Open Sound Meter
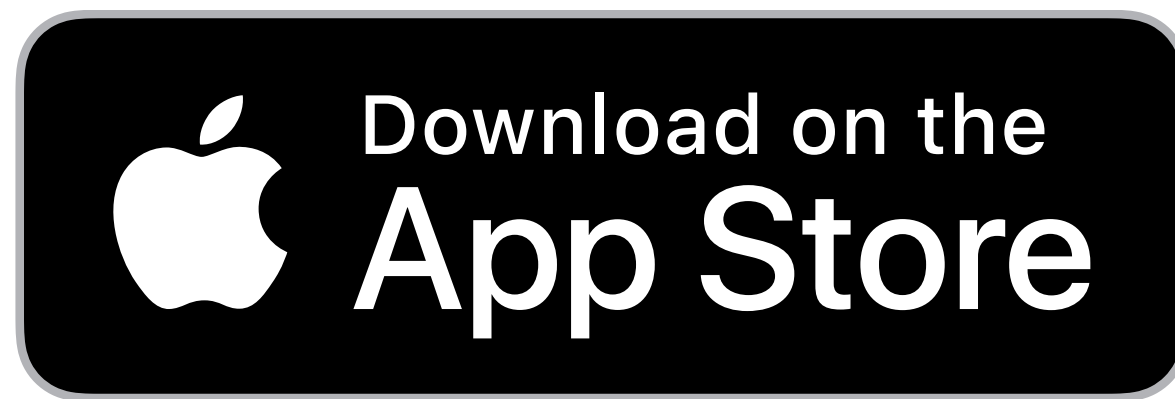

Overview v1.2.3

iPad OS

Version for the iPadOS/iPhone available at App Store by commerce license.

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

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.
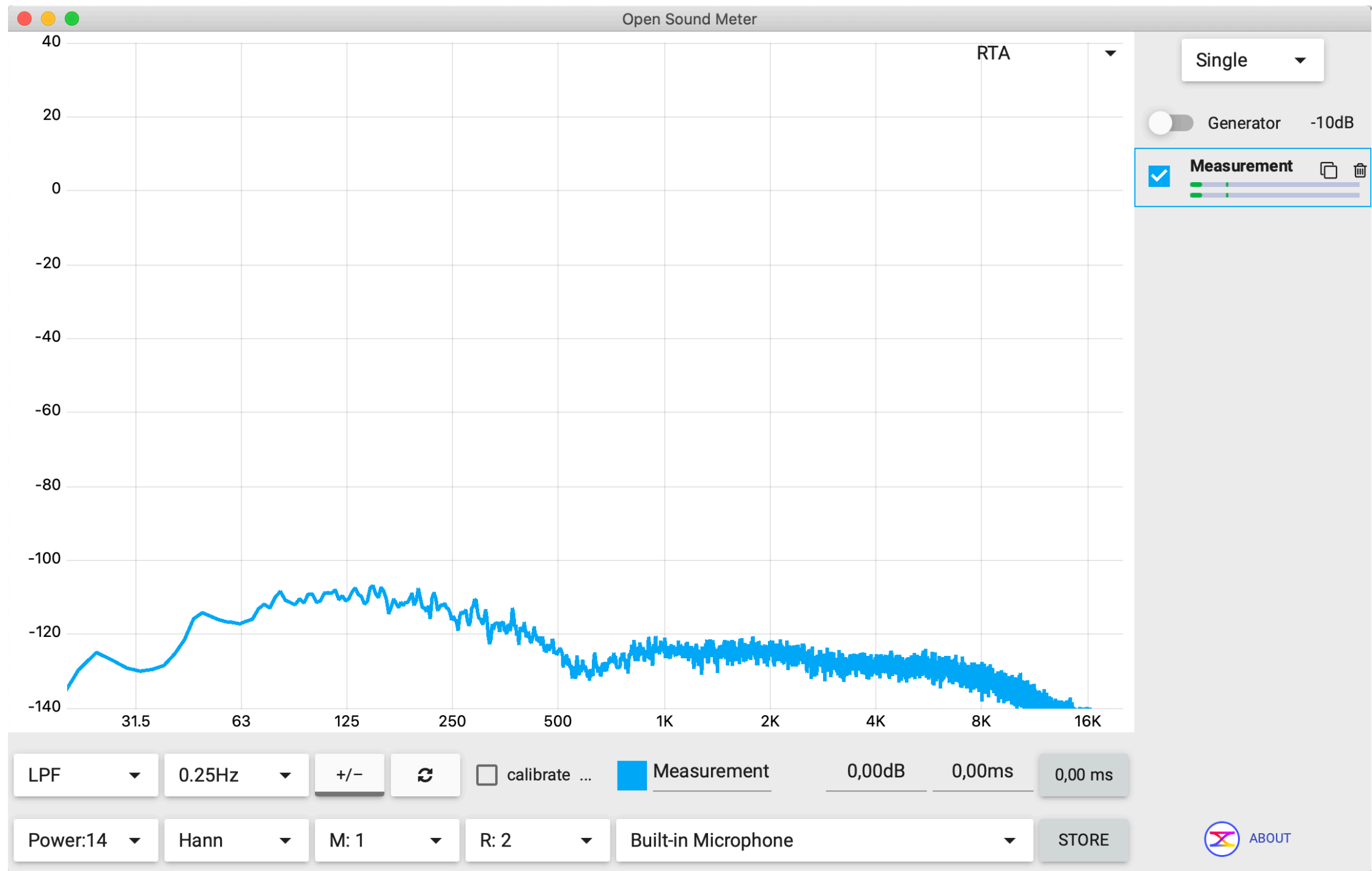
iOS version are distributed by low reasonable price.

https://opensoundmeter.com/about
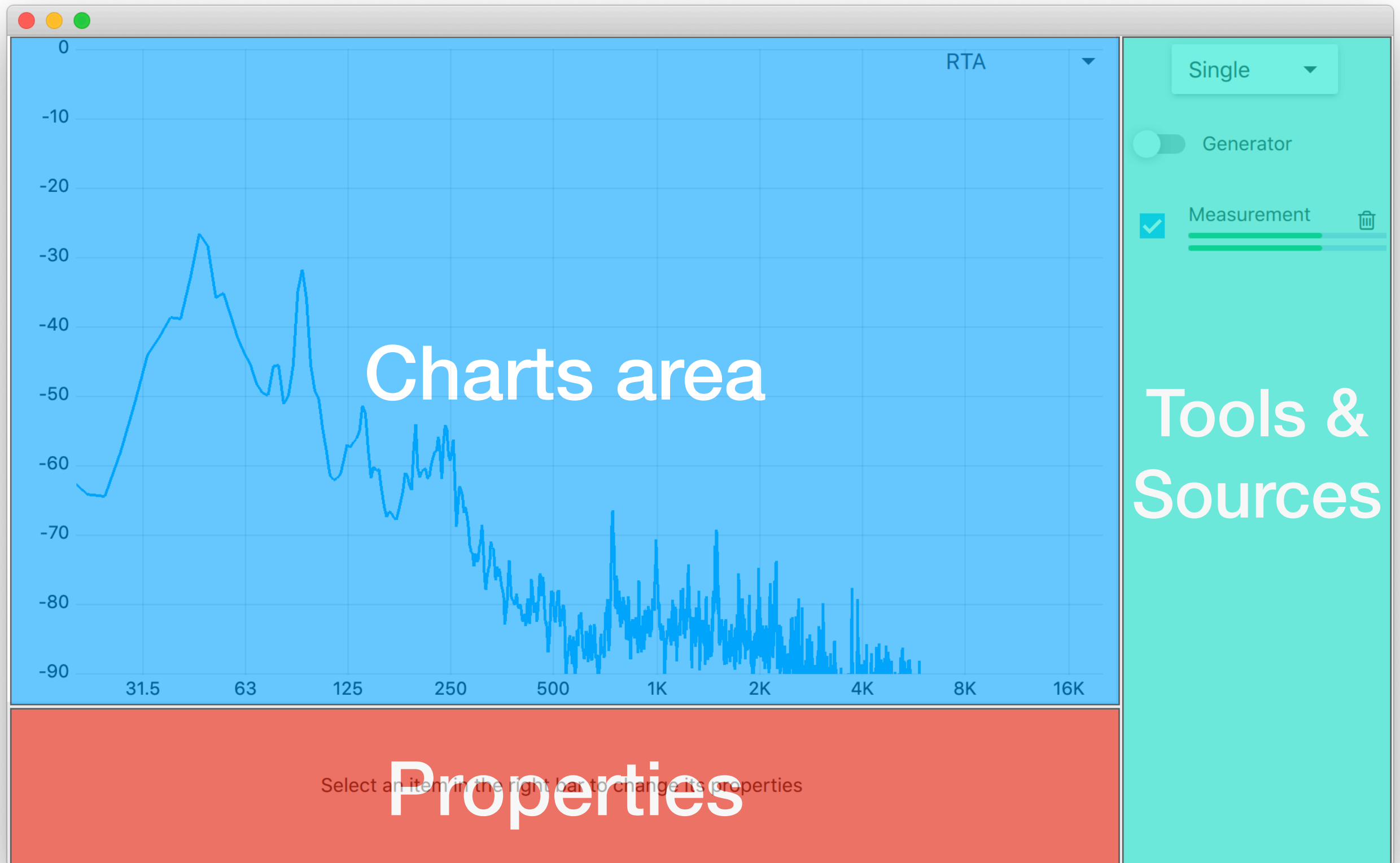
Where can I get it?

