

Logic Analyzer

Moku:Go User Manual

Moku:Go's Logic Analyzer is equipped with 16 bidirectional digital I/O with sampling rates up to 125 MSa/s. It supports 3.3 V logic levels (5 V tolerant) and 1M × 16 input sample depth. Two independent decoder channels can be added to decode UART, I2C, I2S, CAN, Parallel bus, and SPI protocols. Extensive measurements are readily available through the interface. Data, screenshots, and logs can be readily captured to email or cloud-based services for rapid sharing and evaluation. Combined with the analog inputs, analog outputs, and the intuitive graphical user interface, Moku:Go is your go-to solution for undergraduate curriculum labs and senior design projects.

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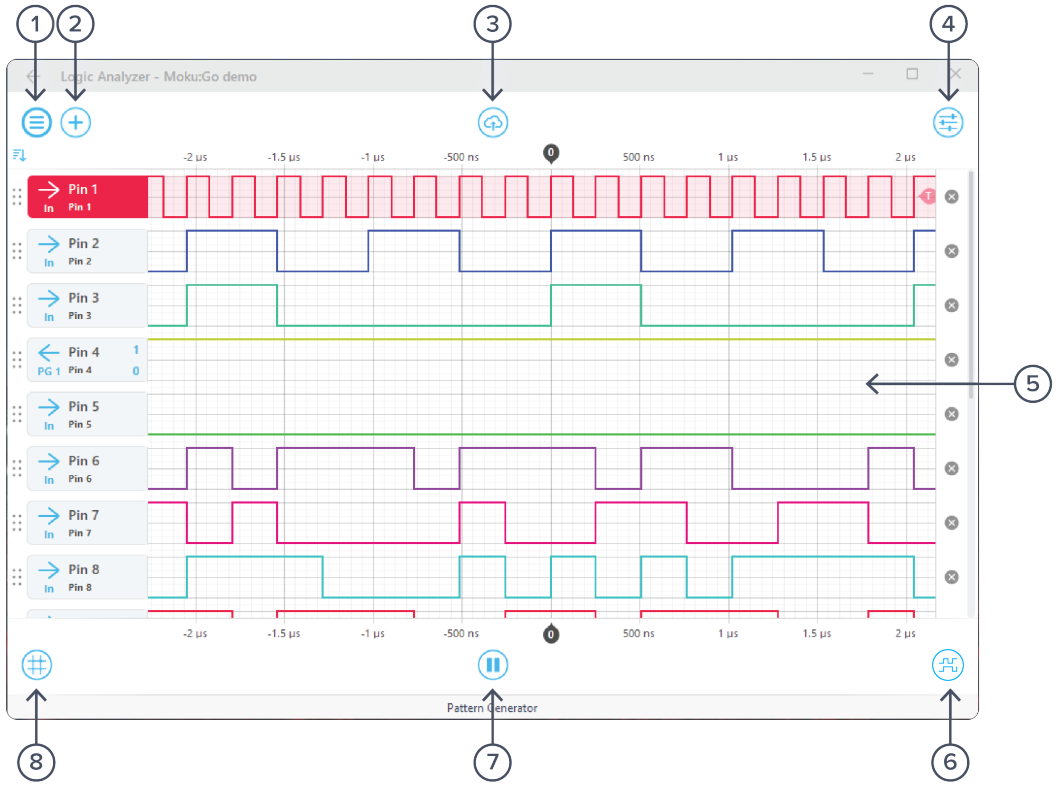
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Ensure Moku:Go is fully updated. For the latest information:

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User Interface

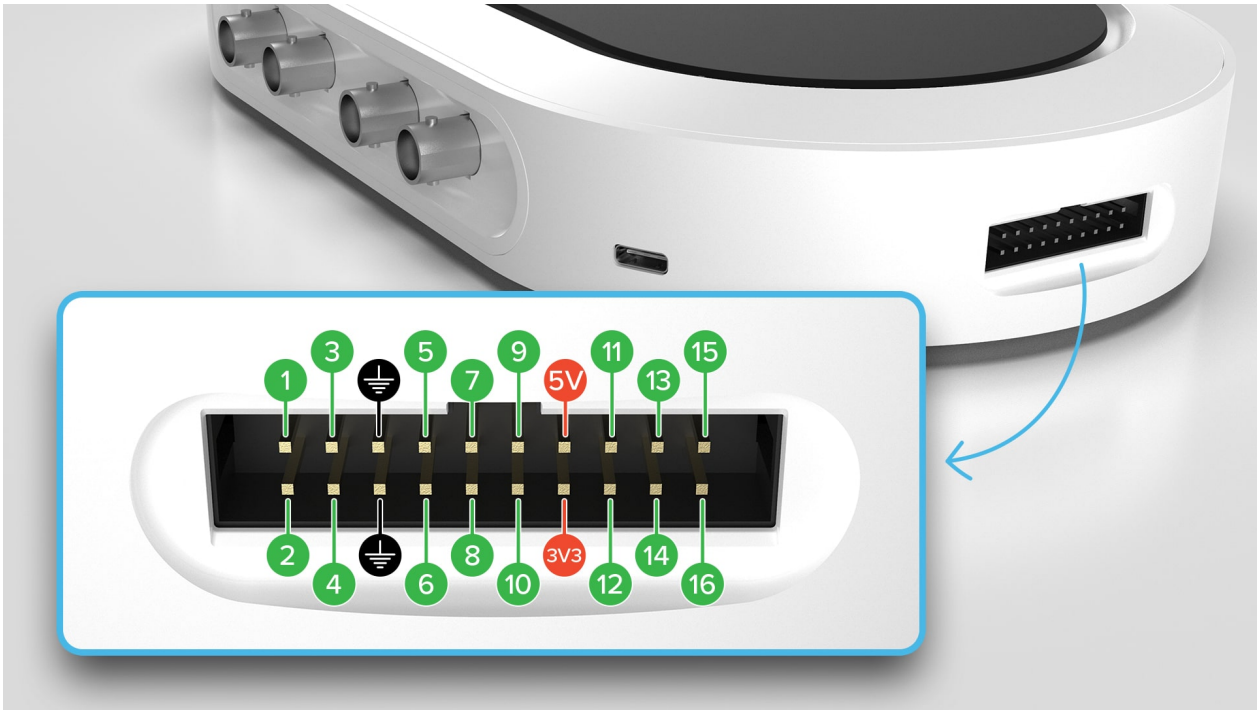


ID	Description	ID	Description
1	Main menu	5	Signal display area
2	Add channel	6	Output pattern generator
3	Save data	7	Input start/pause
4	Settings	8	Cursors

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Physical Interface

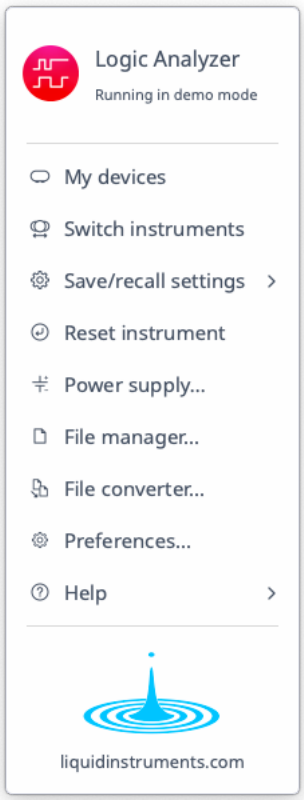
Moku:Go is equipped with a 20-pin digital I/O interface. 16 of the 20 pins are the bidirectional digital I/O. There are two ground pins, one 5 V output, and one 3.3 V output. A detailed layout can be found in the following figure:



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Main Menu

The **main menu** can be accessed by clicking the on the top-left corner.



This menu provides the following options:

Options	Shortcuts	Description
Save/recall settings:		
• Save instrument state	Ctrl+S	Save the current instrument settings
• Load instrument state	Ctrl+O	Load last saved instrument settings
• Show current sate		Show the current instrument settings
Reset instrument	Ctrl+R	Reset the instrument to its default state
Power supply		Access power supply control window*
File manager		Open file manager tool**
File converter		Open file converter tool**
Preferences		Access the preferences tool
Help		
• Liquid Instruments website		Access Liquid Instruments website
• Shortcuts list	Ctrl+H	Show Moku:Go app shortcuts list
• Manual	F1	Access instrument manual
• Report an issue		Report bug to Liquid Instruments

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• About	Show app version, check update, or license information

