



Al Mustaqbal University College



STUDENT NAME:			
TUTOR NAME:	Dr. Ameer Al-khaykan		
PROGRAMME:			
SUBJECT:	Analog Electronics		
COURSEWORK TITLE:	The Clipper Circuits		

Issue Date:	Due Date:	Feedback Date:	Extension Date:

PERFORMANCE CRITERIA:

TARGETED LEARNING OUTCOMES

4. Solve problems involving basic analogue and digital electronic circuits using numerical skills appropriate to an engineer.
5. Identify and safely use standard laboratory equipment to extract data, then apply in the solution of an electronic or electrical engineering problem;
6. Adopt a logical approach to the solution of engineering problems.

Important Information – Please Read Before Completing Your Work

All students should submit their work by the date specified using the procedures specified in the Student Handbook. An assessment that has been handed in after this deadline will be marked initially as if it had been handed in on time, but the Board of Examiners will normally apply a lateness penalty.

Your attention is drawn to the Section on Academic Misconduct in the Student's Handbook.

All work will be considered as individual unless collaboration is specifically requested, in which case this should be explicitly acknowledged by the student within their submitted material.

Any queries that you may have on the requirements of this assessment should be e-mailed to **ameer.alkhaykan@mustaqbal-college.edu.iq**

No queries will be answered after respective submission dates.

You must ensure you retain a copy of your completed work prior to submission.

MARKING CRITERIA

COURSEWORK WILL BE MARKED ACCORDING TO THE FOLLOWING UNIVERSITY CRITERIA.

90-100%: a range of marks consistent with a first where the work is exceptional in all areas;

80-89%: a range of marks consistent with a first where the work is exceptional in most areas.

70-79%: a range of marks consistent with a first. Work which shows excellent content, organisation and presentation, reasoning and originality; evidence of independent reading and thinking and a clear and authoritative grasp of theoretical positions; ability to sustain an argument, to think analytically and/or critically and to synthesise material effectively.

60-69%: a range of marks consistent with an upper second. Well-organised and lucid coverage of the main points in an answer; intelligent interpretation and confident use of evidence, examples and references; clear evidence of critical judgement in selecting, ordering and analysing content; demonstrates some ability to synthesise material and to construct responses, which reveal insight and may offer some originality.

50-59%: a range of marks consistent with lower second; shows a grasp of the main issues and uses relevant materials in a generally business-like approach, restricted evidence of additional reading; possible unevenness in structure of answers and failure to understand the more subtle points: some critical analysis and a modest degree of insight should be present.

40-49%: a range of marks which is consistent with third class; demonstrates limited understanding with no enrichment of the basic course material presented in classes; superficial lines of argument and muddled presentation; little or no attempt to relate issues to a broader framework; lower end of the range equates to a minimum falls short in one or more areas.

35-39%: achieves many of the learning outcomes required for a mark of 40% but falls short in one or more areas.

30-34%: a fail; may achieve some learning outcomes but falls short in most areas; shows considerable lack of understanding of basic course material and little evidence of research.

0-29%: a fail; basic factual errors of considerable magnitude showing little understanding of basic course material; falls substantially short of the learning outcomes for compensation.

Note:

- While constructing circuits all connects should be made with the power supply in the off position.
- Check power and ground connections (and other connections) **before** switch on the power.
- Make sure that the power and the ground are properly connected to all IC's before switch on the power.
- **DO NOT** strip wire ends longer than 1/4" and jam long bare ends into the breadboard holes. This will cause shorts and ruin the board.
- **DO NOT** short (connect) the power supply outputs together, i.e., do not allow the exposed wires to touch each other. This will cause permanent damage to the power supply.
- **DO NOT** connect the power supply to the breadboard with reverse polarity. This will cause the permanent chip damage.

- **DO NOT** connect an output of any gate to the output of another gate, to a switch, to power (+5V), or to ground. These situations will cause excessive currents and result in the permanent damage to the chip or chips involved.

3.1 Objects:

1. To know how is the connection of the clipper circuits, and to know the response of each circuit on the Oscilloscope.
2. To know the application of each circuit.
3. Show that the output voltage variations when compared with the input voltage waveform.

3.2 Theory:

In some practical situations, we need to limit the voltage of the Ac signal to a particular range, so, we need to use wave-shaping circuits which usually called clippers or sometimes limiters. In this experiment, we are going to construct these circuits and to watch its output signal practically.

