Solartron 1260A

RESISTOR IMPEDANCE TEST-ZPLOT SOFTWARE

HTTP://WWW.AMETEKSI.COM/SUPPORT-CENTER/SOLARTRON-ANALYTICAL/USER-TESTS



Why Run a Dummy Cell Test?

Before beginning a dummy cell test, please ensure that the Solartron Analytical 1260A is connected and communicating with your PC. If you are unsure or need assistance with this, please refer to AMETEK®/ Solartron at: http://www.ameteksi.com/support-center/solartron-analytical/user-tests

Additionally, it is imperative that the latest version of the ZPlot software corresponding to the Solartron Analytical 1260A be installed onto the connected PC. This can be found at:

http://www.ameteksi.com/products/software/zplot-software.

When using ZPlot, it is also necessary to download ZView, in order to view the data derived from testing. This can be found at:

http://www.ameteksi.com/products/software/zview-software.

When working with the Solartron Analytical 1260A, as with all Solartron Analytical frequency response analyzers (FRA), it is important to perform a dummy cell test to ensure that the equipment is working properly. Running a test with known parameters and expected results can help to determine whether an FRA that is supplying questionable data requires repair or recalibration.

A properly working FRA that outputs questionable data can indicate any of the following:

- Faulty GPIB connection
- Noise interference (could be from power outlet, or from pumps, heaters, etc.)
- Bad connections to the experiment (i.e.-something may have disconnected mid-experiment)
- Broken or corroded cables
- AC voltage level is set too low
- Insufficient integration time during the experiment
- Measurements taken outside the specified range of the apparatus

Disqualifying the notion that the FRA is responsible is a crucial step to determining the cause of erroneous data. Running a successful dummy cell test and obtaining experimental results that match expected results indicates that the FRA is working correctly under that software configuration.

Running a dummy cell test with ZPlot and ZView will be addressed in this document. The following is a guide which outlines the steps needed to perform this dummy cell impedance test.

Experimental Setup-Physical Equipment

In order to run the impedance experiment, a metal wire must be used to connect the shield of the "INPUT I" and the shield of the "GEN OUTPUT". This is done to give the current a return path to complete the circuit. The wire may be insulated, as seen in Figure 1, or can be bare. However, the ends attached to the 1260A must be free of insulation so that the current can travel freely through the wire.

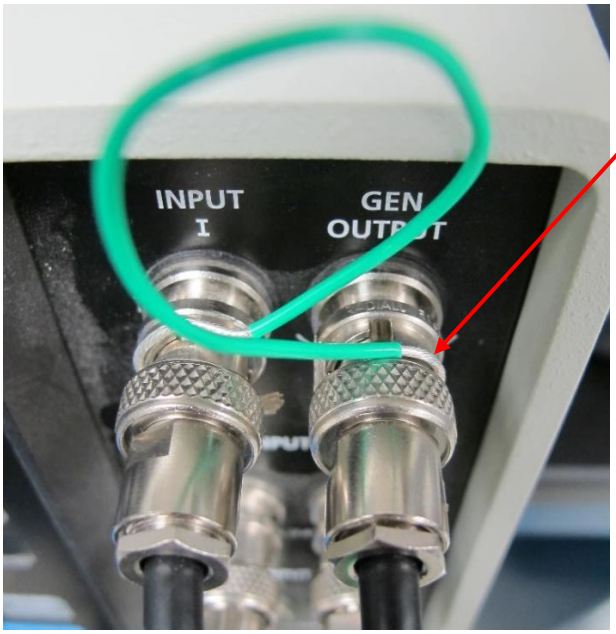


Figure 1

Two BNC coaxial connector adapters, and two BNC T adapters, as shown in Figure 2, respectively, will be needed to connect the cables to the resistor.

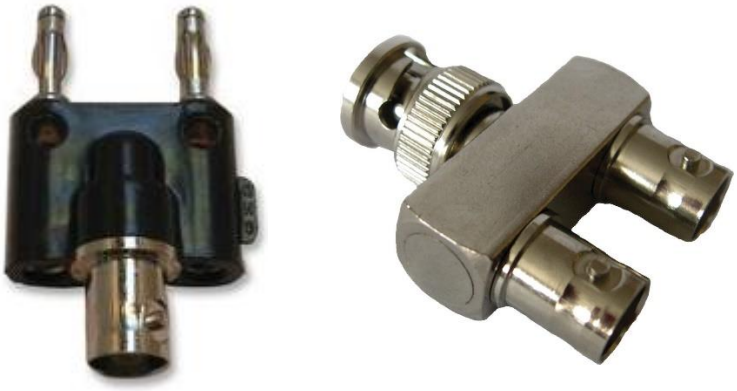


Figure 2

The wires are connected as shown in Figure 3. Connect “GEN OUTPUT” and “INPUT V1 HI” to one side of a resistor, and connect “INPUT I” and “INPUT V1 LO to the other side of the resistor. The known value of the resistor in this example is 1.8kΩ.

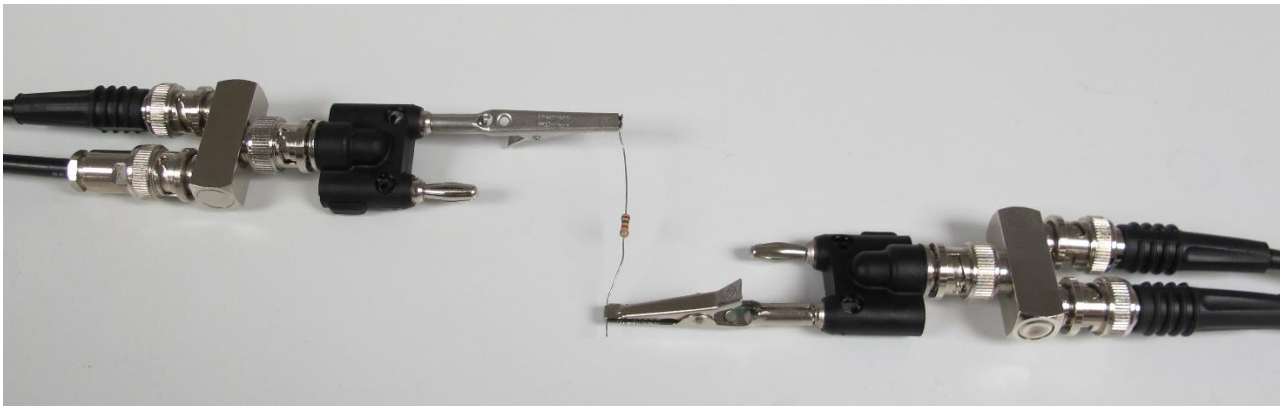


Figure 3

Ensure that the test resistor is connected to the pin side of the BNC adaptor, not the ground side. The pin is the side *without* the tab labeled “GND” for “ground”. See Figure 4 below.

