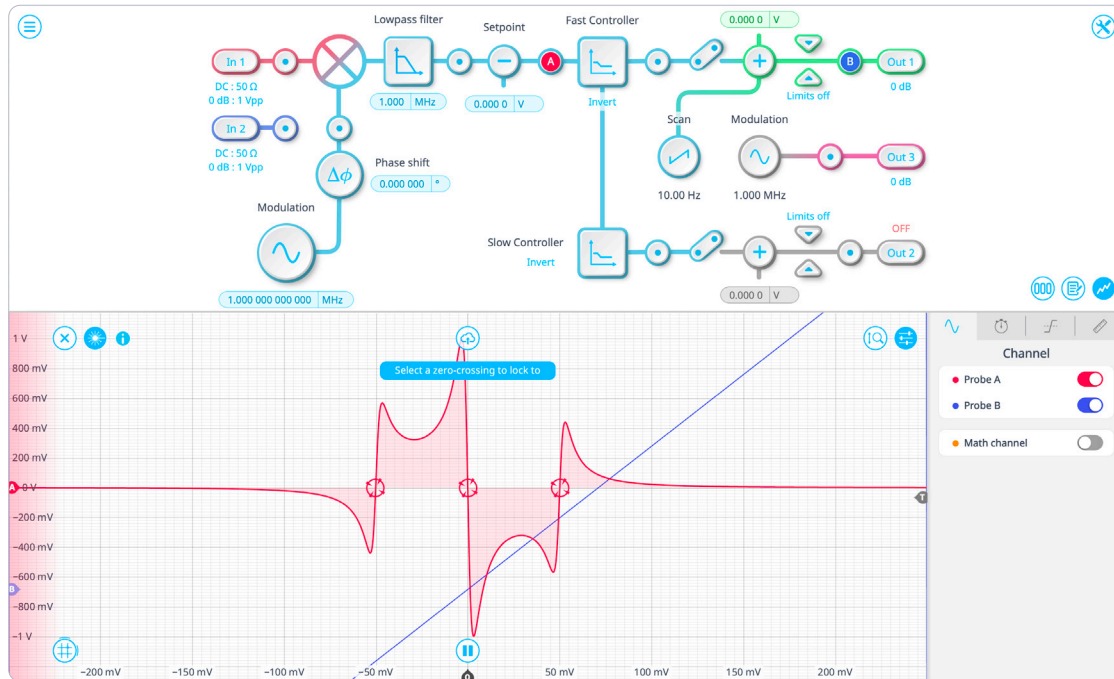# Laser Lock Box

Moku:Delta Laser Lock Box offers precision laser frequency stabilization with wideband performance up to 2 GHz and flexible scan waveforms. With support for up to eight simultaneous lock modules, it features dual PID controllers with independently tuned fast and slow feedback paths. Users can visualize and fine-tune locking behavior in real time using the integrated oscilloscope and leverage the "Lock Assist" function for locking to any zero-crossing in the error signal. Built on a high-speed and low-noise platform, the Laser Lock Box is a powerful tool for multi-laser stabilization, spectroscopy, and precision control experiments.

Demod. Frequency	Scan Frequency	Adjustable Filter	DAC Resolution	Built-in Controllers	Integrated Oscilloscope
1 mHz to 2 GHz	**Up to 10 MHz**	**2.6 kHz to 35 MHz**	**14 bits**	**Dual PID**	**5 GSa/s**

