AK4962

Low-Power CODEC with Audio/Voice DSP

1. General Description

The AK4962 is four channels 32-bit ADC, monaural ADC, stereo advanced 32-bit high sound quality audio DAC and stereo 32-bit DAC with a built-in microphone amplifier, mono receiver amplifier, ground-referenced headphone amplifier, lineout, and a high feature Audio/Voice DSP. The AK4962 features AKM's DSP core to deal with various kinds of voice processing features such as dual mic Tx noise suppression, Rx noise suppression, echo cancellation, and hands free functions. The AK4962 has five audio I/F and SLIMbus I/F to communicate with an Application processor, up to two Baseband processors, a Bluetooth module and a digital input class-D amplifier simultaneously, and mixes asynchronous signal with built-in SRCs.

2. Features

1. Recording Function

- **4-Channel Low Power 32-bit ADC**
  - **2-types Digital Filter for Sound Color Selection**
- **Monaural Low Power ADC**
  - **PDM Output**
- **3 Stereo Input Selectors**
- **3 Stereo Inputs (Single-ended) or 6 Mono Inputs (Full-differential)**
- **MIC Amplifier Gain: +30 dB to 0 dB, 3 dB step**
- **Input Attenuator: 0 dB / –6 dB**
- **5 MIC Power Supplies: 2.8 / 2.5 / 1.8 V Selectable**
- **ADC Characteristics:**
  - **Single-ended Mode**
    - **THD+N: –88 dB, DR, S/N: 95 dB (Gain = +18 dB)**
    - **THD+N: –80 dB, DR, S/N: 102 dB (Gain = 0 dB)**
  - **Full-Differential Mode:**
    - **THD+N: –90 dB, DR, S/N: 95 dB (Gain = +18 dB)**
    - **THD+N: –93 dB, DR, S/N: 102 dB (Gain = 0 dB)**
- **4-Channel Digital MIC Interface**

2. Playback Function

- **Stereo High Sound Quality Low Power Advanced 32-bit DAC for Headphone**
  - **4 types of Digital Filter for Sound Color Selection**
  - **2 types of Operation Mode (High Performance Mode / Low Power Mode)**
- **Low Power 32-bit Stereo DAC for LINEOUT/ Receiver / External Speaker Amplifier**
- **Ground-referenced Class-G Stereo Headphone Amplifier**
  - **Output Power: 25 mW @ 32 Ω, 40 mW @ 16 Ω, THD+N < –60 dB**
  - **THD+N: –106 dB**
  - **S/N: 125 dB**
  - **Output Noise Level: –125 dBV (Analog Volume ≤ –14 dB)**
  - **Analog Volume: +6 ~ –20 dB & Mute, 2 dB Step**
  - **Ground Loop Noise Cancellation**
- **Ground-referenced Stereo Line Outputs**
  - **THD+N: –86 dB, DR, S/N: 100 dB**
  - **Analog Volume: +3 to –7.5 dB, 1.5 dB Step**
- **Mono Receiver Amplifier**
  - **BTL Output**
  - **Output Power: 100 mW @ 32 Ω, THD+N < –65 dB**
  - **THD+N: –87 dB @ 32 Ω, Po = 30 mW**
  - **S/N: 100 dB**
  - **Analog Volume: + 3 to –7.5 dB, 1.5 dB Step**

- **Ground-referenced stereo Line Outputs for External Speaker Amplifier**
  - **2ch Single-ended or Full Differential Outputs**
  - **THD+N: –86 dB, DR, S/N: 100 dB**
  - **Analog Volume: +3 to –7.5 dB, 1.5 dB Step**