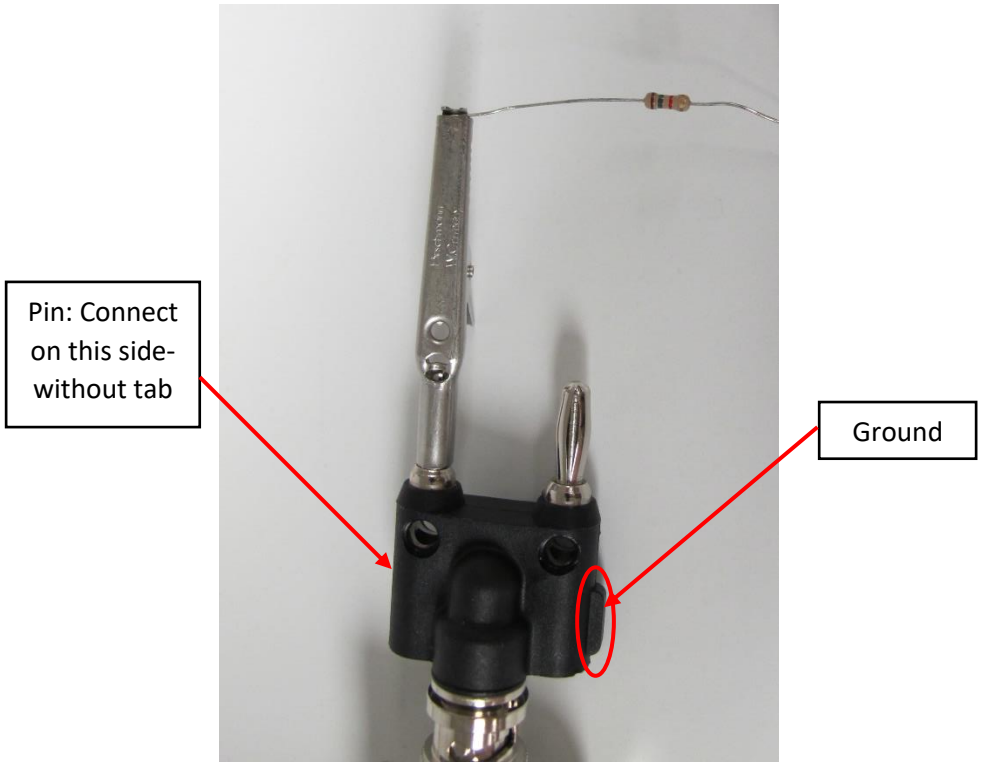


Figure 4

Experimental Setup & Run-ZPlot Software

Having installed the latest version of ZPlot, double click the ZPlot icon on your desktop to start the software. The ZPlot software protection key will need to be entered into a USB port on the PC to run this test. Additionally, a USB-GPIB adaptor will be needed to connect the PC to the instrument.

For more information regarding connections and communications, please refer to the 1260A Connections/Communications document at http://ameteksi.com/support-center/solartron-analytical/user-tests.

Select the "Z" icon at the top to open "Setup ZPlot" (Figure 5).

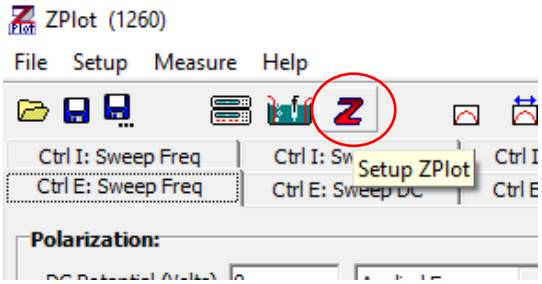


Figure 5

Ensure that Solartron 1260 is selected as the "Analyzer Type" and that 1260 Standalone is selected as the "Pstat/Gstat or Interface" (Figure 6), and that the GPIB address is correct (agrees with the instrument address setting). Click "Test GPIB". If the window displays a "test pass" message, continue. Otherwise, refer to the 1260A Connections/Communications document found at http://ameteksi.com/support-center/solartron-analytical/user-tests for further instructions. Click "OK".

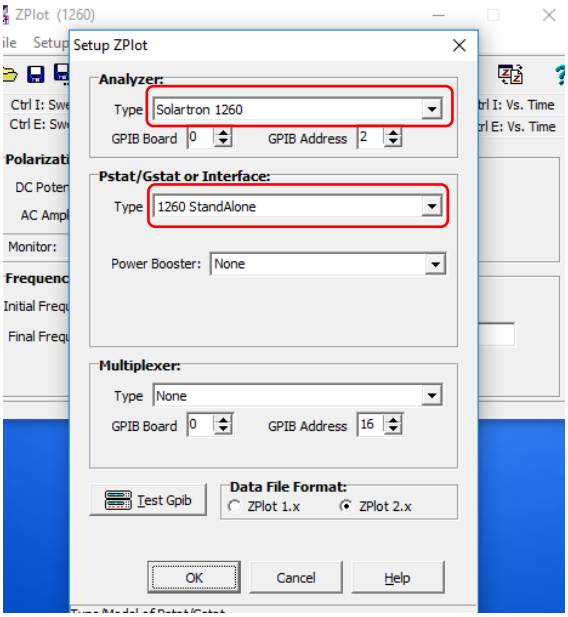


Figure 6

Select the “Ctrl E: Sweep Freq” tab (Figure 7).

