

Keysight 1000A/B Series Oscilloscope

Configurable Test Set, 2-port, 30 kHz to 4.5/8.5 GHz

Engineered to give you more scope than you thought you could afford

Keysight Technologies, Inc. 1000 Series oscilloscopes deliver the performance and features you expect in a big scope – and the portability and low price you require in a small one.

Exploring the basic user interface

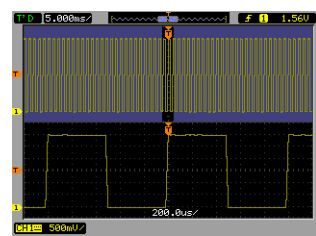
Initial connection: Connect channel 1 to the Probe Comp pin on the front panel of the scope;

(A) = DSO1000A / (B) = DSO1000B

Vertical controls

1. The Vertical controls are color-coded to match the waveform. Use the **larger knob** to set volts/division in 1-2-5 sequence. Press the knob to enter "Vernier (A)/Fine(B)" mode. This lets you adjust in increments as small as 0.5 mV (at 20 mV/div setting).
2. Press [**Channel 1**] to view the vertical menus (press the button next to 1/2 to see all the menu options).
3. Press [**Channel 1**] again to turn the channel off. Press it a third time to restore the channel.

Horizontal controls

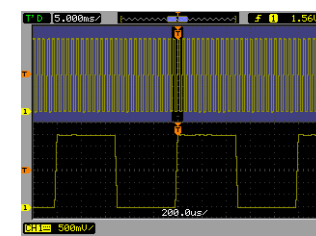


1. In the Horizontal section, turn the large knob to control the time/div setting in a 1-2-5 sequence.
2. Press the large knob to turn on the zoom display mode. This gives you a "forest/trees" view. The large time/div knob now controls the width of the zoom window. Press the knob again to turn off the zoom.
3. Pressing [Menu/Zoom](A)/[Horiz](B) gives you access to other time base options. X-Y and Roll mode are found in here.
4. The small knob controls the delay/offset from the trigger point. Pressing the knob resets the delay/offset to zero.

Trigger controls

1. [Force](A)/[Force Trigger](B) creates a trigger in absence of a qualifying event.
2. Pressing [Trigger Level] sets the trigger level to 50% between the peaks of the trigger source.
3. Use Trigger [Menu](A)/[Trig Menu](B) to select different triggering modes, including Edge, Pulse, Video, Pattern (A only) and Alternate.

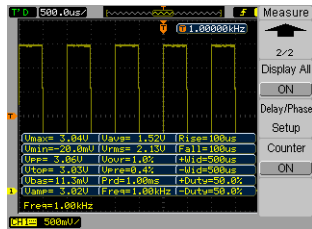
Cursor controls



1. Press [Default Setup] [AutoScale] [Menu On/Off]
2. Press [Cursors] to turn on cursor measurements. Cursors can be set to Manual, Track, Auto or Off.
3. Select Manual. Turn the Selection knob to position Cursor A on a desired edge, showing time relative to trigger.
4. Clear the 4th soft key CurA and select the 5th soft key CurB. Repeat to position Cursor B on another edge. $|\Delta X|$ shows the delta time value between CurA and B.
5. Press [Cursors] again. Now, Cursors track waveform automatically.

Advanced features

Automatic measurements

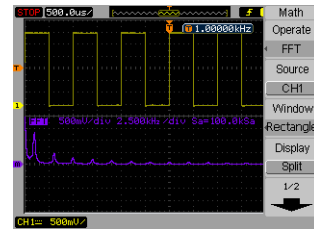


1000 Series supports 23 automatic measurements. Let's explore few of them.

1. Press [DefaultSetup] [AutoScale]
2. Press [Measure](A)/[Meas](B). Verify that the source is CH 1. Press Time and use the selection knob (which is now illuminated) to Freq.
3. Press 1/2 to see the page 2 of the Measure menu. Note that the DS01000A/B scopes offer an integrated 6-digit hardware frequency counter. Toggle Counter to ON.
4. Toggle Display all to ON. The display now shows 18 of the 23 measurements.

