



Spectrum Analyzer

Moku:Go User Manual

Moku:Go's Spectrum Analyzer allows you to observe input signals in the frequency domain between DC and 30 MHz. View two channels of data simultaneously with a resolution bandwidth as low as 1 Hz over a minimum span of 100 Hz. The Spectrum Analyzer also features two integrated waveform generators capable of producing sine waves at up to 20 MHz.





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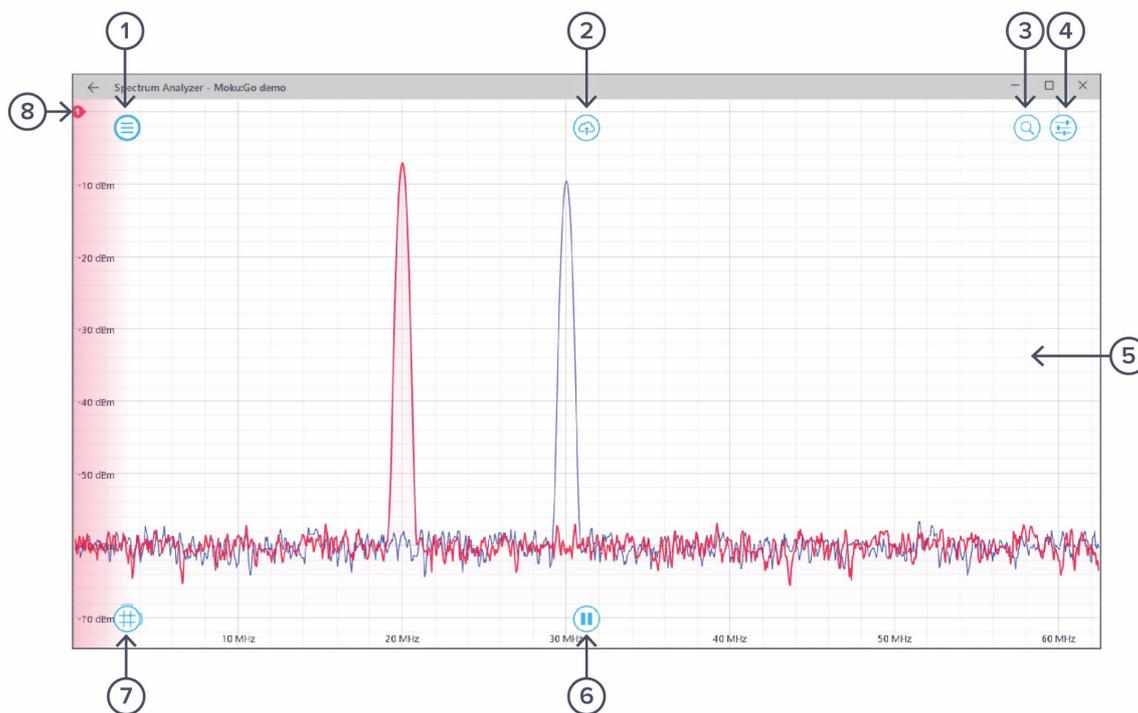


Ensure Moku:Go is fully updated. For the latest information:

www.liquidinstruments.com



User Interface

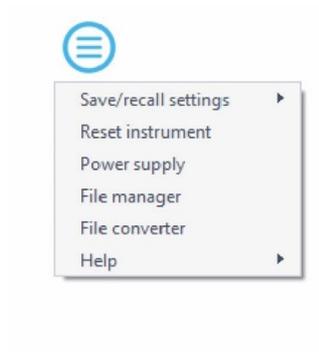


ID	Description	ID	Description
1	Main menu	5	Signal display area
2	Save data	6	Play/Pause
3	Signal display navigation	7	Cursors
4	Settings	8	Reference position indicator



Main Menu

The **main menu** can be accessed by clicking the  icon 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 state		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.**
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.
• About		Show app version, check update, or license information.

