



VST Plugin Analyser 2.0

1 About

The VST Plugin Analyser is a tool to analyse VST effect plugins from several different aspects. It not only shows the properties and information of a VST plugin, but also performs several different measurements to evaluate the signal processing taking place within the VST plugin.

2 Requirements & Limitations

Supported OS:

- **Windows** (XP/Vista/7/8) for both 32-Bit & 64-Bit (with some limitations)
- Mac OS X (based on Carbon) will be supported as well, but later.
- Linux should basically compile/run as well (either using GTK2 or QT)

Plugin Formats:

- **VST 2.3/2.4** will be the default plugin format
- VST 3.x support is planned for a future version
- AU (as soon as there is a Mac OS X version)

A fast CPU is recommended for fast refreshing. GPU acceleration is planned, but will only be available to a certain level (basic 2D rendering).

3 Measurements

In the beginning only the most basic measurements are supported. These include:

- Impulse/Frequency Response Measurement
- Harmonic Distortion
- Waveshaper function (if applicable)

Furthermore some other measurements for dynamics might be available such as:

- Static Characteristic
- Attack/Release Time measurements
- Sidechain filter measurement

All measurements will feature a dedicated dialog to specify further parameters of the measurement. However, the user can also run in easy mode, which does not display the dialog and use the last or default settings.

Eventually each dialog will inherit a field to change the sample rate.

3.1 Impulse/Frequency Response Measurement

The impulse response can be measured using the following excitation signals

- Impulse
- Logarithmic Sweep
- Linear Sweep
- Noise
- Any other WAV file

In addition the level of the excitation signal can be changed from full scale (0 dBFS) to -144 dBFS (which covers at least 24 bit = mantissa of a single precision float).

In case a logarithmic sweep has been selected as excitation signal, the harmonic distortions can optionally be suppressed.

Furthermore a reference impulse response can be used which is deconvolved in real time. With this it is possible to display only the delta from one setting to another setting. As in version 1.0 the reference can be set from within a measurement using a hot key (not yet defined).

The impulse response is automatically transformed into the frequency domain using an FFT. The resulting spectrum is often referred to as frequency response.

3.2 Harmonic Distortion Measurement

To measure the harmonic distortion of a VST plugin a pure tone (sine wave) is passed to the VST Plugin. The frequency is chosen in a way to fit exactly into the measurement buffer (which is typically in the size of 2^n for fast FFT transformations). This technique is called coherent sampling. The default frequency is 1000 Hz and level is set to 0 dBFS, but either the frequency and level can be changed by the user. Furthermore the fundamental frequency can be suppressed in the output.

3.3 Waveshaper Function Measurement

The waveshaper function is evaluated as relation between the input and the output. In contrast to the measurements mentioned in 3.1 and 3.2 the waveshaper function is a 2D function (input on the x-axis and output on the y-axis). Since hysteresis can appear in the plugin under test, the function can also be an area.

Detailed options are not yet specified, but may included excitation signal, hysteresis check, pre-filtering (deconvolution).

3.4 Dynamics: Static Characteristic Measurement

Similar to the waveshaper function, the input/ output relation can be plotted for dynamics (typically using a double logarithmic dB plot). The options for this type of measurement are not defined in particular, but may include excitation signal (currently square wave, but should be sine[/square]/noise with adjustable frequency for multiband dynamics). Also the measurement duration can be specified.

3.5 Dynamics: Attack/Release Time Measurement

The attack/release time can be measured by tracking the level change of a predefined excitation signal (switch on for attack, switch off for release).

3.6 Dynamics: Sidechain Filter Measurement

To improve dynamics measurements the sidechain filter must be evaluated and compensated if possible. A dedicated module shall be present to estimate the sidechain filter.

4 Tools

In addition to the measurements several useful tools will be present for different tasks.

The tools definitely present in version 2.0 will be:

- Benchmark
- Signal Generator
- Stability Test

Similar to the measurements each tool will have a dedicated dialog to set and tweak parameters.

4.1 Benchmark

The basic idea of the benchmark is to process a certain amount of data (for example 1 second) and measure the required time for the processing by the plugin. The ratio can be used to estimate the CPU usage (typically for a single core).