3. **Five Digital Audio interface**
   - **Master/Slave mode**
   - **Sampling Frequency (ADC):**
     8 k, 11.025 k, 12 k, 16 k, 22.05 k, 24 k, 32 k, 44.1 k, 48 k, 64 k, 88.2 k, 96 k, 128 k, 176.4 k, 192 kHz
   - **Sampling Frequency (DAC):**
     8 k, 11.025 k, 12 k, 16 k, 22.05 k, 24 k, 32 k, 44.1 k, 48 k, 64 k, 88.2 k, 96 k, 128 k, 176.4 k, 192 k, 256 k, 352.8 k, 384 kHz
   - **Interface Format**
     - **SDTOx: 32/24/16-bit I^2S/MSB justified, 16-bit PCM Short/Long Frame**
     - **SDTIx: 32/24/16-bit I^2S/MSB justified, 16-bit PCM Short/Long Frame**
     - **TDM Mode (SDTO1A, SDTI1A pin)**
4. **SLIMbus Interface**
5. **Four Asynchronous Sample Rate Converters:**
   - **Up sample: up to x 6**
   - **Down sample: down to x 1/6**
6. **Power Management**
7. **Dual PLL**
8. **X'tal Oscillator**
9. **ANC (Active Noise Canceller)**
10. **Accessories**
    - **Jack Detection**
    - **Headset Detection**
    - **Button Detection**
    - **Impedance Detection**
11. **Embedded Audio/ Hands Free DSP**
    - **Flexible programming with built-in program and data memories**
    - **Hardware accelerator**
    - **Processing features (example)**
      - **Single/Dual Microphone Noise suppression**
      - **Echo cancellation**
      - **Rx Voice Clarity Enhancement**
      - **5-Band Parametric EQ, Dynamic Range Control**
12. **µP I/F: SPI / I^2C (1 MHz) and SLIMbus**
13. **Operation Temperature Range: Ta = –40 to 85°C**
14. **Power Supply:**
    - **AVDD1, 2 (CODEC, MIC, PLL): 1.7 to 1.9 V**
    - **CVDD (HP/LINE/RCV Amplifiers, Charge Pump): 1.7 to 1.9 V**
    - **LVDD (LDO2 for Digital Core): 1.7 to 1.9 V (built-in LDO)**
    - **TVDD1, 2, 3 (Host & Audio I/F): 1.65 to 3.6 V**
15. **Package: 125-pin CSP (4.576 x 5.224mm, 0.4 mm (Min.) pitch)**

