Filter Hose

User Guide v 2.4

HX Audio Lab

Contents

Features

- Easy to quickly create FIR filter based on a measurement or a user defined input
- Create mixed, linear-phase and minimum-phase FIR filters
- Multi-Zone Time Windows to clean input impulse response
- Compatible with Wave, EASERA, Systune, ARTA, and Monkey Forest binary file formats
- Compatible with EASERA, Systune, ARTA, Room EQ Wizard, HOLM Impulse, FuzzMeasure and Smaart ASCII file formats
- Target presets: flat magnitude only (linear or minimum phase filter), flat phase only, flat magnitude & flat phase and minimum phase.
- User defined filter and user defined target curve
- Export filter coefficient in *.csv, *.wav, MiniDSP's *.txt
- Export graph in .png and .emf (vector based)
- Interactive 2D Nyquist plotter (linear and log)
- Numerical data format converter, including freq-mag-phs and freq-real-imag
- Smart smoothing algorithm for the input data
- Manual frequency domain data input
    - RTA data
    - Log-spaced frequency domain data
    - Sample rate conversion
    - Incomplete transfer function
    - User's own creation of a frequency/phase response curve

Note: we have acquired the owner's permissions to implement the binary files loading compatibility.

Compatibility and Known Issues

Windows Platform with Framework 4.0 Client

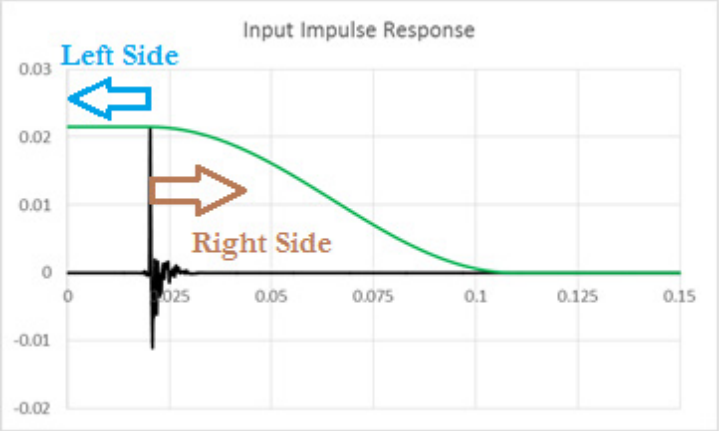
Region and Language of the Operating System: English (USA)

> Note: Filter Hose may not recognize operating system setup with comma as the decimal separator.

Recommended display resolution: 1280 x 800 or higher

Application Notes

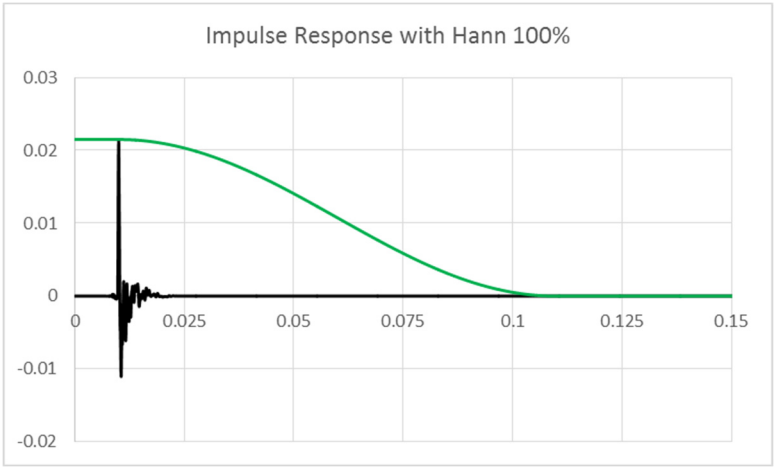
- ✓ Output and filter sample rates depend on the input sample rate. If needed, sample rate conversion can be done via the manual input data (under advanced menu).
- ✓ Windowing for input impulse response [abbreviated as IR from here forward], including multi-zone time windows [abbreviated as MZTW from here forward], is performed at the right half side only with IR peak auto detect.

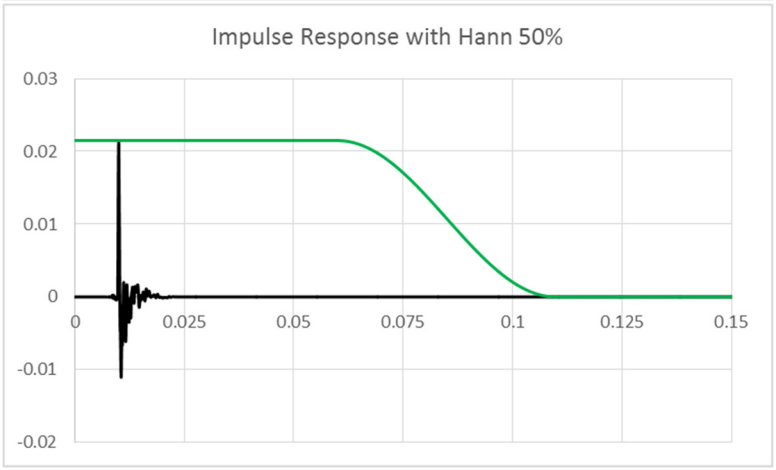


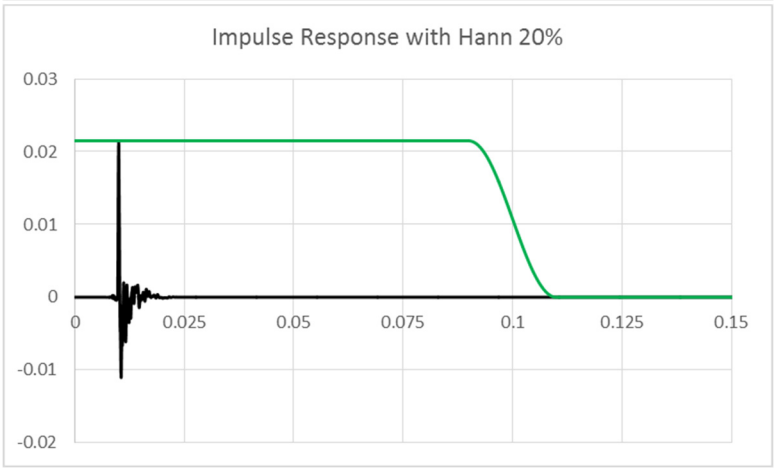
  - MZTW starts at 0.5ms [short] and 1ms [medium, long & room] after the IR peak.
  - Hann 50% window always start at the IR peak.
  - The left half side of the window is rectangular.
- ✓ MZTW suggested applications:
  - *Long:* Fits perfectly to clean up a ground plane measurement in a very large room or outdoor area. For venue tuning application, this allows early reflections to be included in the IR.
  - *Medium:* For general use.
  - *Short:* For creating loudspeaker correction where good measurement is not possible due to limited room size. Smoothing is likely needed after windowing is applied.
  - *Room:* For creating room compensation EQ, where the minimum length of the window at high frequency is 20ms (>5000Hz), and wider at lower frequencies. This window will include early reflections.
- ✓ Maximum filter tap depends on the input IR length (N) unless the filter is loaded from step 2.
- ✓ Wave file export is fixed @ 8, 16 and 24 bit and float @ 32 and 64 bit. *Filter gain may change due to normalization.*
- ✓ User defined target and user defined filter utilize biquad filter input parameters.

Notes cont'd

- ✓ Windowing percentage illustration and comparison
  Hann, impulse peak @ 10ms, window length = 100ms

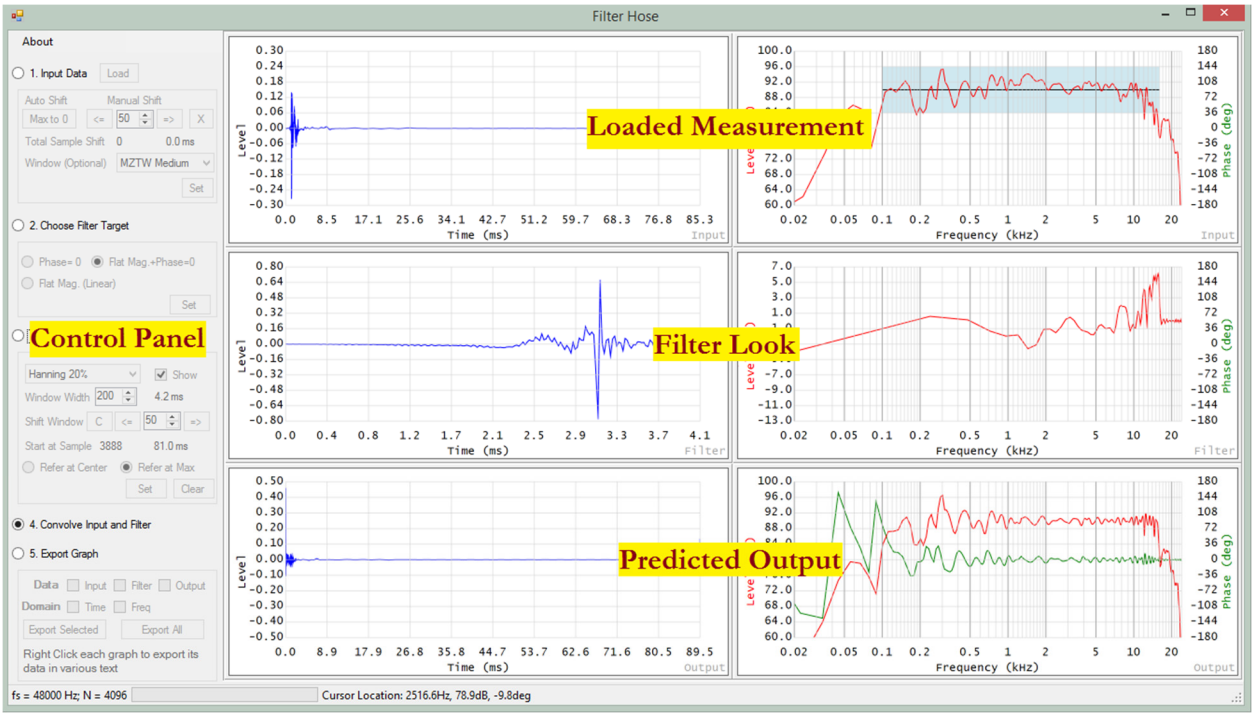




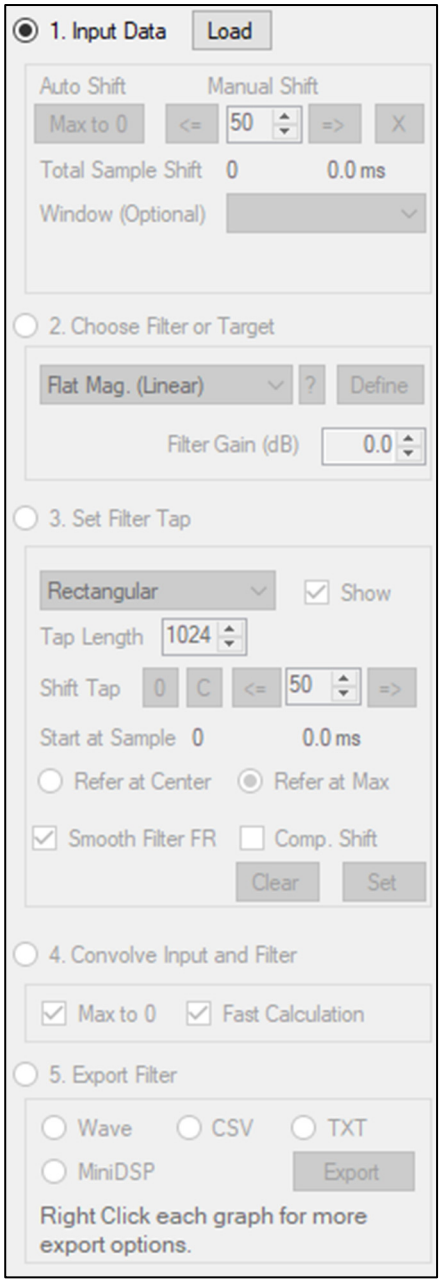


Navigation

Understanding Filter Hose User Interface

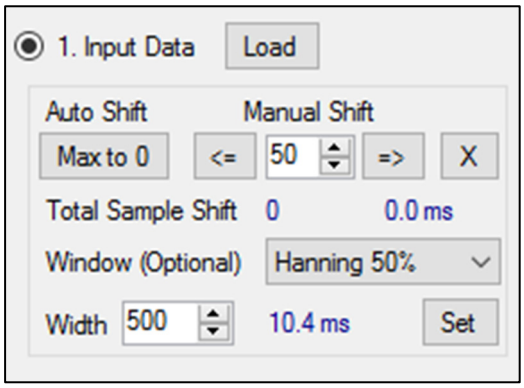


The Five-Step Control Panel



1. Input Data
   Direct load measurement data and provide basic editing such as windowing and cyclic shift. Manual data input can be done via Advance menu – Manual Input Data.
2. Choose Filter or Target
   Choose from several target presets or define your own target curve/filter.
3. Set Filter Window
   Define the FIR tap length and provide basic filter's time domain editing.
4. Convolve Input and Filter
   Calculate the convolution of input IR and filter.
5. Export Filter
   Export FIR filter shown in the filter coefficient graph (middle left graph).

Step 1



Click **Load** button to load measurement file directly (no changes on the original data). Alternatively, use Manual Input Data or Dirac Impulse under the Advanced menu to input data to Filter Hose.

Max to 0 button will cyclically shift the IR so its peak is at 0ms. *Please note that the impulse should not be cut off at 0ms for proper calculation of the predicted output (step 4).* Use Manual Shift to make sure the whole IR is located after 0ms.

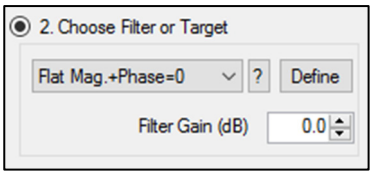
Manual Shift will cyclic shift the IR based on the selected interval (in sample). If the left side of IR is cut off at 0ms, it needs to be shifted to the right. The **X** button will clear all shift performed by Filter Hose.

Window (Optional) drop down list contains several windows option to clean up the input IR. Please see the Notes section of the user guide (page 4-5) for more information. If Hanning 50% is chosen, user can define the total window width, relative to the IR peak. The **Width** input value is in sample.

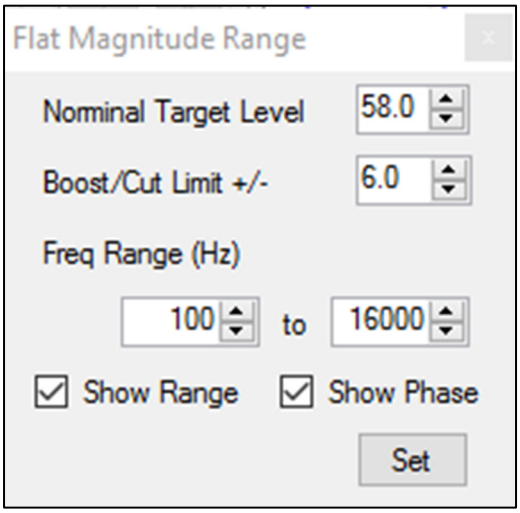
Please click **Set** button to apply the window.

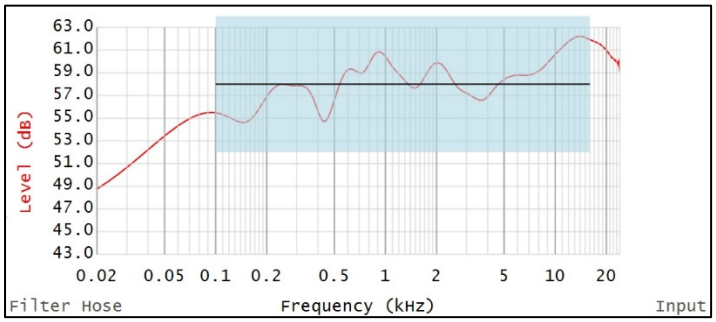
Step 2

Filter Hose provides several targets:



Phase = 0 will flatten the phase response of the input data to 0 degree. Ideally, the magnitude is unchanged, but depending on the property of the filter (step 3), the resultant phase may not be at 0deg at a certain range.
Flat Mag. + Phase = 0 will flatten the magnitude and phase of the input data to a flat line and 0 degree respectively. The actual result depends on the property of the filter (step 3).
Flat Mag. (Linear) will flatten the magnitude of the input data. Ideally, the phase is unchanged, but depending on the property of the filter (step 3), it may be affected.
Flat Mag. (Min. Phase) will flatten the magnitude of the input data. The filter is a minimum-phase FIR filter.
Phase = Min. will create minimum phase of the input data based on its magnitude. Ideally, the magnitude is unchanged, but depending on the property of the filter (step 3), it may be affected.
User Defined Filter and Target create custom FIR filter. This will be explained in the other section of the user guide.
Load from *.csv allows user to load a .csv file as is. The coefficient must use the same sample rate as the input data.
Filter Gain changes the nominal level of the FIR filter.



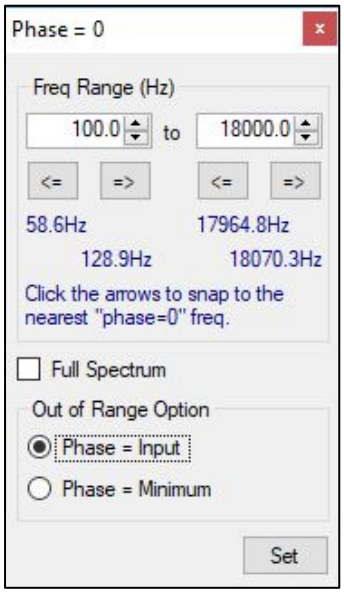


If **Flat Mag. + Phase = 0**, **Flat Mag. (Linear)** or **Flat Mag. (Min. Phase)** is selected as the filter target, **Flat Magnitude Range** window will pop-up.

Magnitude response will be flattened to the **Nominal Target Level** if it is within the specified **Boost/Cut limit**. Please make sure the light blue rectangle covers your desired magnitude range before clicking **Set Target**. If the Y-axis is in dBFS, user may input a negative value in the nominal target level box.

Start Freq and **End Freq** determine the frequency range to flatten.

All parameters are visualized as a black line and a light-blue rectangular, overlapping the magnitude response curve.