opensoundmeter.com

Let's run

Layout

RTA

Single

Generator

Measurement

Charts area

Tools & Sources

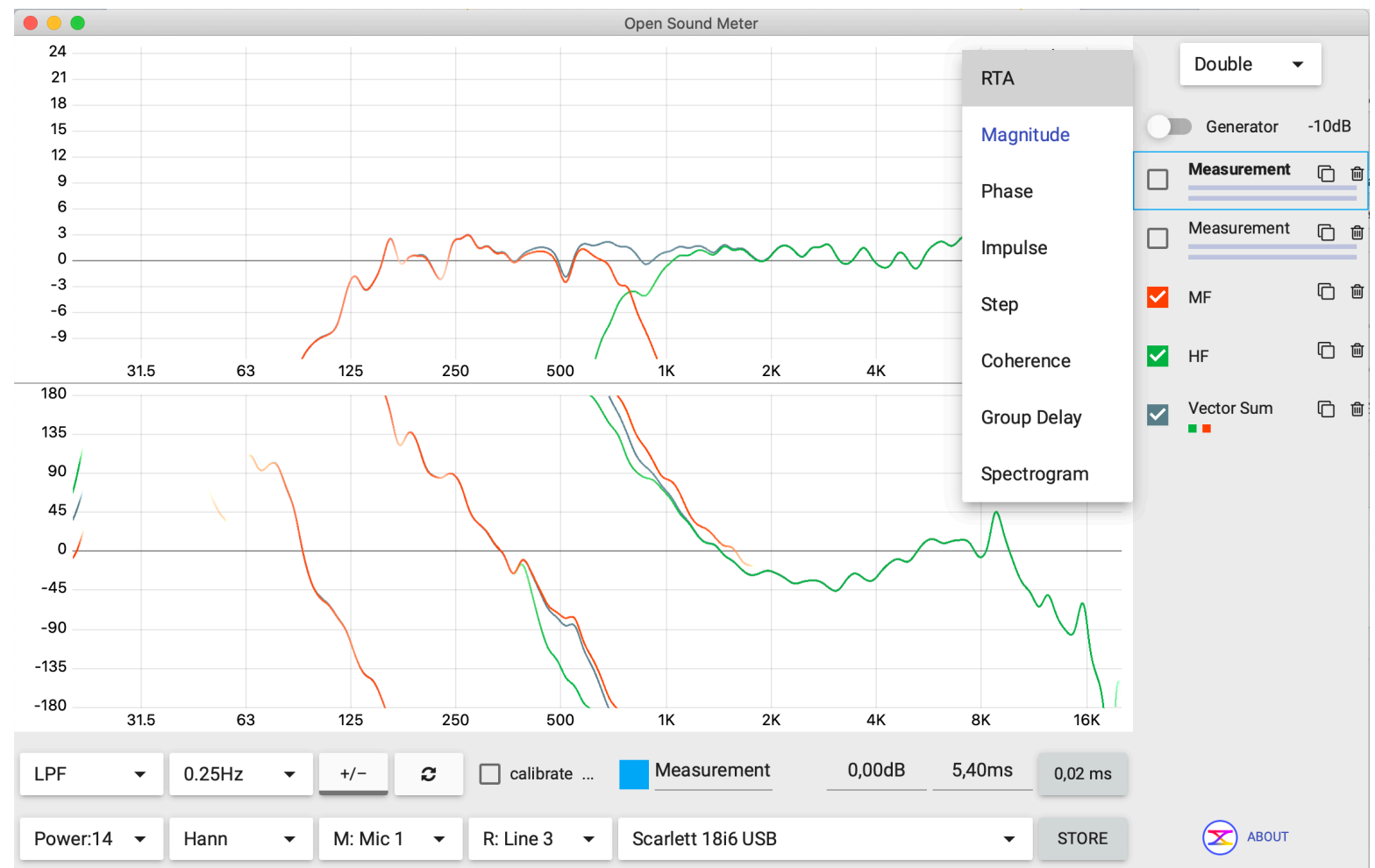Select an item in the right bar to change its properties

Properties

Charts area

Up to three charts of different types:

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

Tools and sources

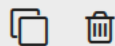**Single** ▾   Charts count

Generator -18dB   Generator's output
Click label to open properties

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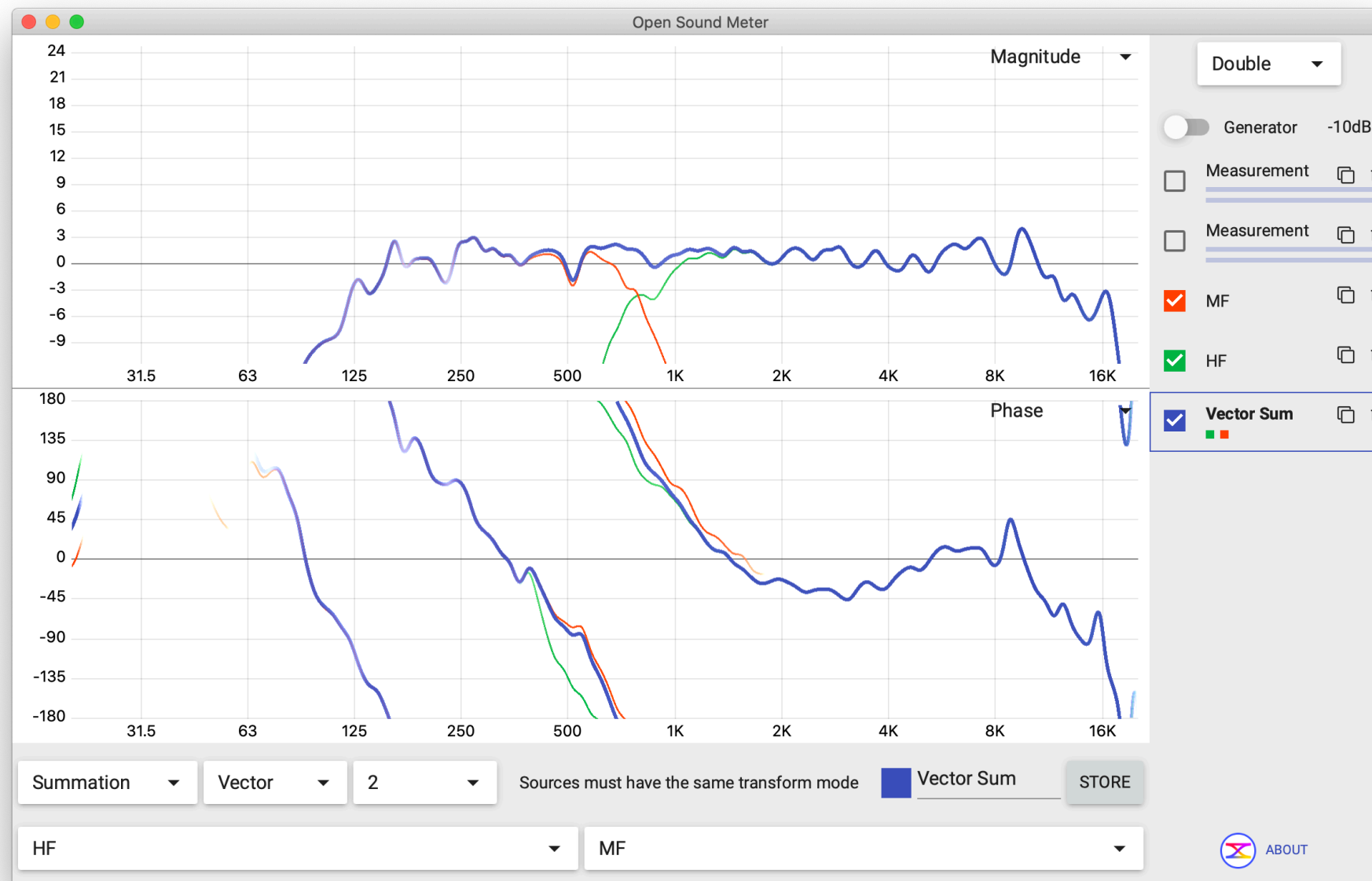Click label to open properties
Checkbox color = series' color
Levels meter for measuring and reference channels
Icons for delete and clone

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

| Pink ▾ | — | -6dB | + |

| Soundflower (2ch) ▾ | ch: 1 ▾ | aux: 2 ▾ |

audio device   output channels

Generator properties

frequency for *sin* type

current   ÷2   x2

| Sin ▾ | — | -6dB | + | — | 1000Hz | + | OCTAVE DOWN | OCTAVE UP |

| Soundflower (2ch) ▾ | ch: 1 ▾ | aux: 2 ▾ |

Generator properties

M-Noise™

https://m-noise.org/
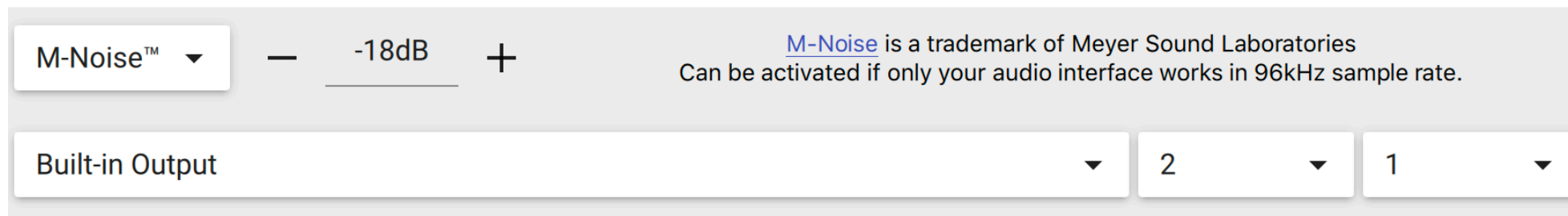
The M-Noise test signal was created by Meyer Sound Laboratories, Incorporated ("Meyer Sound") for the use and benefit of the professional audio community.
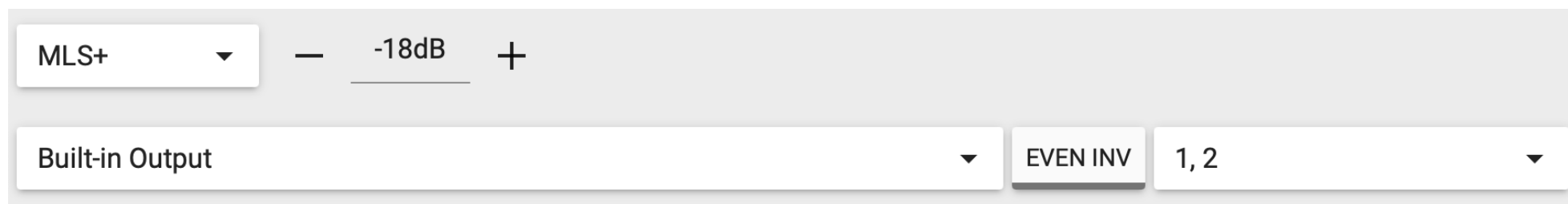
How to use it: https://m-noise.org/procedure/

M-Noise is a trademark of Meyer Sound Laboratories

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 in power of 16.

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

Measurement properties

reverse
polarity

reset
buffers

color   title

| LPF ▼ | 0.25Hz ▼ | +/− | ⟳ | ☐ calibrate ... | 🟦 Measurement | 0,00dB | 94 dB | 0,02ms | 0,00 ms |
| 14 ▼ | Hann ▼ | M: 1 ▼ | R: 1 ▼ | Built-in Microphone | | | | ▼ | STORE |
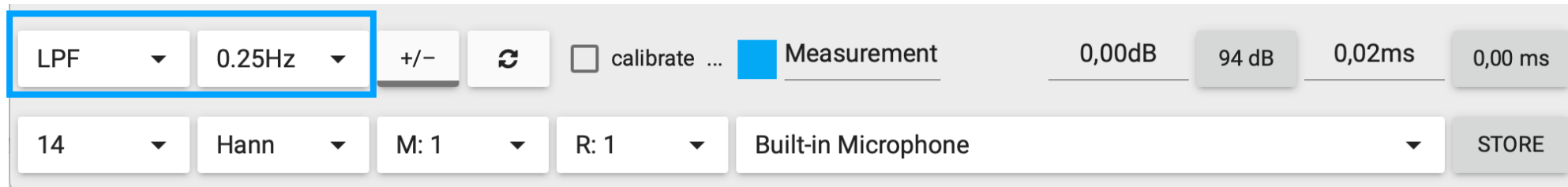
window function   reference channel   audio device

channel for measure

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
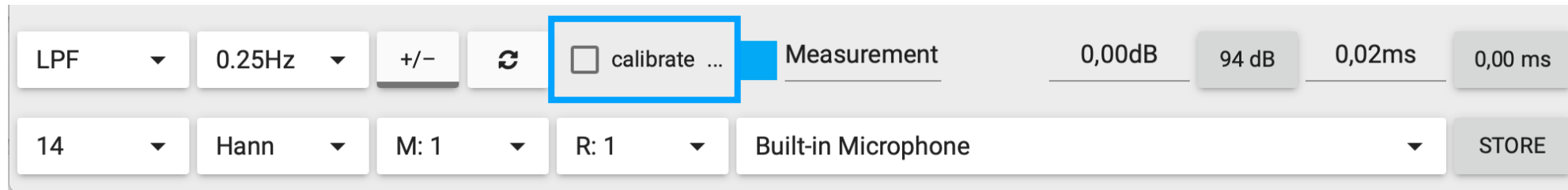
LPF frequencies: ¼Hz, ½Hz, 1Hz