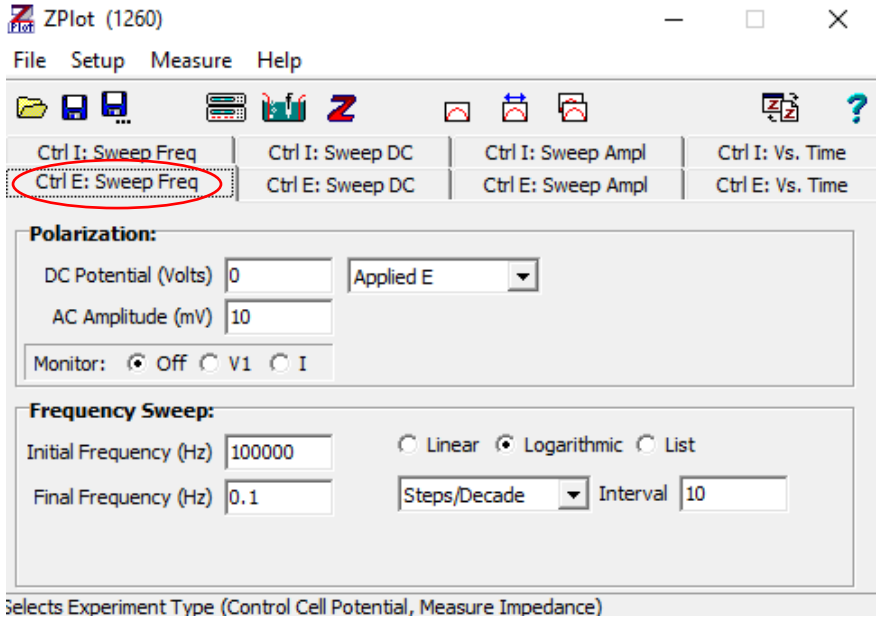


Figure 7

Leave the applied “DC Potential” at “0”, and change the “AC Amplitude” to 100mV. Keep “Monitor” in the “off” position. Set the “Initial Frequency” to 1MHz and the “Final Frequency” to 1Hz. Leave the setting on “Logarithmic” and 10 steps/decade. (Figure 8).

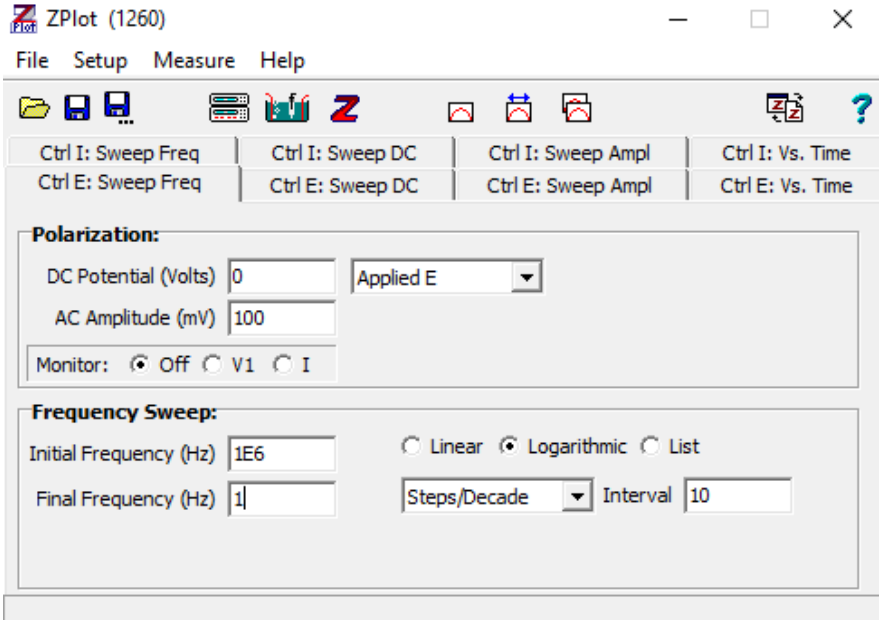


Figure 8

Select “Measure, then “Sweep” (Figure 9).

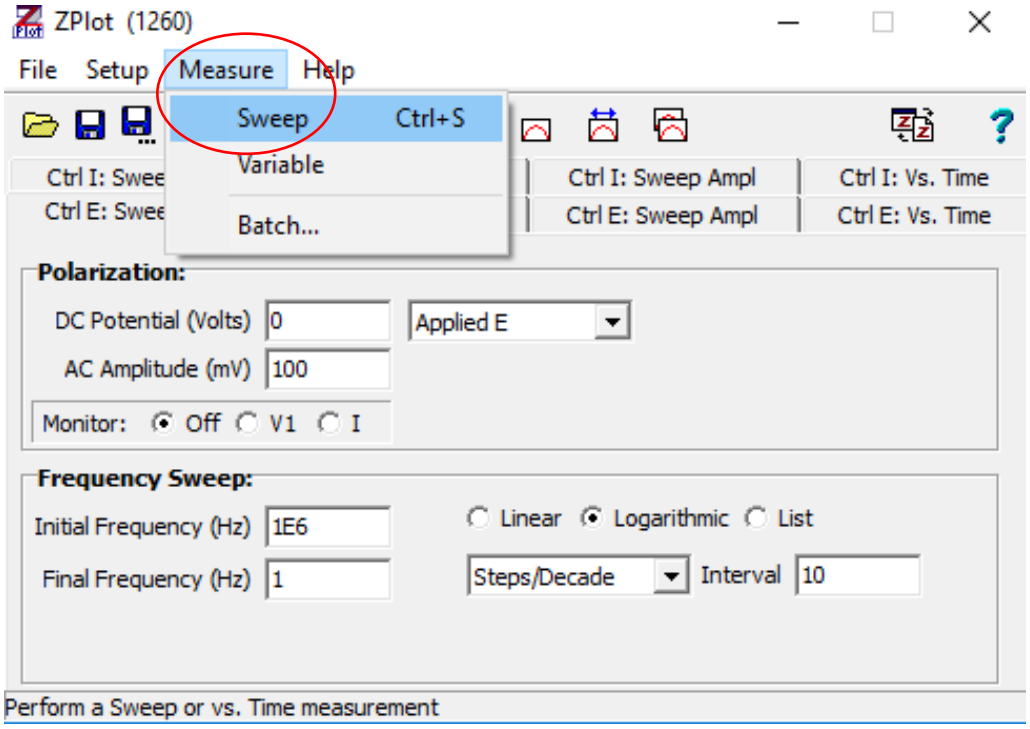


Figure 9

A screen similar to below will appear. This will update the progress of the experiment with regards to points and time. It will also indicate that the cell is on and currently working while giving real-time measurements (Figure 10).