The frequency of the signal is 1 kHz. Now, let's try to find out the frequency content of the signal.

Math

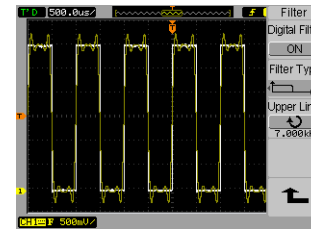


1000 Series offers 4 waveform math; A+B, A-B, AxB or FFT.

1. Press [Measure](A)/[Meas](B) to turn off measurements.
2. Press [Math] in the Vertical section. Select Operate and select FFT.
3. Display says the horizontal scale is 2.5 kHz/div. You can see there are almost no frequency component beyond 20~25 kHz.

You now know the frequency content of the signal. Let's now apply a software filter to see how a time domain signal changes.

Software filter

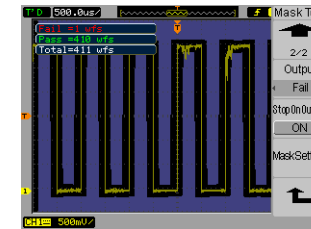


Software filters allow you to isolate signal spectral components. This is a useful tool for isolating ripple currents, modulated signals, or simply for minimizing noise.

1. Press [Math] again to turn it off.
2. Press [Ref] and select Save. The white waveform is your reference waveform.
3. Press Channel 1.
4. Select Digital Filter.
5. Toggle Digital Filter to ON.
6. Use the Selection knob to change the Upper limit bandwidth from 1 kHz to 25 kHz. Watch the 1 kHz square wave gain edge definition.
7. At 25 kHz, the original waveform is almost restored. Let's continue to increase to 49 kHz.
8. Now, the reference waveform and channel 1 are nearly identical.
9. Select Filter Type. High-pass, band-pass, and band-reject filters are also available.

A signal can change with the frequency contents. Now, let's explore the way to stop scope acquisition automatically when an unexpected signal is observed.

Go/No-go mask testing

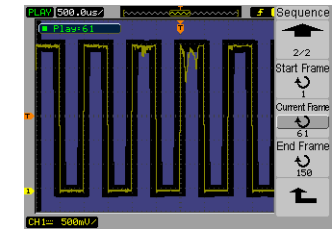


The mask test function monitors waveform changes by comparing the waveform to a predefined mask.

1. Press Digital Filter to turn it off.
2. Press [Ref] twice to turn Ref off.
3. Press [Utility] and select Mask Test. Select Enable Test ON to enable the mask test.
4. Select 1/2. Create a mask by selecting Mask Setting and Create Mask. You now created a mask for your signal.
5. Select 1/2, an up arrow (▲), and 2/2. Select Operate to run or stop the test. Toggle Msg Display to ON to display a summary.
6. Wiggle or briefly disconnect the probe connected to Channel 1 to create a failure and stop the mask test.

You now know how to test a signal against its limit. Now, find out the way to record signals, in order to observe what occurred before a mask failure.

Sequence mode



You can record, play back and store waveforms from any input channel or from the mask test output. The ability to record mask test output is very useful for capturing anomalous waveforms over a long period of time.

1. Toggle Msg Display to OFF.
2. To record the waveforms, press [Acquire] and select Sequence.
3. Select Mode and then select Record.
4. Turn the Selection knob to increase the number of recorded frames to 200. You can record up to 1000 frames.
5. Press Operate to record waveforms in the scope's memory. Wiggle or briefly disconnect the probe while recording.
6. Select Mode and then select Play back.
7. Select Operate to show the 200 stored waveforms. Observe the wiggled signal. Press Operate to stop viewing.
8. Press 1/2 and then Current Frame. You can manually scroll through recorded waveforms. Find your wiggled signal.

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