Features

- Stabilize a laser's frequency to a reference cavity or atomic transition
- Virtually probe within signal processing chain with an integrated oscilloscope
- Quickly lock to any zero-crossing in the error signal using the "Lock Assist" feature
- Individually configure high- and low-bandwidth PID Controllers for fast and slow feedback
- Quickly access the controls you need with a customizable control palette view
- Built-in IIR filter for custom filtering
- Stream or save traces from any point in the signal processing chain
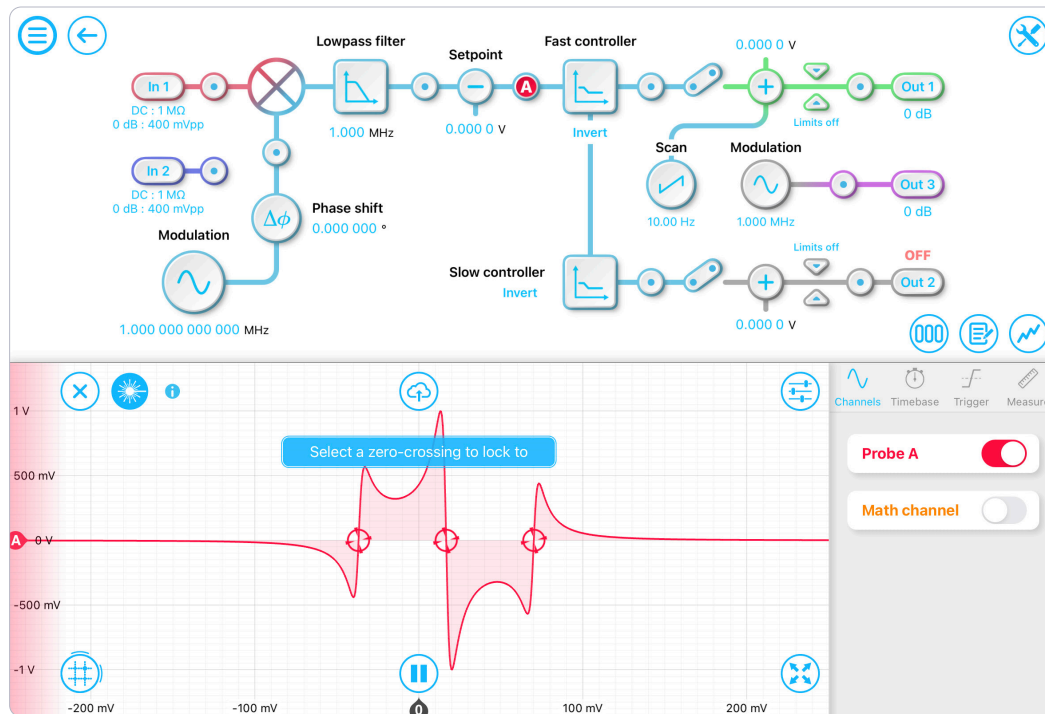
Specifications

- Local oscillator frequency: 1 mHz to 2 GHz
- Input range: 100 mV, 1 Vpp, 10 Vpp, or 40 Vpp
- Scan waveforms: positive sawtooth, negative sawtooth, triangle
- Scan frequency: 1 mHz to 10 MHz
- Low-pass filter corner frequency: 2.601 kHz to 35.16 MHz (second or fourth order)
- Integrator crossover frequency:
  - Fast PID: 312.5 mHz to 3.125 MHz
  - Slow PID: 4.883 mHz to 48.83 kHz
- External PLL frequency multiplier: 0.125x to 250x
- Ultrafast data acquisition: snapshot mode up to 5 GSa/s, continuous mode up to 10 MS/s

Applications

- Custom phase-locked loop
- Gravitational wave detection
- Closed-loop control systems
- Pound-Drever-Hall technique
- Precision spectroscopy
- Atomic and optical clocks
- Quantum optics
- Nonlinear and ultrafast optics
- Cold atom experiments

Note: All Moku:Delta specifications are subject to change.

Laser Lock Box

The Moku:Pro Laser Lock Box enables you to lock a laser's frequency to a reference cavity or atomic transition using high-performance modulation locking techniques. The Laser Lock Box includes a "Lock Assist" feature, enabling you to quickly lock to any zero-crossing on the demodulated error signal. With Multi-instrument Mode (MiM), you can deploy up to four laser lock modules simultaneously on a single Moku:Pro. Each module shares the same clock base from the internal or an external source. This is the ideal solution for multi-laser stabilization systems.

Demod. Frequency	Scan Frequency	Adjustable Filter	DAC Resolution	Built-in Controllers	Integrated Oscilloscope
1 mHz to 600 MHz	**Up to 10 MHz**	**2.6 kHz to 35 MHz**	**16 bits**	**Dual PID**	**1.25 GSa/s**

