# Oscilloscope

Description

The Moku:Oscilloscope features two 500 MS/s analog input channels with 200 MHz analog bandwidth, 10 V_{pp} input voltage range, and user-configurable AC / DC coupling and 50 Ω / 1 MΩ impedance. This instrument takes full advantage of the iPad's multi-touch capabilities, enabling you to add cursors, view measurements, and adjust time and amplitude scales with minimal effort.
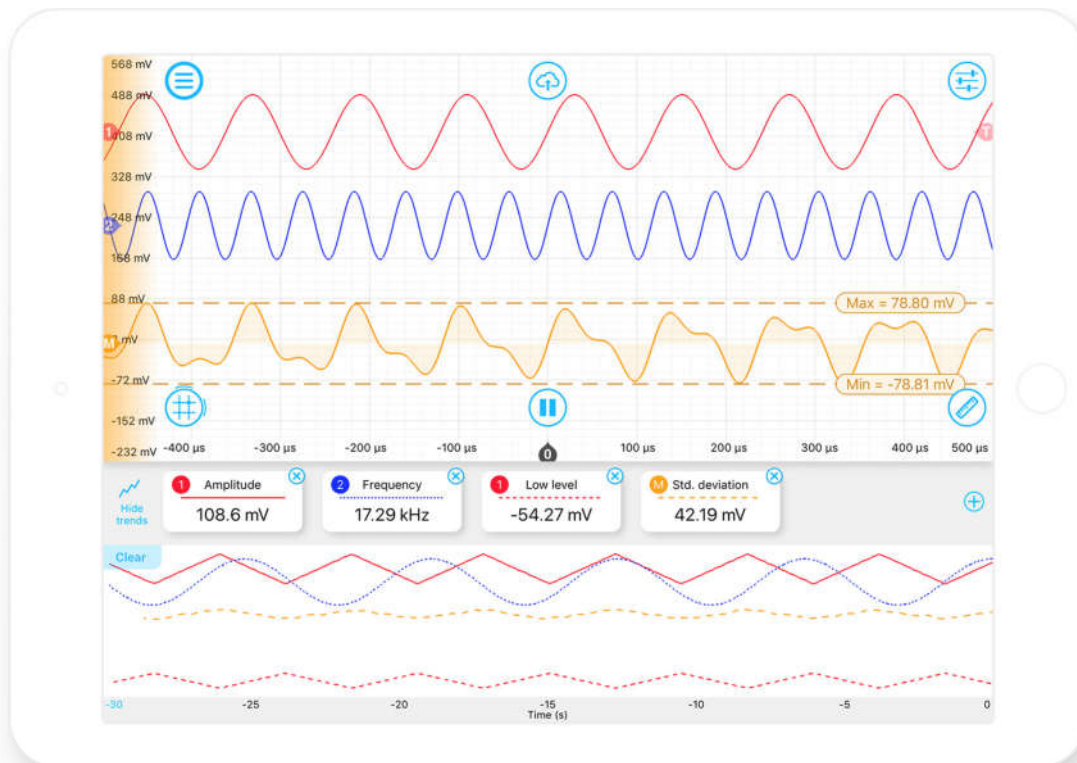
Features

- Analyse two voltage channels with a vertical range of ±5 Volts, 200 MHz analog bandwidth, and maximum sampling rate of 500 MS/s
- Measure data in precision mode to increase measurement resolution by rejecting noise
- Synthesize sine, square, ramp, pulse, and DC waveforms
- Analyse signals in XY mode
- Quickly measure waveform characteristics, trends and statistics

Specifications

Vertical characteristics

Voltage

Channels	2
Input coupling	AC, DC
Input bandwidth (-3 dB)	> 200 MHz into 50 Ω
Input impedance	50 Ω, 1 MΩ
Input voltage range	± 5 V
Vertical resolution[4]	12 bits at 500 MS/s (ADC resolution) 13 bits at 125 MS/s 22 bits at 1 kS/s
Channel-to-channel isolation	> 40 dB

Horizontal characteristics

Time

Time mode	Normal, Roll	
Horizontal range	1 ns/div to 10 s/div	
Delay range	Pre-trigger:	16 kSamples Greater of 32.768 µs or screen width
	Post-trigger:	2^{30} samples 2.147 s to 1 Ms

Acquisition

Acquisition mode	Normal, Precision[5]
Maximum sampling rate	500 MS/s
Memory depth	16,384 Samples per channel 32.7 µs at 2 ns/div
Averaging (linear)	Off, 2 to 100 waveforms
Persistence	Off, 100 ms to 10 s, infinite
Interpolation	Linear, SinX/X, Gaussian

---

[4] Higher effective number of bits (ENOB) above the physical ADC specification is only available in precision mode.

[5] Precision mode samples the waveform at the full rate and applies a finite impulse response (FIR) low-pass filter to attenuate noise above the usable bandwidth of the measurement sampling rate and prevent aliasing.

Trigger

Trigger

Trigger modes	Auto:	Triggers automatically after timeout (1 second if previously triggered, 0.05 seconds otherwise)
	Normal:	Triggers only on trigger event
	Single:	Triggers once on a trigger event. Press the 'play' button to re-trigger
Trigger sources	Input 1, Input 2, Output 1, Output 2, External	
Nth event	Trigger on the 1st to $65,535^{th}$ event	
Holdoff	1 nanosecond to 10 seconds	
Trigger types	Edge: Rising edge, falling edge, both edges Pulse: Positive / negative polarity • 10.0 seconds > **pulse width** > 816.0 nanoseconds	

Trigger sensitivity

Sensitivity modes	Auto:	Automatically configures trigger sensitivity based on horizontal and vertical scales Select *Noise Reject* or high-frequency *HF Reject* options
	Manual:	Manually configure trigger sensitivity
Manual modes	Relative, Absolute	
Hysteresis	Relative: 0.01 div to 5.00 div Absolute: 100 µV to 5.00 V	

Measurements

Measurements

Time measurements	Frequency, period, duty cycle, positive pulse width, negative pulse width, rise time, fall time, rise rate, fall rate
Amplitude measurements	Peak-to-peak, amplitude, maximum, minimum, mean, cycle mean, RMS, cycle RMS, standard deviation, high-level, low-level, overshoot, undershoot
Math	Add, subtract, multiply, divide, XY mode, integrate, differentiate, FFT, min hold, max hold, arbitrary equation mode (using equation editor)
Visualisations	Histogram, time trend

Cursors

Maximum voltage cursors	5 per channel
Maximum time cursors	5 per channel
Voltage cursor options	Manual, track mean, track maximum, track minimum, maximum hold, minimum hold
User defined reference	A single cursor can be set as a reference for differential measurements using all other active cursors

Synthesizer

Channels	2
Output impedance	50 Ω
Waveforms[6]	Sine, Square, Ramp, Pulse, DC
Output frequency range	1 mHz to 250 MHz
Output voltage range	± 1 V into 50 Ω

---

[6] Modulation not available for waveforms synthesized using the oscilloscope instrument.