Version No.	Release Date	Overview of Changes
1.1	14/11/2013	Update document format
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Introduction

The purpose of this document is to give an overview of how to incorporate the device driver into the linux kernel, and a target system. It is expected that anyone reading this document should have a good understanding of the Linux kernel, and preferably some knowledge of ALSA. In addition the reader will require a working hardware platform with which they can run the Linux kernel containing the driver in question.

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Interfaces

This section describes the interfaces supported by the DA7210 audio codec driver.

Control Interface

The DA7210 audio codec driver supports the I2C interface for control of the device. The 7-bit device address is 0x1A.

Audio Interface

The DA7210 audio codec driver supports the I2S interface for all digital audio data transfer

Installation

Linux Kernel

See Release Notes for information on Kernel version, location and how to download source.

Driver should be already part of the kernel. In addition the following steps will be required to link in the codec to a specific platform:

- Add any necessary platform & machine code for codec in **sound/soc/<mach>** to 'plug' the codec into the host platform. Code exists for other devices and can be used as an example.
- Update machine code in **arch/arm/mach-<mach>** to add platform specific code for codec, such as registering I2C client data for the DA7210 codec driver.

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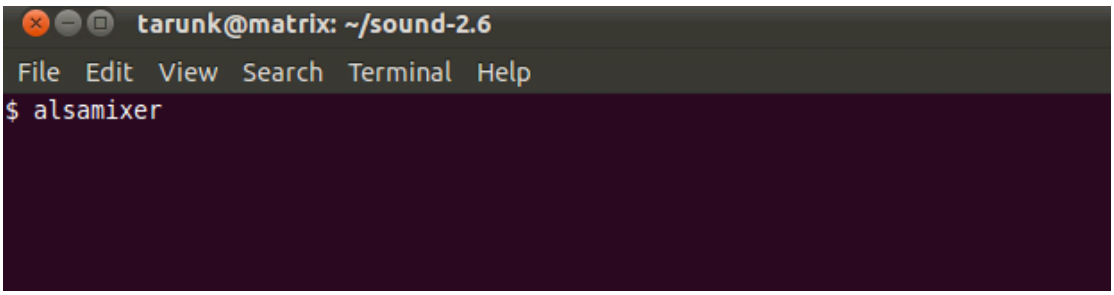
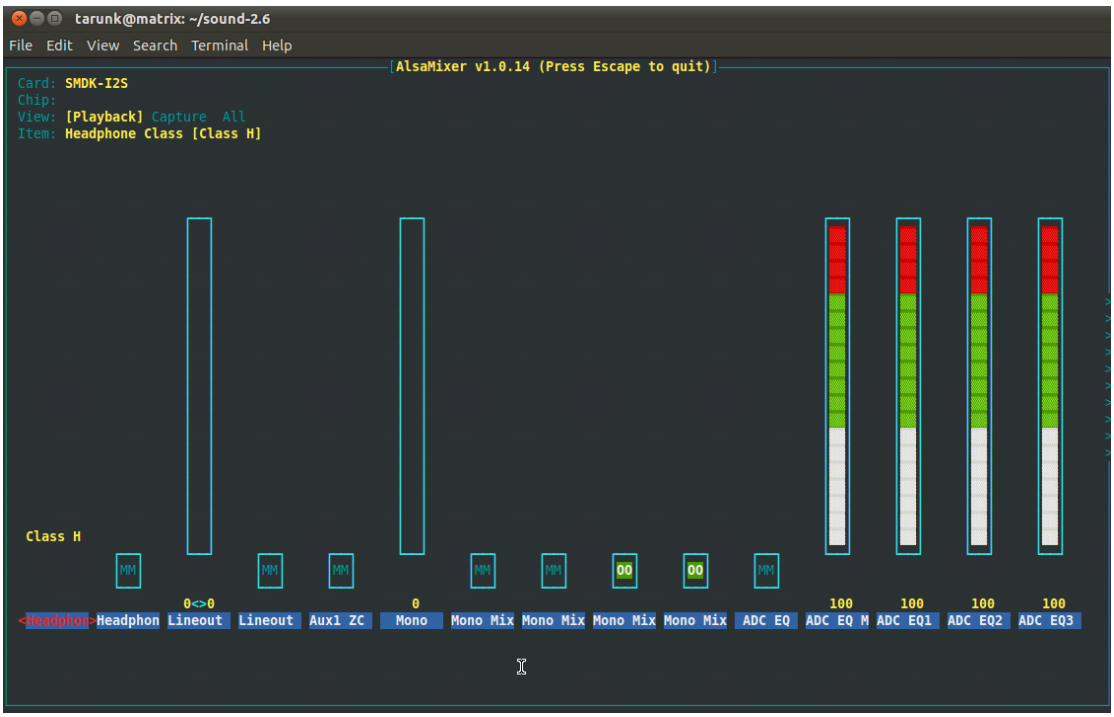
Testing The Driver

Various parameters of DA7210 Audio codec device can be configured run time using the 'alsamixer' utility.

Run 'alsamixer' command on the command prompt.



This command opens the 'alsamixer' utility in the command prompt.



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Equalizer Settings

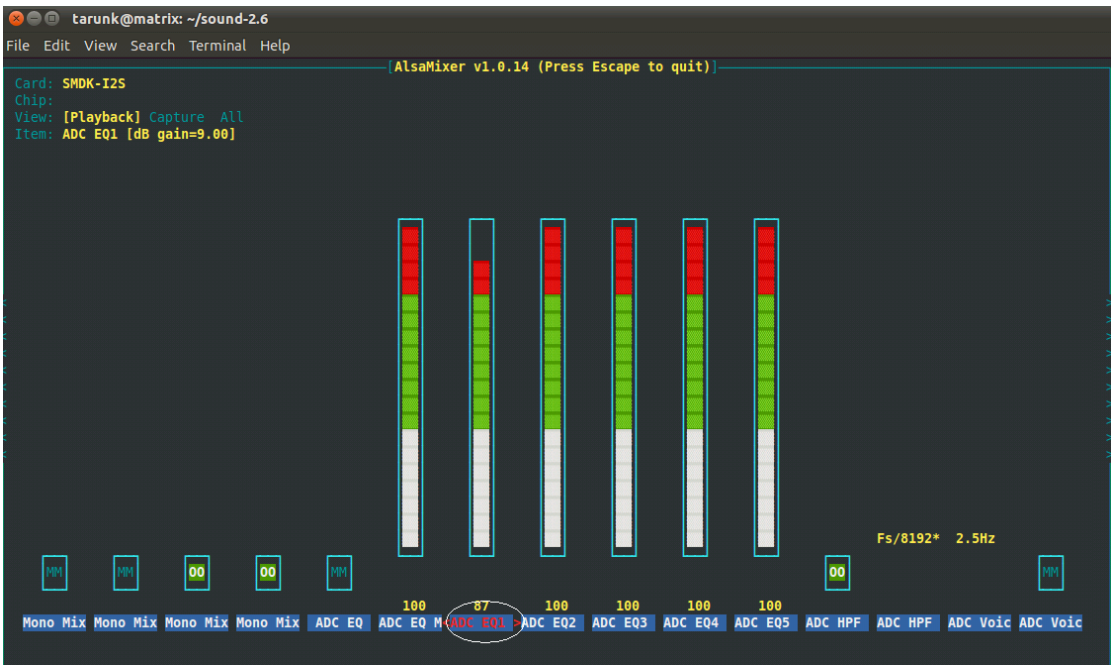
Audio codec DA7210 supports 5-band-equalizer for both ADC as well as DAC.

