LiquidSonics

Reverberate Core

Convolution Reverb for Mac and PC

User Guide

Applies to Reverberate Core v1.210 (and above)

Taking the core convolver capabilities from Reverberate, Liquid Sonics' Reverberate Core is a highly efficient true stereo convolution reverb audio processor featuring true zero-latency operation with oversampled paragraphic equalisers and envelope control for Mac and PC.

1. Installation and Requirements

To install Reverberate Core an Intel Mac or Windows VST/RTAS DAW PC is required. It is recommended to install the plug-in on at least a Pentium 4 2.4GHz PC with 512MB memory. Installation and registration are different under Mac and PC.

Windows PC

The install process will request a number of file locations, your license key file and the type of plug-in you wish to install (VST for most hosts or RTAS for Pro-Tools). Typically Windows VST plug-ins are installed in c:\Program Files\Steinberg\Vstplugins and this folder location should be selected unless another location is used on the target system. RTAS plug-ins for Pro-Tools are typically installed in C:\Program Files\Common Files\Digidesign\DAE\Plug-Ins.

CUDA Support (Windows only)

Reverberate Core for Windows (32-bit and 64-bit) includes support the LiquidSonics CUDA convolver when used within a compatible software and hardware environment. Compute Capability 1.1 is required to enable the CUDA convolver within Reverberate Core (this excludes GeForce 8800 GTS cards). All other CUDA enabled cards are thought to be compatible but neither system or device compatibility is guaranteed.

Availability of the CUDA convolver option within Reverberate Core is highly dependent on the provision of a valid CUDA environment by the user and no guarantee of stability or compatibility with any card or system configuration can be provided. Reverberate Core requires CUDA compatible NVIDIA drivers for Windows XP, Vista or Windows 7, version 260.99 or higher. For information on how to enable the CUDA convolver please refer to the Settings tab documentation under latency.

Special note for 64-bit VST installers: During the installation procedure you will be asked if you wish to install Reverberate Core 64-bit using the same plug-in as Reverberate Core 32-bit.

- For new users it is recommended that you use the same ID.

- For users with projects in 32-bit hosts upgrading to 64-bit hosts and installing Reverberate Core 64-bit it is recommended to use the same ID as the host should then use Reverberate Core 64-bit with your Reverberate Core 32-bit presets in your existing projects/songs.

- For users with projects/songs made in Reverberate Core 64-bit 1.040 and below this is **not** recommended as the host will no longer be able to locate Reverberate Core 64-bit.

Whilst it is possible to install Reverberate Core 32-bit and Reverberate Core 64-bit at the same time, where the same plug-in ID option is selected with Reverberate Core 64-bit it is recommended that only Reverberate Core 64-bit is installed (i.e. Reverberate Core 32-bit should not be installed to avoid conflicts).

Mac

To install the plug-in on Mac, simply run the installer and select your local disk. Your license file is selected after the installation process – open the plug-in and click the LiquidSonics logo, then click 'License' and then select your license file from a location on disk.

2. General Usage

The plug-in is split into the following areas:

- Impulse Response Editing Tab (Wav, WIR, Aiff, SDIR, Flac)

- Impulse Response Filter Tab

- Settings Tab

- Sample Browser

- Presets Browser

The IR tab controls the impulse response(s) to be used for the convolution reverb. The filter tab provides an equaliser that is applied as an offline process.

Processing Delay

On the settings tab is a pull down to change the processing delay associated with the convolution engine. This can be selected from a range of values and applies to all audio processes. Selecting a higher delay typically reduces CPU load. Much effort has gone into optimising the plug-in for efficient operation at zero delay and on a modern processor picking a higher blocking size may be unnecessary.

It should be possible to use the plug-in at zero delay in any host regardless of block size and whatever internal scheme is used to provide the plug-in with samples. Some hosts provide non-powers of two, uneven or inconsistent numbers of samples across process calls; none of these factors should affect zero latency.