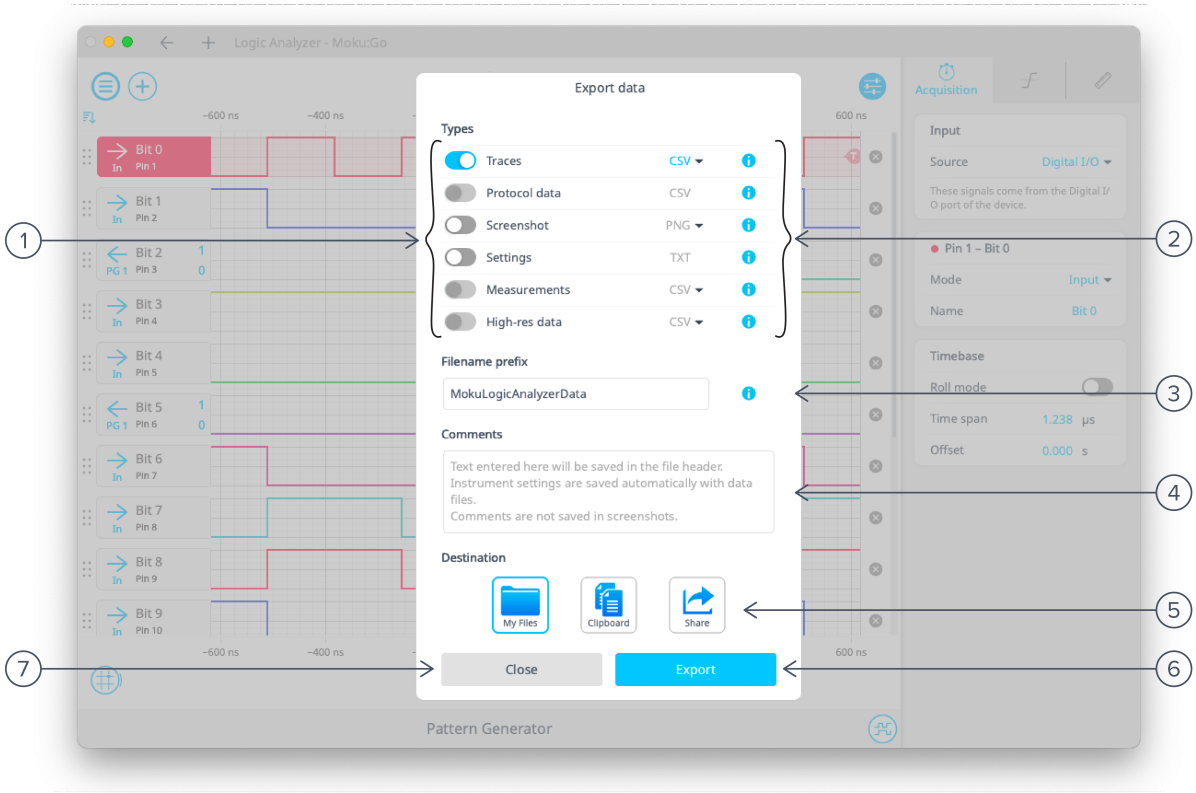
* Power supply is available on the Moku:Go M2 model. Detailed information about power supply can be found in Moku:Go power supply manual.

**Detailed information about the file manager and file converter can be found at the end of this user manual.

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Export data

The **export data** options can be accessed by pressing the on, allowing you to:

