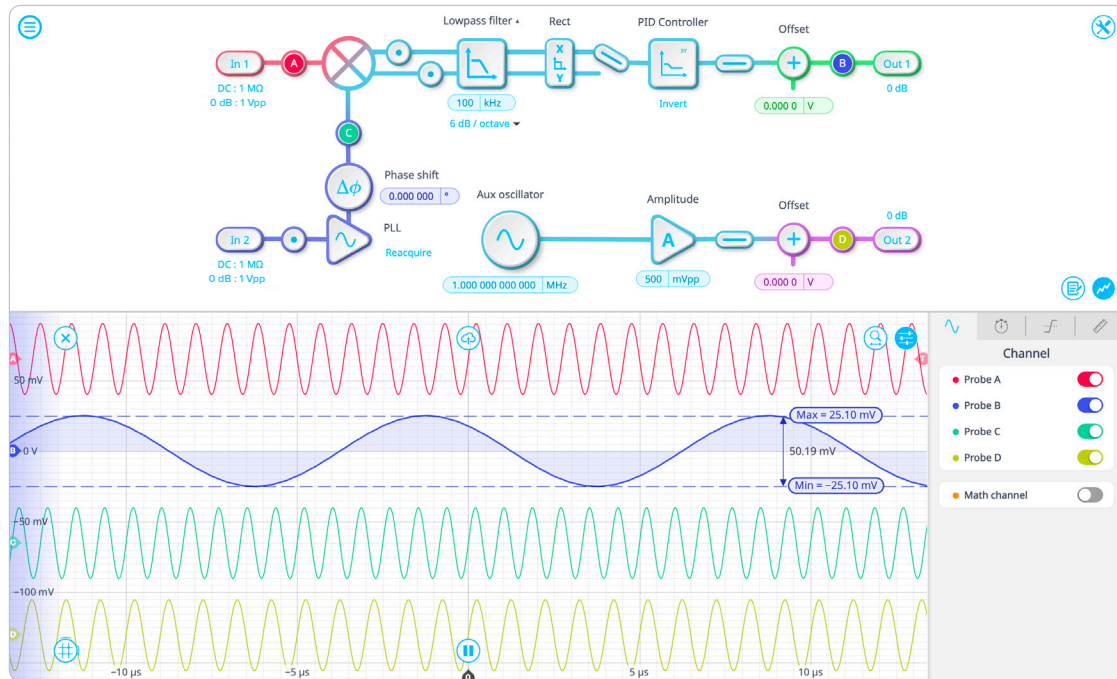




The Moku:Delta Lock-in Amplifier delivers dual-phase demodulation from millihertz to 2 GHz with microhertz resolution and ultralow-noise floor of  $< 10 \text{ nV}/\sqrt{\text{Hz}}$ . It supports external reference locking up to the 250th harmonic or down to the 1/8th subharmonic. A built-in PID controller enables real-time feedback and stabilization, and a 1 TB SSD supports high-throughput, long-duration data logging. With a GPS-disciplined oscillator for precise timing, Moku:Delta is ideal for signal recovery in quantum sensing, ultrafast optics, and advanced control systems.



**Demod. Frequency**  
1 mHz to 2 GHz

**Dynamic Reserve**  
> 120 dB

**Time Constant**  
From 12.8 ns

**Filter Slopes**  
6, 12, 18, 24 dB/Oct

**Input Noise**  
< 10 nV/ $\sqrt{\text{Hz}}$

**Built-in Feature**  
PID Controller  
Data Logger

## Features

- Measure signals obscured by noise with more than 120 dB dynamic reserve
- Block diagram view of the digital signal processing chain
- Built-in probe points for signal monitoring and data logging
- Internal or external demodulation modes including a phase-locked loop (PLL)
- Demodulate at up to the 250th harmonic or down to 1/8th of the fundamental frequency
- Toggle between rectangular (X/Y mode) or polar coordinates (R/ mode)
- Built-in PID Controller and Data Logger
- Supported external clock reference: 10 MHz, 100 MHz, GPS