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

Gain and delay

Input value

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

Button shows the calculated estimated delay value, click to apply

On mouseover tooltip shows delta between current and estimated

Measurement properties

Gain and delay

Apply auto gain for 94 dB SPL A slow

LPF ▼	0.25Hz ▼	+/−	⟳	☐ calibrate ...	🔵 Measurement	0,00dB	94 dB	0,02ms	0,00 ms
14 ▼	Hann ▼	M: 1 ▼	R: 1 ▼	Built-in Microphone				▼	STORE

Measurement properties

FFT power

| LPF ▾ | 0.25Hz ▾ | +/− | ⟳ | ☐ calibrate ... | 🟦 Measurement | 0,00dB | 94 dB | 0,02ms | 0,00 ms |

| 14 ▾ | Hann ▾ | M: 1 ▾ | R: 1 ▾ | Built-in Microphone ▾ | STORE |

Select time window size: $2^{power\ value}$ 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
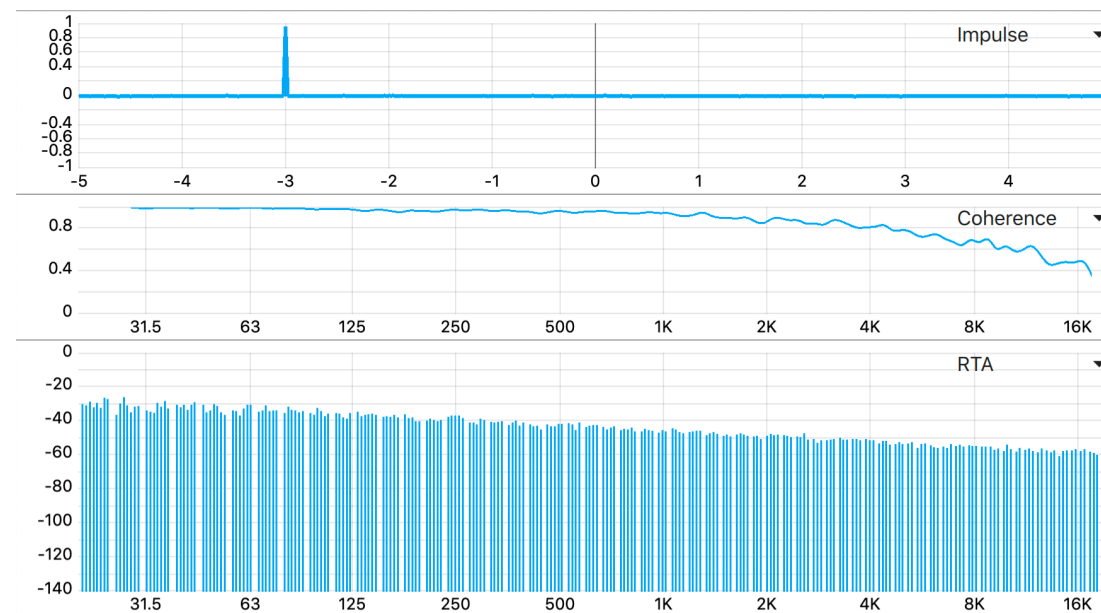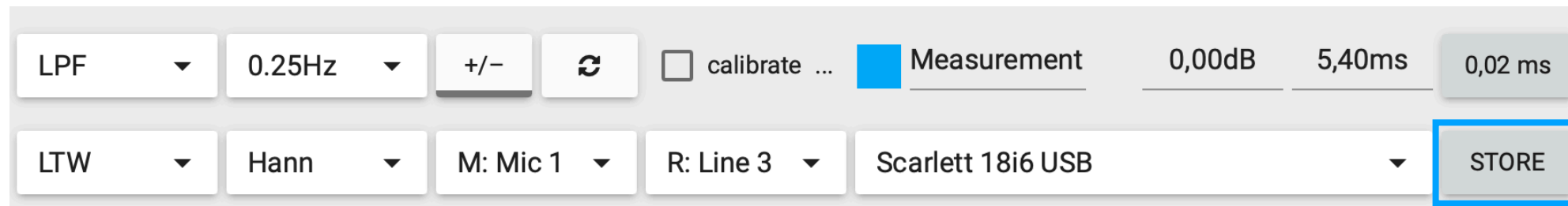
Logarithm time window
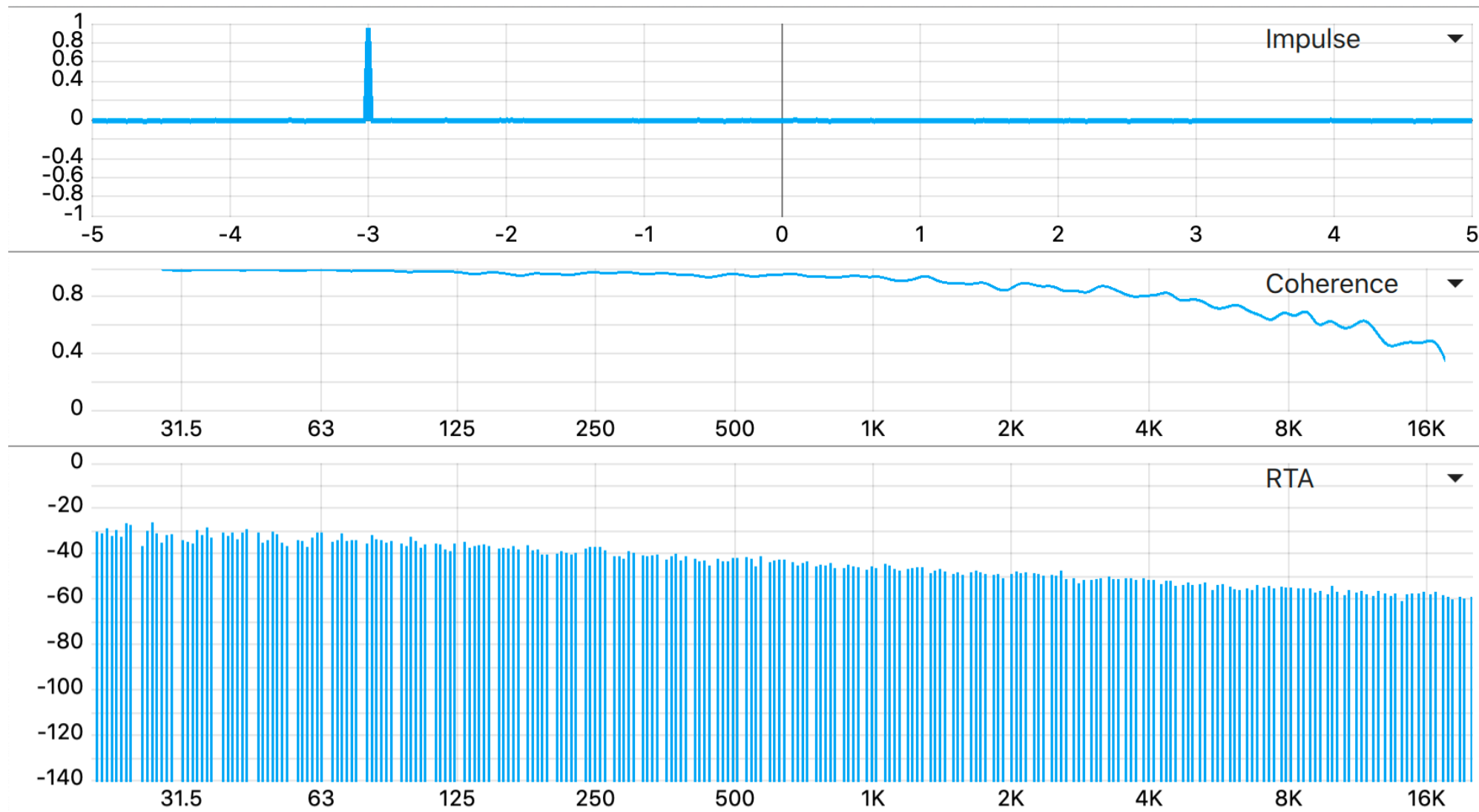
Measurement properties

Storing your measurements
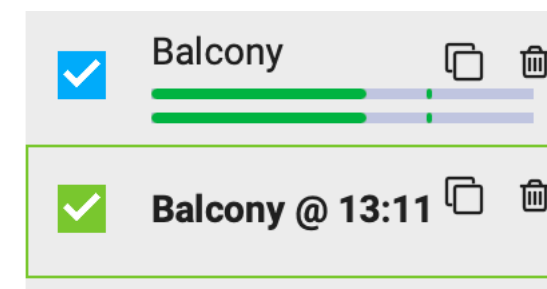

Push the button to store current measuring data

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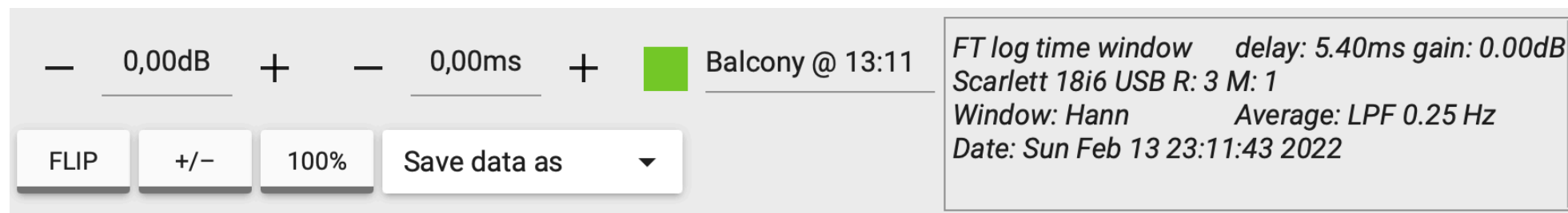of the original measurement and time.