ADC Equalizer Settings

ADC Equalizers are 5-band-equalizers consisting of a low pass, a high pass and three band pass filters. These equalizers act as gain controllers for a specific frequency range.

Steps involved in accessing the ADC equalizers controls:-

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. Alsamixer utility by default opens in ‘Playback’ tab and is highlighted in yellow foreground in ‘View’ row
3. Press ‘Tab’ key, this switches the current view to the next view menu, that is ‘Capture’ menu
4. In ‘Capture’ menu, search for ADC EQ controls, using ‘left’, ‘right’ arrow keys
5. By default all the Equalizers are set to maximum gain value, i.e. 100
6. Currently selected menu item gets highlighted with red foreground
7. Change gain settings using ‘up’, ‘down’ arrow keys
8. Below picture depicts the gain setting for ADC EQ1 highlighted in white ellipse
9. Same procedure can be applied for other ADC 5-band-equalizer gain settings



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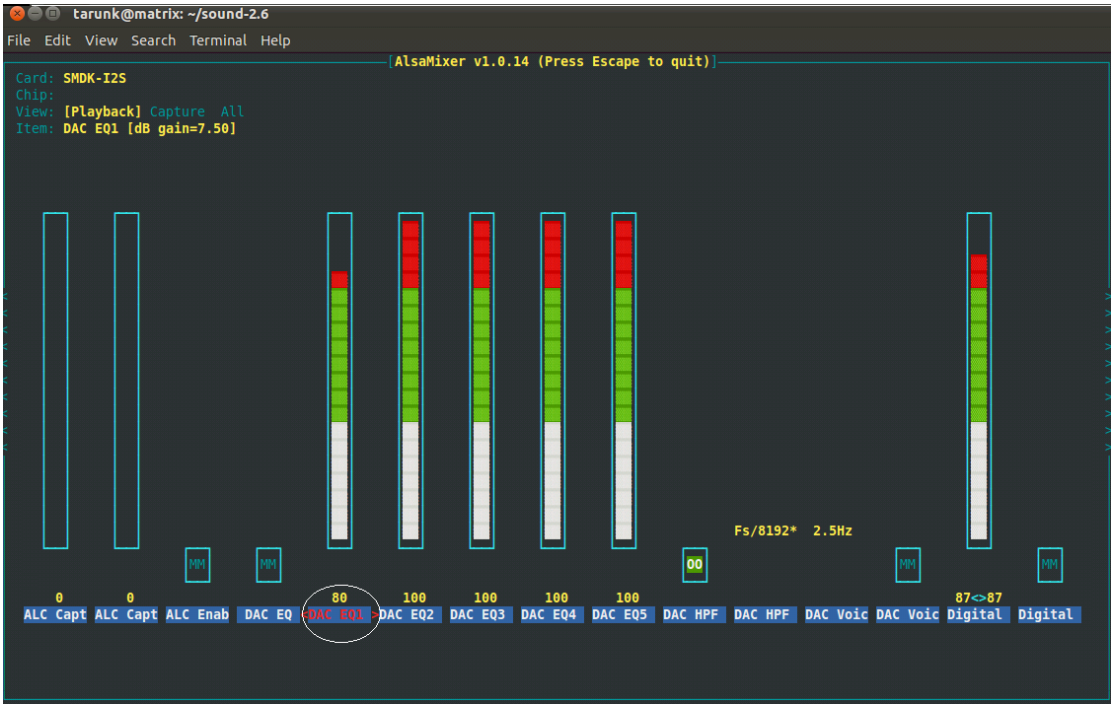
DAC Equalizer Settings

DAC Equalizers are 5-band-equalizers consisting of a low pass, a high pass and three band pass filters. These equalizers act as gain controllers for a specific frequency range.

Steps involved in accessing the DAC equalizers controls:-

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. Alsamixer utility by default opens in ‘Playback’ tab and is highlighted in yellow foreground in ‘View’ row
3. In ‘Playback’ menu, search for DAC EQ controls, using ‘left’, ‘right’ arrow keys
4. By default all the Equalizers are set to maximum gain value, i.e. 100
5. Currently selected menu item gets highlighted with red foreground
6. Change gain settings using ‘up’, ‘down’ arrow keys
7. Below picture depicts the gain setting for DAC EQ1 highlighted in white ellipse
8. Same procedure can be applied for other DAC 5-band-equalizer gain settings.



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Volume Controls

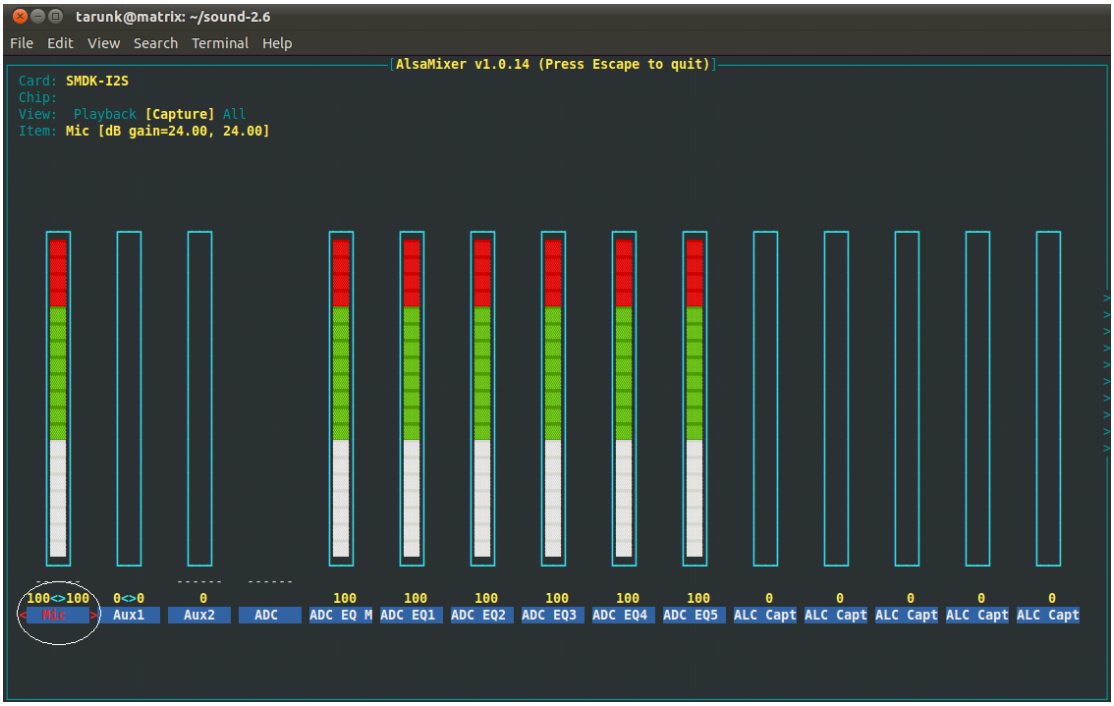
DA7210 audio codec supports various external devices like Mics, Headphones, Aux's etc. Volume control of these peripherals can be controlled by DA7210.

