Control and Data Logging Software for HP/Agilent/Keysight 66312A, 66332A, 6631B, 6632B, 6633B, 6634B, 6611C, 6612C, 6613C, and 6614C, using the serial RS-232 interface

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Table of Content

Introduction

Using the front panel on my 6612C was always a pain. Because of its form factor, the stand-alone entry keypad, found on the 663xB series, was omitted. So, I decide to create a small application that would allow me to enter voltage and current to the power supply remotely without having to touch the front panel. One thing led to another and the software grew in features. I even implement the under-voltage and under-current protection. It now has everything a user wants from a power supply software.

Features:

- Set voltage, current, over-voltage, over-current directly from the app.
- Set UVP (under voltage protection) and UCP (under current protection), implemented on the software side, relies on the measure voltage and current values.
- Retrieve the set voltage, current, OVP (over-voltage protection), OCP (over-current protection) information directly from the power supply, this means that the user can change values from the front panel and the software will automatically update the info on its display panel.
- Front Panel friendly, user can operate the power supply from the front panel and through the software interchangeably.
- Interactive real-time graphing capability for voltage, current, and power (if the software measures voltage and current).
- Plug and play, no need to install anything, just run the software and connect to your power supply
- Fast sampling, the software can retrieve 100 samples in 9 seconds, provided that most data retrieving options are disabled.
- Data Logging, the user can save voltage, current and some other stuff to text/csv files.
- Control multiple power supplies

How to Connect your Power Supply to PC:

1. Make sure that the power supply is configured for RS-232 interface, parity is set to none, flow is set to none, and baud rate is set to 9600. Refer to your power supply's user manual on how to set these settings.
2. You will need a female to female null modem adapter/cable and a male serial to USB or just a male to male serial cable if your PC has a built-in serial port.
3. Connect the null modem adapter/cable to the power supply's RS-232 serial port and then connect your serial cable to the null adapter/cable. After that, connect your serial cable to PC.
4. Run the software, you will see that most of the controls are greyed out, you will first need to connect your power supply to the software before your can access these controls.
5. To do that, first click **Config**, found on the left most side of the top menu. Then click **Select COM Port.**
6. This will open another window, where your will see all the COM ports connected on you PC, select the one that is connected to your power supply. You can select a COM port by double clicking on one from the COM port list or you may type it in the COM Port number text input box.

7. If you already know which COM port your power supply is connected to then you can just click **Connect**. You can skip set 8 and 9.
8. Then click **Device Info**, this will show you your power supply's model ID. If instead you got an error then you must not have chosen the correct COM port or your power supply is turned off, or you may not have connected the power supply to your PC correctly.
9. Try a different COM port if you chosen the wrong one.
10. You may even reset the power supply by clicking the **Reset Device** button.
11. When you click **Device Info** button, the power supply's vfd display will show you the COM port that it is connected to. Click **Reset Device** to clear the display.
12. Once you click Connect, the select COM Port window will close, and the main software window will update it self, showing you all the information about the power supply and allow you access to the previously disabled controls.
13. You now have successfully connect the software to your power supply.

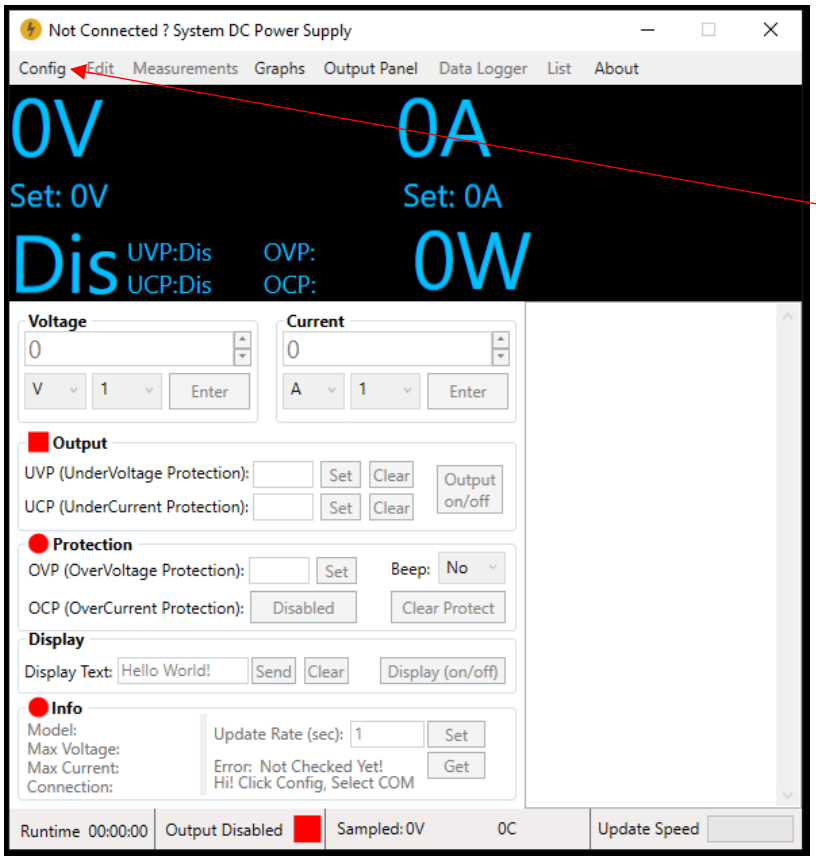


Figure 1: Main Software Window

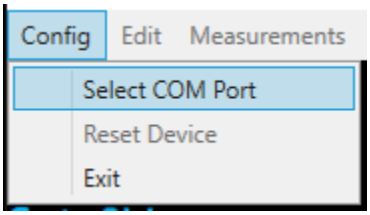
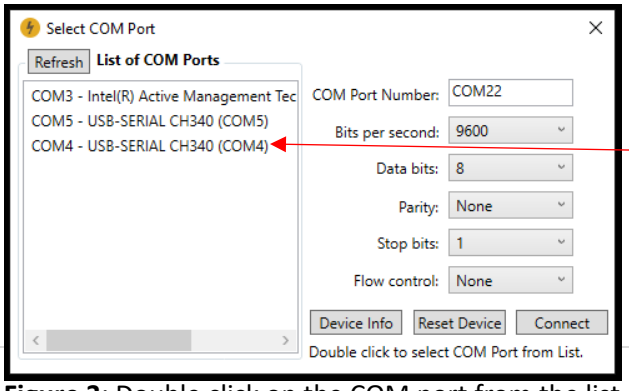


Figure 2: click on Select COM Port to open the Select COM port window



Double click on one from the list, do not change the other settings. Your COM port will appear on the COM Port number text box on the right side of the window.