If **Flat Mag. + Phase = 0** or **Phase = 0** is selected as the filter target, **Phase = 0 Range** window will pop-up.

Start Freq and **End Freq** determine the frequency range for the target phase = 0.

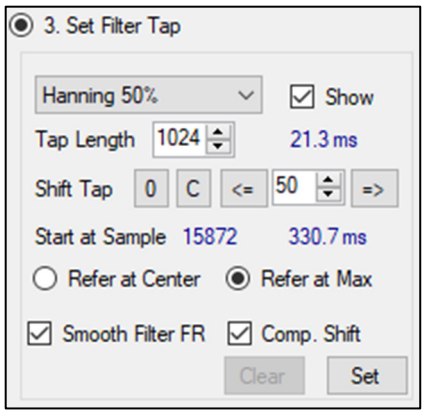
Out of Range Option determines the target phase for the extreme low (0 Hz – *start freq*) and extreme high (*end freq* – Nyquist frequency). User is able to choose minimum phase **(Phase = Minimum)** or original phase **(Phase = Input)**.

Full Spectrum will input 0Hz and Nyquist frequency in the start/end freq range. This option will ignore **outside range** phase target since the whole spectrum target phase will be targeted to be 0 deg. Note: Prior to v1.3, Filter Hose always calculate the whole spectrum for Phase = 0 target.

In v2.1 and newer, user can find **left/right arrows** under the start/end freq range input box. These arrows automatically find the nearest phase crossing point at 0deg (or phase approaches to 0deg) from the input data. For example, the left picture shows that a user intends to flatten the phase from 100Hz. However, the phase is not 0deg at 100Hz. Continuing with this may not result in a good FIR filter. User can use the arrow to find the phase = 0 crossing point location, in this example either starts at 58.6Hz or 128.9Hz. If user is not satisfied with the automatic finding, user can change the input frequency value, in this example lower than 58.6Hz or above 128.9Hz. The finder will automatically find next frequency crossing points.

Step 3

The most important step to create an FIR filter



The **Window drop down list** contains several window presets to taper the filter's front/end tails.

Show check button will toggle the tap selection area display on and off.

Tap Length determines the filter's tap length. The input value is in sample.

Shift Tap will cyclic shift the filter's IR. The input value is in sample.

0 button will locate the window's starting point at the first sample of the calculated filter's IR. This is useful to create minimum phase FIR filter.

C button will center the tap selection to the peak of the impulse.

Note: Selecting appropriate tap location is the most important step of creating FIR filter. Failure to do so will result in a dysfunctional FIR filter.

Select **Refer at Center** to use the center of the tap area as the left and right window dividing point.

Select **Refer at Max** (default) to use the peak sample of the tap area as the left and right window dividing point. This is the recommended choice for general use.

Check **Smooth Filter FR** to extend the filter's N so that the frequency response display is smoother (finer frequency resolution curve). This option only affects the frequency response view (for viewing purpose only).

Set button will apply the window and tap selection to finalize the FIR filter. Click **Clear** button if the user wishes to experiment with other settings.

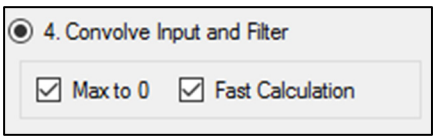
After clicking the Set button and if the final FIR filter contains a processing delay (ie. the peak of the filter is far from 0ms), the filter's phase response will likely drop and contain a lot of wraps. Activate the **Comp. Shift** checkbox to compensate the sample shift introduced by the Shift Tap. This option only affects the frequency response view (for viewing purpose only).

How do I bypass Step 3 (filter editing)?

When you load a filter that you don't want to edit (ie. Load a .csv file in step 2), you will need to bypass step 3 editing. Please follow the steps below:

a. Match the tap length.
b. Use rectangular window.
c. Click 0 button.
d. Click Set.

Step 4



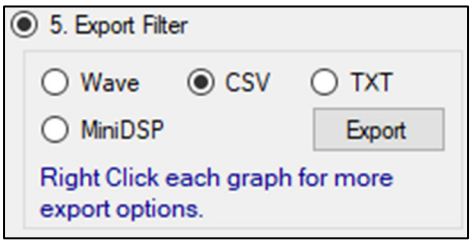
This step convolves the input IR and the filter's IR in the time domain. Then, the frequency response is calculated using DFT/FFT, based on the new calculated IR. **Note: DFT requires significantly longer process time if IR has N larger than 8192.**

To use FFT, please select **Fast Calculation (**by default). To use DFT, please unselect **Fast Calculation** (more accurate result). FFT or DFT choice only affects the frequency domain data.

If **Max to 0** checkbox is selected, the peak of IR will automatically cyclic shifted to 0ms (default).

Tip: If one needs to cyclic shift the calculated output, please use *Send to Input* or *Send to New Window* under Advanced Menu. Using this option, the IR will be loaded to the input (step 1) section of Filter Hose.

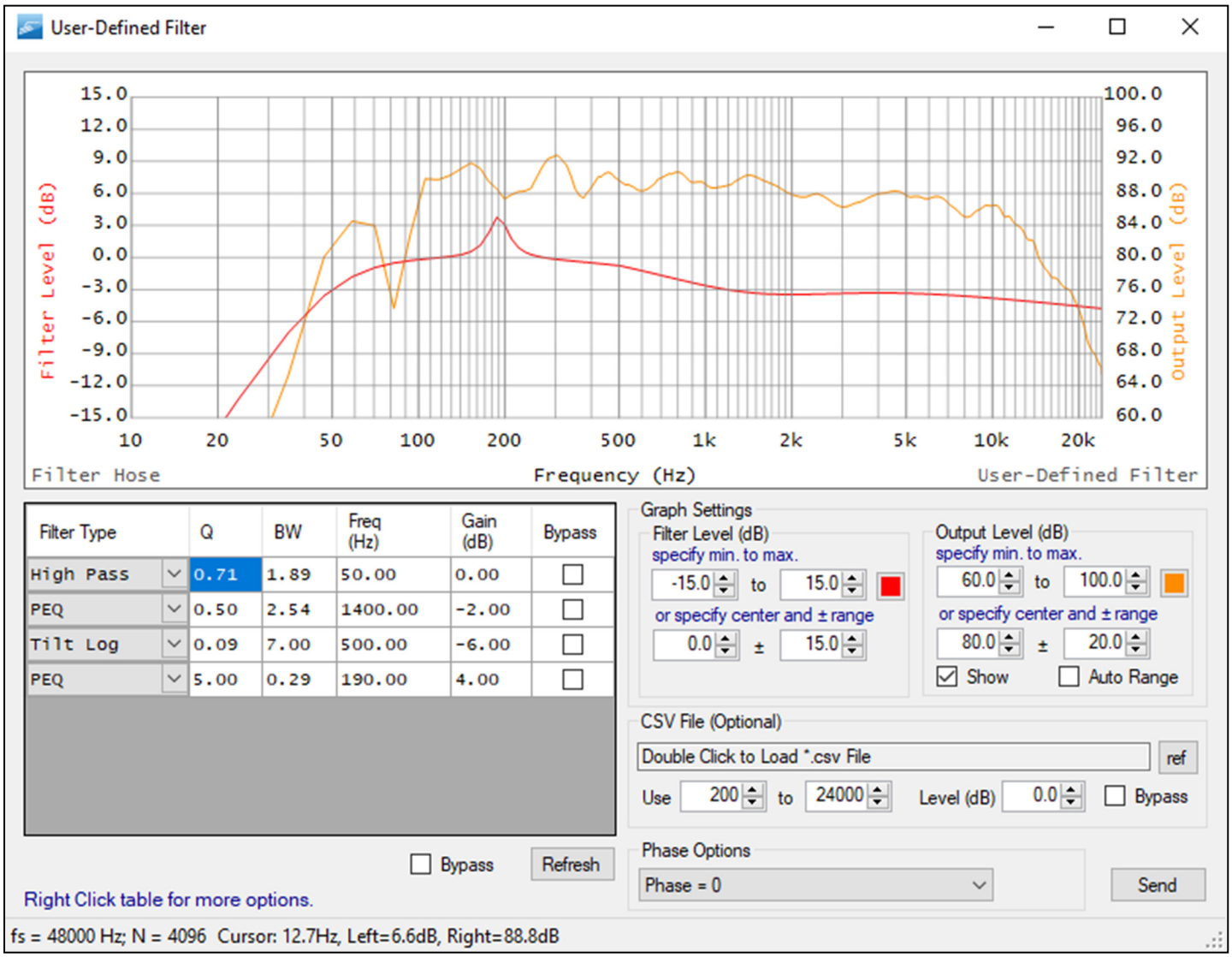
Step 5



This step allows user to export the filter coefficients. User can also export the filter by using right click on the filter coefficient graph (middle left IR graph).

User Defined Filter

User is able to define a filter/EQ curve based on .csv file load, biquad filter input or other controls.



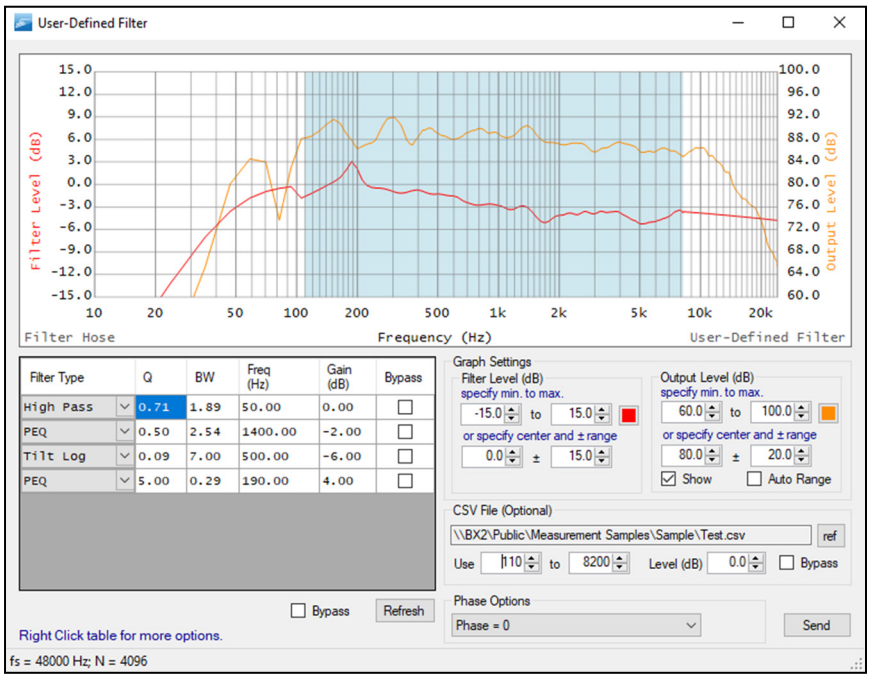
The green curve shows the magnitude of user defined EQ and the red curve shows the magnitude of the predicted output. User is able to edit the table on the left by defining biquad input or other available filter to create the EQ. Please always click **Refresh** button (or hit enter) to refresh the graph after performing any edits. Use **right-click** on the table area to add/remove filters. To change the graph color, please click on the color button on the right of the min/max value.

User can also save/load these table separately. Please use **right-click** on the table. **Save IIR filters** will save the current table to a .iir file, **Load IIR filters** will load and replace the current table and **Add IIR filters** will add the saved parameters to the current table.

Phase Options define the final FIR filter's phase. There are four options:

1. Phase = 0
   Creates an FIR filter with phase = 0. This will ignore the biquad minimum phase filters from the table.
2. Phase = Min.
   Creates a minimum phase FIR filter. This option will calculate a minimum phase from the loaded csv file.
3. Use CSV phase, table phase = 0
   Combines the loaded csv file with the filters defined in the table and set the phase from the table to 0deg.
4. Use CSV phase, table phase = Min.
   Combines the loaded csv file with the minimum phase filters defined in the table. Note: Selecting non-minimum phase filter in the csv file will result in a mixed-phase (hybrid) FIR filter.

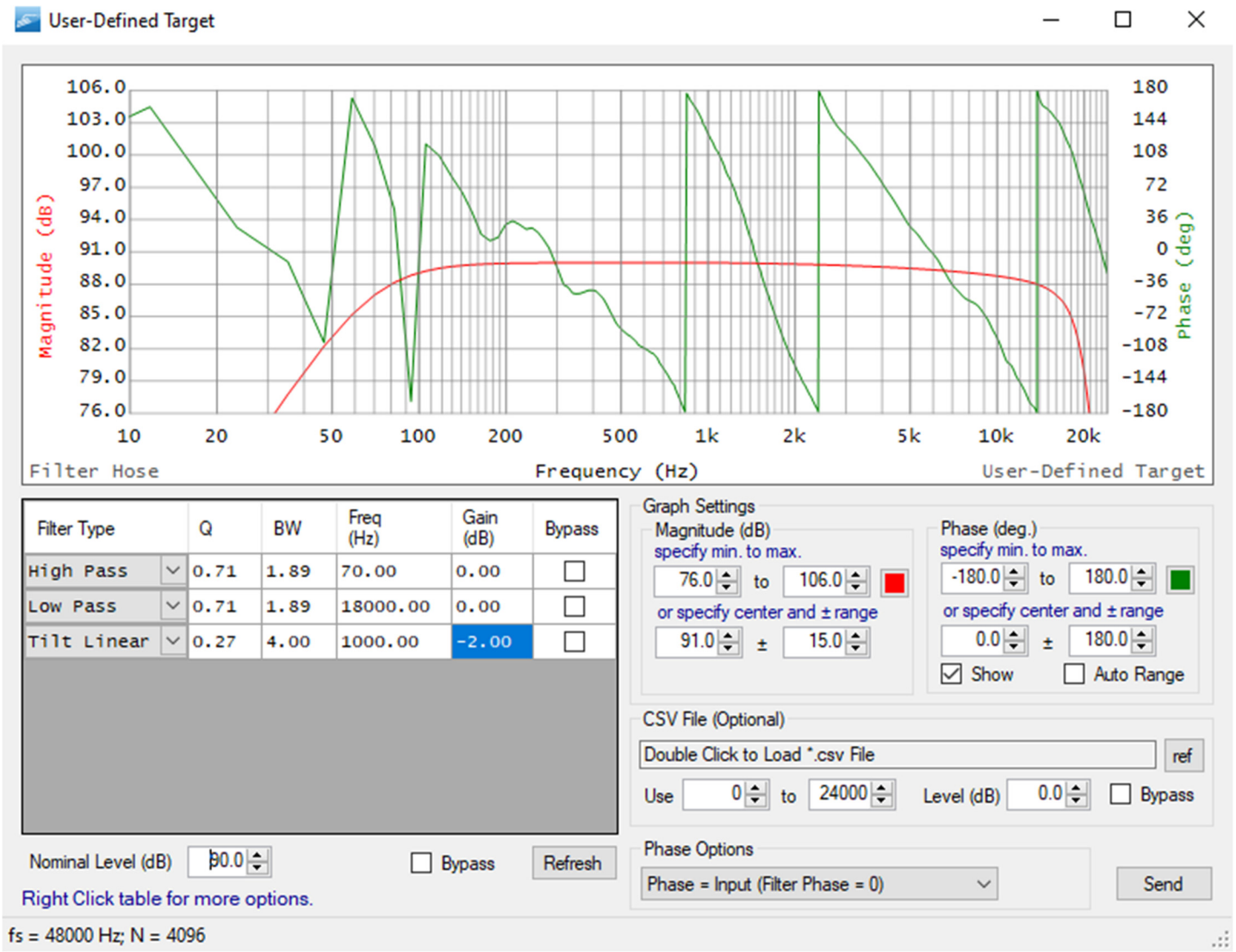
For a certain selection, user is able to define the magnitude range of the loaded .csv file. The graph will show the selected range in the blue rectangle as shown in the picture below.



Note: loading .csv file in user defined filter window requires a same N length with the loaded measurement. Filter Hose will automatically shorten/lengthen the loaded .csv file.

User Defined Target

User is able to define a target curve. The output (step 4) frequency response will likely result closely with the defined target curve in the this window (depends on the step 3) unless user selects filter phase = 0 or filter phase = Min.



The **nominal target level** is always calculated based on the input. Please make sure to adjust the nominal target level first prior to modifying the table.

User can save/load these table separately. Please use **right-click** on the table. **Save IIR filters** will save the current table to a .iir file, **Load IIR filters** will load and replace the current table and **Add IIR filters** will add the saved parameters to the current table.

Phase Options define the target curve's phase response, or assign a certain phase characteristic to the created FIR filter (target curve is used for magnitude correction only). There are six options:

1. Phase = 0
   Creates a target curve with phase = 0.
2. Phase = Min.
   Creates a target curve with minimum phase response.
3. Use CSV Phase, Table Phase = 0
   Combines the loaded csv file with the curve defined from the table (phase = 0).
4. Use CSV Phase, Table Phase = Min.
   Combines the loaded csv file with the curve defined from the table (phase = Min.).
5. Phase = Input (Filter Phase = 0)
   Creates an FIR filter with phase = 0, with the target magnitude curve defined in the table, CSV file or combination.
6. Filter Phase = Min.
   Creates a minimum phase FIR filter, with the target magnitude curve defined in the table, CSV file or combination.

Note: loading .csv file in user defined filter window requires a same N length with the loaded measurement. Filter Hose will automatically shorten/lengthen the .csv file.

Limiting the frequency range

Currently, the filter's table in the user defined target can't be constricted to a certain range only. Should you need to do this, please follow the steps below:

1. Use the user defined target as you wish without the range limitation. Create an FIR filter and finish it in step 3.
2. Save the FIR filter as a .csv file.
3. Go back to step 2 and choose user defined filter.
4. Load the newly created FIR filter in the user defined filter. Notice under the loading function, user can limit the frequency range where the filter affects.

Available Filter Types

To define a frequency response curve in user defined window and user defined target, user is presented with several options:

1. Biquad high pass filter (HPF)
   User is required to define the frequency and Q/bandwidth.
2. Biquad low pass filter (LPF)
   User is required to define the frequency and Q/bandwidth.
3. Biquad high shelf (HS)
   User is required to define the frequency, gain and Q/bandwidth.
4. Biquad low shelf (LS)
   User is required to define the frequency, gain and Q/bandwidth.
5. Biquad all pass filter (APF)
   User is required to define the frequency and Q/bandwidth.
   This is a non-minimum phase filter.
6. Parametric EQ (PEQ)
   User is required to define the frequency, gain and Q/bandwidth.
7. Tilt Log
   User is required to define the start frequency (lower limit), gain and bandwitdh (how many octave up?).
   Example: if user wishes to have a -3dB spectral tilt from 5000Hz – 15000Hz, input the parameters as follow:
   Frequency = 5000Hz
   Bandwidth = 3 octaves (Note: 15000Hz is three octaves higher from 5000Hz).
   Gain = -3dB.
   This is a non-minimum phase filter.
8. Tilt Linear
   User is required to define the start frequency (lower limit), gain and bandwitdh (how many octave up?).
   Please see the example from number 7 above.
   This is a non-minimum phase filter.

