

eNPR Amplifier

Get Started with the Model Cell

This short guide illustrates how to use the “RC estimation” and the “I/V graph analysis” tools to automatically **measure** the **resistance** and the **conductance**, respectively, of the model cell.

Material required:

- The eNPR amplifier



- The Model cell



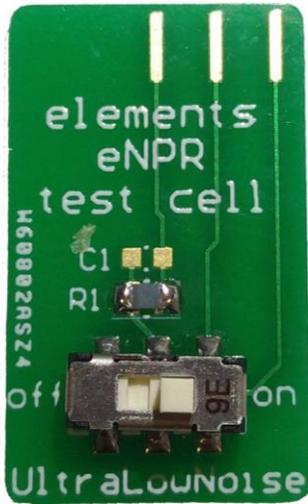
- EDR3 software installed on your computer ([click here](#) to download the latest version)



EDR3 & EDA - Windows
Elements Data Reader 3



EDR3 & EDA - Mac
Elements Data Reader 3



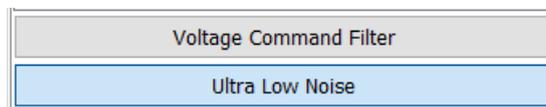
The model cell provided by Elements embeds a **1G Ω** ($\pm 30\%$ tolerance) **resistor** and can be used either in “low noise” or in “ultra-low noise” modality.

Important note: depending on the selected modality (low noise or ultra-low noise), the EDR3 software settings must be adjusted accordingly, as described later on in this guide.

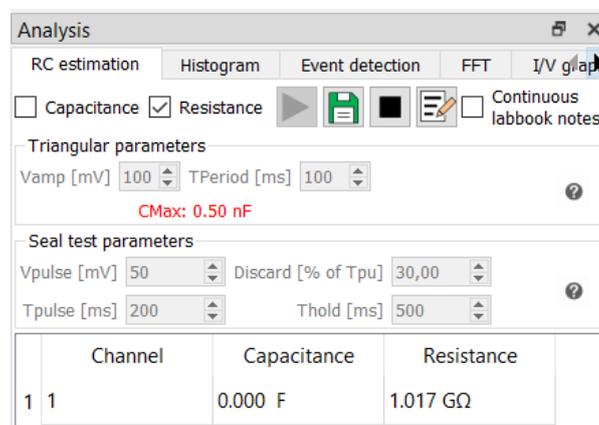
The ultra-low noise modality can be activated by sliding the model-cell’s switch to “ON”, as shown in the left figure. Conversely, sliding the switch to “OFF”, the “low noise” modality is selected.

Measure the model cell resistance using the RC-estimation analysis tool

- Insert the model cell into the eNPR and slide the switch to “ON”.
- Open EDR3 software, enable the “Ultra-Low Noise” modality and disable the “Voltage Command Filter” tool as shown in the figure below. The two commands can be found within the “settings” widget located on the left of the GUI.



- Find the “RC estimation” analysis tool within the analysis widget and check the “Resistance” check box as shown in the figure below. Run the analysis by clicking the “Display” button. By applying a squared voltage stimulus (which parameters can be adjusted in the “Seal-test parameters” box), the software measures the Resistance value.



Measure the model cell conductance using the I-V analysis tool

- Before starting this part, go through the first two steps of the previous paragraph.
- **Compensate the electrode offsets** by clicking on the “Voltage offset compensation” button (red arrow in the figure below). Note: after the baseline has reached the 0 pA value, click again the button to disable the “Voltage offset compensation” tool before applying any other stimulus.
- **Apply the voltage protocol n.3** (blue arrow in the figure below). The parameters of the squared wave stimulus can be adjusted as needed within the “voltage protocol” tab.
- Find the **I/V graph** analysis tool within the “Analysis” widget and run the analysis by clicking the display button (green arrow in the figure below).
- When the I/V plot has been all plotted in the graph you can proceed to **fit the data with a linear equation** to calculate the conductance value. Define the I/V data range which you want to include in the fitting by adjusting the position of the two vertical cursors displayed within the graph (use the two grey sliders below the graph to move the cursors). Finally, click the “I/V linear fit” button (orange arrow in the figure below) and **read the fitting results** shown within the box displayed next to the button. Being the resistance $1\text{G}\Omega$, the expected conductance value is about 1nS .