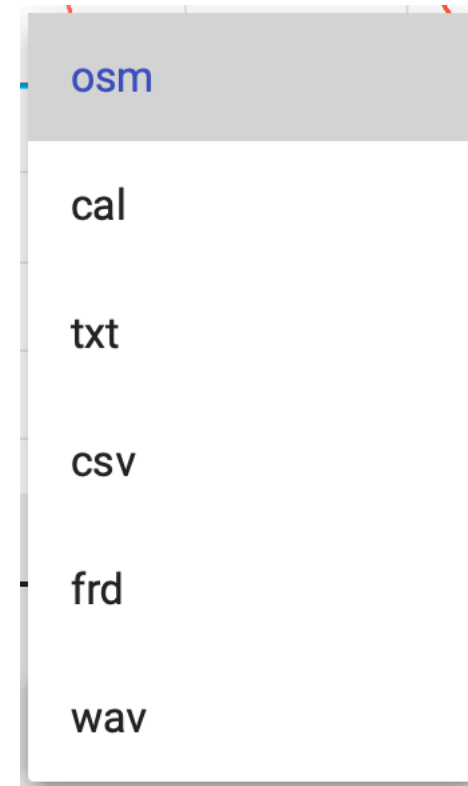Enable/disable checkbox = view/hide the series

Stored properties

editable automatically

color   title   created notes

```
—   0,00dB   +   —   0,00ms   +   ■ Balcony @ 13:11    FT log time window      delay: 5.40ms gain: 0.00dB
                                                       Scarlett 18i6 USB R: 3 M: 1
 FLIP    +/−    100%   Save data as       ▾           Window: Hann           Average: LPF 0.25 Hz
                                                       Date: Sun Feb 13 23:11:43 2022
```
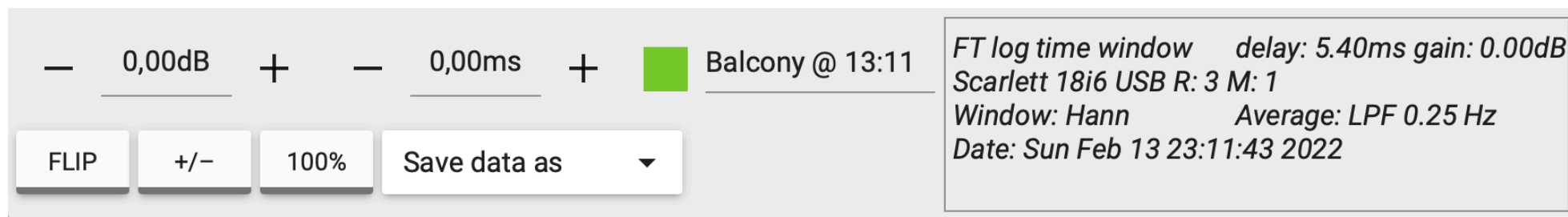
export stored data as:
- OSM file
- calibration file
- TXT
- CSV
- FRD file type
- impulse WAV file

osm

cal

txt

csv

frd

wav
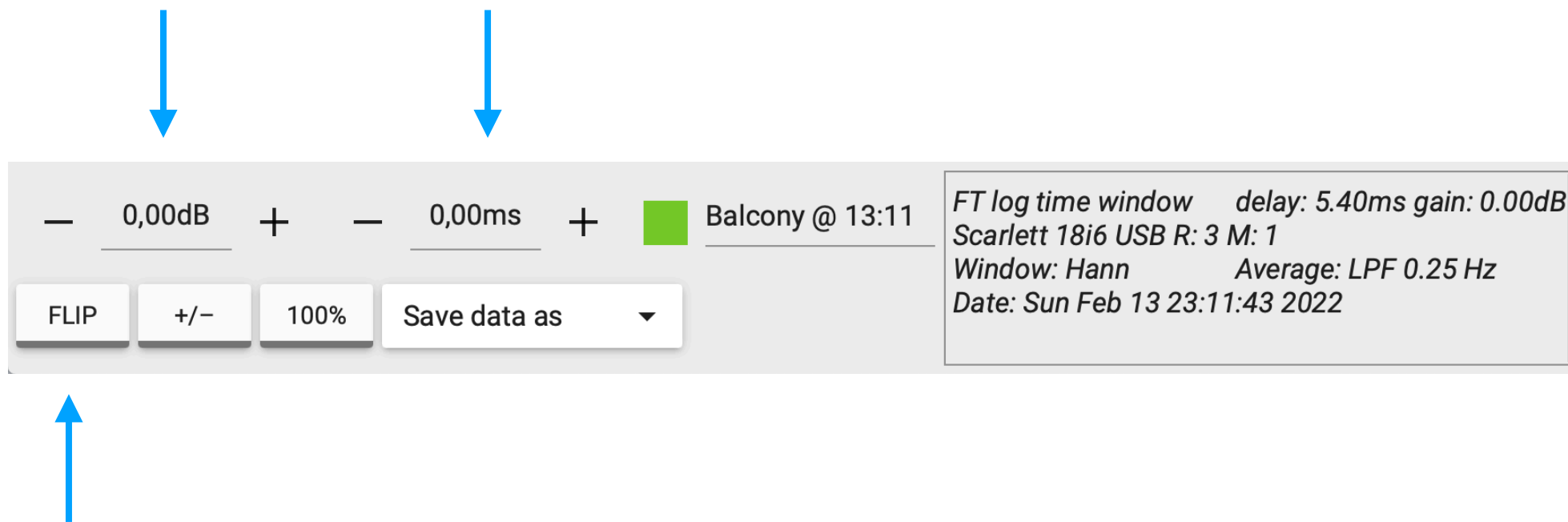
Stored properties

Offline adjustment

gain   delay

inverse magnitude

Stored properties

Offline adjustment

inverse
polarity

force 100% coherence

Math source

store the result

function   type   count

color   title

| Summation ▼ | Vector ▼ | 2 ▼ | Sources must have the same transform mode | ■ Vector Sum | STORE |

| HF ▼ | MF ▼ |

select from 2 to 10 sources: measurements or stored

Filter source

FFT Power   sample rate   color   title   store the result

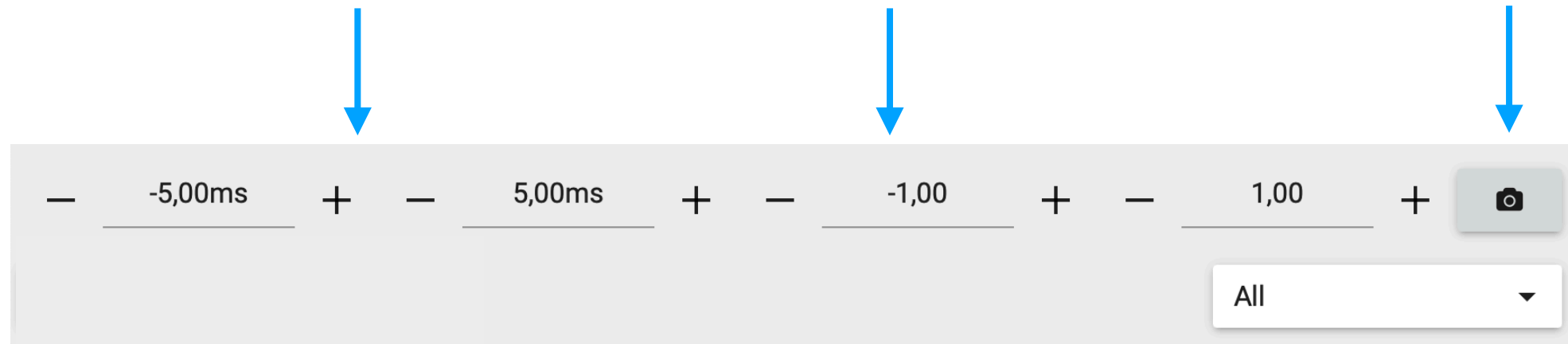| Power:10 ▾ | 48000 ▾ | 🟩 LR LPF 2 | |
| Linkwitz-Riley LPF ▾ | 2 ▾ | — 1 000,0Hz + | STORE |

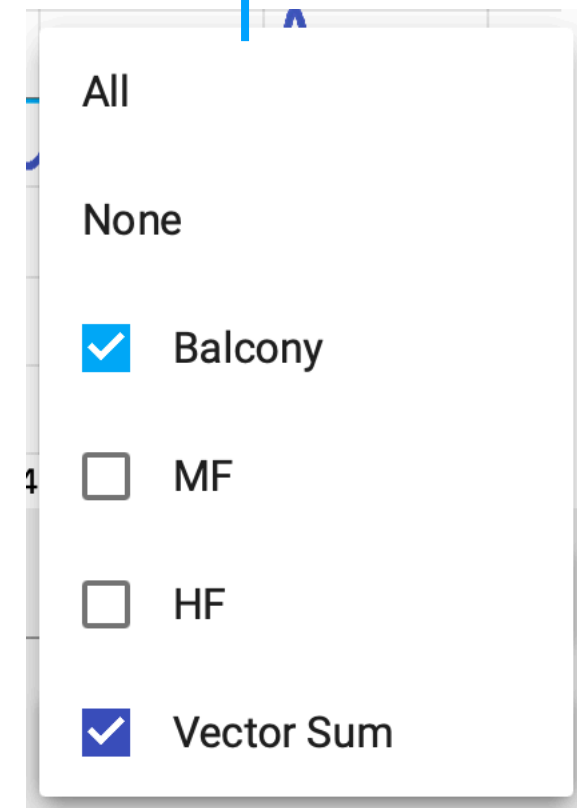Filter type   order   corner frequency

Basic chart properties

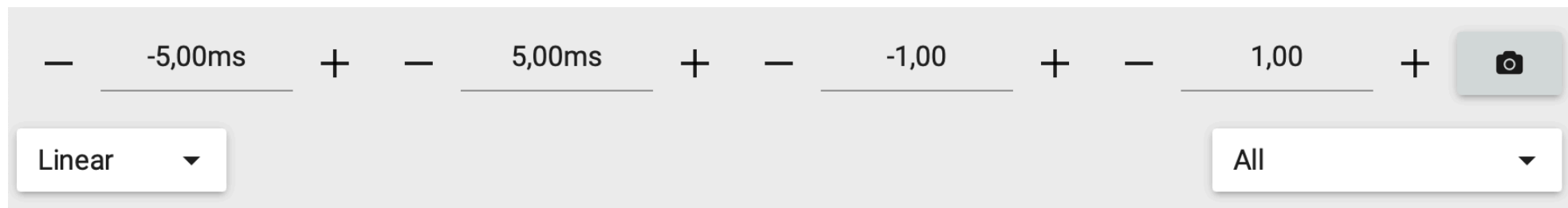**Horizontal axis range**

Vertical axis range

save chart as an image

-5,00ms — + — 5,00ms + — -1,00 + — 1,00 + 📷

All ▾

All

None

☑ Balcony

☐ MF

☐ HF

☑ Vector Sum

If source is selected, just that will be shown.