Features

- Stabilize a laser's frequency to a reference cavity or atomic transition
- Virtually probe within signal processing chain with an integrated oscilloscope
- Quickly lock to any zero-crossing in the error signal using the "Lock Assist" feature
- Individually configure high- and low-bandwidth PID Controllers for fast and slow feedback
- Quickly access the controls you need with a customizable control palette view
- Built-in IIR filter for custom filtering
- Stream or save traces from any point in the signal processing chain
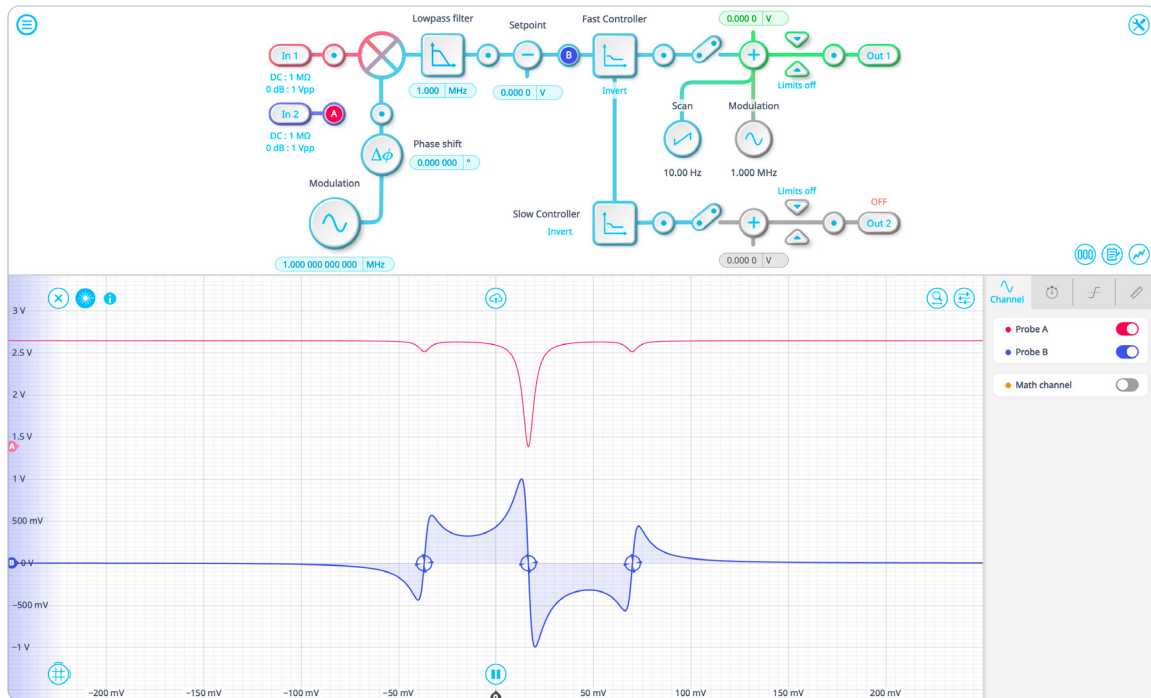
Specifications

- Local oscillator frequency: 1 mHz to 600 MHz
- Scan waveforms: positive sawtooth, negative sawtooth, triangle
- Scan frequency: 1 mHz to 10 MHz
- Infinite impulse response low-pass filter corner frequency: 2.6 kHz to 35.16 MHz (second or fourth order)
- Integrator crossover frequency: 312.5 mHz to 3.125 MHz, 988.2 mHz to 9.882 MHz (double integrator)
- External PLL frequency multiplier: 0.125x to 250x
- Ultrafast data acquisition: snapshot mode up to 1.25 GSa/s, continuous mode up to 10 MS/s

Applications

- Custom phase-locked loop
- Gravitational wave detection
- Closed-loop control systems
- Pound-Drever-Hall technique
- Precision spectroscopy

Laser Lock Box

The Moku:Lab Laser Lock Box enables you to lock a laser's frequency to a reference cavity or atomic transition using high-performance modulation locking techniques. The Laser Lock Box includes a Lock Assist feature, enabling you to quickly lock to any zero-crossing on the demodulated error signal.

Demod. Frequency	Scan Frequency	Adjustable Filter	DAC Resolution	Built-in Controllers	Integrated Oscilloscope
1 mHz to 200 MHz	**up to 10 MHz**	**1 kHz to 14 MHz**	**16 Bits**	**Dual PID**	**500 MSa/s**

Features

- Stabilize a laser's frequency to a reference cavity or atomic transition
- Virtually probe within signal processing chain with an integrated oscilloscope
- Quickly lock to any zero-crossing in the error signal using the Lock Assist feature
- Individually configure high- and low-bandwidth PID controllers for fast and slow feedback
- Quickly access the controls you need with a customizable control palette view
- Built-in IIR filter for custom filtering
- Stream or save traces from any point in the signal processing chain

Specifications

- Local oscillator frequency: 1 mHz to 200 MHz
- Scan waveforms: positive sawtooth, negative sawtooth, triangle
- Scan frequency: 1 mHz to 10 MHz
- Infinite impulse response low-pass filter corner frequency: 1 kHz to 14 MHz (second or fourth order)
- Integrator crossover frequency: 1.25 Hz to 125 kHz (fast PID), 19.53 mHz to 1.953 kHz (slow PID)
- External PLL frequency multiplier: 0.125x to 250x
- Data acquisition: 125 kS/s on two channels, 250 kSa/s on one channel

