ALLO AUDIO CARDS TECHNICAL DETAILS

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This document provides detailed information of Allo audio cards. It covers capabilities, device driver configuration, ALSA fields & its default values. This information will also be helpful for adding support on different players/platforms.

Allo Piano DAC

The Allo Piano DAC is a high-resolution digital-to-analog converter.

- Device description:
  - Device: Allo Piano DAC
  - Chip: PCM5122
  - Interface: I2S
  - Sampling rate: 8 kHz to 384 kHz sampling freq
  - Data bit length: 16 to 32-bit.

- Device driver: snd-soc-allo-piano-dac.ko

- Device tree overlay[#]: dtoverlay=allo-piano-dac-pcm512x-audio

- Driver Parameter:
  - **24db_digital_gain:** Allow gain to be applied via the PCM512x codec Digital volume control.
    Enable with "dtoverlay=allo-piano-dac-pcm512x-audio, 24db_digital_gain"

- ALSA card name: “card 0: PianoDAC [PianoDAC], device 0: PianoDAC pcm512x-hifi-0 []”

- ALSA fields:
  - **Digital Volume control (Digital)**: Set DAC Volume
    - Range: 0 - 207
    - Default: 207 [100%] [dB gain: 0.00, 0.00]
    - E.g.: `amixer -c0 set 'Digital' 150; amixer -c0 set 'Digital' mute`

Driver defined ALSA Default Values for Piano

ALSA Field	Default Value
DSP Prog	FIR inte [FIR interpolation with de-emphasis]
Analogue	Playback 1 [100%] [0.00, 0.00dB]
Analogue Playback Boost	0 [0%] [0.00, 0.00dB]
Auto Mute	Playback [on]

Auto Mute Mono	Playback [on]
Auto Mute Time Left	21ms
Auto Mute Time Right	21ms
Clock Missing Period	1s
Deemphasis	Playback [on]
Digital	207 [100%] [0.00, 0.00 dB]
Volume Ramp Down Emergency Rate	1 sample/update
Volume Ramp Down Emergency Step	4dB/step
Volume Ramp Down Rate	1 sample/update
Volume Ramp Down Step	1 dB/step
Volume Ramp Up Rate	1 sample/update
Volume Ramp Up Step	1dB/step

Allo Piano 2.1 DAC

The Allo Piano 2.1 DAC is a high-resolution digital-to-analog converter. It can work in Dual mode – Dual mono & Dual Stereo and Subwoofer mode - 2.0, 2.1 & 2.2. For 2.1 & 2.2 modes, subwoofer cross-over frequency can be set.

- Device Description:
  - Device: Allo Piano 2.1 DAC
  - Chip: PCM5142
  - Audio Interface: I2S
  - Sampling rate: 8 kHz to 384 kHz sampling freq (Sample rate is limited to 192kHz, for subwoofer modes - 2.1 & 2.2)
  - Data bit length: 16 to 32-bit.

- Device Driver: snd-soc-allo-piano-dac-plus.ko

- Device tree overlay[#]: dtoverlay=allo-piano-dac-plus-pcm512x-audio

- Driver Parameter:
  - **24db_digital_gain**: Allow gain to be applied via the PCM512x codec Digital volume control.
    Enable with "dtoverlay=allo-piano-dac-plus-pcm512x-audio,24db_digital_gain".

  - **glb_mclk**: This option disables internal PLLs of the DAC to provide better sound quality. This setting is to be used with the Kali Reclocker board, which provides the required MCLK.

Enabled with "dtoverlay=allo-piano-dac-plus-pcm512x-audio,glb_mclk".

- ALSA card name:
  - “card 0: PianoDACPlus [PianoDACPlus], device 0: PianoDACPlus multicodec-0 []”

- ALSA fields:
  - **Master Volume control (Master)**: Set DAC Volume (both DAC)
    - Range: 0 - 207
    - Default: 207 [100%] [dB gain: 0.00, 0.00]
    - E.g.: `amixer -c0 set 'Master' 150; amixer -c0 set 'Master' mute`

  - **Digital Volume control (Digital)**: Set DAC Volume (first DAC only)
    - Range: 0 - 207
    - Default: 207 [100%] [dB gain: 0.00, 0.00]
    - E.g.: `amixer -c0 set 'Digital' 150; amixer -c0 set 'Digital' mute`

  - **Subwoofer Volume control (Subwoofer)**: Set DAC subwoofer volume (second DAC only)
    - Range: 0 - 207
    - Default: 207 [100%] [dB gain: 0.00, 0.00]
    - E.g.: `amixer -c0 set 'Subwoofer' 150, amixer -c0 set 'Subwoofer' mute`

  - **Subwoofer Mode (Subwoofer mode)**: Select speaker modes. This selection depends on the type of speakers connected.