Mic Volume Control

This control is used to control the volume of the Mic input.

Following steps are to be followed for Mic volume control:-

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in 'Playback' tab that is highlighted in yellow foreground in 'View' row
3. Press 'Tab' key, this switches the current view to the next view menu, in our case it is 'Capture' menu
4. In 'Capture' menu, search for Mic controls, using 'left', 'right' arrow keys
5. Using the 'up', 'down' arrow keys we can change the gain settings
6. Below picture depicts gain setting done for Mic highlighted in white ellipse
7. Gain value has been changed
8. Both left and right channel volume control can be done.



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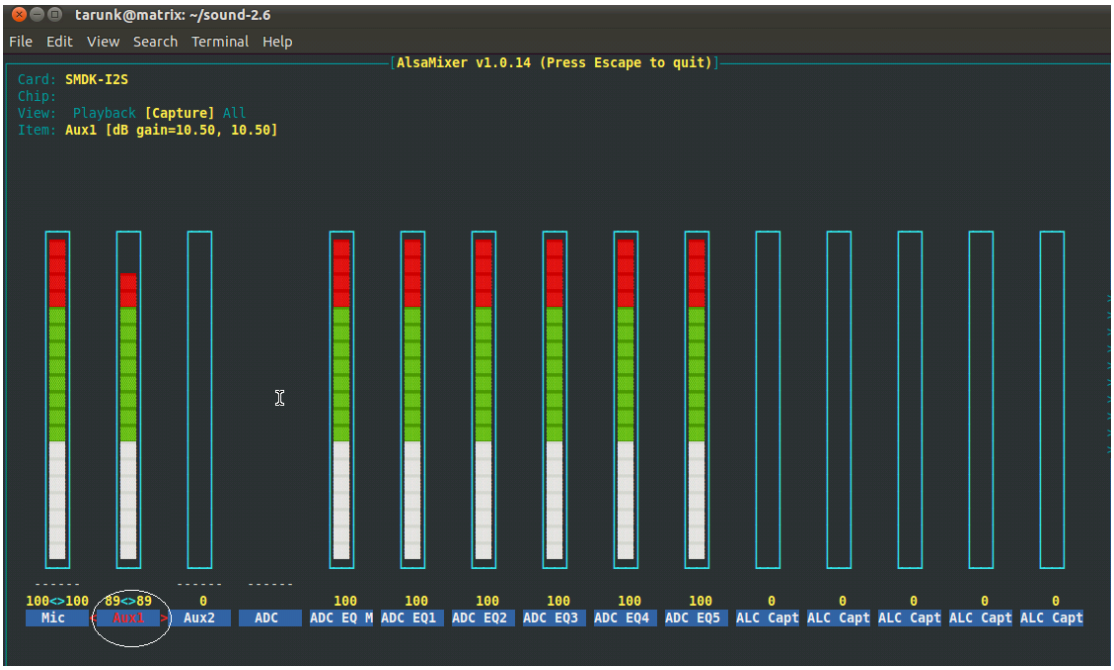
Aux1 Volume Control

This control is used to control Aux1 volume.

Following steps are executed for Aux1 volume control.

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. Press ‘Tab’ key, this switches the current view to the next view menu, in our case it is ‘Capture’ menu
4. In ‘Capture’ menu, search for Aux1 volume control, using ‘left’, ‘right’ arrow keys
5. Using the ‘up’, ‘down’ arrow keys we can change the gain settings
6. Below picture depicts gain setting done for Mic highlighted in white ellipse
7. Gain value has been changed
8. Both left and right channel volume control can be done
9. This control can be used for FM radio volume control.



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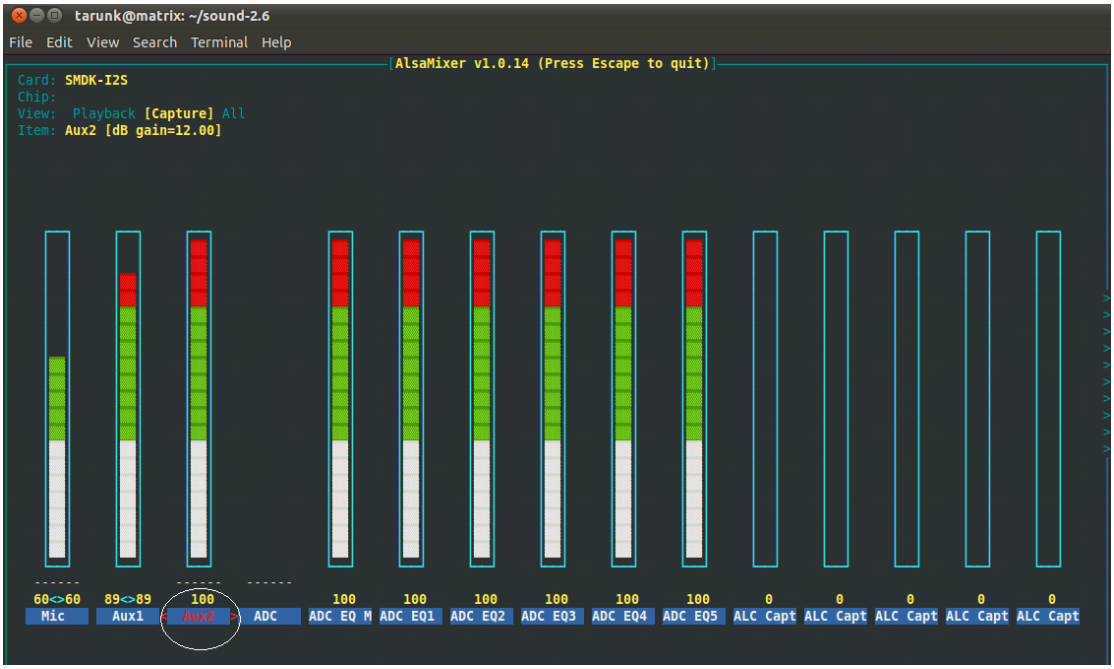
Aux2 Volume Control

This control is used to control Aux2 volume.

