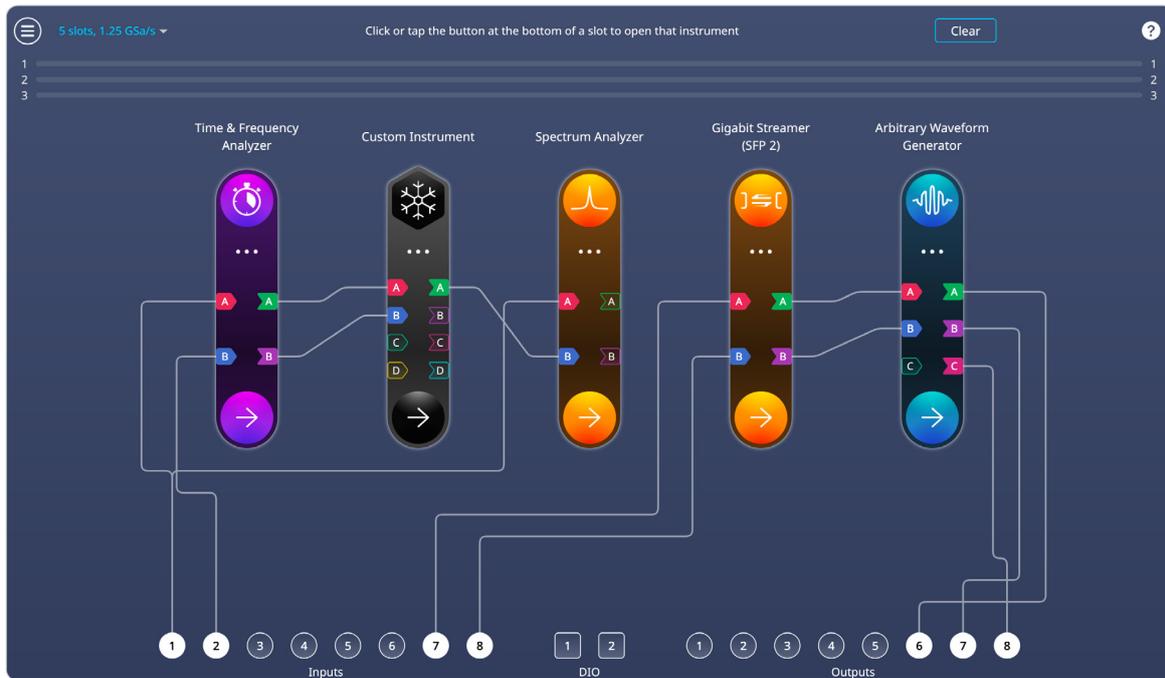


Multi-Instrument Mode

Combine instruments seamlessly for advanced measurement solutions



Multi-Instrument Mode on Moku enables you to run multiple instruments simultaneously to create custom test sequences and complex measurement workflows. Each instrument has full access to all analog inputs, outputs, and adjacent slots, connected through a low-latency, real-time signal path of up to 80 Gb/s. Instruments can operate independently or be combined into tightly integrated signal processing pipelines, with the flexibility to swap instruments dynamically without interrupting measurements. Unlock advanced capabilities with Moku Compile and on-device Neural Network integration to deploy custom algorithms and enable application-specific functionality.



Deployable Instruments

- Arbitrary Waveform Generator
- Custom Instrument
- Data Logger
- Digital Filter Box
- FIR Filter Builder*
- Frequency Response Analyzer
- Gigabit Streamer**
- Laser Lock Box*
- Lock-in Amplifier
- Logic Analyzer
- Neural Network
- Oscilloscope
- Phasemeter
- PID Controller
- Spectrum Analyzer*
- Time & Frequency Analyzer
- Waveform Generator

Moku:Delta

- Switchable configuration:
 - Three slots @ 5 GSa/s
 - Five slots @ 1.25 GSa/s
 - Eight slots @ 625 MSa/s
- 1 ppb stability onboard clock
- < 450 ns input-to-output latency
- Frequency-dependent blended 14-bit and 20-bit ADCs
- Two sets of 16 DIO pins:
 - Selectable 16-bit input buses
 - Selectable 16-bit Pattern Generators

Moku:Pro

- Four instrument slots @ 1.25 GSa/s
- 300 ppb stability onboard clock
- < 650 ns input-to-output latency
- Frequency-dependent blended 10-bit and 18-bit ADCs
- Selectable input bandwidth: 300 MHz or 600 MHz

Moku:Lab

- Switchable configuration:
 - Two slots @ 500 MSa/s
 - Three slots @ 250 MSa/s
- 12-bit, 500 MSa/s ADCs
- < 1 μ s input-to-output latency
- 500 ppb stability onboard clock