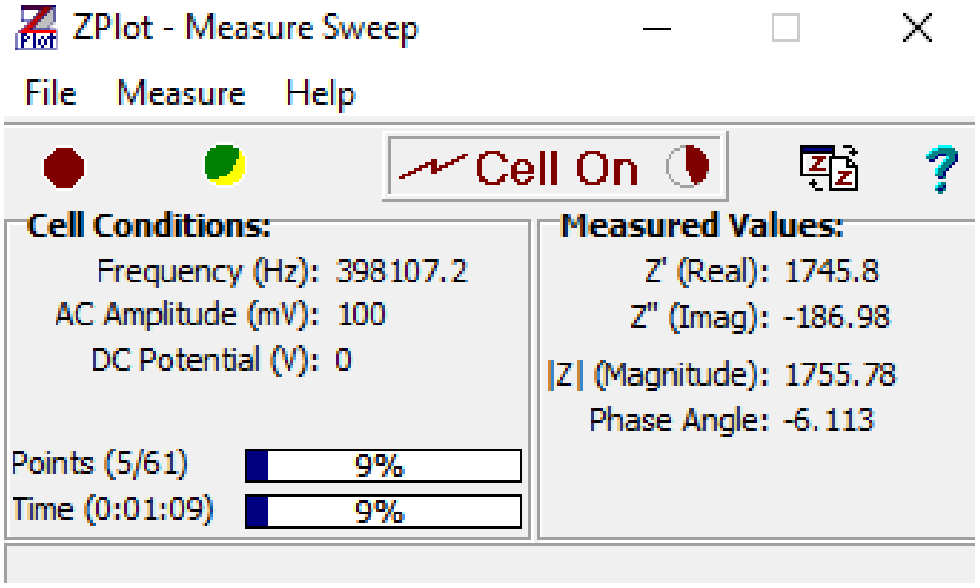


Figure 10

When the experiment is complete, a dialogue box will appear prompting the user to save the project. Type a name for the data file, and click “OK” (Figure 11). In this example, the data file is named “Impedance”.

The data can be viewed while it is being collected by clicking on the “Z-Z” Icon in Figure 11. Autoscale may be needed to better view the data. Data can also be viewed by using ZView as outlined in the following pages.

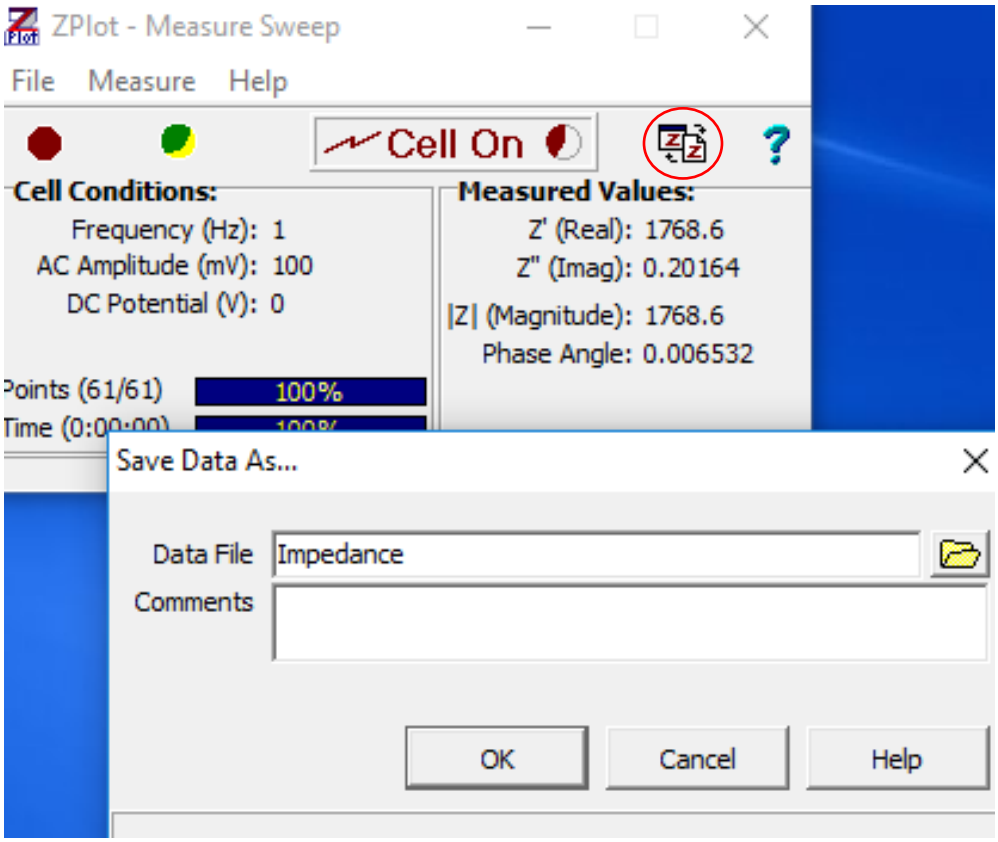


Figure 11

Viewing the Data with ZView

Open ZView, and click “File”, then “Data Files” (Figure 12)

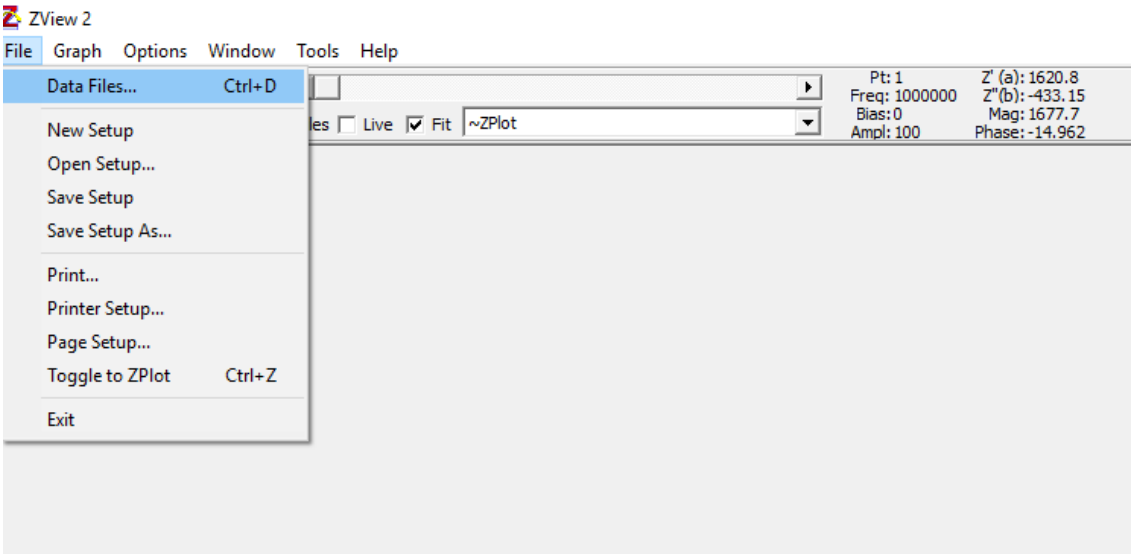


Figure 12

Under “Select Data Files”, select the “Impedance” file created as shown in Figure 13.