Clipper means that there is a part of the input sinusoidal voltage wave will clip out from the output wave. Diodes can do this process because their ability to connect current in one direction and block it in another one. This process can clip a positive or negative part of the wave. We can use this process to clip of the noisy part of the sinusoidal wave that we don't use it in any circuit and especially in the T.V and radio circuits. And there are two types of the clipping circuit; the positive and the negative clipper circuits shown in figure (1) and figure (3).

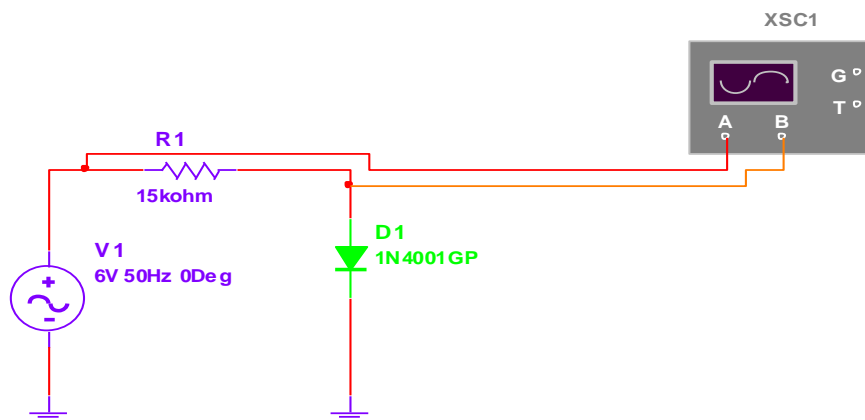


Figure (1) Positive clipper circuit

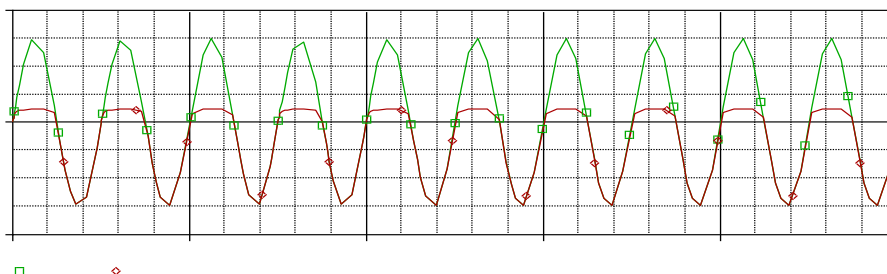


Figure (2): The input and output waveforms to the positive clipper circuit

As we can see from the waveform diagram in figure (2), which shows the input voltage wave form and this wave is complete, and the waveform with clipping out the positive half cycle.

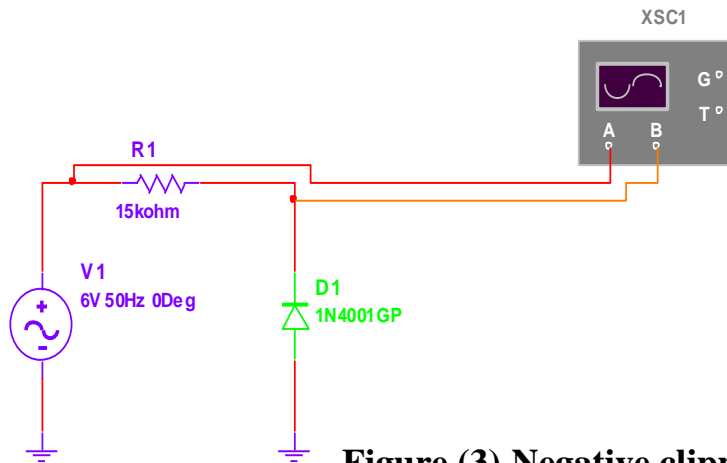
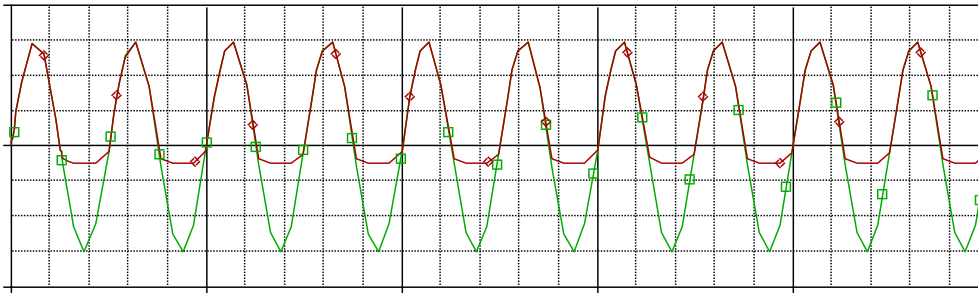


