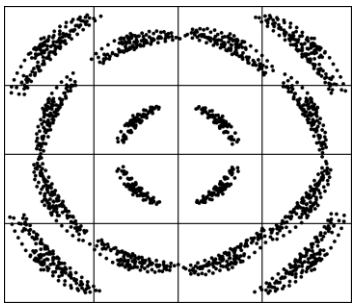
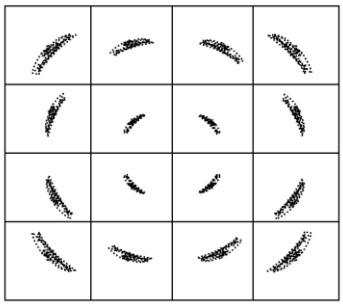
# Signal Integrity Solutions: Ultra-Low Phase Noise & Precision Measurement

Today's communication systems (e.g., 5G and Wi-Fi) utilize high order modulation to achieve high data throughput. Higher throughput requires faster clock rates, which make these systems more sensitive to local oscillator (LO) phase noise. This sensitivity can degrade EVM, increase symbol errors, and limit overall performance, underscoring the importance of minimizing phase noise for high-integrity communications.



*16 QAM with a poor phase noise LO.*

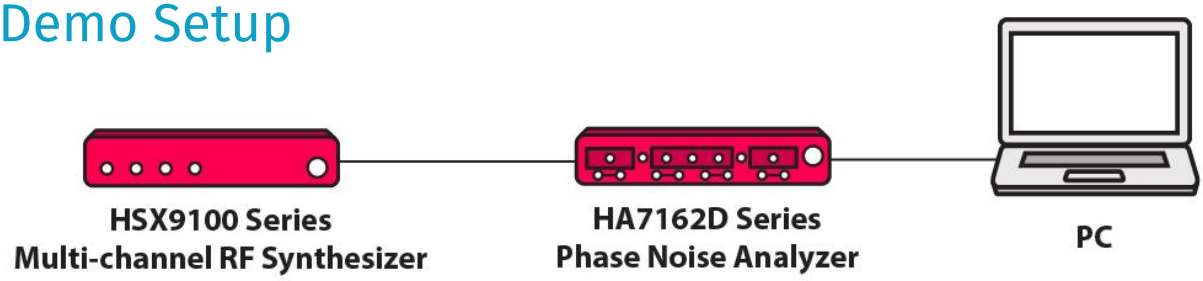


*16 QAM with a low phase noise LO.*

In radar systems, excessive LO phase noise can mask weak return signatures and reduce a radar receiver's ability to resolve Doppler-shifted target information. Minimizing phase noise is therefore critical for improving receiver sensitivity and target detection.

This demonstration highlights both ultra-low phase noise signal generation with the Maury Microwave HSX9100 series multi-channel RF synthesizer and precision phase noise measurement, featuring the Maury HA7162D series real-time phase noise analyzer. The stable, spectrally pure output of the HSX9100 series can be used as an LO substitute during testing to evaluate its impact on system performance, whether in communication links or radar receivers, while the high-performance HA7162D can measure the phase noise improvement directly to find a suitable replacement LO.

## Demo Setup




## Target Users

Target users include design engineers and technicians engaged in design, verification, and troubleshooting of radar systems and RF/microwave communications systems.

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# Product Overview

## HSX9100 Series Multi-channel RF Synthesizer

The HSX9100 series offers exceptional phase noise and spectral purity performance as a multi-channel CW signal source. The compact 1U chassis allows for anywhere from 1 to 4 independently tunable channels (frequency/phase offset/amplitude) to optimize channel density within test system racks where real estate is often crucial.

### KEY SPECIFICATIONS AND FEATURES:

- Fully independent channel
- Phase coherent channels
- The ultimate in channel-to-channel stability

## HA7162D Real-time Phase Noise Analyzer

The HA7162D real-time phase noise analyzer offers a unique combination of accuracy, speed, flexibility, and reliability in a compact form factor. Control is easy through an intuitive GUI or simple remote commands. The real time engine covers the full measurement bandwidth with extremely fast measurement speeds to reduce product development time and optimizes ATE manufacturing throughput.

### KEY SPECIFICATIONS AND FEATURES:

- Automated absolute and additive (residual) measurements
- Real-time cross correlation
- Only analyzer available that allows actual noise floor measurement

# More Resources

Visit [maurymw.com/info/mapcon-2025](maurymw.com/info/mapcon-2025) to learn more about Maury solutions.

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