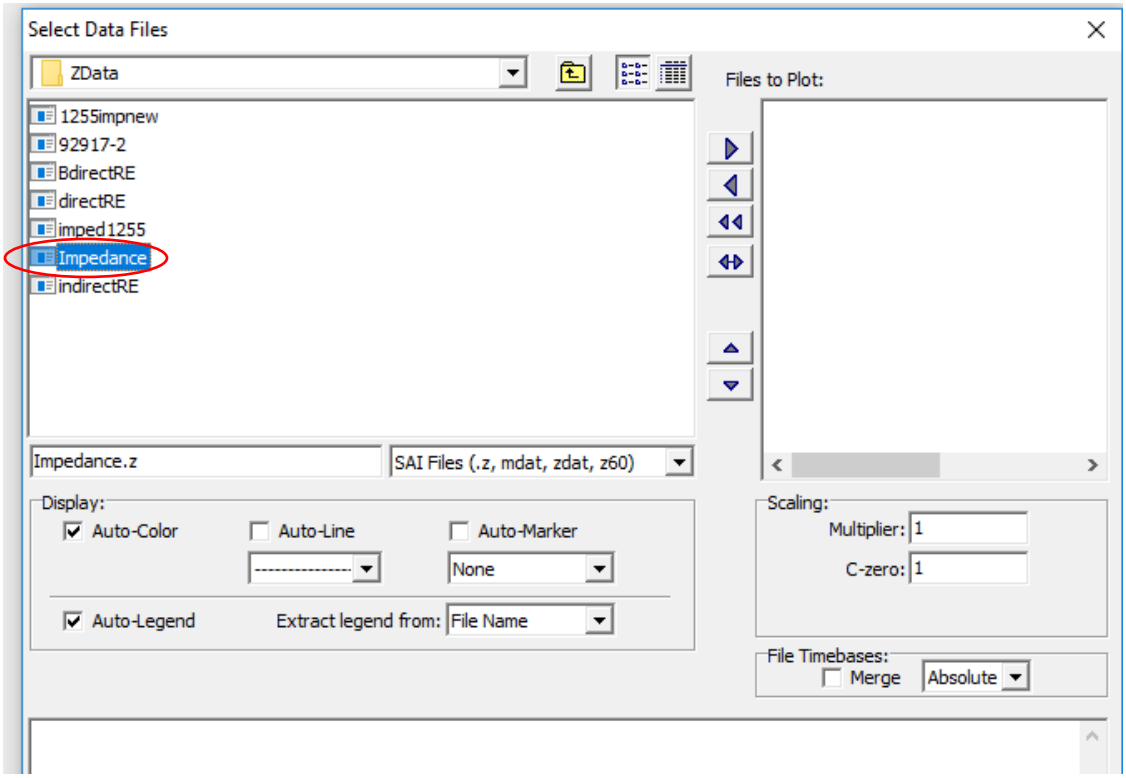


Figure 13

Click the arrow pointing to the right, and select “OK” to add the file to “Files to Plot:” (Figure 14).

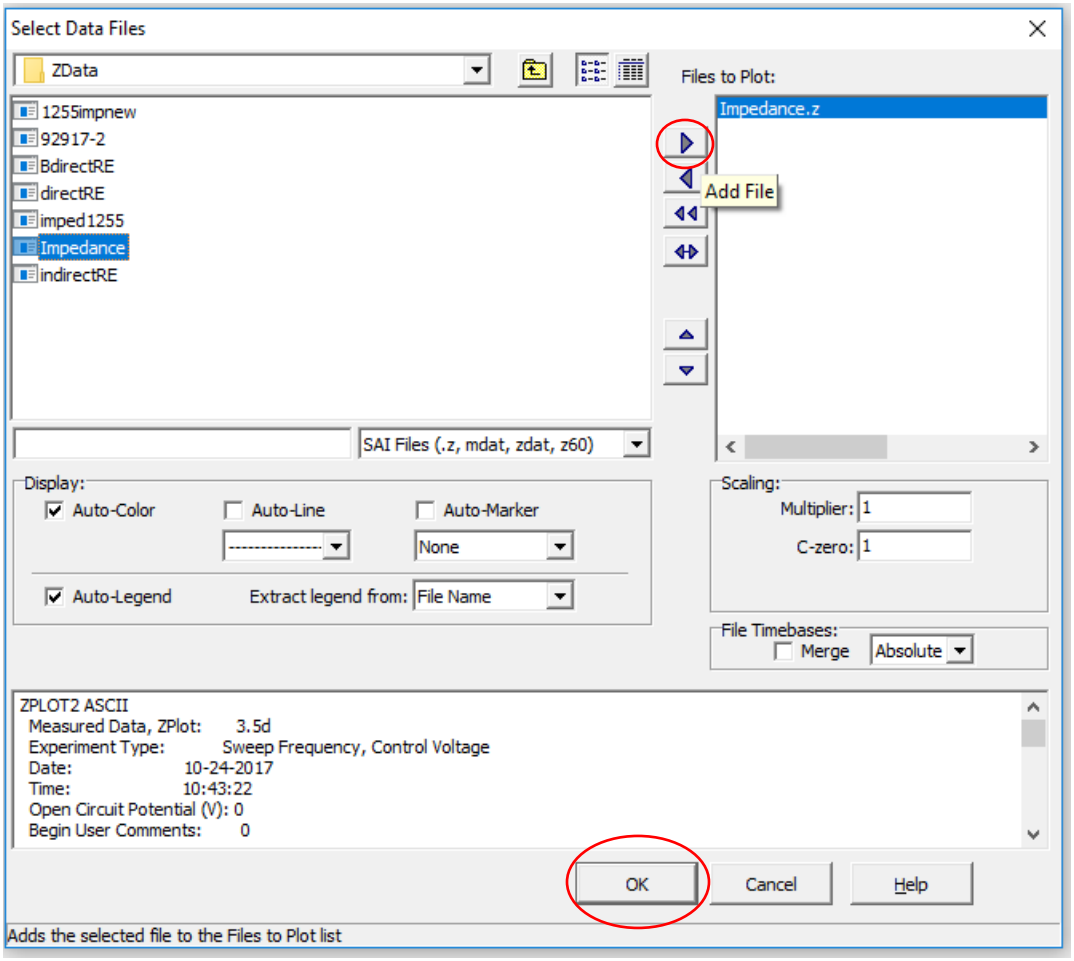


Figure 14

This dialogue box will disappear, and the screen will return to that shown in Figure 12.

