

# Logic User's Guide

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Note: this is a new version to support the 1.1.0+ software. Please let us know if you can't find what you're looking for – <http://www.saleae.com/contact>

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## Installing the Software

### Installation on Windows & Mac

Download the latest version from our site, here: <http://www.saleae.com/downloads>. Double click & install like any other application.

Note: Vista & Windows 7 Users: Please download either the 32-bit or 64-bit installation depending on your version of Windows. You can find out by right-clicking *Computer* in the start menu and choosing *Properties*.

OS X Tiger Users: The application needs to be unzipped before it can be installed.

### Installation on Linux

- Download the latest version from our site, here: <http://www.saleae.com/downloads>.
- Unzip the *Logic x.x.x* folder anywhere you like, perhaps your home folder.
- Double click the Logic executable to start the program.
- Create a link to the Logic application for your desktop or application menu. (*optional*)
- When connecting to Logic, you may get a message from the application that it doesn't have permissions to connect to Logic. If this happens, run the *install\_driver* script in the application's *Driver* folder.

64-bit Distribution Users: Logic is currently only shipped as a 32-bit application. You will need 32-bit libraries to be installed to run Logic. In Ubuntu, install the *ia32-libs* package with the package manager.

## Using the Software

### Quick Tips:

- Almost everything has tooltips that offer some explanation of what it does.
- You can use the arrow keys to navigate the data.
- Most functions have keyboard shortcuts, described in their menu item or their tool tip.

### Using the Trigger

- Tip: Mouse-over the trigger buttons for a description.
- The trigger looks for a single edge. To use the trigger, there must be one edge specified.
- You can also specify that other inputs must be in particular states (high or low) when the edge occurs.
- Pre-trigger data will be collected in the region of time before the trigger is found (to the extent the trigger is not immediately found).
- The time where the trigger is found is time zero in the display.

### Navigating the Data Display

- Click and drag the display to move it.
- Use the scroll wheel on your mouse to zoom in and out.
- Alternatively, use the arrow keys to zoom and pan. (The +/- keys also zoom)
- To “jump to next,” click the next or previous buttons which will appear at the left and right sides of each channel display. These buttons will become visible when you move your mouse near the ends of the channels. You can use the keys N (next) and P (previous) as well. (This applies to the channel that was last used by the mouse)

### Timing Measurements

- Tip: Move your mouse over each measurement label for a description.
- Width: The time between the selected two successive signal transitions.
- Period: The time elapsed between the selected three successive signal transitions.
- Frequency: The frequency computed by dividing one (1) by the time elapsed between the selected three successive signal transitions.
- Duty Cycle: The % of time the signal is high (1) during the selected three successive signal transitions.
- Byte: The numerical representation of all 8 channels combined into 1 byte, at the specified location.
- T1: The absolute time specified by the location of the T1 timing marker.
- T2: The absolute time specified by the location of the T2 timing marker.
- | T1 - T2 |: The time elapsed between the timing markers.

### Placing Timing Markers

- Single-click the T1 or T2 label.

- Move your mouse to the desired location. Note that you can still pan and zoom.
- Single-click to place the marker. Your mouse must not be moving when you place the marker.
- To move the marker after it has been placed, click it.
- To cancel placing a marker, right-click or press the escape key.

## **Saving and Opening a Session**

- To save a session that includes data, press CTRL-S (CMD-S on a Mac) or select this function from the Options menu.
- To save a session that contains only settings, press CTRL-SHIFT-S (CMD-SHIFT-S on a Mac), or select this function from the Options menu.
- To open a session of any type, drag it into the software, or press CTRL-O (CMD-O on a Mac), or select this function from the Options menu.

## **Exporting Data**

- Channels to Export: Select which channels you would like to export
- Samples to Export: Select the time period over which you would like to export samples
  - Tip: If you are using timing markers, you can export just the data between them. This option will only appear in the list if two timing markers have already been placed.
- Export Format – Binary
  - You can select if you want data outputted for every sample, or only for samples that are different than prior samples. Note that if you export only changes in the data, a 64-bit sample number is written before each sample in the file.
  - If you aren't exporting all of the channels, you can choose to leave the bits in their original channel locations, or to have them shifted right to fill any unused positions.
  - You can choose to export each sample as an 8, 16, 32 or 64-bit word.
- Export Format – VCD
  - VCD stands for Value Change Dump, and is a common format for digital data.
- Export Format –CSV
  - Choose this format to export data as comma or tab delimited, human readable text.
  - You can optionally include column headings for the data.
  - You can use sample number (e.g., 1, 2, 3, 4) or timestamps (e.g., .00123s ) to specify the time a sample represents. This occupies the first column.
  - You can combine all the channels into a single number, or you can export each bit in its own column.
  - You can export every sample, or only samples that have changed.

## **Saving Screenshots**

- You can take a screenshot of all or part of the application, and either save it to a file, or copy it to the clipboard. You can find this in the Options menu, or use the keyboard shortcuts.

## **Selecting the Display Radix (e.g., Hex, Decimal, etc.)**

- Use this Options menu item (or the keyboard shortcuts) to quickly toggle between different display modes.

## Using Protocol Analyzers

- To add a protocol analyzer, select one from the menu in the Analyzers panel.
- Protocol analyzers can share inputs with other analyzers. This can be useful in some cases, such as SPI.
- After you add (or edit) an analyzer, it immediately runs against any data you have collected.
- To export data from an analyzer, press the small file icon next to it. (Center button)

## Data Integrity

Logic may not be able to achieve a particular sample rate [see the next section], but it will never present data with samples missing. By design it stops and notifies you as soon as any data are lost.

## Maximum Sample Rate

Generally speaking Logic is able to achieve sample rates of 24MHz when no other devices are on the USB host, and your computer is responding sufficiently quick. However, if the USB is servicing other devices, or the computer is performing in a latent manner, a smaller sample rate, such as 16MHz or 12MHz may be the fastest achievable. The reason for this is as follows:

Logic uses USB 2.0, and uses the USB transfer type known as “Bulk”. While this transfer type has the largest theoretical average bandwidth (significantly larger even than the 24 MB/s needed by Logic), it also has the lowest priority. This means it may be “bumped” for other USB traffic from other devices.

The second issue is that Logic has very limited device-side memory. Specifically it has x4 512 byte buffers. These buffers must be emptied by the USB in such a way that they never all become full at the same time. If this happens, the Logic software will report that the sample rate could not be maintained.

This means that even if on average (which would normally be the case) the USB can give Logic at least 24 MB/s, it must not prioritize other devices on the USB for so much time that Logic’s small buffer would overflow. For this reason Logic can’t guarantee that it will operate at its maximum 24MHz, as this is contingent on a number of factors including computer performance, USB bandwidth availability and latency, other drivers that may be using the USB, etc.

To maximize the sample rate possible on your computer, try the following:

- Make sure that no other applications are consuming significant CPU time.
- Make sure you have enough free RAM so that Windows will not have to swap ram to the hard drive. This will be too slow.
- Try connecting Logic directly to your computer instead of through a USB hub.
- Make sure other devices on the USB are minimally active. (e.g., not webcams, hard drives, etc.)
- Try disconnecting other peripherals from the USB, or switching Logic to a port serviced by a different host controller.

- Increase the process priority of the Logic software. From the Windows Task Manager, select the Processes tab, and find the Logic process. Right click on this item and select Set Priority -> High.

## **Contacting Us**

You're always welcome to contact us about anything. [support@saleae.com](mailto:support@saleae.com) is typically the best way to reach us, or online at <http://www.saleae.com/support>