

PRODUCT BRIEF

Mono Class D Audio Codec Subsystem with Ground Referenced Headphone Amplifiers, Earpiece Driver, and Audio DSP

1.0 General Description

The LM49352 is a high performance mixed signal audio subsystem. The LM49352 includes a high quality stereo DAC, a high quality stereo ADC, a stereo headphone amplifier, which supports True Ground operation, a low EMI Class D loudspeaker amplifier, and an earpiece speaker amplifier. It combines advanced audio processing, conversion, mixing, and amplification in the smallest possible footprint while extending the battery life of feature rich portable devices.

The LM49352 features dual bi-directional I²S or PCM audio interfaces and an I²C compatible interface for control. The stereo DAC path features an SNR of 103dB with 24-bit 48 kHz input. The headphone amplifier delivers 65mW_{RMS} (typ) to a 32Ω single-ended stereo load with less than 1% distortion (THD+N) when HP_V_{DD} = 2.8V. The loudspeaker amplifier delivers up to 970mW into an 8Ω load with less than 1% distortion when LS_V_{DD} = 4.2V.

The LM49352 employs advanced techniques to extend battery life, to reduce controller overhead, to speed development time, and to eliminate click and pop artifacts. Boomer audio power amplifiers are designed specifically for mobile devices and require minimal PCB area and external components.

Notice: This document is not a full datasheet. For more information regarding this product or to order samples please contact your local National Semiconductor sales office or visit <http://www.national.com/support/dir.html>

2.0 Applications

- Smart Phones
- Mobile Phones and VOIP Phones
- Portable GPS Navigator and Portable Gaming Devices
- Portable DVD/CD/AAC/MP3/MP4 Players
- Digital Cameras/Camcorders

3.0 Key Specifications

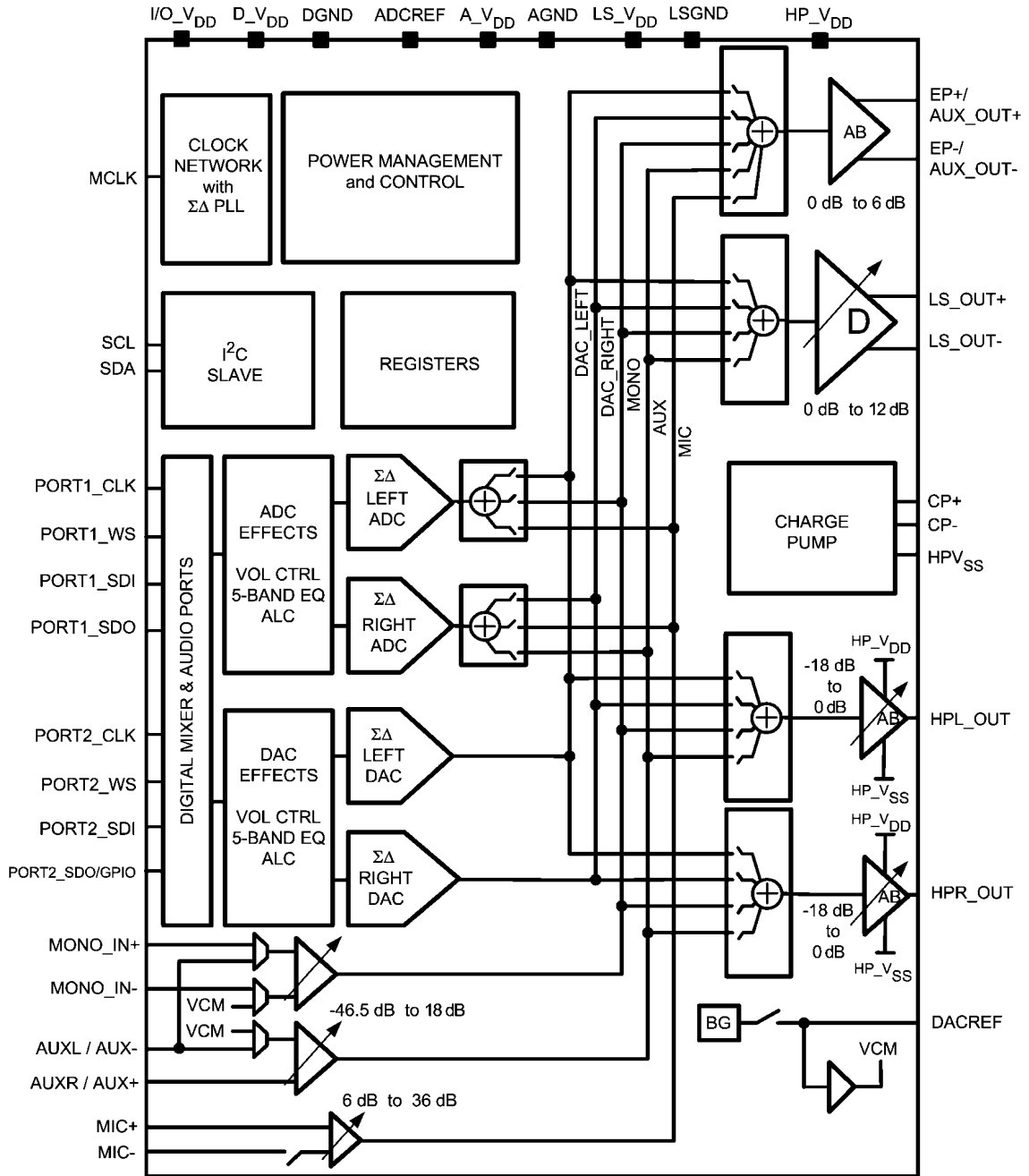
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|--|---------------|
| ■ Class D Amplifier Efficiency | 93% (typ) |
| ■ P _{EP} at A_V _{DD} = 3.3V, 32Ω, 1% THD | 58mW (typ) |
| ■ P _{HP} at HP_V _{DD} = 2.8V, Stereo 32Ω, 1% THD | 65mW/ch (typ) |
| ■ P _{LS} at LS_V _{DD} = 5V, 8Ω, 1% THD | 1.4W (typ) |