Following steps are executed for Aux2 volume control.

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. Press ‘Tab’ key, this switches the current view to the next view menu, in our case it is ‘Capture’ menu
4. In ‘Capture’ menu search for Aux2 gain control using ‘left’ and ‘right’ arrow keys
5. Using the ‘up’, ‘down’ arrow keys we can change the gain settings
6. Below picture depicts gain setting done for Mic highlighted in white ellipse
7. Gain value has been changed
8. This control can be used for Mono volume control.



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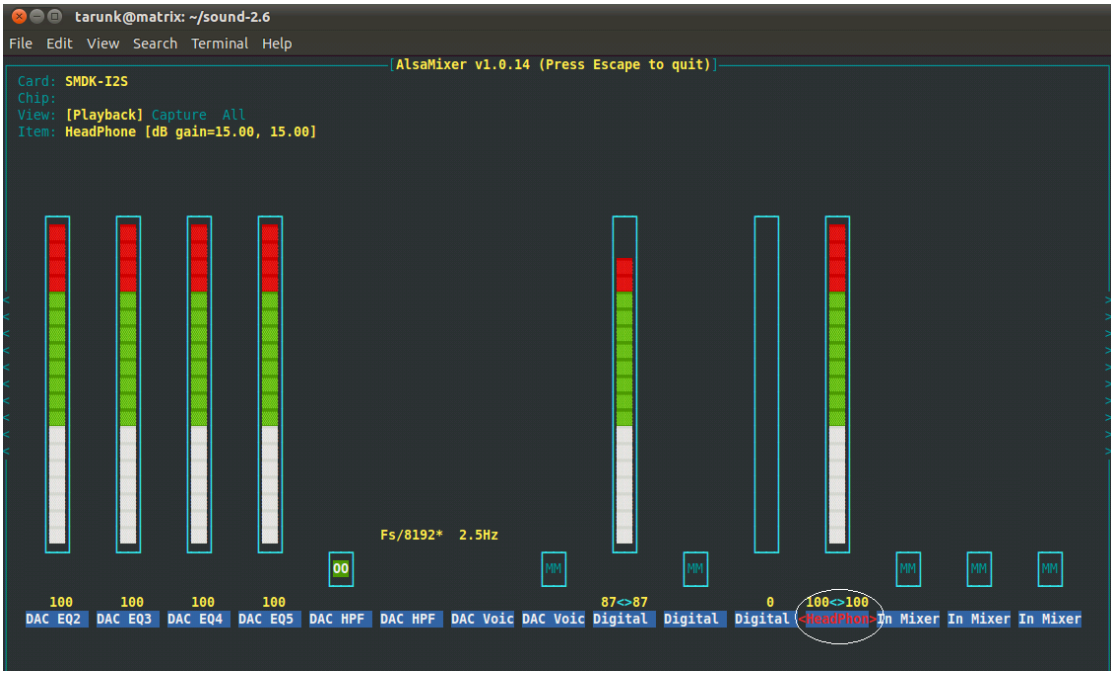
Headphone Volume Control

This control is used to control Headphone volume.

Following steps are executed for Headphone volume control

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. In ‘Playback’ menu we search Headphone gain control using ‘left’, ‘right’ arrow keys.
4. Using the ‘up’, ‘down’ arrow keys we can change the gain settings
5. Below picture depicts gain setting done for Headphone highlighted in white ellipse
6. Gain value has been changed
7. Both left and right channel volume control is done.



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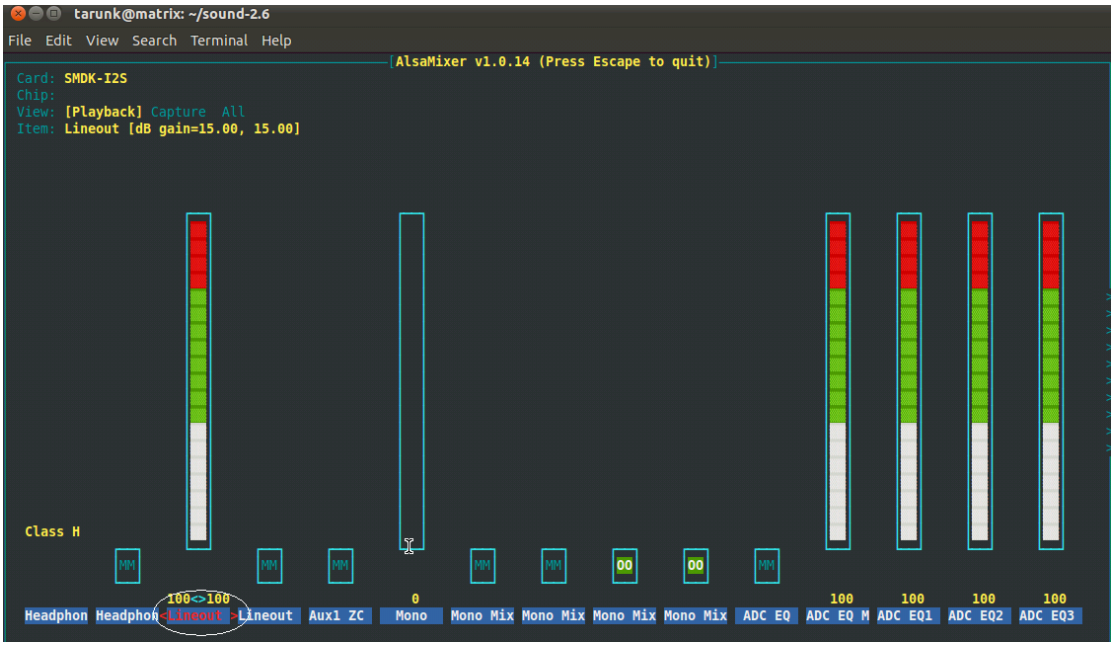
Out1 Volume Control

This control is used to control Out1 volume.