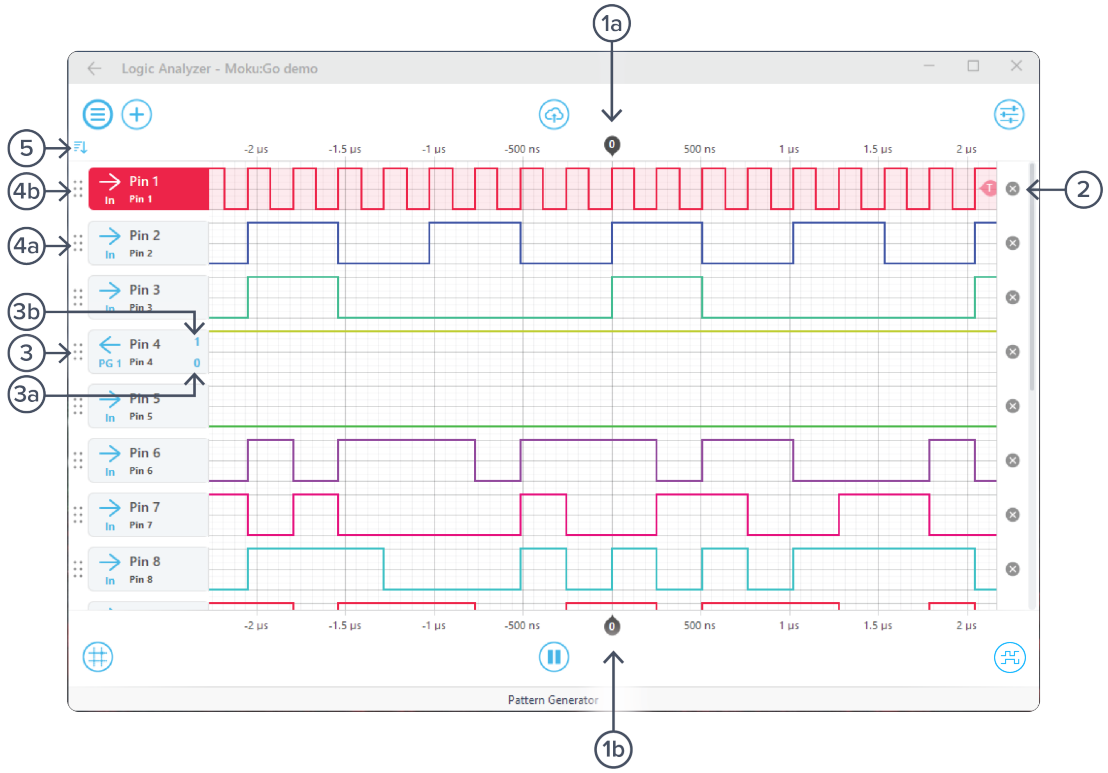


ID	Description
1	Select the type of data to export.
2	Select the **export format**. Available options are .csv, .mat, .jpg, .png, .npy. .li, .hdf5, .txt
3	Select the **Filename Prefix** for your export.
4	Select the exporting location on your local computer.
5	Enter additional **Comments** to be saved in any text-based file header.
6	**Export** the data, or
7	**Close** the export data window, without exporting.

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Signal Display and Signal Navigation

Signal display



ID	Button	Description
1a	Top time origin mark	Marks the “zero second” point on the time scale. This will be the trigger point if the logic analyzer has triggered.
1b	Bottom time origin mark	Marks the “zero second” point on the time scale. This will be the trigger point if the logic analyzer has triggered.
2	Remove trace	Click here to remove the trace. It will appear when the mouse cursor is over the signal trace area for this pin on the signal display.
3	Output pin header	Signal header for Pin 4. The left pointing arrow indicates it is currently set to be an output channel from pattern generator 1. Click the arrow to switch direction.
3a	Low override	Click to override this output to Low.
3b	High override	Click to override this output to High.
4a	Input pin header	Signal header for Pin 3. The right pointing arrow indicates it is currently set to be an input channel. Click the arrow to switch direction.

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4b	Active pin header	Click the signal trace area or pin header for any pin to make it the active signal. This allows user to access settings and pattern editor for this pin. Click the header again to deselect the active pin.
5	Sort channels	Sort channels by channel number or channel type.

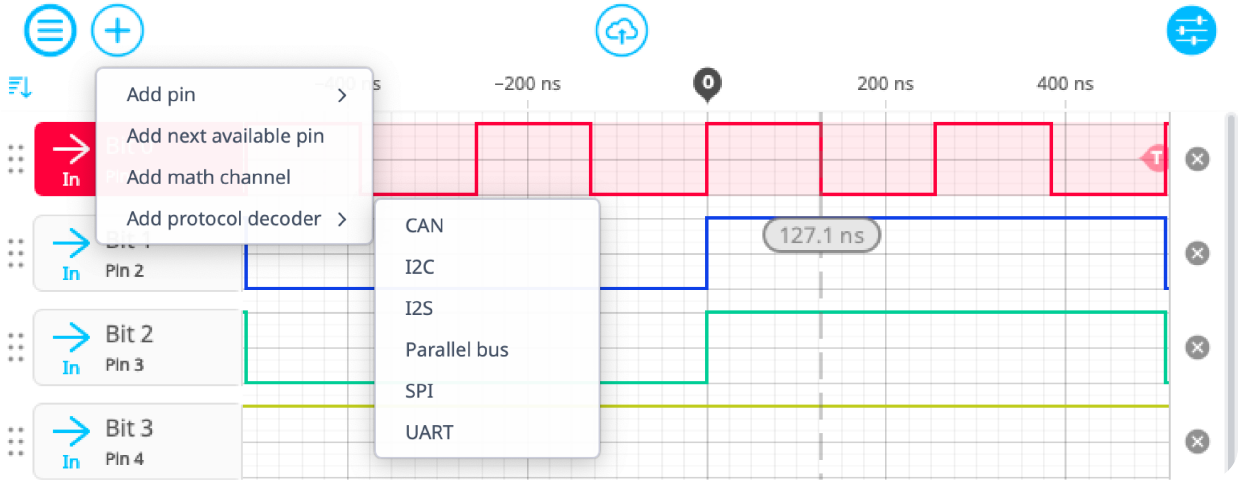
Signal display navigation

The displayed signal can be moved around the screen by clicking anywhere on the signal display window and dragging to the new position.

Scrolling the mouse wheel zooms in and out along the time axis.

Add channel

Additional channels can be added to the screen by clicking the icon.



