Abu Dhabi University

Electronic Devices and Circuits

Lab Report 2
Half, Full and clipping Circuits of Diodes

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Section 1

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Abstract

In this lab we were introduced to many of the practical applications of a diode. These applications include Clipping, Half wave and full wave Rectification of AC supply voltage.

1 Introduction

Diodes rectifiers are mainly used for converting AC to DC because of diode's properties to allow current to pass in only one direction. So depending on the positioning of the diode in the circuit, It allows particular unidirectional current to pass only. This phenomenon of converting AC to DC is known as Rectification.

Clipping circuits are designed to prevent the output of a circuit from exceeding a predetermined voltage level without distorting the remaining part of the applied waveform. Diode clipper can be used for the protection of different types of circuit. For example: a digital circuit against transients which may cause considerable damage, or the input of an audio amplifier.

2 Experiment Set-up

The Experiment was set up as shown in the figures below

2.1 Experiment 1

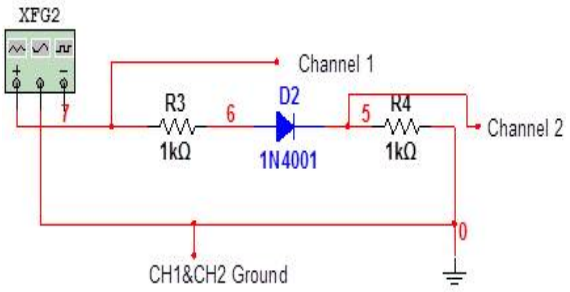

Figure 1: This is how we set up the circuit for experiment 1

2.2 Experiment 2

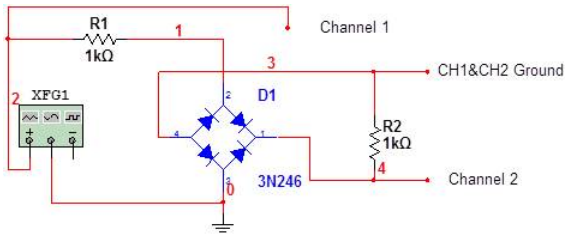

Figure 2: This is how we set up the circuit for experiment 2

2.3 Experiment 3

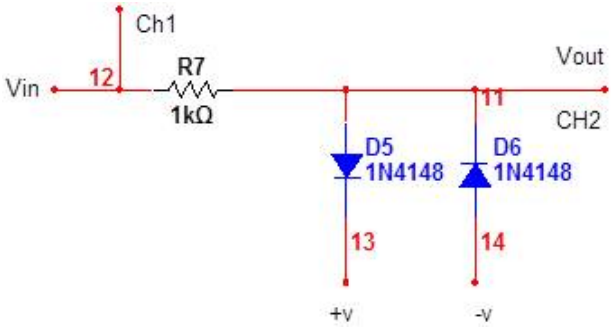

Figure 3: This is how we set up the circuit for experiment 3

3 List of Equipment used

- Function Generator.
- Oscilloscope.
- Function Generator Crocodile Clip Cable.
- Oscilloscope Probe.
- Breadboard.
- Breadboard Cables.
- Resistors.
- Silicon Diode (1N4148).
- Bridge Diode (2W10).

4 Procedure

4.1 Exersice 1

- Set the Function generator to the settings shown in the Table given in the Lab Manual.
- Connect the circuit as shown in the figure 1.
- Save the picture from the oscilloscope in a Flash Drive.
- Then record the values in the table given in the Lab Manual.

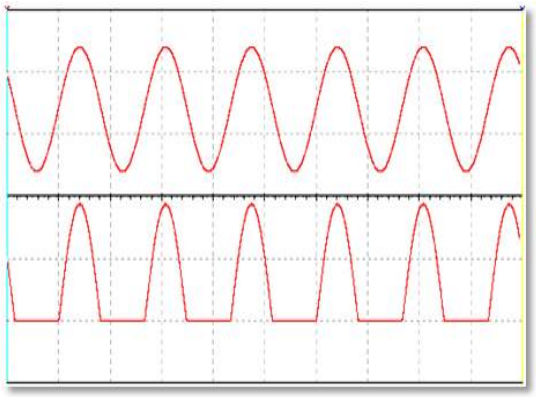

Figure 4: This is the expected result from the oscilloscope

4.2 Exercise 2

- Set the Function generator to the settings shown in the Table given in the Lab Manual.
- Connect the circuit as shown in the figure.
- Save the picture from the oscilloscope in a Flash Drive.
- Then record the values in the table given in the Lab Manual.

