Smaart v8.3 Release Overview

rational acoustics

Table of Contents

8.3 Release Notes

· Added control of the Roland® OCTA-CAPTURE™ to the Input Meters window
> O Added "Gain Tracking" feature that detects changes in the gain of OCTA-CAPTURE inputs and automatically adjusts the input calibration.

· Client Window improvements
> O New WebSocket-based network API
> O Added Live IR support for transfer function measurement data
> O Added signal type selection to Signal Generator control
> O Added Level Meters to individual measurement controls
> O Added measurement stream throttling options (in API Options)
> O Live Averages are now available remotely
> O Eliminated multiple crash scenarios

· Added Frequency-domain Time Windowing (FTW) for complex averaged transfer function measurements
· Added Normalized Power Spatial Averaging for live and captured transfer function measurement averages
· Improved Fractional-octave Smoothing
· Web updater now automatically checks for updates on start-up if an internet connection is available.
· Added support for using MTW with devices running at 96k sample rate
· Expanded Leq capabilities to allow more Leq measurements with user defined time periods
· Alarm level indicator is now plotted in the SPL History plot regardless of displayed metrics
· Top SPL metric in the SPL History z-order is now highlighted in the plot legend
· Display state of SPL Metrics in SPL History is now persistent
· Deleting windows from the Measurement Config tree now prompts you to keep or discard the window's tabs
· Main application window can now be deleted from Measurement Config
· Configuration is now automatically saved when exiting the Configurator
· Changed label text for "Inverted" check boxes in transfer function Measurement Config and Trace Info dialog for captured transfer function traces to "Invert Magnitude Display"
· Optimized 10EaZy device access to reduce CPU usage
· Signal Generator toggle button in Signal Generator Options now turns red when generator is turned on
· Added hover text to Config Management table if config name is longer than table width
· Recapture now replaces the top trace in the Data Library if no captured trace is selected
· Fixed a bug where SPL A Slow would use the wrong time integration
· Fixed a bug where 10EaZy MAM display would reset after hide/show of SPL Meters window
· Fixed a bug where clicking the Spectrograph axis in IR Mode could set the zoom range to something random
· Fixed a bug where trace order was lost when moving multiple traces to a folder
· Fixed a bug where the Live IR plot would revert to default settings after toggling hide/show
· Fixed a bug in Windows build where Generator could fail to output audio under certain circumstances, depending on input and output channel selections
· Fixed bugs related to the on-screen keyboard appearing in Windows when text fields have focus
· Fixed a bug where the Command Bar could lose all of its buttons
· Fixed a bug where the Live IR trace could disappear
· Fixed a bug that caused Smaart to freeze momentarily
· Fixed a crash that could occur when deleting a Tab

Roland OCTA-CAPTURE Control Integration

When a Roland OCTA-CAPTURE recording interface is used with Smaart v8.3, you can directly control/monitor Gain, Phantom Power, and Polarity settings for the OCTA-CAPTURE's 8 mic preamps using Smaart's Input Meters window. Simply choose the OCTA-CAPTURE for use in I-O Config, then use the hotkey SHIFT + E to display the Input Meters window. The control implementation is bi-directional, so changes made from the front panel of the OCTA-CAPTURE are immediately reflected in Smaart's Input Meters.
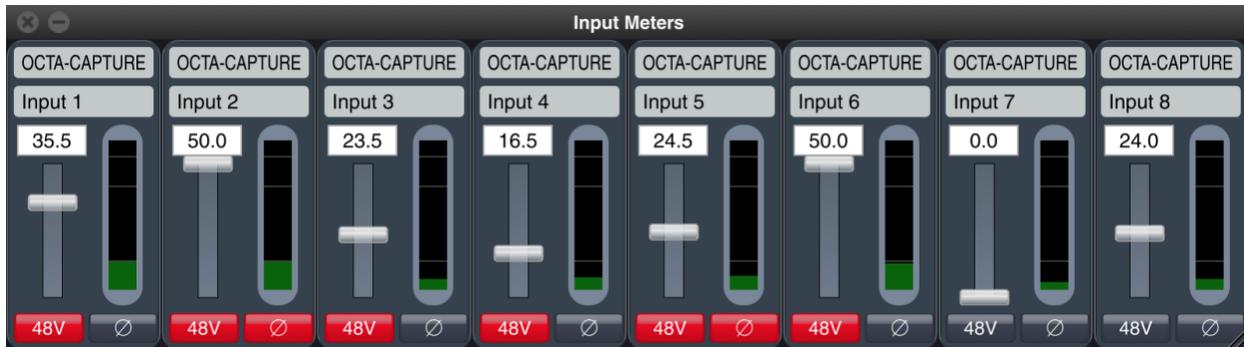
Gain Tracking

