X-Powers AC108

4-Channel ADC with TDM Output for Multiple-MIC Devices

Revision 0.9

Overview

The AC108 is a highly integrated quad-channel ADC with I2S/TDM output transition . It's designed for multi-microphone array in high definition voice capture and recognition application platforms.

The integrated digital PLL supports a large range of input/output frequencies, and It can generate required system clocks from common reference clock frequencies such as 6-/12-MHz, 6.144-/12.288-MHz, 5.6448-/11.2896-MHz, 13MHz and 19.2MHz. The audio sample 8kHz, 16kHz, 22.05kHz, 24kHz, 32kHz, 44.1kHz, 48kHz is supported.

The AC108 integrates four synchronized ADCs with independent programmable mic bias voltage and mic boost amplifier to deliver valid channel data that channel crosstalk can be eliminated. The analog input port MIC1P/N ~MIC4P/N is designed as four differential microphone pin or single-ended line-in pin.Two smart digital mic interfaces are supported to make low jitter clock output and decimation filter for up to four digital mic. Independent digital voice controllers are provided in each channel .

The AC108 can transit its four channels output data over two I2S ports by I2S or PCM format, also a single port by TDM format. Furthermore, one to four device can be combined to transit up to 16 channels output data by a single TDM line.

The device includes several DSP features such as high-pass filters, noise elimate, and volume control.

AC108 is controlled through TWI (2-wire serial interface) . It works only in the slave mode .

The device is available in 48-pin 6x6 QFN package.

Features

■ ADC future

- 108 dB dynamic range (A-weighted) @ 0 dB boost gain
- –80 dB THD+N @ 0 dB boost gain
- 4 programmable boost amplifiers with 0dB to 30dB in 1dB step
- ADC sample rates supported: 8kHz, 16kHz, 22.05kHz, 24kHz, 32kHz, 44.1kHz, 48kHz
- Analog mixer and digital mixer in record data path

■ Analog Input and output

- Four fully differential microphone inputs: MIC1P/N ~MIC4P/N
  - Can be configured as pseudo differential, single-ended mode
  - Can be configured as digital MIC data pin
- Four low noise mic bias outputs: MIC1_BIAS~MIC4_BIAS
  - Programmable bias voltage 1.8V to 3.4V

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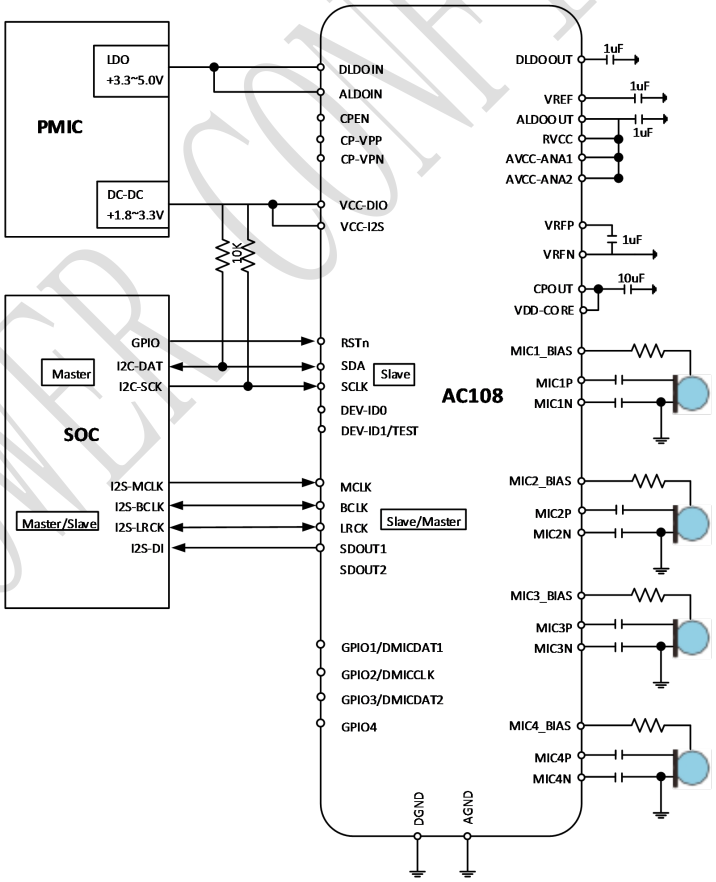
Digital Output

- Two digital microphone SCLK output@1M~3M
- Two I2S data output:
  - Can be configured as I2S/PCM format using 2 pins to output 4channel data
  - Can be configured as I2S/PCM format using 1 pins to output 4channel data even 16 channel of 4 devices.
  - Can be configured as TDM format using 1 pins to output 4 channel data even 16 channel of 4 devices.

Other Features

- DPLL support a wide input for 6-/12-MHz, 6.144-/12.288-MHz, 5.6448-/11.2896-MHz, 13MHz and 19.2MHz.
- Integrated LDO allowing single supply (3.3V~5V)
- <6mA@3.3V per ADC channel for low power consumption application
- TWI control interface support from 100 kHz up to 400 kHz
- QFN 48-pin package, 6mm x 6mm

Typical Application Diagram



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