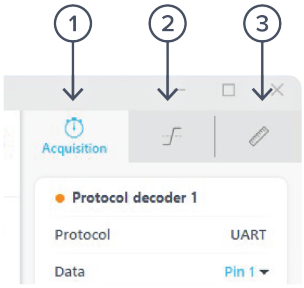
It gives you the following options:

Options	Shortcuts	Description
Add pin		Select a specific pin to add
Add next available pin	Ctrl/Cmd+Shift+N	Add the next pin that is not currently in use
Add math channel		Add math channel
Add protocol decoder		Add protocol decoder channel

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Settings

The **settings** options can be accessed by clicking the icon, allowing you to reveal or hide the controls drawer, giving you access to all instrument settings. The controls drawer contains settings and measurements.

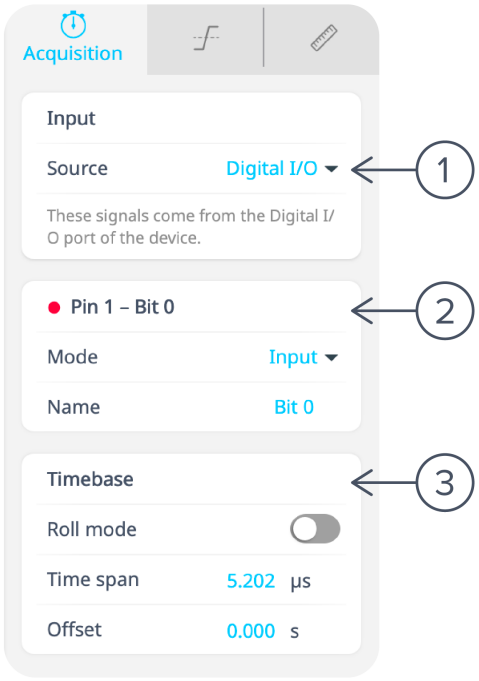


ID	Description
1	Acquisition
2	Trigger
3	Measurement

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Acquisition

The **acquisition** pane allows you to configure the active pins, math channels, decoders, and timebase.



ID	Button	Description
1	Input selection	Select the input source for all pins to use (Digital I/O or Analog Input).
2	Active pin settings	Set the mode of the selected pin to either Input or Output and change the name of the selected pin.
3	Timebase	**Roll mode:** Toggle between roll and sweep mode. **Timespan:** Horizontal screen scale. Changes dynamically when zooms in and out a trace or can be entered manually. **Offset:** Horizontal trigger point offset. Changes dynamically when horizontally-dragging a trace or can be set manually.

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Active input pin settings

Options	Description
Mode	Select between input and output mode

Active output pins settings

Options	Description
Mode	Select between input and output mode
Output override	Select to override the output with “Low” or “High”

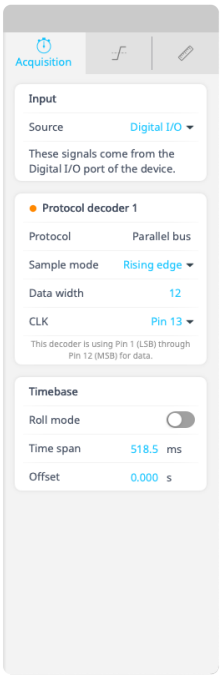
Active math pins settings

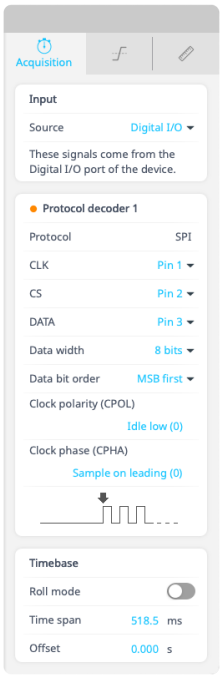
Options	Description
Source A	Select the first source for the math operation
Operation	Select from AND, OR, XOR, NAND, NOR, XNOR operation
Source B	Select the second source for the math operation

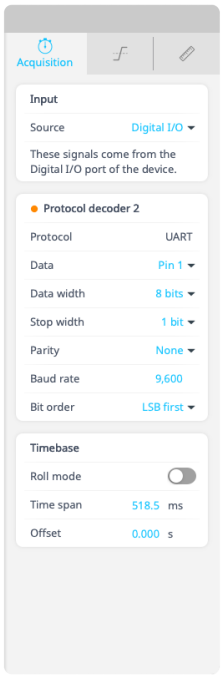
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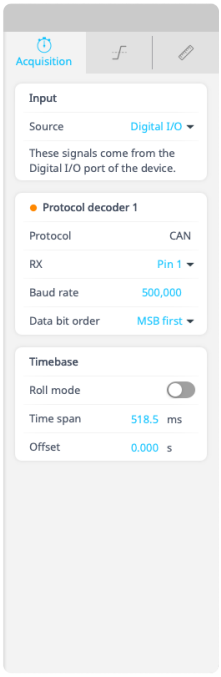
Protocol Decoder