Figure 3: Double click on the COM port from the list and click Device Info or Connect.

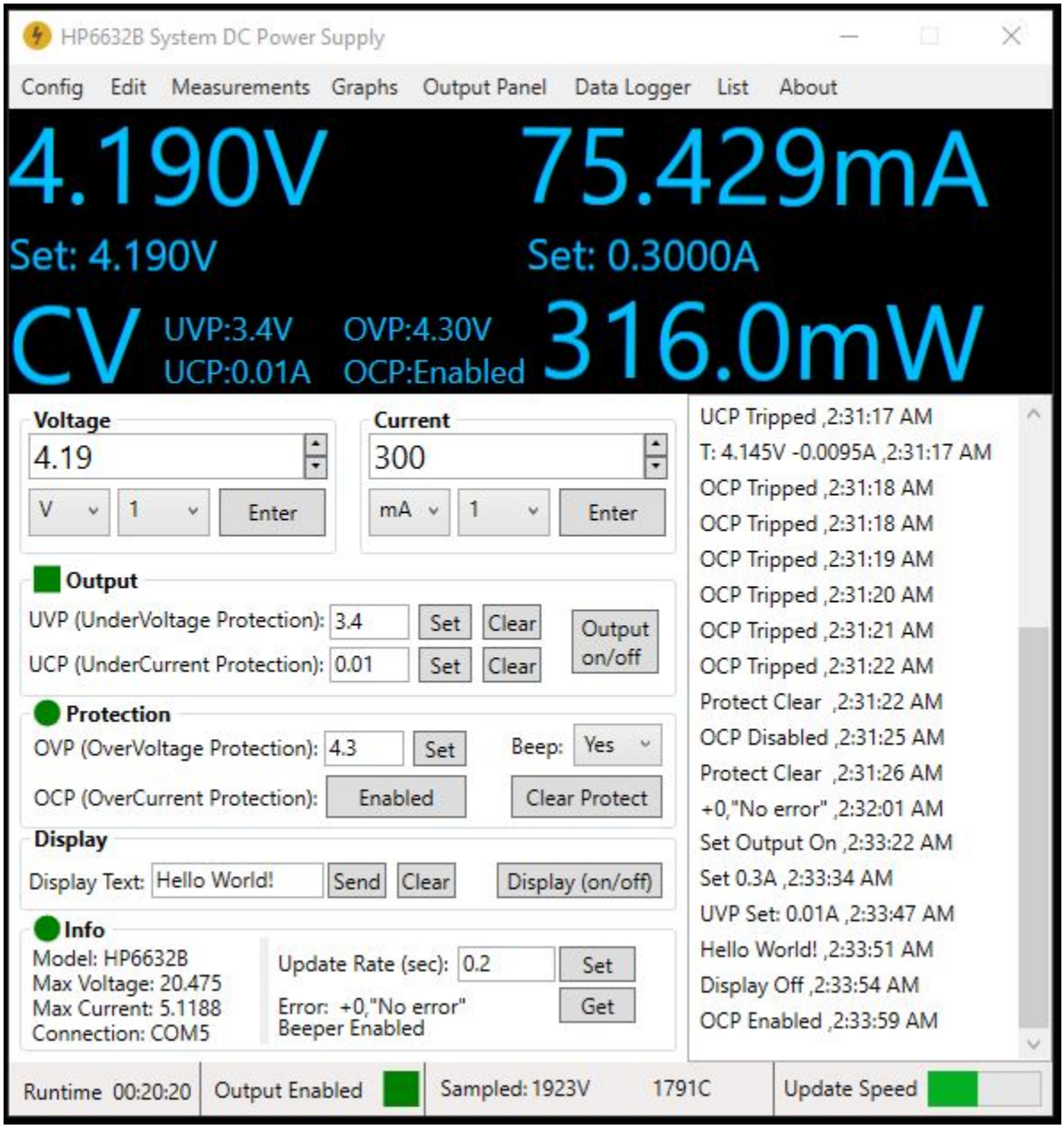
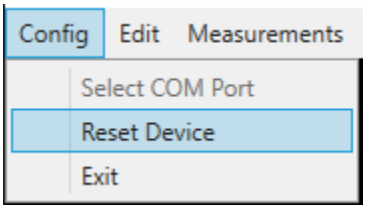
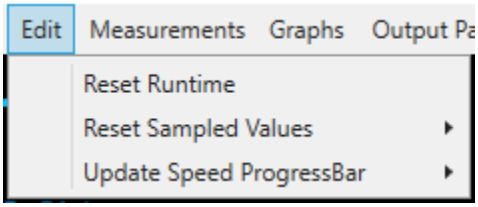


Figure 4: Once you successfully connect, the software will do the rest. From here you can set the voltage and current, view graphs and enable the protection features as well as log data.

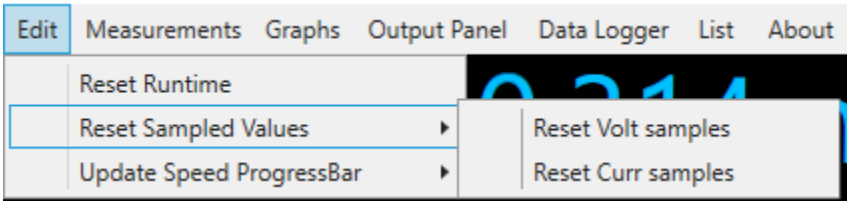
Info about the various menu options:

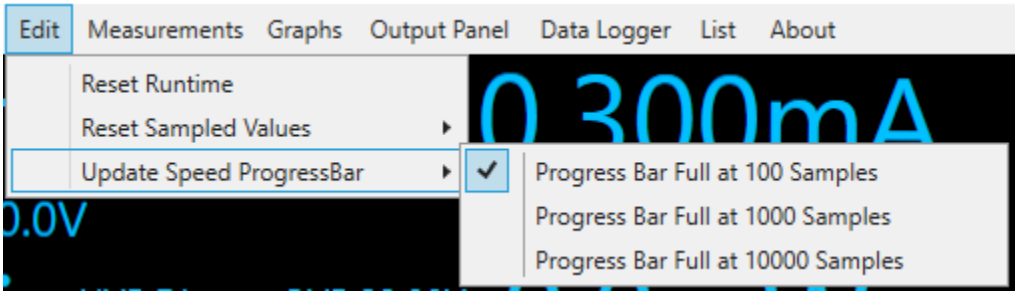


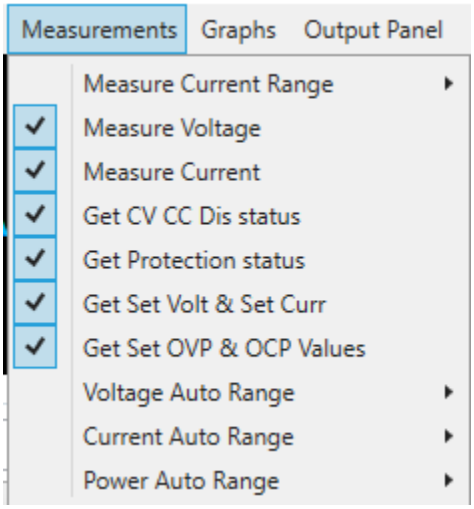
The config menu allows user to open the Select COM Port window, so that they may connect a power supply to this software. Once connected, the reset option allows them to reset the device. The exit option allows user to successfully exit the software. You can also just exit the software by clicking the x check mark on the top right most corner of the software.



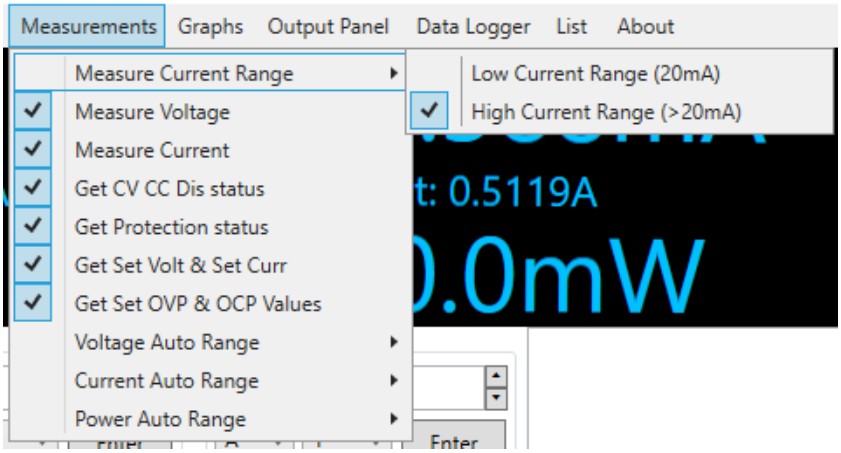
Using this menu, the user can reset the 24-hour runtime timer, located on the bottom left side. You can also reset the voltage and current sample count. And, change the progress bar full sample value. The progress bar can become full when x number of samples are collected and reset itself and repeat the cycle.



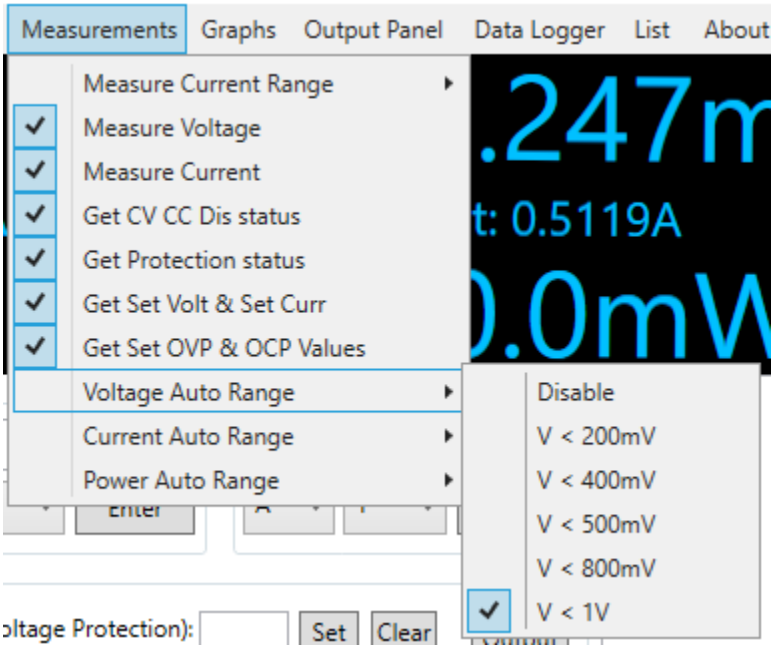




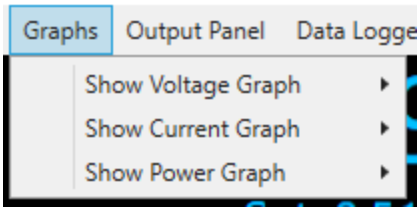
The most important menu of the entire software. Here, the user can choose to get or not get the measure voltage/current values from the power supply. They may also disable the software from getting the output status info from the power supply, such as whether the device output is disabled or in constant current or constant voltage or negative constant current or constant voltage constant current mode. Also, they can choose to get the set voltage and set current values from the power supply as well as set over voltage value and whether the over current protection is enabled or not. Disabling all the options other then measure voltage and measure current can increase sampling speed when update rate is set to less that 1 seconds. You may also choose to only measure voltage or current for maximum sampling speed.



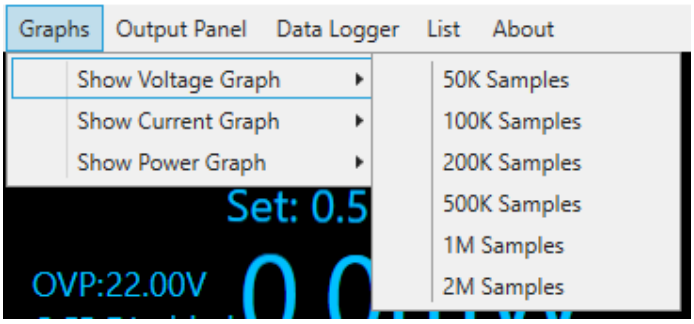
All the supported power supplies have two current ranges. You may switch to the low current range if you wish to measure current less than 20mA for better accuracy. Warning, setting the current range to low may cause issues if measured current goes above 20mA. On the power supply's display, you may see an overload status and if you are logging data, the current readings will be recorded as 0A. Graphs will display 0A, power values will become 0W.



