Open Sound Meter

Overview v1.5

iPad OS

Version for the iPadOS/iPhone available at App Store by low reasonable price.

What is Open Sound Meter

Cross-platform
measurement application
for tuning sound systems
in real-time

Main goals

- **K**eep only really needed functions
- **I**ndividual functions should be easily and quickly accessible
- **S**imple interface
- **S**upport young engineers

Similar to a design principle noted by the U.S. Navy in 1960: keep it simple, stupid

Consulting

If you have any questions about any tools or options — we are here to help.

We provide consulting service and trainings for users.

Visit https://opensoundmeter.com/consulting for the details.

Supported systems

iPad, iPhone	from iOS12
macOS	from 10.13
Windows x64	from 7
Linux	AppImage (Glibc 2.29 or above)

If you can't find binaries for your system, build it with Qt5.15

Is it free? Really?

Desktop versions are distributed by the model pay what you want

Just remember, every donation is a great help for further development.

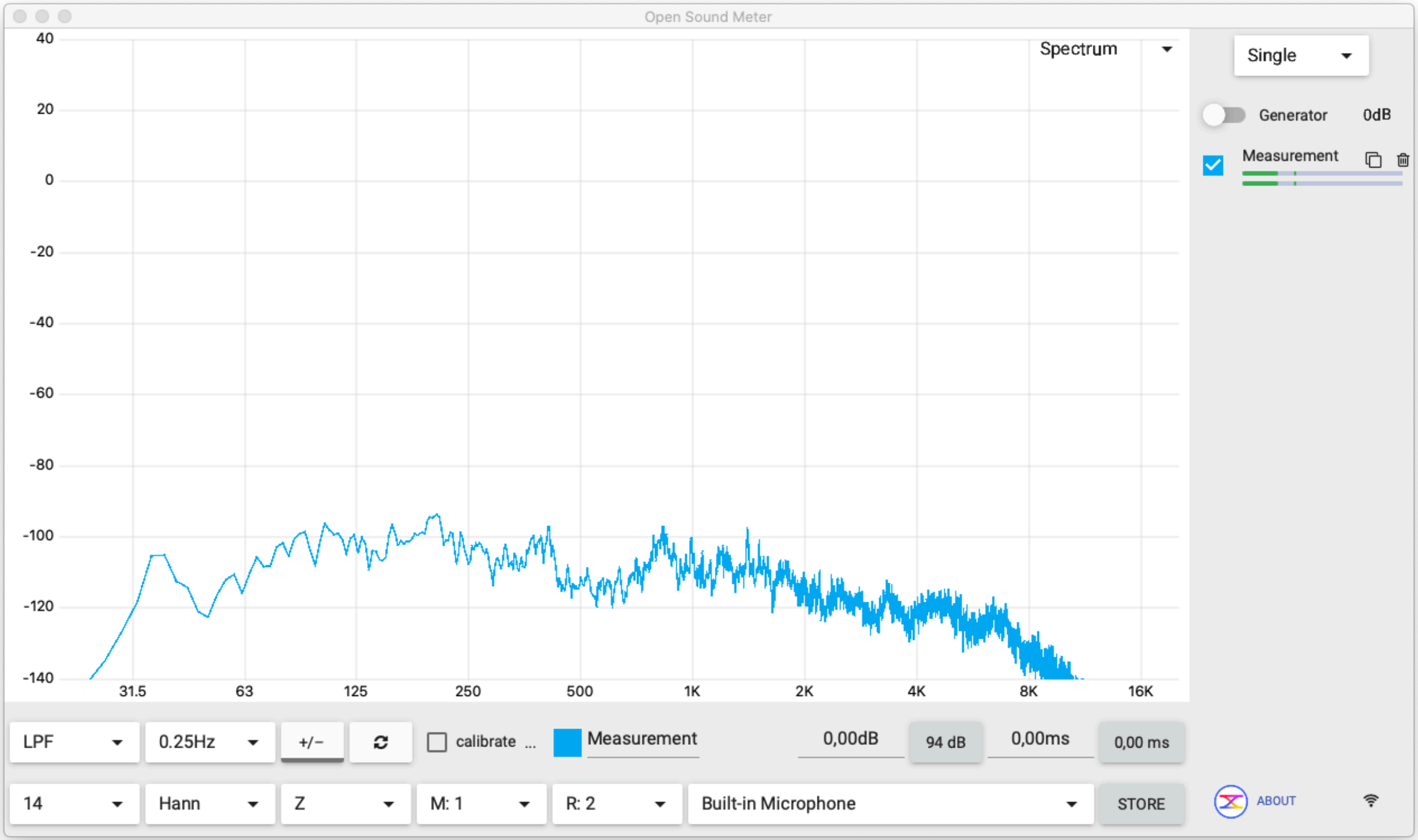
iOS version are distributed by low reasonable price.

https://opensoundmeter.com/about

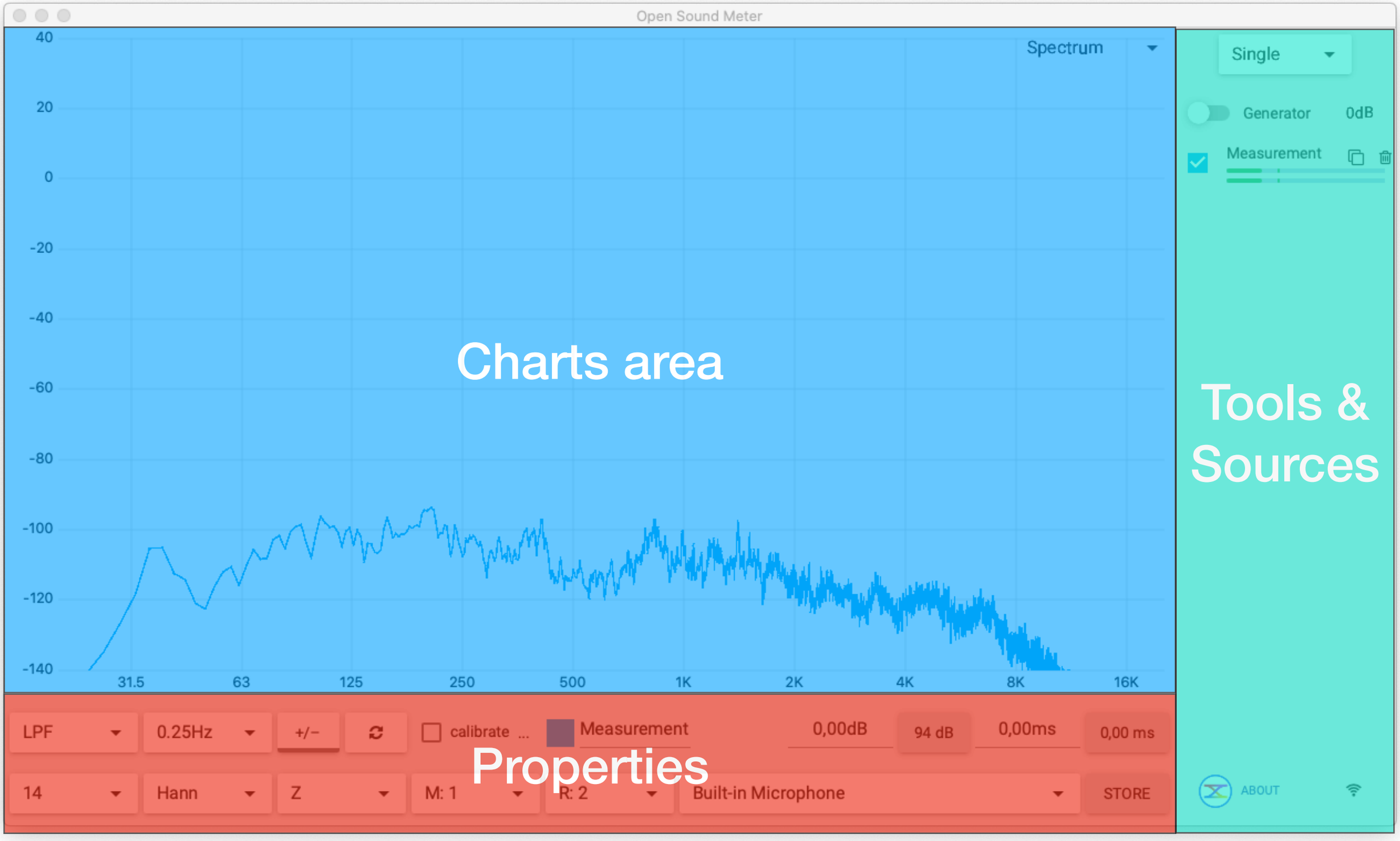
Where can I get it?

opensoundmeter.com

Let's run


Open Sound Meter
40
20
0
-20
-40
-60
-80
-100
-120
-140
31.5
63
125
250
500
1K
2K
4K
8K
16K
Spectrum
Single
Generator
0dB
Measurement
LPF
0.25Hz
+/−
calibrate ...
Measurement
0,00dB
94 dB
0,00ms
0,00 ms
14
Hann
Z
M: 1
R: 2
Built-in Microphone
STORE
ABOUT

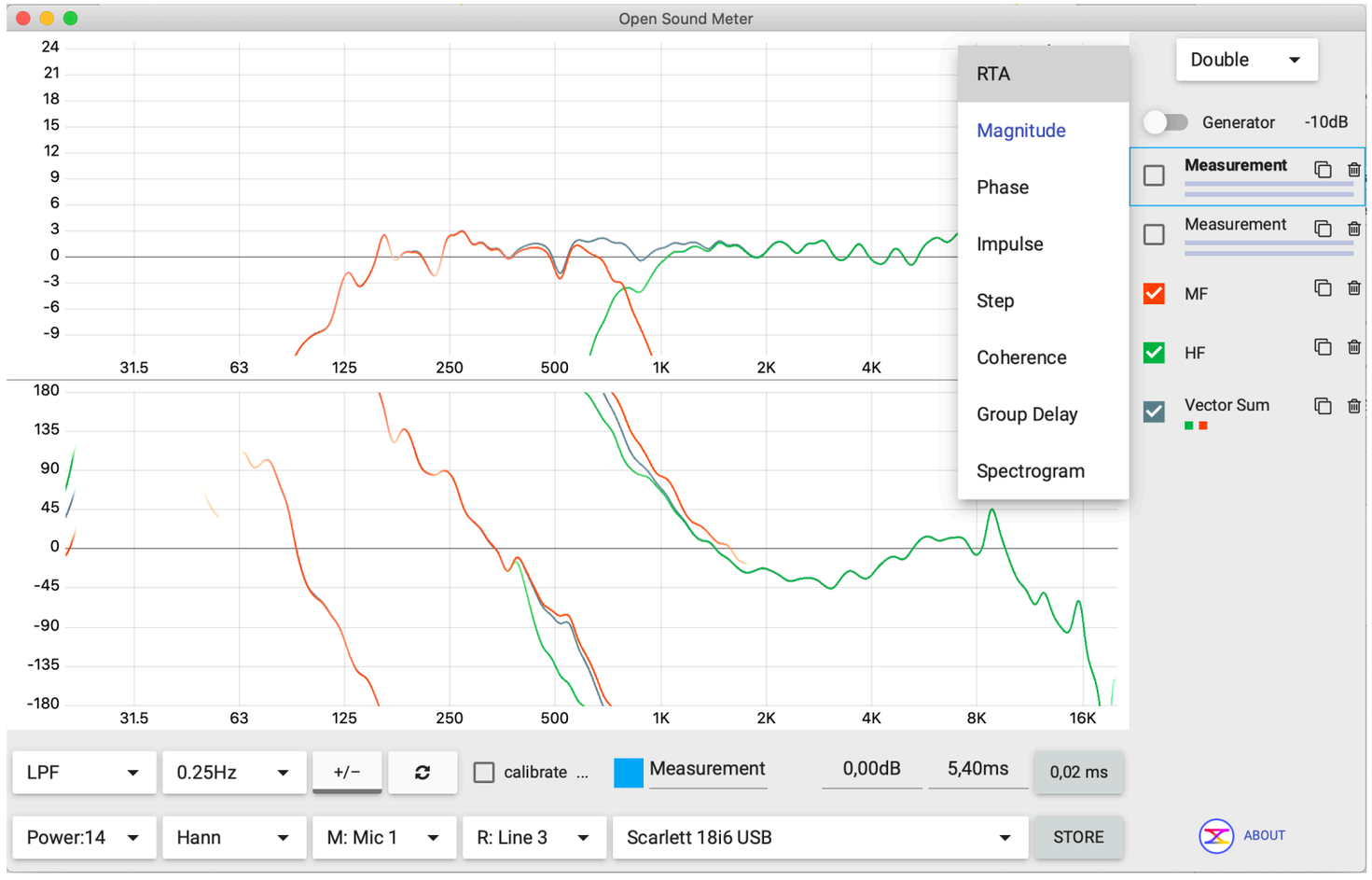
Layout


Open Sound Meter
Spectrum
40
20
0
-20
-40
-60
-80
-100
-120
-140
31.5
63
125
250
500
1K
2K
4K
8K
16K
Charts area
Single
Generator
0dB
Measurement
Tools &
Sources
LPF
0.25Hz
+/−
calibrate ...
Measurement
0,00dB
94 dB
0,00ms
0,00 ms
Properties
14
Hann
Z
M: 1
R: 2
Built-in Microphone
STORE
ABOUT

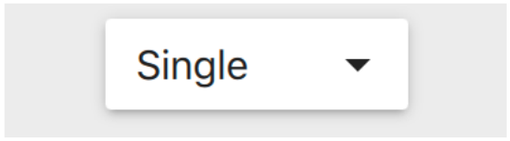
Charts area

Up to three charts of different types, or numerics values

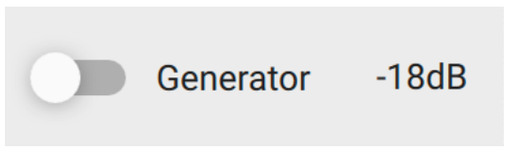
- Spectrum
- Magnitude
- Phase
- Impulse
- Step
- Coherence
- Group delay
- Spectrogram
- Phase delay
- Level
- Crest factor
- Nyquist plot



Tools and sources



Charts count



Generator’s output
Click label to open properties

Measurement’s processing and visibility
Click label to open properties
Checkbox color = series’ color
Levels meter for measuring and reference channels
Icons for delete and clone

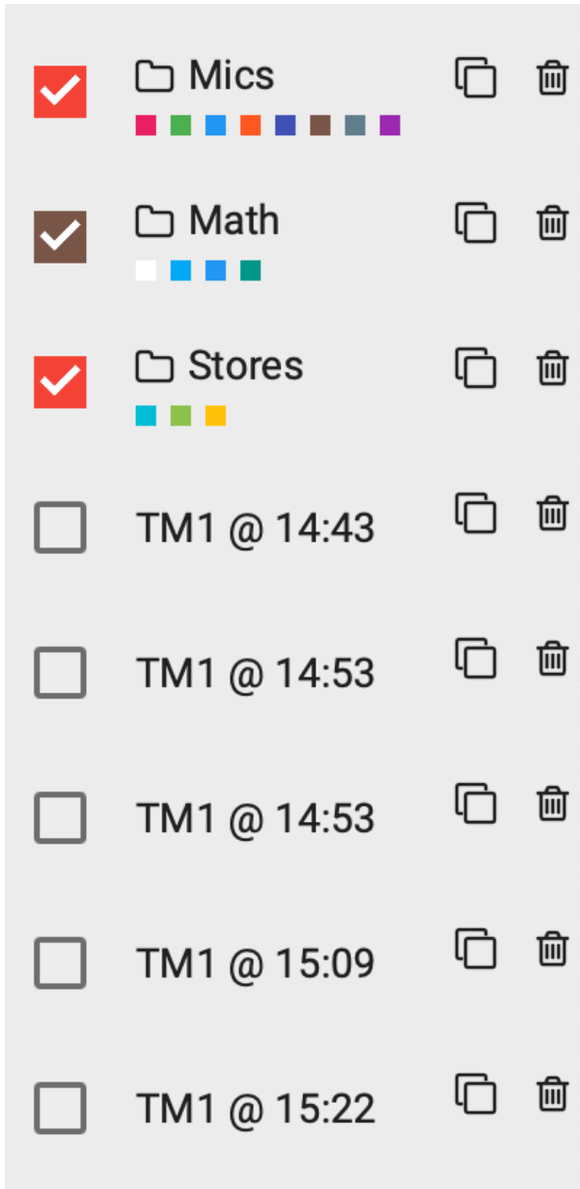
Sources

All data sources are collected on the right

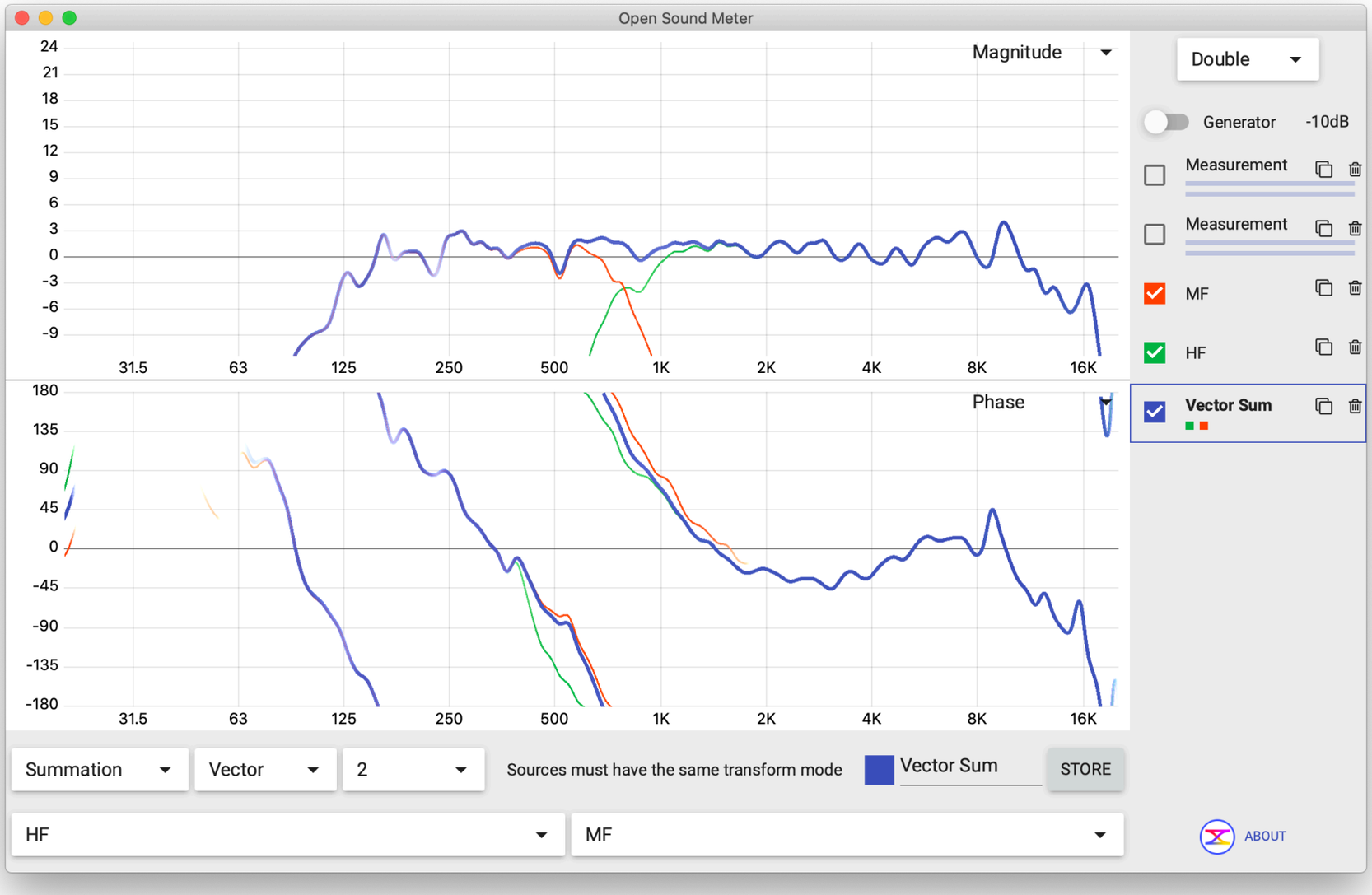
It’s possible to combine sources in groups
Use menu or a short-key to add new group

With a drag-n-drop it’s possible to sort sources.
Source can be dropped into the group

To activate drag-n-drop press and hold needed source, then it’s possible to move it.