Subwoofer Mode	
‘None’	Set “None” will selecting Dual mode options.
‘2.0’	no filtration, all pass
‘2.1’	High freq to Right & Left connectors and mono low freq to Sub Left connector (DSP files required).
‘2.2’	High freq to Right & Left connectors and low freq to Sub Right & Sub Left connectors (DSP files required).

Default: ‘None’
E.g.: `amixer -c0 set 'Subwoofer mode' '2.1'`
(Note: On changing subwoofer mode, unit must be rebooted)

- **Dual Mode**: Select speaker modes. This selection depends on the type of speakers connected.

Dual Mode	
'None'	Set 'None' will selecting Subwoofer mode options.
'Dual-Mono'	Double mono output. No filtration, pass all frequencies to one connector of each set (Left & Sub Right).
'Dual-Stereo'	Double stereo output. No filtration, pass all frequencies to both set of connectors.

Default: 'Dual-Mono'
E.g.: `amixer -c0 set 'Dual Mode' 'Dual-Mono'`
(Note: On changing Dual mode, unit must be rebooted)

- **Cross-over frequency (Lowpass):** Set cross-over frequency for the filters. This is applicable only for Subwoofer modes – 2.1 & 2.2.
  - Range: 60, 70, 80, …200Hz
  - Default: 60
  - E.g.: `amixer -c0 set 'Lowpass' 90`

Note:

- The driver allows only one mode - Dual or Subwoofer - operational at a time. One mode will be turned off automatically if the other is chosen.

  E.g.: To set Dual Stereo,

  Only "`amixer -c0 set 'Dual Mode' 'Dual-Stereo'`"

  OR

  "`amixer -c0 set 'Dual Mode' 'Dual-Stereo'`"

  "`amixer -c0 set 'Subwoofer mode' 'None'`"

- Subwoofer modes – 2.1 & 2.2 – require DSP firmware files to be installed. DSP firmware files can be downloaded from https://github.com/allocom/piano-firmware.git.

Driver defined ALSA Default Values for Piano 2.1

ALSA Field	Default Value
Master	207 [100%] [0.00, 0.00 dB]
DSP Prog	FIR inte [FIR interpolation with de-emphasis]
Analogue	Playback 1 [100%] [0.00, 0.00dB]
Analogue Playback Boost	0 [0%] [0.00, 0.00dB]
Auto Mute	Playback [on]
Auto Mute Mono	Playback [on]
Auto Mute Time Left	21ms
Auto Mute Time Right	21ms
Clock Missing Period	1s
Deemphasis	Playback [on]
Digital	207 [100%] [0.00, 0.00 dB]
Dual Mode	'Dual-Mono'
Lowpass	60
Subwoofer	207 [100%] [0.00, 0.00 dB]
Subwoofer mode	'None'
Volume Ramp Down Emergency Rate	1 sample/update
Volume Ramp Down Emergency Step	4dB/step
Volume Ramp Down Rate	1 sample/update
Volume Ramp Down Step	1 dB/step
Volume Ramp Up Rate	1 sample/update
Volume Ramp Up Step	1dB/step

Allo Boss DAC & Allo Mini Boss DAC

The Allo Boss DAC & Allo Mini Boss DAC are high-resolution digital-to-analog converter. It works as a master DAC, with built-in 45 & 49MHz crystals. Allo Boss DAC is not supported on Sparky SBC.

- Device description:
  - Device: Allo Boss DAC
  - Chip: PCM5122
  - Interface: I2S
  - Sampling rate: 8 kHz to 384 kHz sampling freq
  - Data bit length: 16 to 32-bit.

- Device driver: snd-soc-allo-boss-dac.ko

- Device tree overlay[#]: dtoverlay=allo-boss-dac-pcm512x-audio

- Driver Parameter:
  - **24db_digital_gain:** Allow gain to be applied via the PCM512x codec Digital volume control.
    Enable with "dtoverlay=allo-boss-dac-pcm512x-audio, 24db_digital_gain"

  - **Slave:** Force Boss DAC into slave mode.
    Enable with "dtoverlay=allo-boss-dac-pcm512x-audio,slave"

- ALSA card name: "card 0: BossDAC [BossDAC], device 0: Boss DAC HiFi [Master] pcm512x-hifi-0 []"