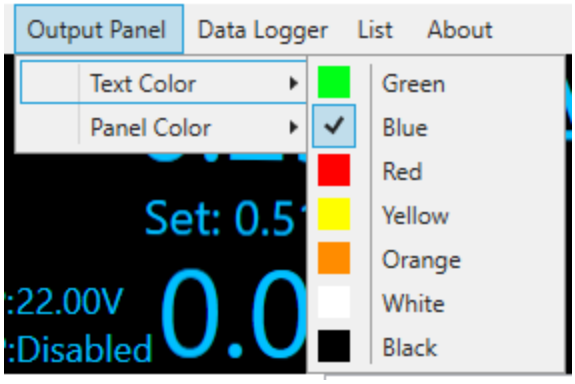
You may enable or disable whether the software might display the mV, mA, mW values when V, A, W are less that the specified values.



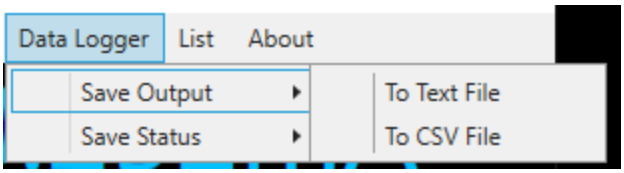
A very important feature of this software. User can choose to enable real-time graphing of voltage, current and even power (if you are measuring both voltage and current). The sample size determines how much data can the graph plot before it stops plotting values. The larger the sample size the user choose, the more memory the graph will consume. 50K sample size gives you around 13.8 hours of recording time if update rate is set to 1 second.



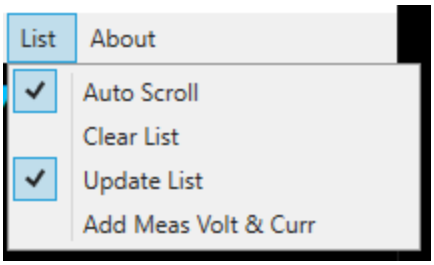
Users can simply save the graph data and open another one when max sample limit is reached. Warning, opening any graph(s) will lower the sampling speed if update rate is set to less than 1 seconds. Moving the graphs and maximizing them will increase memory and CPU usage considerably.



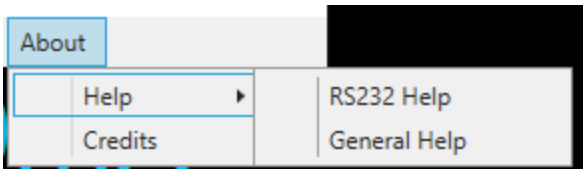
Users may choose to change the color of the information display panel. By default, its set to blue with black background.



You may choose to save the measured voltage and current values to a text/csv file. You can also choose to save the list status updates to a text file. It is recommended that the users enable this option first when running the software. As the software does not store any measured values internally, users are encouraged to enable saving output values to a text file as soon as possible.



Auto scroll option automatically scrolls the list to the recently added status text. Clear list option will clear the list. Update list option allows users to decide whether the software will log all the user activity inside the list box. It is recommended that this option be enabled, it is enabled by default. Add Meas Volt & Curr option will add the measured values inside the list. Warning, this option should not be enabled for long durations as it uses large amounts of RAM and can cause the software to slow down or even crash, clearing the list will not fix it. You will have to restart the software.

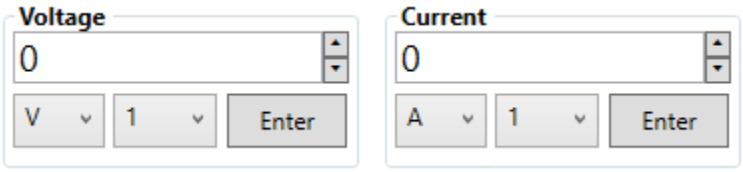


Some general help can be found in these menu items.

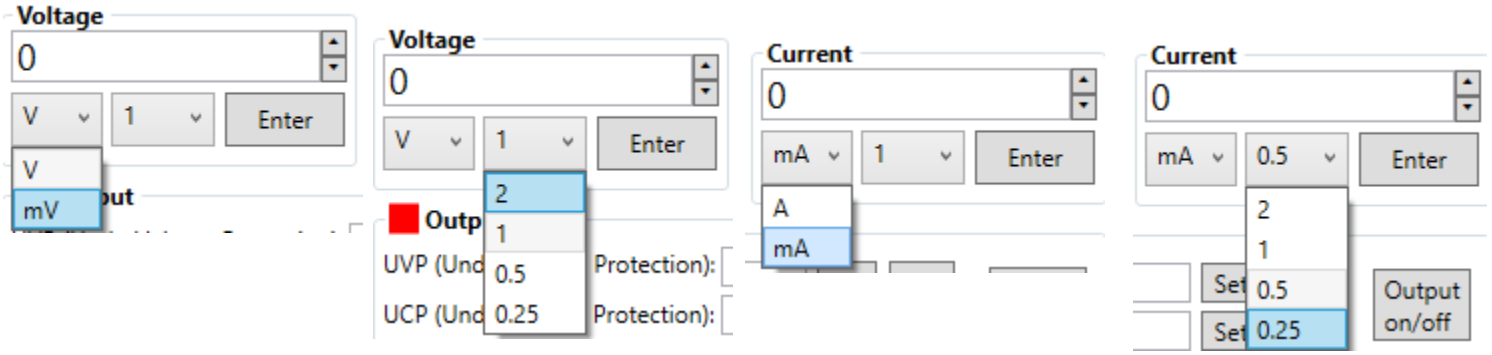
Info on various Panels:

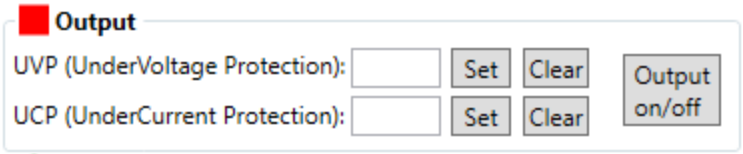
The display panel shows the users the measured voltage, current and power values. It also shows the set voltage and set current values. The output status is also shown on the left bottom corner. UVP, UCP, OVP, and OCP values and their status is also shown. The panel's color can be changed though the output panel menu.

A "?" can be displayed on any of the information if the user decides not to get the appropriate information from the power supply. Users can also disable software from displaying values in mV. mA, and mW by going to the Measurements menu. If the get set voltage and current option is disabled, then the software will update the set voltage and current values when the user sets the voltage and current through the software but not through the front panel.