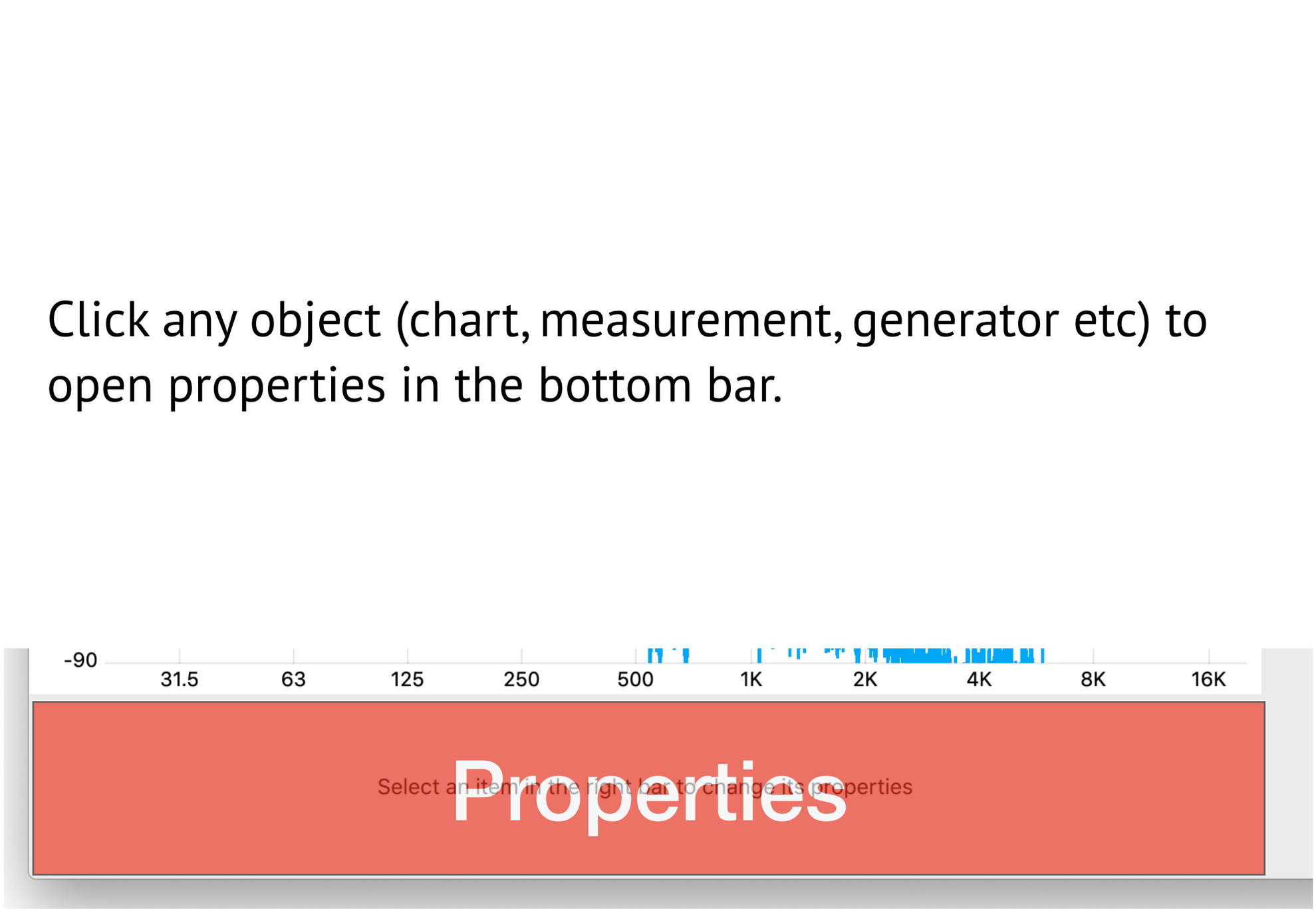
Charts area



Selected source has bold line and always on top on other charts
z-order of charts corresponds to the sources order

Properties

Click any object (chart, measurement, generator etc) to open properties in the bottom bar.

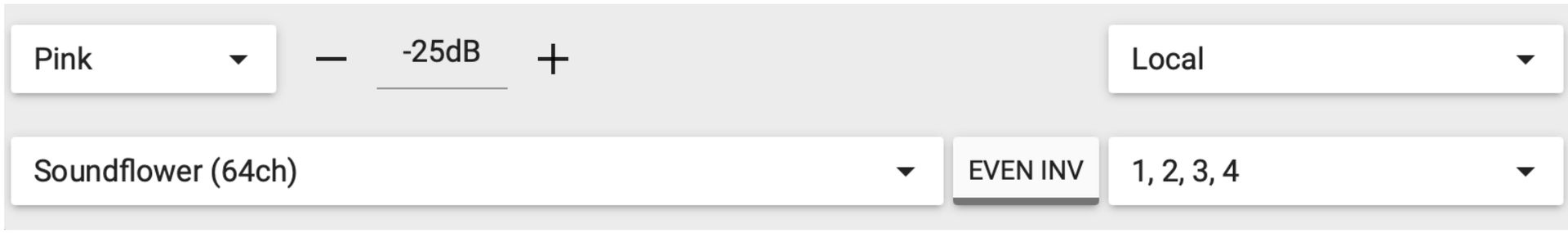


Generator properties

signal's type

gain

target (local or remote)



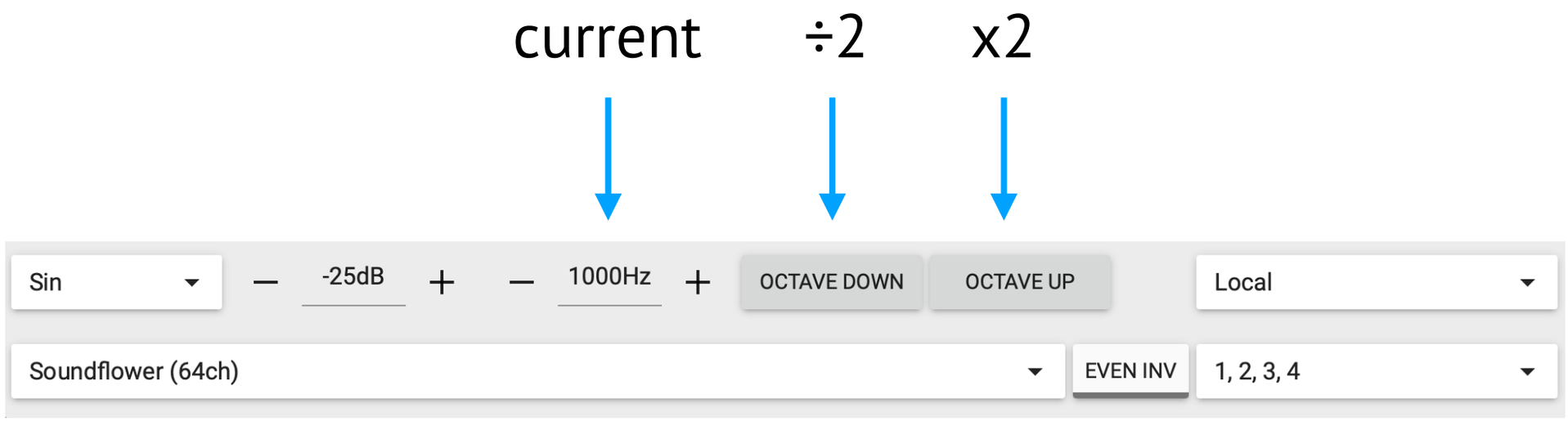
audio device

invert even channels

outputs

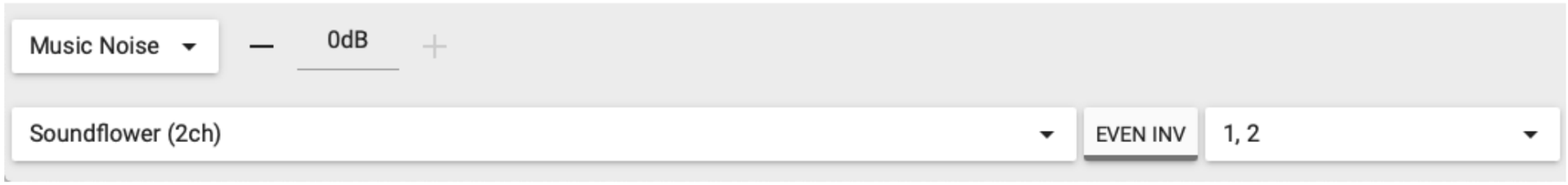
Generator properties

frequency for *sin* type



Generator properties

Music-Noise
for AES75 2023



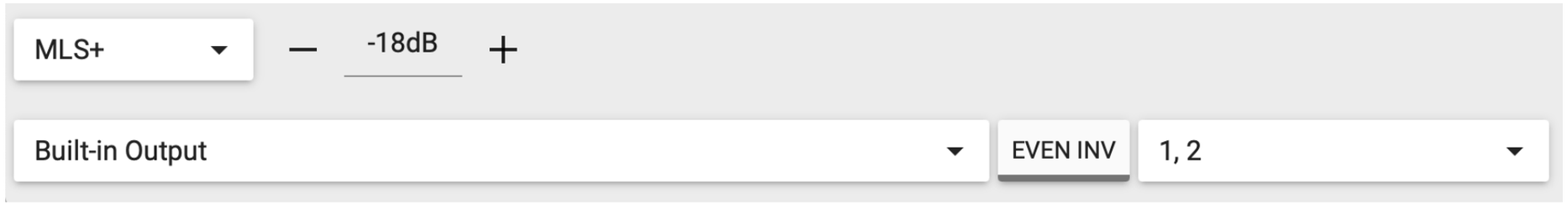
AES75 2023: AES standard for acoustics - Measuring loudspeaker maximum linear sound levels using noise, details a procedure for measuring maximum linear sound levels of a loudspeaker system or driver using a test signal called Music-Noise.

Music Noise is available only when audio device works at 48kHz or 96kHz

https://www.aes.org/standards/AES75/

Generator properties

MLS+

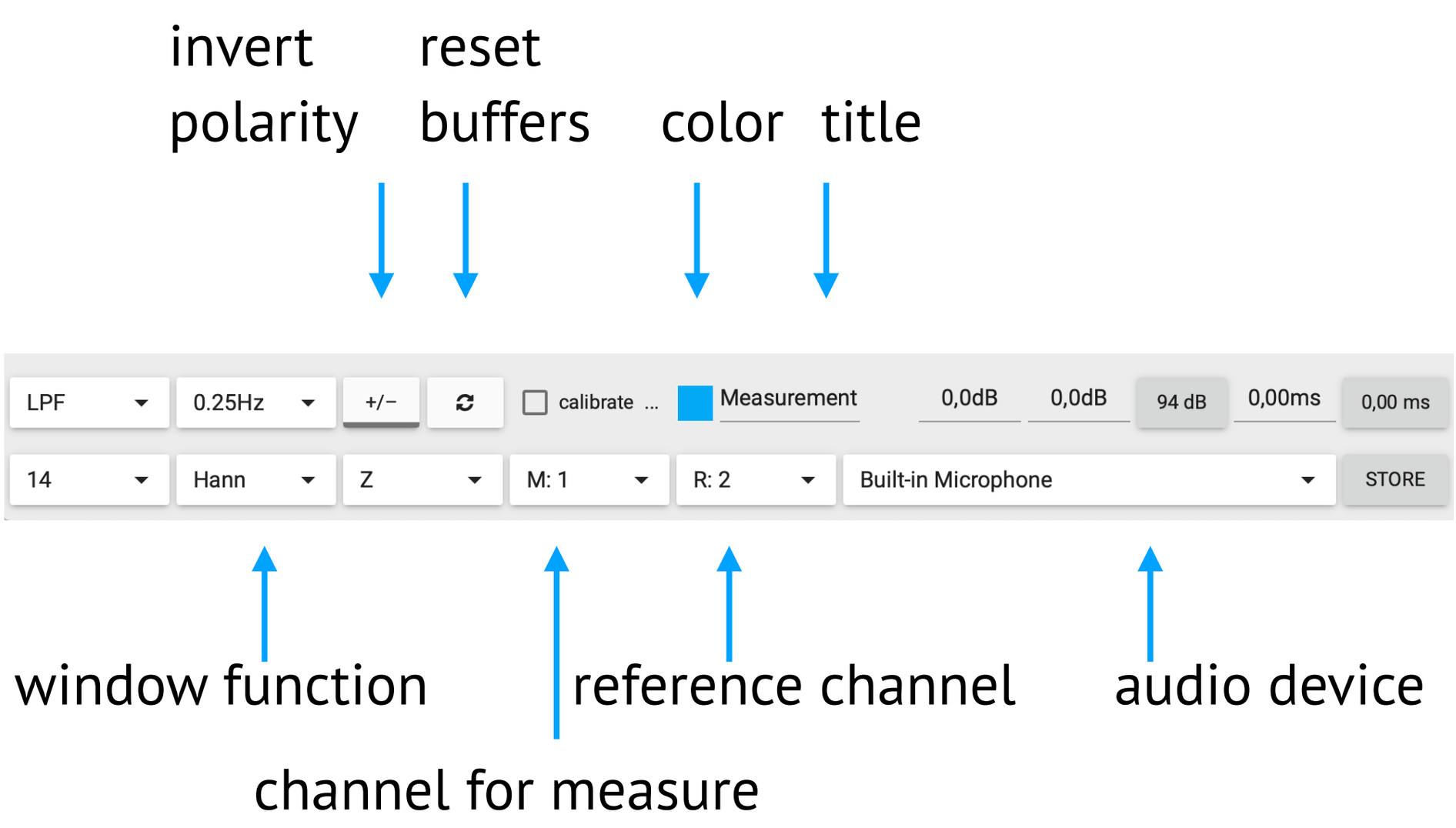


The MLS+ test signal was created by Pavel Smokotnin for Open Sound Meter.

Original MLS noise creation procedure was modified to have period exactly 2 to the power of 16.