Impulse chart properties

-5,00ms — + — 5,00ms + — -1,00 + — 1,00 + 📷

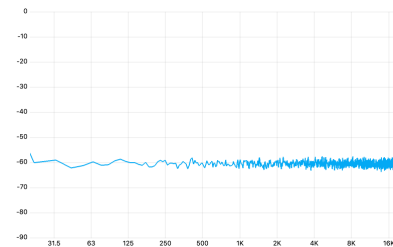Linear ▼   All ▼

Select linear or log (dB) vertical scale
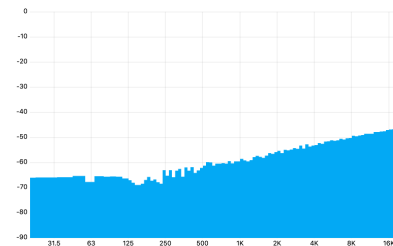
RTA chart properties
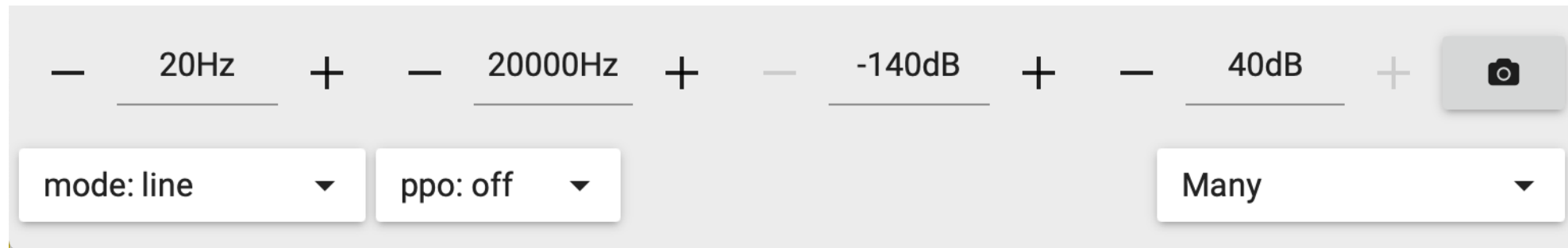
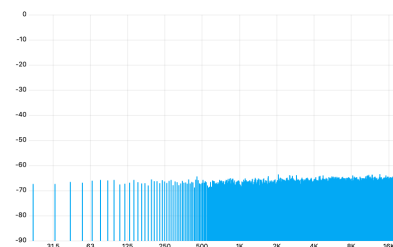line — one continuous line

points per octave define smooth

bars — points per octave define the bar width

ppo 12

lines — one line per frequency

Magnitude chart properties

| 20,00Hz | 20 000,00Hz | -18,00dB | 18,00dB | ☐ invert | 📷 |

| dB ▼ | ppo: 12 ▼ | ☑ use coherence | 0,70 | All ▼ |

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

20Hz	+	−	20000Hz	+	−	9º	+	−	360º	+	📷

ppo	12 ▾	±180º ▾	☑ use coherence	−	0,70	+	All ▾

Coherence threshold for
the alpha channel

Apply coherence value
for the series opacity

Points per octave

Phase chart range

center angle   range

| − | 20Hz | + | − | 20000Hz | + | − | 9° | + | − | 360° | + | 📷 |

| ppo | 12 ▼ | ±180° ▼ | ☑ use coherence | − | 0,70 | + | All ▼ |

Show values:

- -180° to +180°
- 0° to 360°

Coherence chart properties
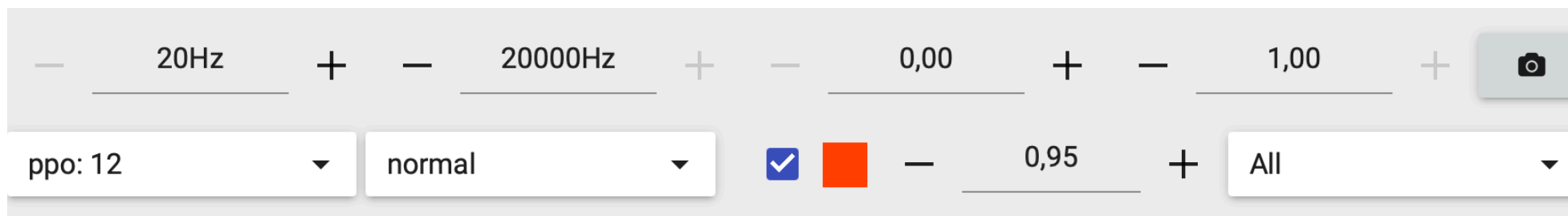
Show normal, squared or SNR value

Points per octave

Coherence chart properties

Show help line and its value

Spectrogram chart properties

| 20Hz | + | — | 20000Hz | + | — | 0s | + | — | 4s | + | 📷 |

| ppo | 48 ▾ | — -90dB + | — -50dB + | — 10dB + | Measurement ▾ |
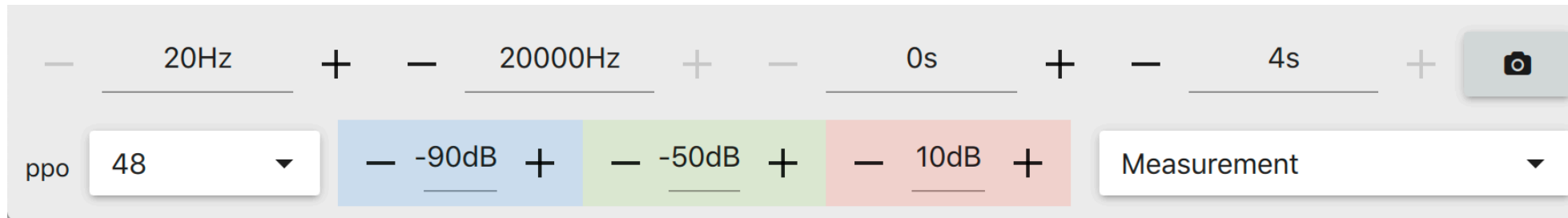
Set colours thresholds   Select a source

Points per octave

Level chart properties

-60,00s + - 0,00s + - 62,00dB + - 140,00dB + 📷

| SPL ▾ | A ▾ | Slow ▾ | | Many ▾ |
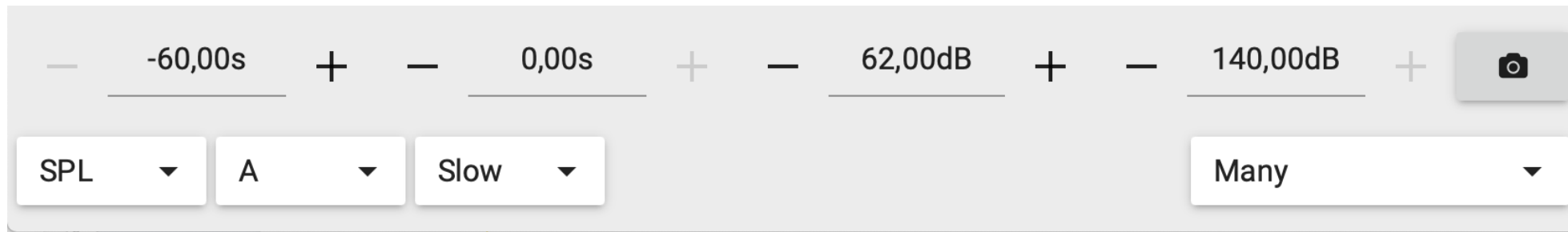
Fast or Slow

Weighting curve

SPL or dBfs

SPL chart

columns count

rows count

SPL chart
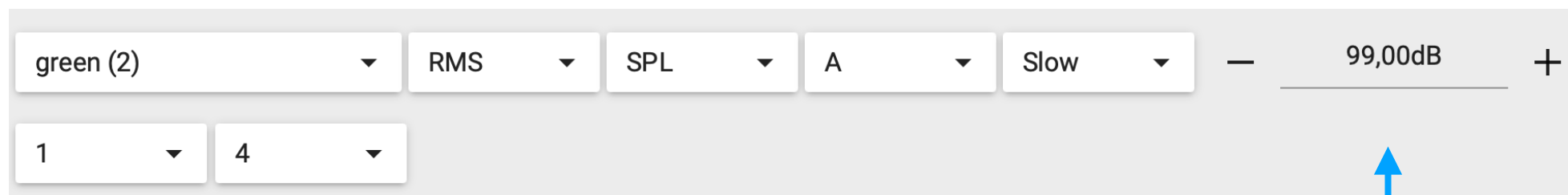
Select source

Value   Scale

Weighting curve

Integration time

| green (2) | ▼ | RMS | ▼ | SPL | ▼ | A | ▼ | Slow | ▼ | — | 99,00dB | + |
| 1 | ▼ | 4 | ▼ | | | | | | | | | |

