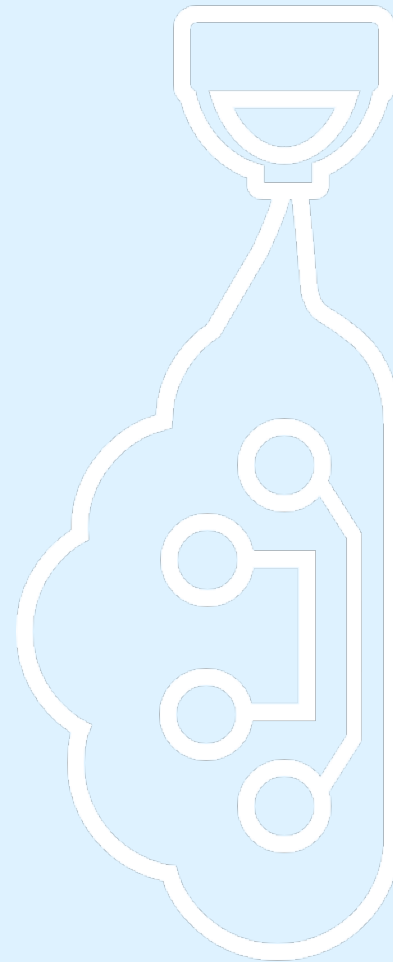


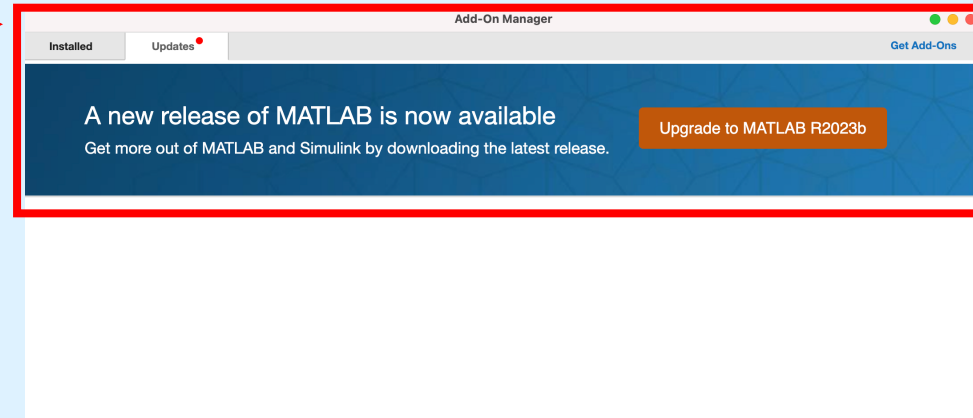
Step by Step Manual



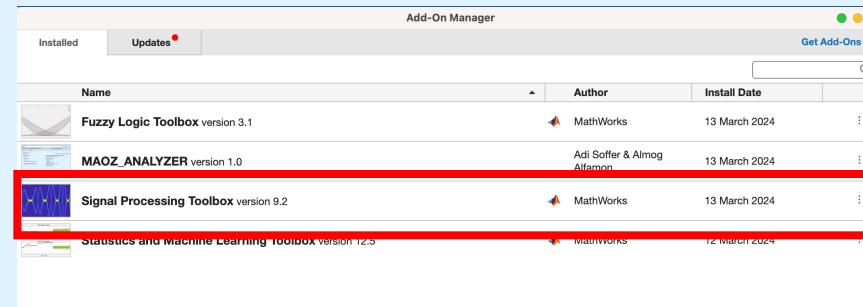
MEA
Analyzer
0
Z

Pre-Installation

- 1) **make sure you are using the most updated version of MATLAB** - On the MATLAB app go to Home>Add-ons>Manage add-ons> Updates > check if any update is needed →