Note: each biquad filter is a second order filter.

Mouse Navigation on Each Graph

- ✓ **Left-Click on graph**:
  Shows the cursor location.
- ✓ **Right-Click:**
  Shows the export menu, graph setup, peek window and other options.
- ✓ **Control Right-Click:**
  Pops up the graph property window.
- ✓ **Control Left-Click + drag:**
  Horizontal zoom in.
- ✓ **Shift Left-Click + drag:**
  Vertical zoom in
- ✓ **Double Left-Click:**
  100% zoom out and activate the auto range.

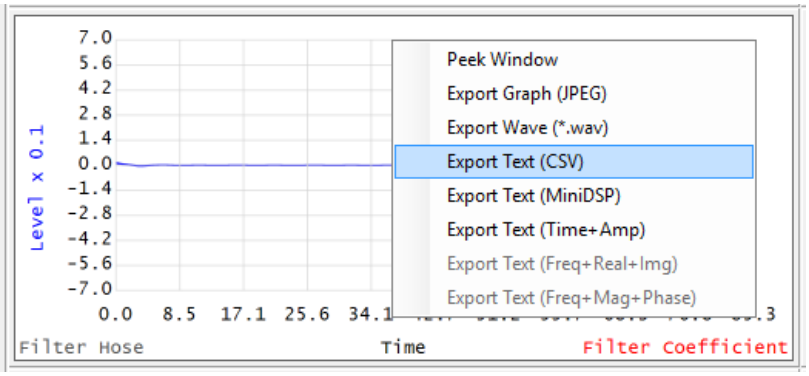
Peek Window

Larger view for each graph is available, user can access peek window by right clicking each graph and select peek window option. The data in the peek window is not affected if changes are made in the main Filter Hose window.

User is able to rename the peek window's name to keep track what data is shown in a peek window, especially if multiple peek windows are opened.

Exporting FIR values

User can export FIR filter coefficient from step 5 or right-click on the time-domain filter's graph (middle left graph - as shown below).



Exporting High-Resolution Vector-based Graph

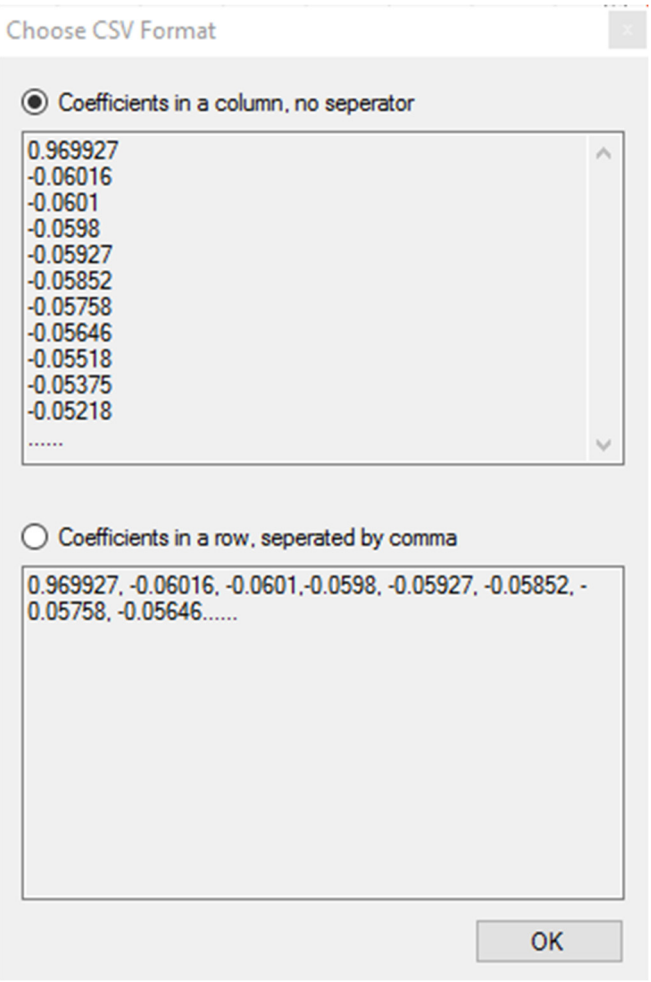
Vector-based graph export (.emf) is introduced in Filter Hose V2.3 and beyond. Please use **right-click** on the graph you wish to export, select export graph, and toggle the type between .png or .emf.

Project Save/Load

Under the file menu in the main window, user can save/load the Filter Hose project. This will save/load all values/settings in Filter Hose from step 1 to step 4.

Filter Hose .csv File Format

The .csv file format that Filter Hose recognizes (export and import) follows the following screenshot.



Manual Time Domain Data Input

If a software exports a time domain data ASCII file (.txt or .csv) that is not recognized by Filter Hose, user can manually edit the data in the notepad or excel to include only the IR's amplitude data, and format it in a column with no separator or in a row separated by comma. Then save it as a .csv file. User can also rename a .txt file to a .cvs file. This enables a flexibility to manually input time domain data to Filter Hose. This is also explained in the sub chapter importing a filter transfer function at the end of the user guide.

Known Hardware Compatibility

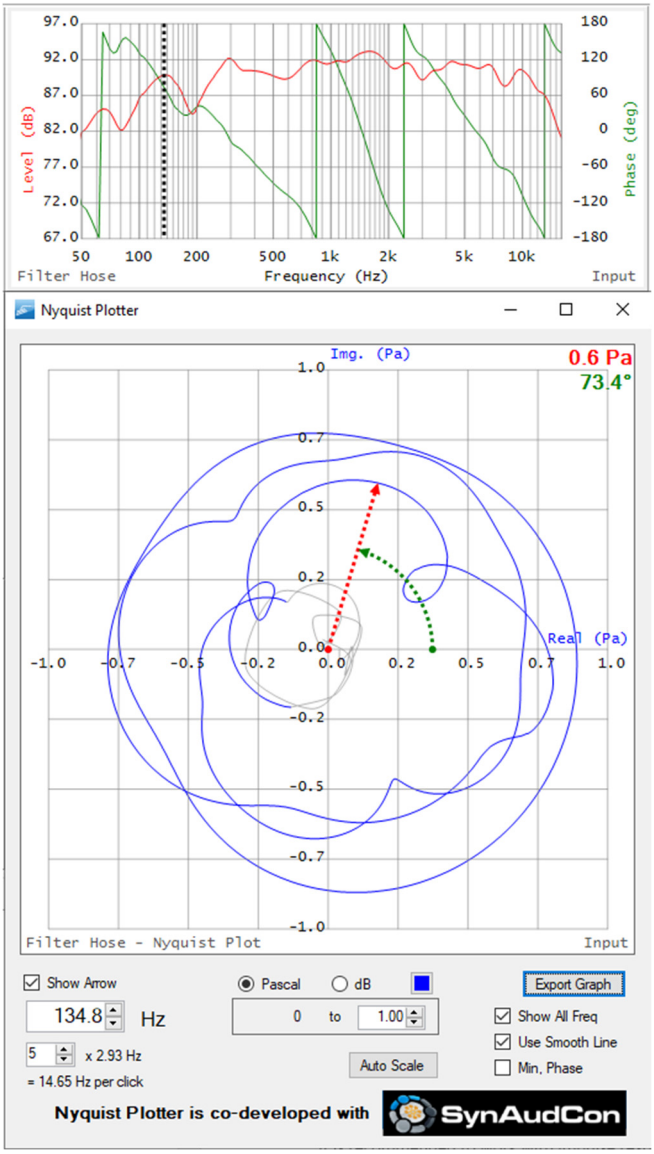
Coefficients in a column is recognized by DSP such as QSC Q-sys, Marani Audio, Symmetrix, DFM Audio, etc.

Coefficients in a row, separated by comma is recognized by DSP such as Biamp Tesira.

The above examples were tested in 2018 and may change in the future. Please always check with your DSP manufactures. Should you find a DSP input format that is not recognized by Filter Hose export function, please contact us.

Interactive 2D Nyquist Plotter

An interactive 2D Nyquist plot is included in Filter Hose V2.3 and beyond. Use **right-click** on each frequency domain data graph in Filter Hose main window to access the Nyquist plotter.

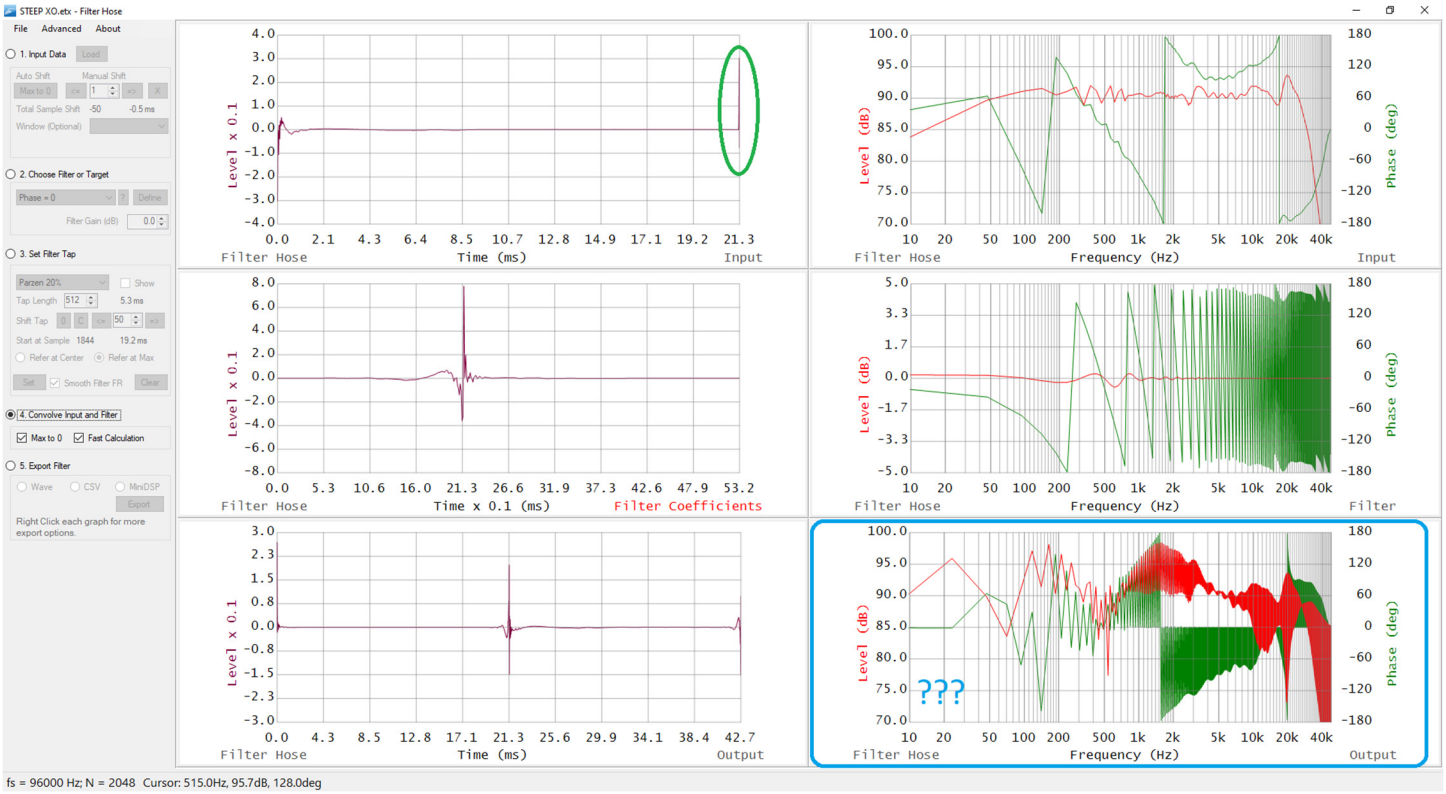


This Nyquist plotter is an interactive window and is linked to the main window's related graph.

Show arrow checkbox will toggle the pointer on/off.
Show All Freq checkbox is controlled by the graph setting window (including using the mouse click to do zoom in/out). Frequencies that are not shown in the main graph window will not be displayed as grey if it is checked.
Use Smooth Line checkbox will smooth out the view of the Nyquist plot, especially at low frequency resolution area.
Min. Phase check box is only available on the input transfer function graph. This will toggle the input data to minimum phase.
Pascal / dB button toggles the view in log or linear graph.

Getting a Good Output Prediction

Here is a example of a filter creation screenshot where the user uses Max to 0 on the input data (step 1). The filter is created to flatten the phase with 2ms of processing delay. Please notice the input impulse response is chopped (marked by green circle on the left top graph). The FIR filter created is valid, however step 4 will result in a weird output frequency response, see the right bottom graph marked with light blue rectangle.

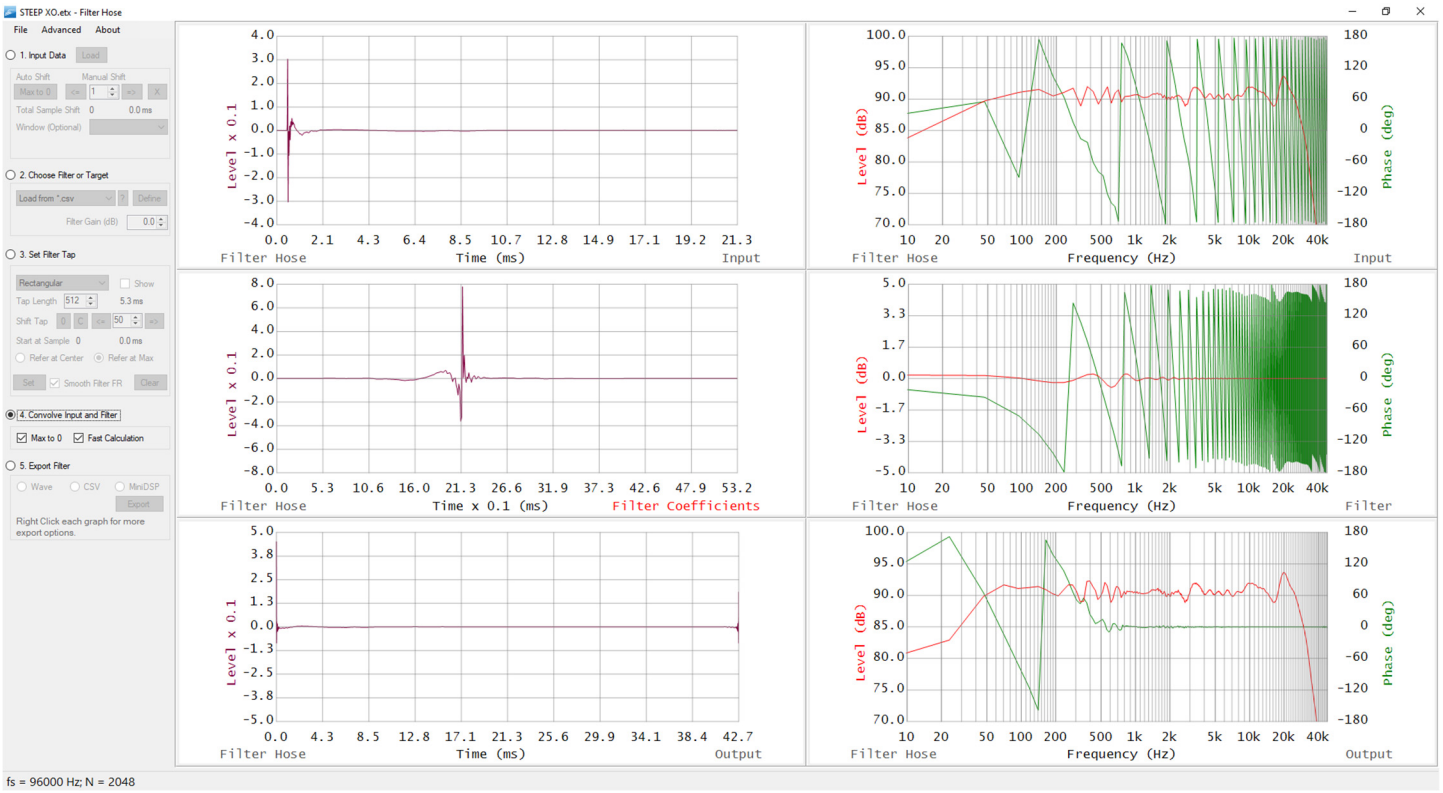


How can user get a good output prediction in this case?

