
LMX2531LQ1500E	749.5 to 755	1499 to 1510
<b>NEW!</b> LMX2531LQ1515E	725 to 790	1450 to 1580
LMX2531LQ1500E	749.5 to 755	1499 to 1510
LMX2531LQ1570E	765 to 818	1530 to 1636
LMX2531LQ1650E	795 to 850	1590 to 1700
LMX2531LQ1700E	831 to 885	1662 to 1770
LMX2531LQ1742	880 to 933	1760 to 1866
LMX2531LQ1778E	863 to 920	1726 to 1840
LMX2531LQ1910E	917 to 1014	1834 to 2028
LMX2531LQ2080E	952 to 1137	1904 to 2274
LMX2531LQ2265E	1089 to 1200	2178 to 2400
LMX2531LQ2570E	1168 to 1395	2336 to 2790

Other frequency bands in development and by request

### Design Resources

EasyPLL WEBENCH® Design Tool

PLL Performance, Simulation and Design Handbook 4th Edition

PLL Codeloader Evaluation Software

Visit: [national.com/timing](http://national.com/timing)