MLS+ has very low crest factor and doesn’t require time windowing (when power settings is 16)

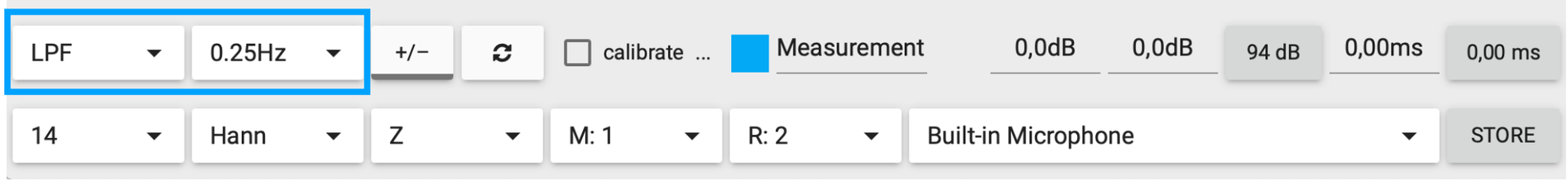
Measurement properties



right click on the color checker applies next color from application's palette

Measurement properties

Averaging



Averaging type: off, FIFO, LPF (low pass filter)

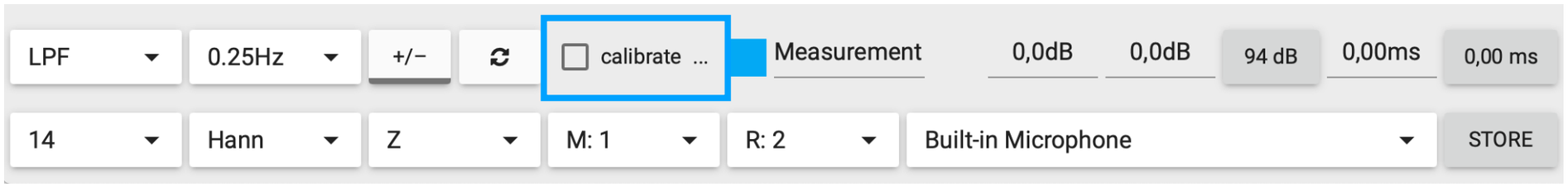
FIFO size from 1 to 100

LPF frequencies: ¼Hz, ½Hz, 1Hz

What is LPF and why use it:
facebook.com/notes/pavel-smokotnin/averaging-of-the-measurements/1070092436507447/

Measurement properties

Applying a calibration file



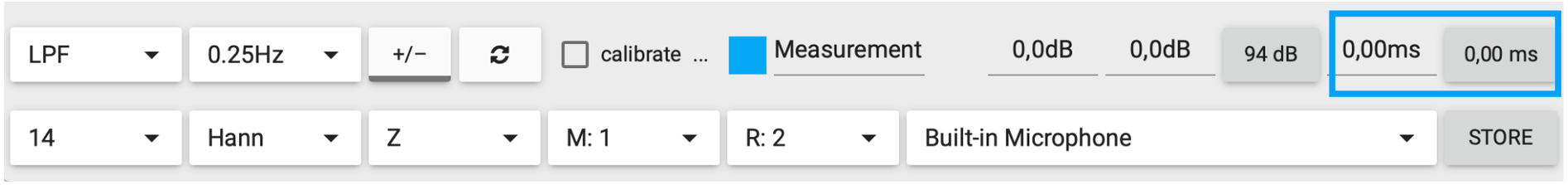
Click to enable or disable

File selection dialogue will appear on first click

If you want to change the file click at **...**

Measurement properties

Delay

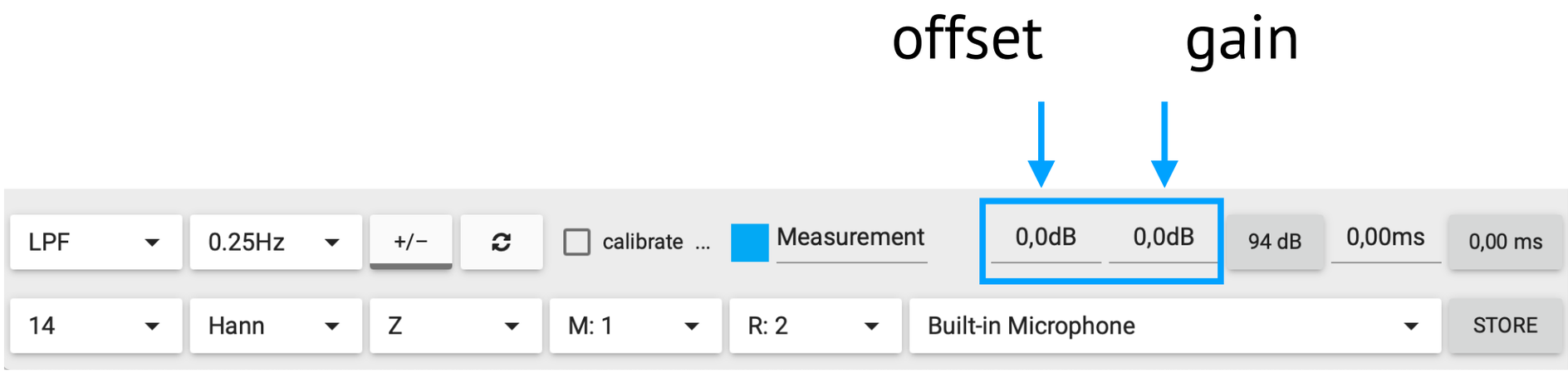


Button shows the calculated estimated delay value, click to apply

On mouseover tooltip shows delta between current and estimated delay

Measurement properties

Gain and offset



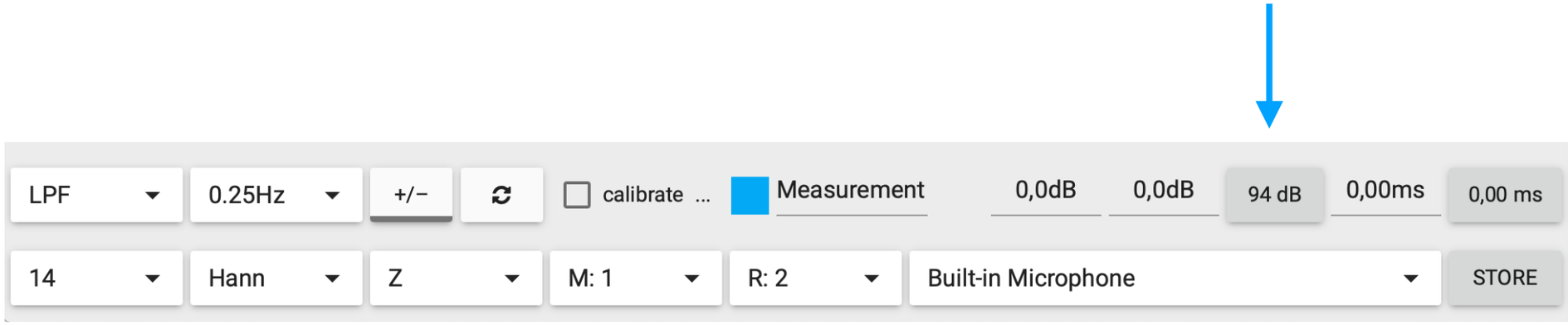
Offset - offset for 0 at magnitude response
(gain for reference channel)

Use keys ↑ and ↓ to adjust value,
Use Shift key for fine adjustment

Measurement properties

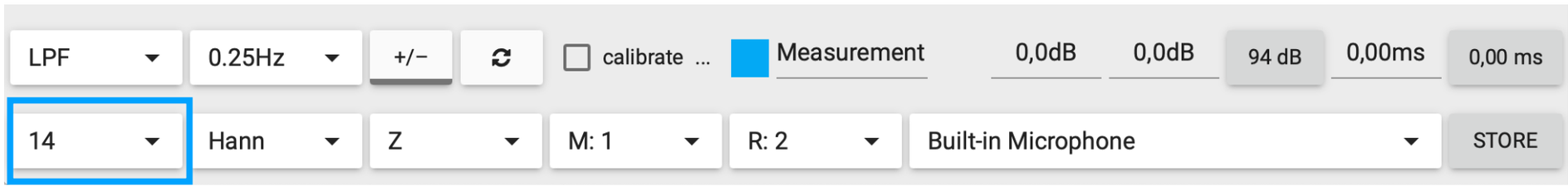
Gain and delay

Apply auto gain for 94 dB SPL A slow



Measurement properties

FFT power



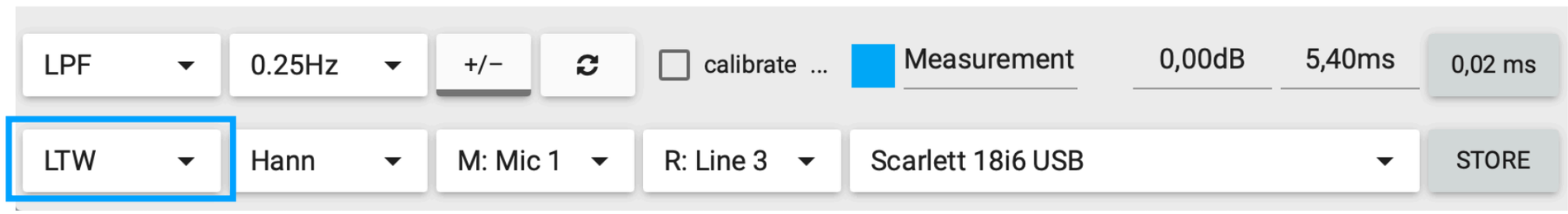
Select time window size: $2^{\text{power value}}$ samples

power	10	11	12	13	14	15	16
samples	1024	2048	4096	8192	16384	32768	65536
time window*, ms	21,3	42,6	85,3	170,5	341	682,6	1365,3
frequency step*, Hz	47	23,5	11,7	5,9	2,93	1,46	0,73

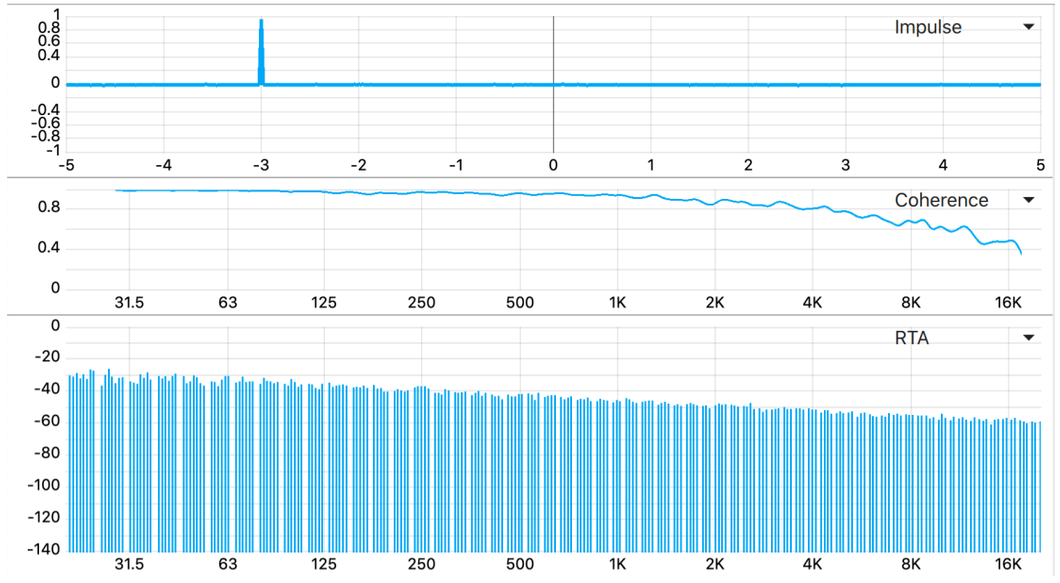
* - for sample rate: 48 000Hz

Measurement properties

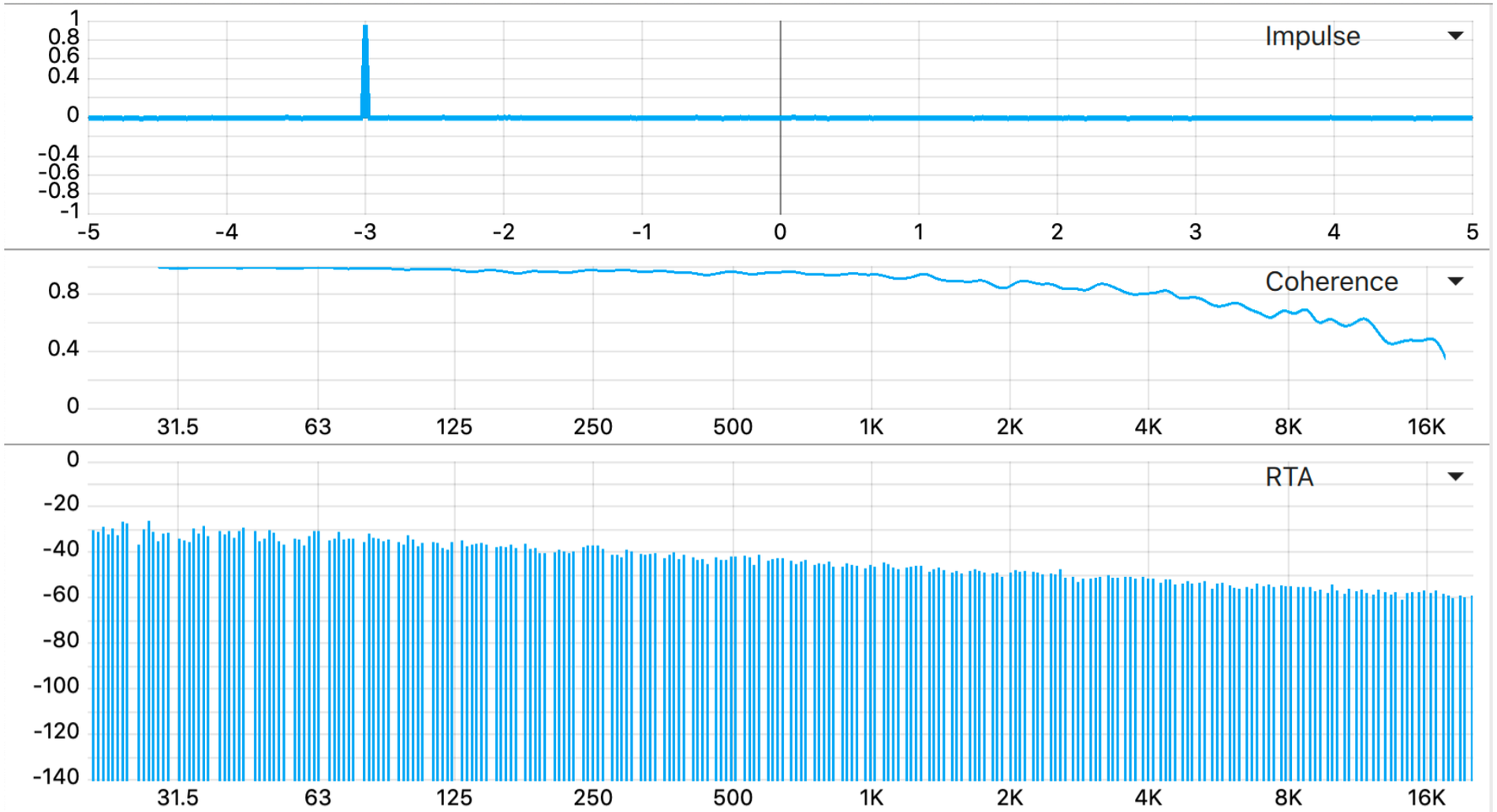
Logarithm time window



- 24 frequencies per octave
- each has its own time window

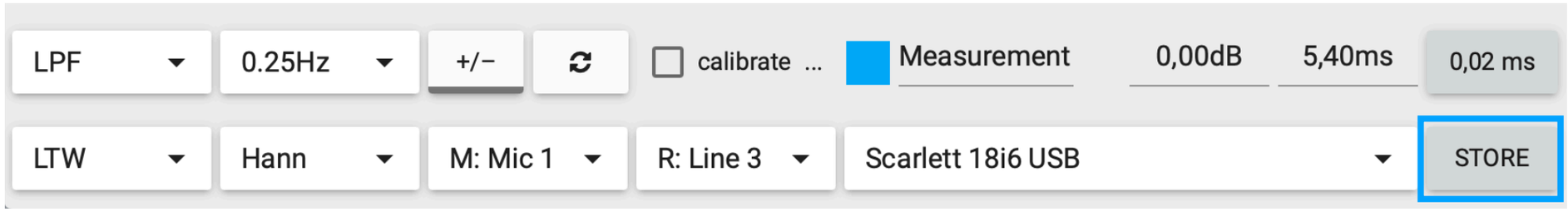


Logarithm time window



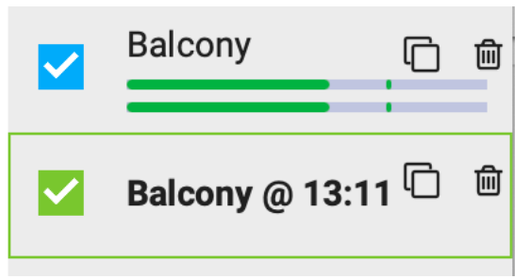
Measurement properties

Storing your measurements



Push the button to store current measuring data

Stored series will appear at the charts and its label in the right bar
Name of the store will contain the name of the original measurement and time.