As explained previously, step 4 uses time domain data convolution to calculate the output prediction. When the input impulse response is chopped at 0ms, this will result in a weird output. To solve this, please follow the step-by-step below:

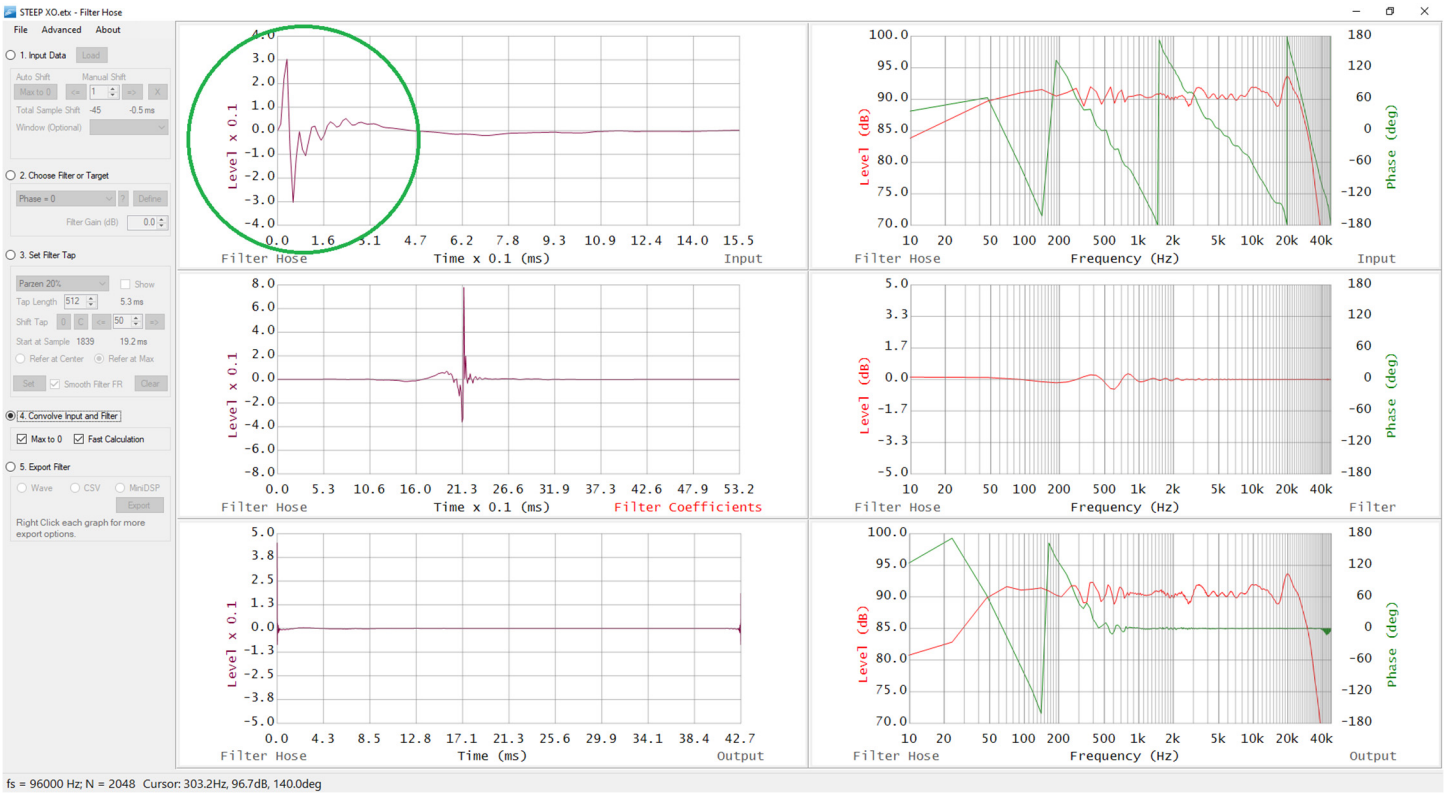
- Save the FIR filter to a .csv file.
- Go back to step 1 and move the impulse' peak far from 0ms. User can cyclic shift the whole impulse response to the right, for example 100 samples (ignore the phase response wrap).
- Reload the saved FIR filter on step 2 using load from *.csv.
- To make sure step 3 does not alter the saved filter (bypassing step 3 editing feature):
    a. Match the tap length.
    b. Use rectangular window.
    c. Click 0 button.
    d. Click Set.
- Proceed to step 4, and you can see the correct result.

Please observe the screenshot on the next page, the right bottom graph is now correct and the right top graph will show more phase wraps due to the shifted IR location.



Note: if phase wraps are obstructing the view of the frequency response graph, user can deactivate the phase view from the graph setting.

Alternatively, user can start by properly placing the impulse response's earliest energy arrival in step 1. Please see the next screenshot of the same input data. The impulse response is adjusted so all of the impulse energy is located after 0ms. When user proceeds in creating the filter and observing the output, step 4 will show a good prediction without the need of going back to step 1.



For more information about this, user is invited to read our article: A Meaningful Loudspeaker Phase Response. The article is downloadable from www.HXAudioLab.com – Publications.

Advanced Menu

In Filter Hose v1.2 and newer, advanced menu is introduced.

Filter (also available for Input/Output)- Send Filter to Input/New Window

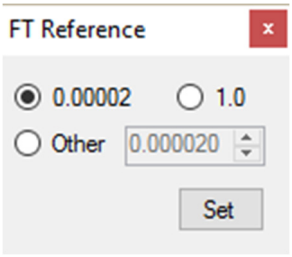
When a filter is already generated, this function enables user to send the filter (time domain) to the data input or a new instance of Filter Hose window. This is useful when creating a mixed-phase FIR filter or tweaking the FIR filter. A similar way can be done by saving the filter as a .csv file and loading it to the data input. Please see the section on Importing a Filter Transfer Function in this user guide. The FT reference is automatically set to 1.

Filter – Flip Polarity

Flips the polarity of the filter. This function is active after a filter is created.

Input - FFT Reference

User is able to define a reference value for the Fourier transform. This will affect the level in the frequency response.



If send filter to input is clicked, the FT reference is automatically set to 1. After changing the FT reference, user shall reload the input file.

Input - Flip Input Polarity

Flips the polarity if the input.

Input – Dirac Impulse

Filter Hose will automatically input a Dirac delta function to the input. This enables user to create their own filer using user defined filter/target selection or test their own Filter.

Input - Remove 2nd Half of N

This function shorten the data input N by eliminating the last half samples and the function works for N > 1024. Please make sure the impulse is not chopped incorrectly by shifting the peak to near beginning/0ms.

Tips on shortening Input N

Several programs collect long impulse response by default and may cause Filter Hose “not responding”. To shorten the data input, please follow the steps below

1. Load a data (assuming N > 64k) and wait.
2. Click on Max to 0
3. Cyclic move the impulse at least 50 samples to the right (to avoid the impulse getting chopped).
4. Use Advanced – Input – Remove 2nd half of N function, one to three times to shorten the impulse length.

It is recommended to work with impulse response with N <= 16k to avoid the slow response of the program. If a wave file is used, use wave editors to shorten the length of the impulse response to under 2 seconds.

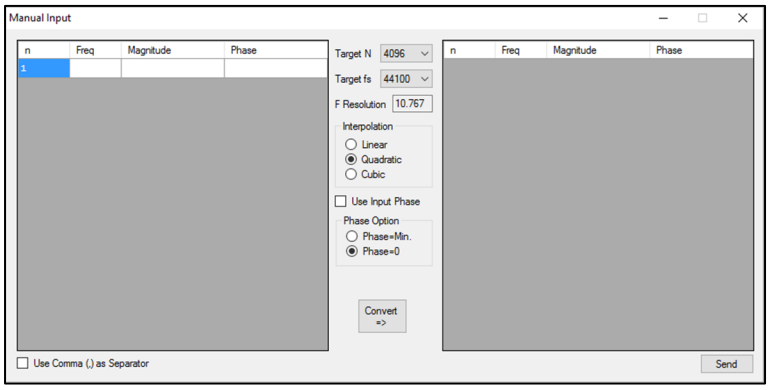
Input - Smooth

This function will smooth the input data to approximate 1/3, 1/6 or 1/12 octave smoothing. User is able to repeatedly apply this function.

Input – Phase to Min. / Use Original Phase

This function will calculate and show the minimum phase from the input data. The function can toggle back to the original phase data.

Input - Manual Input Data



Clicking this function will pop-up a new window as shown on the left. This window enables user to:

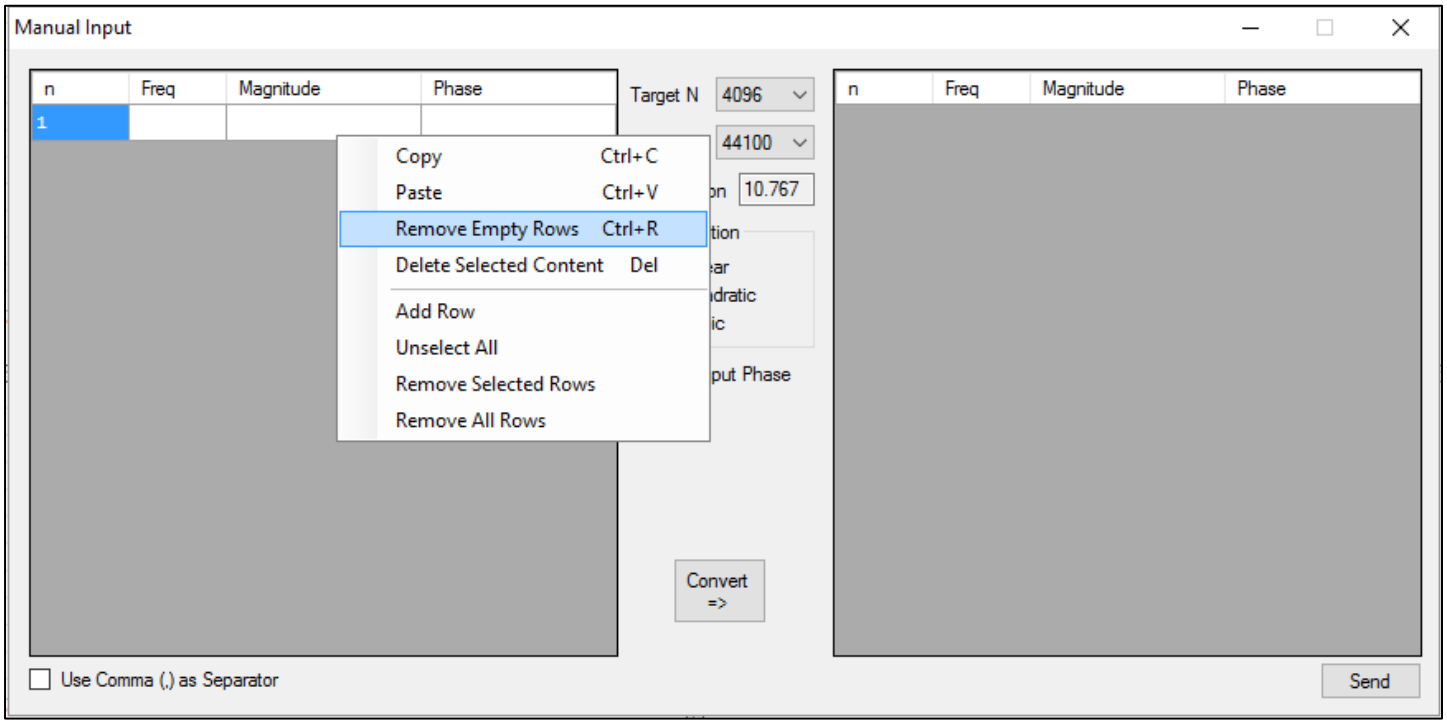
- ✓ Load an RTA data
- ✓ Load a log-spaced frequency domain data
- ✓ Do a sample rate conversion
- ✓ Load an incomplete frequency domain data
- ✓ Create a custom frequency domain data input

The user input is located on the left table. User is able to copy-paste text/ASCII data from notepad or Excel or other similar software. It accepts log or linear frequency domain data, including incomplete transfer function.

By unchecking **Use Input Phase**, Filter Hose offers two options on how the phase will be generated: minimum phase (calculated from the magnitude data) or phase = 0 deg. This step is required to create a phase curve from RTA data, or if user wish to overwrite the current measured phase data.

Please define the target sample rate (fs) and N before clicking **Convert**. The new data set will be transferred to the main Filter Hose window by clicking **Send.**

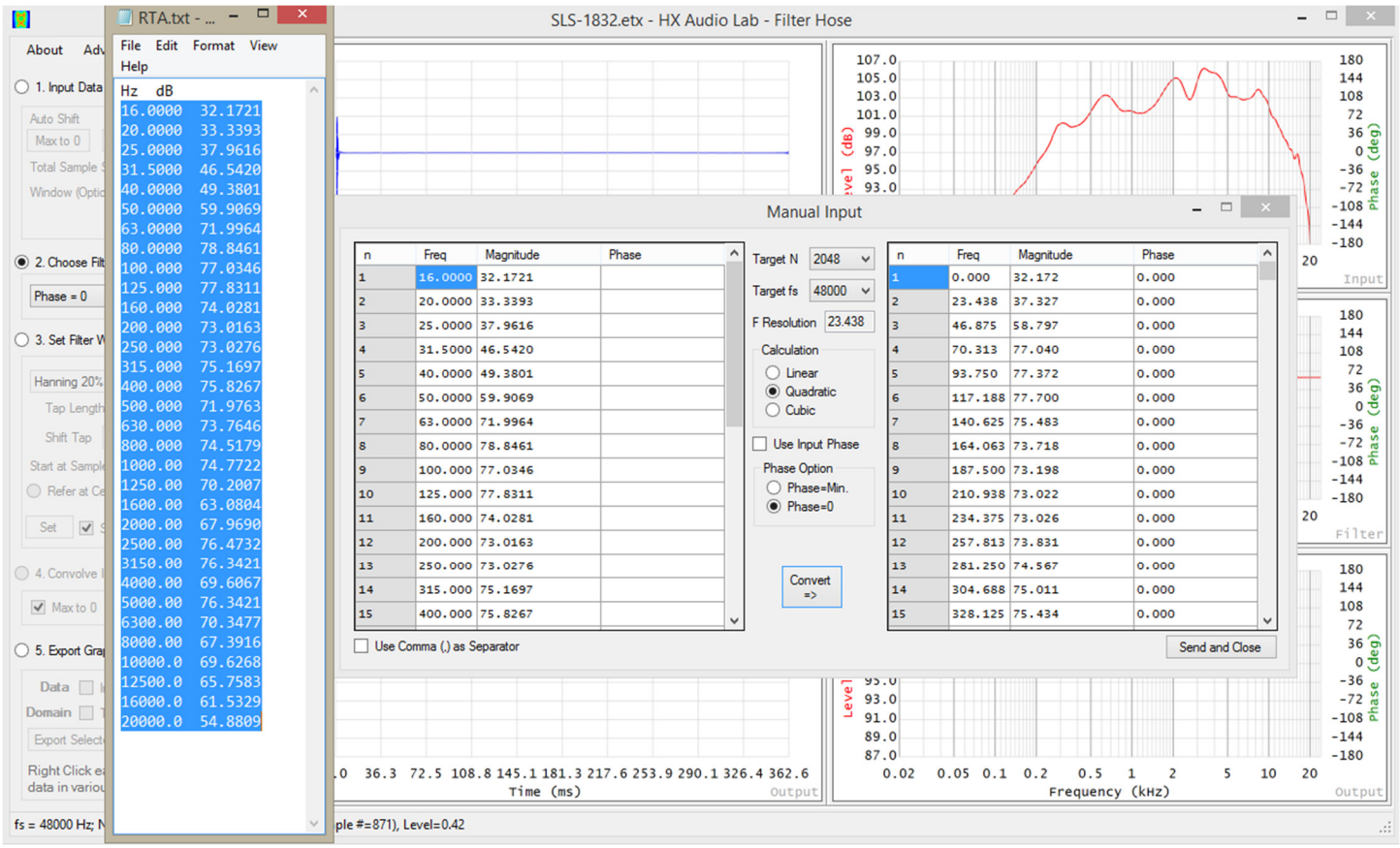
The pasted data on the left table may contain rows that are not acceptable to Filter Hose. Please use right click on the row to perform editing. Several table editing options can be seen below.



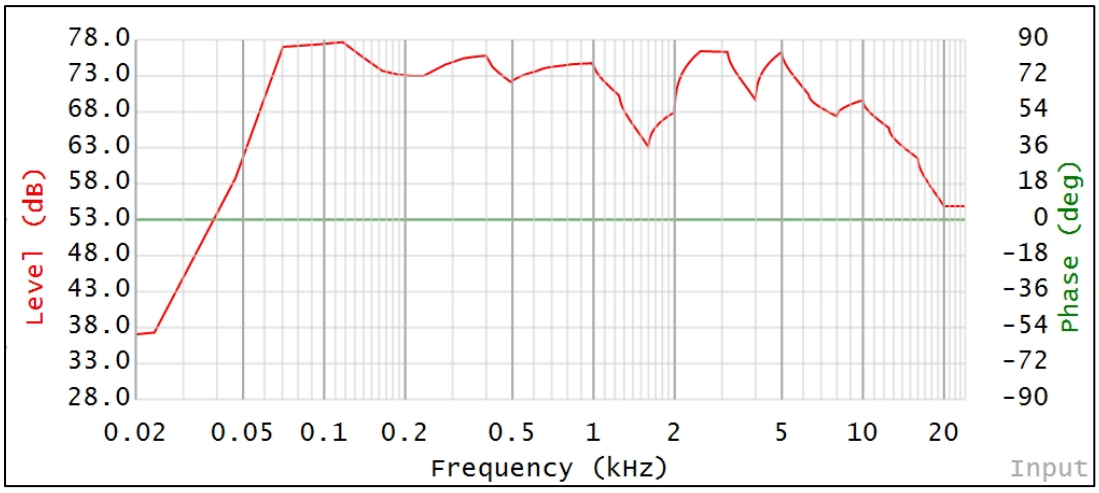
Note:

1. *<u>Target N refers to time domain data N</u>, therefore the data in the right table will contain <u>half</u> of the selected target N value.*
2. *Manual input <u>always</u> perform interpolation/extrapolation to create a new (linear frequency) data set. To import the data without any changes, please use the direct load button (Step 1 from the main window).*
3. User is able to create her/his own frequency/phase response by inputting the value in each row manually.
4. Please refer to HX Audio's article: <u>Creating Earthworks Mic Compensation in EASERA and Systune using Filter Hose</u> for an application example of the manual input where user inputs an incomplete data and customizing a lower frequency curve manually.

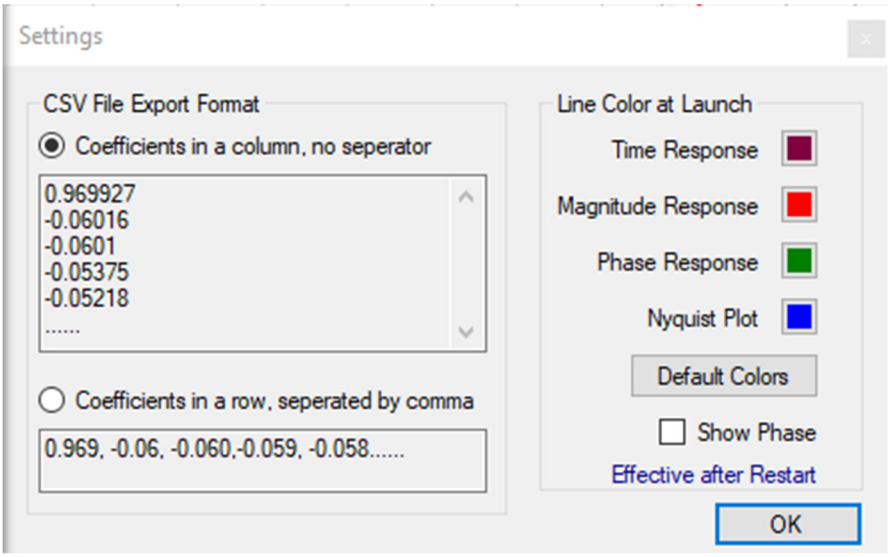
Manual Input Example – Loading an RTA data



An RTA data is copy pasted from notepad. The data is transferred without phase information, and filter hose is inputting phase = 0. To do this, please unclick **Use Input Phase** and select the desired option. The input result can be seen below (48kHz sample rate, N=2048).