- | | |
|--|-------------|
| ■ P _{LS} at LS_V _{DD} = 4.2V, 8Ω, 1% THD | 970mW (typ) |
| ■ P _{LS} at LS_V _{DD} = 3.3V, 8Ω, 1% THD | 590mW (typ) |
| ■ SNR (Stereo DAC at 48kHz) | 103dB (typ) |
| ■ PSRR at 217 Hz, A_V _{DD} = 3.3V, (HP from AUX) | 100dB (typ) |

4.0 Features

- Ultra efficient, spread spectrum Class D loudspeaker amplifier that operates at 93% efficiency
- Low voltage, true ground headphone amplifier operation
- High performance 103dB SNR stereo DAC
- High performance 97dB SNR stereo ADC
- Up to 96kHz stereo audio playback
- Up to 48kHz stereo recording
- Dual bidirectional I²S or PCM compatible audio interfaces
- Read/write I²C compatible control interface
- Flexible digital mixer with sample rate conversion
- Sigma-delta PLL clock network that supports system clocks up to 50MHz including 13MHz, 19.2MHz, and 26MHz
- Dual stereo 5 band parametric equalizers
- Cascadable DSP effects that allow stereo 10 band parametric equalization
- ALC/Limiter/Compressor on both DAC and ADC paths
- Dedicated Earpiece Speaker Amplifier
- Stereo auxiliary inputs and mono differential input
- Differential microphone input with single-ended option
- Automatic level control for digital audio inputs, mono differential input, microphone input, and stereo auxiliary inputs
- Flexible audio routing from input to output
- 16 Step volume control for microphone with 2dB steps
- 32 Step volume control for auxiliary inputs in 1.5dB steps
- 4 Step volume control for class D loudspeaker amplifier
- 8 Step volume control for headphone amplifier
- Micro-power shutdown mode
- Available in the 3.3 x 3.3 mm 36 bump micro SMD package