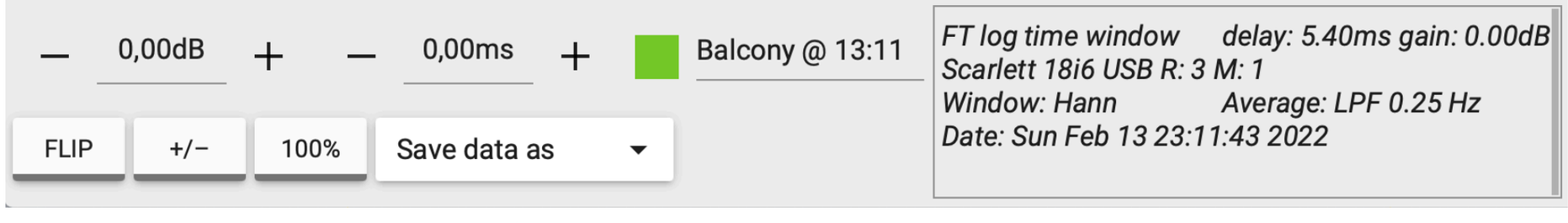
Enable/disable checkbox = view/hide the series

Stored properties

editable automatically created notes

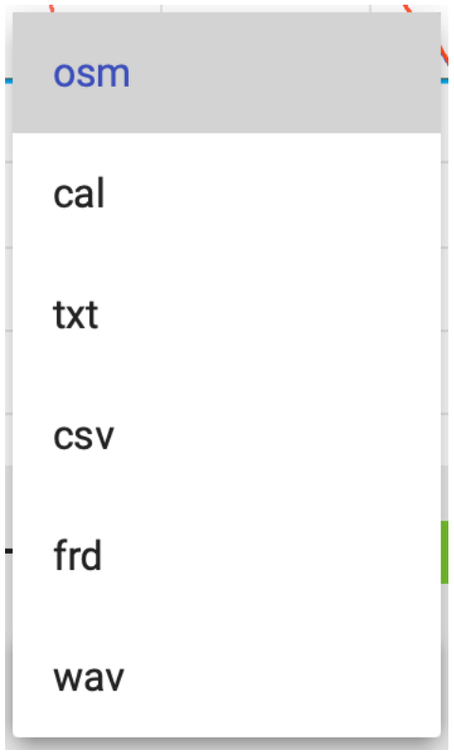
color

title



export stored data as:

- OSM file
- calibration file
- TXT
- CSV
- FRD file type
- impulse WAV file

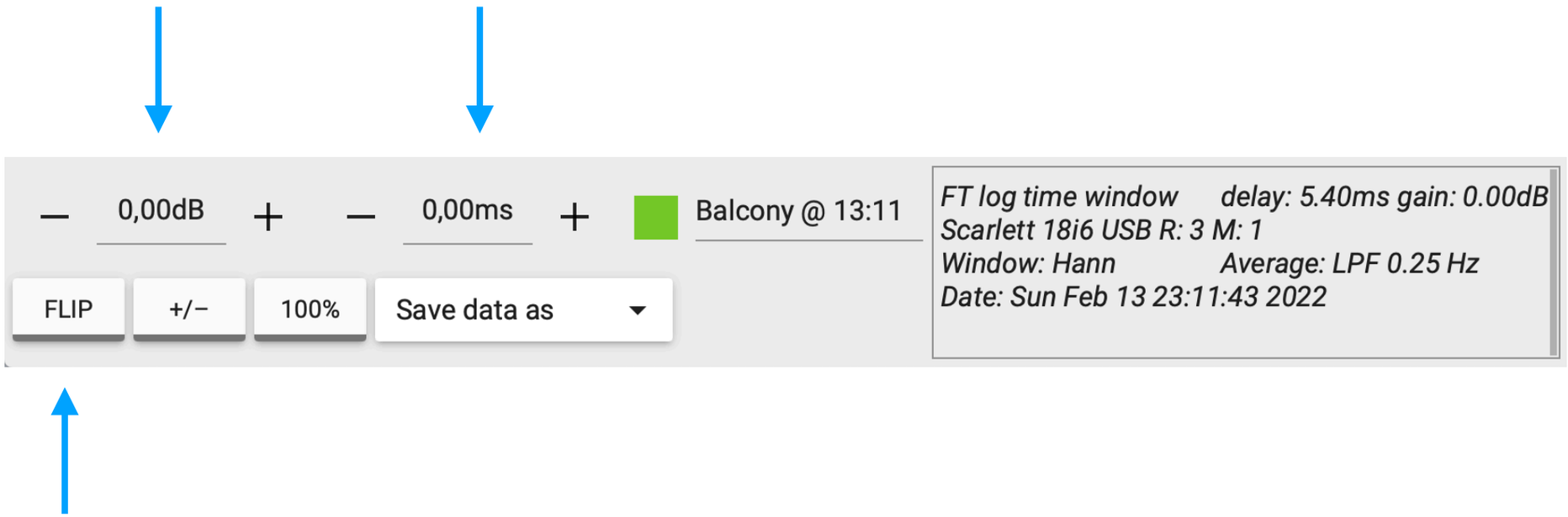


Stored properties

Offline adjustment

gain

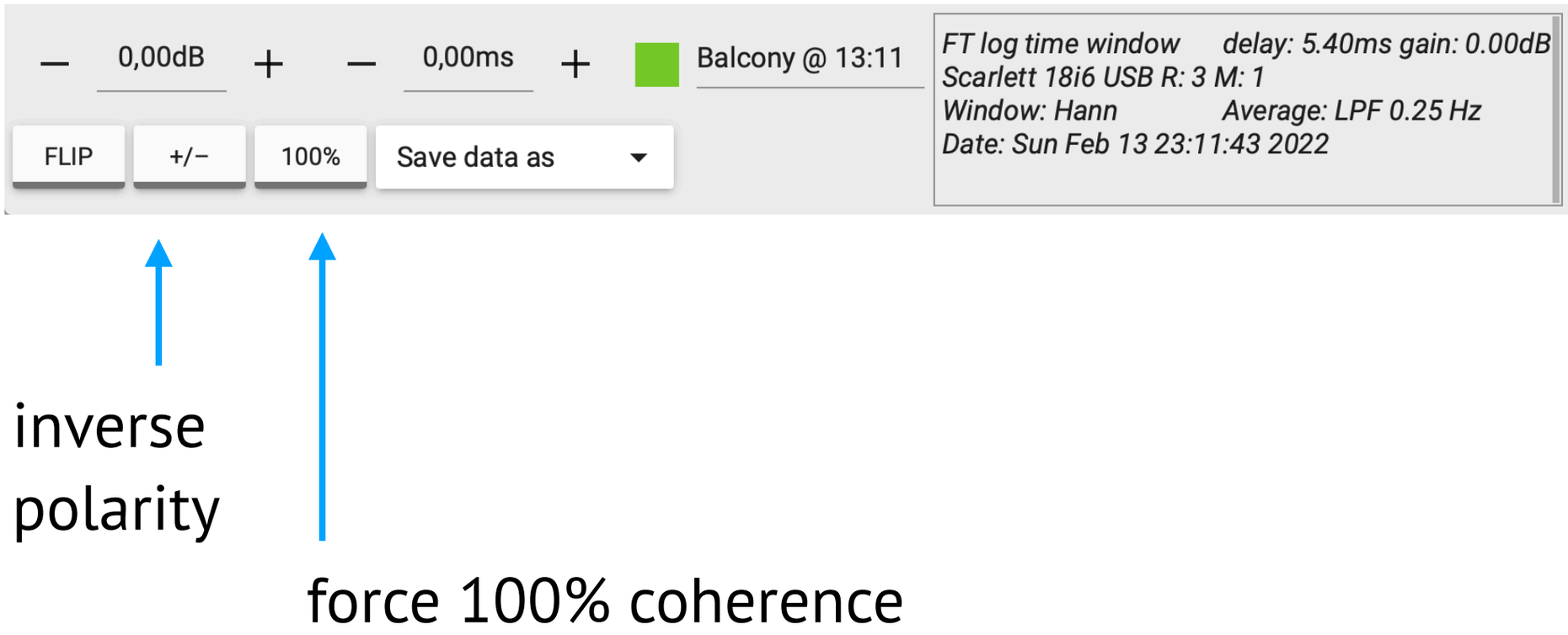
delay



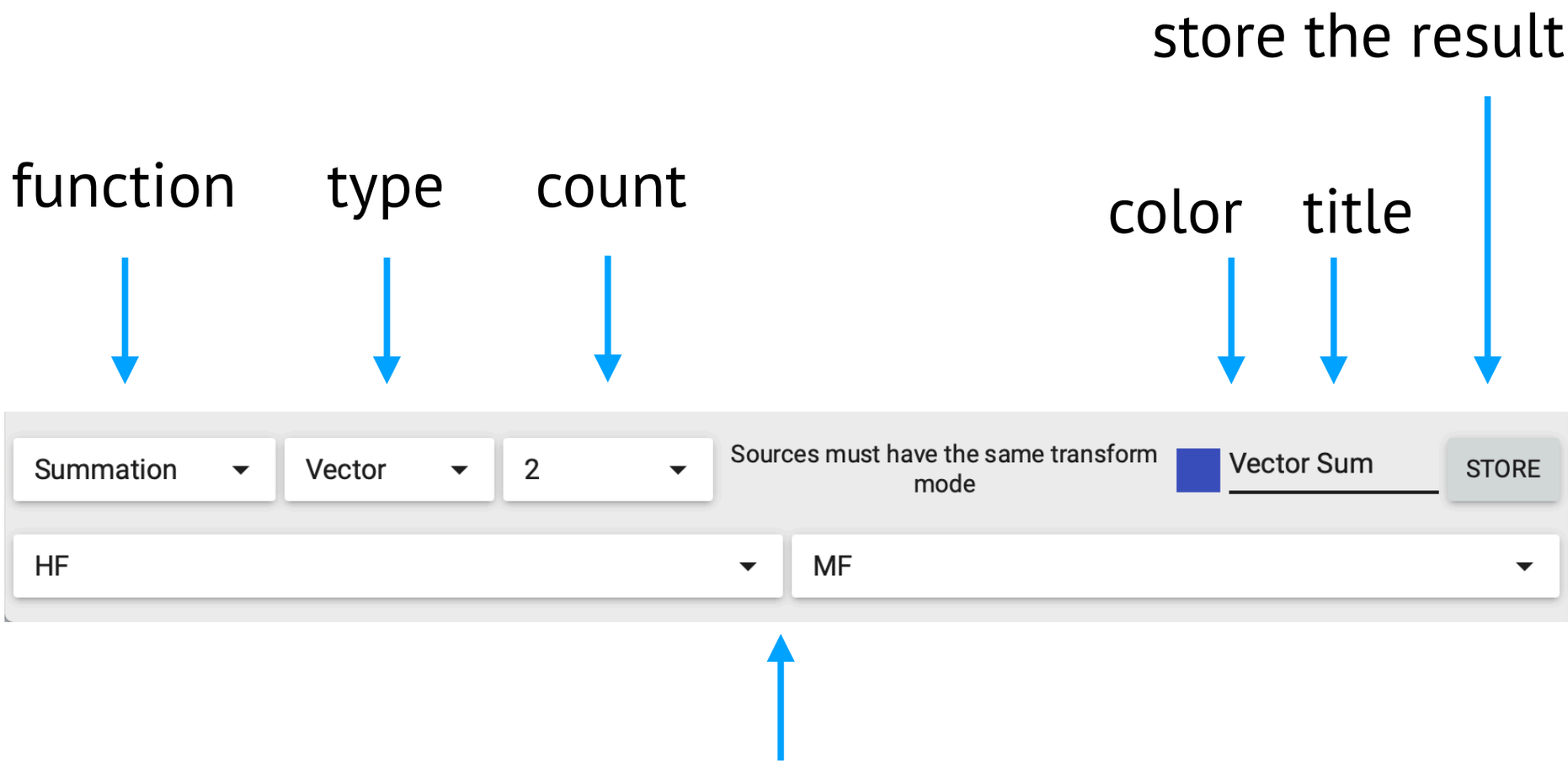
inverse magnitude

Stored properties

Offline adjustment



Math source



select from 2 to 10 sources: measurements or stored

Remember, your sources must have the same sample rate and window size for the correct calculation.

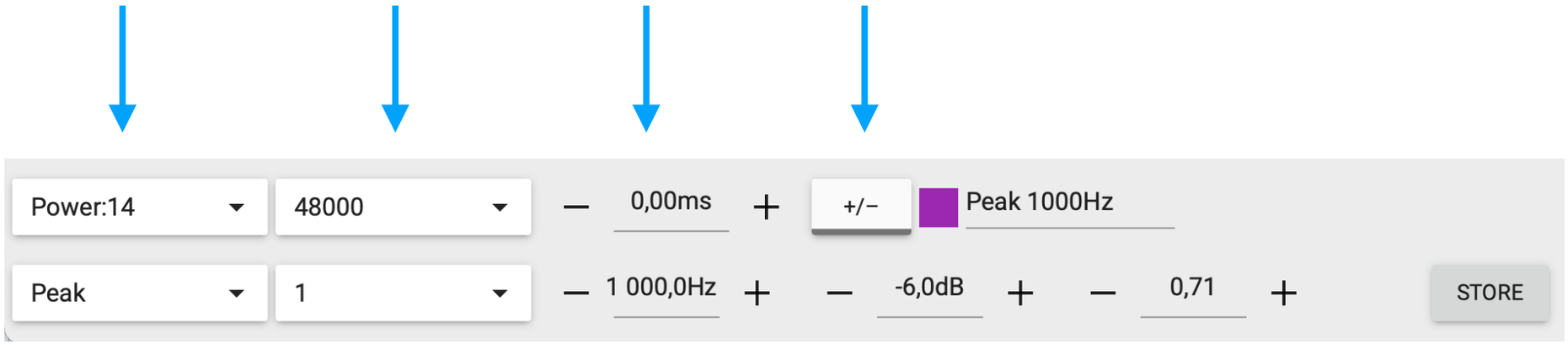
Filter source

FFT Power

sample rate

delay

polarity



Filter type

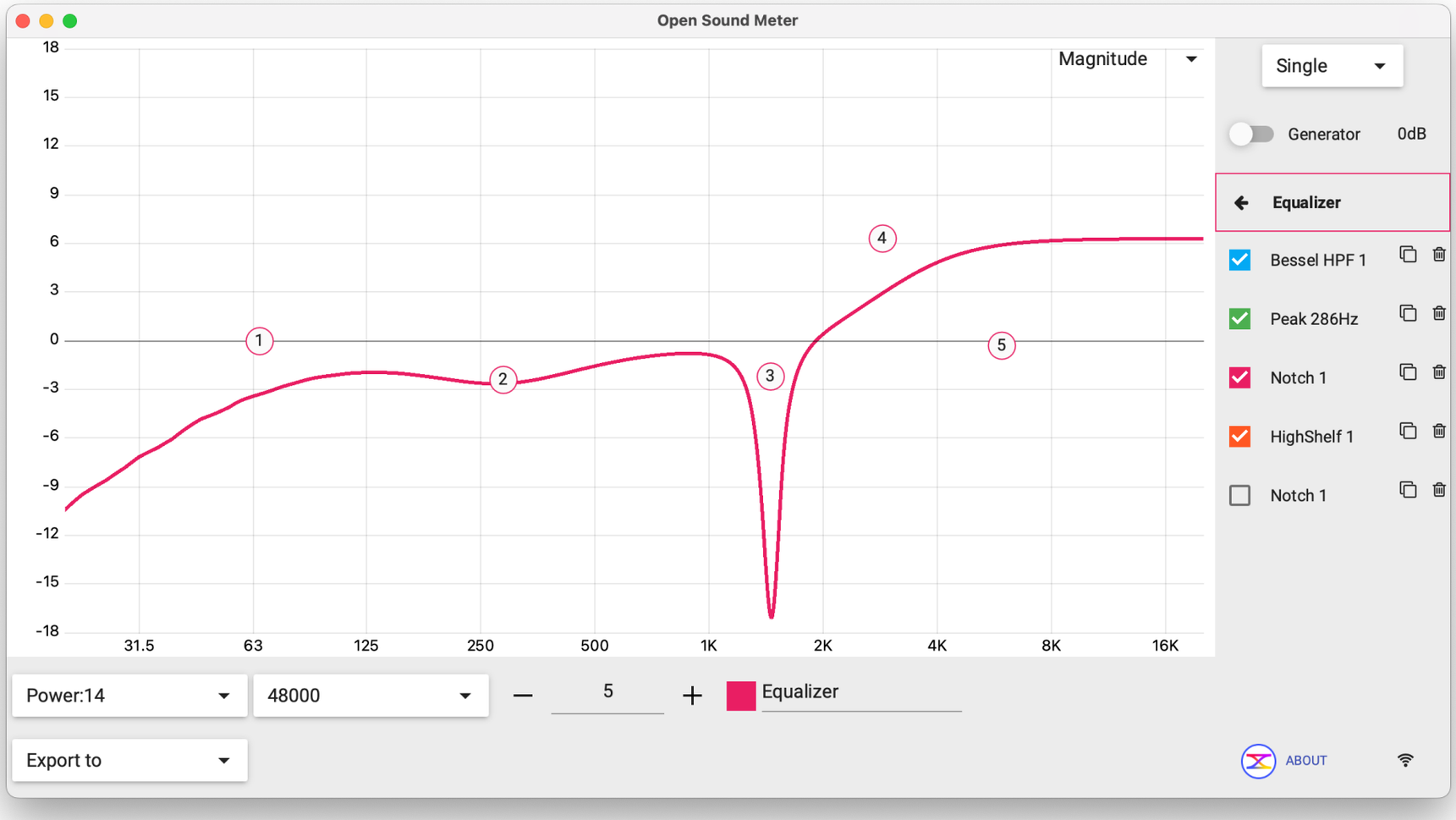
order

corner frequency

level and Q (when applied)

store result

Equalizer source

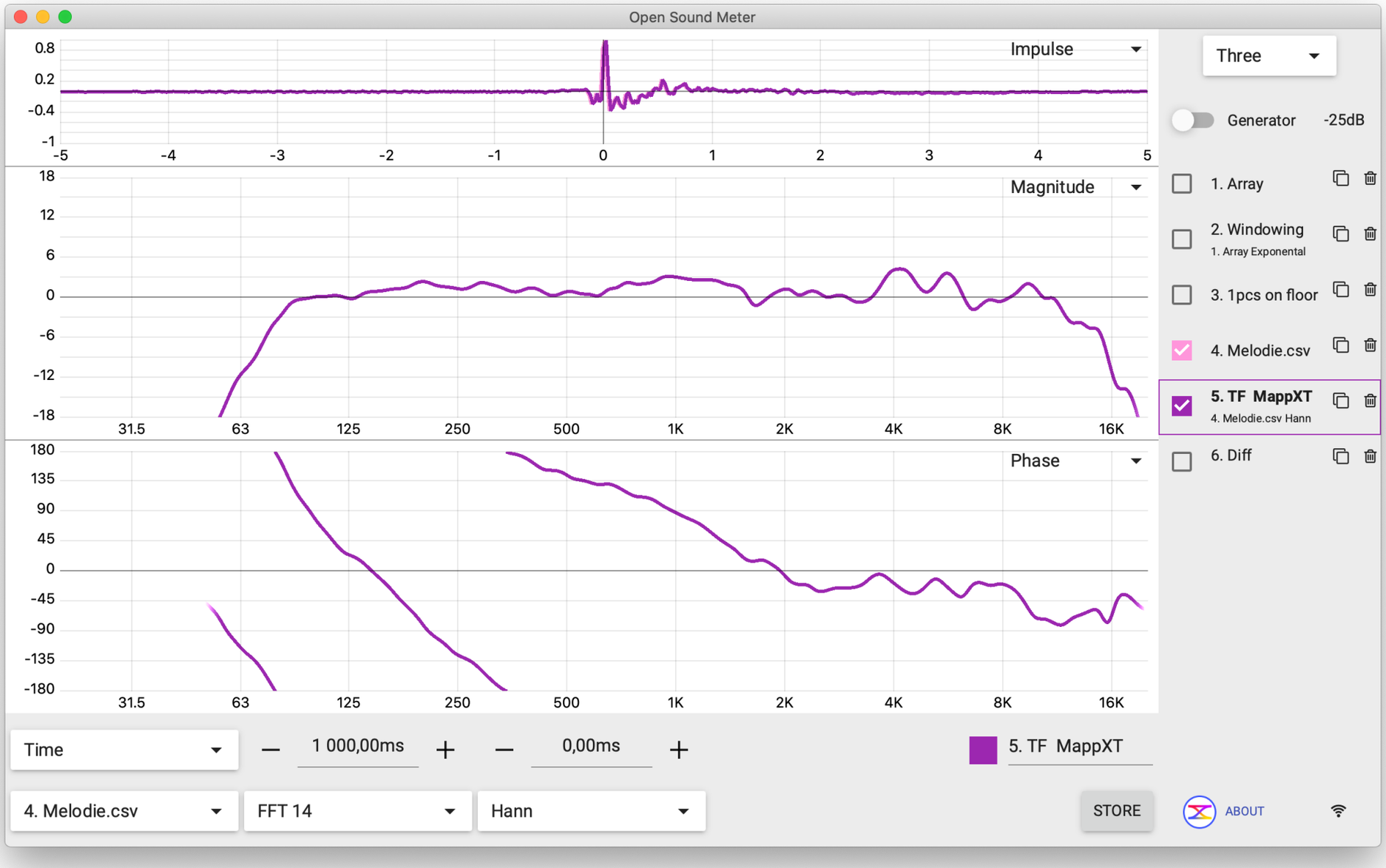


When equalizer is selected, filters' frequencies are marked with dragable points on the magnitude chart.