Settings



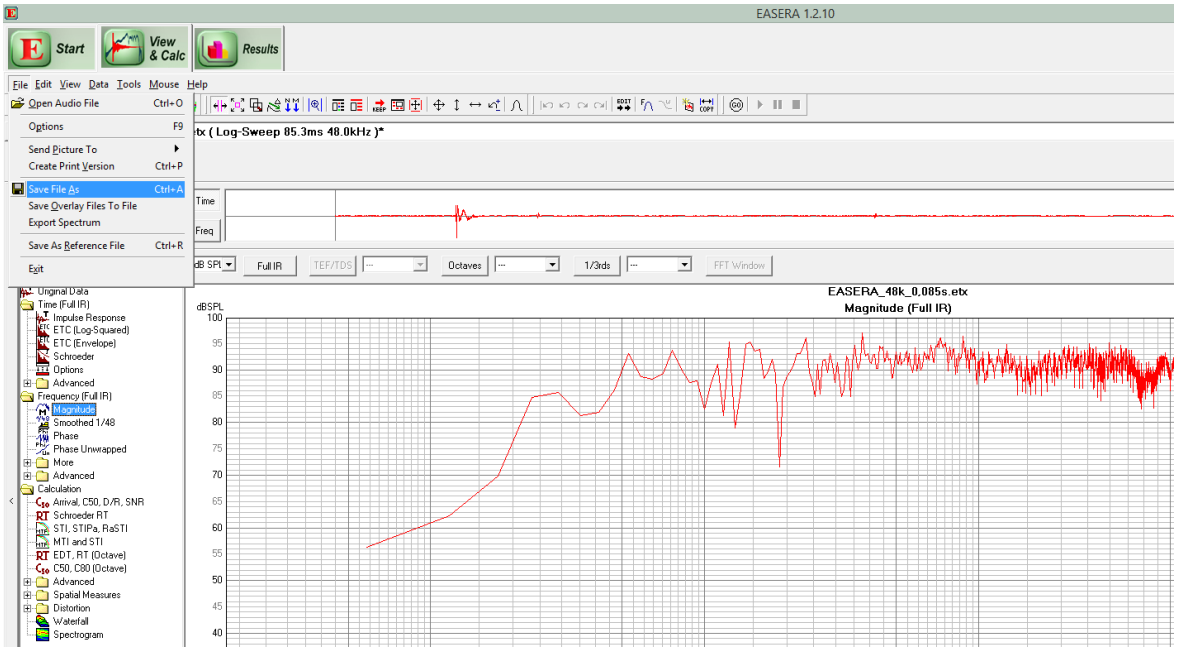
The settings window is introduced in Filter Hose V2.3. The .csv file format compatibility can be found here. **Show phase** check box allows user to turn off the phase display by default. The line colors for the program can be changed via this settings window. Some changes may require a restart of Filter Hose.

Direct Import ASCII Measurement Files

Direct load only accepts 2^n measurement data length.

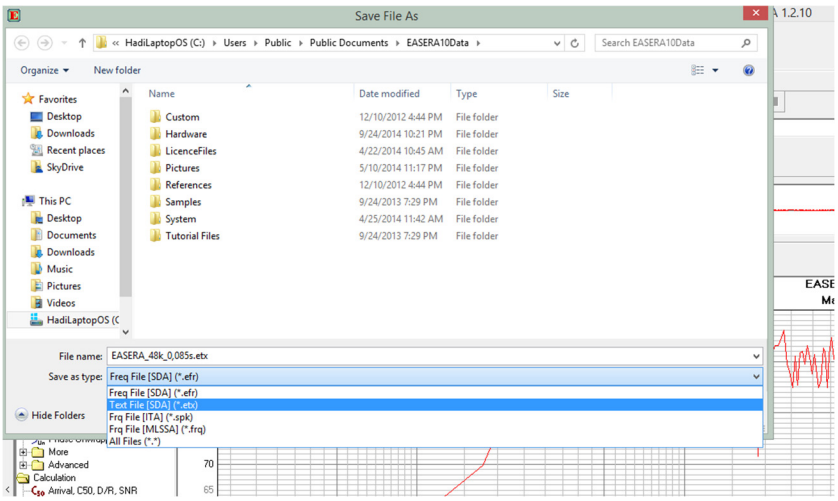
EASERA .etx file (Tested using v1.2.13)

Filter Hose is able to load time and frequency domain EASERA .etx files. The example below is in frequency domain.



Click **Magnitude** on the left panel

Click **File** – **Save File As**

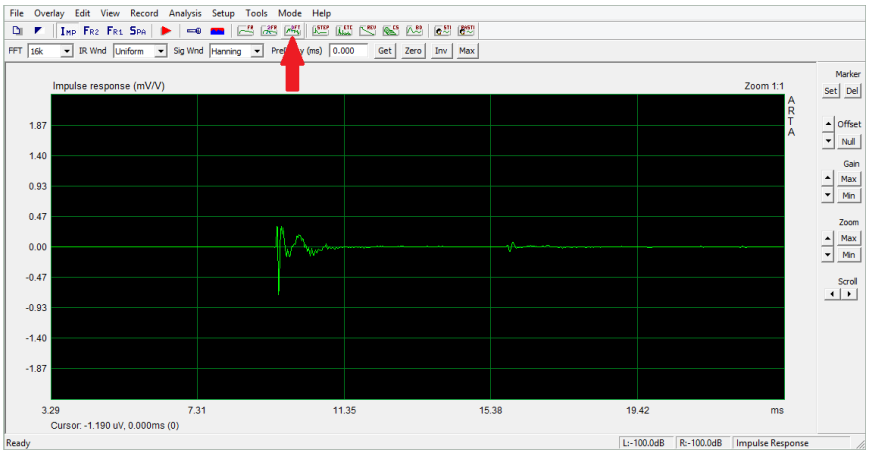


Select Text File *.etx from the drop down menu

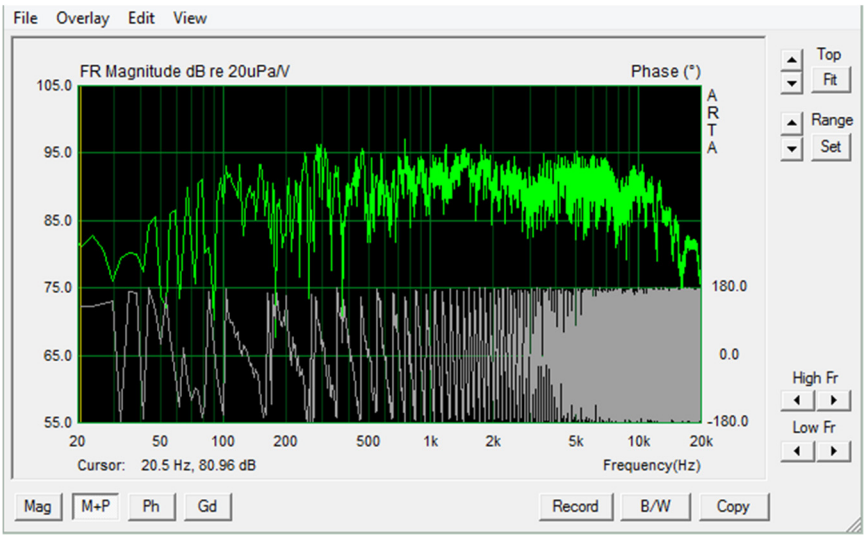
Alternatively, use the wave file export. If the wave file results in a very long impulse response, use any wave editors to shorten it to 2 seconds or less. Please also see "Tips on Shortening Input N" section in the user guide.

ARTA .txt file (Tested using v1.8.5)

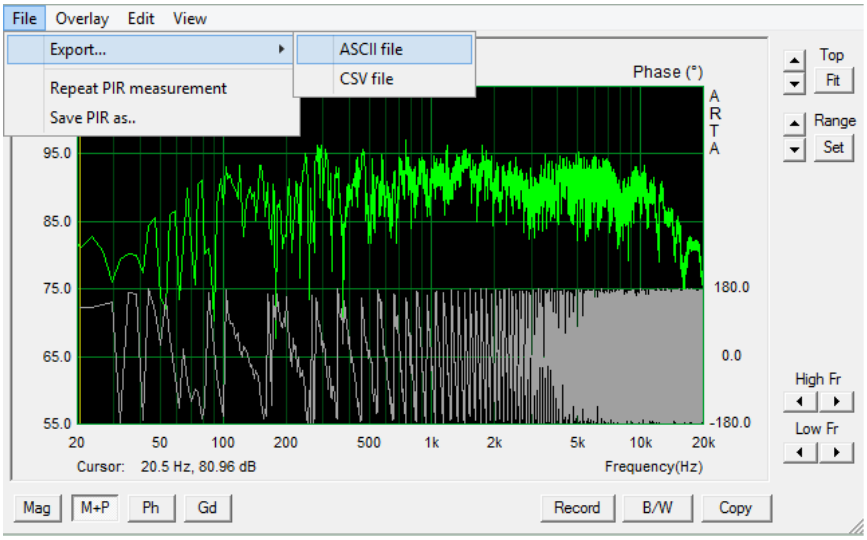
Click **DFT** (unsmoothed FR)



Make sure magnitude and phase are both shown by clicking **M+P** button

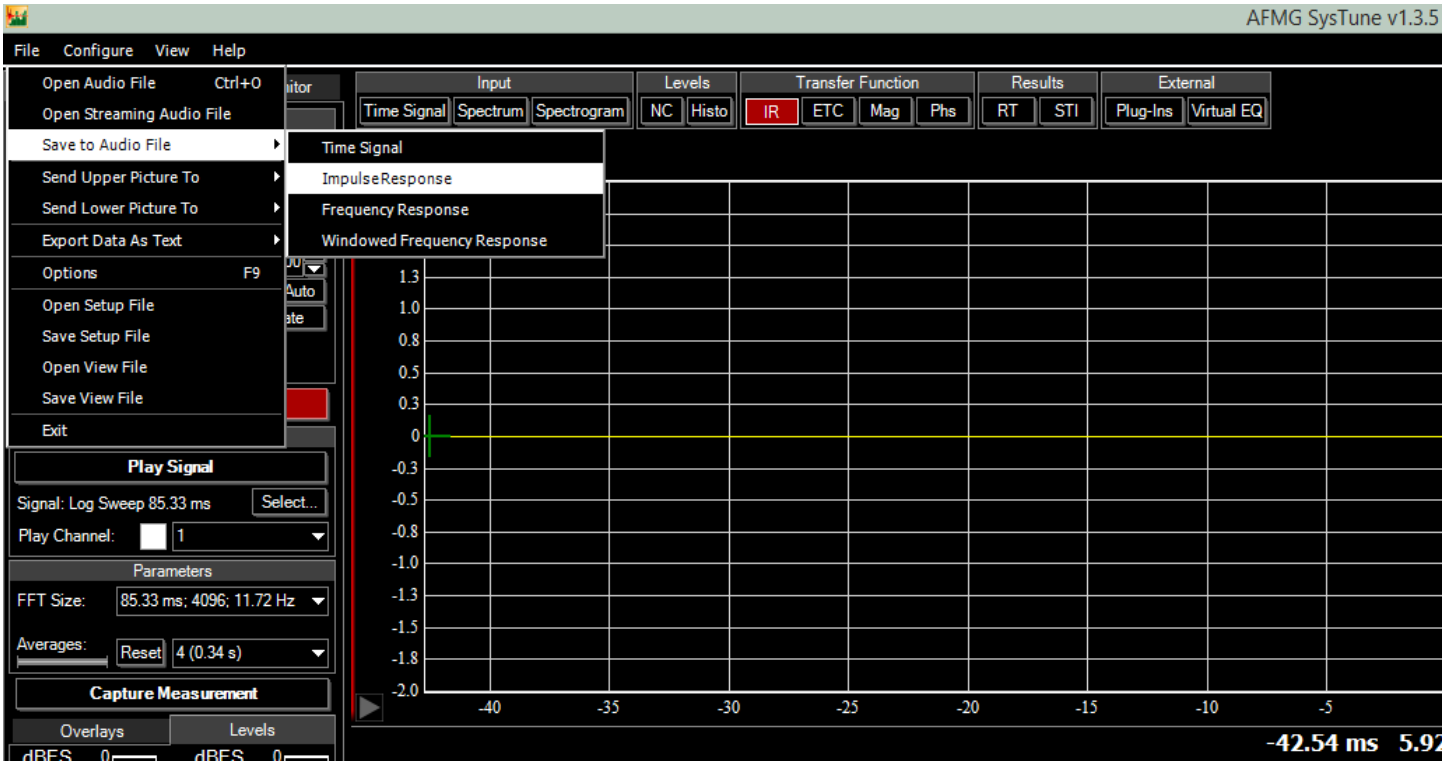


Click **File** – **Export** – **ASCII file**

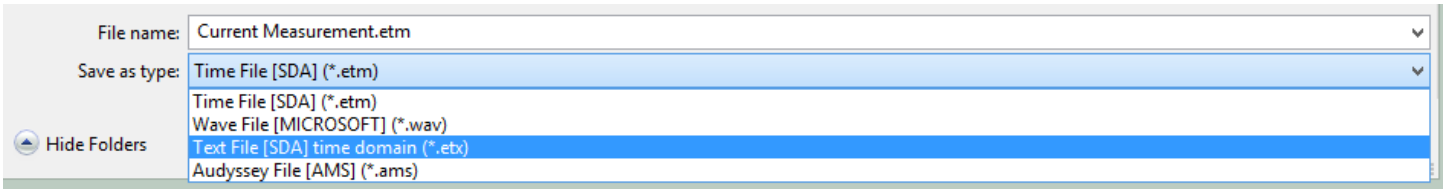


Systune .etx file (Tested using V1.3.7)

Click **File – Save Audio As – Impulse Response** to create an .etx file from Systune. We recommend using Systune's time domain etx data format.



From the file dialog, select *.etx.



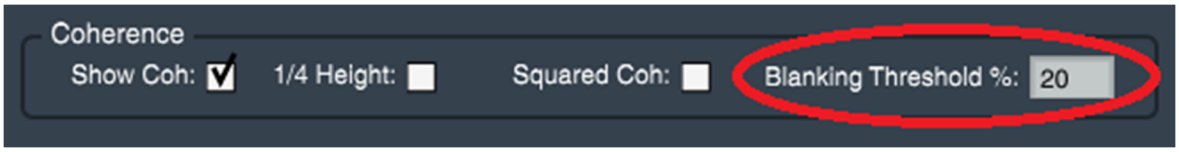
In Filter Hose, please use EASERA *.etx file type to import the file.

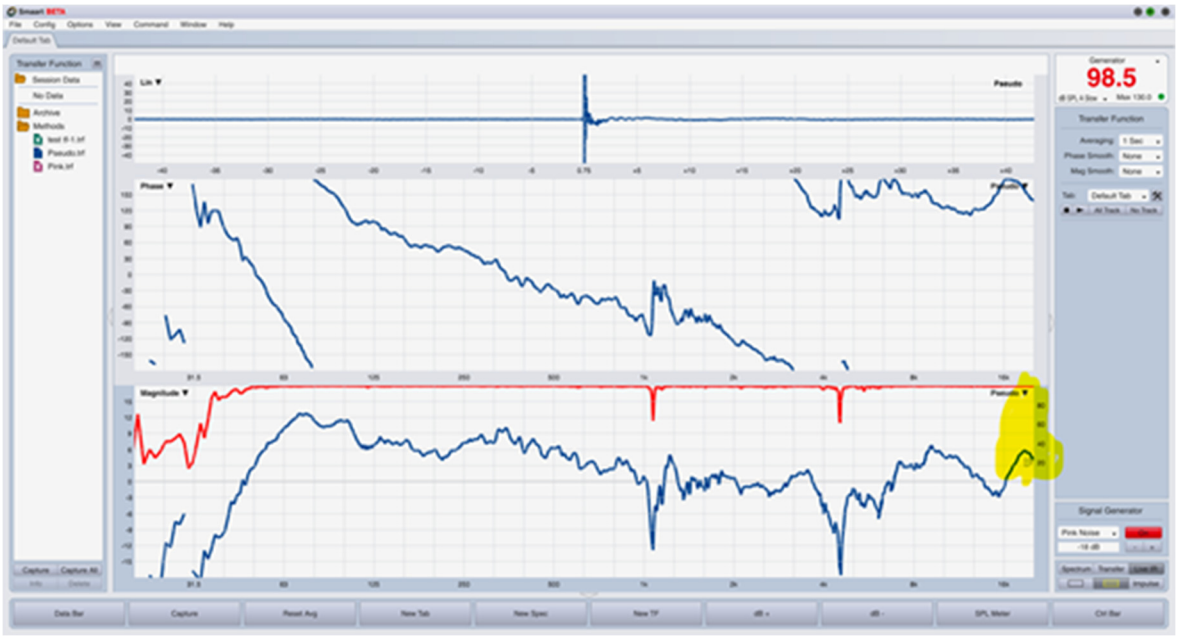
Alternatively, use the wave file export. If the wave file results in a very long impulse response, use any wave editors to shorten it to 2 seconds or less. Please also see "Tips on Shortening Input N" section in the user guide.