## Specifications

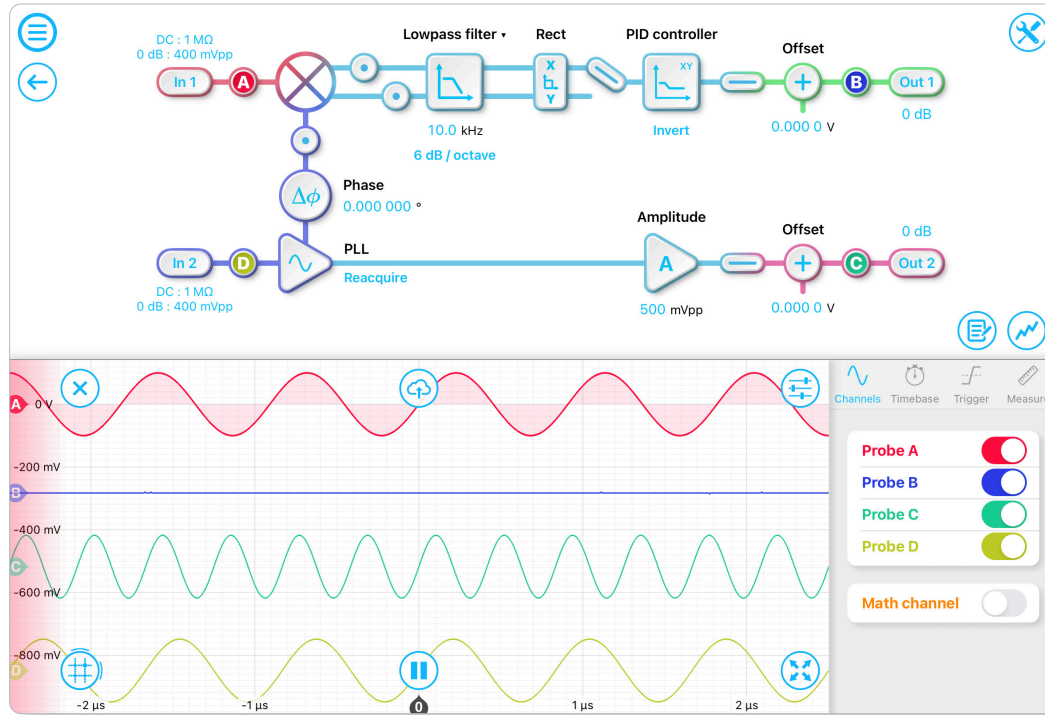
- Demodulate with frequencies ranging from 1 mHz to 2 GHz with  $\mu\text{Hz}$  resolution
- External PLL frequency multiplier: 0.125x to 250x
- Phase shift precision of 0.000 001°
- Input impedance: 50  $\Omega$  / 1 M $\Omega$
- Time constant : 12.8 ns to 0.215 s
- Low-pass filter corner frequency: 700 mHz to 12.4 MHz
- 6, 12, 18, or 24 dB/octave filter roll-off
- Output gain range: -80 to +160 dB
- LO output: up to 2 GHz with variable amplitude
- Ultrafast data acquisition:
  - snapshot mode up to 5 GSa/s
  - continuous mode up to 10 MSa/s

## Applications

- Quantum sensing and control
- Ultrafast laser spectroscopy
- Laser frequency stabilization
- Laser scanning microscopy
- Multi-channel magnetometry (magneto-optical Kerr effect)
- Scanning probe and near-field microscopy



The Moku:Pro digital Lock-in Amplifier supports dual-phase demodulation (XY/R $\theta$ ) from 1 mHz to 600 MHz with more than 120 dB dynamic reserve. A PID Controller can be placed after the demodulation stage for phase-locked loop applications. It also features an integrated 4-channel Oscilloscope and Data Logger, enabling you to observe signals at up to 1.25 GSa/s and log data at up to 10 MSa/s.



Demod. Frequency  
1 mHz to 600 MHz

Dynamic Reserve  
> 120 dB

Time Constant  
From 12.8 ns

Filter Slopes  
6, 12, 18, 24 dB/Oct

Input Noise  
30 nV/ $\sqrt{\text{Hz}}$  at 100 Hz

Built-in Feature  
PID Controller

## Features

- Measure signals obscured by noise with more than 120 dB dynamic reserve
- Block diagram view of the digital signal processing chain
- Built-in probe points for signal monitoring and data logging
- Internal or external demodulation modes including a phase-locked loop (PLL)
- Demodulate at up to the 250th harmonic or down to 1/8th of the fundamental frequency
- Toggle between rectangular (X/Y mode) or polar coordinates (R/ $\theta$  mode)
- Built-in PID Controller and Data Logger