Following steps are executed for Out1 volume control

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. In ‘Playback’ menu we search Lineout gain control using ‘left’, ‘right’ arrow keys.
4. Using the ‘up’, ‘down’ arrow keys we can change the gain settings
5. Below picture depicts gain setting done for Lineout highlighted in white ellipse



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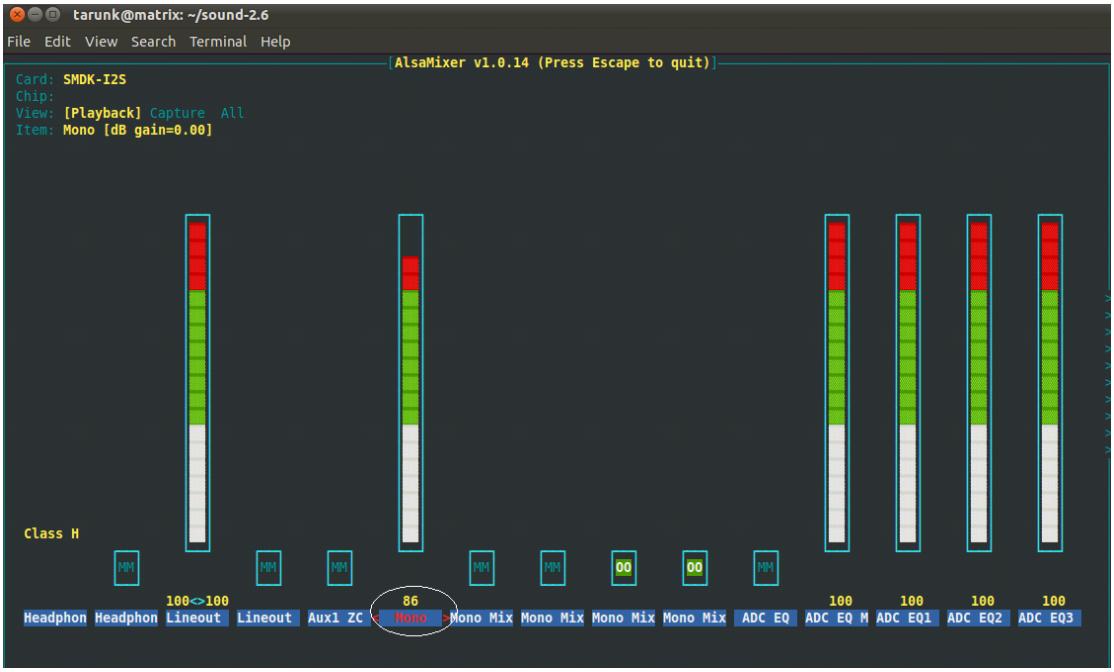
Out2 Volume Control

This control is used to control Out2 volume.

Following steps are executed for Out2 volume control

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. In ‘Playback’ menu search the Mono volume control, i.e. Out2 Volume gain, using the ‘left’, ‘right’ arrow keys
4. Using the ‘up’, ‘down’ arrow keys we can change the gain settings
5. Below picture depicts gain setting done for Lineout highlighted in white ellipse
6. Gain value has been changed
7. Both left and right channel volume control can be done.



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Mixer Controls

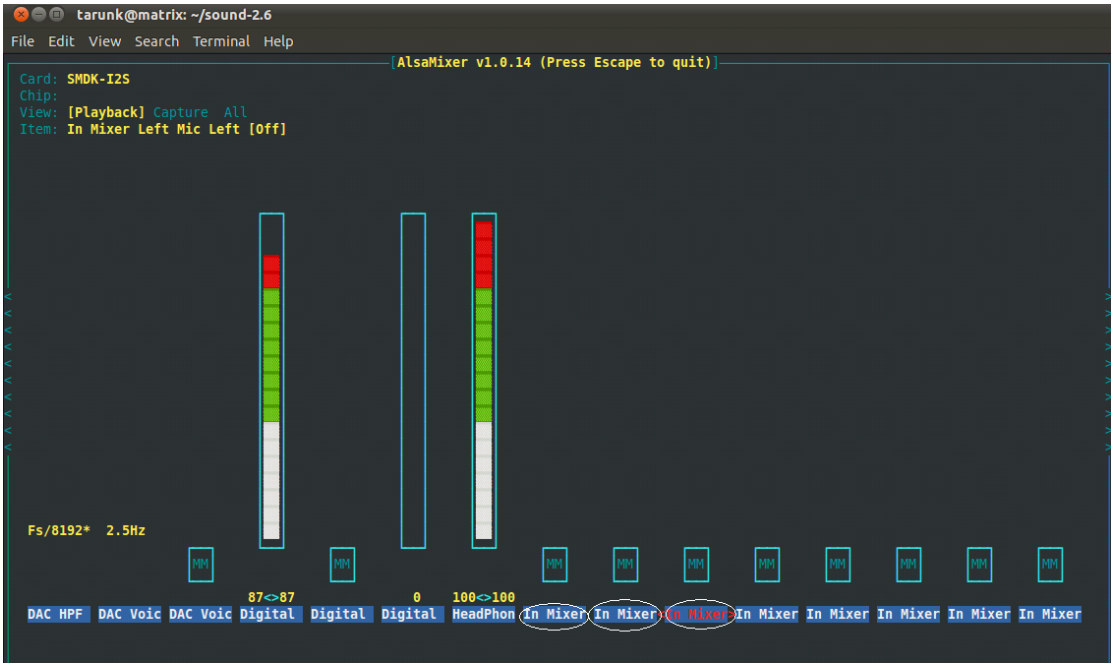
DA7210 audio codec supports Left and Right channel Input mixers and also supports Left, Right and mono Output mixers.

Left Input Mixer

Left Input Mixers allows mixing Aux1, Mic, Aux2 inputs with each other.

Following steps help to change the In Mixer left configuration

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. In ‘Playback’ menu search for In mixer controls using ‘left’, ‘right’ arrow keys
4. By default Mic Left is added to in mixer left
5. Other inputs can be added or removed by selecting the corresponding control and then enabling/ disabling through ‘m’ key
6. Below picture depicts Mic left being added in Input mixer left and the remaining inputs are highlighted using the white ellipse
7. In mixer left can have possible inputs from Aux1_left and Aux2.