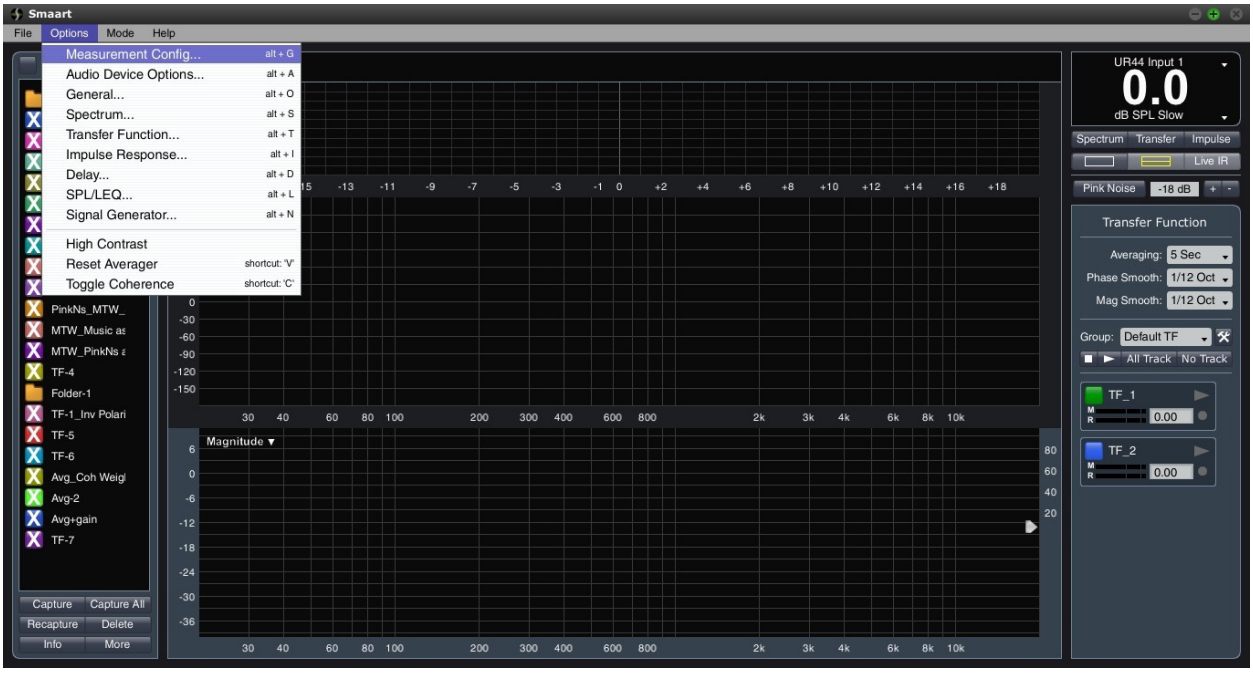
Smaart .txt file (Tested using v7.5.2 and v8.4.3)

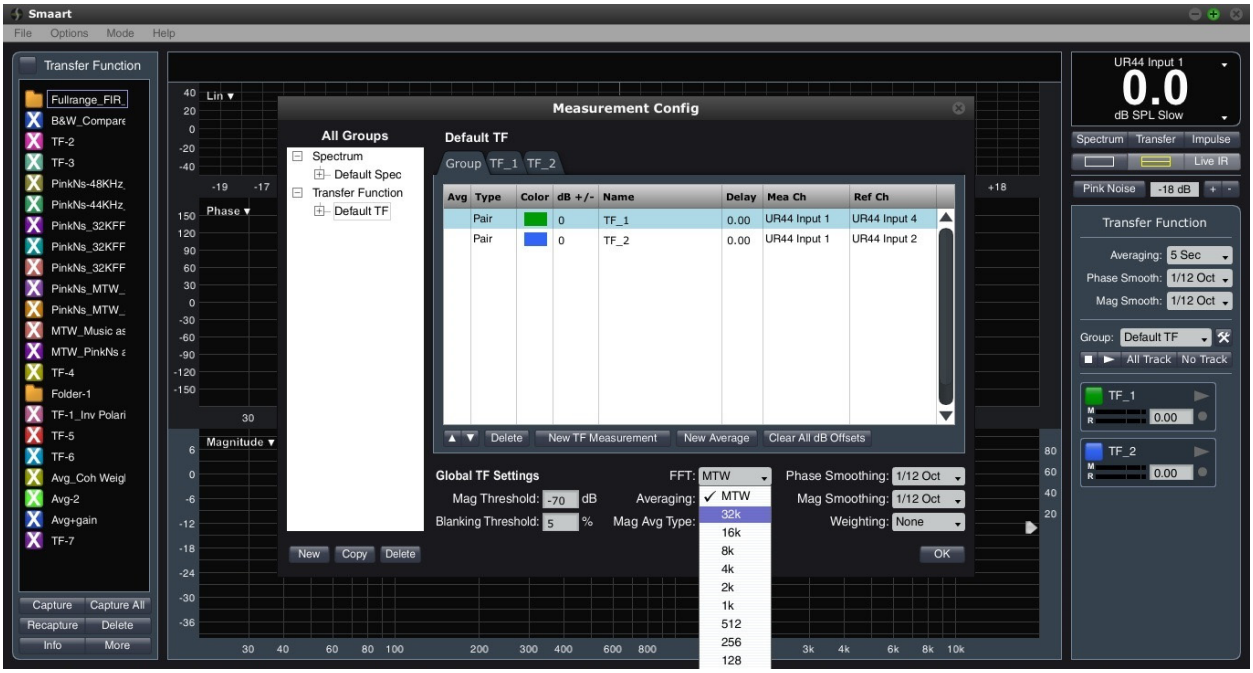
To improve the transfer accuracy, we recommend using the linear data: Click **Measurement Config** and switch the MTW to an FFT size. If MTW data is preferred, the Filter Hose direct load will automatically load the values to the manual input. The user will need to set the sample rate, click Convert and then click Send.

In Smaart, please make sure the coherence blanking threshold is set to 0% (circled in red below and highlighted in yellow).

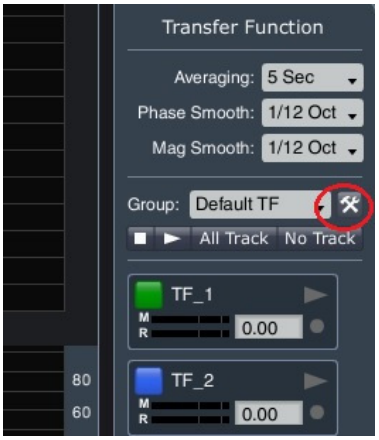





Smaart
File
Options
Mode
Help
Measurement Config... alt + G
Audio Device Options... alt + A
General... alt + O
Spectrum... alt + S
Transfer Function... alt + T
Impulse Response... alt + I
Delay... alt + D
SPL/LEQ... alt + L
Signal Generator... alt + N
High Contrast
Reset Averager shortcut: 'V'
Toggle Coherence shortcut: 'C'
UR44 Input 1
0.0
dB SPL Slow
Spectrum
Transfer
Impulse
Live IR
Pink Noise
-18 dB
Transfer Function
Averaging: 5 Sec
Phase Smooth: 1/12 Oct
Mag Smooth: 1/12 Oct
Group: Default TF
All Track
No Track
TF_1
TF_2
Magnitude
Capture
Capture All
Recapture
Delete
Info
More


Smaart
Transfer Function
Measurement Config
All Groups
Spectrum
Default Spec
Transfer Function
Default TF
Default TF
Group
TF_1
TF_2
Avg
Type
Color
dB +/-
Name
Delay
Mea Ch
Ref Ch
Pair
TF_1
TF_2
UR44 Input 1
UR44 Input 4
UR44 Input 2
Delete
New TF Measurement
New Average
Clear All dB Offsets
Global TF Settings
Mag Threshold: -70 dB
Blanking Threshold: 5 %
FFT: MTW
Averaging:
Mag Avg Type:
Phase Smoothing: 1/12 Oct
Mag Smoothing: 1/12 Oct
Weighting: None
OK
New
Copy
Delete
MTW
32k
16k
8k
4k
2k
1k
512
256
128
Lin
Phase
Magnitude

Another way to open **Measurement Config** is to press the tool button as shown below:



Click **More** – **Copy to ASCII**

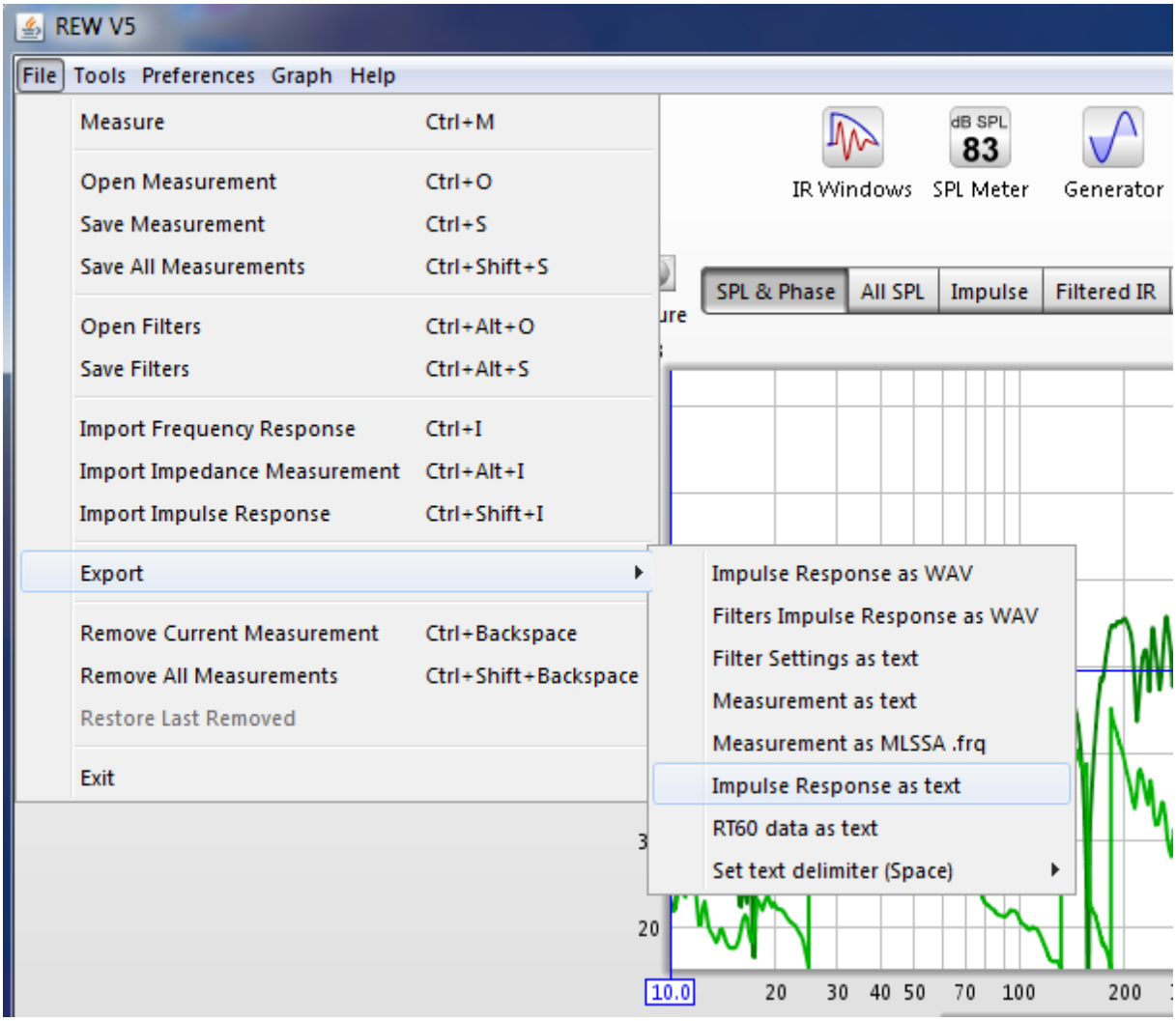
The values are stored in the clipboard. Open Notepad to paste in the values, and save as a new text file (*.txt), or you can paste the value directly to the Filter Hose Manual Input window.

Alternatively, use the wave file export. If the wave file results in a very long impulse response, use any wave editors to shorten it to 2 seconds or less. Please also see "Tips on Shortening Input N" section in the user guide.

Room EQ Wizard/REW (Tested using v5.19)

Click **File – Export – Impulse Response as text** to create a compatible txt file for Filter Hose use.

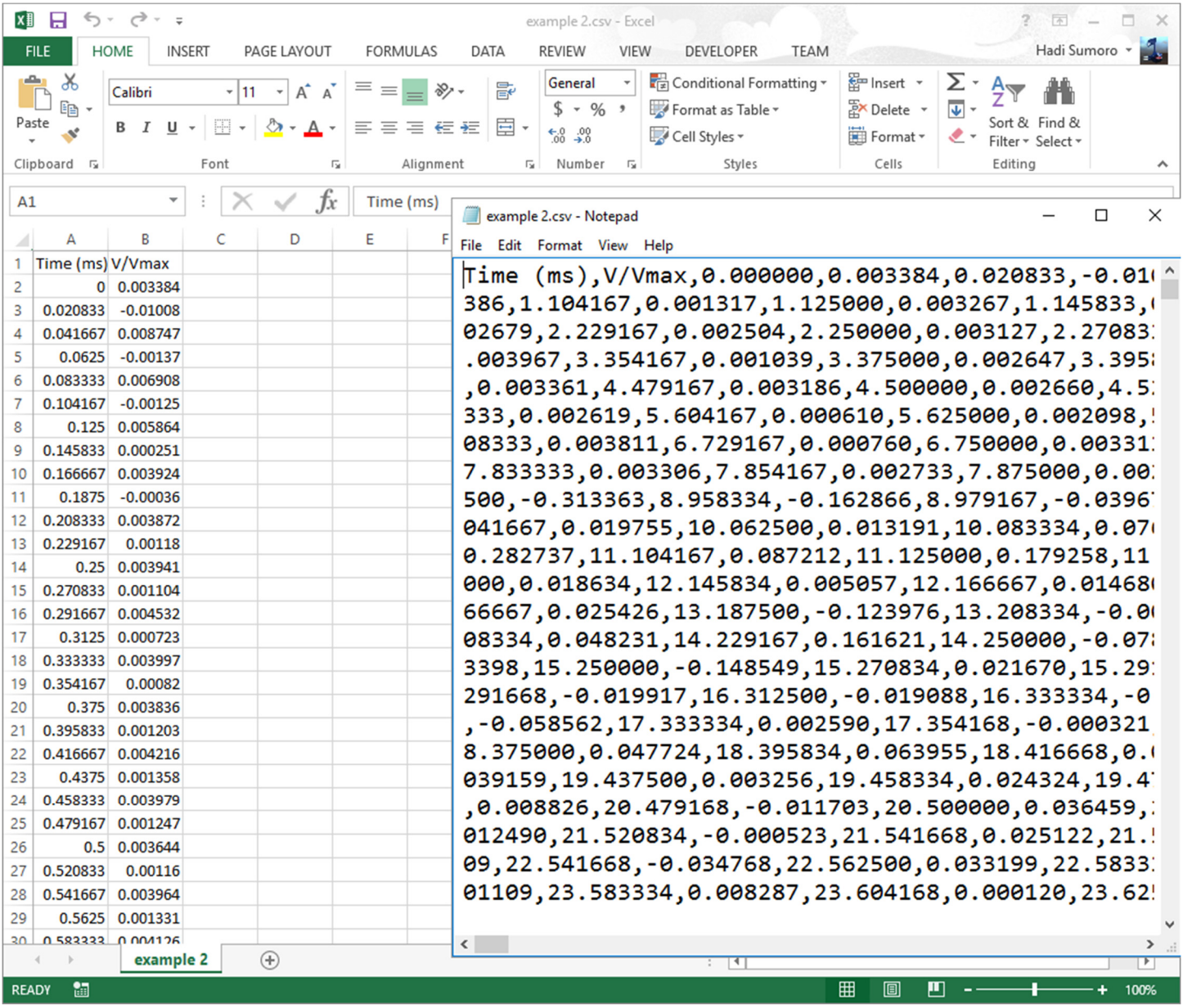
Please note that REW impulse length is default to N > 64k. Upon loading the txt file to Filter Hose, it is recommended to use **Advance – Input – Remove 2nd Half of N** to shorten the impulse length at least to N <= 16k. Please see "Tips on Shortening Input N" section in the user guide.



Alternatively, use the wave file export. If the wave file results in a very long impulse response, use any wave editors to shorten it to 2 seconds or less. Please also see "Tips on Shortening Input N" section in the user guide.

FuzzMeasure

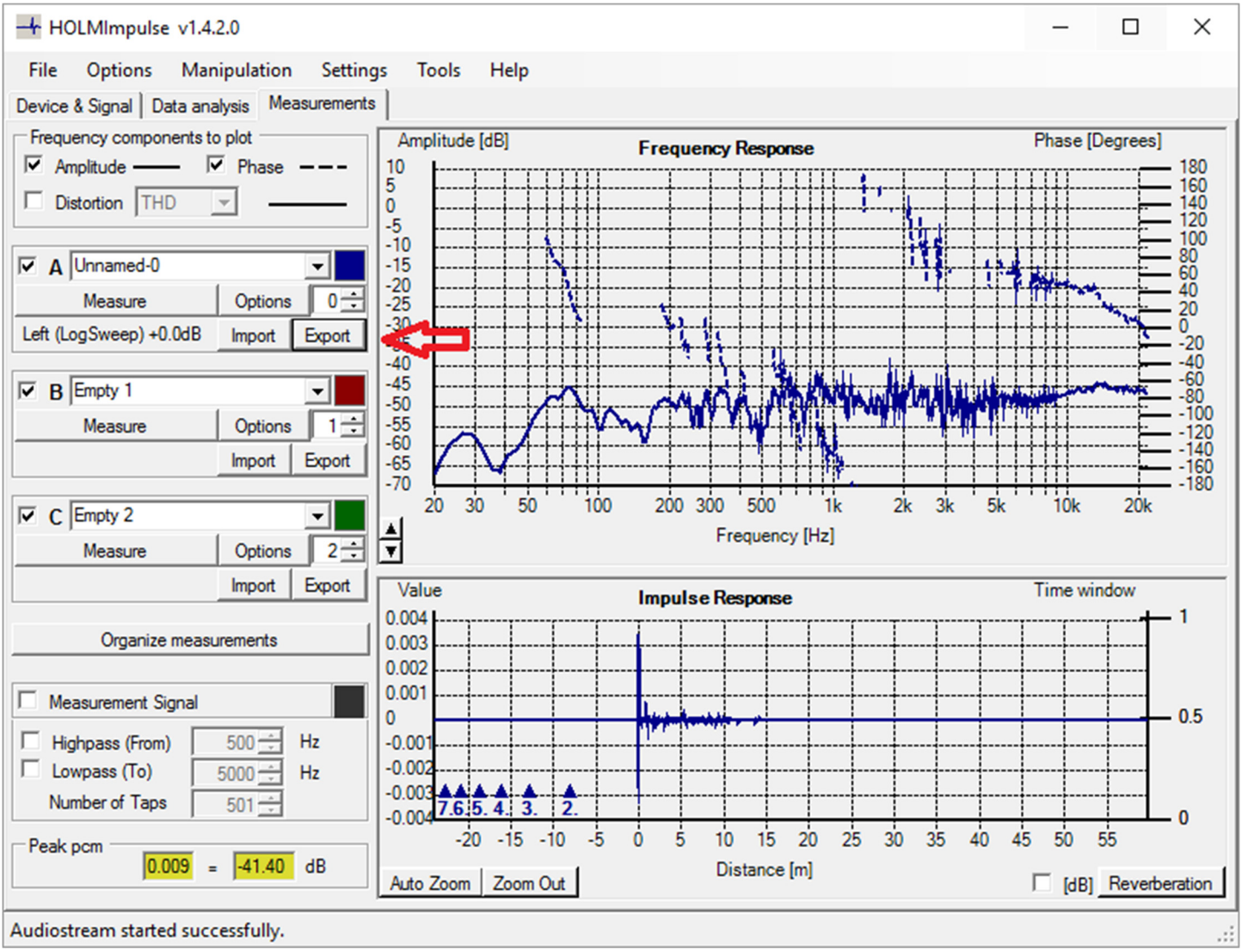
Filter Hose accepts FuzzMeasure time domain data export (.csv file). Please make sure the exported csv file contains the time (ms) and amplitude of the impulse response as shown below (opened in Excel and NotePad).