3. Block Diagram and Functions

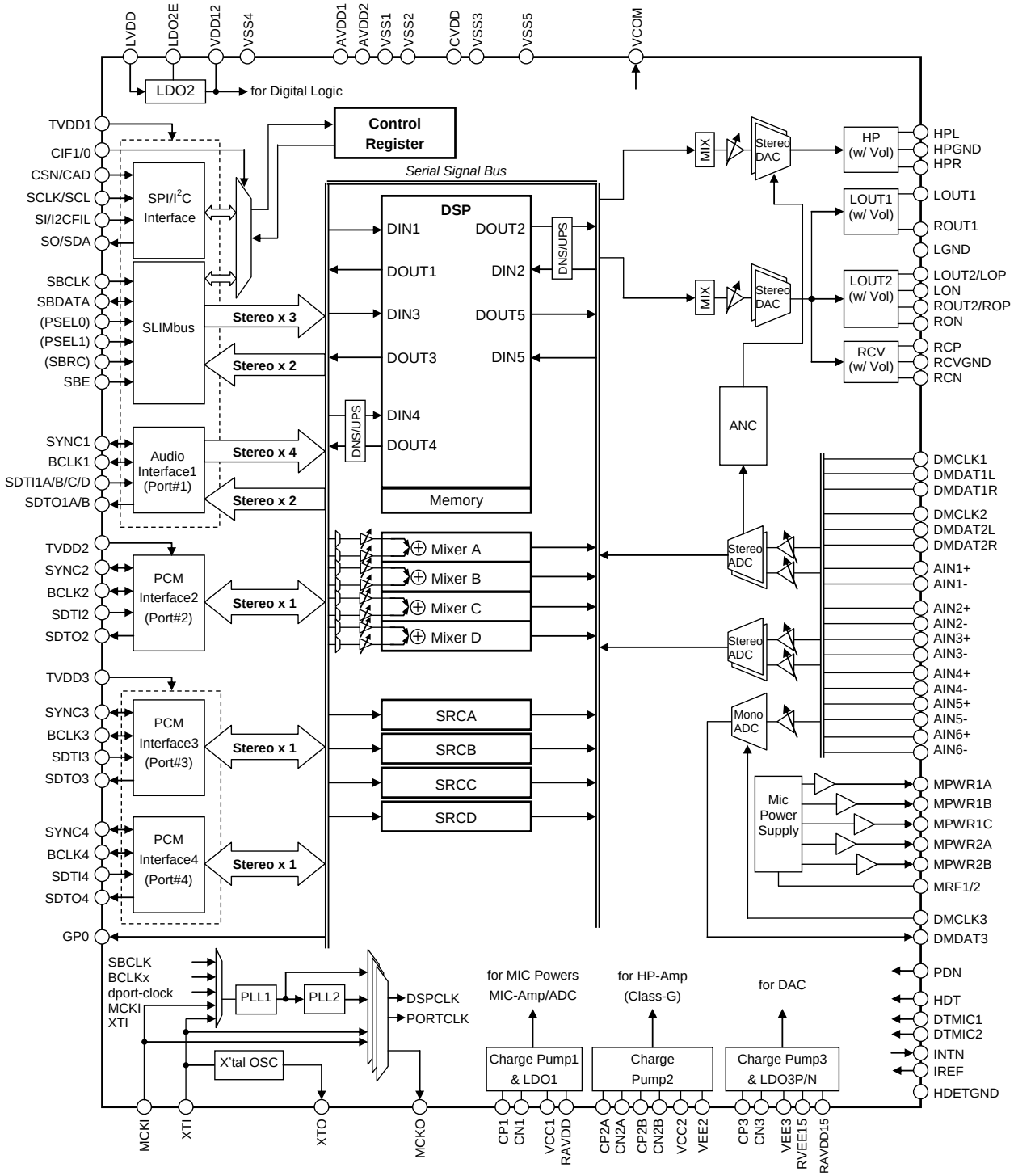
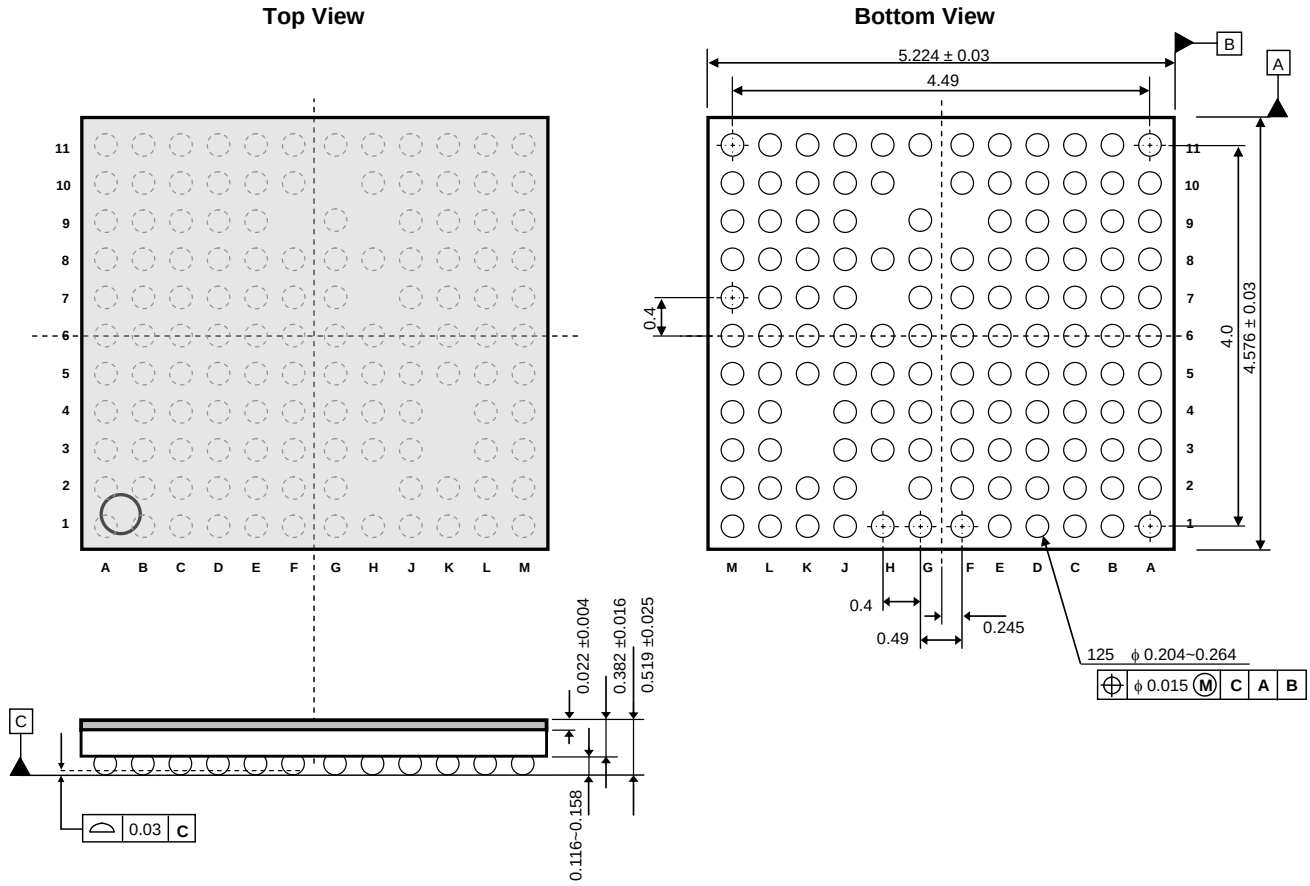