2.1. Impulse Response Editor and EQ Tabs

The impulse response editor tab is the first encountered and allows one or (two stereo impulse response in true stereo mode) to be loaded.
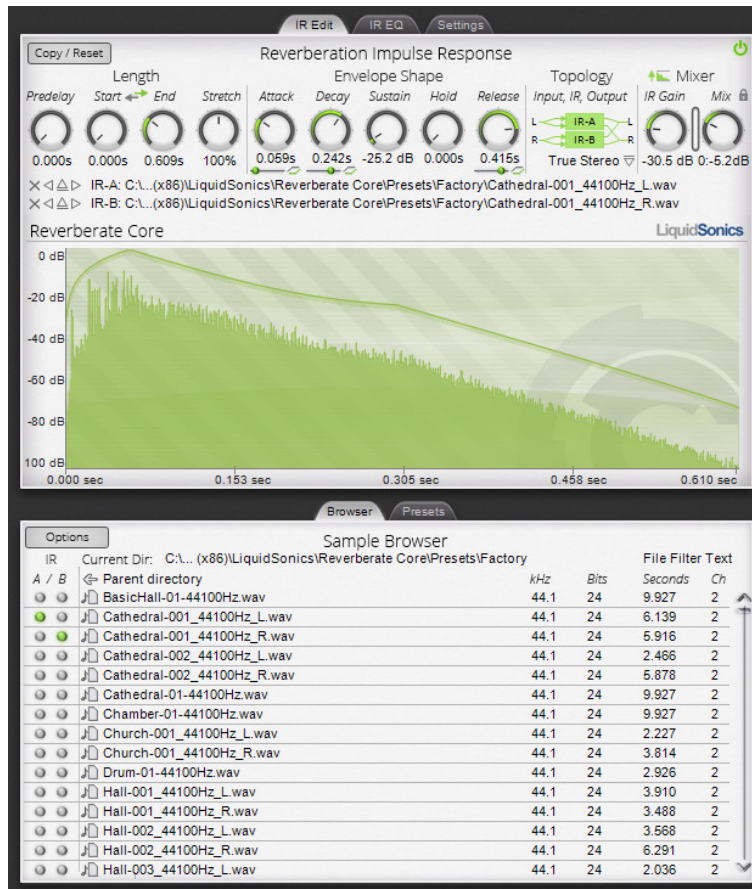
IR / EQ Bypass

The impulse response and filter tabs have a bypass switch to enable processing of the IR and/or EQ within the current tab. The grey/green power icon to the top right hand edge of the screen enables or disables each component.

Load IR and Length

The impulse response is loaded using the eject button next to the impulse response name (an upwards pointing triangle), by selecting a file in the browser tab or by dropping a file from an Explorer or Finder window into the IR visualisation area.

Once loaded, the IR can be lengthened, shortened and stretched using the length controls or removed using the X button. The file can be reversed using the arrows icon between the Start and End length controls.

Mono, stereo and 4-channel IR files can be loaded. The parallel and mono-stereo topology modes will only use the first two channels of a 4-channel file. In true stereo topology mode selecting the same 4-channel file for IRx-A and IRx-B will load channels 1 and 2 into the IRx-A stereo pair and 3 and 4 into the IRx-B stereo pair.

The left and right spinner arrows provide the ability to rapidly move between files in the current directory. When true stereo files are used and the auto pairing mode is active (see the settings tab) the eject and arrows for IR-A attempt to automatically load an appropriate file into the IR-B file container based on the recognition of the presence of L, R, Left and Right (case insensitive) in the file names.

Gain and Mix

The gain of the IR and dry/wet mix can be controlled via the final two dials. Between them a VU meter shows the output audio level. It is recommended to reduce the IR gain or input to the plug-in when the dials show red. The lock icon next to the mix control allows the mix level to stay the same across different presets (this is especially useful when using Reverberate Core as a send effect).

Amplitude Envelope and Normalisation

A normalisation parameter is provided to maximise the amplitude of the loaded IR.

The envelope controls provide the traditional synthesizer-style envelope shape controls to control attack, hold and decay of the IR. The shape of the envelopes can be modified to affect the nature of the speed of attack, decay and release; exponential and logarithmic envelopes can be defined with a parameter to control the degree of shaping applied (a horizontal slider below the circular dials). Reverb tails may sound more natural when using an exponentially decaying shaped envelope.