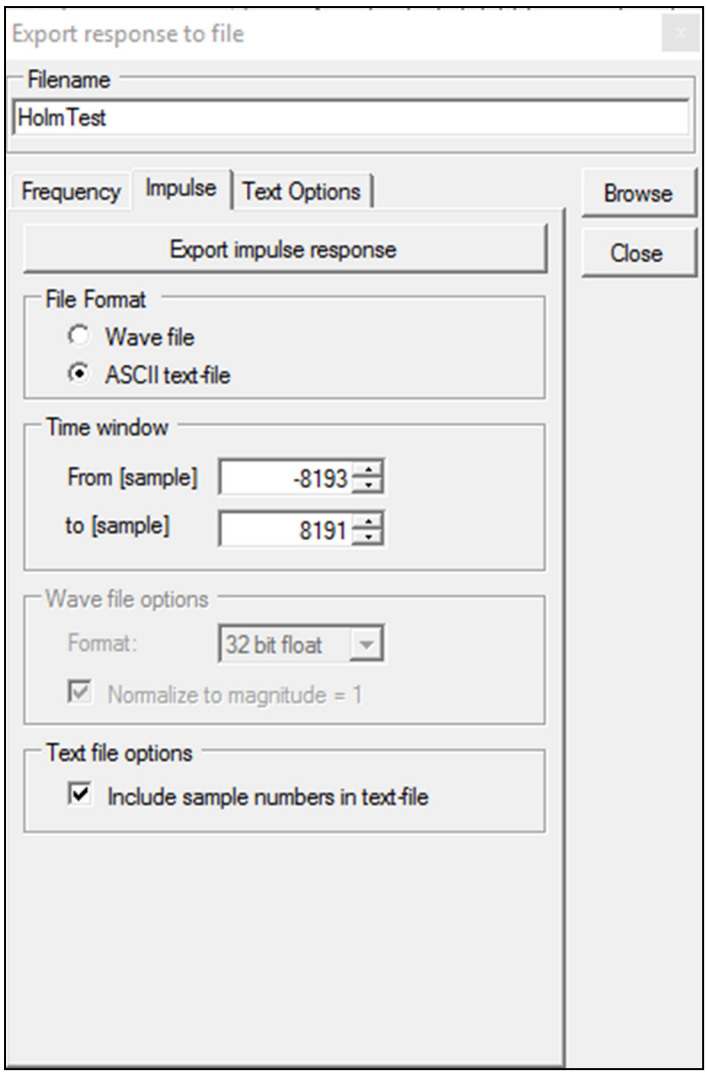


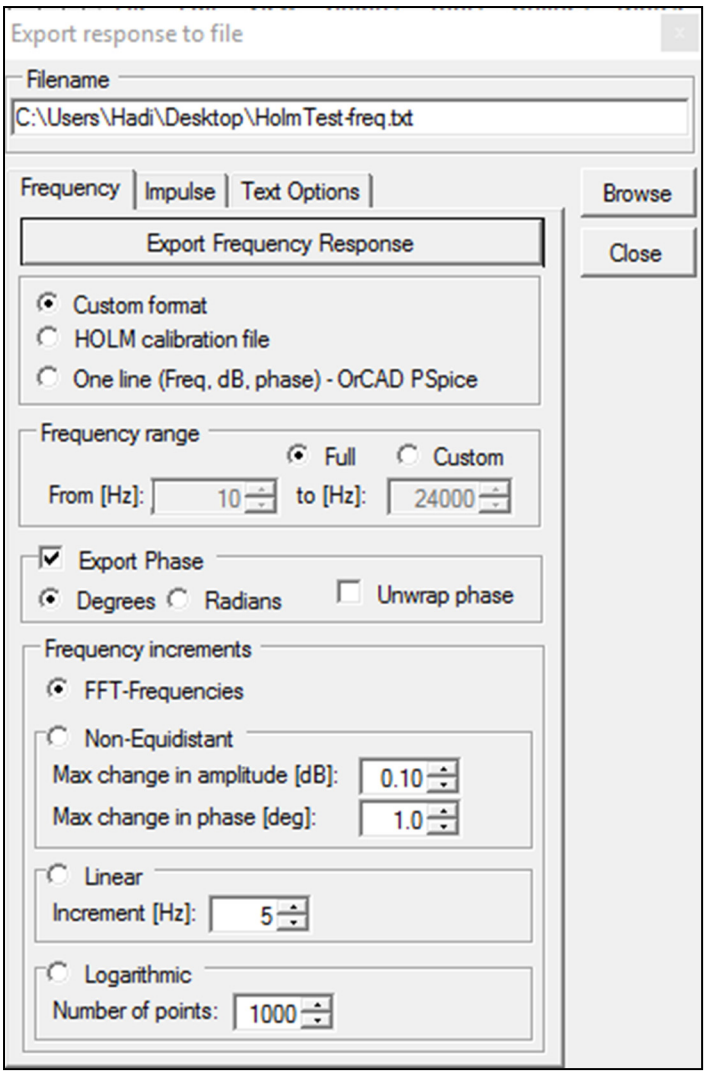
Alternatively, use the wave file export. If the wave file results in a very long impulse response, use any wave editors to shorten it to 2 seconds or less. Please also see "Tips on Shortening Input N" section in the user guide.

Holm Impulse (Tested using v1.4.2.0)

Filter Hose accepts time and frequency domain data export from Holm Impulse.



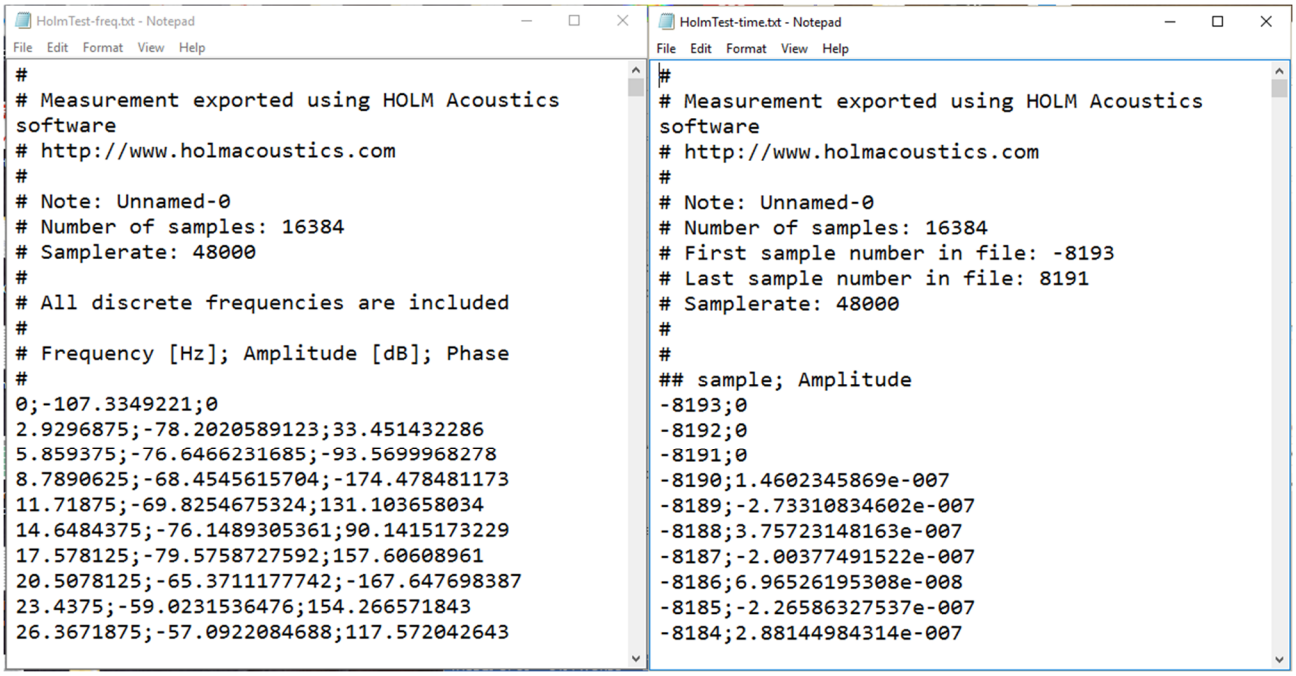


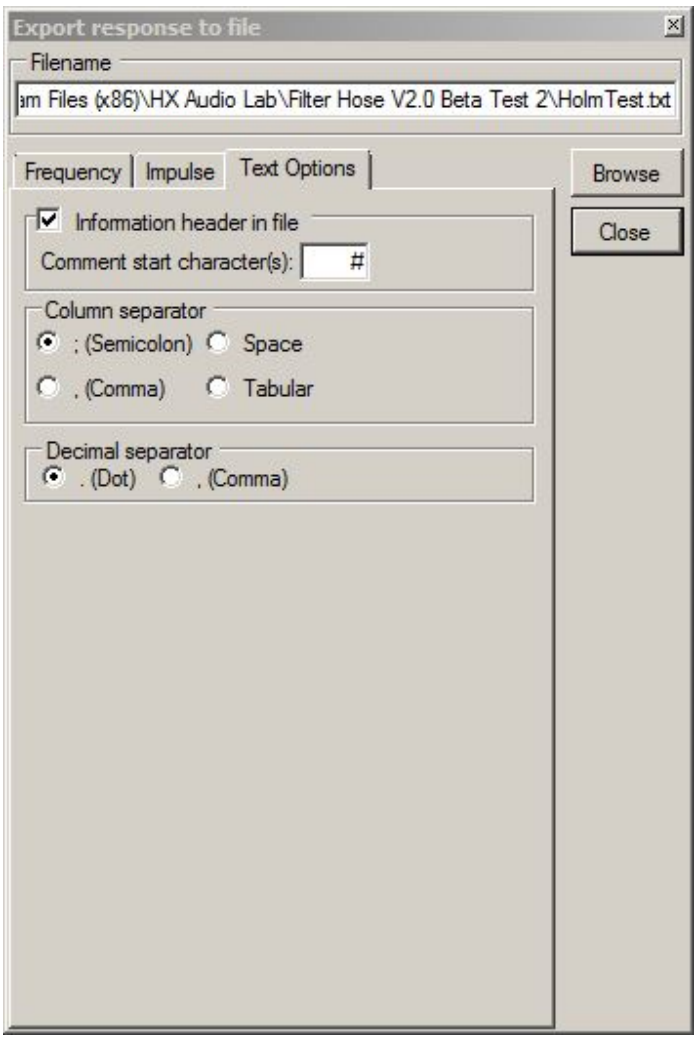


Please follow the setup in the left screenshot for time domain export or the right screenshot for frequency domain export.

The .txt file shall look like the pictures in the next page.

Alternatively, use the wave file export. If the wave file results in a very long impulse response, use any wave editors to shorten it to 2 seconds or less. Please also see "Tips on Shortening Input N" section in the user guide.

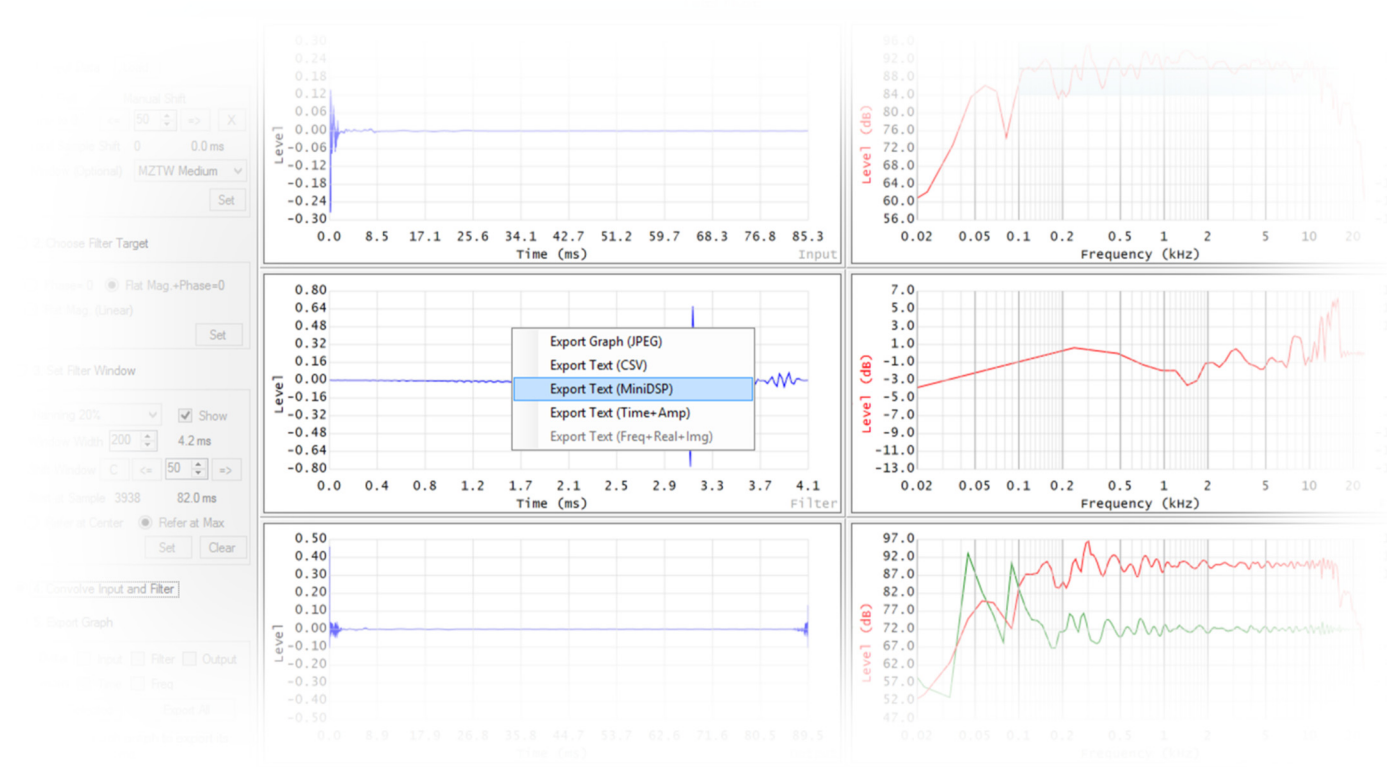

HolmTest-freq.txt - Notepad
File Edit Format View Help
#
Measurement exported using HOLM Acoustics software
http://www.holmacoustics.com
#
Note: Unnamed-0
Number of samples: 16384
Samplerate: 48000
#
All discrete frequencies are included
#
Frequency [Hz]; Amplitude [dB]; Phase
#
0;-107.3349221;0
2.9296875;-78.2020589123;33.451432286
5.859375;-76.6466231685;-93.5699968278
8.7890625;-68.4545615704;-174.478481173
11.71875;-69.8254675324;131.103658034
14.6484375;-76.1489305361;90.1415173229
17.578125;-79.5758727592;157.60608961
20.5078125;-65.3711177742;-167.647698387
23.4375;-59.0231536476;154.266571843
26.3671875;-57.0922084688;117.572042643
HolmTest-time.txt - Notepad
File Edit Format View Help
#
Measurement exported using HOLM Acoustics software
http://www.holmacoustics.com
#
Note: Unnamed-0
Number of samples: 16384
First sample number in file: -8193
Last sample number in file: 8191
Samplerate: 48000
#
#
sample; Amplitude
-8193;0
-8192;0
-8191;0
-8190;1.4602345869e-007
-8189;-2.73310834602e-007
-8188;3.75723148163e-007
-8187;-2.00377491522e-007
-8186;6.96526195308e-008
-8185;-2.26586327537e-007
-8184;2.88144984314e-007


Export response to file
Filename
am Files (x86)\HX Audio Lab\Filter Hose V2.0 Beta Test 2\HolmTest.txt
Frequency
Impulse
Text Options
Browse
Close
Information header in file
Comment start character(s):
#
Column separator
; (Semicolon)
Space
, (Comma)
Tabular
Decimal separator
. (Dot)
, (Comma)

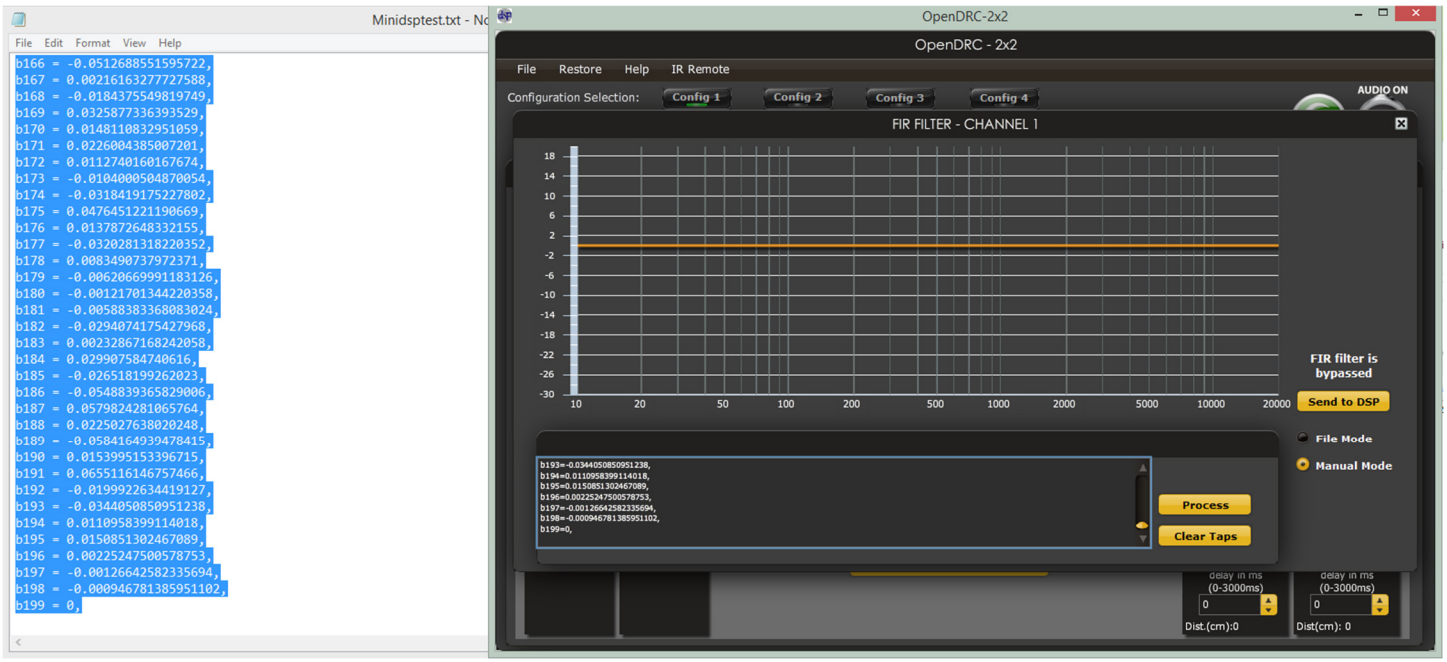
Export to MiniDSP

Filter Hose is able to export coefficient to MiniDSP OpenDRC plugin.

