

EE 135: Spring 2003

Class D Amplifier
Instruction Manual

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Introduction

A class D amplifier is an amplifier in which the output transistors are operated as switches. When a transistor is off, the current through it is zero and when it is on the voltage across it is ideally zero. Overall, this type of amplifier is more efficient. A basic class d amplifier consists of a comparator, which drives two MOSFET transistors. These MOSFET transistors operate as switches. The comparator has two inputs: a triangle wave and an audio signal where the frequency of the triangle wave must be much higher than that of the audio output. Using the triangle wave, the comparator pulse width modulates (PWM) the audio signal and then the two switching transistors amplify the PWM. A low pass filter will return the amplified audio signal. As can be seen from our schematic our amplifier is a little more complex.

Testing Procedures for Our Design

The actual testing of our class D amplifier chip should be relatively easy assuming no major catastrophe occurs. Procedure is given below:

1. Vdd is hooked up to +3 volts while Vss is hooked up to -3 volts.
2. All resistors and capacitors must be hooked up according to their pin assignments.
3. Input is Vaudio with the main output labeled Output.
4. After the voltage is input the output should output the same amount of voltage with approximately 333mA of current.

Note:

1. All op-amps have a 380-kohm resistor placed off-chip connected to Vdd.
2. The comparator has a 420-kohm resistor placed off-chip connected to Vdd.
3. The capacitor, C, is carried off chip.

Pin Assignment

Left side (from top):

| | | |
|-------------|----------|----|
| C (0.01 uF) | negative | 16 |
| | 380k R | 17 |
| | GND | 18 |
| | 380k R | 19 |

Top (from left):

| | | |
|-------------|---------------|----|
| C (0.01 uF) | positive | 15 |
| | GND | 14 |
| | Triangle Out | 13 |
| | 380k R | 12 |
| | Voff | 11 |
| | Triangle2 Out | 10 |
| | 420k R | 9 |
| | Vaudio | 8 |
| | Vss | 7 |
| | Vdd | 6 |

Right side (from top):

| | |
|--------|---|
| Vss2 | 5 |
| Output | 4 |
| Vdd2 | 3 |

Bottom (from right):

| | | |
|-----------------------|------------|----|
| The 4 th : | PWM output | 32 |
|-----------------------|------------|----|