Warning threshold
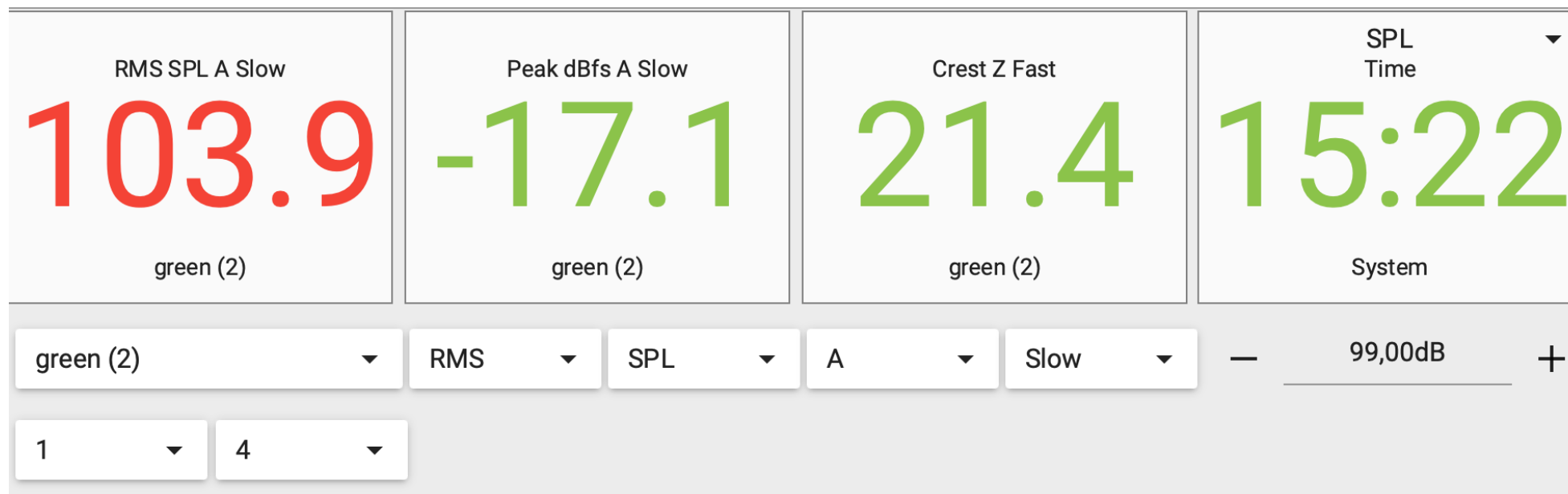
Wavelength calculator

	1000 Hz	+		1,000 ms	+		20°C	+	343,3 m/s
—			—			—			

	0,343 m	+		0,171 m	+			meter ▾
—			—					

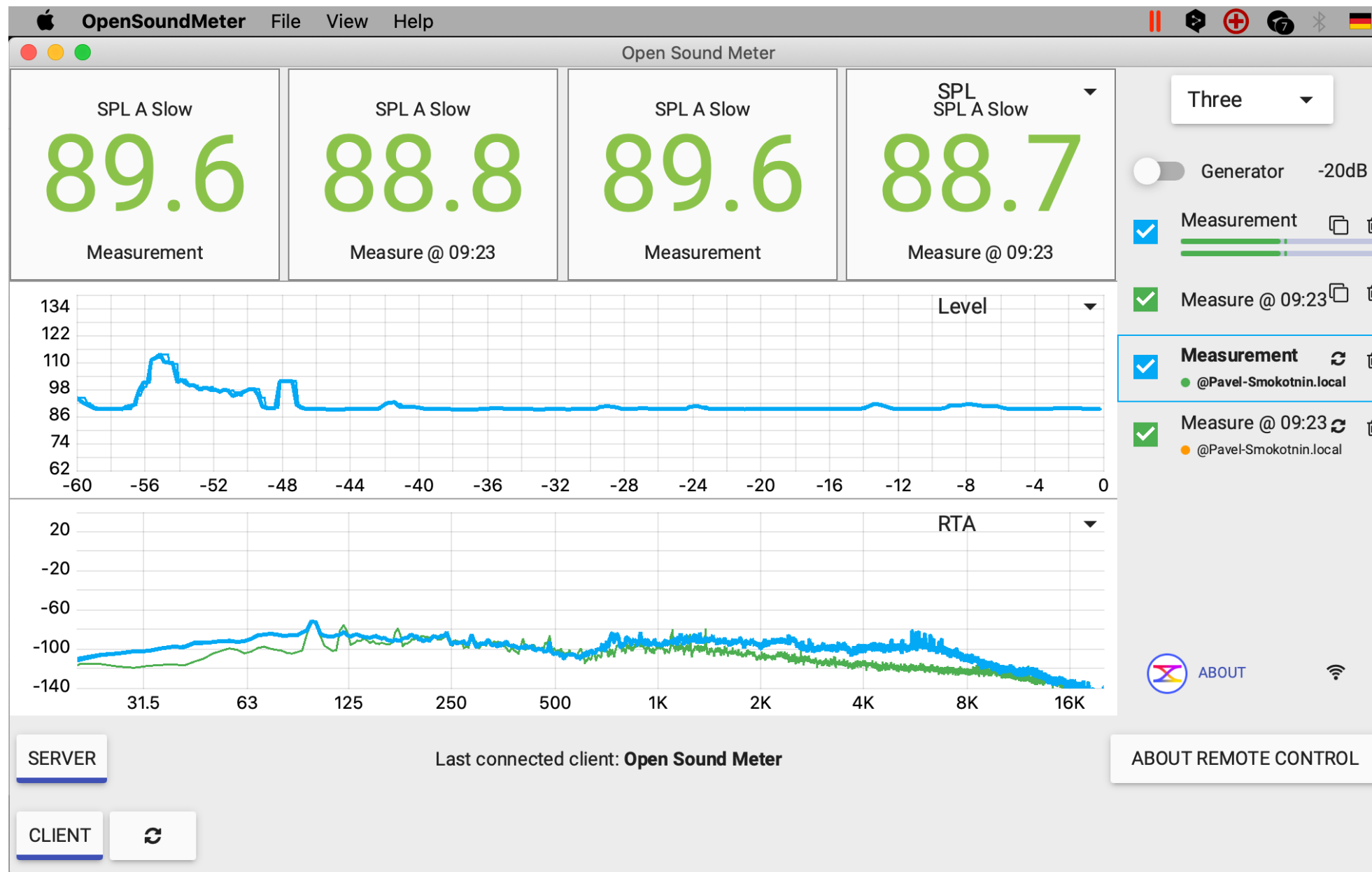Allows you calculate between frequency, period and wavelength.
You can change any value and get others.
Use Shift key to fine adjust value

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.

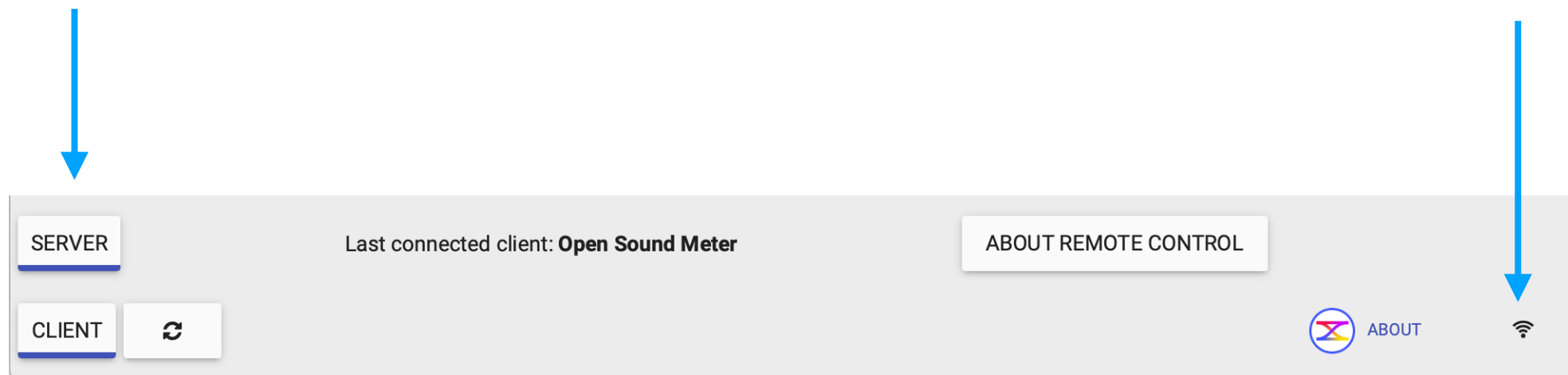# Remote API

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

Remote API

Activate API Server

Open remote settings

SERVER

Last connected client: **Open Sound Meter**

ABOUT REMOTE CONTROL

CLIENT

ABOUT

Refresh connection

Activate API Client

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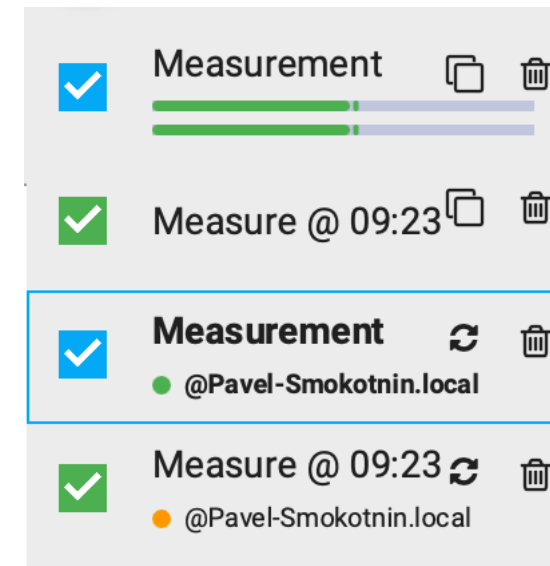If you activate Client application will receive data from Server

Remote API

Remote measurement   ⟶
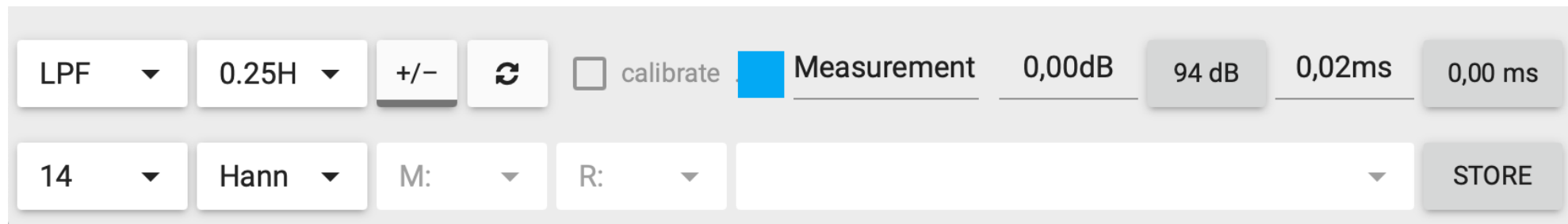
Remote stored data   ⟶

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.

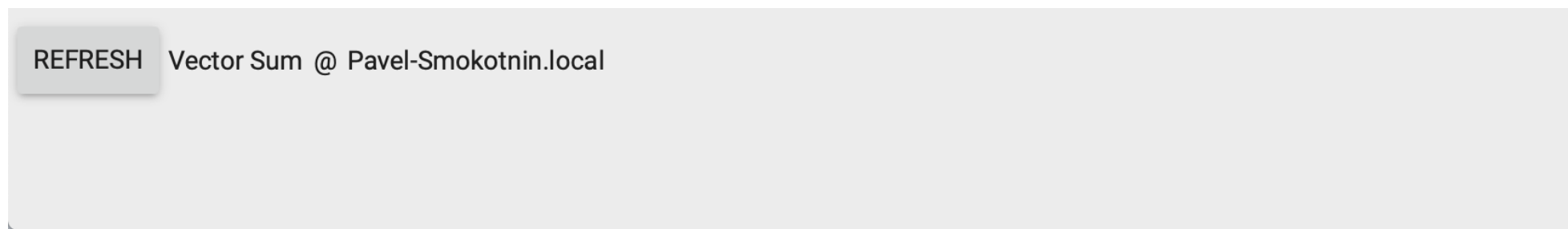# Remote API

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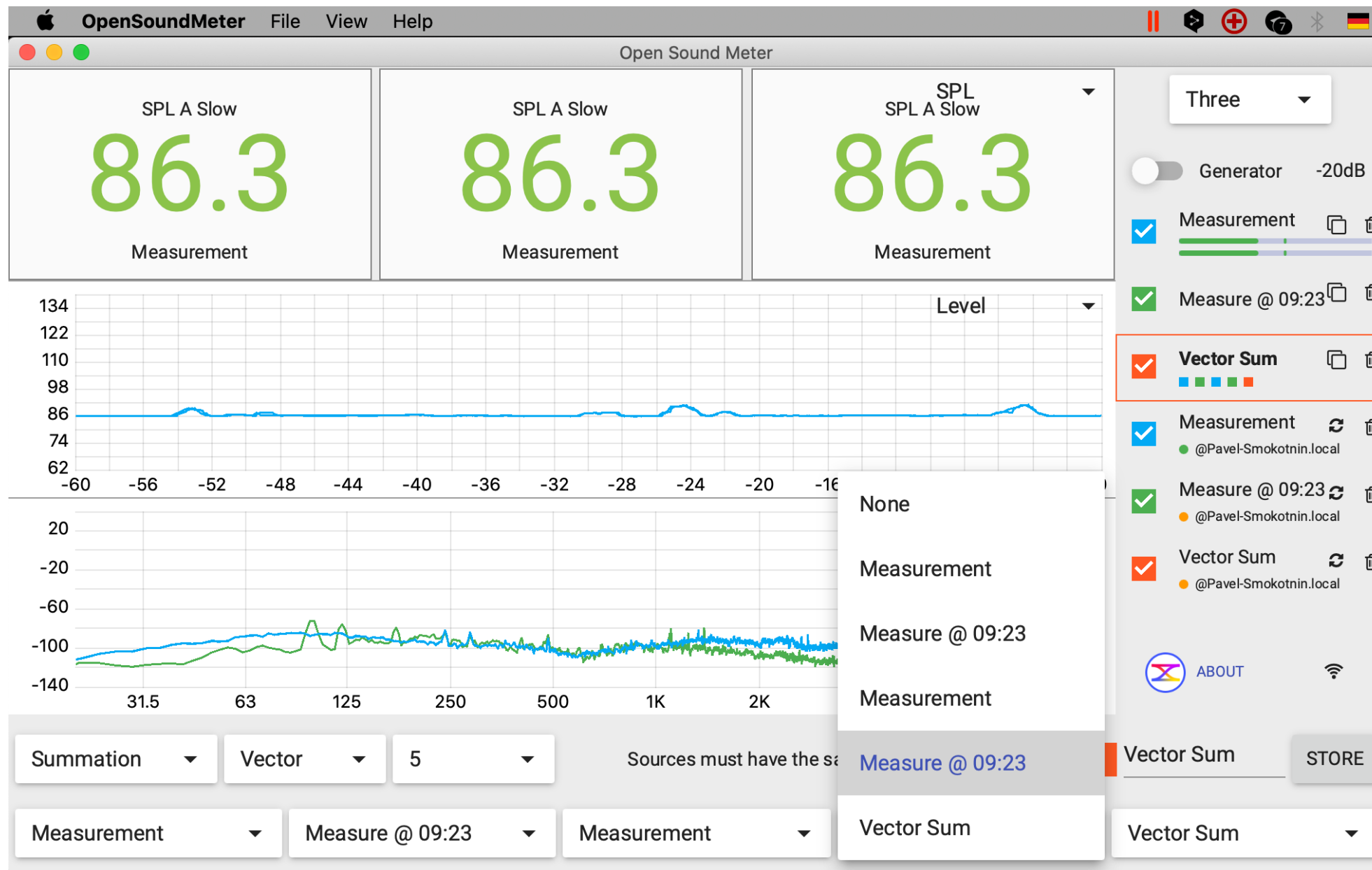
Remote API