These boxes allow user to enter voltage and current. They may type the values then hit enter on their keyboard or use the mouse scroll wheel increase/decrease the values then click the enter button. If a user wishes to enter a value in mV or mA, then they can set the units to mV/mA and the values will be set in milli units. User may also change the increment/decrement value to control how much should a value change by when a mouse scroll wheel is used. You may also click the little up and down arrow buttons to increment/decrement by 1 or hold them down to change quickly. The maximum value you can enter for voltage and current depends on you power supply connected to the software. Entering a value large than maximum value allowed will set the input to the max value. User may not enter negative value and anything other than numbers.

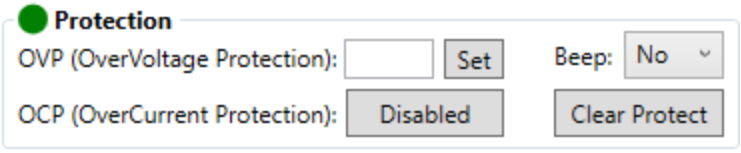




Set and clear UVP and UCP values. These features depend on measured values. If measure voltage option is disabled, then UVP feature will not work and if measure current option is disabled then the UCP feature will not work. Both, UVP and UCP will only accept values in V and A. You may also not enter anything other than numbers.

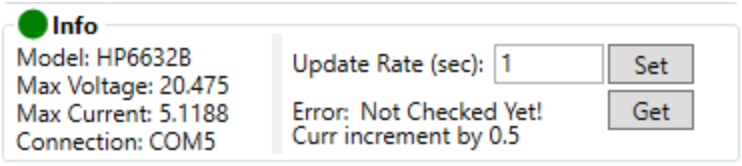
The Output button allows users to turn the power supply's output on and off just like they would through the front panel. The rectangle box may appear red or green depending on the output status.

The UVP and UCP features are implement on the software side only. The output will turn of if UVP, UCP are tripped.

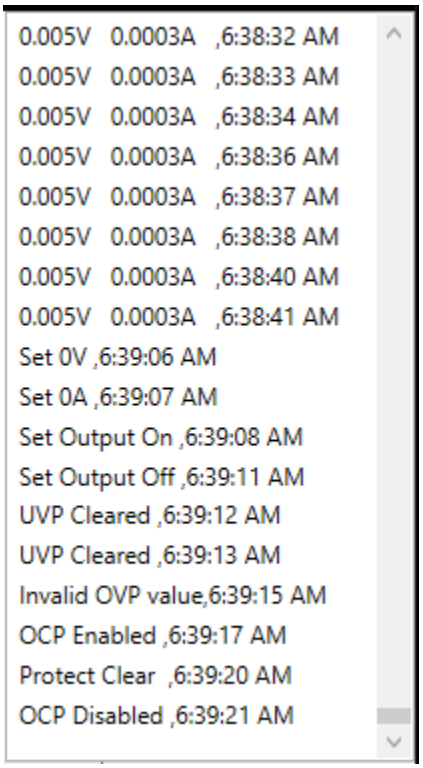


Users can set the OVP values and enable/disable OCP protection just like they would do through the front panel. You may also turn the beeper on and off, if turned on then it will beep once whenever the protection is tripped. The eclipse's color will change from green to red if tripped, it will also change to black if user disables the get protection status option. You may also click the clear protection button to clear the protection tripped status, refer to the user manual of your power supply to understand this better.

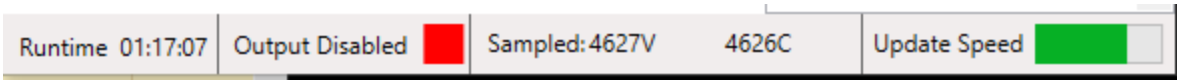
Turn the vfd display on your power supply on and off. You may also display text on the vfd display.



Display the information gathered from your power supply as well as change the update rate. If update rate is set to 1 seconds, then the software will send and receive data from the power supply every 1 second. If set to 0 then the information will be retrieved and send as soon as possible. Changing the update rate will affect how fast can the set voltage and set current values can be send to the power supply. You can check for errors by clicking the Get button.



List box, user activity as well as protection status is show here. You may also enable save status to text in the data logger menu.



Status bar shows the 24-hour timer, how many voltage and current samples are collected and the update speed progress bar.

Info on Graphs:

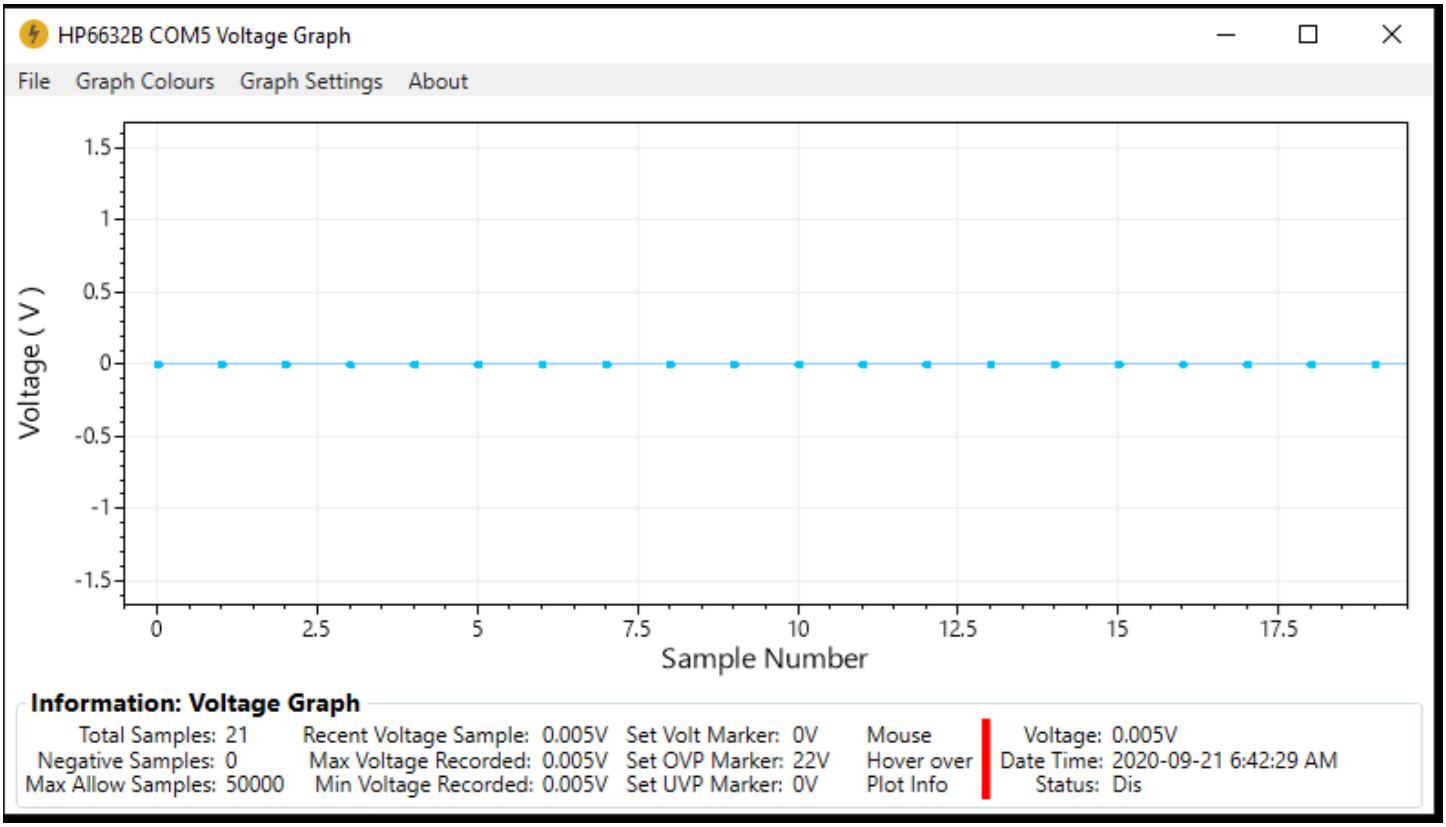
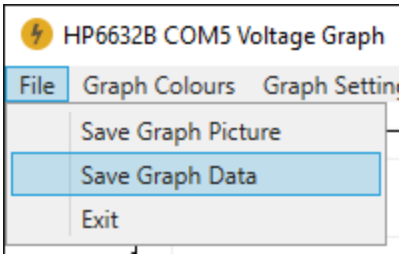
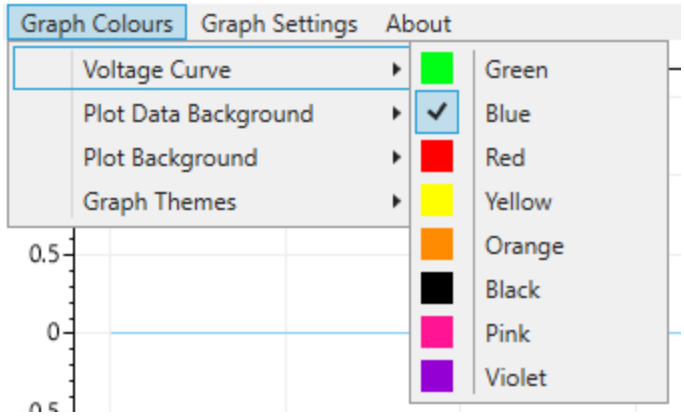


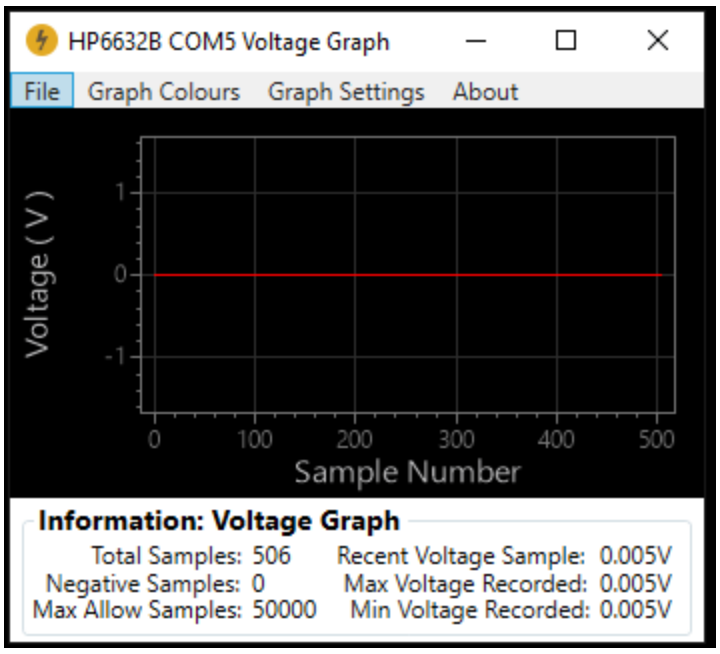
Figure 5: Users may have up to 3 different kinds of graphs active, voltage, current, and power. Feature wise they are all identical.