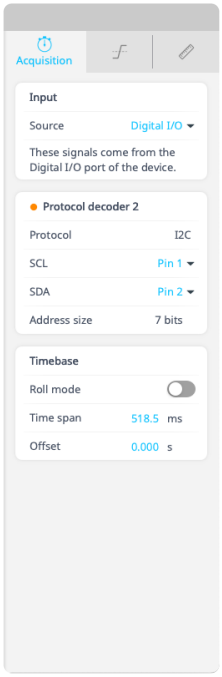
The protocol decoder channels can be added via the ⊕ button. Detailed settings for each protocol can be configured under the **acquisition** pane when it is selected as the active channel.

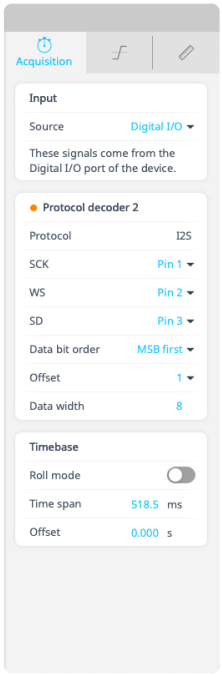






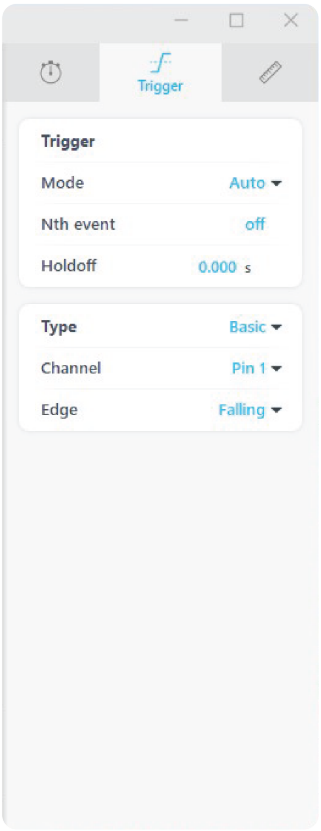






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Trigger

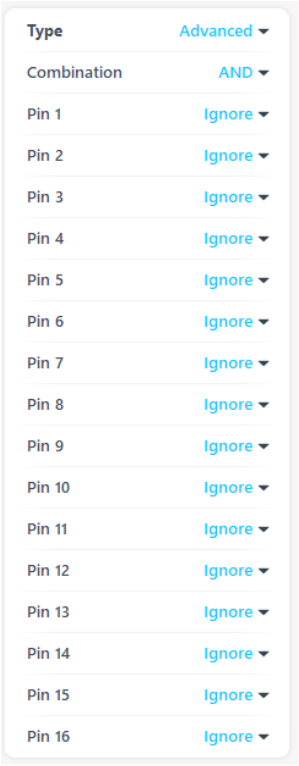


Button	Description
Mode	Switches between auto, normal and single trigger modes
Nth event	Select up to 65,535 trigger events before actually triggering
Holdoff	Select a time to holdoff trigger post trigger event
Type	Select between basic or advanced trigger mode
Channel	Select the source for the trigger circuit
Edge	Select to trigger on rising, falling, or both edges

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Advanced Trigger Mode

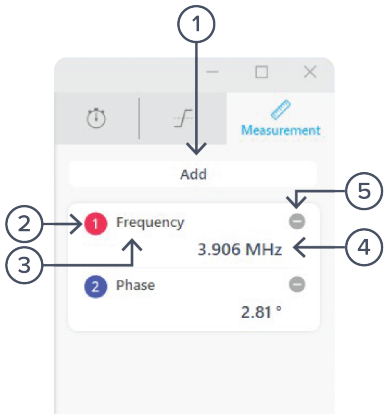
In the advanced trigger mode, user can select to trigger from multiple channels, with OR or AND combinational logic.



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Measurement

The measurement pane allows you to add/remove measurements. A measurement can be assigned to a specific input, output, math channel, or difference between any two channels.