Q for each filter is changed by mouse wheel, when cursor is on the point.

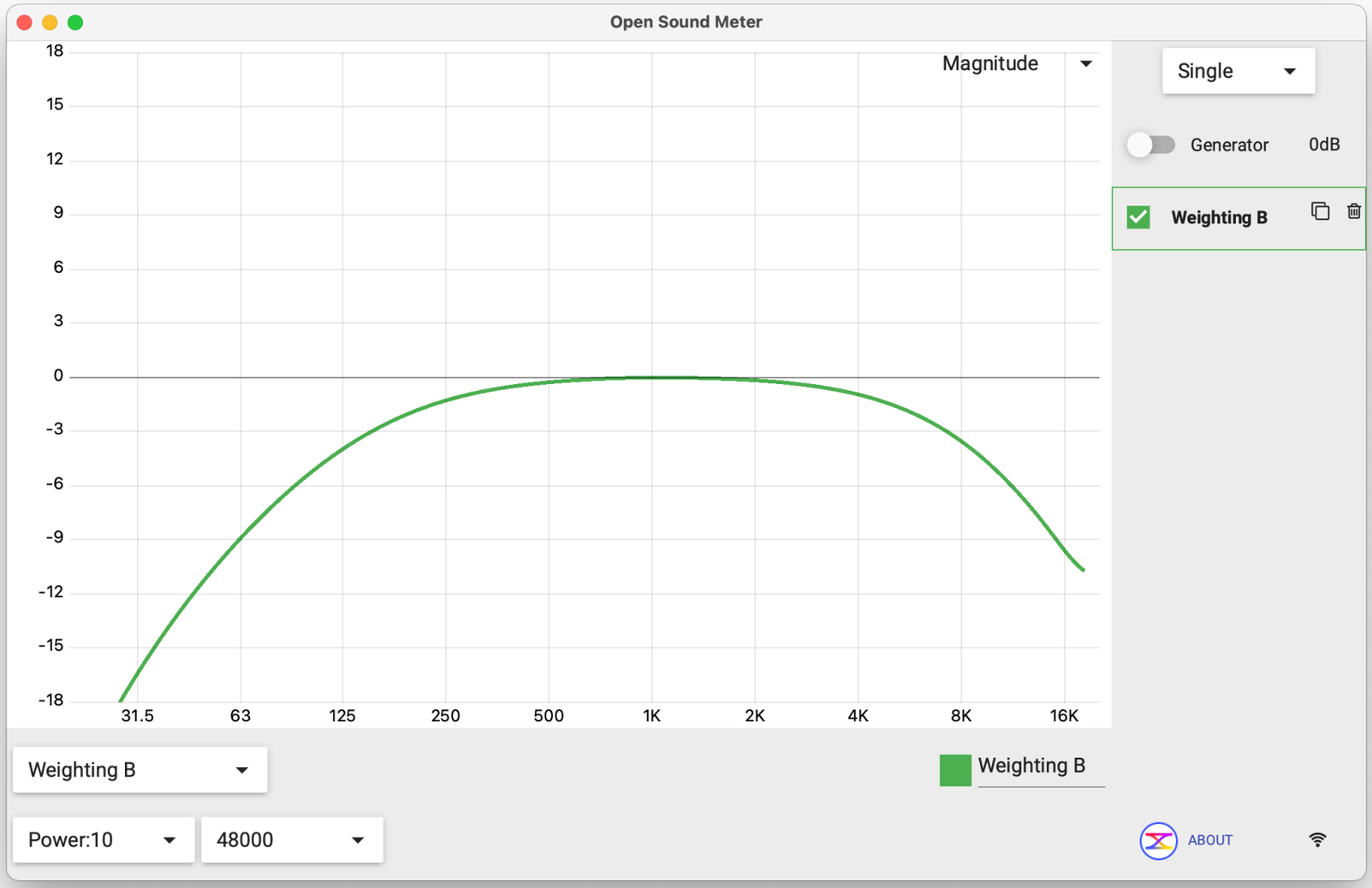
Double click on equalizer source to see individual filters.

Windowing source



Conversion tool from one domain to another

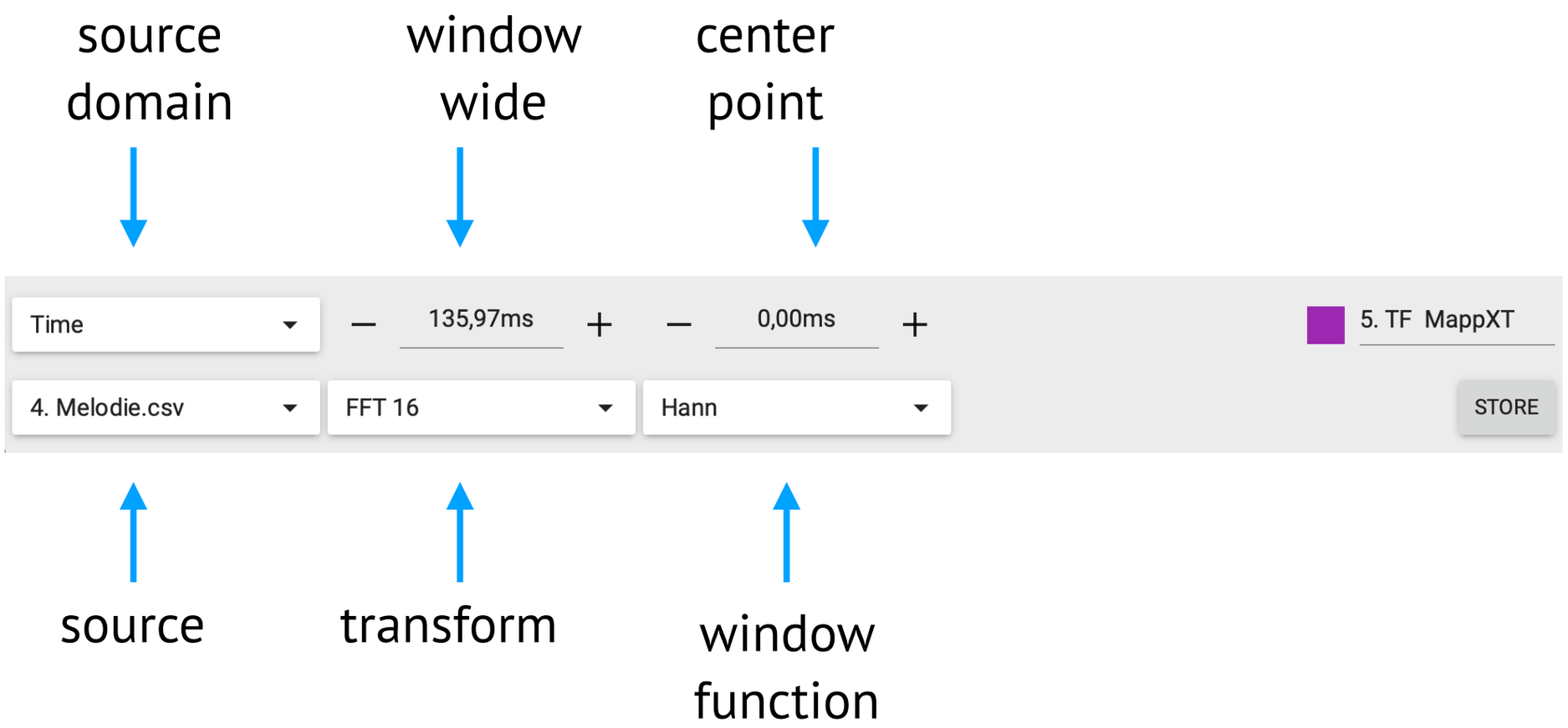
Standard line source



Creates one of the standard lines:

- Weighting filter (A, B, C)
- Equal loudness contour
- Flat response

Windowing source

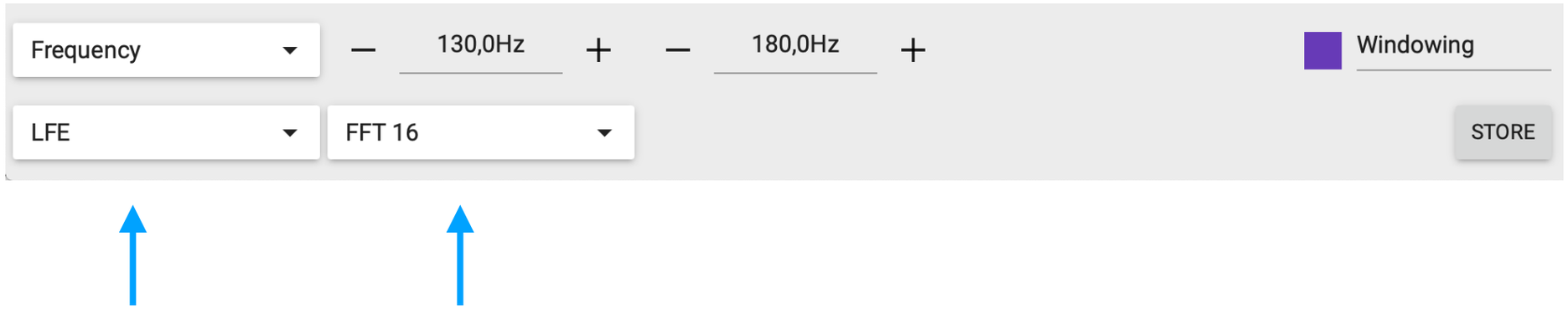


Windowing source

source domain

starting frequency

end frequency



source

transform

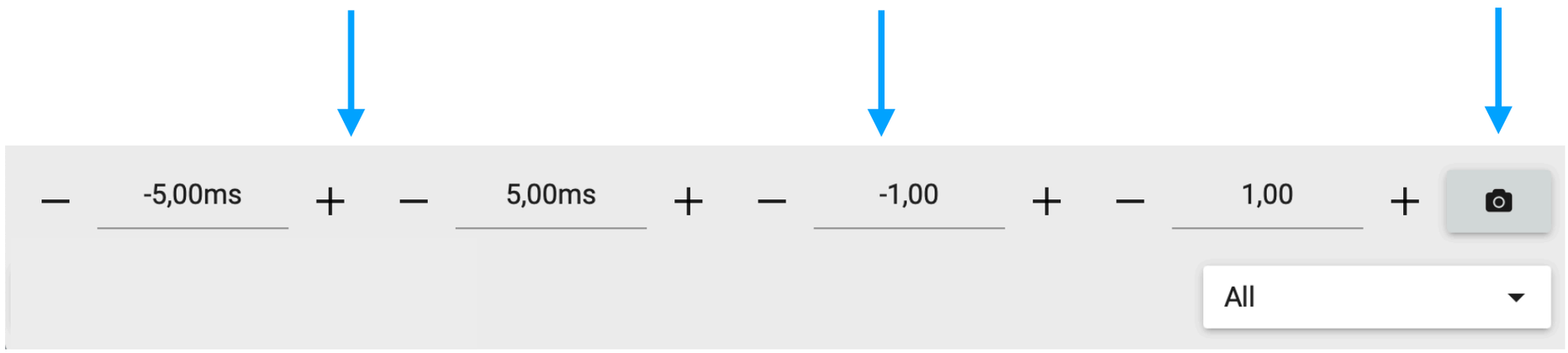
Frequencies outside the selection will be ignored

Basic chart properties

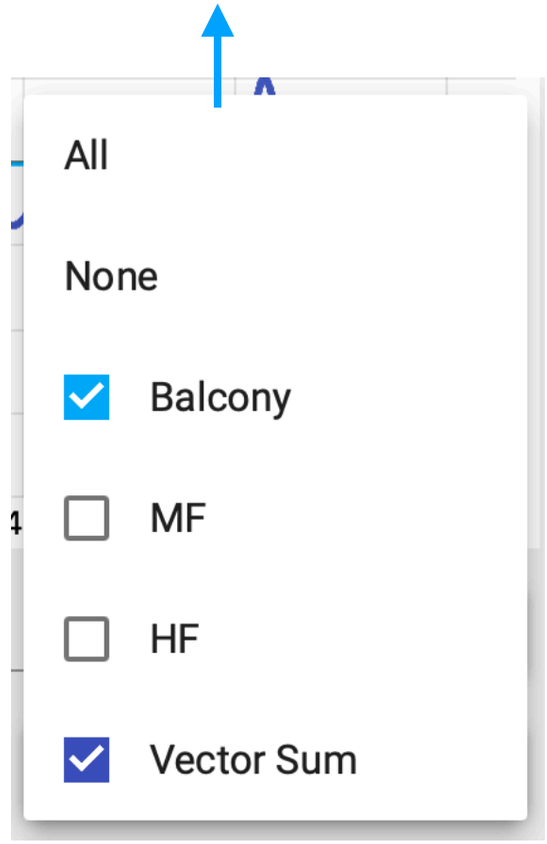
Horizontal axis range

Vertical axis range

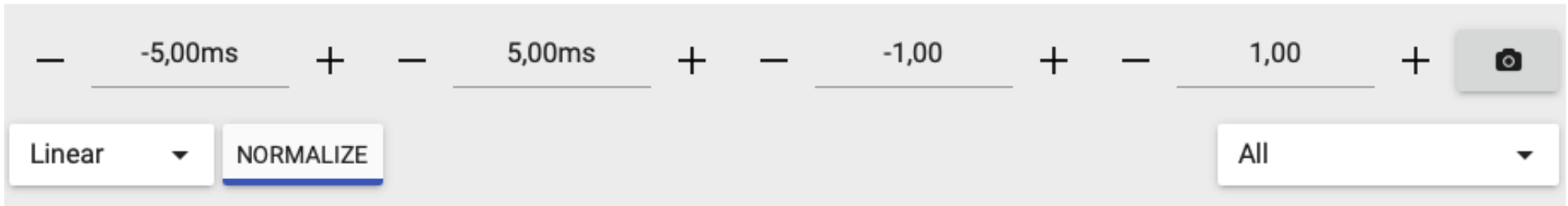
save chart as an image



If source is selected, just that will be shown.



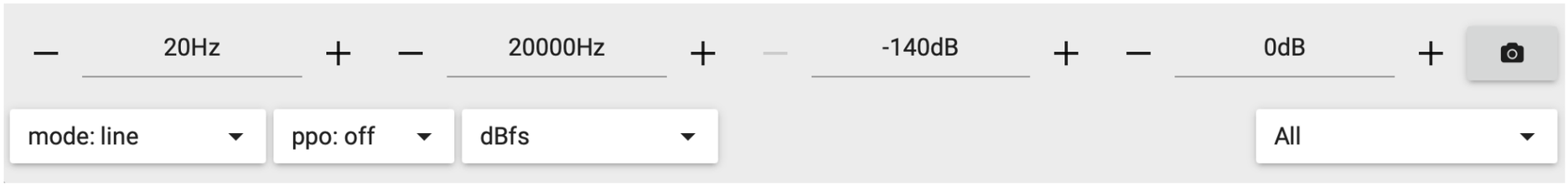
Impulse chart properties



Normalize displayed data

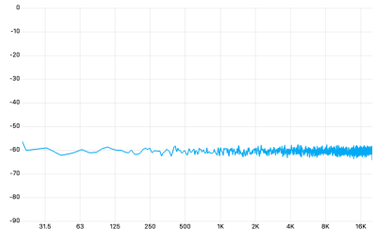
Select linear or log (dB) vertical scale

Spectrum chart properties



scale
(dBfs, SPL, phons)