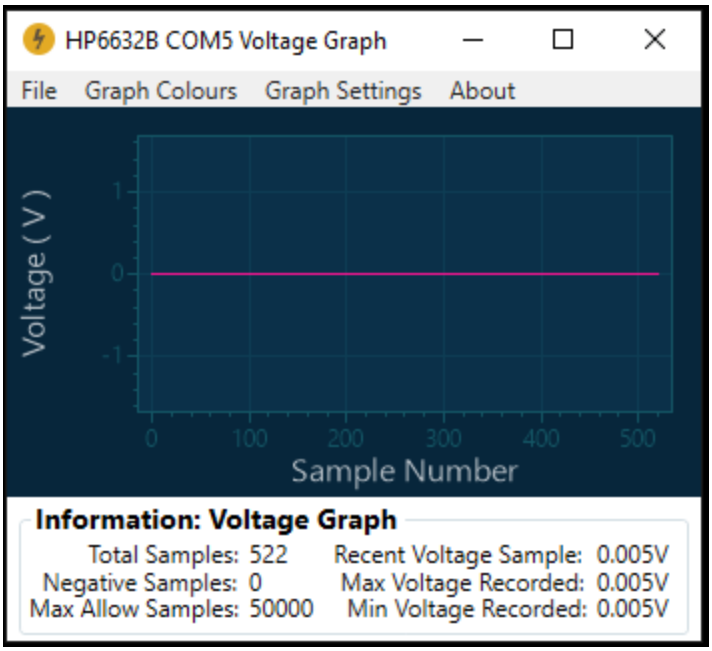


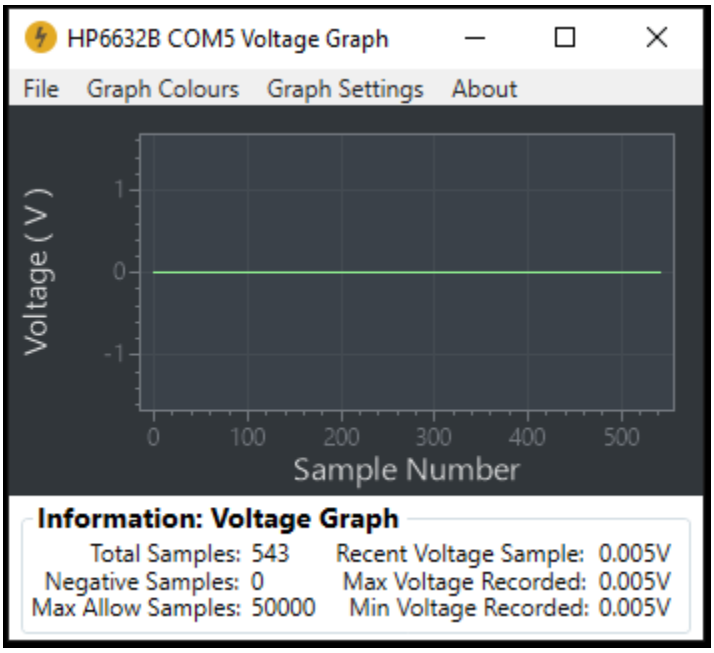
Save Graph Picture will save a picture of the graph at the same location as where your software is located at. Warning, newly saved graph image will overwrite the previously taken picture so make sure to move the previous image to a different location prior to taking a new picture. Save Graph Data will save the samples from the graph to a text file. Exit allows user to close the graph.

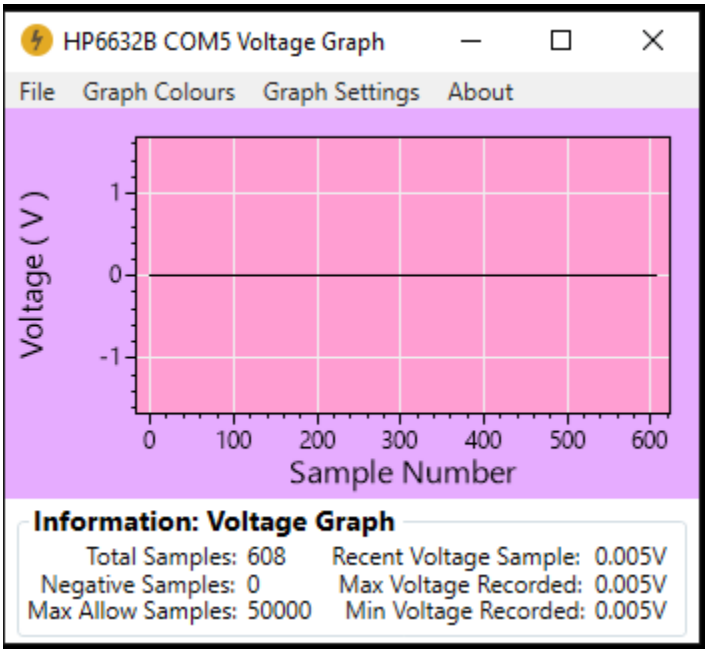


Customize the graph's visuals the way you like. Does not affect performance. You can change the color of the curve, the plot's background, the curve's background as well as choose a plot theme.



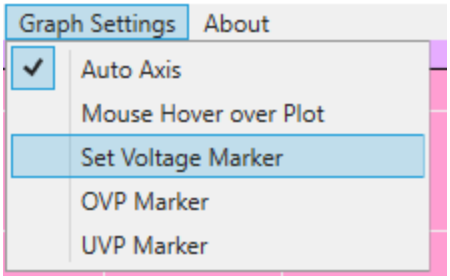






Set the color and theme of the graphs the way you like it. All graphs have these options.

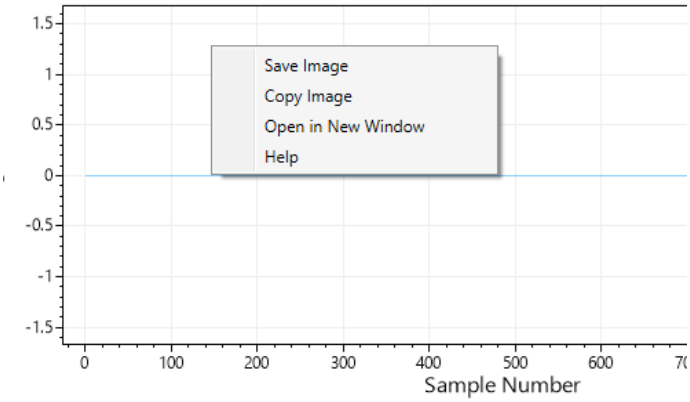
Some interesting information is display inside the information box; this is similar for all the graphs. If mouse hover option is enabled, then the sample's data is display on the right side after the red/green line.



Auto Axis options will automatically scale the graphs show all the points inside the graph window. Disable this option to pan and zoom inside the graph.

Mouse Hover over Plot option will put a vertical dash line marker, moving it around a particular sample point will shows its information on the information panel such as what date and time the sample was taken. Performance will drop if this feature is used.