Smaart v8.3 can detect changes in the gain setting of the OCTA-CAPTURE inputs and automatically adjust the input calibration to compensate for the change. This feature is enabled by checking the box that says "Gain Tracking" below the device details table in I-O Config.
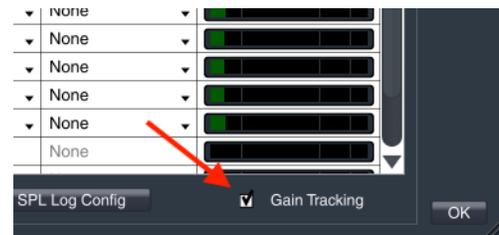

A note about Gain Tracking accuracy

Due to variations in precision across the gain range of the OCTA-CAPTURE™ inputs, Gain Tracking accuracy is roughly +/- 1.5 dB at gain settings of 0 and 50 when calibrated at a gain setting of 25. This can also vary between devices.

To quickly determine the accuracy of your specific device when used with the Gain Tracking feature, set an input to a gain of 25, then calibrate for sound level measurements using a microphone calibrator. Finally, with the calibrator still fitted to the microphone and turned on, enable Gain Tracking and watch the SPL meter in Smaart as you turn the gain up to 50, and down to 0. This routine represents the most common use-case. The maximum deviation from the known-level of the calibrator represents the maximum expected accuracy of your setup.

Expanded Leq Capabilities

Multiple custom-period Leq measurements can be configured by clicking the "Leq Config" button in SPL Config. Smaart is pre-configured to measure Leq 10 with "A", "C", and unweighted varieties. These measurements can be replaced or removed by either adjusting the settings via the drop menus in the Leq Config table, or using the " - " button to remove the measurement. Additional measurements can be added to the table by pressing the " + " button. Custom Leq measurements are logged in the same way as other sound level metrics.
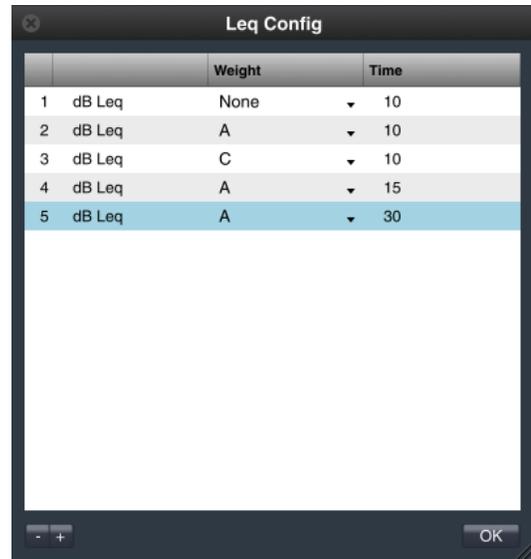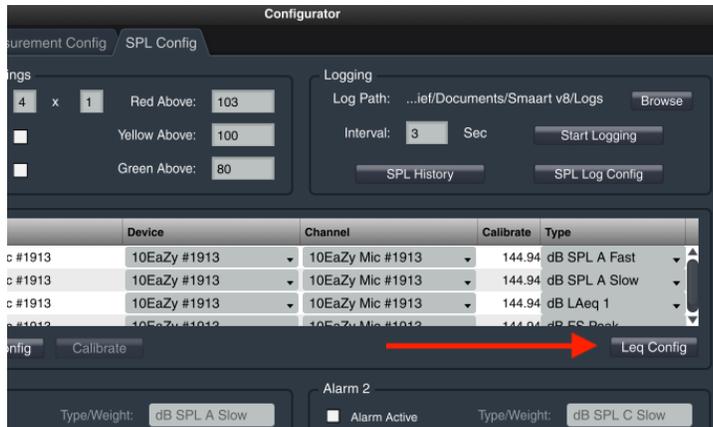
API Options – Additions