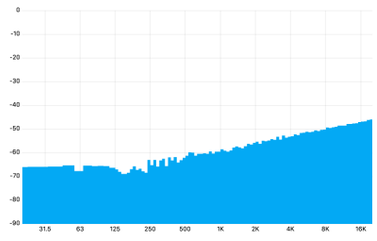
line

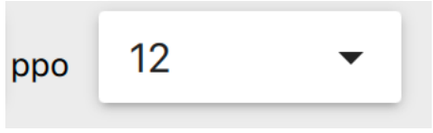


one continuous line

points per octave define smooth

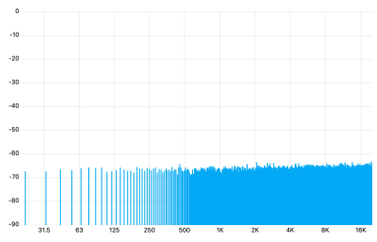
bars





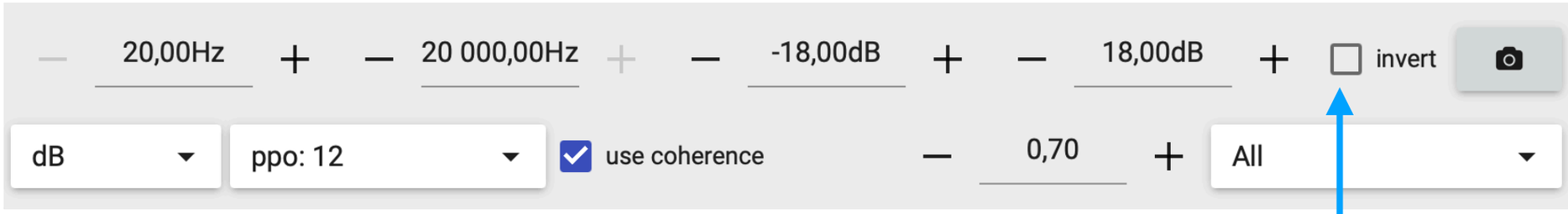
points per octave define the bar width

lines



one line per frequency

Magnitude chart properties



Y-axis scale

Points per octave

Apply coherence value for the series opacity

Coherence threshold for the alpha channel

Invert Y axis

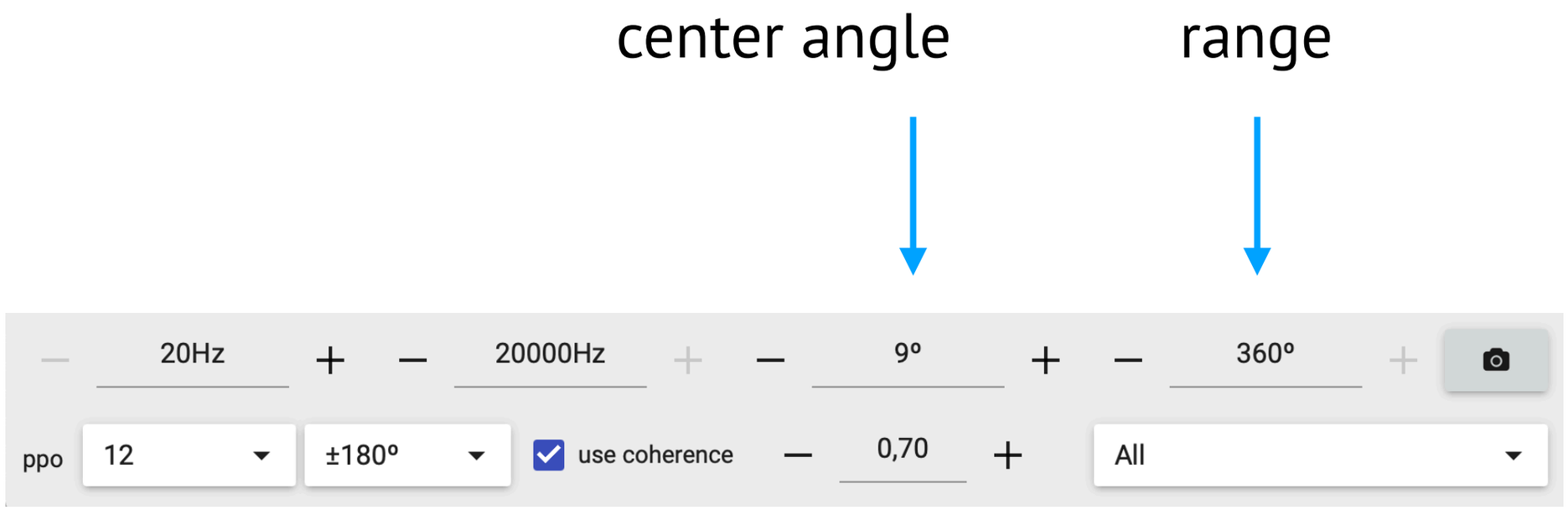
Phase chart properties

Points per octave

Apply coherence value
for the series opacity

Coherence threshold for
the alpha channel

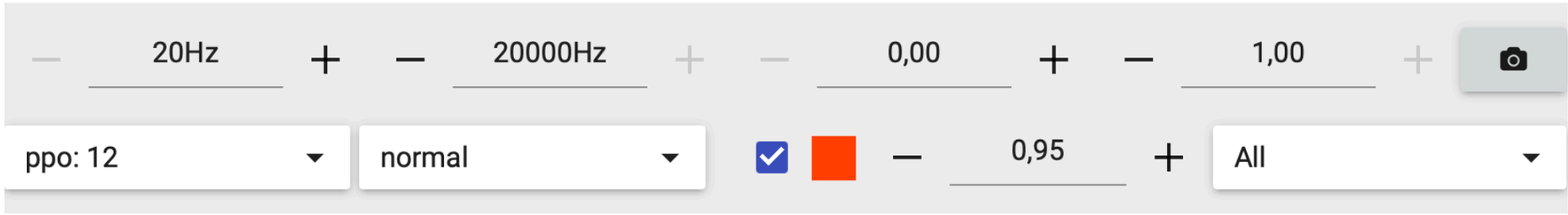
Phase chart range



Show values:

- -180º to +180º
- 0º to 360º

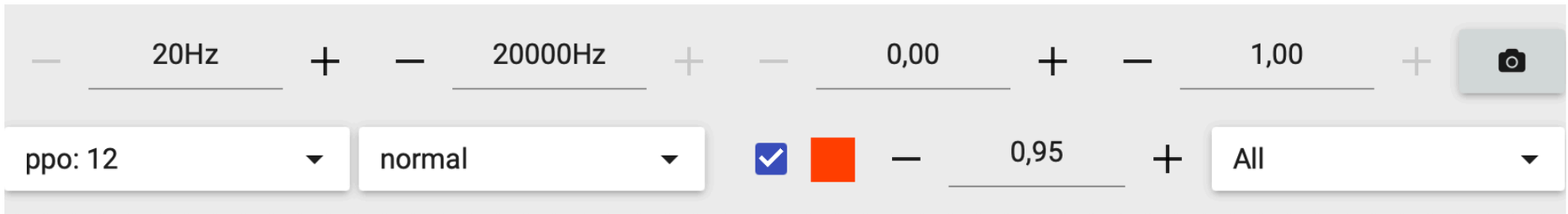
Coherence chart properties



Show normal, squared or SNR value

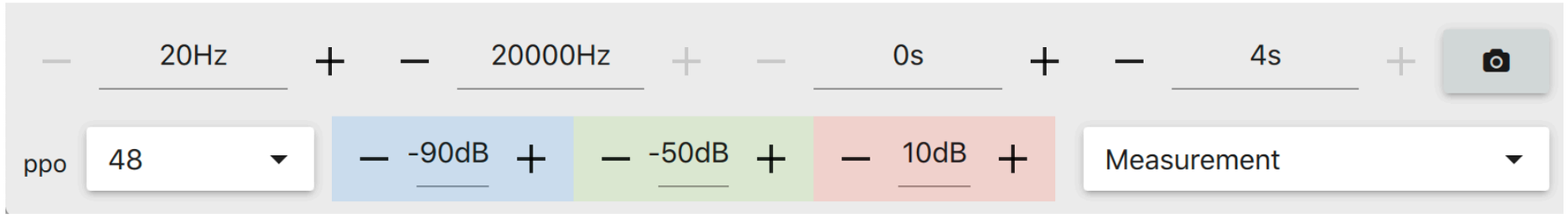
Points per octave

Coherence chart properties



Show help line and its value

Spectrogram chart properties

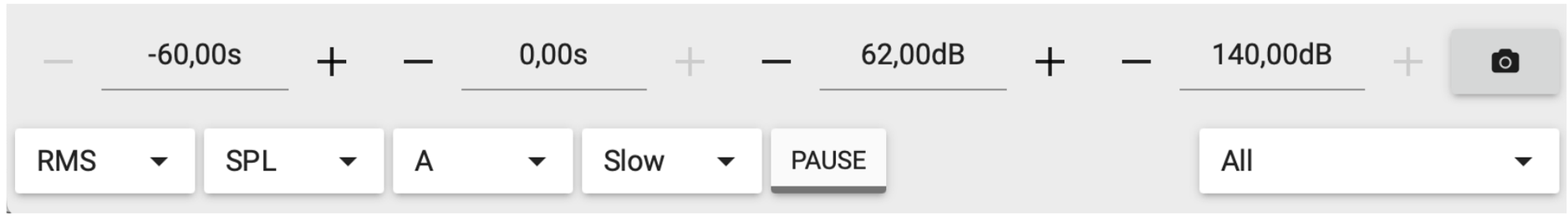


Points per octave

Set colours thresholds

Select a source

Level chart properties



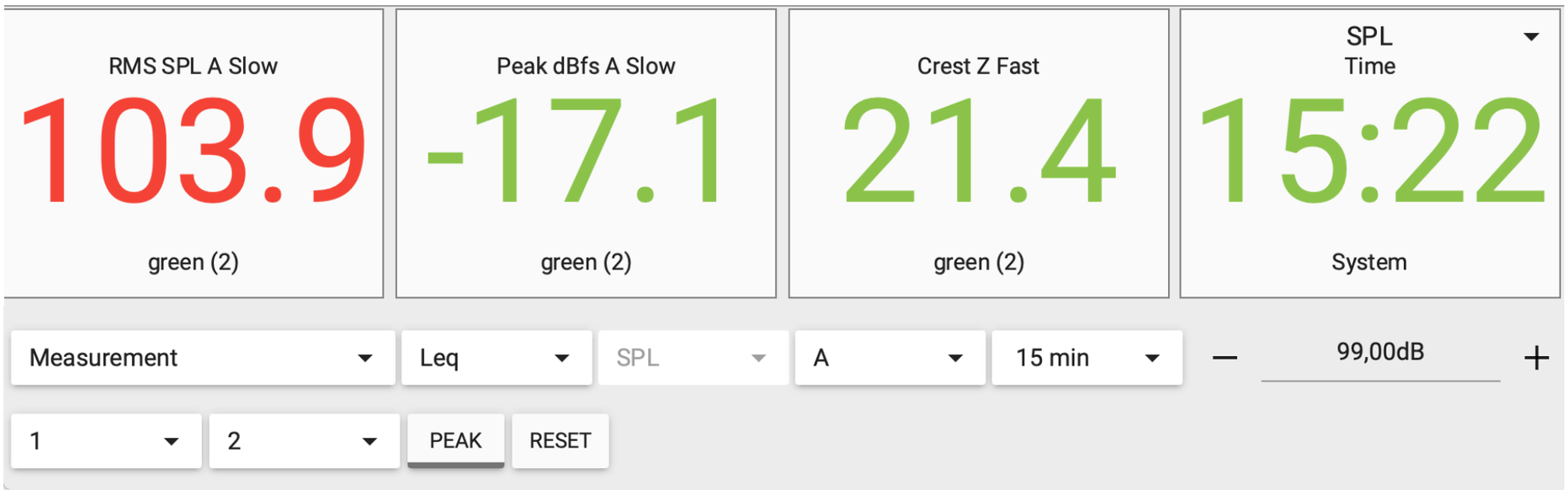
Fast or Slow

Weighting curve

SPL or dBfs

RMS or Leq

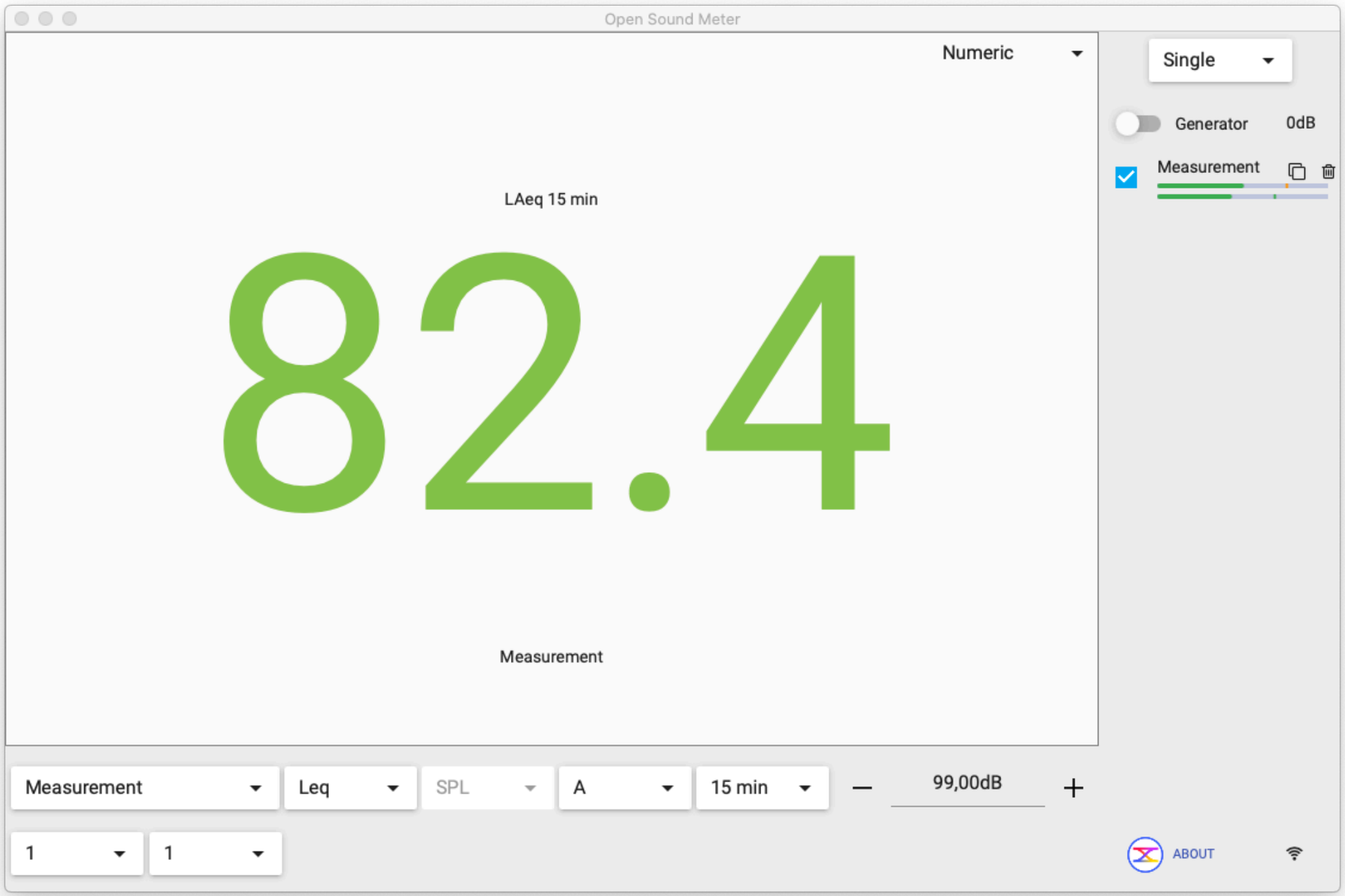
Numeric



columns count

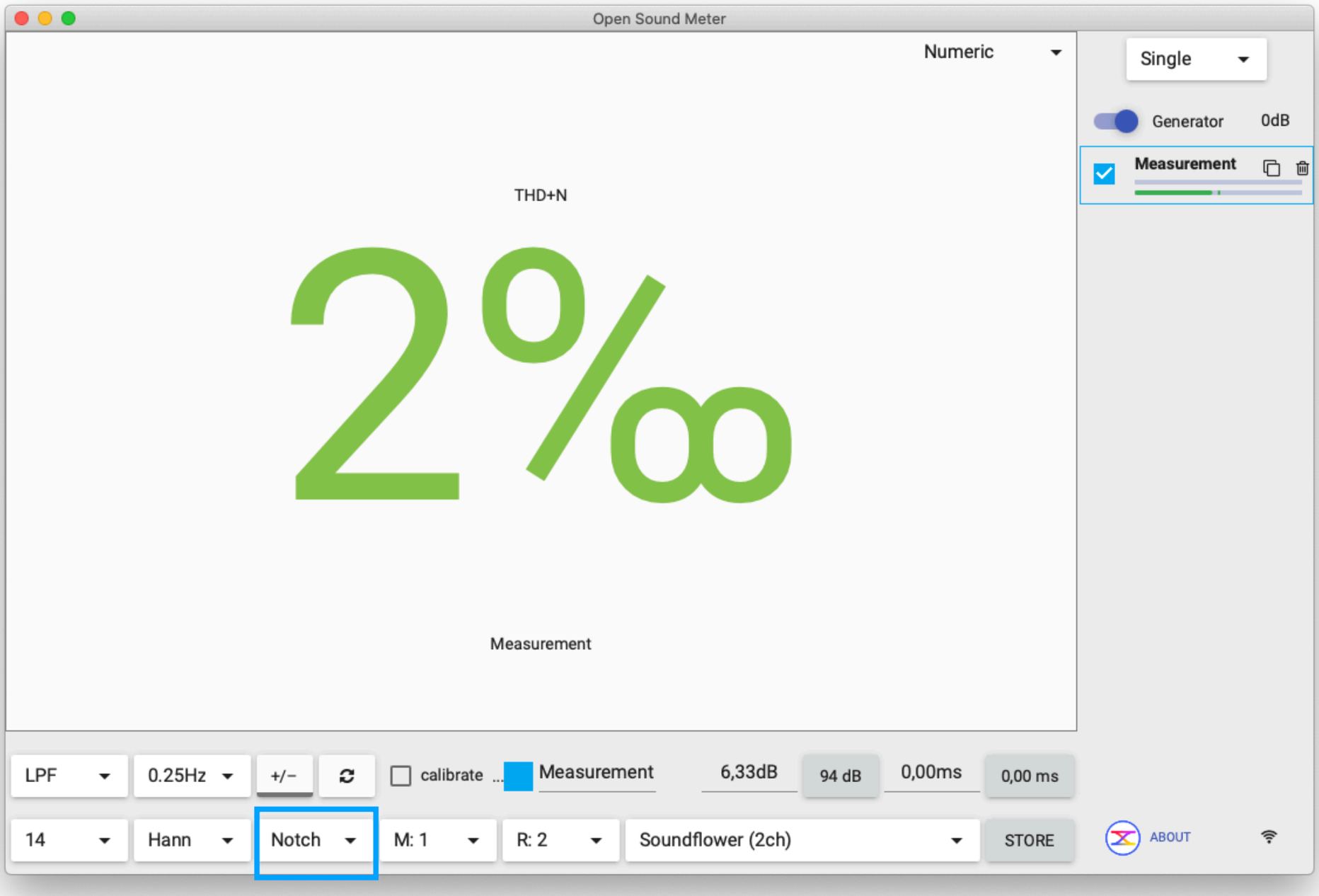
rows count

Leq



rows count

THD+N



For THD+N activate Notch filter in the measurement's properties

Numeric properties

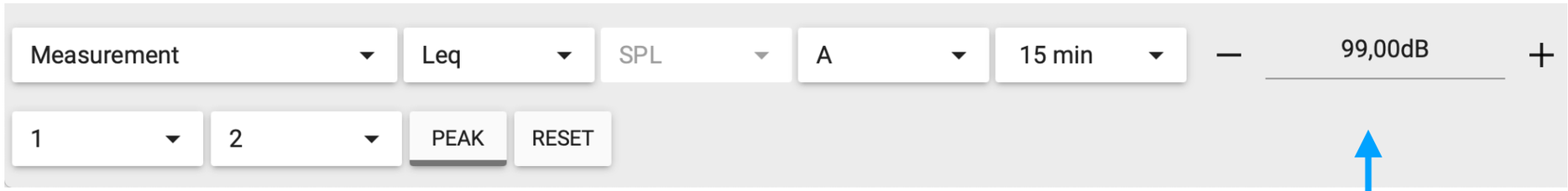
Select source

Value

Scale

Weighting curve

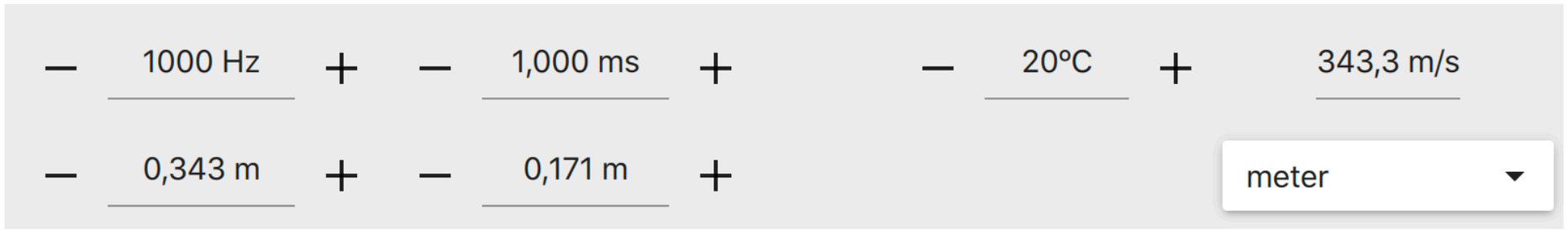
Integration time



peak hold

Warning threshold

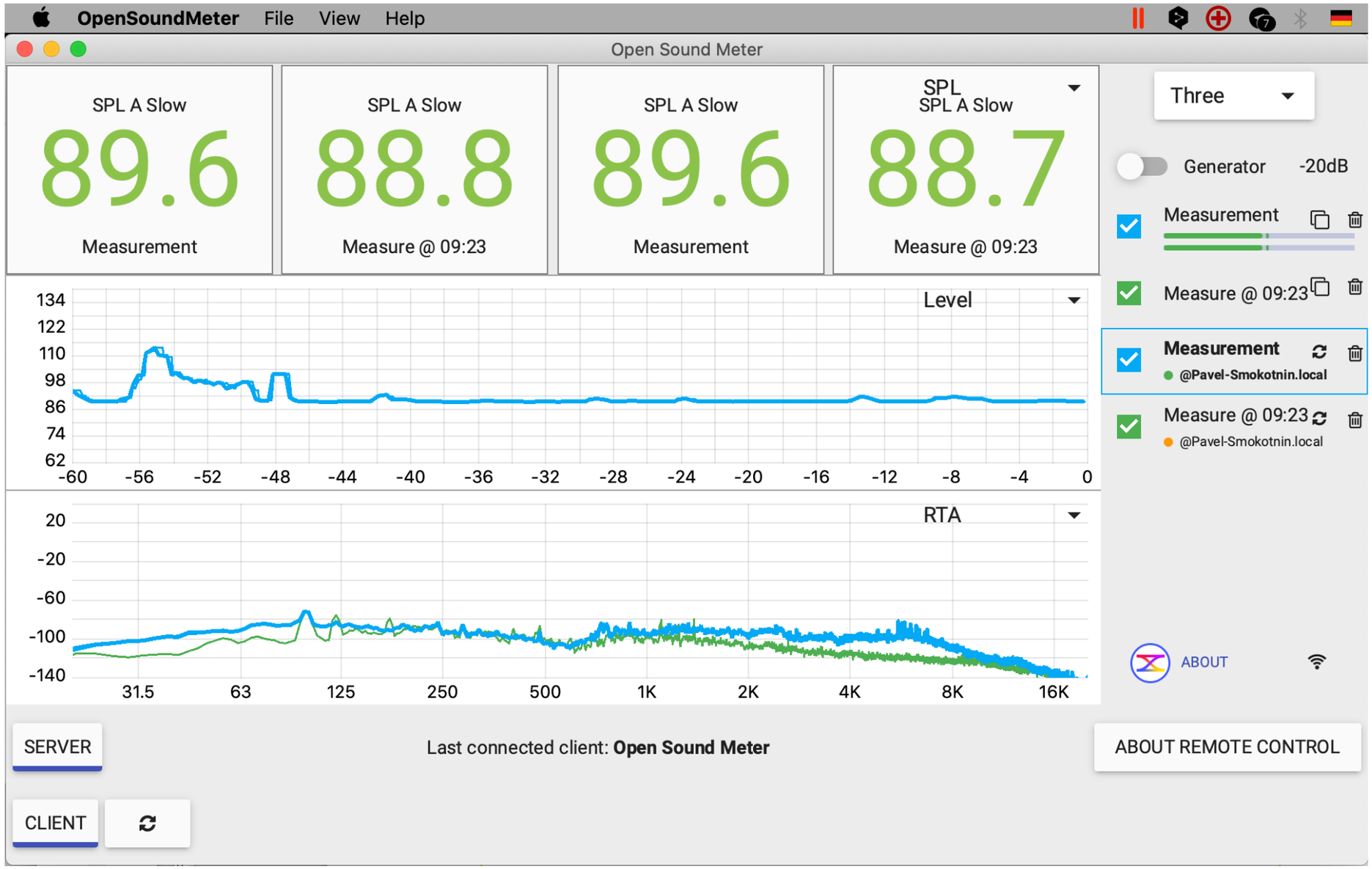
Wavelength calculator



Allows you calculate between frequency, period and wavelength.
You can change any value and get others.
Use Shift key to fine adjust value

To quick open calculator for interested frequency click the right mouse button on a chart.
On iPad put one finger at the interesting point and
touch the chart with second one.

Remote API



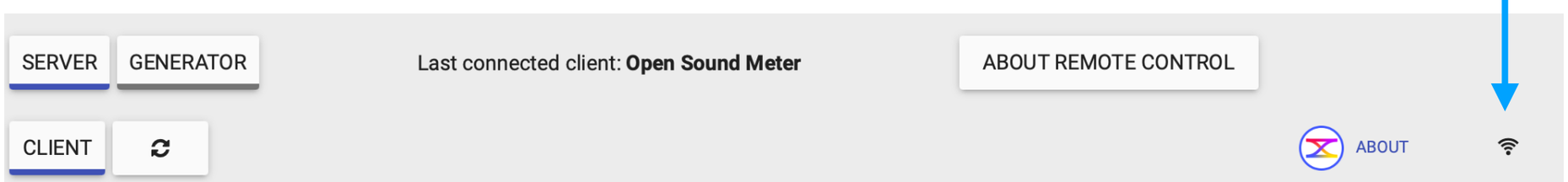
Different instances of Open Sound Meter on the same network could share data

Remote API

Activate API Server

Enable generator control

Open remote settings



Refresh connection

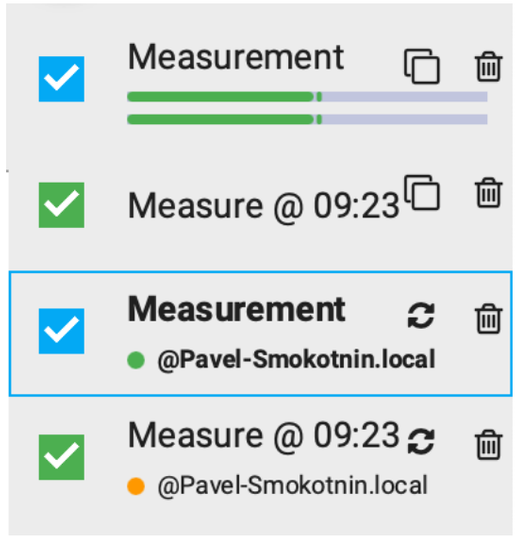
Activate API Client

If you activate Server application will share data
If you activate Client application will receive data from Server

Remote API

Remote measurement

Remote stored data

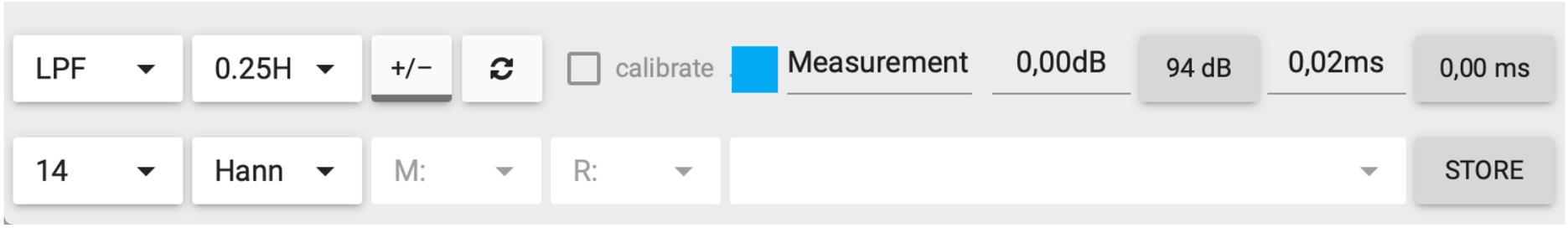


Remote sources shown in the side bar as a regular sources with a label from what host it was taken. Each remote source has coloured label:

- it was just updated less than 1 second ago
- it was updated more than 1 second ago
- error occurred during last update

Refresh button allows to manually update source from the Server.

Remote API

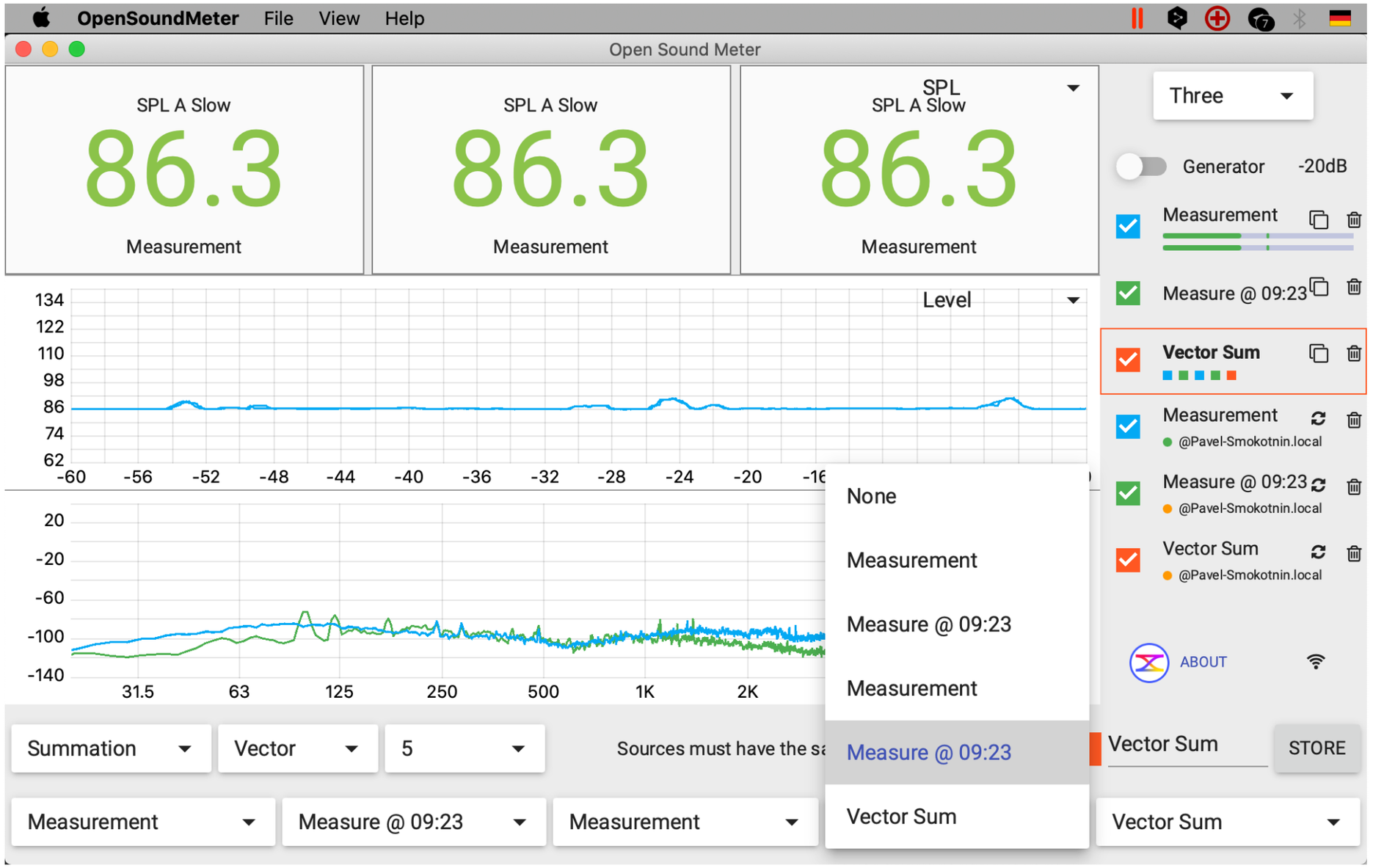


For remote sources you can change all settings but audio.
Unavailable options are disabled.

Remote API

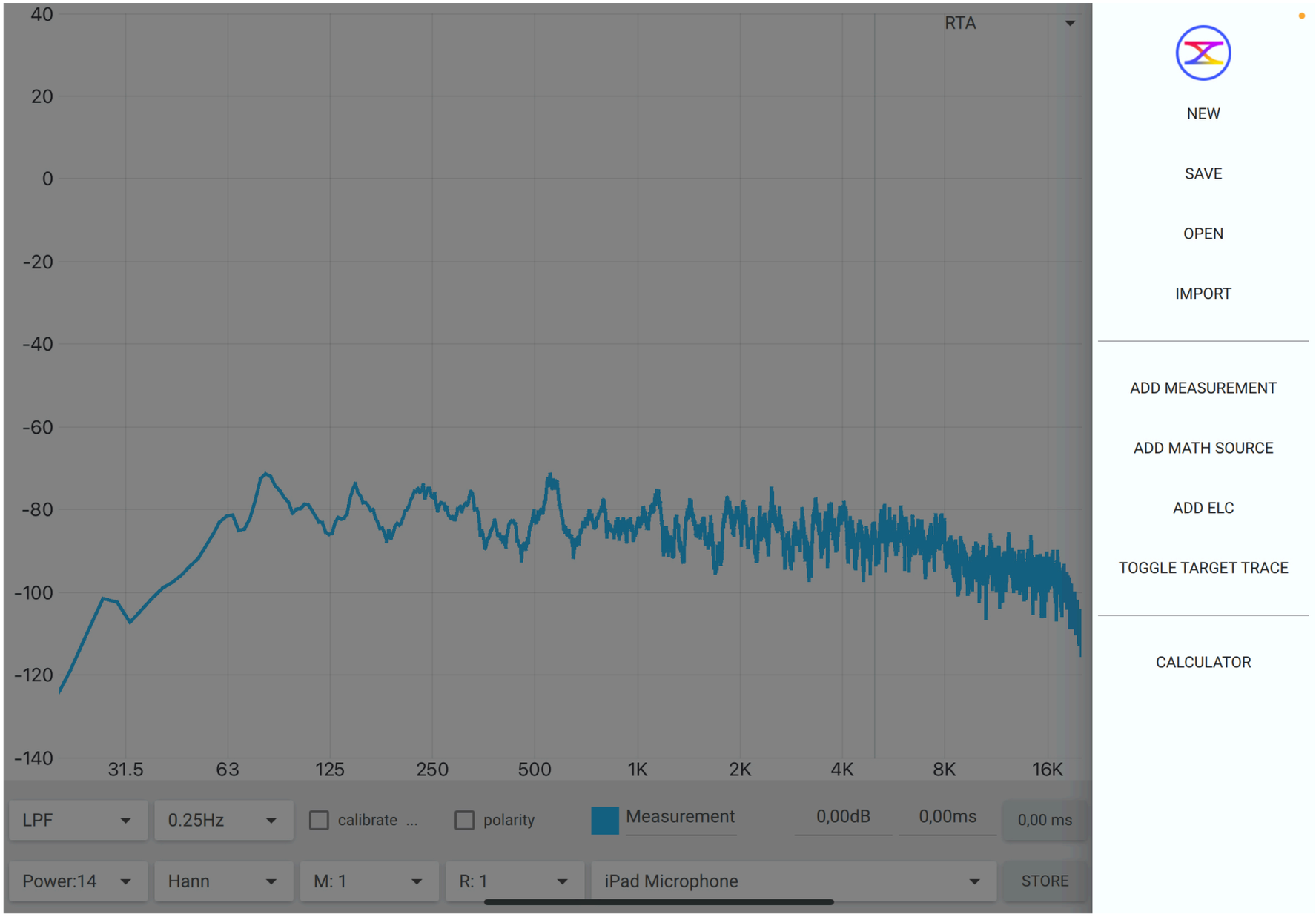
If remote source have no settings to edit, you'll see only refresh data button.