REFRESH Vector Sum @ Pavel-Smokotnin.local

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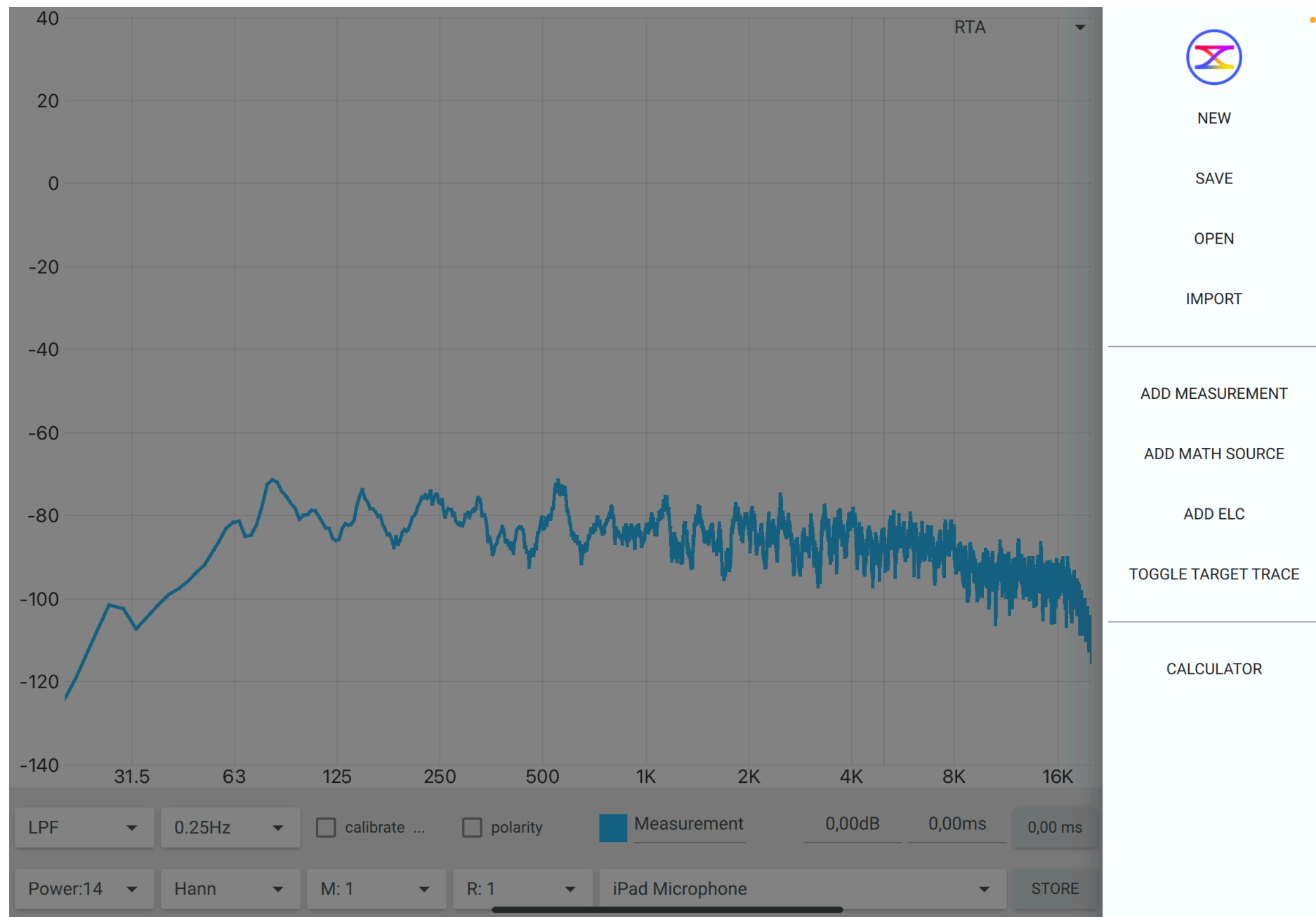
Swipe from left side to the right to open menu.
Or click menu button in the top right corner.

Target trace
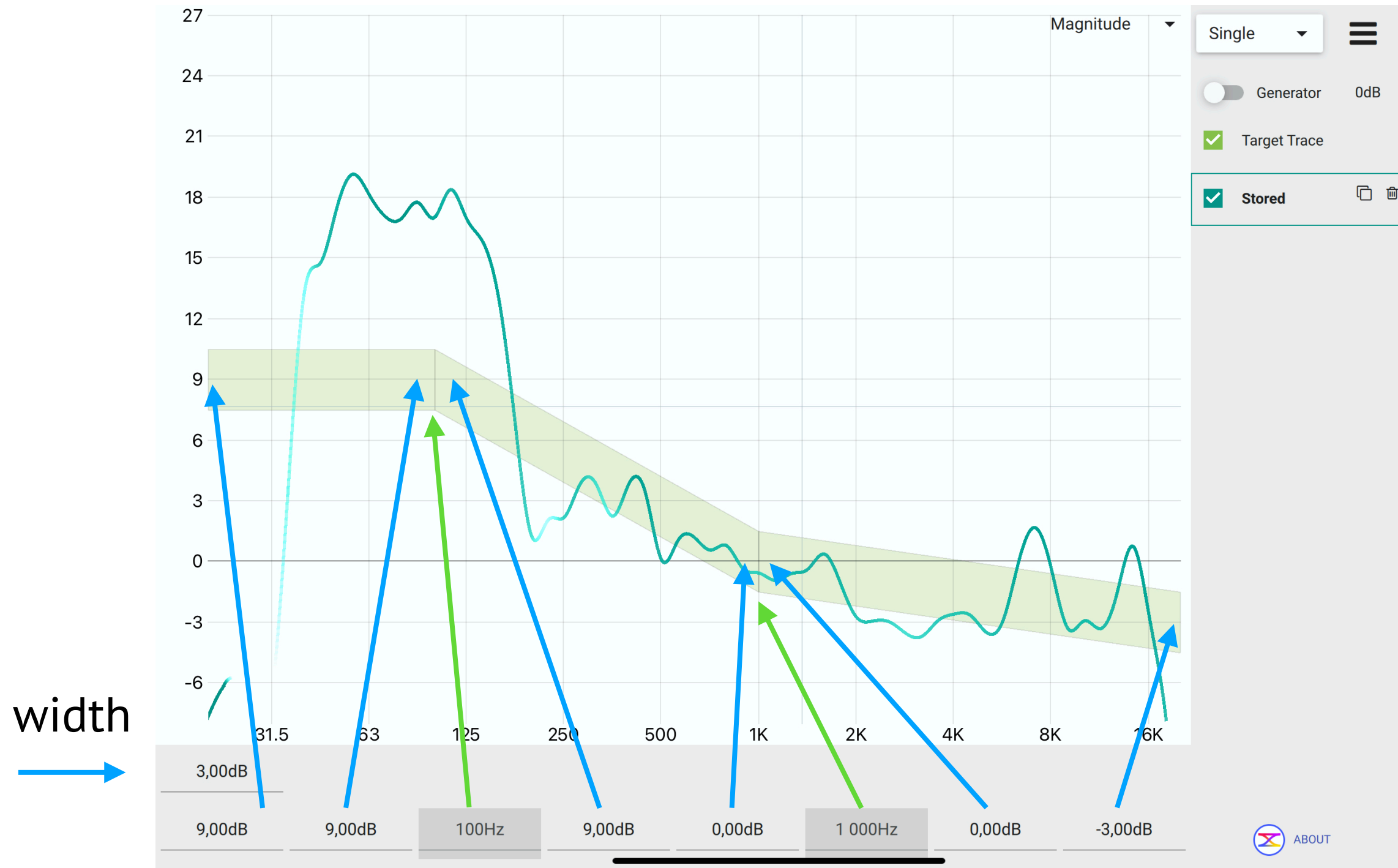
Application menu
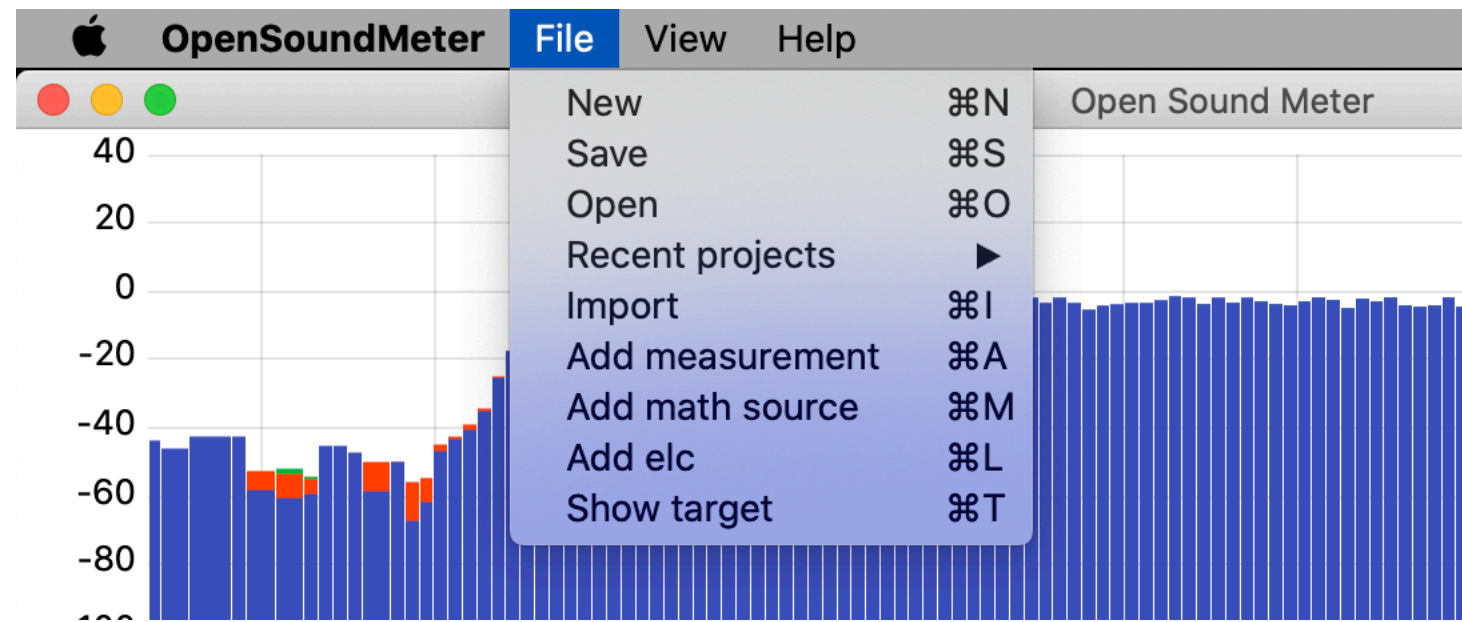
New — create empty measuring project