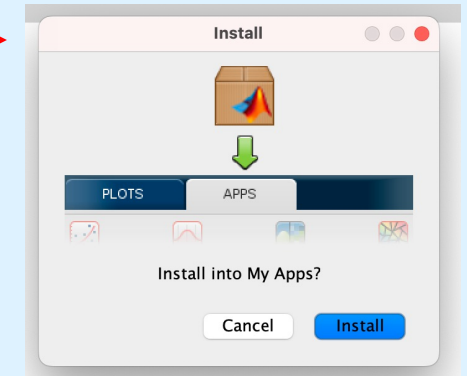
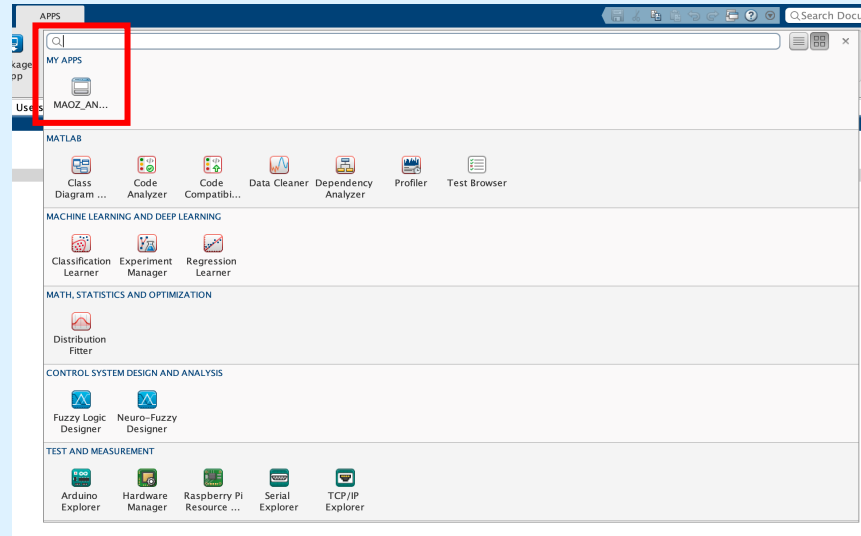
- 2) **Make sure you have the "Signal Processing Toolbox" add-on.** On the MATLAB app go to Home>Add-ons>Manage add-ons> Installed and check if the add-on appear there.



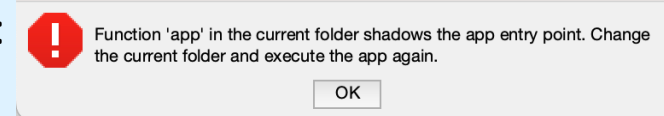
If you don't have it, install it using Home>Add-ons> get add-ons > search "Signal Processing Toolbox" > install

Installation

- 1) Download the MAOZ Analyzer app and save it on your computer.
- 2) Open MATLAB and go to Home>open>choose the folder in which you saved the app>doble click on the app
- 3) If A window will pop up and MATLAB will ask you if you want to install the app, press install. →
- 4) The app will be added to the "APPS" section and now you can open it:



Note: if you trying to to open the app and this warning message appears:



it is because the "current folder" tab is open on the same folder that the app is saved in, so simply change it to a different folder.

Installation

- 1) The app package include the following:
 - a. The app
 - b. The app logo
 - c. Single well analysis code
 - d. Six well analysis code
- 2) Where can you find these files : They will be saved in a folder that will be open automatically when you install the app. The folder will be located based on MATLAB add-ons default preferences:

“MATLAB installs all other add-ons in a default installation folder specific to the platform.

•Windows® — C:\Users\username\AppData\Roaming\MathWorks\MATLAB Add-Ons

•Linux® — ~/MATLAB Add-Ons.

•macOS — ~/Library/Application Support/MathWorks/MATLAB Add-Ons

•MATLAB Online™ — /MATLAB Add-Ons

*To change the default installation folder, on the **Home** tab, in the **Environment** section, click **Preferences > MATLAB > Add-Ons**. Then, in the **Installation Folder** field, specify a folder name to which you have write access.*

If you change the default installation folder, add-ons installed in the previously selected folder are no longer accessible from within MATLAB.

Changing the default installation folder or customizing installed add-ons is not supported in MATLAB Online.” (MATLAB Documentation)

For more information: https://www.mathworks.com/help/matlab/matlab_env/get-add-ons.html

Pre - Use

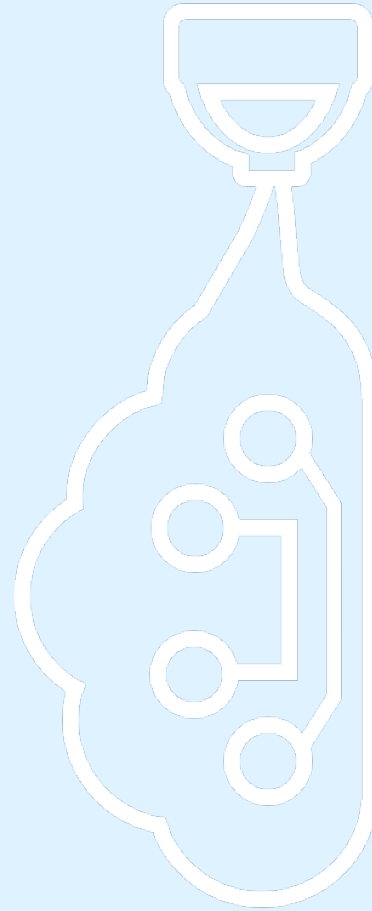
Step 1 – install MaozAnalyzer into MATLAB APP

Step 2 – open MaozAnalyzer in MATLAB apps

Step 3 – change the recording file you want to analyze to an H5 file.