Remote API



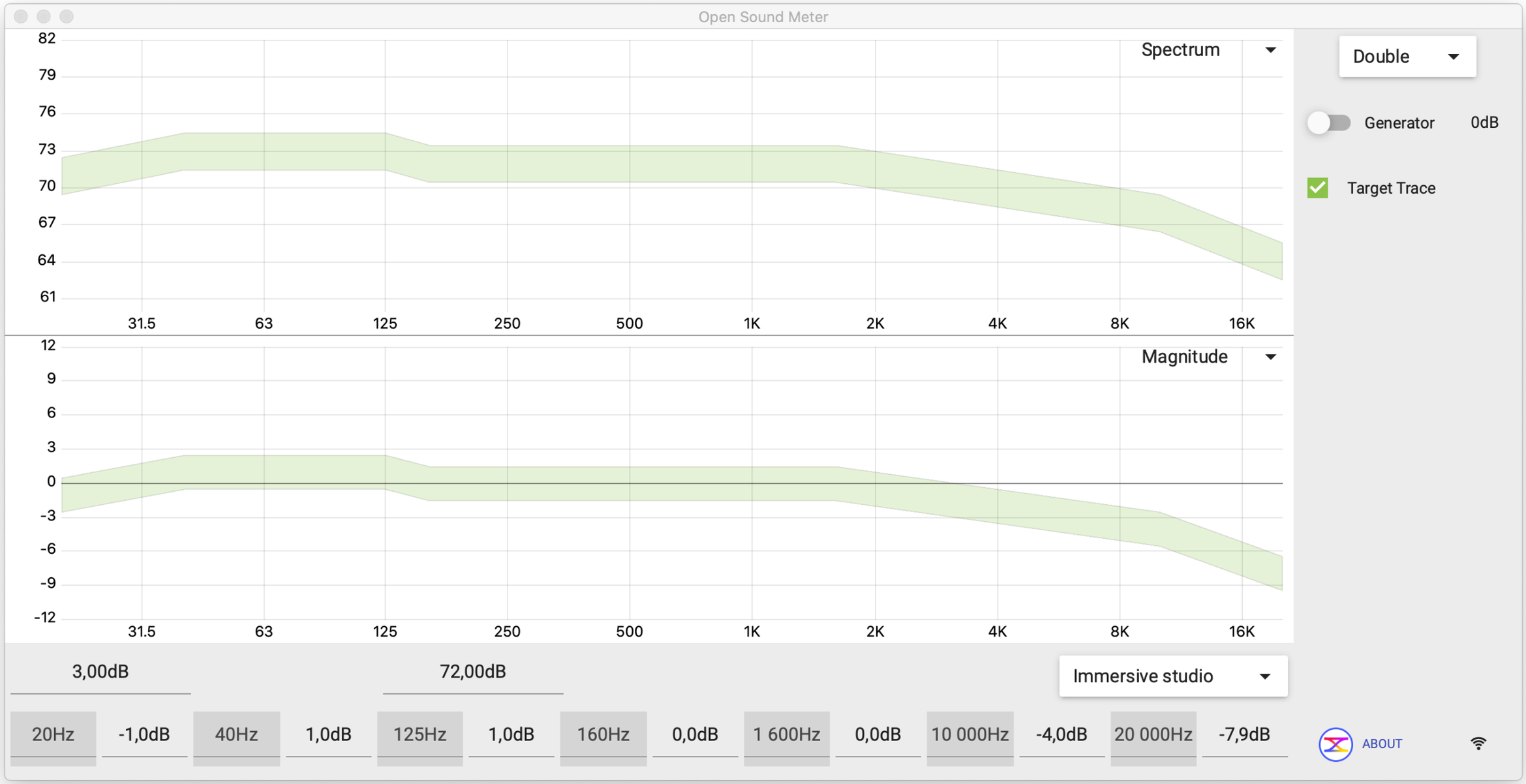
You are able to use remote sources in the math operations as well as locals, even mix them.

Application menu (iPad)



Swipe from left side to the right to open menu.
Or click menu button in the top right corner.

Target trace

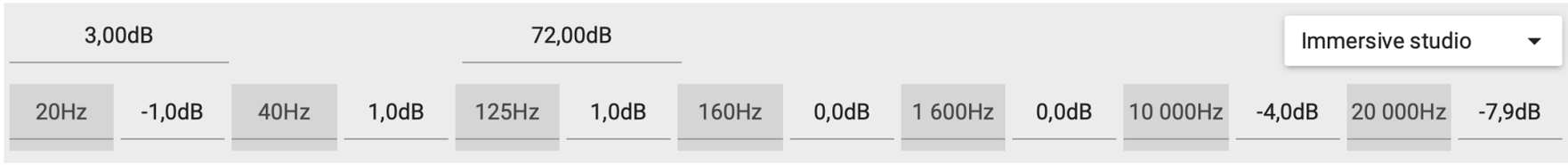


Target trace

width

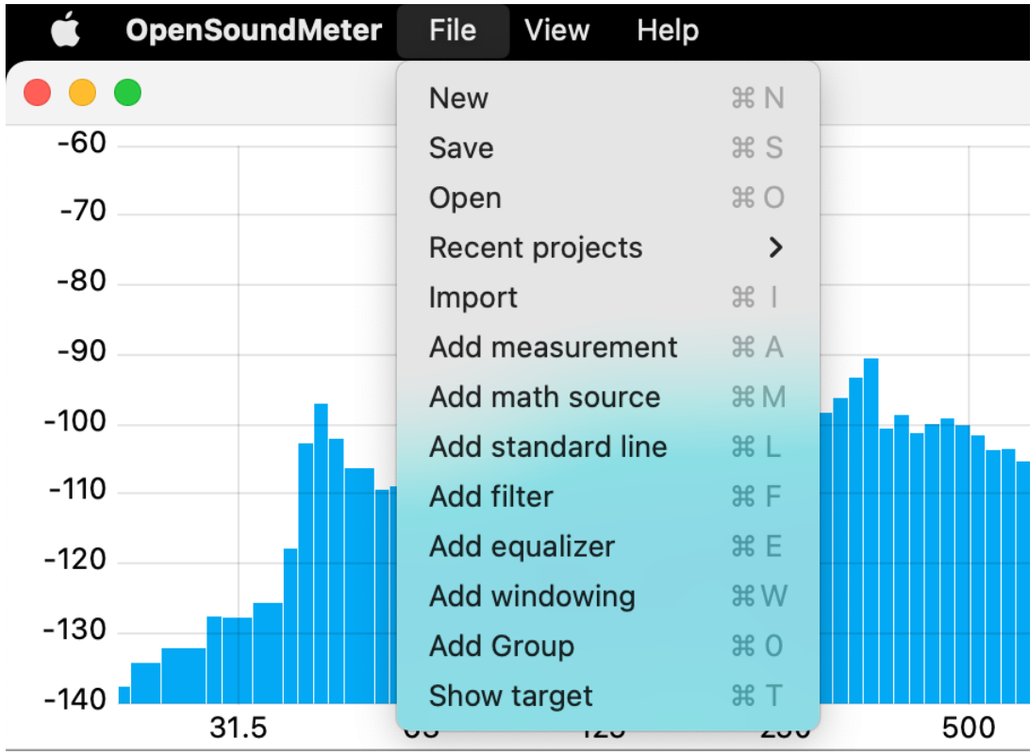
SPL target

presets



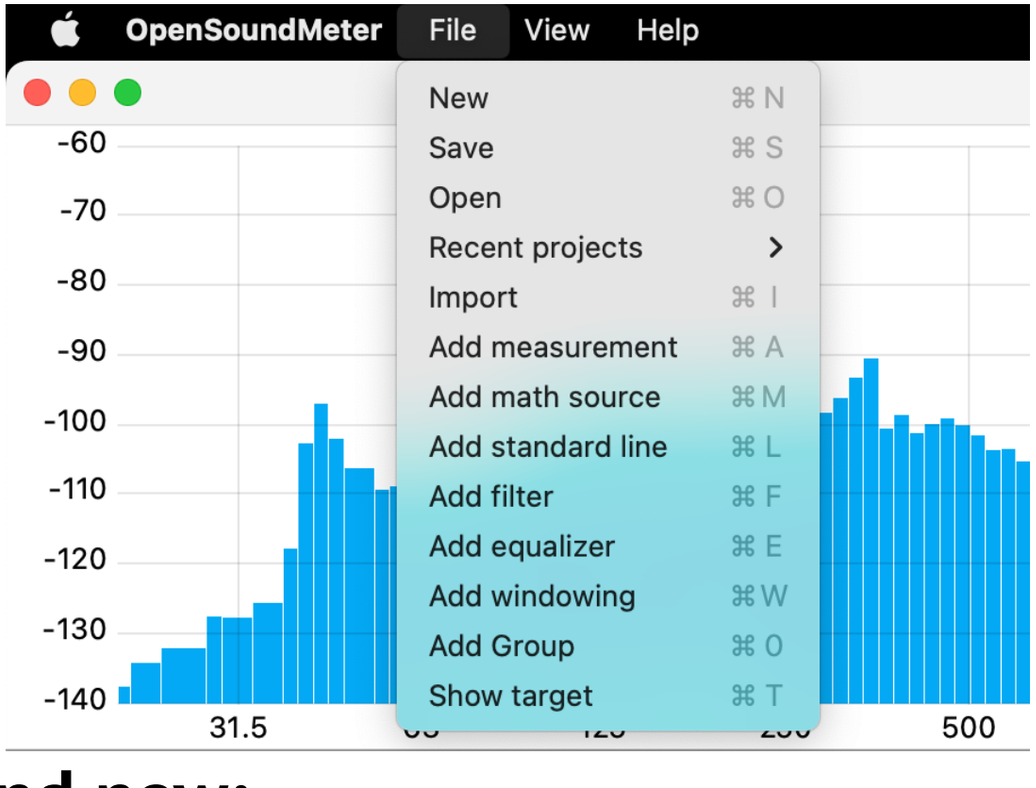
7 frequency-gain points

Application menu



New — create empty measuring project
Save — save all current measurements and stored data to a file
Open — load project file or single stored data
Recent projects — list of the last opened files
Import — import frequency or time domain data

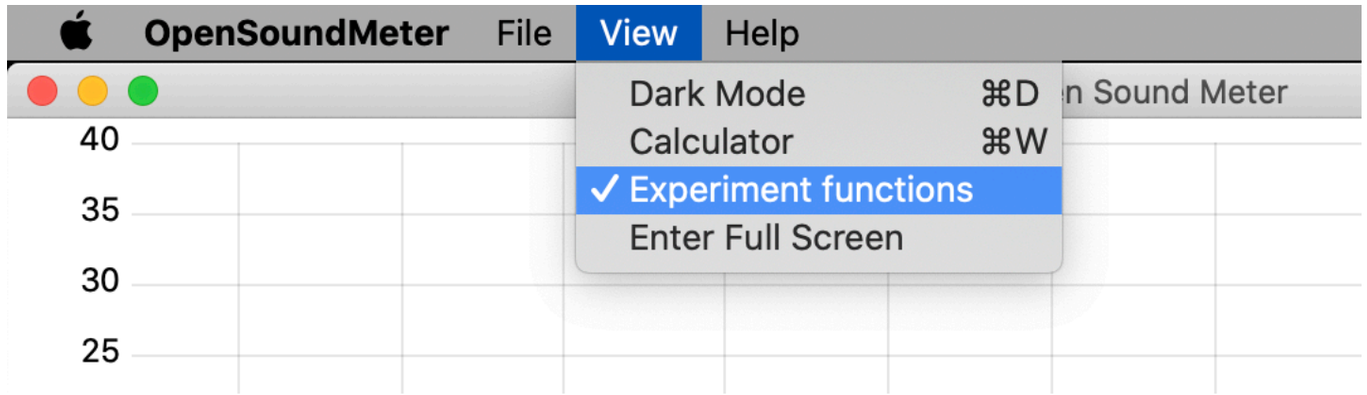
Application menu



Append new:

- measurement
- math source
- standard line
- filter
- equalizer
- windowing
- group
- toggle target trace

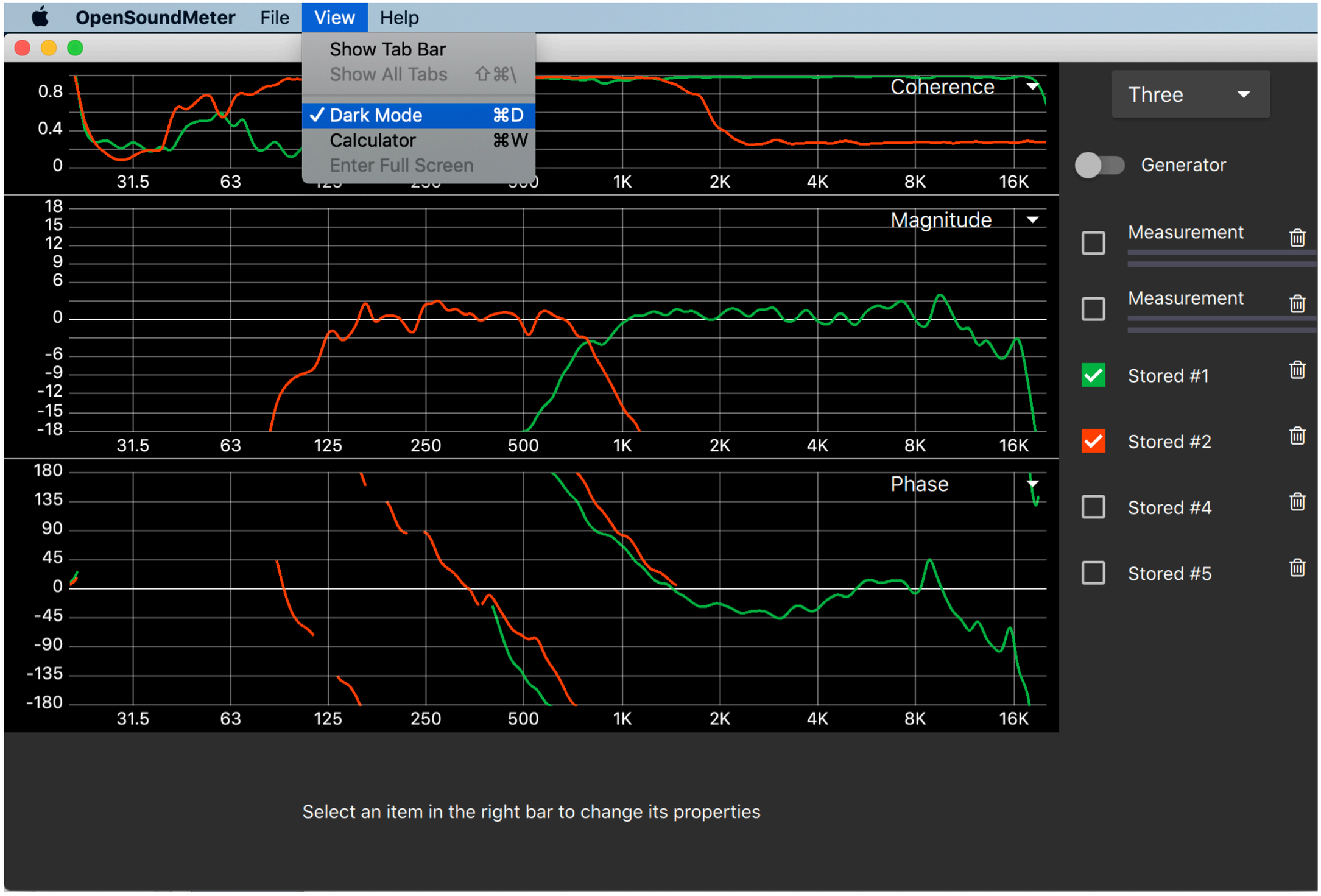
Experimental functions



Adds three more available charts:

- Crest factor of the measurements
- Nyquist plot
- Phase delay

Dark mode

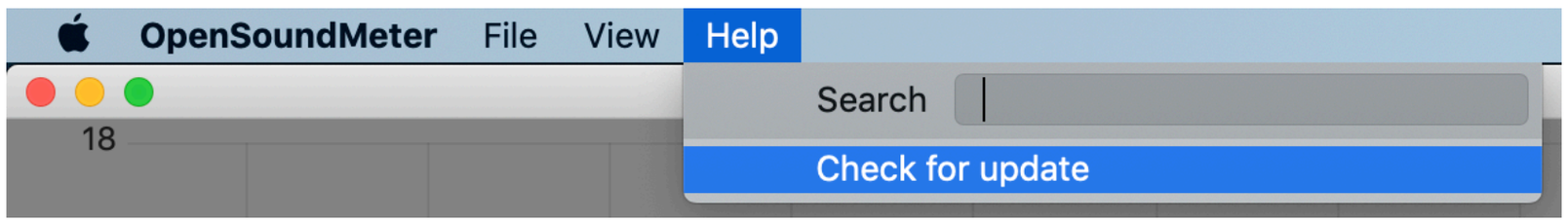


Thanks to Josh Barker for contribution

Update application

Open Sound Meter checks for updates at every start if internet connection is available.
You will see a message about update.

For manually check, use the menu item:
“Help > Check for update".



Shortcuts

Action	macOS	Windows and Linux
new project	⌘+N	Ctrl+N
save	⌘+S	Ctrl+S
open	⌘+O	Ctrl+O
append measurement	⌘+A	Ctrl+A
append math source	⌘+M	Ctrl+M
append window source	⌘+W	Ctrl+W
append filter source	⌘+F	Ctrl+F
append equalizer source	⌘+E	Ctrl+E
add group	⌘+0	Ctrl+0
add ELC	⌘+L	Ctrl+L
store all measurements	⌘+X	Ctrl+X
store current measurement	⌘+C	Ctrl+C
reset averages	⌘+R	Ctrl+R
apply estimated delay	⌘+D	Ctrl+D
Toggle target trace	⌘+T	Ctrl+T

Shortcuts

Action	macOS	Windows and Linux
toggle generator	⌘+G	Ctrl+G
show 1 chart	⌘+1	Ctrl+1
show 2 chart	⌘+2	Ctrl+2
show 3 chart	⌘+3	Ctrl+3
auto charts height	⌘+4	Ctrl+4
open wavelength calculator	⌘+K	Ctrl+K
toggle dark mod	⌘+D	Ctrl+D
show shortcuts	F1	F1
show info	F2	F2
check for update	F3	F3

Application’s data path

macOS	~/Library/Application Support/opensoundmeter/
Windows	C:/Users/{USERNAME}/AppData/Local/opensoundmeter
Linux	~/.local/share/opensoundmeter

Application’s data in its folder

autosave.osm	last autosaved project
log.txt	output log in case of support
settings.sosm	Interface settings

Remove those files if you want to completely remove the application

How can you contribute?

- Donate opensoundmeter.com/about
- Share this overview with all the sound engineers
- Send me your ideas and wishes about the project
- Give me detailed reports about the errors or crushes

Thank you for support!

Consulting

If you have any questions about any tools or options — we are here to help.

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