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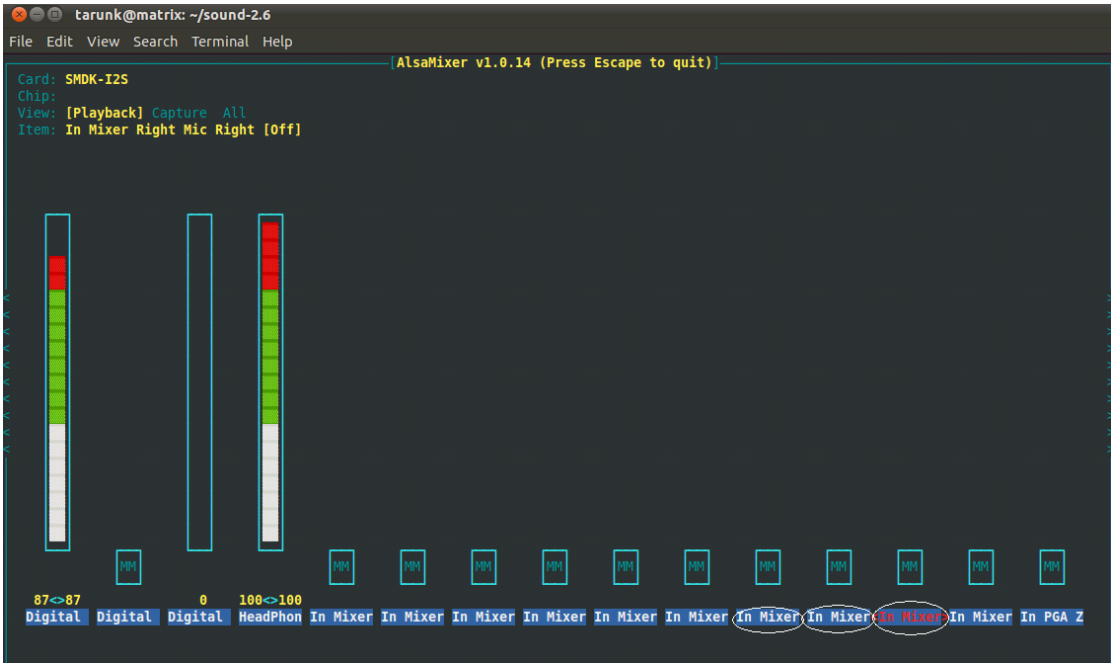
Right Input Mixer

Right Input Mixer allows mixing Aux1, Mic, Aux2 inputs with each other.

Following steps help to change the In Mixer right configuration

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. In ‘Playback’ menu search for In mixer controls using ‘left’, ‘right’ arrow keys
4. By default Mic Right is added to in mixer right
5. Other inputs can be added or removed by selecting the corresponding control and then enabling/ disabling through ‘m’ key
6. Below picture depicts Mic Right being added in Input Mixer Right and the remaining inputs are highlighted using the white ellipse



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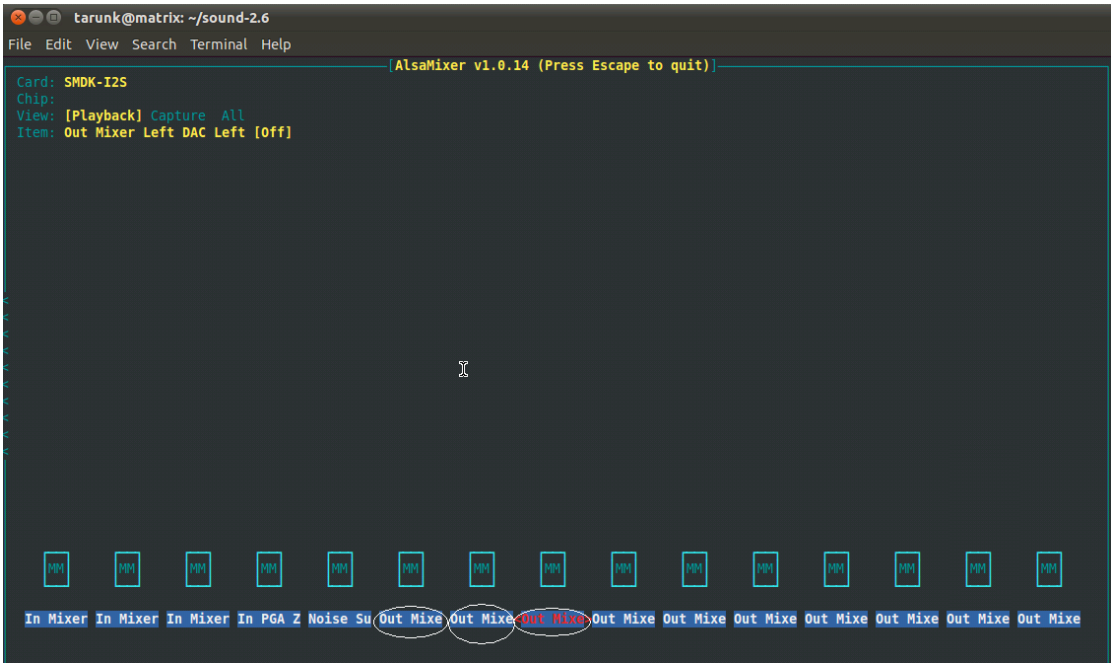
Left Output Mixer

Left Output Mixer allows mixing of Aux1_left, In-mixer left, Aux2 inputs, DAC Left with each other.

Following steps help to change the Out Mixer left configuration

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. In ‘Playback’ menu search for Out mixer controls using ‘left’, ‘right’ arrow keys
4. By default DAC left is added to Out mixer left.
5. Other inputs can be added or removed by selecting the corresponding control and then enabling/ disabling through ‘m’ key
6. Below picture depicts DAC left being added in Output mixer left and the remaining inputs are highlighted using the white ellipse
7. Out mixer Left can have possible inputs from In-mixer left, Aux2 and Aux1_left and DAC left.



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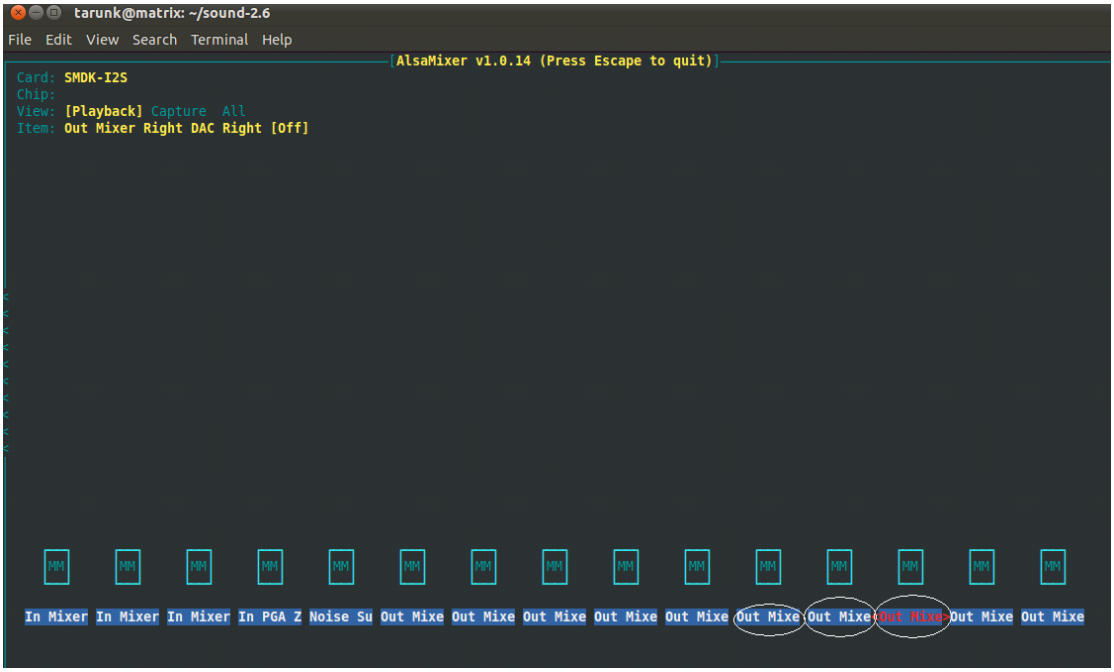
Right Output Mixer