You can use “Multi Channel DataManager”

<https://www.multichannelsystems.com/software/multi-channel-datamanager>



MEA
Analyzer
MAOZ

MATLAB App

Path

MEANalyzer
0
2

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☐ Modifying Filter & Th (optional)

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

If this is your first time using the app, click here for help

Copy & paste the path
to the folder where the
H5 recordings are
located.

MATLAB App

Path

MEANalyzer
OZ

Choose A Tab According To Number of Wells [First time here? Read Me](#)

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☐ Modifying Filter & Th (optional)

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

Based on the MEA plate you use to record, choose the relevant option

MATLAB App

Path

MEA Analyzer 0 Z

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☐ Modifying Filter & Th (optional)

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

This is the name of the experiment.

It will be the name of the result folder and Excel file.

Warning

Don't run the same recording on the same experiment name twice
It will run over the old results

MATLAB App

Path

MEA Analyzer

Choose A Tab According To Number of Wells

First time here? Read Me

Single Well Six Wells

Experiment name

Condition list

Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☐ Modifying Filter & Th (optional)

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

Condition list according to the recording.

- The number of conditions needs to be much the number of recording
- The condition order is based on the alphabet order of the recording.

MATLAB App

Path

MEA Analyzer

Choose A Tab According To Number of Wells

First time here? Read Me

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☐ Modifying Filter & Th (optional)

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

If six well option
was marked

Choose the
orientation of the
MEA plate (during
the recording)

MATLAB App

Path

MEAnalyzer

Choose A Tab According To Number of Wells

Single Well **Six Wells**

Experiment name

Condition list Input format : condition1,condition2

Orientation 1 - Well D towards the hinge / 2 - Well A towards the hinge

Choose Outputs

- ☐ Excel
- ☐ Raster plot
- ☐ Traces plot
- ☐ Traces Plot With Marked Spikes
- ☐ Modifying Filter & Th (optional)

Choose Parameters For The Representative Plots

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Six Wells

Choose the
results output
you want

MATLAB App

Path

MEANalyzer
OZ

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes

☐ Modifying Filter & Th (optional)

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

MATLAB App

Path

MEANalyzer
OZ

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☐ Modifying Filter & Th (optional)

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI (interspike interval)
- ☐ Number of Bursts
- ☐ Avg IBI (interburst interval)
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

Choose what
representative
plot of the
parameter you
want to see
(optional)

MATLAB App

Path

MEA Analyzer
OZ

Choose A Tab According To Number of Wells [First time here? Read Me](#)

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☒ **Modifying Filter & Th (optional)**

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

☐ Standard Diviation Threshold

☐ Bandpass Bottom Threshold

☐ Bandpass Upper Threshold

☐ Minimum Spikes Per Minute

☐ Minimum Spikes In Burst

☐ Maximum ISI In Burst

Run Single Well

If needed,
you can
adjust some
of the
analysis
parameters to
fit your data



For a parameter to be changed, it needs to be marked.

If not, the analysis will run with the default parameters (writing in the app)

Path

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

☒ Modifying Filter & Th (optional)

- ☒ Standard Diviation Threshold 4.5
- ☒ Bandpass Bottom Threshold 300
- ☒ Bandpass Upper Threshold 1100
- ☐ Minimum Spikes Per Minute 15
- ☐ Minimum Spikes In Burst 3
- ☐ Maximum ISI In Burst 0.3

Run Single Well

Parameter explain

The app will detect a spike if its amplitude is higher than the average of the signal + $4.5 \times$ times STD.

Path

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☒ Modifying Filter & Th (optional)

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

☒ Standard Diviation Threshold

☒ Bandpass Bottom Threshold

☒ Bandpass Upper Threshold

☐ Minimum Spikes Per Minute

☐ Minimum Spikes In Burst

☐ Maximum ISI In Burst

Run Single Well

Parameter explain

Bottom frequency of the filter. Any signal under this value will be filter.