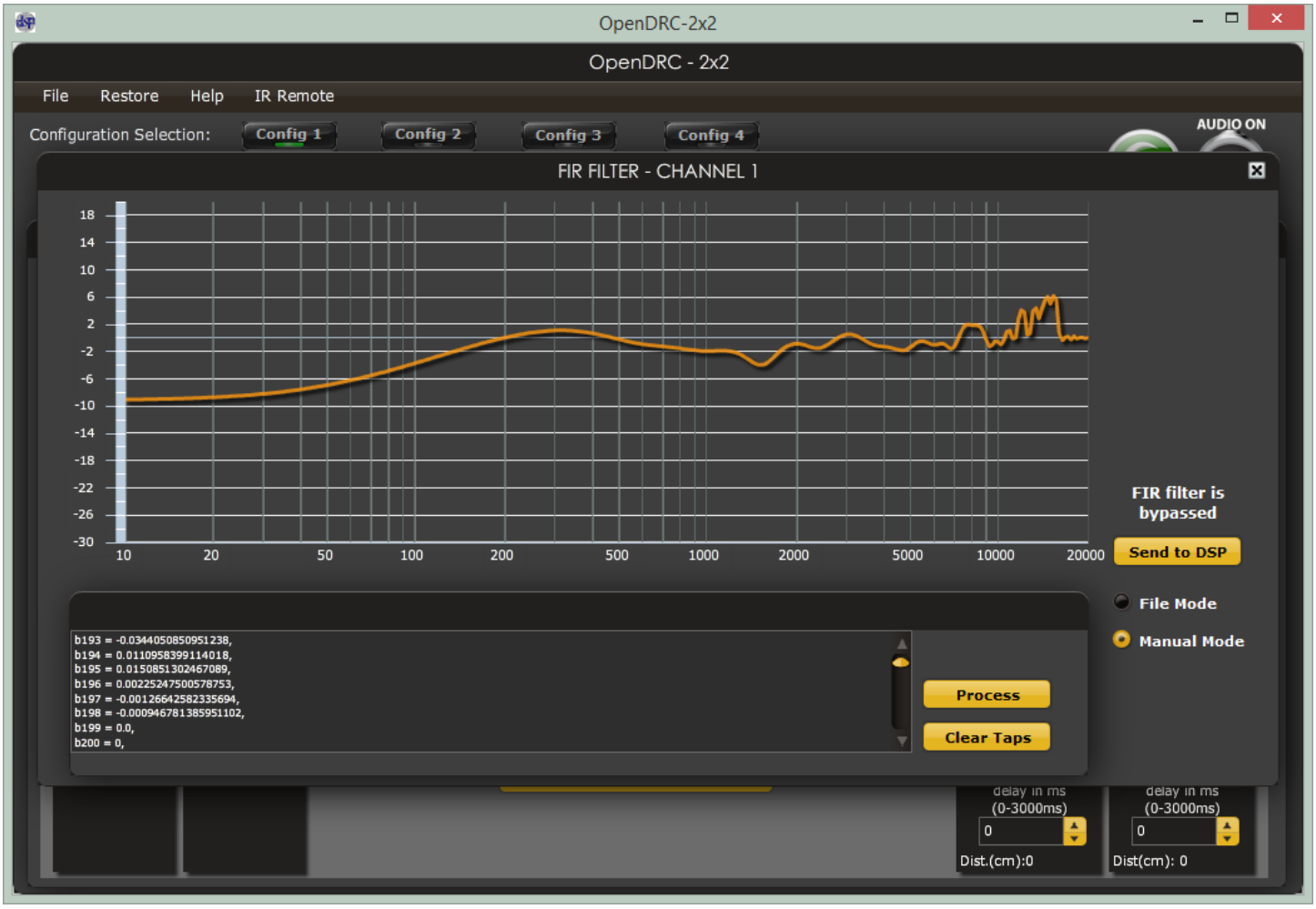
Right-click on the time-domain filter graph and select **Export Text (MiniDSP)**.



Open the text file in Notepad; copy all text to MiniDSP input. Please make sure that MiniDSP is in manual mode and its previous filter taps are cleared (click **Clear Taps** button).



Click **Process** and **Send to DSP**.



Example: Importing a Filter Transfer Function (Time Domain Data Input)

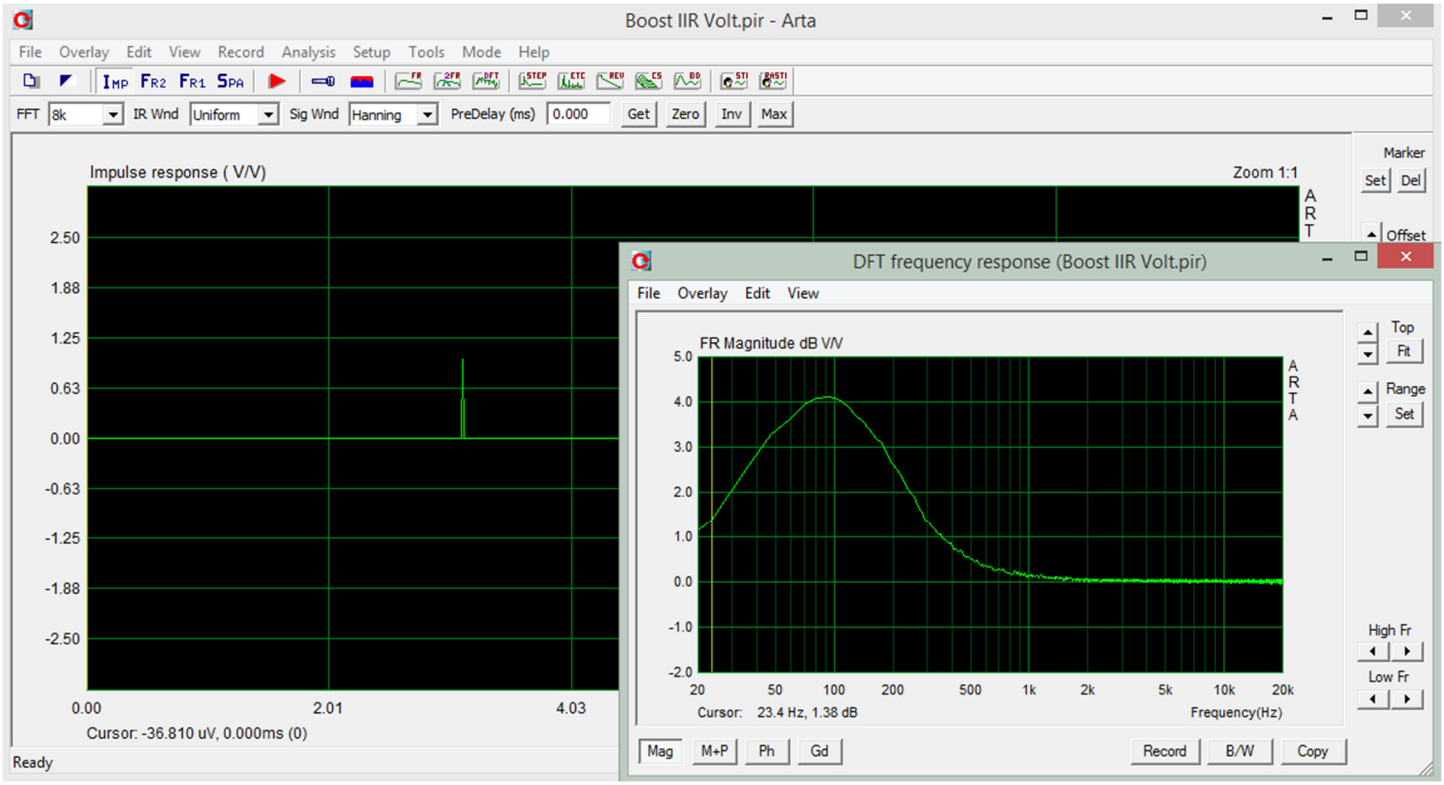
General Information

In Filter Hose v1.2 and higher, it is possible to import a .csv file in step one or step two. Step one will import .csv file and will extend the length to the next 2^n value or more. Sample rate will be asked when a .csv file is loaded. Step two will import .csv as is, assuming the sample rate matches the loaded measurement (step one).

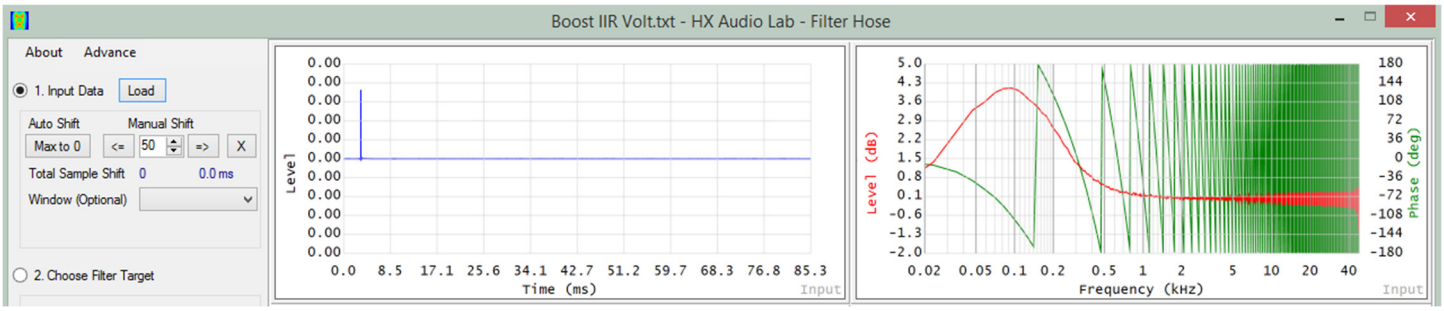
Loading a Filter Transfer Function Measurement

To load a filter transfer function measurement to Filter Hose, user can use a time domain data. This can be done by using a .csv/.txt format. Please follow the example below.

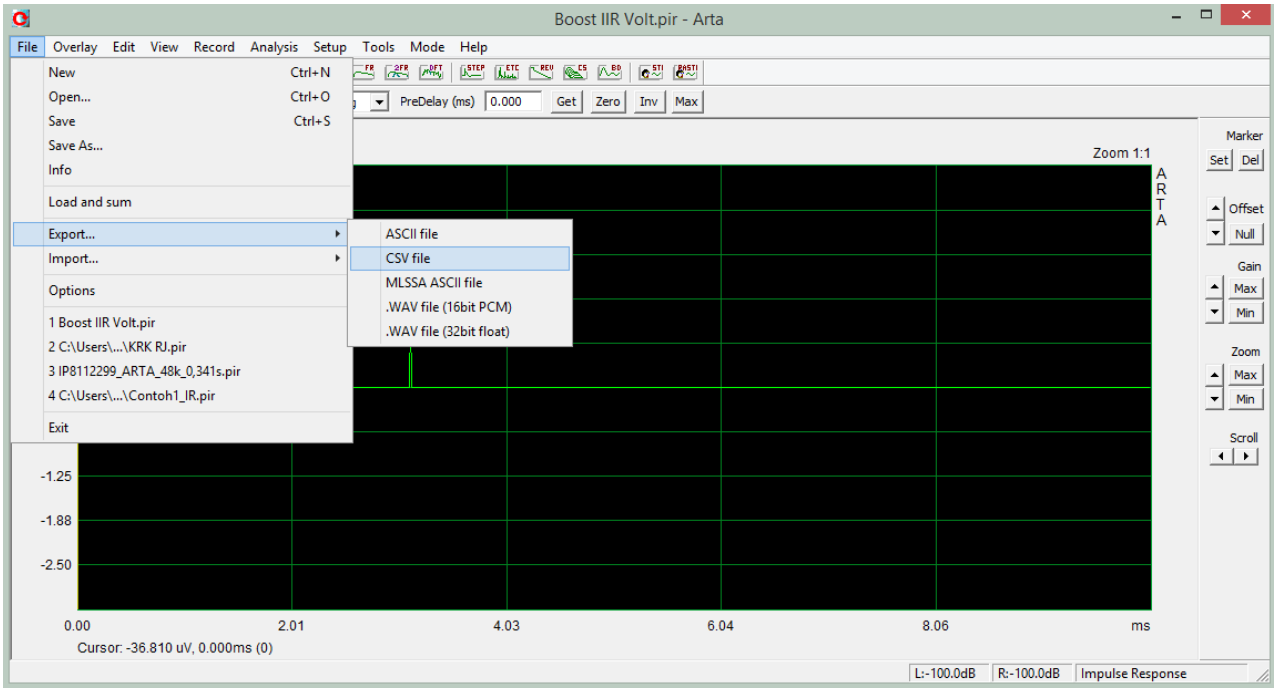
1. ARTA is used to measure a transfer function of a digital loudspeaker management system. The transfer function contains only low frequency boost centered at 90Hz as shown below.



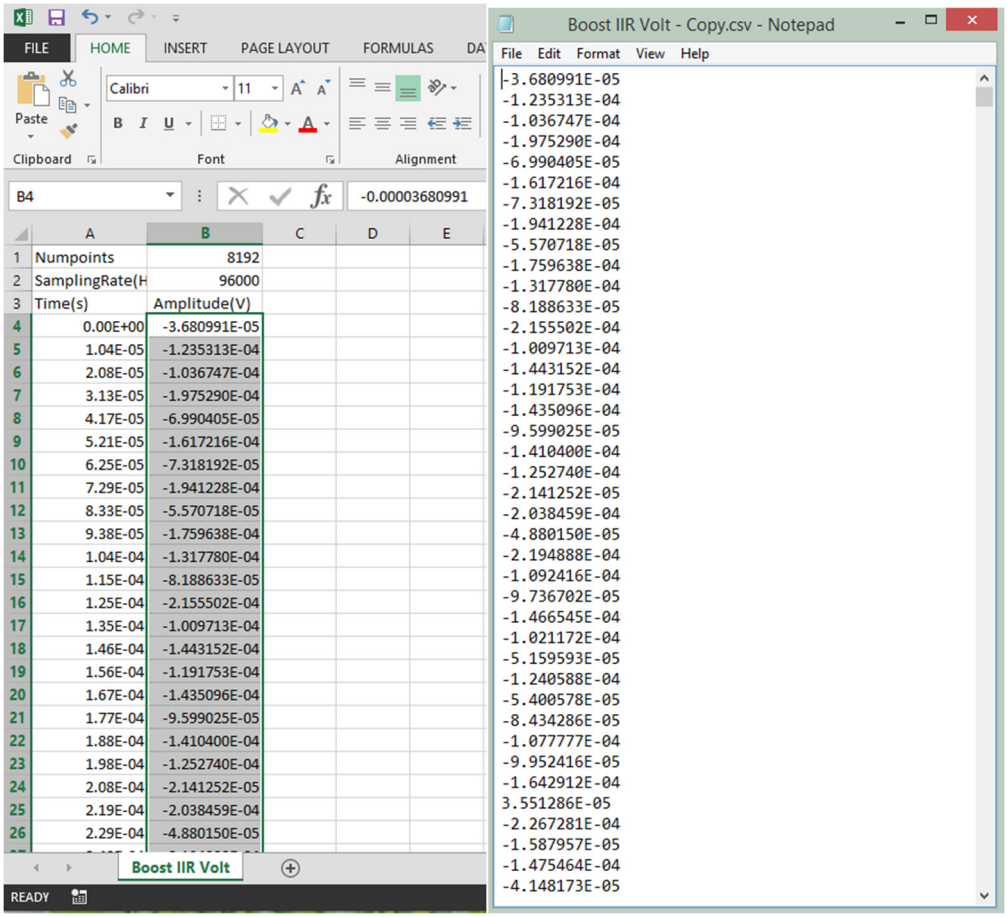
2. When the filter is exported from ARTA, the ARTA .txt file contains frequency domain data. If it is loaded to Filter Hose under ARTA (.txt), it will result incorrect time domain data. Note the Y-axis is all 0.



3. To do this correctly, it is recommended to export the time domain data from ARTA as shown below.



4. Open the exported ARTA .csv file (time domain) and select the amplitude column only. Copy paste the value to a new .txt file (such as using NotePad) and then rename the .txt to .csv as shown below. Note: .csv is basically a .txt file format.



5. Use Load Filter (.csv) option from Filter Hose to open the filter, choose the appropriate sample rate and desired extended N. The graph below matches the graph shown under step 1 of this tutorial.