Final Year Project 2006~2007

Design of Monolithic Class D Audio Amplifier

Supervisor: Professor Philip Mok

Participators: Ng Kwok Ping* (04283026)
Sin Kwok Ching (05610771)
Introduction
For portable electronic devices, size and power dissipation are the key factor when choosing the components. Class D amplifier has outstanding power efficiency; however, it could only amplify in low frequency voice signals in the past. As the IC technology has improved, it is possible to design a Class D amplifier for audio amplification with comparable Hi-Fi quality. Thus, design of a monolithic class D audio amplifier is needed to reduce the power consumption and the volume.

Objectives:
- Class D amplifier on 0.35μm CMOS technology
- Bandwidth >20kHz
- Efficiency >85%
- Total Harmonic Distortion < 0.5%

Applications:
- Cell phone
- PDA
- MP3 player
- Notebook
- All music players which drive headphone or mini speakers

Block Diagram
The schematic diagram of the Class D audio amplifier
Results

**Input (Red) and Output (Blue) signal of the Class D audio amplifier**

**FFT Simulation of the Class D audio amplifier**

- Bandwidth: \(~30\text{kHz}\)
- Power Efficiency: \(~88\%\)
- Total Harmonic Distortion: \(~0.35\%\)

**Conclusion**

A monolithic Class D audio amplifier was designed. It achieved the project objective. Its ability to amplify the hi-fi quality signal can be applied in the cellular phone or any other portable devices to improve power efficiency and enhance the battery life.