Use the drop-down box on the task bar to select the file created-“Impedance” (Figure 15)

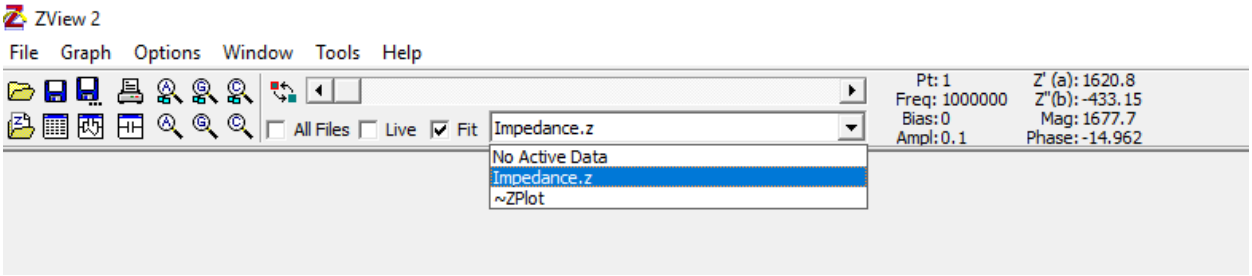


Figure 15

The selected file should now show in the drop-down box as the first item (Figure 16).

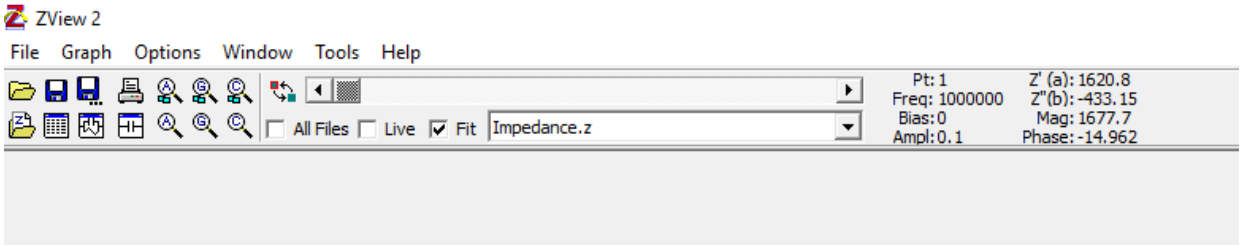


Figure 16

Select “Graph”, then “New Bode” as shown in Figure 17 (for example-or choose whichever graph preferred).

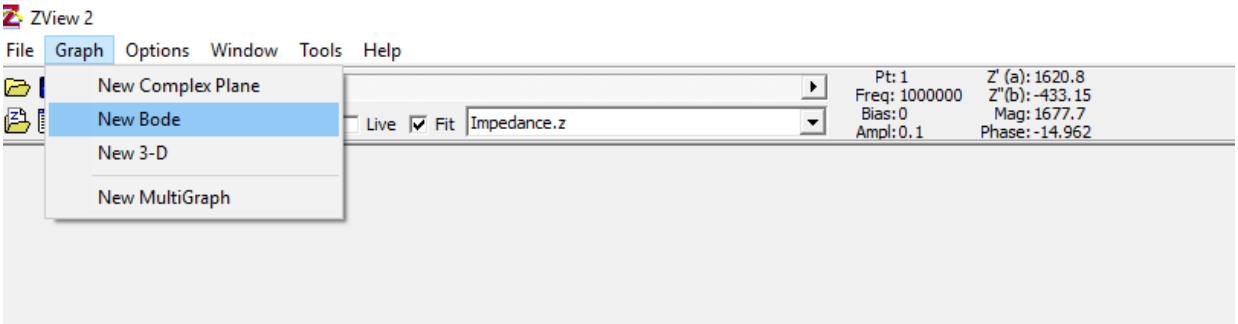


Figure 17

A graph such as the one in Figure 18 will appear.