Note that the plot is logarithmic in the vertical axis; on such a scale linear or log envelope lines are curved and exponential lines are straight.
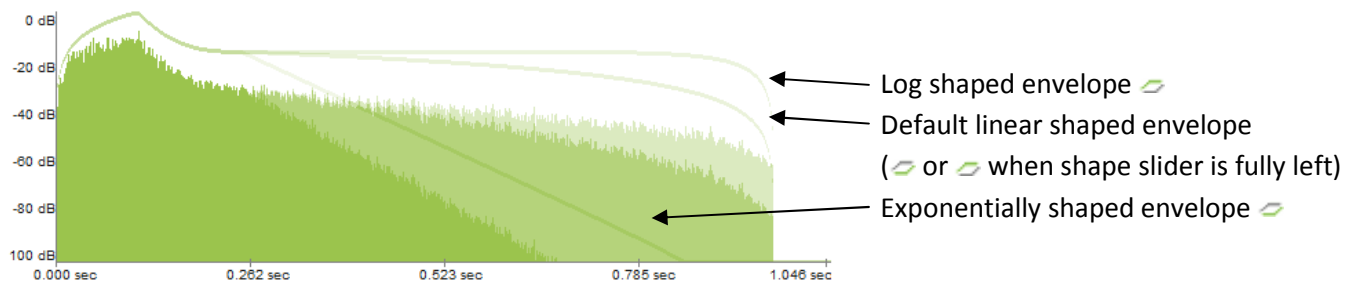

Automation Note

All parameters in this section can be controlled by/from the host and obey parameter automation instructions, hence real-time modification of these parameters is possible. Since many IR modifications require re-computation for each change requested (denoted by an orange egg timer shown in the top left corner) it is not recommended to apply host based modulation to such parameters as CPU usage will be considerably higher.

Topology

Three topologies for convolution are provided:

1. Parallel Stereo: The left input channel is convolved with the left impulse response file channel and the right input channel is convolved with the right impulse response file channel. This is the typical configuration for stereo convolution reverbs when used with stereo impulse responses, although when input audio is panned left or right, using 'Mono to Stereo' may provide more intuitive results.
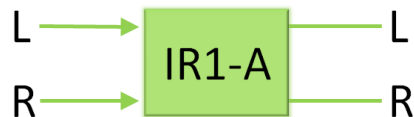
2. True Stereo: The left input channel is convolved with the left *and* right impulse response file channels from IR-A and the right input channel is convolved with the left *and* right impulse response file channel from IR-B. The two output convolutions' respective left and right components are then summed into a single stereo output. This configuration is necessary to take full advantage of true stereo impulse responses. True stereo impulse responses are required to be provided as two separate stereo files and loaded into IR-A and IR-B. This configuration is typically found in high-end algorithmic reverbs.
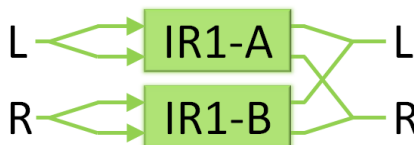
3. Mono to Stereo: The left and right input channels are mixed to mono and then independently convolved with the left and right impulse response file channels. When using a single stereo impulse response file, this is useful when input audio is panned hard left or right; this configuration is often encountered in low/medium-end stereo algorithmic reverbs.
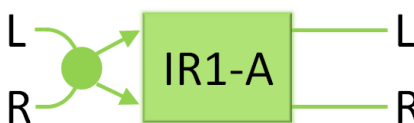
IR Equaliser Tabs

The IR EQ filter tab provides a 5-band twice-oversampled paragraphic EQ which is applied to the impulse response(s). The frequency and gain of each EQ band can be modulated in time independently to apply swept EQ effects to the impulse responses. When the final frequency and final gain parameters are set fully left no modulation is applied, otherwise the EQ settings applied to the static IR will be modulated linearly between the start to end times chosen. No modulation is applied if the end time is less than the start time.

Modulation of the EQ can be useful for applying subtle low pass filtering where the frequency cut-off reduces over time to mimic the natural high frequency roll-off in real spaces, or for more creative purposes. Frequency modulation can be set to a linear or exponential time base using the button between the Start and End titles. Moving filters often sound more natural with an exponential time base as lower frequencies are more pronounced. Gain modulation can be set to linear or half-cosine.

The view control sets the position of the EQ display in time. When set fully left it represents the initial state of the EQ and fully right shows the final state of the EQ. The output of the IR EQ is not affected by the view control, it is provided purely for user convenience to help visualise the effect the modulation has over time.

Each frequency band has a full controls tab and there is also a consolidated controls tab where the start position of bands 1-5 can be controlled in a single location for a more traditional EQ manipulation view.

