Uncompromising Fractional-N Synthesizers

REF DIV

VCO

OUT DIV

FRAC-N DIV ΔΣ MOD
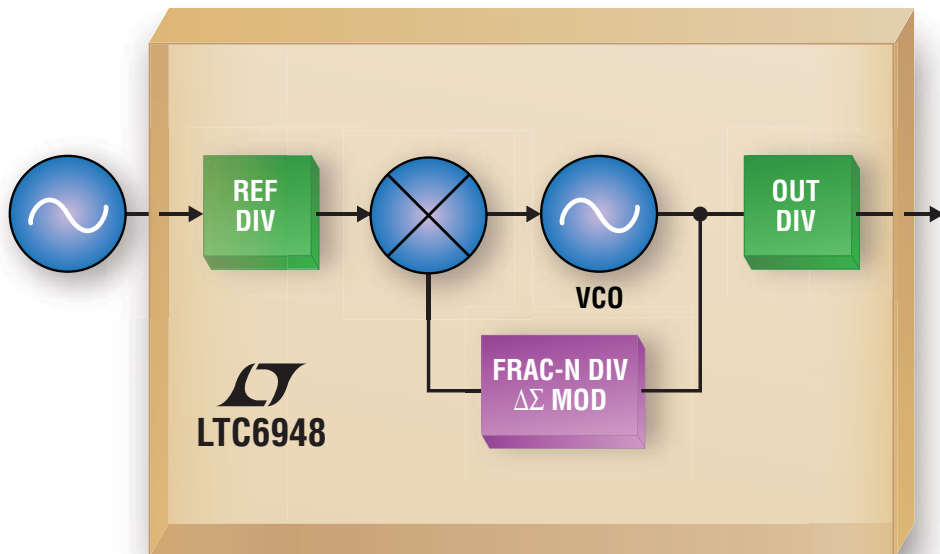
LTC6948

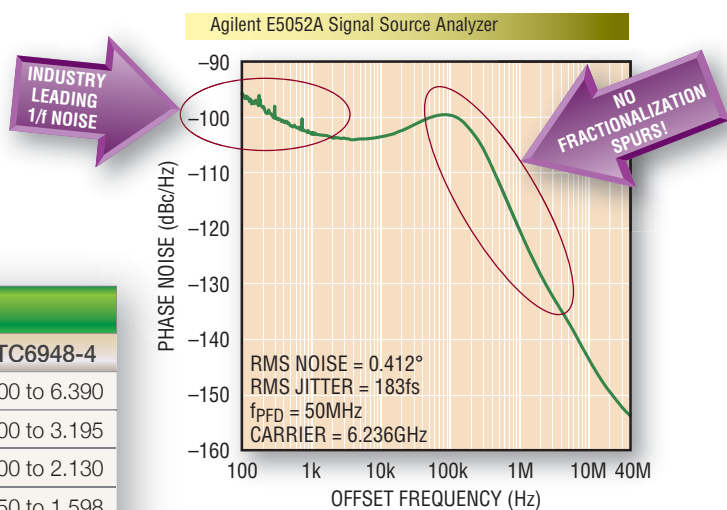## 6GHz Fractional-N Frequency Synthesizers with Integer-N Spurious Performance

The LTC®6947 and LTC6948 set a new bar in fractional-N PLLs by offering all the benefits of fractionalization – from frequency agility to overall reduced in-band phase noise, but without the downsides of unpredictable spurs, delta-sigma modulator noise and design complexity. Design using the LTC6947 and LTC6948 is made easy with the use of FracNWizard™, a free CAD tool that accurately simulates synthesizer performance.