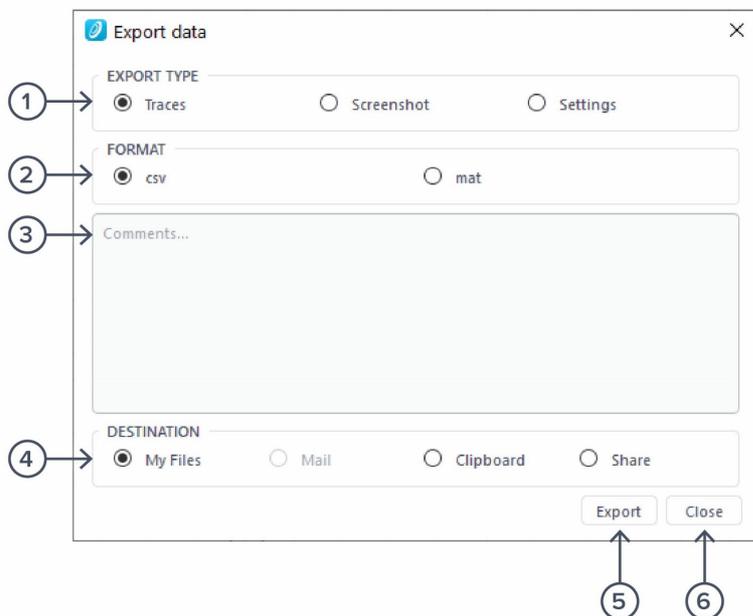
* Power supply is available on Moku:Go M1 and M2 models. Detailed information about power supply can be found in Moku:Go power supply manual.

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



Export data

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



ID Description

- 1 Select the type of data to export.
- 2 Select the exporting format (CSV or MAT).
- 3 Enter additional comments for the saved file.
- 4 Select the exporting location on your local computer.
- 5 Click to execute data export.
- 6 Click to close the export data window.



Signal Display Navigation

Signal display position

The displayed signal can be moved around the screen by clicking anywhere on the signal display window and dragging to the new position. The cursor will turn into a  icon once clicked, drag horizontally to shift along the frequency axis and drag vertically to shift along the amplitude/power axis.

The signal display can also be moved horizontally and vertically with arrow keys.

Display scale and zoom

Scrolling the mouse wheel zooms in and out along the primary axis. Access the scroll setting by hovering the cursor over the  icon.

Icons Description

	Assign the horizontal axis as the primary axis.
	Assign the vertical axis as the primary axis.
	Rubber band zoom: hold the primary mouse button to draw a region to zoom-in, release the button to execute.

Additional keyboard combinations are also available.

Actions	Description
Ctrl + Scroll Wheel	Zoom secondary axis.
+/-	Zoom primary axis with keyboard.
Ctrl +/-	Zoom secondary axis with keyboard.
Shift + Scroll Wheel	Zoom primary axis towards the center.
Ctrl + Shift + Scroll Wheel	Zoom secondary axis towards the center.
R	Rubber band zoom.

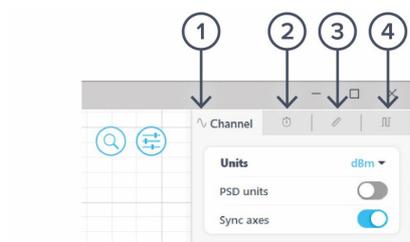
Auto scale

Double click anywhere on the signal display window to auto scale the traces.