Right Output Mixer allows mixing Aux1_Right, In-mixer right, Aux2 inputs, DAC Right with each other.

Following steps help to change the Out Mixer right configuration

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. In ‘Playback’ menu search for Out mixer controls using ‘left’, ‘right’ arrow keys
4. By default DAC right is added to Out mixer right
5. Other inputs can be added or removed by selecting the corresponding control and then enabling/ disabling through ‘m’ key
6. Below picture depicts DAC right being added in Output mixer right and the remaining inputs are highlighted using the white ellipse
7. Out mixer Right can have possible inputs from In-mixer left, Aux2 and Aux1_left and DAC right.



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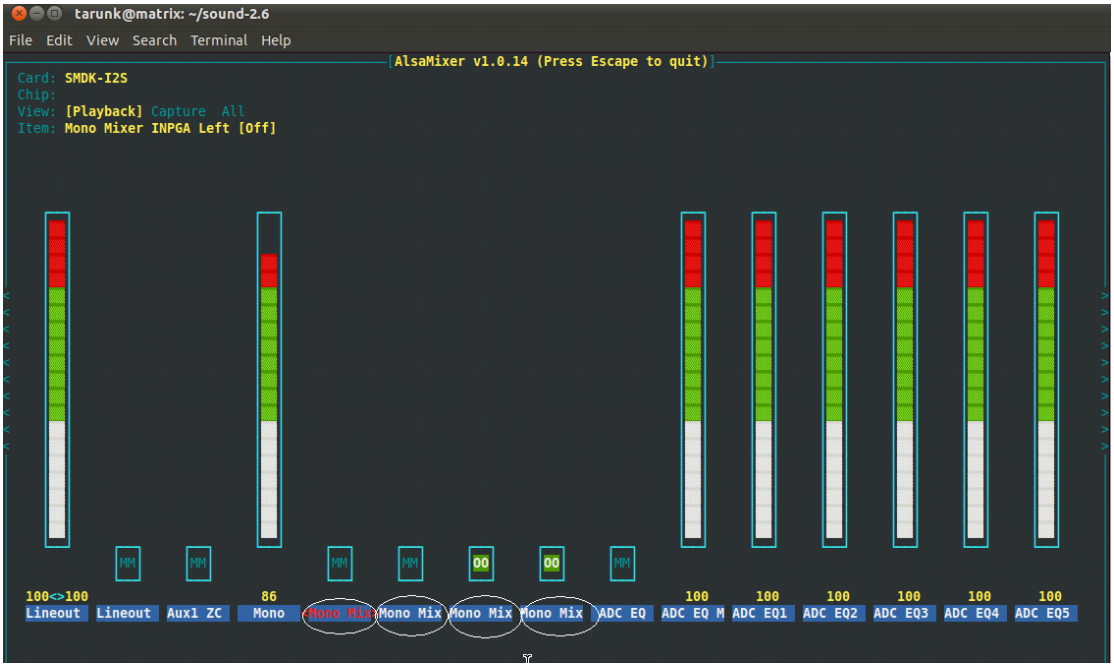
Mono Mixer

Mono Mixer allows mixing of Out-mixer right, Out-mixer left, In-mixer right and In-mixer left.

Following steps help to change the Mono Mixer configuration

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. In ‘Playback’ menu search for Mono Mixer controls using ‘left’, ‘right’ arrow keys
4. Inputs can be added or removed by selecting the corresponding control and then enabling/ disabling through ‘m’ key
5. Below picture depicts Mono mixer inputs, that are highlighted in white ellipse.



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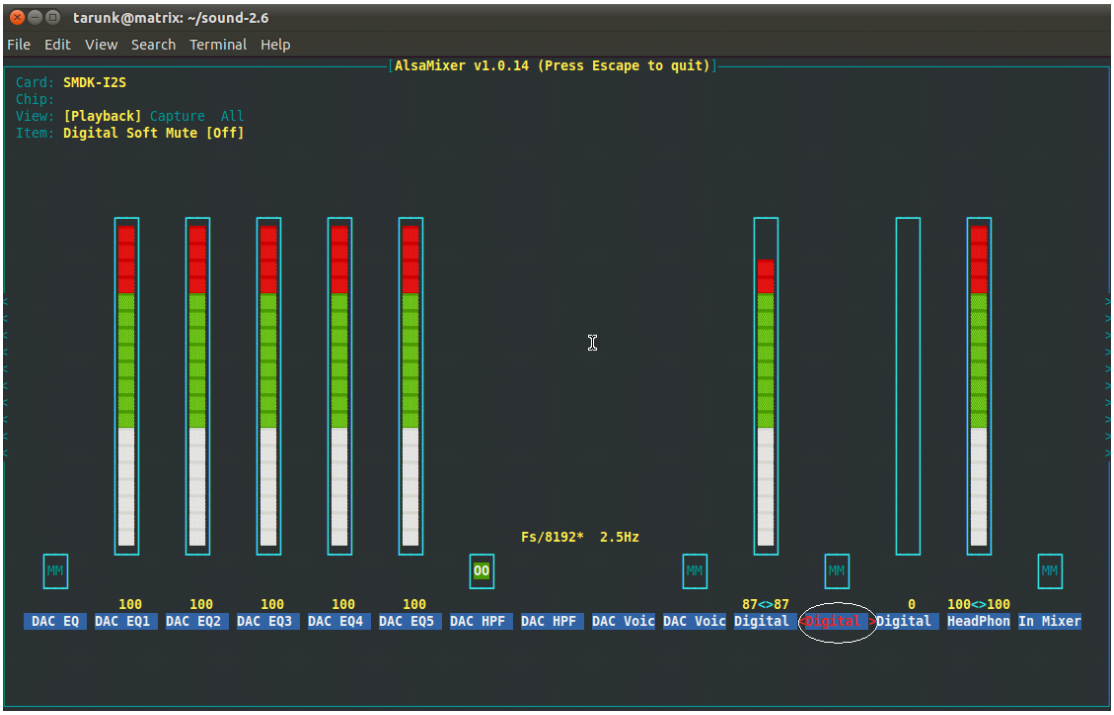
Mute controls

DA7210 audio codec supports mute controls for Mic, Aux2, ADC, and DAC.