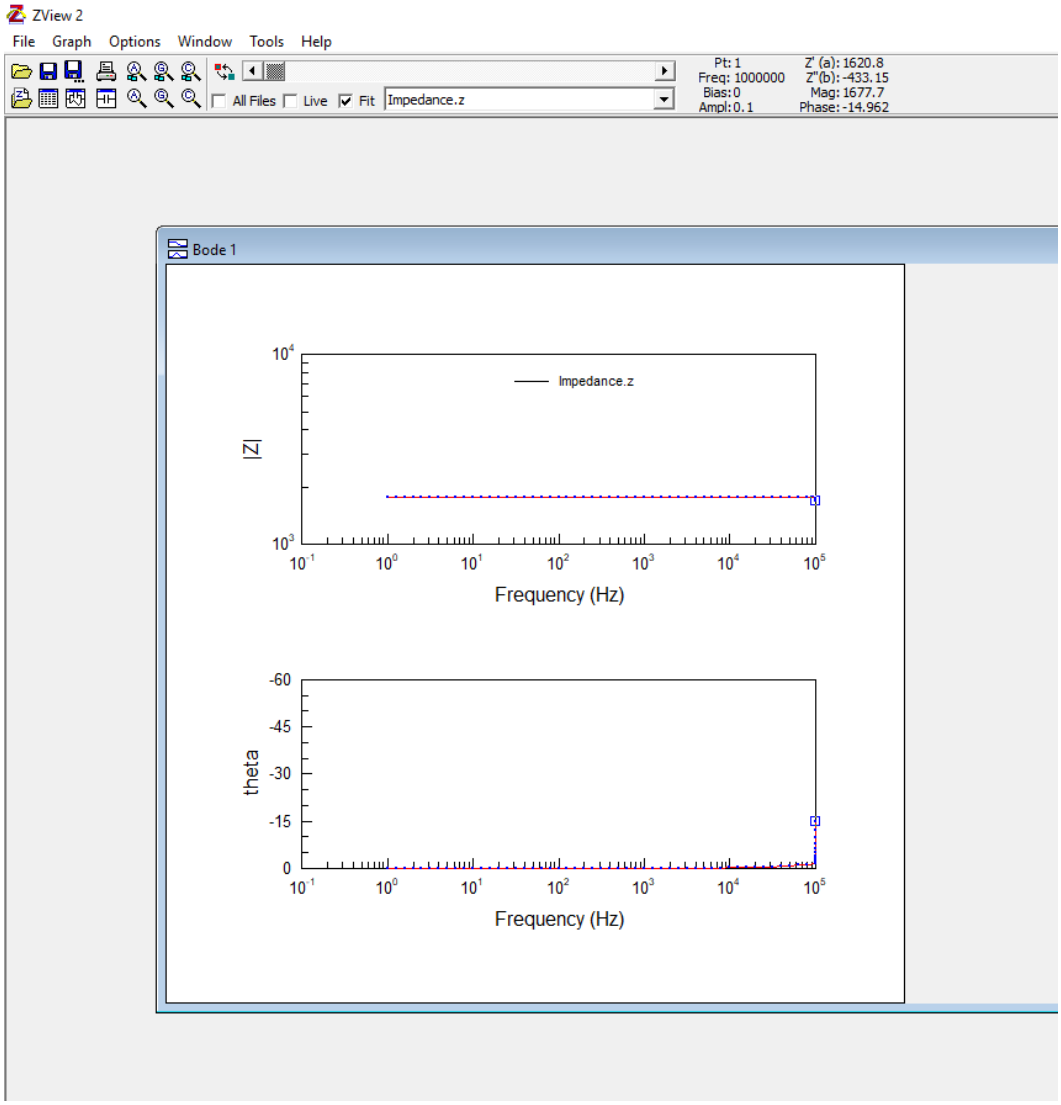


Figure 18

In order to make the graph easier to view, click the magnifying glass with the “A” inside to automatically adjust the scaling within the graphs. This will produce a graph similar to Figure 19.

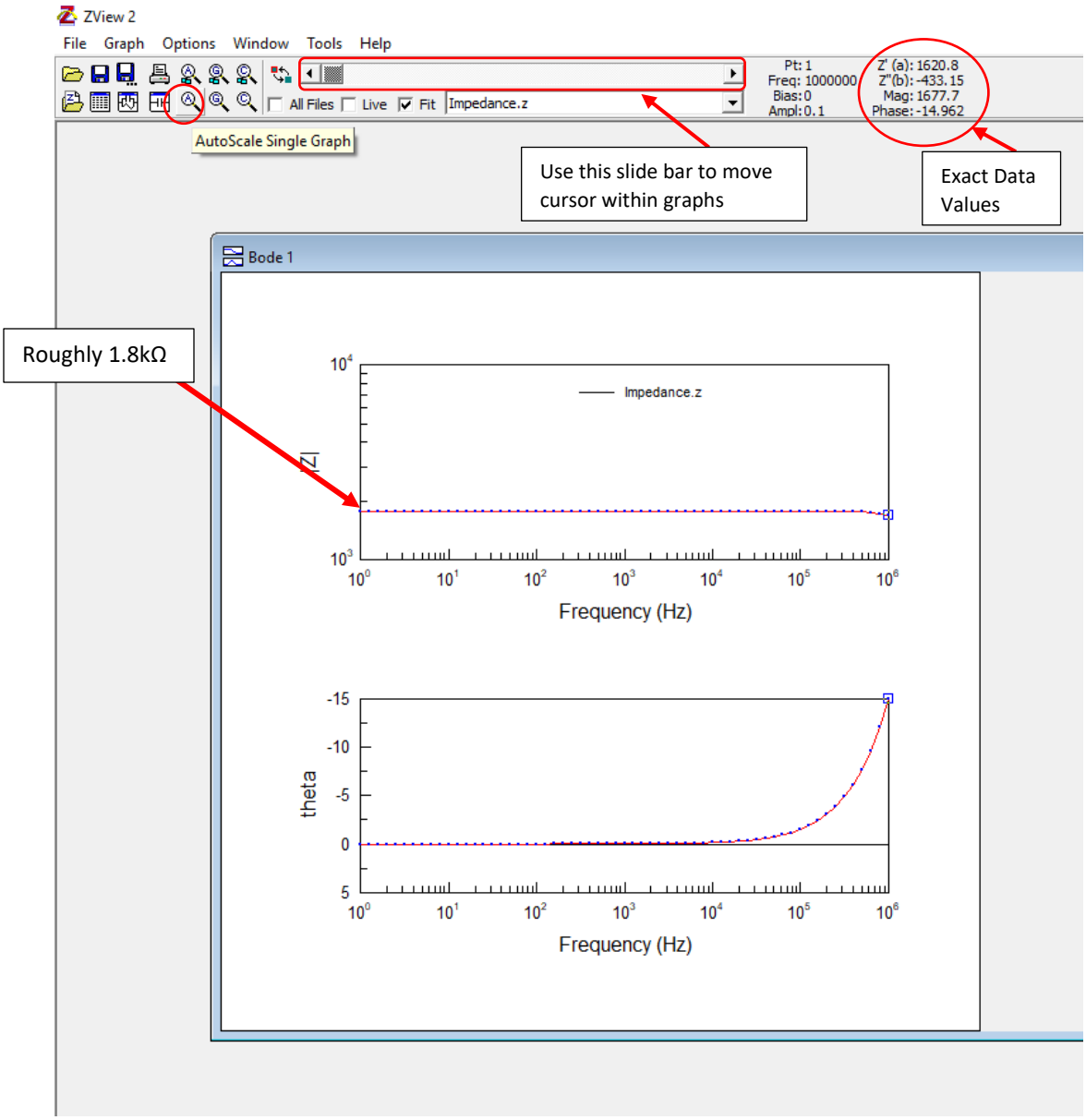


Figure 19

The upper graph shows the impedance value from the experiment is roughly 1.8kΩ. This is what was expected, as it is the known value of the resistor. Values can also be seen in the upper righthand corner of the screen. Additionally, the slide bar at the top can be used to control the cursor on the graph, giving data at each individual point. The data obtained from this experiment suggests that the FRA is working properly. If other experiments are giving erroneous data, causes outside of an impaired FRA should be explored.

Actual data values can also be obtained by clicking on the “Data Values” icon shown in Figure 20. This will then display data in the format shown in Figure 21.