New Client Window settings are available in API Options. These settings are sent from the Client Window to the API server upon connection. The measurement stream update rate (FPS=frames per second) and the Live IR Range (plot will show +|- (range/2)) can be configured to accommodate slower network connections or reduced bandwidth. The Command Timeout setting adjusts the amount of time before an API command is abandoned by the server. This timeout should not be increased unless you're experiencing problems with API commands failing.
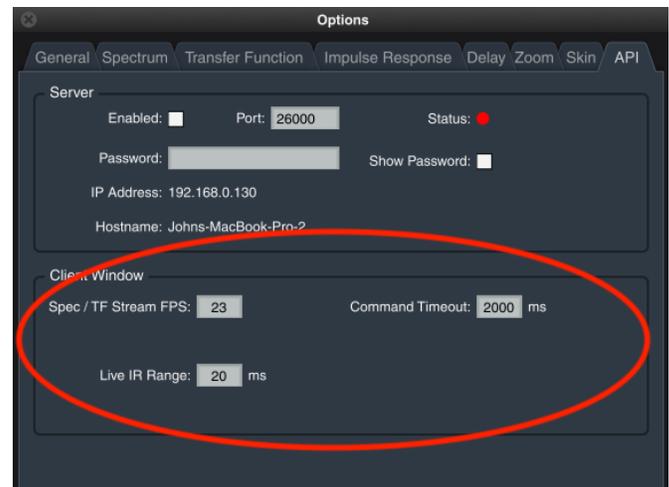
Frequency-domain Time Windowing (FTW)

Frequency-domain Time Windowing (FTW) is a complex, linear smoothing function in the frequency domain that is mathematically equivalent to applying a time window to the impulse response in the time domain. It can be used for any application where a time windowed transfer function measurement is needed, such as windowing out a strong reflection or for standardized measurement procedures requiring time windowed measurements (e.g., InfoCOMM/Avixa's ACU and draft spectral balance standards[1]).

FTW is an advanced feature that is not enabled by default, and it should only be enabled if there is a specific need to achieve a time windowed response. It should be noted that Smaart's frequency-domain Smoothing produces similar results to time-domain windowing in the mid-to-high frequencies, and in many circumstances is far more useful in the mid-to-low frequencies.

To enable FTW, open Transfer Function Options and check the box labeled "Enable FTW" near the bottom of the dialog. Close the Options dialog.
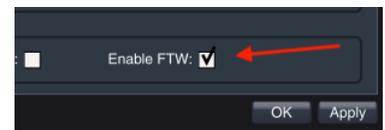
Additional controls are now shown in the program Control Bar. The text field labeled "FTW (ms):" is used to change the half-window size of the FTW smoothing function (see FTW, in-depth for more information). The unlabeled checkbox serves as a toggle to apply FTW (or not). FTW smoothing is applied to live transfer function measurements as well as captured transfer function traces that came from measurements using Complex magnitude averaging. **Note:** When FTW is enabled, the Mag Averaging Type is locked to "Complex", as complex-averaged data is required for the calculation.

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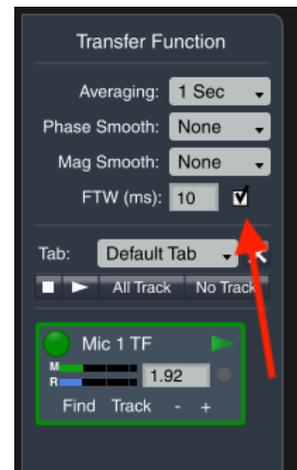
[1] ANSI/INFOCOMM A102.01:2017. Audio Coverage Uniformity in Listener Areas; AVIXA A103.01:201X. Spectral Balance of Sound Systems in Listener Areas

