1. General Description

The AK4377 is stereo advanced 32-bit high sound quality audio DAC with a built-in ground-referenced headphone amplifier that adopted VELVET SOUND™ technology. The AK4377 has four types of 32-bit digital filters for better sound quality, achieving low distortion characteristics and wide dynamic range. AK4377 accepts up to 768 kHz PCM data and DSD256 input. The AK4377 is available in a 36-pin CSP package, utilizing less board space than competitive offerings.

2. Features

1. Stereo High Sound Quality Advanced 32-bit DAC
   - 4-types of Digital Filter for Sound Color Selection
   - 2-types of Operation Mode (High Performance Mode / Low Power Mode)
2. Ground-referenced Class-G Stereo Headphone Amplifier
   - Output Power: 60 mW @ 16Ω
   - THD+N: \(-109 \text{ dB} @ \text{Po} = 10 \text{ mW, } R_L = 32\Omega\)
   - \(-106 \text{ dB} @ \text{Po} = 25 \text{ mW, } R_L = 32\Omega\)
   - S/N: 128 dB
   - Output Noise Level: \(-129 \text{ dBV}\)
   - Analog Volume: \(+4 \text{ to } -20 \text{ dB} & \text{Mute}\)
   - Ground Loop Noise Cancellation
3. Headphone Amplifier Output Pins Comply with IEC61000-4-2 Level4 ESD Protection
4. Digital Audio Interface
   - Master/Slave Mode
   - Sampling Frequency:
     - Slave Mode: 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 k, 512 k, 705.6 k, 768 kHz
     - Master Mode: 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: 32/24/16-bit I²S/MSB justified
   - DSD Support by DoP: DSD64, DSD128, DSD256
5. Power Management
6. PLL
7. X’tal Oscillator
8. µP Interface: I²C-bus (400 kHz)
9. Operation Temperature Range: \(Ta = -40 \text{ to } 85^\circ \text{C}\)
10. Power Supply:
    - AVDD (DAC, PLL): 1.7 to 1.9 V
    - CVDD (Headphone Amplifiers, Charge Pump): 1.7 to 1.9 V
    - LVDD (LDO2 for Digital Core): 1.7 to 1.9 V (built-in LDO)
    - TVDD (Digital Interface): 1.65 to 3.6 V
11. Package: 36-pin CSP (2.893 x 3.082 mm, 0.4 mm pitch)
Figure 1. AK4377 Block Diagram
4. Package

■ Outline Dimensions
36-pin CSP (Unit: mm)

Top View

Bottom View

■ Material and Lead Finish

Package molding compound: Epoxy Resin, Halogen free
Solder ball material: SnAgCu
### Marking

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

### 5. Ordering Guide

- **AK4377ECB** –40 to 85 °C  36-pin CSP (0.4 mm pitch)
- **AKD4377** Evaluation board for AK4377

### 6. Revision History

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