ID	Description
1	Click to add additional measurement tile
2	Measurement source. Click to loop through the measurement sources.
3	Measurement type
4	Measurement value
5	Click to remove the measurement tile

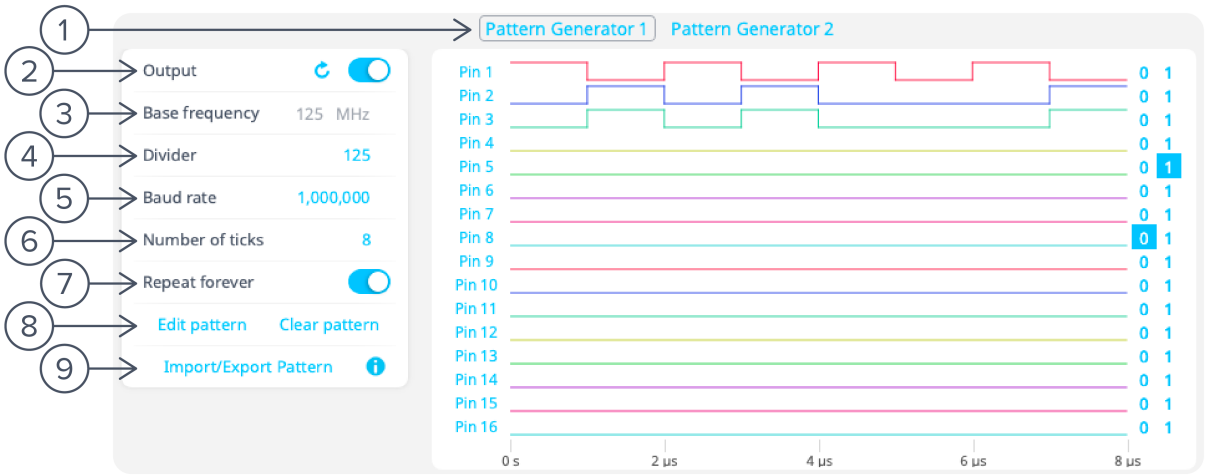
Click a measurement tile to open the menu to adjust the measurement. The following options are available:

Options	Description
Type	Select the measurement type
• Frequency	
• Phase	
• Period	
• Duty cycle	
• Pulse width	
• Neg width	
Channels	Select measurement source
Difference Channels	Measure the difference between the measurement source to another channel
Remove	Remove the measurement tile

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Pattern Generator

The output pattern can be accessed by clicking the icon. Moku:Go is equipped with two independent pattern generators. Each pattern generator can store a pattern for all 16 pins. User can select to output a pattern for a specific pin from pattern generator 1 or 2.



ID	Description
1	Switch to configure pattern generator 1 or 2
2	Enable the output or restart the pattern playback if repeat forever is not enabled (
3	Base sampling frequency
4	Decimation factor from the base frequency
5	Baud rate
6	Adjust the length of the pattern
7	Enable or disable the repeating output
8	Click to edit or clear the pattern
9	Import or export the pattern from or to file or clipboard

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Pattern Editor



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ID	Description
1	Fill the pattern generator with a specific pattern: • Zeros • Ones • Clock • Pulse • Random
2	Tick number
3	Click to manually flip the bit
4	Click to close the editor
5	Enable or disable auto commit
6	Commit the changes
7	Discard the changes

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Cursor

The **cursors** can be accessed by clicking the icon, allowing you to add time cursors, or remove all cursors.



In Addition, you can right click on a cursor to set it as the reference or remove the cursor.

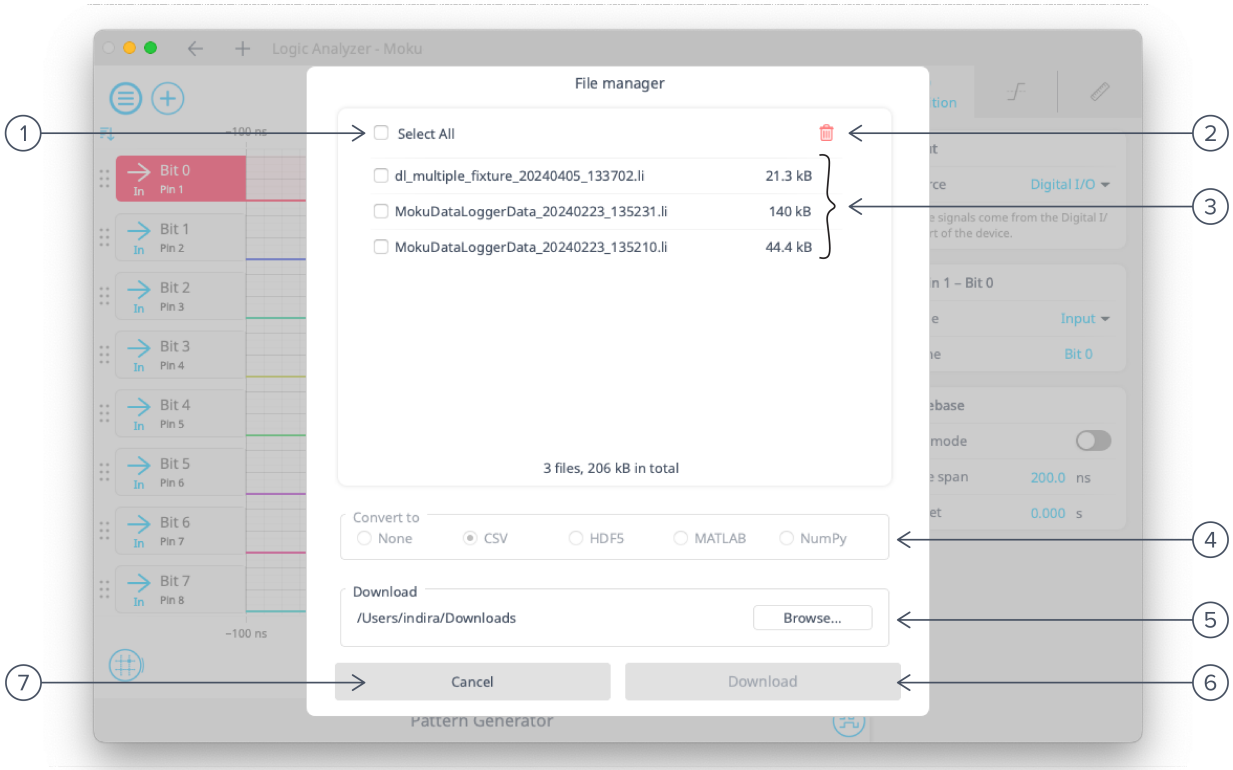
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Additional Tools