Settings

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

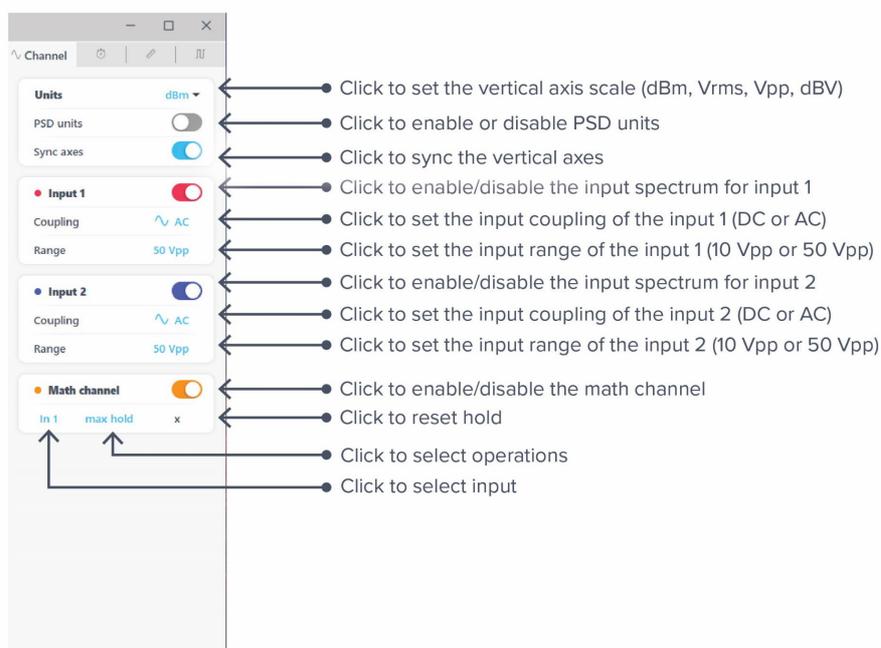


ID Description

1	Channel
2	Frequency
3	Measurement
4	Output

Channels

The **channels** pane allows you to change the input settings for each ADC channel, adjust the input scales and coupling, and enable/disable the math channel.

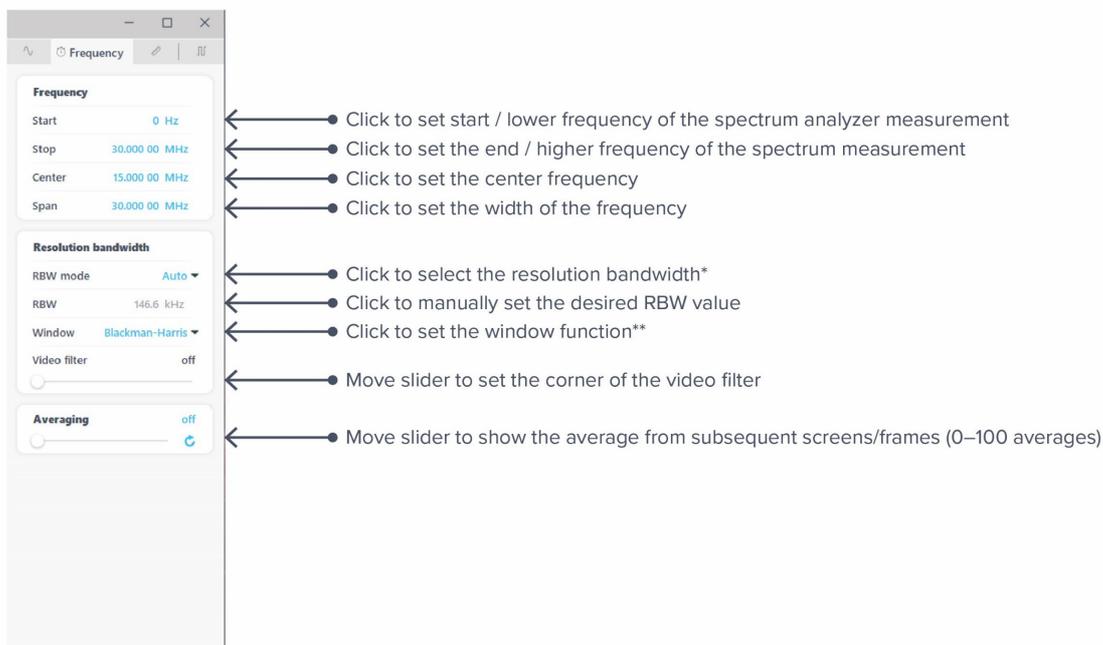


Four operations are currently supported by Moku:Go's Spectrum Analyzer: +, ×, min hold, and max hold.



Frequency

The **frequency** pane allows you to change parameters related to the frequency domain (horizontal axis), including frequency span, resolution bandwidth (RBW), and video bandwidth.



Note that [Start, Stop] and [Center, Span] in the frequency panel are equivalent representations of the measured frequency range. Moku:Go will automatically update the other pair if one is changed.

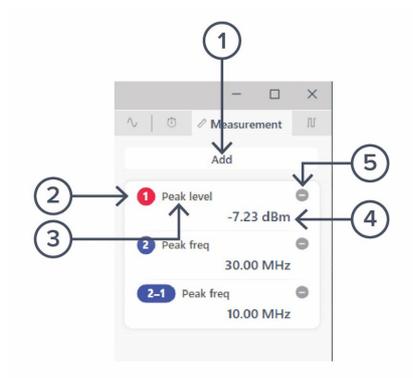
* Auto: determines the best RBW automatically; Manual: manually set the RBW; Min: uses the smallest RBW available.