Applications

- Pound-Drever-Hall technique
- Precision spectroscopy
- Gravitational wave detection
- Custom phase-locked loop
- Closed-loop control systems

Laser Lock Box

The Moku:Go Laser Lock Box enables you to lock a laser's frequency to a reference cavity or atomic transition using high-performance modulation locking techniques. Use the "Lock Assist" feature to quickly lock to any zero-crossing on the demodulated error signal. Configure up to three locking stages to customize the lock procedure.
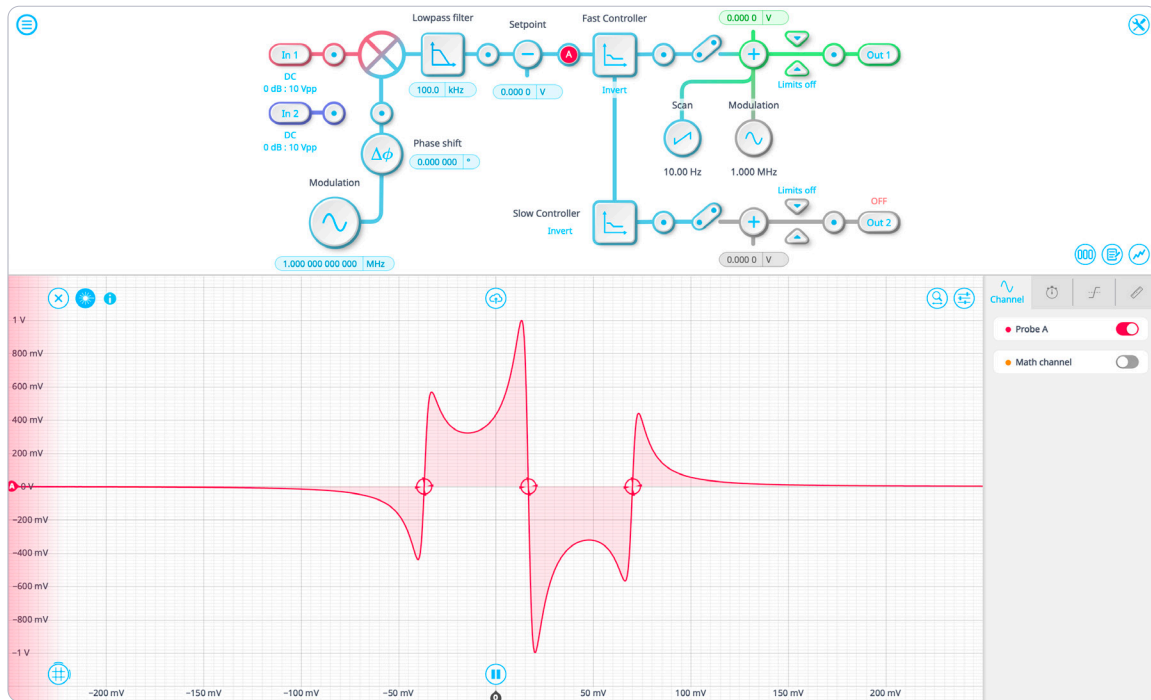
Demod. frequency	Scan frequency	Adjustable filter	DAC resolution	Built-in controllers	Integrated Oscilloscope
1 mHz to 30 MHz	**Up to 10 MHz**	**260.1 Hz to 3.516 MHz**	**12 bits**	**Dual PID**	**125 MSa/s**

Features

- Stabilize a laser's frequency to a reference cavity or atomic transition
- Virtually probe within signal processing chain with an integrated oscilloscope
- Quickly lock to any zero-crossing in the error signal with "Lock Assist"
- Individually configure high- and low-bandwidth PID Controllers for fast and slow feedback
- Implement custom filtering with the built-in IIR filter
- Quickly access the controls you need with a customizable control palette view

Specifications

- Local oscillator frequency: 1 mHz to 20 MHz
- Scan waveforms: positive ramp, negative ramp, triangle
- Scan frequency: 1 mHz to 10 MHz
- Infinite impulse response low-pass filter corner frequency: 260.1 Hz to 3.516 MHz (second or fourth order)
- Integrator crossover frequency: 312.5 mHz to 31.25 kHz
- External PLL frequency multiplier: 0.125x to 250x
- Ultrafast data acquisition: snapshot mode up to 125 MSa/s, continuous mode up to 1 MS/s

Applications

- Custom phase-locked loop
- Closed-loop control systems
- Pound-Drever-Hall technique
- Precision spectroscopy