Following steps help to change the Mute configurations of the above mentioned entities

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. Using ‘tab’ key change the view to ’All’ menu
4. In ‘All’ menu search for Mute controls using ‘left’, ‘right’ arrow keys
5. Use ‘m’ key for Mute controls.
6. Below picture depicts mute controls for Mic left and Mic right are highlighted in white ellipse
7. By default all mute controls are turned off.



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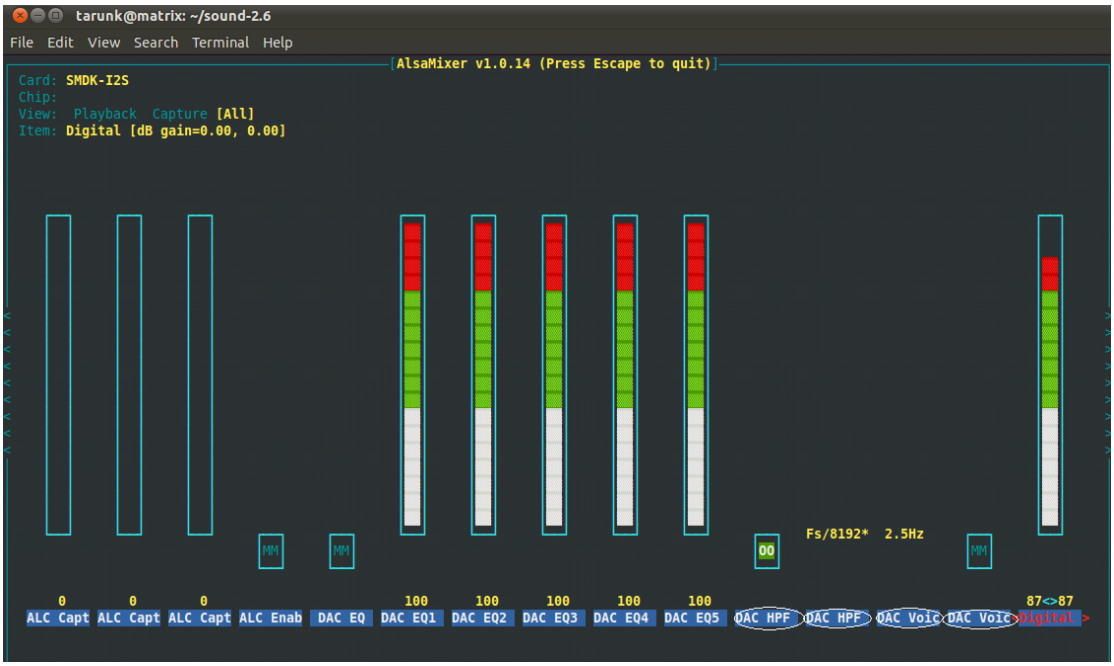
Miscellaneous Controls

Along with grouped controls DA7210 audio codec chip also supports some controls like Voice mode selection, Zero Cross enabling, Noise suppression, ADC and DAC High pass filter frequency selection and voice filter selection.

Following steps help to change the Mute configurations of the above mentioned entities

1. Run alsamixer command on the command prompt, it opens alsamixer utility
2. The utility by default opens in ‘Playback’ tab that is highlighted in yellow foreground in ‘View’ row
3. Using ‘tab’ key change the view to ’All’ menu
4. In ‘All’ menu search for the required controls using ‘left’, ‘right’ arrow keys
5. For controls other than Enable/Disable use ‘up’, ‘down’ arrow keys to select the appropriate setting
6. For Capture and Playback related controls use ‘m’ key for enabling/disabling controls.



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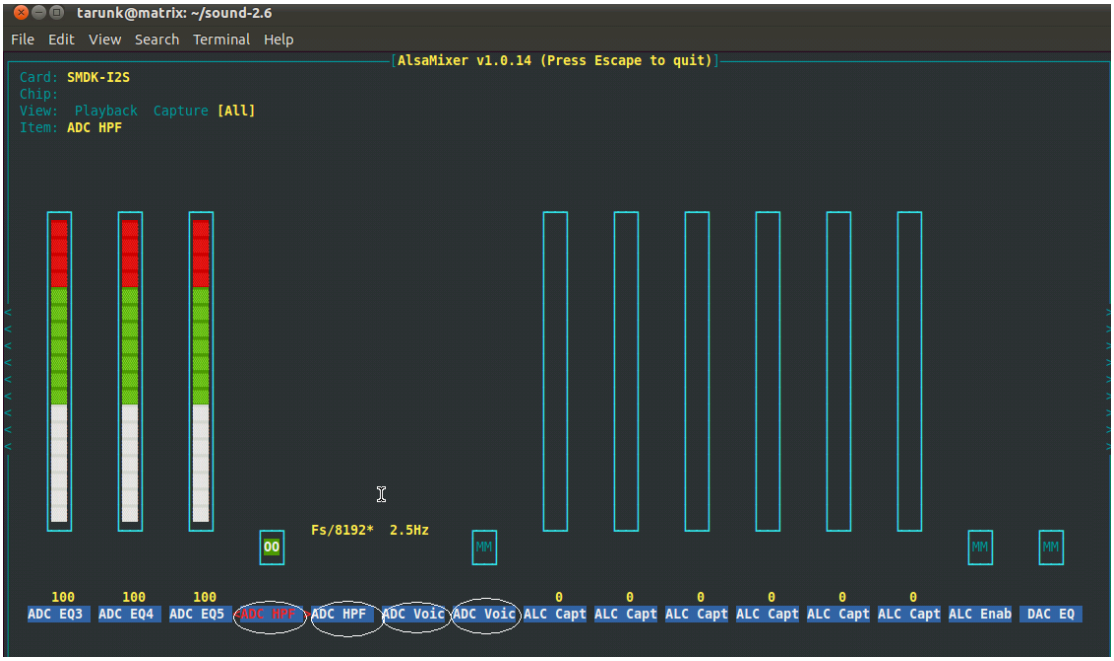

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