UNIVERSITY OF CALIFORNIA AT BERKELEY

College of Engineering

Department of Electrical Engineering and Computer Sciences

EE105 Lab Experiments

Experiment 4: Diodes, LEDs, Photodetectors

Lab Report

Student 1 name: Bryan Ngo

Student 2 name: Kyle Lui

Lab group: Tuesday 8-11 / Tuesday 5-8 / Thursday 8-11 / Thursday 5-8

# Lab

# Half-Bridge Rectifier

What output waveform do you see? What applied voltage led to a 250 mV output? Is the waveform exactly half a sinusoid? Why or why not?

1.6 V, not exactly half a sinusoid

Now try adding a 1 uF capacitor in parallel with the resistor load. Vary the frequency from 100 Hz to 5 kHz. What happens to the amplitude of the waveform? Its shape?

Amplitude goes down and slews

Try the same circuit with a 10 uF and 1 nF capacitor at the load. At what frequencies does that output begin to change for those capacitors at the load?

10 µF: 100 Hz

10 nF: 100 kHz

What does the capacitor do the output waveform? Explain why this is happening.

The capacitor adds a tail to the output waveform since there is now a charge/discharge rate.

# LED transmitter

The DC voltage Vs to achieve a 20mA current through the LED: 3.2 V

# Photodiode

Is the current dependent on the supply voltage? No

# Receiver - DC

Receiver 1 indicator LED voltage: 1.9 V

Receiver 1 indicator LED current: 4.7 mA

Receiver 2 indicator LED voltage:

Receiver 2 indicator LED current:

# Receiver - transient

Receiver 1 waveforms for 10KHz input:

Receiver 2 waveforms for 10KHz input:

Are these waveforms different from the simulated in the pre-lab? Why or why not?

Receiver 1 waveforms for the maximum bitrate:

Receiver 2 waveforms for the maximum bitrate:

26 kHz

Is this higher or lower frequency than you expected from the pre-lab?

# Receiver - low swing

Receiver 1 maximum bitrate: 150 kHz

1.9 V

Receiver 1 waveforms for the maximum bitrate:

Receiver 2 maximum bitrate:

Receiver 2 waveforms for the maximum bitrate:

Explain the result! Why are there differences in the low swing vs. high swing situations?