Features

- Integrated VCO, up to 6.39GHz (LTC6948)
- 350MHz to 6GHz VCO Input Range (LTC6947)
- –226dBc/Hz Normalized In-Band Phase Noise Floor
- –274dBc/Hz Normalized In-Band 1/f Noise
- Excellent Spurious Performance
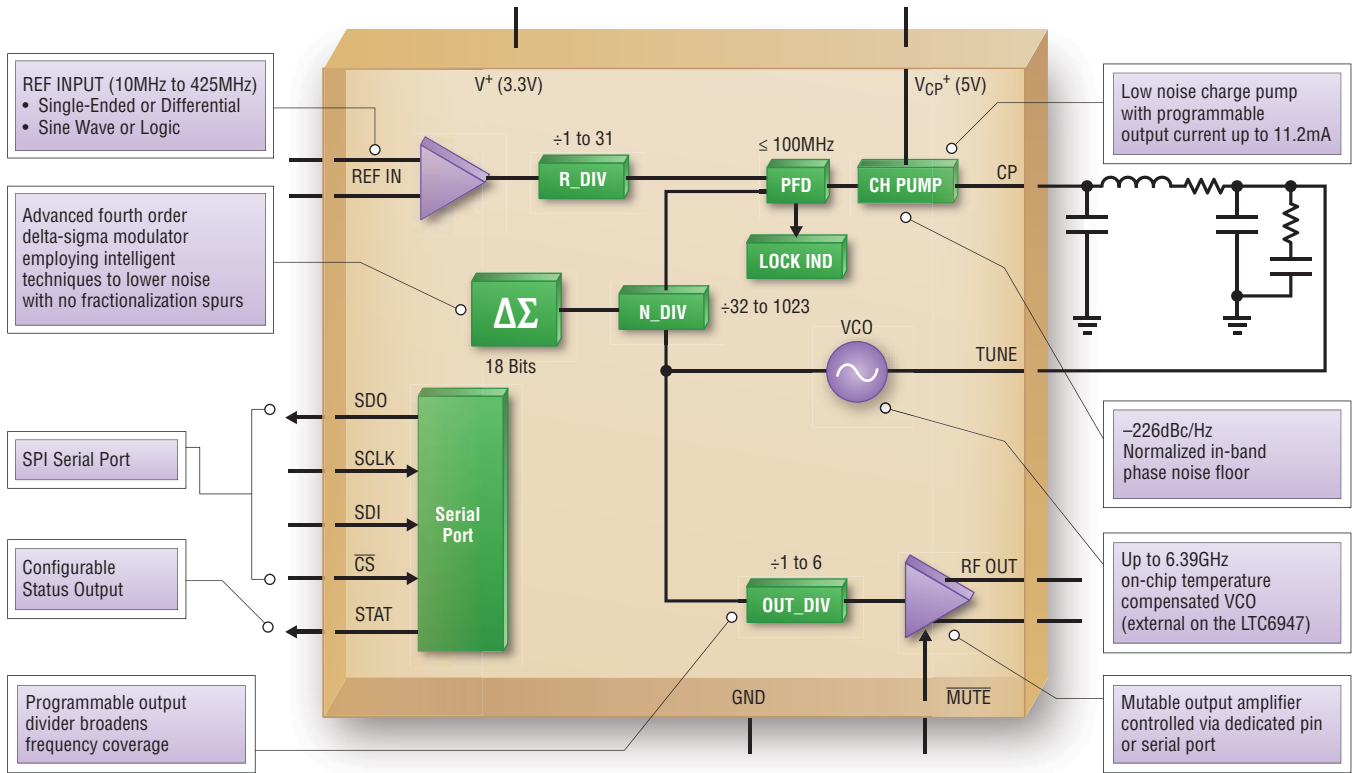- Reference Input Frequency up to 425MHz
- Fast Frequency Switching (LTC6948)

LTC6948-4 Phase Noise at 6.236GHz

Agilent E5052A Signal Source Analyzer

INDUSTRY LEADING 1/f NOISE

NO FRACTIONALIZATION SPURS!

RMS NOISE = 0.412°
RMS JITTER = 183fs
f_{PFD} = 50MHz
CARRIER = 6.236GHz

Output Frequency Options (Frequency in GHz)				
	LTC6948-1	LTC6948-2	LTC6948-3	LTC6948-4
OUT DIV = 1	2.240 to 3.740	3.080 to 4.910	3.840 to 5.790	4.200 to 6.390
OUT DIV = 2	1.120 to 1.870	1.540 to 2.455	1.920 to 2.895	2.100 to 3.195
OUT DIV = 3	0.747 to 1.247	1.027 to 1.637	1.280 to 1.930	1.400 to 2.130
OUT DIV = 4	0.560 to 0.935	0.770 to 1.228	0.960 to 1.448	1.050 to 1.598
OUT DIV = 5	0.448 to 0.748	0.616 to 0.982	0.768 to 1.158	0.840 to 1.278
OUT DIV = 6	0.373 to 0.623	0.513 to 0.818	0640 to 0.965	0.700 to 1.065

LINEAR TECHNOLOGY

LTC6948-X Block Diagram

REF INPUT (10MHz to 425MHz)
• Single-Ended or Differential
• Sine Wave or Logic

Advanced fourth order delta-sigma modulator employing intelligent techniques to lower noise with no fractionalization spurs

SPI Serial Port

Configurable Status Output

Programmable output divider broadens frequency coverage

V⁺ (3.3V)

V$_{CP}$⁺ (5V)

Low noise charge pump with programmable output current up to 11.2mA

REF IN

÷1 to 31
R_DIV

≤ 100MHz
PFD

CH PUMP

CP

LOCK IND

ΔΣ
18 Bits

N_DIV

÷32 to 1023

VCO

TUNE

−226dBc/Hz Normalized in-band phase noise floor

Up to 6.39GHz on-chip temperature compensated VCO (external on the LTC6947)

SDO
SCLK
SDI
CS
STAT

Serial Port

÷1 to 6
OUT_DIV

RF OUT

GND

MUTE

Mutable output amplifier controlled via dedicated pin or serial port

FracNWizard Tool Simplifies the Design Process

Design Features
- Find Part Parameters Based on Your Frequency Plan
- Design Noise-Optimized Loop Filters
- Simulate Loop Frequency Response and Stability
- Simulate VCO and Reference Source Noise
- Simulate Output Noise Characteristics and Statistics
- Import and Export VCO, Reference and Output Noise Data

Evaluation Features
- Read and Write All Device Registers
- Configure Using a Block Diagram Programming Interface
- Troubleshoot Common Setup Problems
- Receive Alerts Due to Programming Errors

Get the
FracN Wizard
www.linear.com/fracnwizard

Fully Optimized Design in Less Than 30 Seconds!

LINEAR TECHNOLOGY

0914a