- ALSA fields:
  - **Digital Volume control (Digital)**: Set DAC Volume
    - Range: 0 - 207
    - Default: 207 [100%] [dB gain: 0.00, 0.00]
    - E.g.: `amixer -c0 set 'Digital' 150; amixer -c0 set 'Digital' mute`

Driver defined ALSA Default Values for Boss

ALSA Field	Default Value
DSP Prog	FIR inte [FIR interpolation with de-emphasis]
Analogue	Playback 1 [100%] [0.00, 0.00dB]
Analogue Playback Boost	0 [0%] [0.00, 0.00dB]
Auto Mute	Playback [on]
Auto Mute Mono	Playback [on]
Auto Mute Time Left	21ms
Auto Mute Time Right	21ms
Clock Missing Period	1s
Deemphasis	Playback [on]
Digital	207 [100%] [0.00, 0.00 dB]
Volume Ramp Down Emergency Rate	1 sample/update
Volume Ramp Down Emergency Step	4dB/step
Volume Ramp Down Rate	1 sample/update
Volume Ramp Down Step	1 dB/step
Volume Ramp Up Rate	1 sample/update
Volume Ramp Up Step	1dB/step

Allo Digione

Allo Digione is a high-quality S/PDIF output board for the Raspberry Pi. The S/PDIF interface chip supports up to 192kHz/24bit resolution with dual low-jitter oscillators.

- Device description:
  - Device: Allo Digione
  - Chip: WM8805
  - Interface: I2S
  - Sampling rate: 32 kHz to 192 kHz sampling freq
  - Data bit length: 16 to 24-bit.
- Device driver: snd-soc-allo-digione.ko
- Device tree overlay[#]: dtoverlay=allo-digione
- Driver Parameter: < none >
- ALSA card name:
  - "card 0: sndallodigione [snd_allo_digione], device 0: Allo DigiOne HiFi wm8804-spdif-0 []"

Allo Cheapo

Allo Cheapo has S/PDIF out, RCA connector & 3.5mm headphone jack. It has a Headphone Amplifier of 138mW. Cheapo is supported only on Sparky SBC.

- Device description:
  - Device: Allo Cheapo
  - Chip: TPA6133A2
  - Interface: Analog Audio
  - Sampling rate: 8 kHz to 192 kHz sampling freq
  - Data bit length: 16 to 32-bit.
- Device driver: atm7059link
- Driver Parameter: < none >
- Devices:
  - device 0: ATC2603C PCM atc2603c-dai-0

- device 1: HDMI PCM atm7059-hdmi-dai-1
- device 2: SPDIF PCM atm7059-spdif-dai-2

- ALSA card name:
  - “card 0: atm7059link [atm7059_link], device 0: ATC2603C PCM atc2603c-dai-0 []”
  - “card 0: atm7059link [atm7059_link], device 1: HDMI PCM atm7059-hdmi-dai-1 []”
  - “card 0: atm7059link [atm7059_link], device 2: SPDIF PCM atm7059-spdif-dai-2 []”

- ALSA fields:
  - **Volume control:** set volume of the inbuilt DAC
    - Volume Range: 0 to 40
    - e.g.: `amixer -c0 set 'DAC PA' 35`

  - **Audio output mode:**
    - i2s: set if 3.5mm jack or RCA connectors of the cheapo are used OR any other DAC are used like Piano or Piano 2.1.
    - hdmi: set if HDMI output is required (can be set without Cheapo card also).
    - spdif: set if S/PDIF optical connector of Cheapo is used.

Driver defined ALSA Default Values for Cheapo

ALSA Field	Default Value
Mic0 Mode Mux	Differential
ADC0 Digital Gain control	0
ADC0 Mux	0
AMP1 Gain boost Range select	43
AOUT FL FR Mixer FL FR	off
AOUT FL FR Mixer FM	off
AOUT FL FR Mixer MIC	off
Adc0 Digital Gain	0
Adc0 Gain	60
DAC Digital FL FR	off off
DAC FL FR PLAYBACK	off
DAC FL Gain	71
DAC FR Gain	71
DAC PA	100
DAC PA OUTPUT Stage	00
Dummy earphone detect method	off
Dummy earphone gain	75
Dummy earphone volume	100

Dummy mic Gain	100
Dummy mic mode	00
Dummy mic num	50
Dummy speaker gain	67
Dummy speaker volume	100
External MIC Power Voltage	100
External MIC Power	00
Internal MIC Power	Off
PA Output Swing Mux	Vpp1.6
audio output mode switch	i2s
speaker on off switch	Off

#: Applicable only for RPi SBC