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 — data from txt or csv format

Application menu
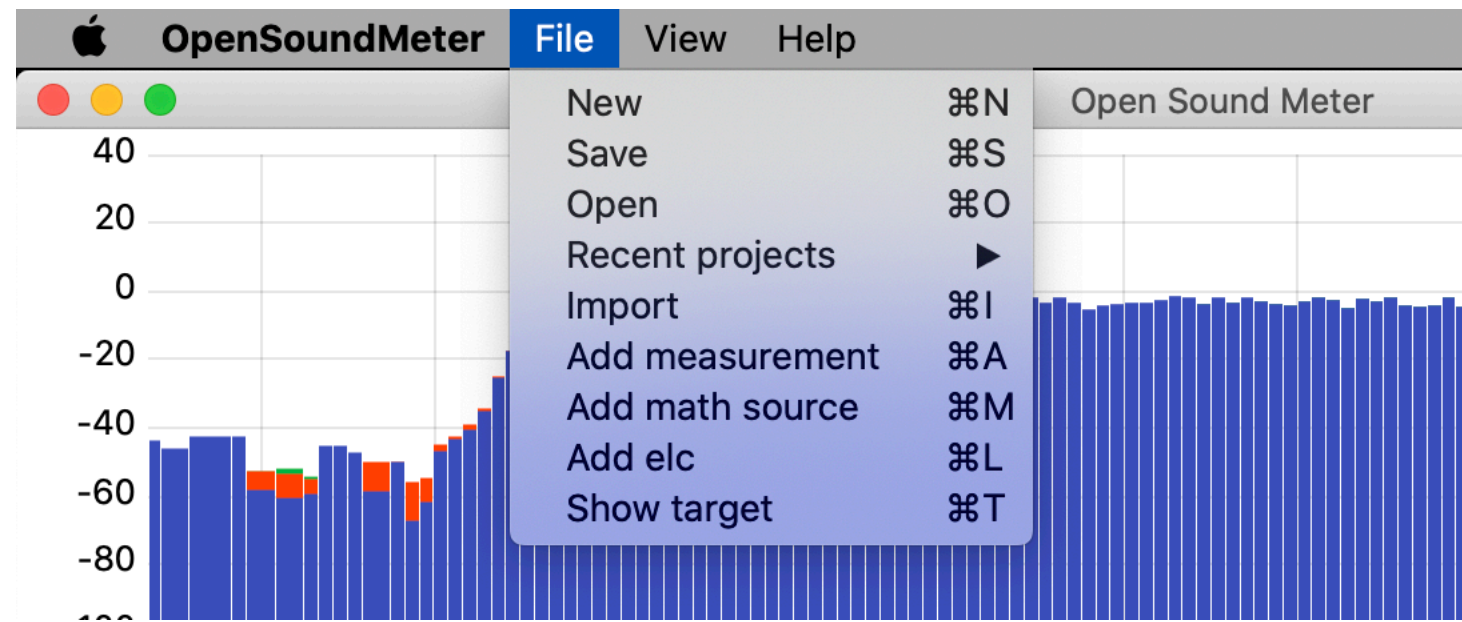
Append measurement — add a single measurement to the project

Add math source — add a single virtual math source

Add elc — add equal loudness contour

Show target — toggle target trace

Experimental functions
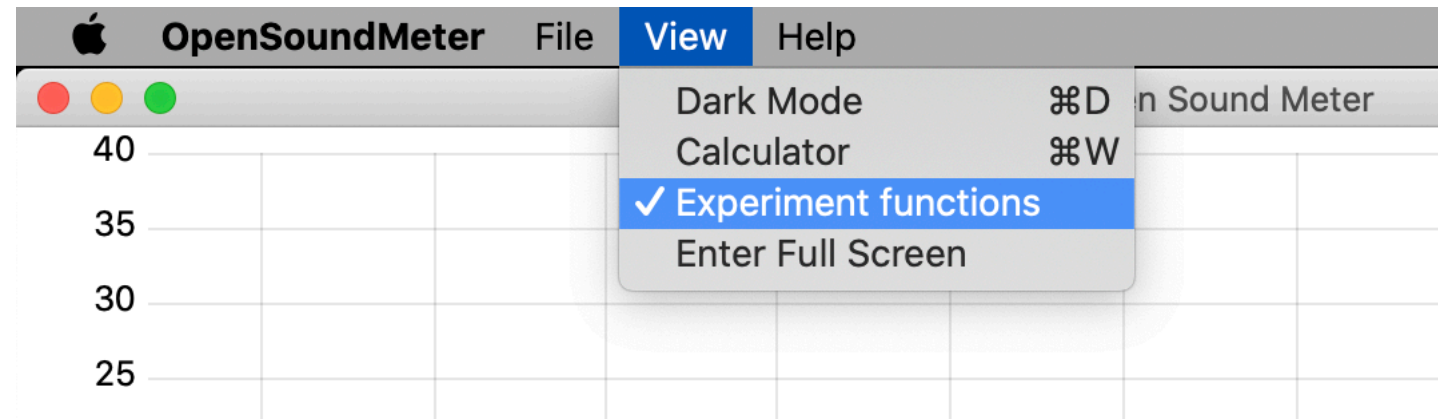
Adds three more available charts:

- 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".
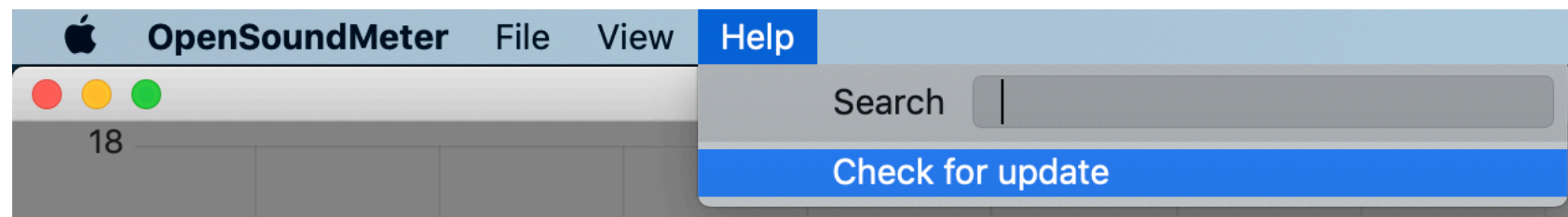
Shortcuts

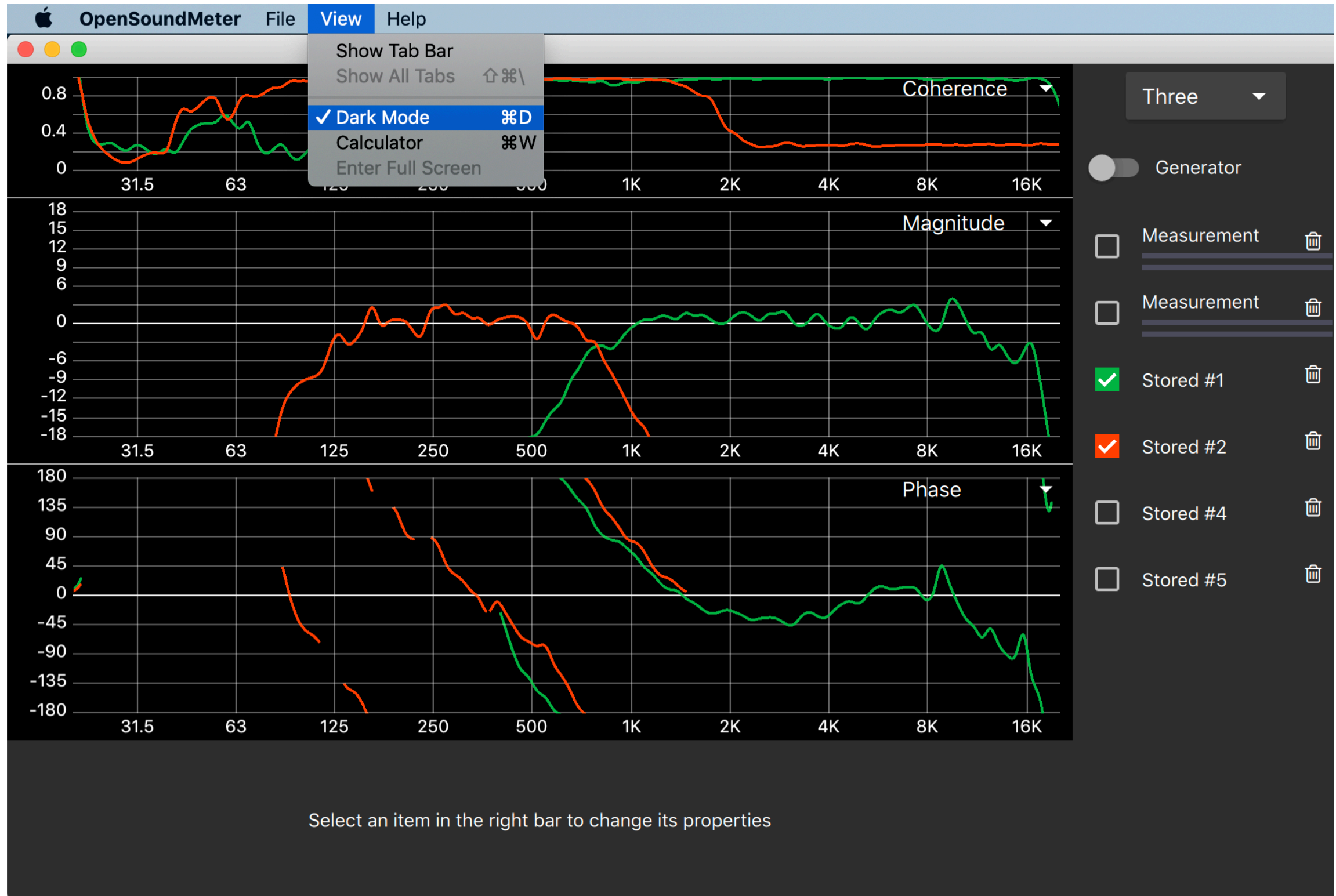| Action	macOS	Windows and Linux
new project	⌘+N	Ctrl+N
save	⌘+S	Ctrl+S
open	⌘+O	Ctrl+O
append measurement	⌘+A	Ctrl+A
append math source	⌘+M	Ctrl+M
add ELC	⌘+L	Ctrl+L
store all measurements	⌘+X	Ctrl+X
store current measurement	⌘+C	Ctrl+C
reset averages	⌘+R	Ctrl+R
apply estimated delay	⌘+E	Ctrl+E
Toggle 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	⌘+W	Ctrl+W
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

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

- Create new functions and fix issues if you are a programmer

Thank you for support!

Consulting

We provide consulting service and trainings for users.

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

Follow

facebook.com/opensoundmeter