** Available options: Blackman-Harris, Flat top, Hanning, and None.



Measurement

The measurement pane allows you to add/remove measurements to probe a spectra's peak level, peak frequency, noise level, etc. A measurement can be assigned to a specific input channel, 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. |

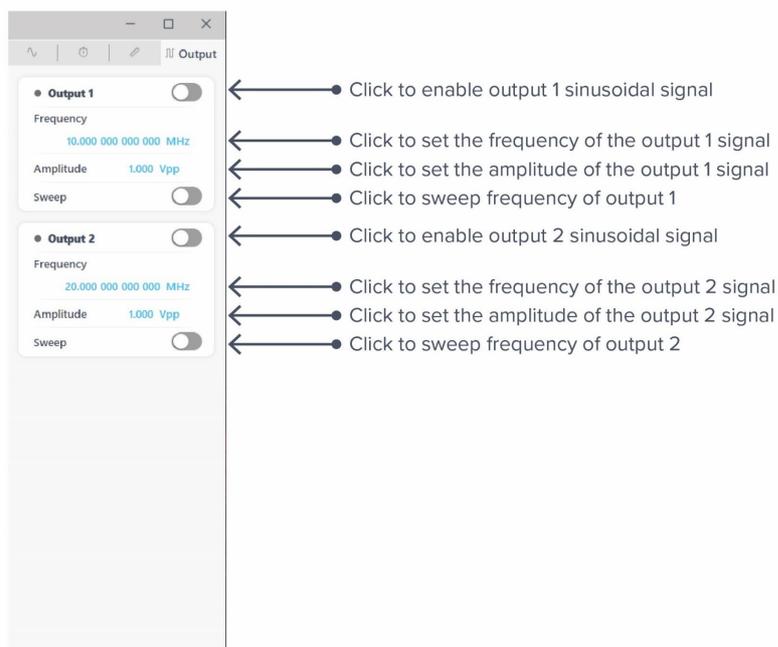
Click a measurement tile to open the menu to adjust the measurement. The following options are available:

Options	Description
Type	Select the measurement type.
<ul style="list-style-type: none">• Peak level• Peak frequency• Noise level• Peak SNR• Occupied BW	<p>Power/voltage level of the highest peak.</p> <p>Frequency of the highest peak.</p> <p>Power/voltage level of the average baseline.</p> <p>The signal-to-noise ratio of the highest peak to the baseline.</p> <p>Occupied bandwidth of the highest peak.</p>
Channels	Select measurement source.
Difference Channels	Measure the difference between the measurement source to another channel.
Remove	Remove the measurement tile.



Output

The **output** pane allows you to configure the Spectrum Analyzer's integrated sine wave generator.

