Calculation Report: Monolithic Power Amplifier
PRO-Q2

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EQ2.a
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1 Introduction

In this calculation report the monolithic power amplifier is determined and calculated.

2 Monolithic Power Amplifier

2.1 Requirements

The power amplifier has the following specifications:

- Input impedance of at least 50 kΩ
- Output power: 15 W sine in R_{load} = 8 Ω at 1 kHz
- Frequency range: 10 Hz to 100 kHz (−3 dB) at P_{load} = 0.5 W in 8 Ω

2.2 Chosen Power Amplifier

For the power amplifier, the LM1875 (Farnell code: 1468913) was chosen. This specific power amplifier has been chosen because the LM1875 meets the specified requirements.

2.3 Calculations

For determining the maximum output voltage and current, it is assumed the amplifiier drives an 8 Ω load at 15 W.

The formula for the power equals to:

$$P = U * I \tag{1}$$

Therefore the following formulas can be derived:

$$U_{OUT,max} = \sqrt{P * R} = \sqrt{15 * 8} = 11V \tag{2}$$

$$I_{OUT,max} = \sqrt{\frac{P}{R}} = \sqrt{\frac{15}{8}} = 1,37A \tag{3}$$

The amplifier has a bandwidth of 70 kHz at 20 W output power, however the desired dynamic range of 10 Hz to 100 kHz can be easily achieved at lower power output.

According to the datasheet from LM1875 [1] the supply voltage need to be approximately ± 18 V to accomodate to the 15 W output power.

References

[1] Texas Instruments. (2004, May). "*LM1875 20W Audio Power Amplifier*" [online]. Available: http://www.farnell.com/datasheets/1703151.pdf [April 3, 2015].