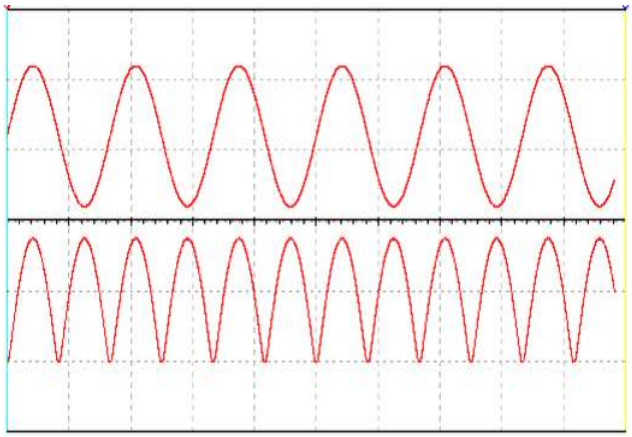

Figure 5: This is the expected result from the oscilloscope

4.3 Exercise 3

- Connect the circuit as shown in the figure.
- Apply the input wave forms (vin) by using the attributes written in Table in Lab Manual.
- Connect the oscilloscope's CH1 to vin and CH2 to vout.
- Save the picture from the oscilloscope in a Flash Drive.
- Then record the values in the table given in the Lab Manual.

5 Results and Discussions

After the circuit has been connected we found that the result as shown in the tables below for half and full wave rectifier :

Signal Waveform	Frequency (Hz)	Peak Voltage (V_P)	V_{rms}(V)	V_{dc}(V)	P = $(V_{rms})^2/R_z$
Sin	60	2.5V	0.45v	0.3v	0.203mw
Sin	60	5V	1.13V	0.79V	1.28m W

Figure 6: Table 1

Signal Waveform	Frequency (Hz)	Peak Voltage (V_P)	V_{rms}(V)	V_{dc}(V)	P = $(V_{rms})^2/R_z$
Sin	60	2.5V	740mv	0.67v	0.55mw
Sin	60	5V	1.64	2.34v	2.7mw

Figure 7: Table 2

In the full wave rectifier both of positive and negative cycles appeared whereas In half wave rectifier one of the positive appeared and the negative was removed .the efficiency of full wave rectifier was double of half wave rectifier due to Vrms Also , the full wave rectifier was provide more Power than the half wave rectifier

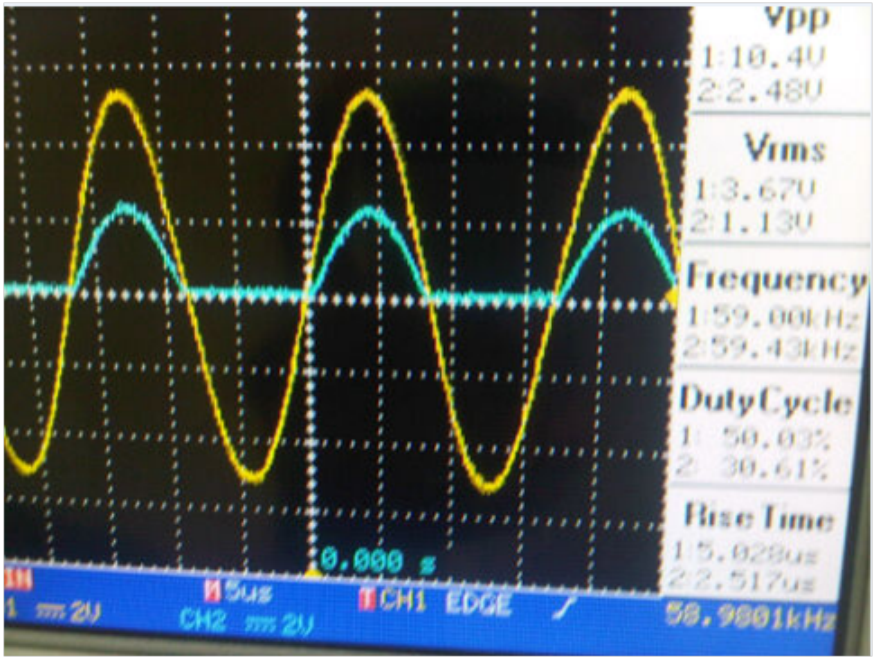

Figure 8: The input and output of half wave rectifier

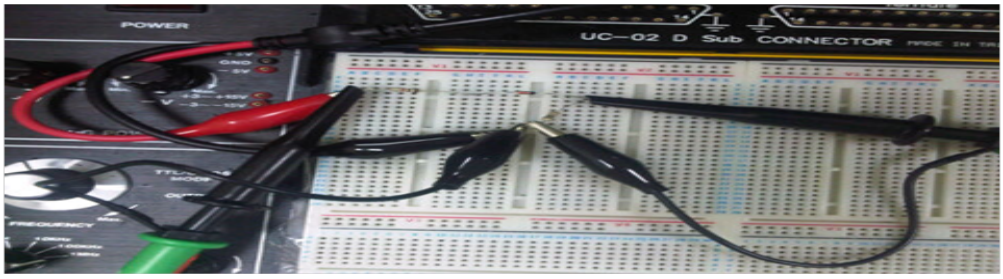

Figure 9: The connection for half wave rectifier

6 Conclusion

- In non ideal condition the voltage across a diode is 0.7 V.
- Half-wave rectifiers cause the electrical energy to be lost because the other half cycle of the supply is wasted.
- Full- wave rectifiers are very efficient and do not cause much energy wastage as it rectifies both of the cycles. ie. POsitive and negative cycles.
- The output V peak from the full wave rectifier is reduced 1.4 Volts compared to the input V peak.
- Vavg is same as Vdc.

