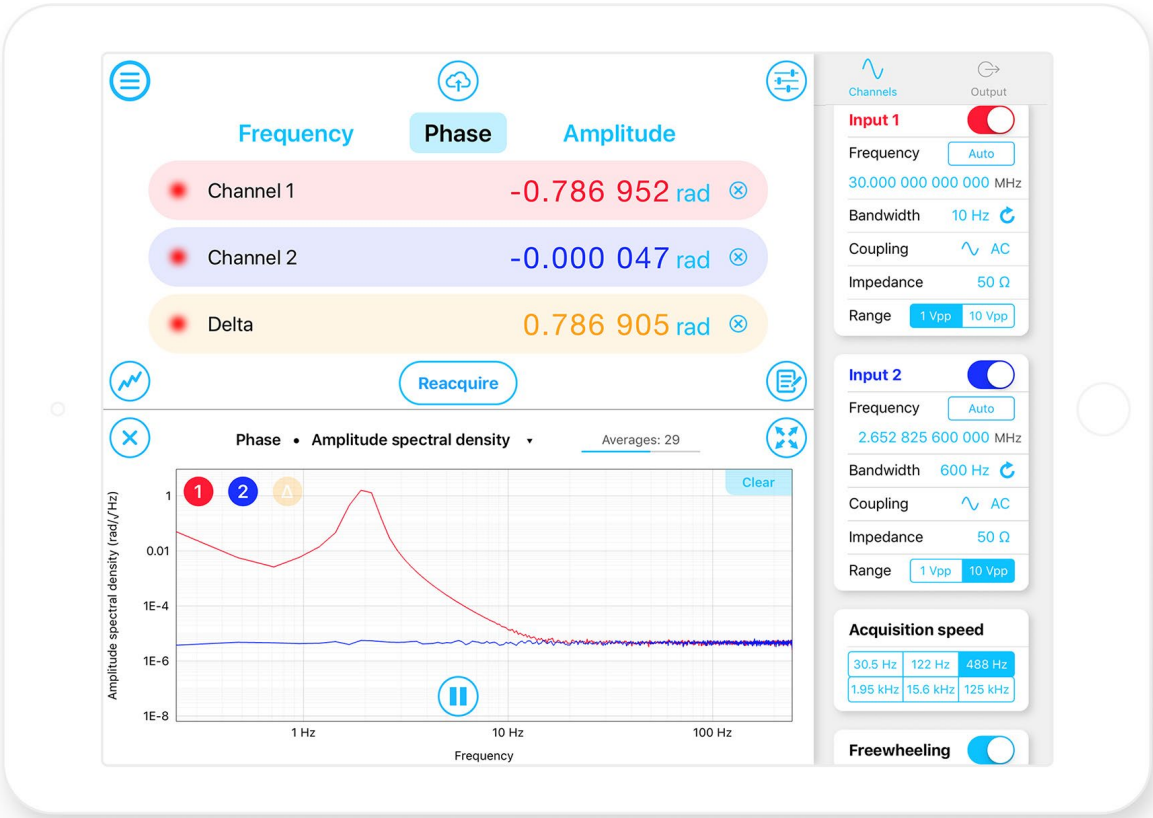
Phasemeter

Description

Moku:Lab's Phasemeter measures phase of up to two input signals with better than 6 µradian precision from 1 kHz up to 200 MHz. Based on a digitally implemented phase-locked loop architecture, Moku:Lab's phasemeter provides exceptional dynamic range, zero dead-time and measurement precision that exceeds the performance of conventional lock-in amplifiers and frequency counters.



Features

- Measure phase over a range of more than 65 million cycles with better than 1 µcycle precision
- Simultaneously measure the phase, frequency and amplitude of an incoming signal
- Acquire data at up to 125 kSa/s
- Observe measurement data in the frequency domain using the Phasemeter's integrated spectral analysis toolkit

Specifications

Inputs

Input characteristics

Input frequency range	1 kHz to 200 MHz
Input voltage range	± 0.5 V into 50 Ω
Input impedance	50 Ω / 1 MΩ
Input coupling	AC / DC

Measurement

Measurement characteristics

Frequency set-point precision	3.55 µHz	
Modes of operation	Auto-acquire	Automatically determines input frequency for signals above 1 MHz
	Manual	Initializes the phasemeter to a specific frequency
Tracking bandwidth	10 Hz / 40 Hz / 150 Hz / 600 Hz / 2.5 kHz / 10 kHz (user selectable)	
Frequency precision	**Input Frequency**	**Precision (f = Fourier frequency)**
	< 10 MHz	*f* x 10 µHz/√Hz from 1 mHz to 1 kHz
	< 100 MHz	*f* x 20 µHz/√Hz from 1 mHz to 1 kHz
	> 100 MHz	20 µHz/√Hz below 1 Hz *f* x 20 µHz/√Hz from 1 Hz to 1 kHz
Phase precision[11]	< 10 MHz	100 nCycles/√Hz above 1 Hz
	< 100 MHz	2 µCycles/√Hz above 1 Hz
	> 100 MHz	20 µCycles/√Hz above 1 Hz

Data visualisation

Visualisations	Timeseries, Power Spectral Density, Amplitude Spectral Density, Coherence, Rayleigh Spectrum, Allan Deviation

[11] Frequency and phase measurement precision is limited by sampling jitter at low Fourier frequencies.

Saving Data

Saving data	
Logging rates	30 Sa/s, 120 Sa/s, 490 Sa/s, 1.95 kSa/s, 15.6 kSa/s, 125 kSa/s
File formats	Plain text: records data using a standard CSV format
	Binary: records data using a proprietary LI format for high-speed data logging. **Note:** data saved using the LI format must be converted to plain text using the LI file converter available here: https://github.com/liquidinstruments/lireader
Export modes	SD Card, Dropbox, E-mail and iCloud, My Files (iOS 11)
Delayed log start time	Up to 240 hours
Log duration	1 second up to 240 hours

Synthesizer

Synthesizer[12]	
Channels	2
Output impedance	50 Ω
Waveform shape	Sine
Output modes	Manual, phase-locked to input signal
Sampling rate	1 GSa/s per channel
Voltage range	± 1 V into 50 Ω

[12] Where not stated, the phasemeter's synthesizer specifications match those of the Moku:WaveformGenerator instrument.