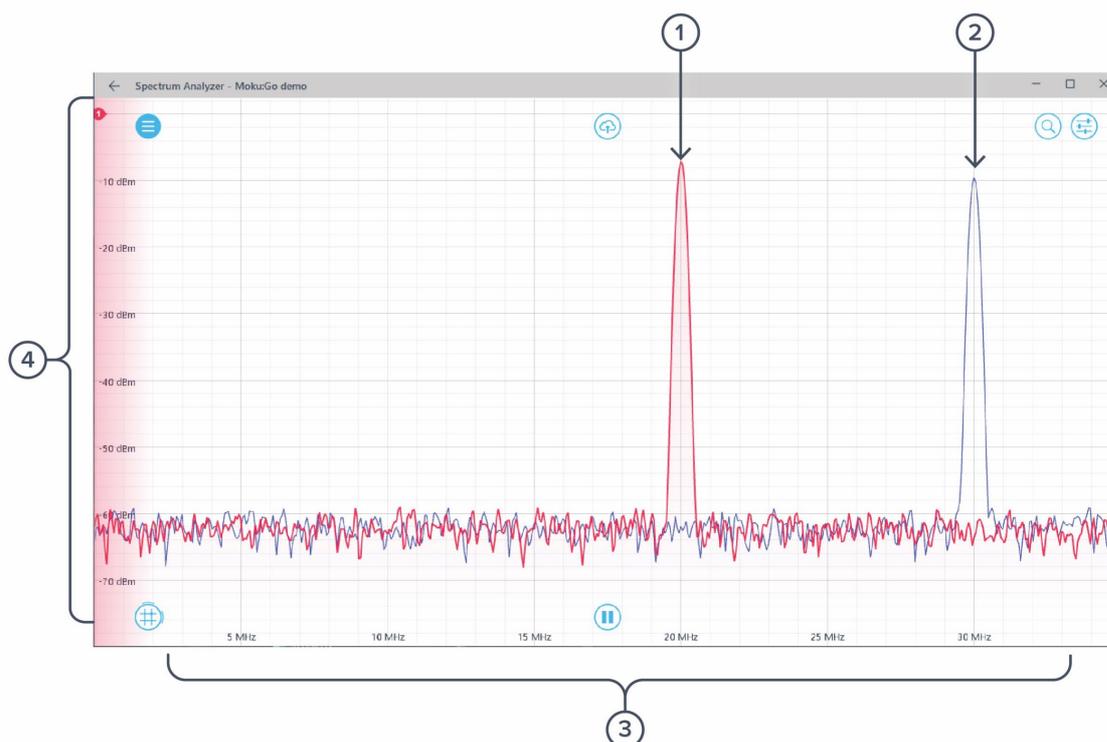




Display

User Interface

This area is intended to display the spectrum of input and math channels, where the horizontal axis is the measured frequency range and the vertical axis is the power or power spectral density (PSD) in linear or log scales.



ID Description

- | | |
|---|--|
| 1 | Spectrum for input channel 1. |
| 2 | Spectrum for input channel 2. |
| 3 | Frequency axis: shows the frequency scale for both channels. |
| 4 | Power axis: shows the power scale for the active channel. * |

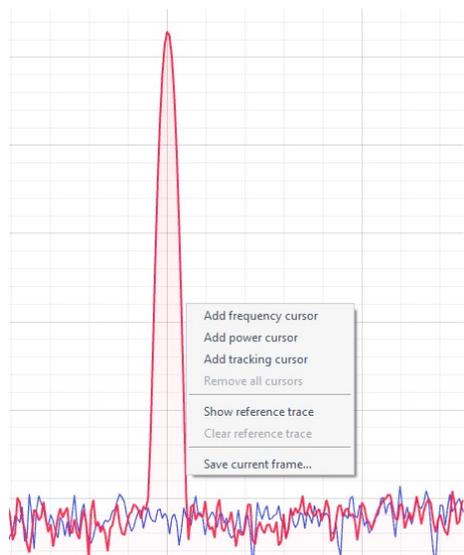
The scales of both axes can be zoom and drag.

* The shaded color near the vertical axis indicates the active channel. **Red** represents channel 1, **blue** represents channel 2, and **yellow** represents the math channel.



Spectrum Trace

Right-click (secondary click) in the signal display area reveals additional option for the active channel. You can add or remove reference trace, or save the current frame on the display via this menu. Options regarding to cursors is covered in detail in the next section.



Options

Description

Show reference trace	Display the current frame as reference trace.
Clear reference trace	Clear the current reference trace.
Save current frame	Open the export data window.



Cursors

The **cursors** can be accessed by clicking the  icon, allowing you to add power or frequency cursors, or remove all cursors. In addition, you can click and hold the cursors icon, and drag horizontally to add a frequency cursor, or vertically to add a power cursor.

User Interface

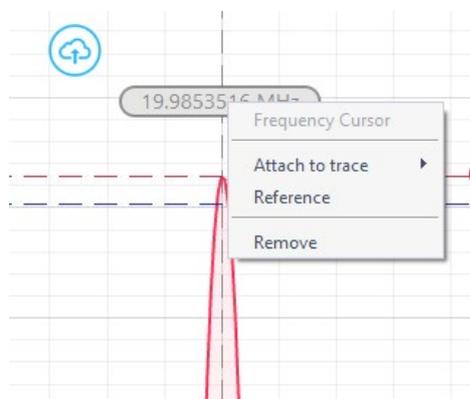


ID	Parameter	Description
1	Frequency reading	Right-click (secondary click) to reveal frequency cursor options. Drag left or right to set positions.
2	Frequency cursor	Color represents the channel of the measurement (Gray – Unattached, Red – channel 1, Blue – channel 2, Yellow - math).
3	Power cursor	Drag up or down to set positions.
4	Cursor function	Indicates the current cursor function (max, min, max hold, etc).
5	Amplitude reading	Right-click (secondary click) to reveal amplitude cursor options.
6	Reference indicator	Indicates the cursor is set as reference. All other cursors in the same domain and channel measure the offset to the reference cursor.