5.0 LM49352 Overview

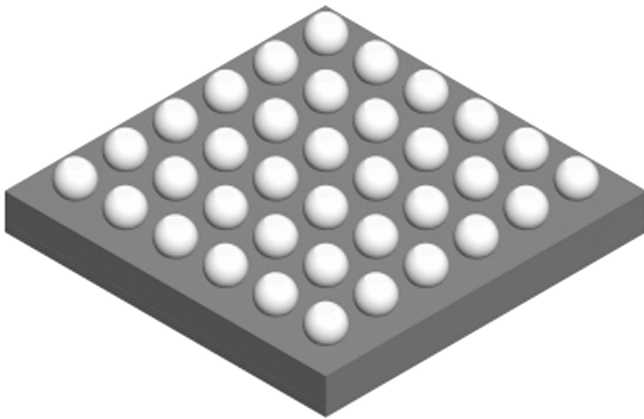


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FIGURE 1. LM49352 Block Diagram

6.0 Connection Diagrams

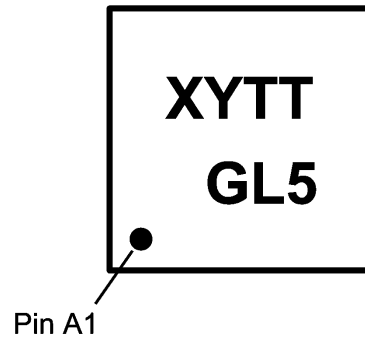
36 Bump micro SMD



Order Number LM49352RL
See NS Package Number RLA36MMA

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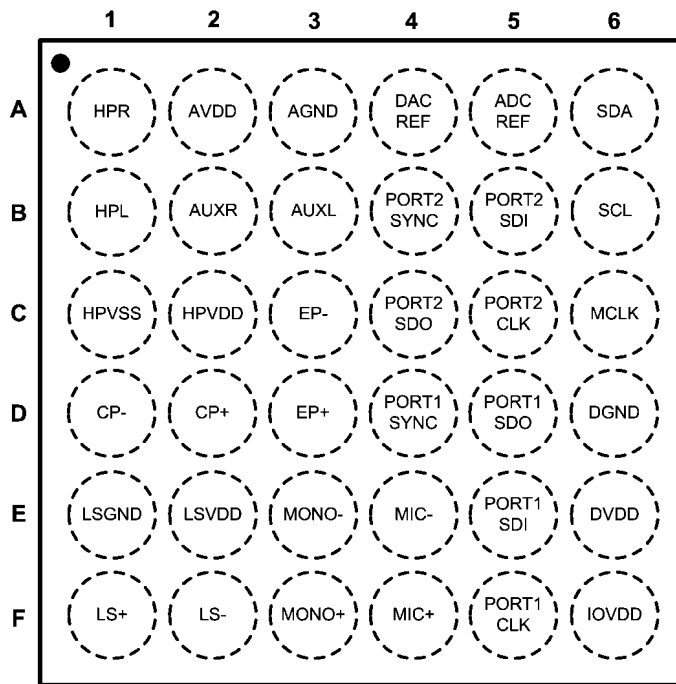
36 Bump micro SMD Marking



Top View
XY — Date Code
TT — Die Traceability
G — Boomer
L5 — LM49352RL

300727q7

LM49352RL Pinout Diagram



Top View (Bump Side Down)

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Ordering Information

| Order Number | Package | Package DWG # | Transport Media | MSL Level | Green Status |
|--------------|---------------------|---------------|-----------------------------|-----------|-------------------|
| LM49352RL | 36 Bump micro SMDxt | RLA36MMA | 250 units on tape and reel | 1 | RoHS and no Sb/Br |
| LM49352RLX | 36 Bump micro SMDxt | RLA36MMA | 1000 units on tape and reel | 1 | RoHS and no Sb/Br |

Notes

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