## Specifications

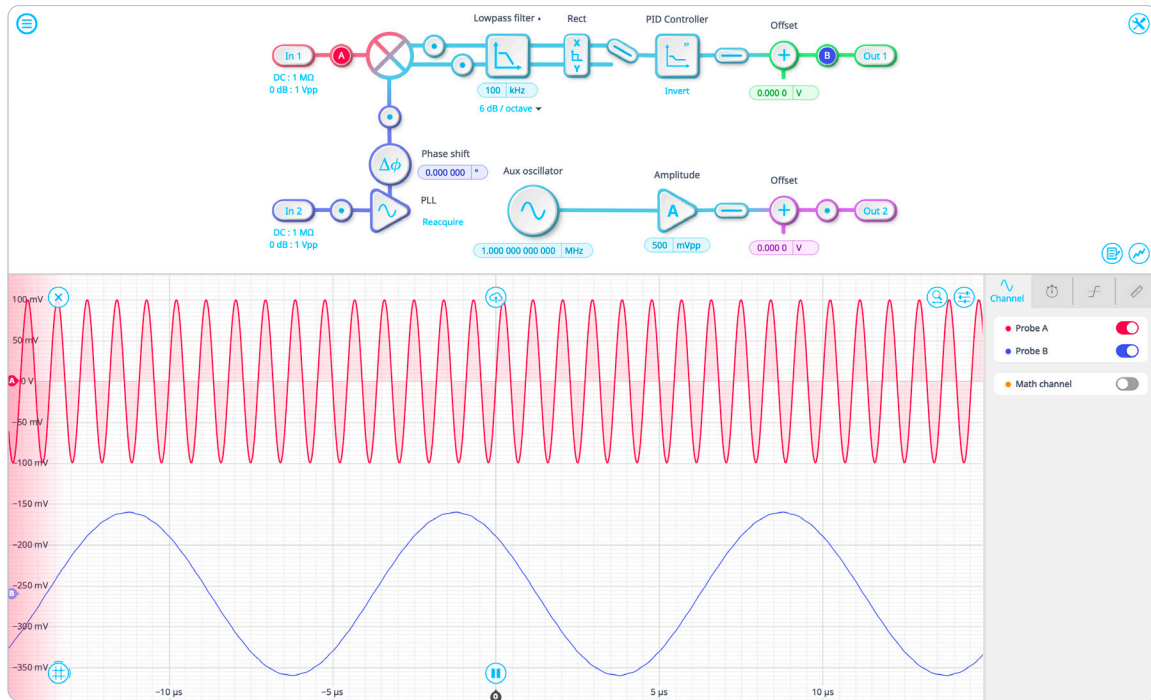
- Demodulate with frequencies ranging from 1 mHz to 600 MHz with  $\mu$ Hz resolution
- External PLL frequency multiplier: 0.125x to 250x
- Phase shift precision of 0.000 001°
- 50  $\Omega$  / 1 M $\Omega$  input impedance
- Adjustable time constant from 12.8 ns to 0.215 s
- 6, 12, 18, or 24 dB/octave filter roll-off
- Output gain range: -80 to +160 dB
- LO output up to 500 MHz with variable amplitude
- Ultrafast data acquisition: snapshot mode up to 1.25 GSa/s, continuous mode up to 1 MSa/s

## Applications

- Laser frequency stabilization
- Laser scanning microscopy
- Magnetic sensing (magneto-optical Kerr effect)
- Pump probe / ultrafast spectroscopy



The Moku:Lab digital Lock-in Amplifier supports dual-phase demodulation (X/Y or R/ $\theta$ ) from DC to 200 MHz with more than 120 dB of dynamic reserve. A PID Controller can be placed after the demodulation stage for phase-locked loop applications. It also features an integrated 2-channel Oscilloscope and Data Logger, enabling you to observe signals at up to 500 MSa/s and log data at up to 250 kSa/s.



**Demod. frequency**  
1 mHz to 200 MHz

**Dynamic reserve**  
>120 dB

**Time constant**  
From 32 ns

**Filter slopes**  
6, 12, 18, 24 dB/oct

**Dual-phase demod.**  
X/Y or R/ $\theta$

**Built-in feature**  
PID Controller  
Data Logger

## Features

- Measure signals obscured by noise with more than 120 dB dynamic reserve
- Block diagram view of the digital signal processing chain
- Built-in probe points for signal monitoring and data logging
- Internal or external demodulation modes including a phase-locked loop (PLL)
- Demodulate at up to the 250th harmonic or down to 1/8th of the fundamental frequency
- Toggle between rectangular (X/Y mode) or polar coordinates (R/ $\theta$  mode)
- Built-in PID Controller

## Specifications

- Demodulate with frequencies ranging from 1 mHz to 200 MHz with  $\mu$ Hz resolution
- PLL frequency multiplier: 0.125x to 250x
- Phase shift precision of 0.000 001°
- 50  $\Omega$  / 1 M $\Omega$  input impedance
- Adjustable time constant from 32 ns to 537 ms
- 6, 12, 18, or 24 dB/octave filter roll-off
- Output gain range: -80 to +160 dB
- Local oscillator output up to 200 MHz with adjustable amplitude
- Data acquisition up to 250 kSa/s