Figure 1. AK4962 Block Diagram

4. Package

■ Outline Dimensions

125-pin CSP package (4.576 x 5.224 mm, 0.4 mm (Min.) pitch)



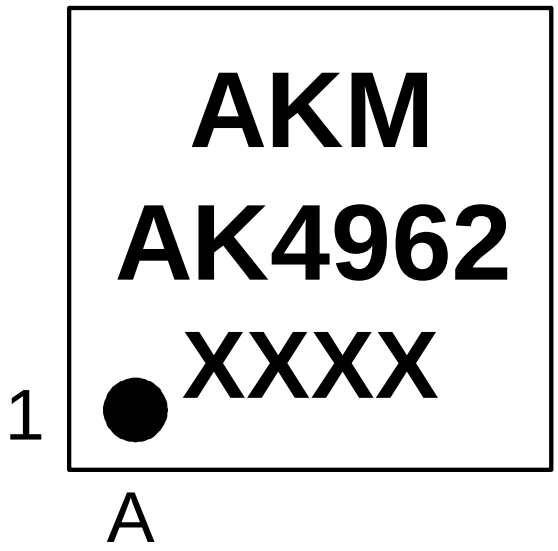
*The pin pitch is 0.4mm except between G and F. The pin pitch between G and F is 0.49 mm.

■ Material & Lead finish

Package molding compound: Epoxy, Halogen (bromine and chlorine) free
Solder ball material: SnAgCuNi

■ **Marking**

CSP Package



XXXX: Date code (4 digits)
Pin #A1 indication

5. Ordering Guide

■ **Ordering Guide**

AK4962ECB	−40 to 85°C	125-pin CSP 4.576 x 5.224mm (0.4 mm (Min.) pitch)
AKD4962	Evaluation board for AK4962	

6. Revision History

Date (Y/M/D)	Revision	Reason	Page	Contents
16/01/15	00	First Edition		
16/02/10	01	Error Correction		

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