MATLAB App

Path

MEA Analyzer 0.2

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☒ Modifying Filter & Th (optional)
- ☒ Standard Diviation Threshold
- ☒ Bandpass Bottom Threshold
- ☒ Bandpass Upper Threshold
- ☐ Minimum Spikes Per Minute
- ☐ Minimum Spikes In Burst
- ☐ Maximum ISI In Burst

Choose Paremeters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

Parameter explain

Upper frequency of the filter. Any signal above this value will be filtered out.



MATLAB App

Path

MEA Analyzer 0.2

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☒ Modifying Filter & Th (optional)
- ☒ Standard Diviation Threshold
- ☒ Bandpass Bottom Threshold
- ☒ Bandpass Upper Threshold
- ☐ Minimum Spikes Per Minute
- ☐ Minimum Spikes In Burst
- ☐ Maximum ISI In Burst

Choose Paremeters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

Parameter explain

Definition of active electrodes.

Any electrode with less than this value will not be count in the analysis

MATLAB App

Path

MEA Analyzer 0.2

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☒ Modifying Filter & Th (optional)
- ☒ Standard Diviation Threshold
- ☒ Bandpass Bottom Threshold
- ☒ Bandpass Upper Threshold
- ☐ Minimum Spikes Per Minute
- ☐ Minimum Spikes In Burst
- ☐ Maximum ISI In Burst

Choose Paremeters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

MATLAB App

Path

MEA Analyzer 0.2

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☒ Modifying Filter & Th (optional)
- ☒ Standard Diviation Threshold
- ☒ Bandpass Bottom Threshold
- ☒ Bandpass Upper Threshold
- ☐ Minimum Spikes Per Minute
- ☐ Minimum Spikes In Burst
- ☐ Maximum ISI In Burst

Choose Paremeters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

Parameter explain

Definition of burst



MATLAB App

Path

MEA Analyzer OZ

Choose A Tab According To Number of Wells

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☒ Modifying Filter & Th (optional)

☒ Standard Diviation Threshold

☒ Bandpass Bottom Threshold

☒ Bandpass Upper Threshold

☐ Minimum Spikes Per Minute

☐ Minimum Spikes In Burst

☐ Maximum ISI In Burst

Choose Paremeters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

Parameter explain

Definition of burst



MATLAB App

Path

MEANalyzer
OZ

Choose A Tab According To Number of Wells [First time here? Read Me](#)

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☐ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☒ **Modifying Filter & Th (optional)**
- ☒ Standard Deviation Threshold
- ☒ Bandpass Bottom Threshold
- ☒ Bandpass Upper Threshold
- ☐ Minimum Spikes Per Minute
- ☐ Minimum Spikes In Burst
- ☐ Maximum ISI In Burst

Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☐ Avg ISI In Burst

Run Single Well

Click run to
run the
program



MATLAB App

Path

MEAnalyzer

Choose A Tab According To Number of Wells [First time here? Read Me](#)

Single Well Six Wells

Experiment name

Condition list Input format : condition1,condition2

Choose Outputs

- ☒ Excel
- ☐ Raster Plot
- ☐ Traces Plot
- ☐ Traces Plot With Marked Spikes
- ☐ Modifying Filter & Th (optional)

