Block Description

AD1938 Codec
The codec module consists of an ADC (Analog-to-Digital Converter) to convert our analog sound input to digital signal for the DSP core to process and a DAC (Digital-to-Analog Converter) to convert the processed digital signal back to analog signal as sound output. It also consists of a pre-amplifier for the amplification of the input microphone signal. We are using
Analog Devices’ AD1938YSTZ as our audio codec module. It has 4 ADCs, 8 DACs, and it utilizes a SPI interface to communicate with our ADSP-21479 DSP chip. The operating supply voltage is 3.3V to 5V. It has an input sampling rate of 48kHZ.

Safety Statements
1. High intensity -> damage to hair cells in ears
To protect the ear, the intensity of our hearing-aid output signal should be below 85dB NIOSH and CDC (2002): 85dB, 8hours -> damage
(Accepted standards for recommended permissible exposure time for continuous time weighted average noise)¹
2. High frequency sound: Human speech, which ranges from 300 to 4,000 Hz, Hearing range: 20–20,000 Hz²
   1) Check sampling rate: avoid aliasing
   2) Make sure highest cutoff frequency of filter bank <= 8000Hz

3. Voltage
Make sure voltage will not exceed 5V, so that the circuit will not get burned or further hurt the user.

4. Material
Since part of our production is inserted in human ears. We have to sure make the materials are not harm to human skin.