Figure (3) Negative clipper circuit



□ **Figure (4): The input and the output waveforms to the negative clipper circuit**

As we can see from the waveform diagram, it shows the input voltage waveform and this wave is complete, while the waveform with clipping out the negative half cycle.

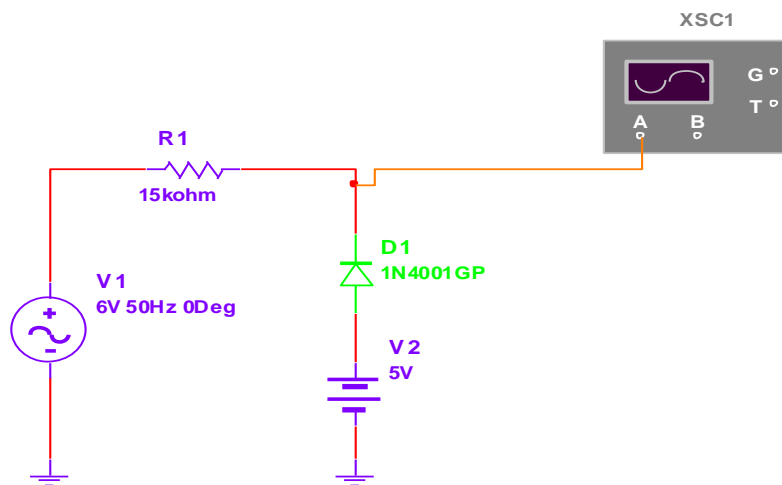


Figure (5): Negative clipper circuit with a DC power supply

As we can see from the circuit in figure (5) the output voltage waveform is affected with the DC additional voltage source and there is a changing happened to the output waveform.

$V_{OUT} = V_{IN}$ at the positive half cycle. When the diode is in on state the output voltage will be equal to the DC voltage source. The output voltage waveform will depend on the direction of the diode and the DC voltage.

3.3 Equipments:

1. Function generator.
2. 15k ohm resistor.
3. 1N4001 silicon rectifier diode.
4. Oscilloscope.
5. DC power supply.

3.4 Procedure:

1. Connect the circuit as shown in figure (1).
2. Switch the signal generator on and adjust the voltage level to 6 V (P-P) and then select the proper scales to the oscilloscope.
3. Measure the output voltage by connecting the oscilloscope to the terminal of the resistance and record the result.
4. Draw the input and the output waveforms of the positive clipper circuit as shown in figure (2).
5. Reverse the diode in the above clipper circuit (as shown in figure (3), and by following the above steps, draw the input and the output waveforms of the negative clipper circuit as shown in figure (4).
6. Adding a DC power supply to the above circuits of figure (3) (Adding 5 dc voltages) in series with the diode and measure the output voltage of the circuit.
7. Draw the output voltage of the circuit shown in figure (5).

3.5 Discussion

1. Give some uses of the clipper circuits.
2. What are the parameters that the output voltage and current waveforms depend on it?
3. What is the property of the diode that the clipper circuits depend on it?
4. How does a positive clipper differ from a negative clipper?

3.6 Review Questions

1. For the positive clipper circuit of figure (1), the positive peak voltage is approximately
(a) 0V (b) +0.6V (c) +3V (d) +6V

2. For the negative clipper circuit of figure (3), the positive are not clipped because the diode is

- (a) Reverse biased (b) forward biased

3. In all the clipping circuits in this experiment, the $15\text{k}\Omega$ resistor is used to

- (a) Set the clipping level
(b) Set the peak output voltage
(c) Limit the voltage across the diode
(d) Limit the peak forward diode current

4. For the circuit of figure (5), the DC voltage is used to set the clipping level of the outputs

- (a) Positive peaks (b) negative peaks (c) positive and negative peaks.