Options are:

- excitation signal (noise/silence/arbitrary file)
- block size
- duration

4.2 Signal Generator

Similar to the measurements, the plugin is feed continuously with a certain excitation signal coming from a dedicated signal generator. The signal generator can generate:

- Sine/Square/Saw/Triangle wave of arbitrary frequency
- Noise (White/Black)
- Silence (/ DC)

4.3 Stability Tests

The [VST Plugin Unit test suite](#) shall be integrated neatly into version 2.0. It can be useful for developers, but also to track bugs and issues for users.

4.4 Further Tools

It is planned to add as many of the existing tools to the new versions, but only if it is possible to remain a consistent user experience. Eventually some tools might not work as they do in version 1.

5 Displays

In the new version, the VST Plugin GUI remain the main focus of the application. However, typically the measurement data needs to be displayed, which will happen in dedicated windows.

So far there will be 3 basically different windows for the data output. These are:

- 1D data display (audio data, impulse response, spectrum)
- 2D data display (functions for waveshaper and static characteristic)
- Text Display (for log file information)

Eventually there will be a 3D data display for waterfall charts and harmonic distortion maps (distortion in relation to frequency and level). However, since this means to add 3D support, it is yet discarded.

The data displays can be rendered either in software (at least one renderer already available yet) or hardware (either using OpenGL or Direct2D). Screenshots of the data displays rendering can be saved directly as PNG. Furthermore the data can be passed/rendered to a vector file format (such as SVG).

5.1 VST Plugin GUI

The VST Plugin GUI can be shown either as the default GUI (provided by the VST Plugin manufacturer) or as generic parameter interface. With the later it might be possible to tweak parameters that are not present on the GUI of the Plugin or to exceed the GUI's limitations.

Eventually tabs will be introduced to several different plugins in parallel. This would make comparison easier. A switch between different plugins during a measurement shall be possible then.

5.2 1D Data Display

The 1D data display is responsible to display all 1D data over a fixed grid (typically the time [or its inverse the frequency]). It will also display the FFT output data as real value (either real, imaginary, magnitude, phase [wrapped, unwrapped] or group delay).

The 1D data can be interpolated between the samples/bins using either nearest/linear/spline/sinc interpolation. The axis can scale linearly or logarithmically (for dB).

A simple cursor will be available to navigate within the data. This can be useful to select certain portions for further processing or export.

5.3 2D Data Display

The handling and rendering of 2D data is similar to 1D data. However, the display will be slightly less sophisticated, since 2D data is not as common as 1D data.

5.4 Text Display (log file)

As in version 1.0 of the VST Plugin Analyser, the text display will only contain log information. Its data can be stored as .txt file.

6 *New Features / Feature Requests*

The following list contains feature requests, that might or might not make it immediately into version 2.0., as it depends on the complexity required to implement these features.

The below list is divided into 3 sections, the one that will be implemented, the one that might be implemented and the one that has least priority (for several reasons):

1. Features that will make it to version 2.0:

- External I/O support routing (at least as I/O plugin)
- Level/gain adjust to get signal test at -18/-20 dBFS (by measurement)
- Portable version (settings are saved in registry by default, except if the executable has a local ini file, as can be selected in the settings)
- DC offset filter (implemented per measurement)

2. Features that might make it to version 2.0:

- 2x2 FX Chain support w/ latency compensation
- GUI + plot screen shot (both are possible, but not at the same time)
- Multi test mode with frequency/phase/static compression/HA distortion plots
- x2 and x4 oversampling (sampling rate can be specified in the measurement dialog, but not dedicated oversampling)
- some own ideas, not sure if they work out

3. Features that might not make it to version 2.0:

- yet empty, but will be populated when development starts and some features were to ambiguous

7 *Licensing*

The VST Plugin Analyser 2.0 will be still free for non-commercial purpose. However, export features will be limited in the free version. A commercial license can be obtained enabling the full potential, which is mainly export function and some extended processing of the data prior to the export.

8 *Summary*

A rough specification for the version 2.0 of the VST Plugin Analyser has been collected. Some parts are already implemented and others can be copied from the original version.

To get all the things mentioned above implemented, about a month of work is required. The calculation assumes working full time, which can not be achieved right now (as I need to get other things to be done at the same time).

However, the planned release date will be Q1 of 2013. Everyone who is willing to support the development can donate money (about 1500€ is currently still necessary to get things started). For every donation above 100€ the supported will receive the full version once it is done. Other supporter (with donations above 10€) will receive a special version with some goodies. Everyone donating will be mentioned in the about dialog.