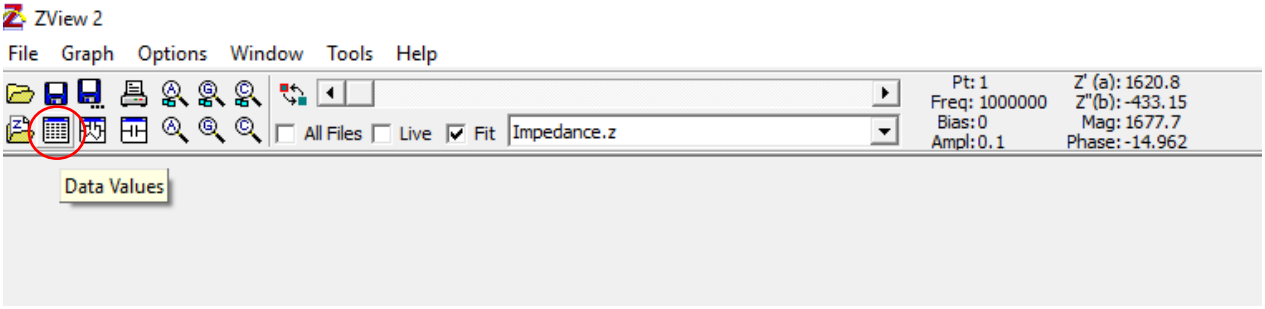
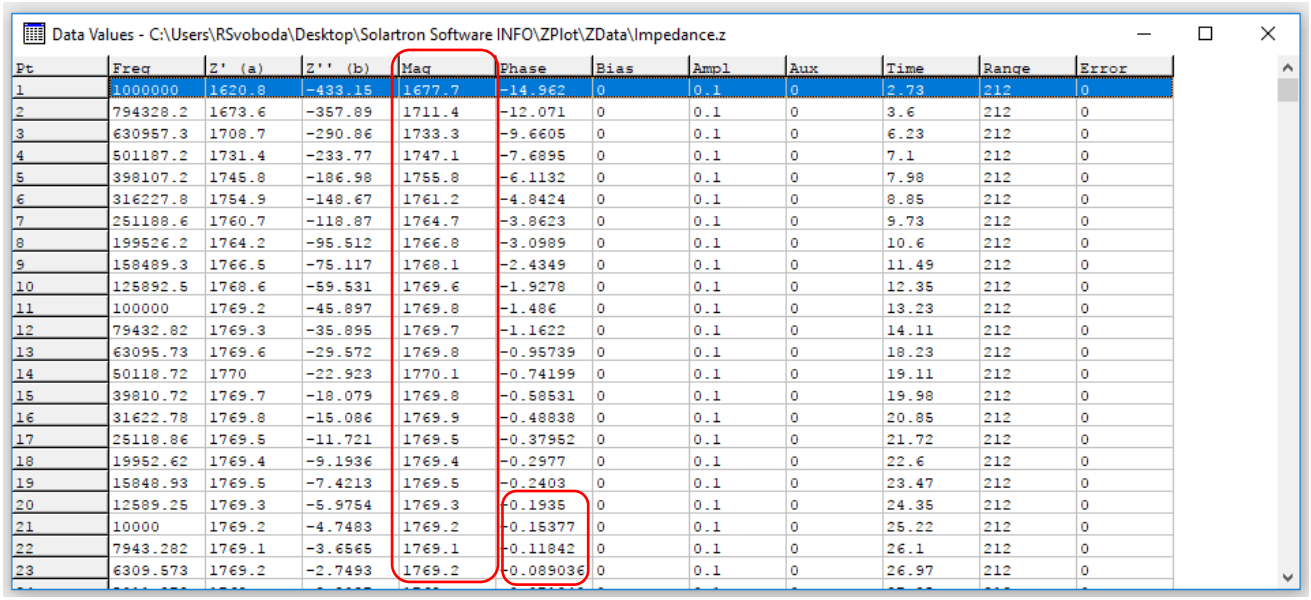


Figure 20



Pt	Freq	Z' (a)	Z'' (b)	Mag	Phase	Bias	Ampl	Aux	Time	Range	Error
1	1000000	1620.8	-433.15	1677.7	-14.962	0	0.1	0	2.73	212	0
2	794328.2	1673.6	-357.89	1711.4	-12.071	0	0.1	0	3.6	212	0
3	630957.3	1708.7	-290.86	1733.3	-9.6605	0	0.1	0	6.23	212	0
4	501187.2	1731.4	-233.77	1747.1	-7.6895	0	0.1	0	7.1	212	0
5	398107.2	1745.8	-186.98	1755.8	-6.1132	0	0.1	0	7.98	212	0
6	316227.8	1754.9	-148.67	1761.2	-4.8424	0	0.1	0	8.85	212	0
7	251188.6	1760.7	-118.87	1764.7	-3.8623	0	0.1	0	9.73	212	0
8	199526.2	1764.2	-95.512	1766.8	-3.0989	0	0.1	0	10.6	212	0
9	158489.3	1766.5	-75.117	1768.1	-2.4349	0	0.1	0	11.49	212	0
10	125892.5	1768.6	-59.531	1769.6	-1.9278	0	0.1	0	12.35	212	0
11	100000	1769.2	-45.897	1769.8	-1.486	0	0.1	0	13.23	212	0
12	79432.82	1769.3	-35.895	1769.7	-1.1622	0	0.1	0	14.11	212	0
13	63095.73	1769.6	-29.572	1769.8	-0.95739	0	0.1	0	18.23	212	0
14	50118.72	1770	-22.923	1770.1	-0.74199	0	0.1	0	19.11	212	0
15	39810.72	1769.7	-18.079	1769.8	-0.58531	0	0.1	0	19.98	212	0
16	31622.78	1769.8	-15.086	1769.9	-0.48838	0	0.1	0	20.85	212	0
17	25118.86	1769.5	-11.721	1769.5	-0.37952	0	0.1	0	21.72	212	0
18	19952.62	1769.4	-9.1936	1769.4	-0.2977	0	0.1	0	22.6	212	0
19	15848.93	1769.5	-7.4213	1769.5	-0.2403	0	0.1	0	23.47	212	0
20	12589.25	1769.3	-5.9754	1769.3	-0.1935	0	0.1	0	24.35	212	0
21	10000	1769.2	-4.7483	1769.2	-0.15377	0	0.1	0	25.22	212	0
22	7943.282	1769.1	-3.6565	1769.1	-0.11842	0	0.1	0	26.1	212	0
23	6309.573	1769.2	-2.7493	1769.2	-0.089036	0	0.1	0	26.97	212	0

Figure 21

Like the graph shown in Figure 19, the data shown in the first column highlighted in Figure 21 indicates an approximate impedance value of 1.8kΩ. This again confirms the expected resistor value indicating a properly working FRA. It can also be noted that at low frequency, the phase angle approaches zero, indicating the presence of the resistor. At high frequency, due to stray capacitance and inductance from the component under test and from its connections, the phase angle will deviate from zero ohms and the impedance magnitude will deviate from its low frequency value of 1.8kΩ.

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