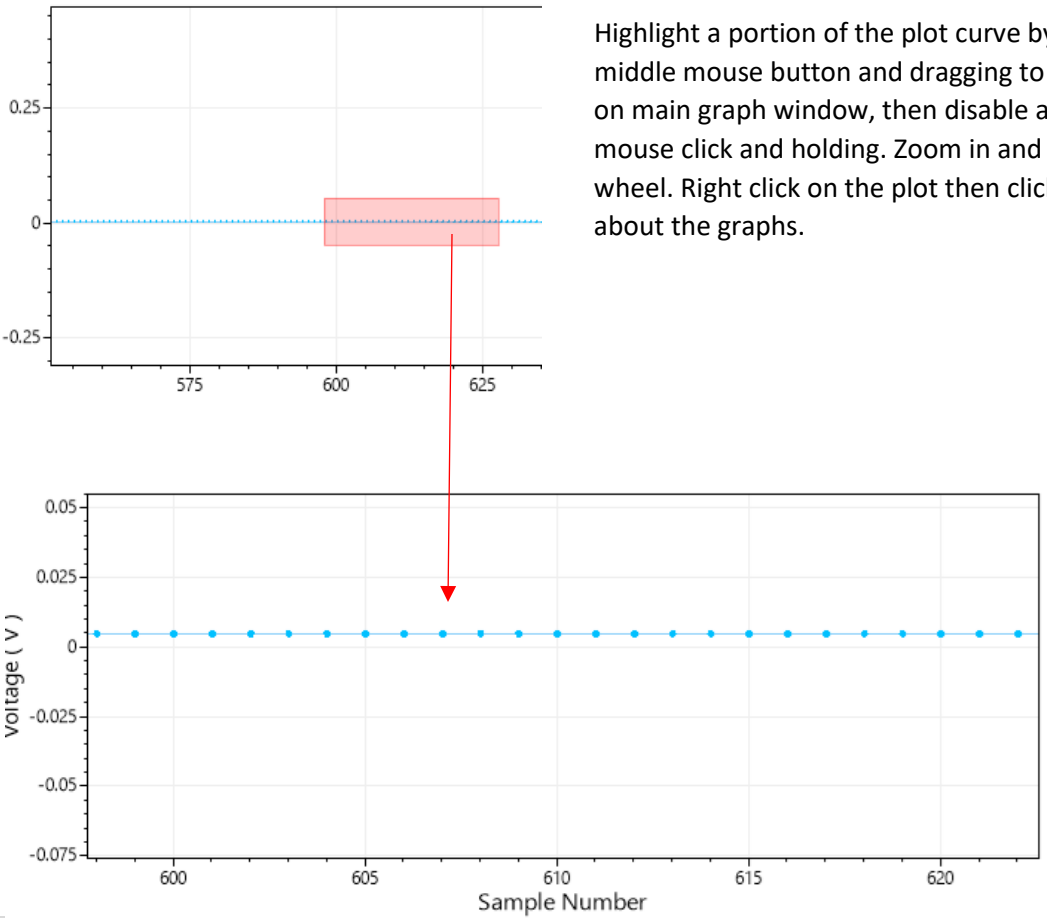
OVP marker and UVP marker will create a dashed horizontal line on the graph were your OVP and UVP values are. On the current graph, you have OCP marker and UCP marker. On power graph these are not available.



Right click on the graph to open this menu. Save image will open a save prompt menu allowing users to save the plot as an image to their specified location.

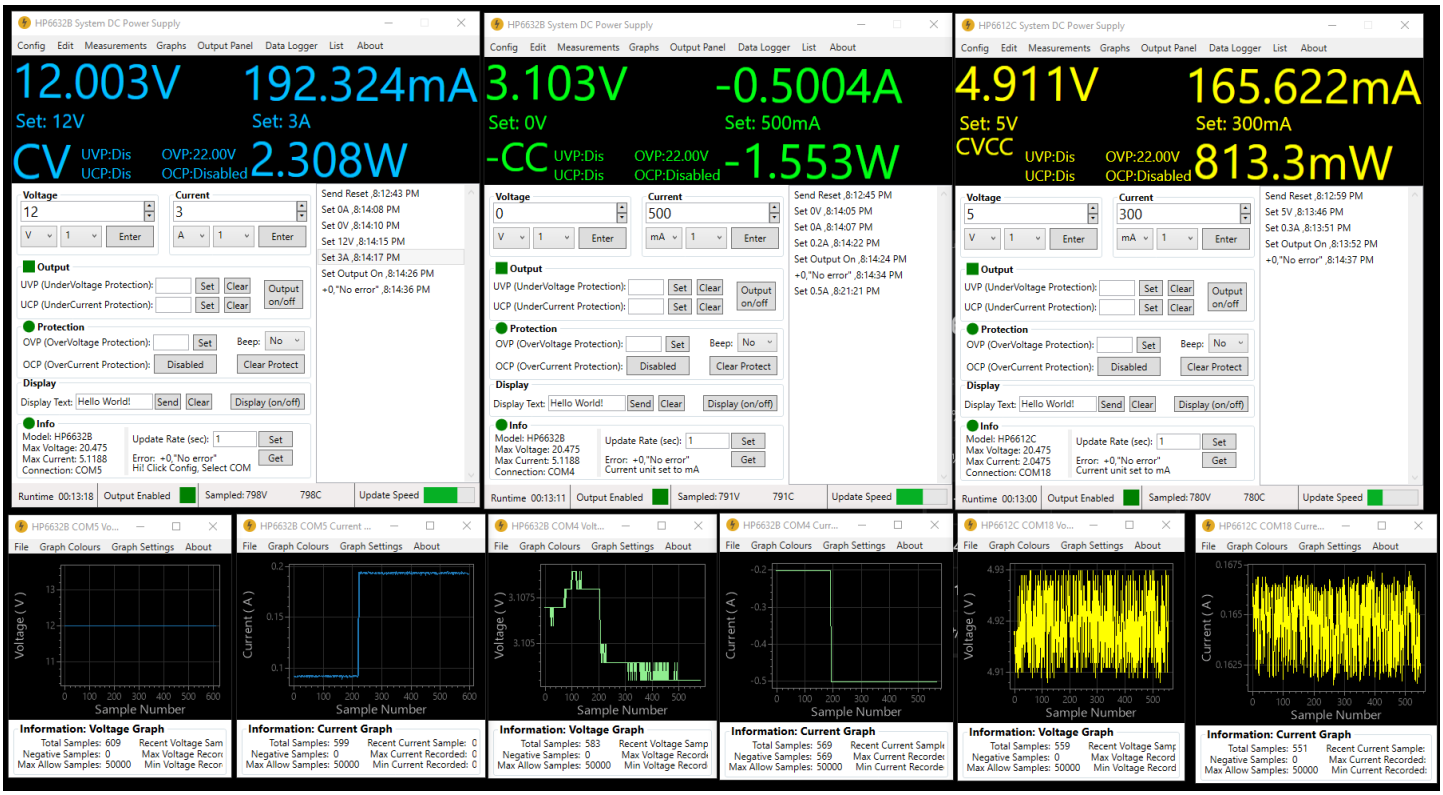
Copy image will save the image to clipboard so you may paste it somewhere like a word document.

Open in new window allows user to open a copy of the graph in a new window where you may pan and zoom with having to disable the Auto Axis option.



Highlight a portion of the plot curve by clicking and holding the middle mouse button and dragging to see a zoomed in view. If done on main graph window, then disable auto axis. Pan using the left mouse click and holding. Zoom in and out using the mouse scroll wheel. Right click on the plot then click help option to know more about the graphs.

Up to 3 graphs can be displayed. They are voltage, current and power graphs. Graphs can slow down measurement sample rate. So, close them if you desire as fast as possible sampling rate.



Control multiple power supplies at the same time by opening multiple instances of the software.