## Applications

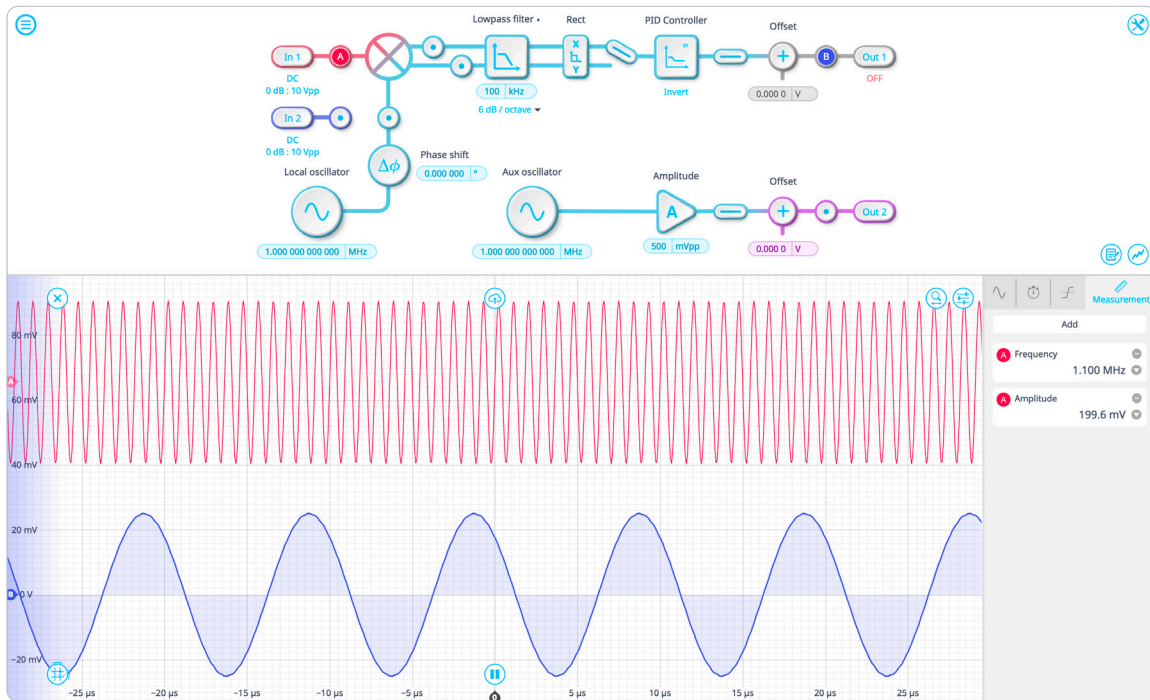
- Laser frequency stabilization
- Laser scanning microscopy (SRS, TA, and more)
- Magnetic sensing (magneto-optical Kerr effect)
- Pump probe / ultrafast spectroscopy



# 30 MHz Lock-in Amplifier



The Moku:Go digital Lock-in Amplifier supports dual-phase demodulation (XY/R $\theta$ ) from DC to 30 MHz. It features an integrated 2-channel Oscilloscope and Data Logger, enabling you to observe signals at up to 125 MSa/s and log data at up to 1 MSa/s. A PID Controller can also be placed after the demodulation stage for phase-locked loop applications.



**Demod. frequency**  
1 mHz to 30 MHz

**Time constant**  
128 ns to 2.15 s

**Filter slopes**  
6, 12, 18, 24 dB/Oct

**Dual-phase demod.**  
X/Y or R/ $\theta$

**Signal generator**  
Up to 20 MHz

**Built-in feature**  
PID Controller  
Data Logger

## Features

- Block diagram view of the digital signal processing chain
- Built-in probe points for signal monitoring and data logging
- Internal or external demodulation modes including a phase-locked loop (PLL)
- Demodulate at up to the 250th harmonic or down to 1/8th of the fundamental frequency
- Dual-phase demodulation
- Toggle between rectangular (X/Y mode) or polar coordinates (R/ $\theta$  mode)
- Built-in PID Controller

## Specifications

- Demodulate with frequencies ranging from 1 mHz to 30 MHz with  $\mu$ Hz resolution
- Phase shift precision of 0.000 001°
- 1 M $\Omega$  input impedance, AC/DC coupling
- Adjustable time constant from 128 ns to 2.15 s
- 6, 12, 18, or 24 dB/octave filter roll-off
- Output gain range: -80 to +160 dB
- Local oscillator output up to 20 MHz with variable amplitude
- Dynamic reserve > 100 dB
- Onboard data acquisition: snapshot mode up to 125 MSa/s, continuous mode up to 1 MSa/s

## Applications

- Laser frequency stabilization
- Phase-locked loop
- Radio receiver education
- Signal extraction from noise education
- Signal modulation and demodulation
- Software-defined radio