When FTW is applied, a red vertical line is displayed in the Phase and Magnitude plots. This line represents the "cutoff" frequency for usable data; anything below the cutoff frequency should not be considered accurate.
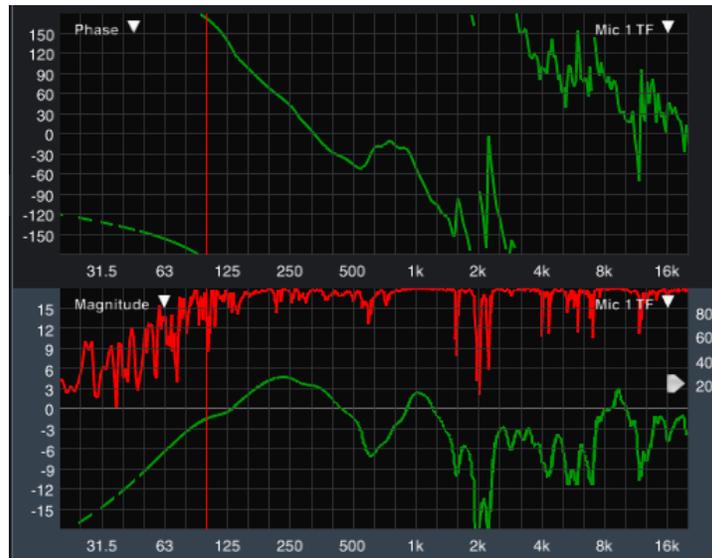

FTW, in-depth

FTW complex smoothing is specified in terms of the equivalent nominal half-window length. Because the equivalent window function in the time domain is fully symmetrical, the maximum half window size is one half of the FFT time constant, however as a general rule, 25-30% might be considered a practical maximum.

The shape of the equivalent window function in the time domain is somewhat dependent on the relative length of the nominal half window. At half-window sizes up to 25% of the FFT time constant, the equivalent FTW time window is similar to a slightly flattened Hamming window, providing a minimum of -22 dB of attenuation at the nominal window edges. At half window sizes between 25% and 50% of the FFT time constant, the window becomes flatter in the center, allowing lower frequencies more time to "ring out." The trade-off of longer relative window sizes is less attenuation in the noise tail of the IR and so half-window sizes greater than 25% will tend to work best with very well behaved measurements.

The chart below shows equivalent FTW time window functions for 10%, 25% and 50% half window sizes relative to a 16K FFT.
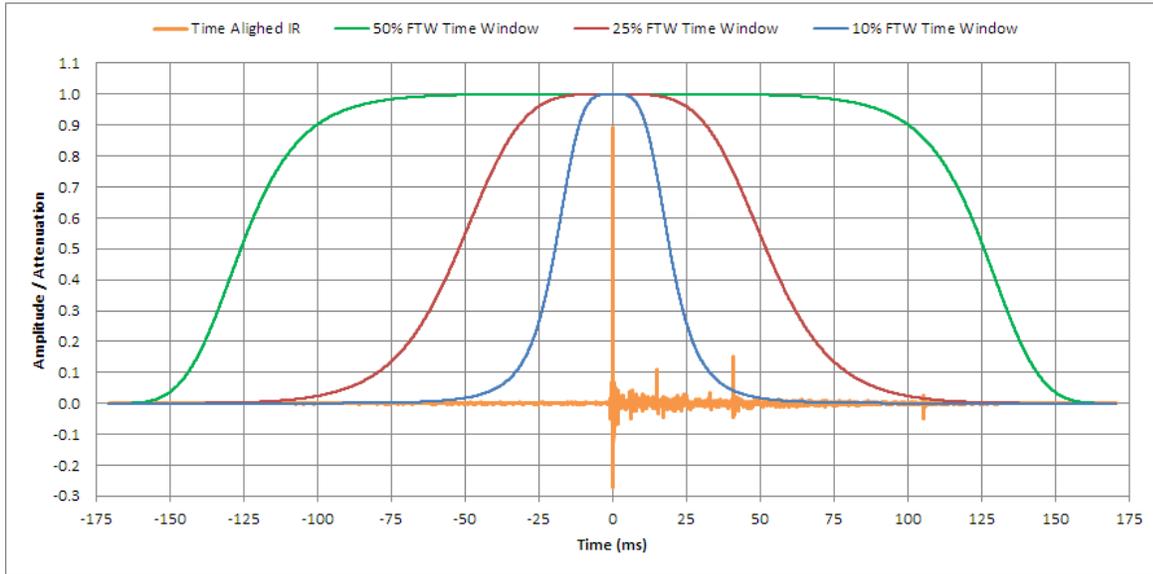
A comparison of Smaart FTW and Hamming window functions with 10% nominal window sizes.