The consolidated view contains controls marked with a note button that can be used to set the frequency to a range of presets from A_0 to $G^{\#}_8$ providing a very musical approach to equalisation.

The EQ graph handles can be dragged to change gain and frequency, and right clicked to toggle them to enabled or disabled. Holding the keyboard ALT key and clicking a handle toggles the EQ type (peak, low pass, etc).

2.2. Sample and Presets Browsers

Reverberate Core includes a browser that is always visible for locating either presets or IR sample files on disk to load. The browser mode is changed by clicking the IR Browser or Presets lower tab headers.

Browser

Clicking a file loads it into the convolver. A favourites menu is provided from which the user can focus the browser on any location where an active IR file currently resides, select the local file system disks/drives or manage favourite location presets. Favourite locations are searched if a file is missing on disk at load-time.

The file filter text box allows the user to filter for files (but not directories) containing a plain-text phrase such as *plate*, *hall* or *aiff*. Some hosts are subject to the caveat discussed in the next section.

Presets

The preset browser provides a mechanism to select and manipulate the 48 presets within a Reverberate Core bank. Clicking a preset name selects it, and the name can be edited by clicking the italic copy of the preset name above all the other presets and typing in the box (see caveat below regarding some OS X hosts).

Presets saved in Reverberate Core can be used with Reverberate, and vice versa, although the capabilities in Reverberate not in Reverberate Core may cause presets to sound slightly different.

Further capabilities are available within the load/save menu:

Load/Save: Current Preset:

- Copy: Copy the current preset to an internal clipboard.

- Paste: Paste the preset in the internal clipboard into the currently selected preset.

- Clear: Wipe the current preset applying an empty preset state.

- Swap with: Swap the positions of the current preset and another preset (to be selected in the sub-menu).

Load/Save: Current Bank of Presets:

- Load FXB Bank of Presets: Allows the user to select an FXB preset file from disk.

- Save Presets as FXB Bank: Saves the current 48 presets in a new FXB bank to be selected by the user.

- Recent: Contains a list of recently loaded or saved FXB banks. The list can be edited by clearing all entries, or removing individual items. Any FXB files at start-up found to be missing on disk are automatically (and permanently) removed from the recent bank files list.

- Favourites: Provides a set of .fxb files to be stored in a list of user-definable favourites.

- Clear All Presets in Bank: Wipe all memory resident presets clean to the empty preset state.

- Create Bank of Presets From Current Preset: Using the current preset as a template, create a bank of presets incrementing the IR for each preset from the current directory. Selecting this option on preset 10 will only change presets 10 and above, this is useful when creating presets from files in multiple directories.

Load/Save: Bank Initialisation Options: A number of choices are available for the initial presets that will be used when the plug-in is loaded.

- Initialise as Factory Defaults: The factory defaults will be loaded.

- Initialise as Empty Preset: All presets will be loaded as empty presets ready for use with new configurations.

- Initialise with User Defined Bank: Uses the file selected by 'Choose User Defined Bank File'. Clicking this menu item displays what file will be used in a message box.

- Choose User Defined Bank File: Opens a file selection dialog so the user can pick a default file to use with the 'Init as User Bank' option.

Caveat: In OS X, preset naming is not possible in Live 8 due to GUI compatibility issues; it is recommended to use the VST and re-name presets via the host and manage all other aspects of presets and banks within Reverberate. LiquidSonics is working with the vendors of these hosts to arrive at suitable solution.

2.3. Settings Tab

A number of user settings are provided (selections are saved in the registry for the current user) and apply to all instances of the plug-in. Reloading is typically necessary to propagate settings to all instances.

Latency: The latency setting provides a means to set the delay associated with the plug-in. Longer delays increase processing efficiency. A re-start of the plug-in is required to change latency.

If a compatible CUDA card and driver configuration is detected an option to enable the CUDA convolver is revealed beneath the first block of latency settings (Windows only). When CUDA GPU resources are depleted (typically when a number of instances of CUDA plug-ins are active using up most of the available GPU memory) the CPU convolver is used as a fall-back with the same latency as the CUDA convolver originally selected. The splash screen (accessed by clicking the LiquidSonics logo on the main plug-in) provides information on free GPU memory when the CUDA convolver is selected and indicates if the CPU convolver is being used as a fall-back.