Frequency Cursor

Right-click (secondary click) to reveal frequency cursor options:

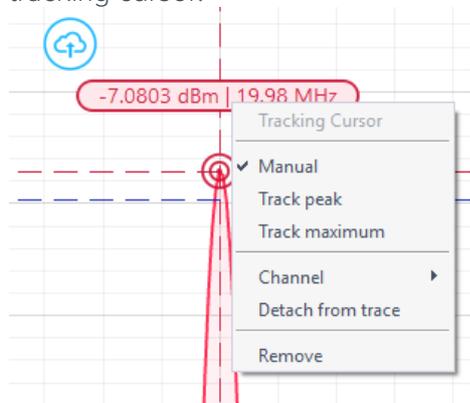


Options	Description
Frequency Cursor	Cursor type.
Attach to trace	Choose to attach the frequency cursor to input 1, input 2, or math channel. Once the cursor is attached to a channel, it becomes to a tracking cursor.
Reference	Set the cursor as the reference cursor.
Remove	Remove the frequency cursor



Tracking Cursor

Once a frequency cursor is attached to a channel, it becomes to a tracking cursor. It displays the set frequency, and the signal power level at the set frequency. Additional options are available for tracking cursor:



Options	Description
Tracking Cursor	Cursor type.
Manual	Manually set the tracking cursor frequency.
Track peak	Track the frequency of the closest peak.
Track maximum	Track the frequency of the global maximum.
Channel	Assign tracking cursor to a specific channel.
Detach from trace	Detach the tracking cursor to a frequency cursor.
Remove	Remove the tracking cursor.

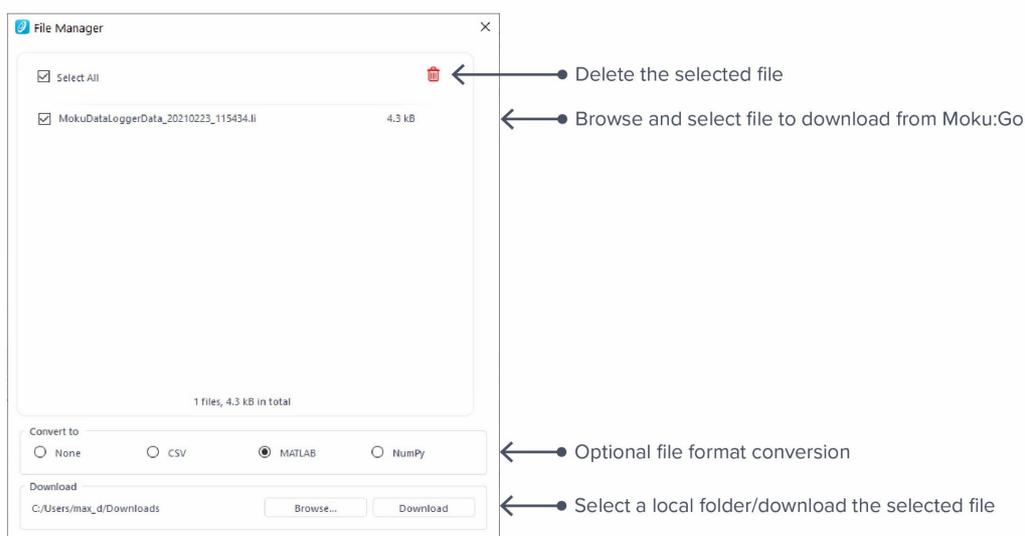


Additional Tools

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 local computer, with optional file format conversion.