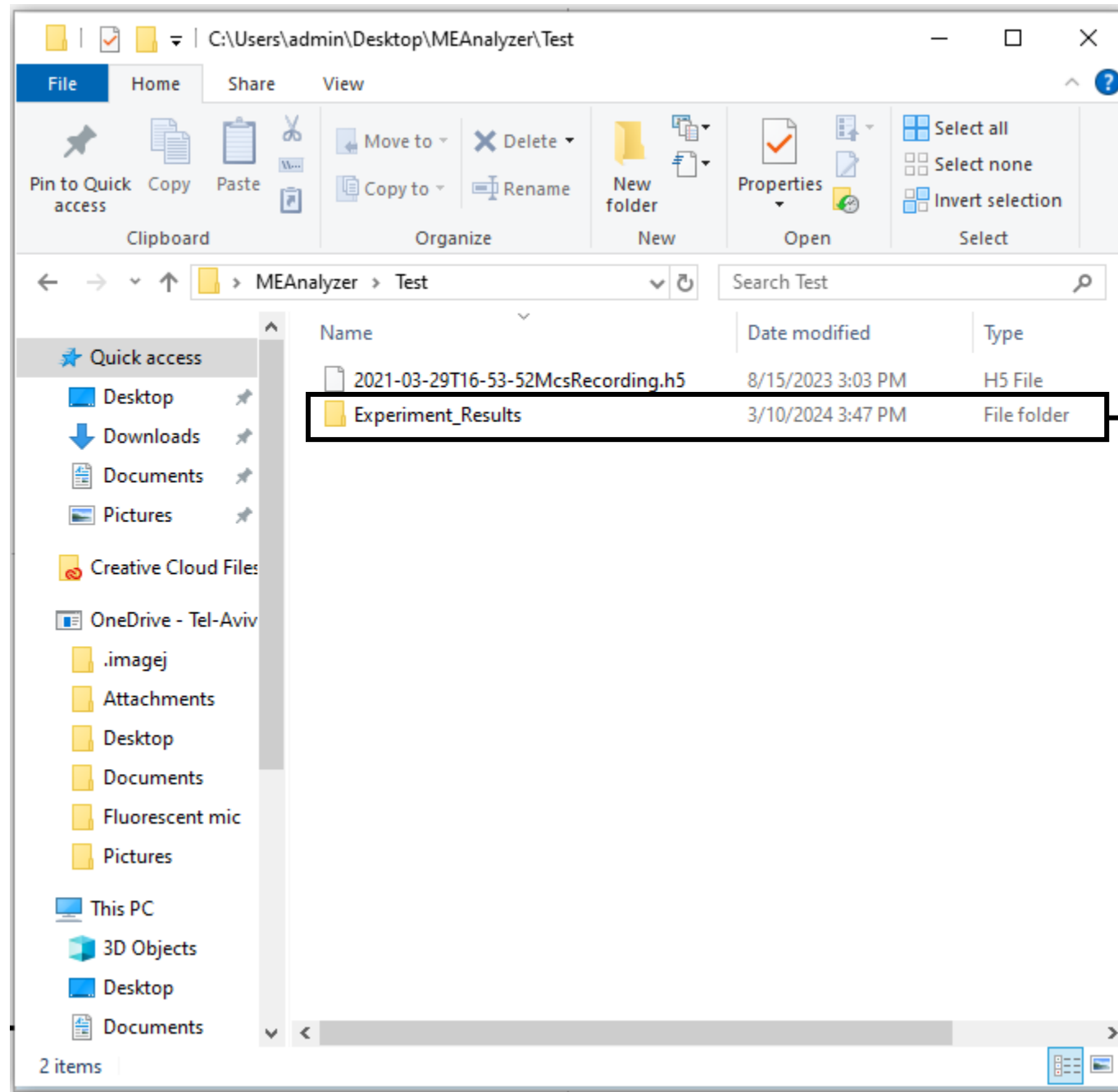
Choose Parameters For The Representative Plot

- ☐ Number of Active Electrodes
- ☐ Number of Spikes
- ☐ Spikes Frequency
- ☐ Avg ISI
- ☐ Number of Bursts
- ☐ Avg IBI
- ☐ Avg Numer of Spikes In Burst
- ☐ Avg Burst Duration
- ☒ Avg ISI In Burst

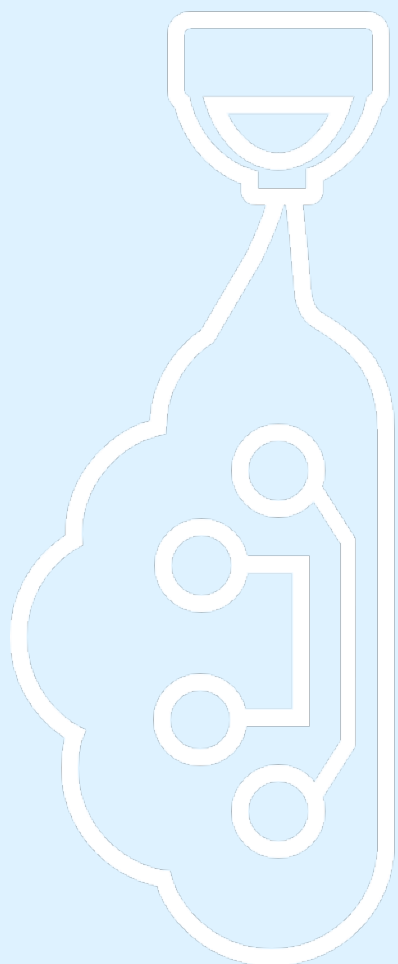
Run Single Well

Once it is
finished the
bottom will
turn green





New folder
will be
created
holding all the
results



MEA Analyzer OZ

For additional help
contact MaozLab