Default Path: The default IR path controls how the eject buttons operate when selecting impulse responses. The following options are available:

- Most Recent: This passes responsibility for setting the initial location of the open box to the operating system; it chooses the most recent location of a file-open dialog box if one is available.

- Current IR: The current location of the impulse response is used (depending which eject button is pressed).

- User Default: Depending on the location set with the 'Set Default' option, this option can be used to select a standard location for the starting directory of eject dialog boxes. This may be useful where the user has all their impulse responses stored in a central location on disk (e.g. d:\Productions\Samples\Impulse Responses) and wishes to begin navigating from this location when clicking eject.

- Set Default: Opens a directory selection dialog so the user can pick a default directory to use with the 'User Default' option.

Default Wet Mix: The default mix level on plug-in start-up or manual preset bank loads can be changed here:

- Off (Insert): The wet lock is disabled. Presets are typically provided configured for insert effects.

- On (Send): When using a reverb as a send it is common to want all presets to be fully wet. This setting will override any wet/dry data stored in the preset and save it to fully wet. This can then be disabled in the plug-in if desired.

- Bank Default: Whatever was saved in the bank regarding wet lock will be preserved on load.

Auto-Pair True Stereo IR: When in true stereo mode and auto pairing is selected, loading a true impulse response of the format <name>Left.<extension> or <name>L.<extension> will result in the auto pairing function seeking an appropriate file named <name>Right.<extension> or <name>R.<extension> for paired loading (pairing is case insensitive). This is only active when loading files into the IR-A containers when using the eject or left/right spinner buttons.

The IR-B controls do not automatically pair files to enable rapid auditioning of alternative pairings for true stereo impulse responses.

- Off: No paring is attempted when changing IRs.

- Attempt Paring: When loading IRs an attempt will be made to pair the files based on file name. If files are named using a scheme not recognised by the plug-in pairing algorithm, no automated pairing will be evident.

Sample Rate Dependence: The sample rate of the host or audio device can affect the sound of a convolution reverb. This setting allows the user to normalise the behaviour of reverberate in different host sample rate environments.

- Host Rate Independent: The sample rate setting of the host will not affect the gain or filter behaviour of Reverberate. IRs will be scaled relative to the host sample rate to ensure that the output convolution amplitude is equal regardless of the host or soundcard sample rate setting, and filters are always limited to a maximum frequency of 22 kHz.

- Host Rate Dependent: The sample rate of the host can affect the gain and filter settings of Reverberate. IRs will be normalised with respect to their amplitude only. Running at different host or soundcard sample rates will cause the convolution of IRs to result in differing amplitudes. Filters are limited to the Nyquist of the host sample rate instead of being fixed to 22 kHz. For example, running Reverberate in a host set to 88.2 kHz will result in the convolved audio output being twice as loud as if set to 44.1 khz using the same IR. This mode of operation is included for compatibility with Reverberate versions 1.240 and below.

- Downsample if >48kHz: In order to conserve CPU, Reverberate can be set to run at half the host sample rate when the host is running at sample rates greater than 48 kHz. Audio is downsampled to half rate, processed, and then upsampled to reduce CPU consumption. For example, 48 kHz runs at 48 kHz, 88.2 kHz runs at 44.1 kHz, 96 kHz runs at 48 kHz, 192 kHz runs at 96 kHz.

Dials Mode: Sets the way the dials react to dragging the mouse.

- Circular: Move the mouse in a circular manner to change value.

- Relative Circular: Similar to circular, but moves relative to the current position.

- Slider: Move the mouse up and down to change value. Holding SHIFT on the keyboard allows for fine-grain control in this mode.

IR Visualisation: Enables and disables the facility to show individual channels on the IR view page.

- Multiple: Shows selection toggles to enable the different channels of an IR to be selected on the IR1 and IR2 tab views (shown right).

- IRx-All only: combines all IR graphs into one (default view).