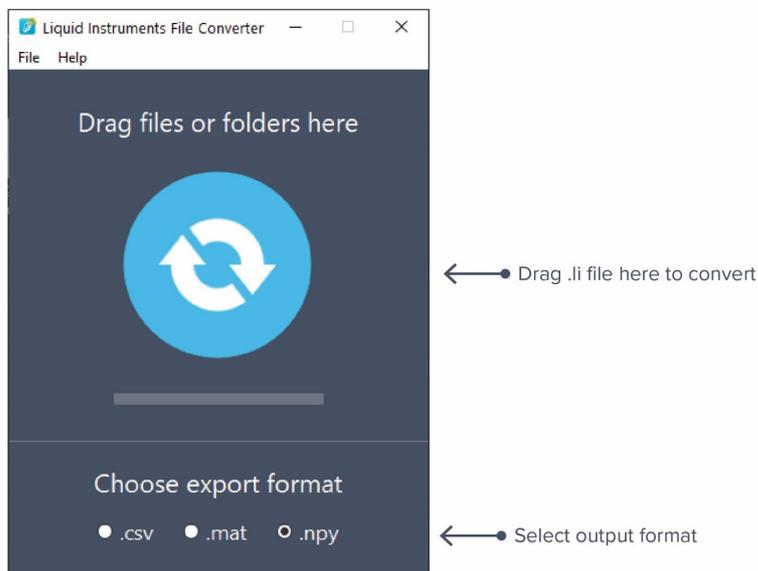


Once a file is transferred to the local computer, a  icon shows up next to the file.



File Converter

The file converter converts the Moku:Go's binary (.li) format on the local computer to either .csv, .mat, or .npy format.



The converted file is saved in the same folder as the original file.

Liquid Instruments File Converter has the following menu options:

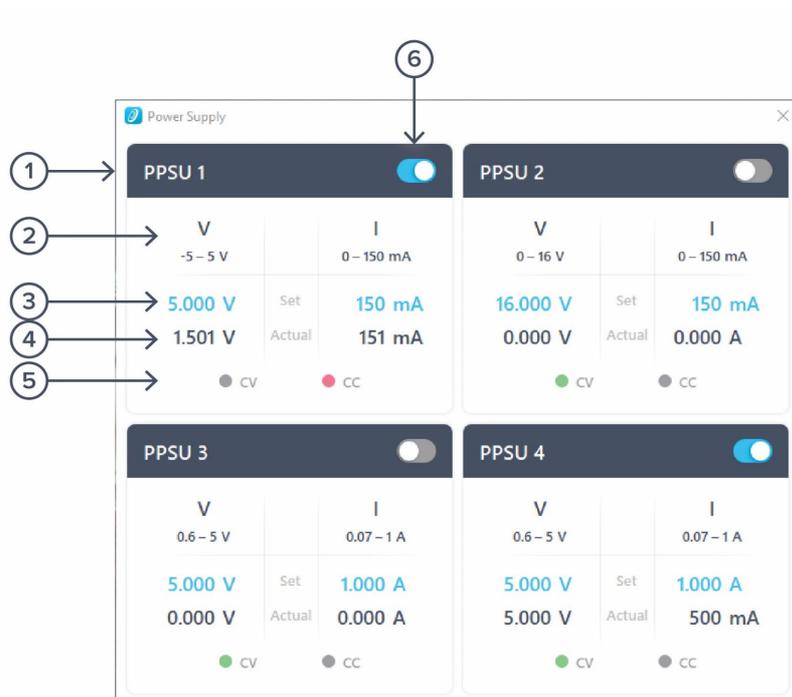
Options	Shortcut	Description
File		
• Open file	Ctrl+O	Select a .li file to convert
• Open folder	Ctrl+Shift+O	Select a folder to convert
• Exit		Close the file converter window
Help		
• Liquid Instruments website		Access Liquid Instruments website
• Report an issue		Report bug to Liquid Instruments
• About		Show app version, check update, or license information



Power Supply

Moku:Go Power supply is available on M1 and M2 models. M1 features a 2-channel power supply, while M2 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	Readback numbers	Voltage and current readback from the power supply, the actual voltage and current being supplied to the external load.
5	Mode indicator	Indicates if the power supply is in CV (green) or CC (red) mode.
6	On/Off Toggle	Click to turn the power supply on and off.



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