Moku:Go

- Switchable configuration:
 - Two slots @ 125 MSa/s
 - Three slots @ 62.5 MSa/s
- 12-bit, 125 MSa/s ADCs

Applications

- Automated test sequences
- System prototyping and simulation
- Closed-loop control design
- Optical metrology and spectroscopy
- Quantum computing
- Deploying custom algorithms to Moku hardware
- Real-time user-defined Neural Networks

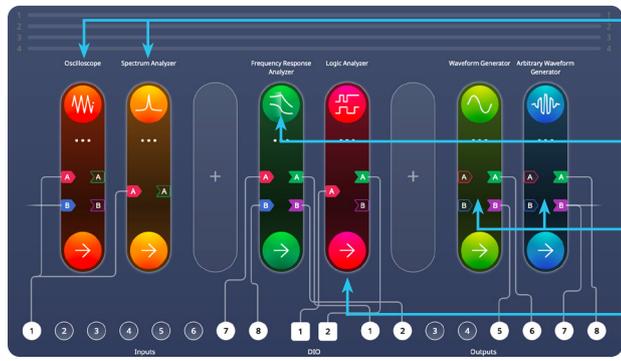
*Availability limitations in Multi-Instrument Mode for Moku:Lab and Moku:Go

**Only available for Moku:Delta

Application Highlights

Mixed-signal automated testing

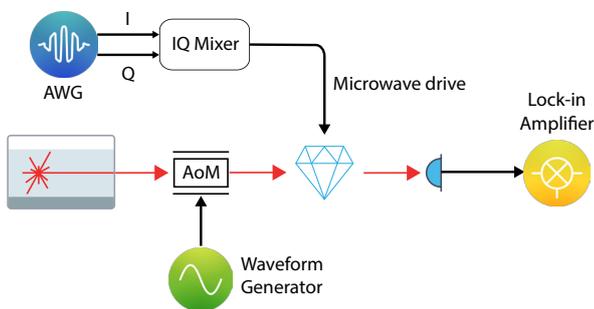
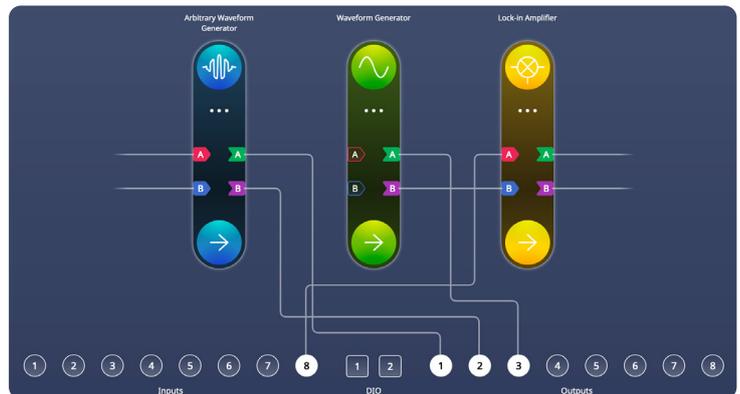
Multi-Instrument Mode enables integrated testing by combining up to eight instruments on a single device. Users can generate test signals, capture responses across multiple domains, and run real-time analysis without external switching or complex hardware setups. A high-speed FPGA-based signal bus ensures low-latency synchronization between instruments, supporting precise and repeatable measurements. Configurations can be managed through the Moku software interface or automated via Python, MATLAB, or REST APIs, making it straightforward to integrate into larger test frameworks.



- **Oscilloscope and Spectrum Analyzer:** monitor or measure device under test (DUT) output signals in the time and frequency domain simultaneously.
- **Frequency Response Analyzer:** performs stimulus/response measurements to analyze the transfer function of the DUT.
- **AWG and Waveform Generator** generate test signals from simple sine waves to complex modulated waveforms.
- **Logic Analyzer / Pattern Generator** provides digital signal decoding and control.

Quantum sensing

Multi-Instrument Mode enables precise control and measurement in quantum sensing experiments, such as spin defect initialization and readout for electromagnetic field detection. Use the Arbitrary Waveform Generator to generate I/Q baseband signals for an external mixer, and the Waveform Generator to synchronize initialization and readout laser pulses via an acousto-optic modulator (AOM). A Lock-in Amplifier extracts weak fluorescence signals with high sensitivity, enabling stable, high-fidelity measurements in a single integrated setup.

MEMS control

Creating a closed-loop control system to stabilize a MEMS resonator with Multi-Instrument Mode. The setup combines three Lock-in Amplifiers and a PID Controller on a single device. One Lock-in measures the feedback amplitude, the PID adjusts the drive signal to maintain stability, and a second Lock-in modulates the drive while a third monitors the response in real time. Low-latency FPGA signal paths seamlessly connect the instruments, delivering precise, responsive control without relying on multiple discrete devices.