Appendix A: Automation Parameter Names

<u>Master params</u>

Master gain	Gain
Master mix	ReverbMix1
Master wet lock ignore	WetLockIg
Bank's cur program select	Prog#Sel

<u>IR</u>

IR1 toggle	IROnOff1
IR1 topology	IRTplgy1
IR1 normalise	IRNorm1
IR1 gain	IRGain1
IR1 balance	IRBal1
IR1 balance mod	IRBal1Md
IR1 balance mod phase	IRBal1Ph
IR1 stereo mono	IR1St
IR1 user resample factor	Length1
IR1 crop from start	CropStrt1
IR1 crop from end	CropEnd1
IR1 reverse	IRRev1
IR1 ADSHR A	Attack1
IR1 ADSHR D	Decay1
IR1 ADSHR S	Sustain1
IR1 ADSHR H	Hold1
IR1 ADSHR R	Release1
IR1 ADSHR A shape	Atk1Shp
IR1 ADSHR D shape	Dec1Shp
IR1 ADSHR R shape	Rel1Shp
IR1 ADSHR A shape inv	Atk1ShpI
IR1 ADSHR D shape inv	Dec1ShpI
IR1 ADSHR R shape inv	Rel1ShpI
IR1 pre delay	PreDelay1

IR filter

IR1 filter Master toggle	IR1filter
IR1 filter1 toggle	IR1filter1
IR1 filter1 mode	IR1Mode1
IR1 filter1 freq	IR1Freq1
IR1 filter1 gain	IR1Gain1
IR1 filter1 q	IR1Q1
IR1 filter2 toggle	IR1filter2
IR1 filter2 mode	IR1Mode2
IR1 filter2 freq	IR1Freq2
IR1 filter2 gain	IR1Gain2
IR1 filter2 q	IR1Q2
IR1 filter3 toggle	IR1filter3
IR1 filter3 mode	IR1Mode3
IR1 filter3 freq	IR1Freq3
IR1 filter3 gain	IR1Gain3
IR1 filter3 q	IR1Q3
IR1 filter4 toggle	IR1filter4
IR1 filter4 mode	IR1Mode4
IR1 filter4 freq	IR1Freq4
IR1 filter4 gain	IR1Gain4
IR1 filter4 q	IR1Q4
IR1 filter5 toggle	IR1filter5
IR1 filter5 mode	IR1Mode5
IR1 filter5 freq	IR1Freq5
IR1 filter5 gain	IR1Gain5

IR1 filter5 q	IR1Q5
IR1 filter1 freq mod to	IR1Fq1to
IR1 filter1 freq start time	IR1Fq1st
IR1 filter1 freq end time	IR1Fq1en
IR1 filter1 gain mod to	IR1Gn1to
IR1 filter1 gain start time	IR1Gn1st
IR1 filter1 gain end time	IR1Gn1en
IR1 filter2 freq mod to	IR1Fq2to
IR1 filter2 freq start time	IR1Fq2st
IR1 filter2 freq end time	IR1Fq2en
IR1 filter2 gain mod to	IR1Gn2to
IR1 filter2 gain start time	IR1Gn2st
IR1 filter2 gain end time	IR1Gn2en
IR1 filter3 freq mod to	IR1Fq3to
IR1 filter3 freq start time	IR1Fq3st
IR1 filter3 freq end time	IR1Fq3en
IR1 filter3 gain mod to	IR1Gn3to
IR1 filter3 gain start time	IR1Gn3st
IR1 filter3 gain end time	IR1Gn3en
IR1 filter4 freq mod to	IR1Fq4to
IR1 filter4 freq start time	IR1Fq4st
IR1 filter4 freq end time	IR1Fq4en
IR1 filter4 gain mod to	IR1Gn4to
IR1 filter4 gain start time	IR1Gn4st
IR1 filter4 gain end time	IR1Gn4en
IR1 filter5 freq mod to	IR1Fq5to
IR1 filter5 freq start time	IR1Fq5st
IR1 filter5 freq end time	IR1Fq5en
IR1 filter5 gain mod to	IR1Gn5to
IR1 filter5 gain start time	IR1Gn5st
IR1 filter5 gain end time	IR1Gn5en
IR1 filter1 freq mod shape	EQ1Frq1S
IR1 filter2 freq mod shape	EQ1Frq2S
IR1 filter3 freq mod shape	EQ1Frq3S
IR1 filter4 freq mod shape	EQ1Frq4S
IR1 filter5 freq mod shape	EQ1Frq5S
IR2 filter1 freq mod shape	EQ2Frq1S
IR2 filter2 freq mod shape	EQ2Frq2S
IR2 filter3 freq mod shape	EQ2Frq3S
IR2 filter4 freq mod shape	EQ2Frq4S
IR2 filter5 freq mod shape	EQ2Frq5S