

ELEC-313
Lab 1: Amplifier Models

September 15, 2013

Date Performed: September 11, 2013
Partners: Charles Pittman
Stephen Wilson

1 Objective

The objective is to verify the equivalence of four circuits used to model an amplifier, shown in Figure 3.

2 Schematics

Circuit Tested

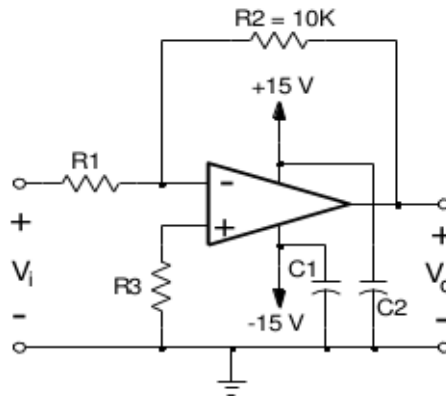


Figure 1: Circuit being tested. $C_1 = C_2 = 1 \mu F$

Test Configuration

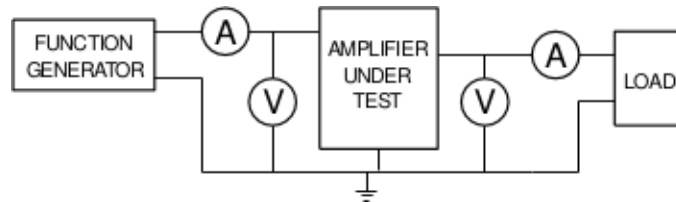


Figure 2: Test Configuration

3 Procedure

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec hendrerit tempor tellus. Donec pretium posuere tellus. Proin quam nisl, tincidunt et, mattis eget, convallis nec, purus. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Nulla posuere. Donec vitae dolor. Nullam

tristique diam non turpis. Cras placerat accumsan nulla. Nullam rutrum. Nam vestibulum accumsan nisl.

4 Results

Name	Nominal (k Ω)	Measured (k Ω)	% Error
R_1	1	0.986	1.40
R_2	10	9.88	1.20
R_3	1	0.983	1.70

Table 1: Comparison of labelled and actual resistance.

	Voltage		Current		Gain	
	V_i	V_o	I_i	I_o	A_v	A_i
	(mV _{rms})	(V _{rms})	(mA _{rms})	(mA _{rms})		
No Load	200	1.98	0.2	nil	9.9	nil
Load	200	1.98	0.2	9.52	9.9	47.6

Table 2: Comparison of electrical characteristics of the amplifier under load.

5 Conclusions

In Table 4, lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec hendrerit tempor tellus. Donec pretium posuere tellus. Proin quam nisl, tincidunt et, mattis eget, convallis nec, purus. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Nulla posuere. Donec vitae dolor. Nullam tristique diam non turpis. Cras placerat accumsan nulla. Nullam rutrum. Nam vestibulum accumsan nisl.

Nullam eu ante vel est convallis dignissim. Fusce suscipit, wisi nec facilisis facilisis, est dui fermentum leo, quis tempor ligula erat quis odio. Nunc porta vulputate tellus. Nunc rutrum turpis sed pede. Sed bibendum. Aliquam posuere. Nunc aliquet, augue nec adipiscing interdum, lacus tellus malesuada massa, quis varius mi purus non odio. Pellentesque condimentum, magna ut suscipit hendrerit, ipsum augue ornare nulla, non luctus diam neque sit amet urna. Curabitur vulputate vestibulum lorem. Fusce sagittis, libero non molestie mollis, magna orci ultrices dolor, at vulputate neque nulla lacinia eros. Sed id ligula quis est convallis tempor. Curabitur lacinia pulvinar nibh. Nam a sapien.

Equations

$$\%_{error} = \frac{|measured - nominal|}{nominal} \times 100\% \quad (1)$$

$$R_o = \frac{V_{noload} - V_{load}}{I_{load}} \quad (2)$$

$$R_i = \frac{V_i}{I_i} \quad (3)$$

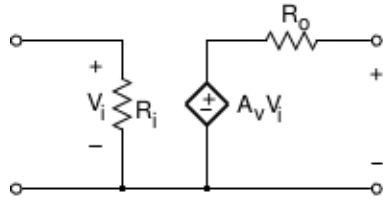
$$A_v = \frac{V_o}{V_i} \quad (4)$$

$$A_i = A_v \left(\frac{R_i}{R_o} \right) \quad (5)$$

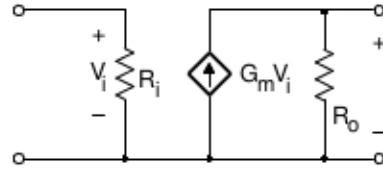
$$G_m = \frac{A_v}{R_o} \quad (6)$$

$$R_m = A_v R_i \quad (7)$$

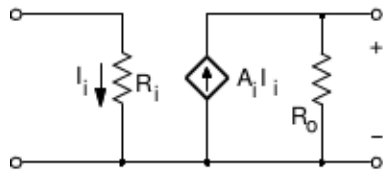
6 Appendix



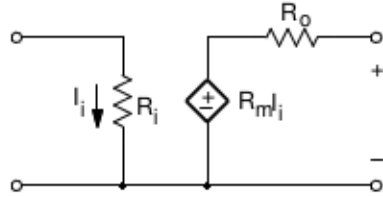
VOLTAGE AMPLIFIER MODEL



TRANSCONDUCTANCE MODEL



CURRENT AMPLIFIER MODEL



TRANSRESISTANCE MODEL

Figure 3: Four equivalent models of an amplifier