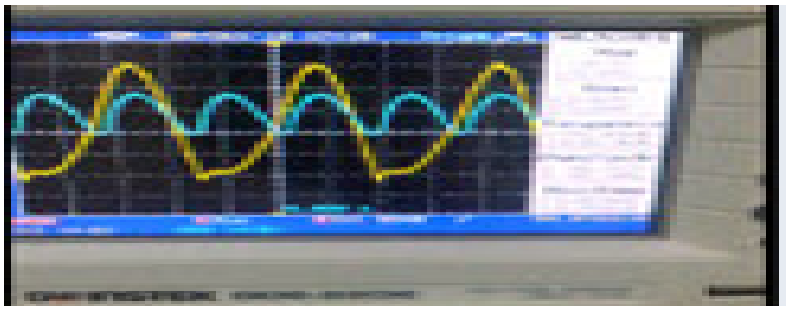

Figure 10: Full wave rectifier

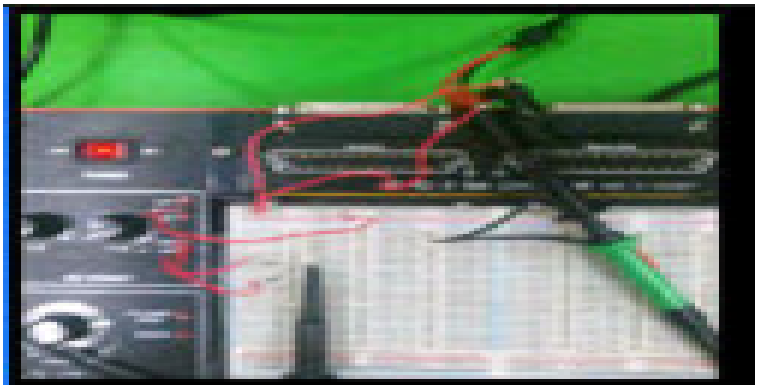

Figure 11: Clipping circuit

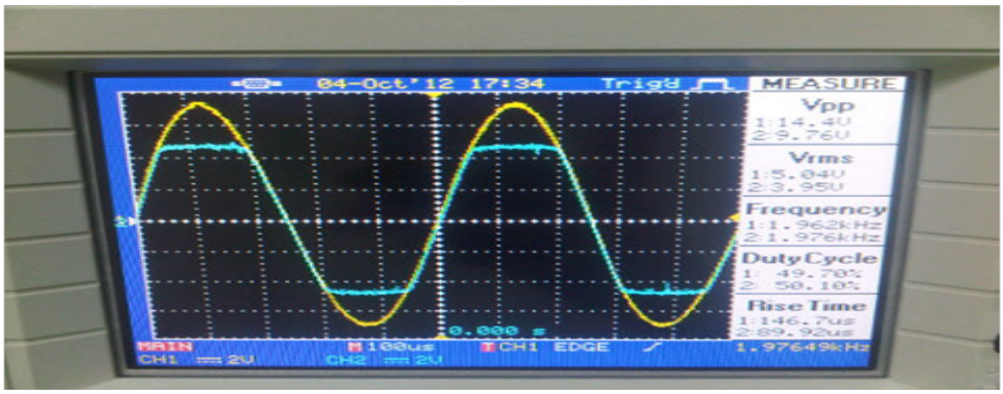

Figure 12: Clipping

Function Generator Configuration	DC power supply Configuration	Figure 14 output peak to peak voltage	
Sin, 2 KHZ, 10V_{PP}	+V = 2V, -V = -2V,	V_{PP}	3.0v
Sin, 2 KHZ, 14V_{PP}	+V = 3V, -V = -3V,	V_{PP}	4.03
Sin, 2 KHZ, 10V_{PP}	+V = 4V, -V = -3.5V,	V_{PP}	3.5

Figure 13: As shown in the figure, there are some portion of positive and negative cycles of input removed .therefore, it was called "biased negative clipper " when the circuit clipped in negative cycle vice verse in positive cycle it was called "biased positive clipper "


INSTEK
2.998


-3.494


INSTEK
04.03