Moku:Go app has two built-in file management tools: file manager and file converter.

File Manager

The file manager allows the user to download the saved data from Moku:Go to the local computer, with optional file format conversion.



To save logged data:

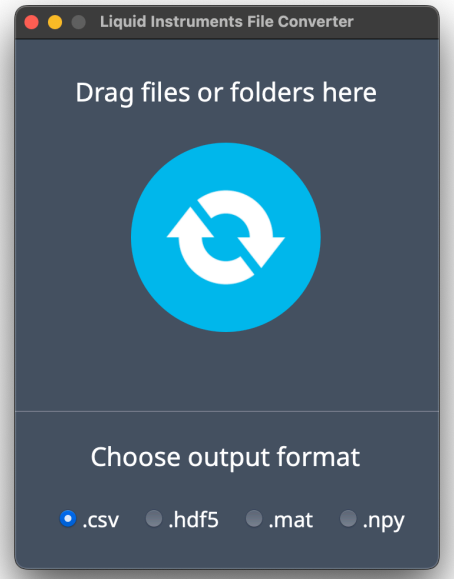
1. **Select all** files logged to the device's memory, to download or convert.
2. **Delete** the selected file/s.
3. Browse and **select file/s** to download or convert.
4. Select an optional **file conversion format**.
5. Select an optional **location** to export your selected files to.
6. **Export** the data.
7. **Close** the export data window, without exporting.

Once a file is transferred to the local computer, a icon shows up next to the file.

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File Converter

The File Converter converts the Moku binary (.li) format on the local computer to either .csv, .mat, .hdf5 or .npy format. The converted file is saved in the same folder as the original file.



To convert a file:

1. Select a file type to convert to.
2. Open a file (Ctrl/Cmd+O) or folder (Ctrl/Cmd+Shift+O) or drag and drop into the File Converter to convert the file.

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Power Supply

Moku:Go's Power Supply is available on the M2 model, which features a 4-channel power supply. The power supply control window can be accessed in all instruments under the main menu.

The power supply operates in two modes: **constant voltage (CV)** or **constant current (CC)** mode. For each channel, the user can set a current and voltage limit for the output. Once a load is connected, the power supply operates either at the set current or set voltage, whichever comes first. If the power supply is voltage limited, it operates in the CV mode. If the power supply is current limited, it operates in the CC mode.



ID	Function	Description
1	Channel name	Identifies the power supply being controlled.
2	Channel range	Indicates the voltage/current range of the channel.
3	Set value	Click the blue numbers to set the voltage and current limit.
4	Mode indicator	Indicates if the Power Supply is in constant voltage (CV), green, or constant current (CC), red, mode.
5	On/Off Toggle	Click to turn the power supply on and off.
6	Range	Indicates the Voltage and current limits of each Power Supply.
7	Readback values	Voltage and current readback from the Power Supply. This is the actual voltage and current being supplied to the external load.

Each Power Supply has two modes: constant voltage (CV) and constant current (CC). You can set both current and voltage limits for each channel. The Power Supply operates in CV mode if voltage is limited and in CC mode if current is limited.

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