



EXPERIMENT - 02

AIM :- Test the functionalities of positive clipper circuits & negative clipper circuits.

Apparatus Required:-

Hardware

- Computer/Laptop

Software

- EASYEDA Pro
- Web Browser (Google Chrome/Microsoft Edge)

Components Used in Simulation

S.No	Component	Specification	Quantity
1	Silicon Diode	1N4148 / 1N4007	1
2	Resistor	1 k Ω	1
3	AC Voltage Source	Sine Wave (10 V peak, 1 kHz)	1
4	Ground	GND	1
5	Oscilloscope	Virtual Oscilloscope	1

Theory:-

Introduction

A **Clipper Circuit** is an electronic circuit that removes or clips a portion of the input waveform without affecting the remaining part. Clippers are mainly constructed using **diodes, resistors**, and sometimes **DC bias sources**.

Unlike rectifiers, clipper circuits do not convert AC into DC. Instead, they limit the output voltage to a predetermined level.



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Clipper circuits are widely used in:

- Voltage limiting
- Wave shaping
- Digital electronics
- Communication systems
- Signal protection
- Noise suppression

Thus, two major clipper circuits are:

1. Positive Clipper
2. Negative Clipper

Positive Clipper Circuit:-

A positive clipper removes or clips the **positive portion** of the input waveform while allowing the negative portion to pass.

Working

- During the positive half-cycle:
 - The diode becomes forward biased.
 - Output voltage becomes approximately **0 V** (ideal diode).
 - Positive half-cycle is clipped.
- During the negative half-cycle:
 - The diode is reverse biased.
 - Output follows the input signal.
 - Negative half-cycle appears across the load.

Negative Clipper Circuit :-

Definition

A negative clipper removes the **negative portion** of the input waveform while allowing the positive portion to pass.

Working

- During positive half-cycle:



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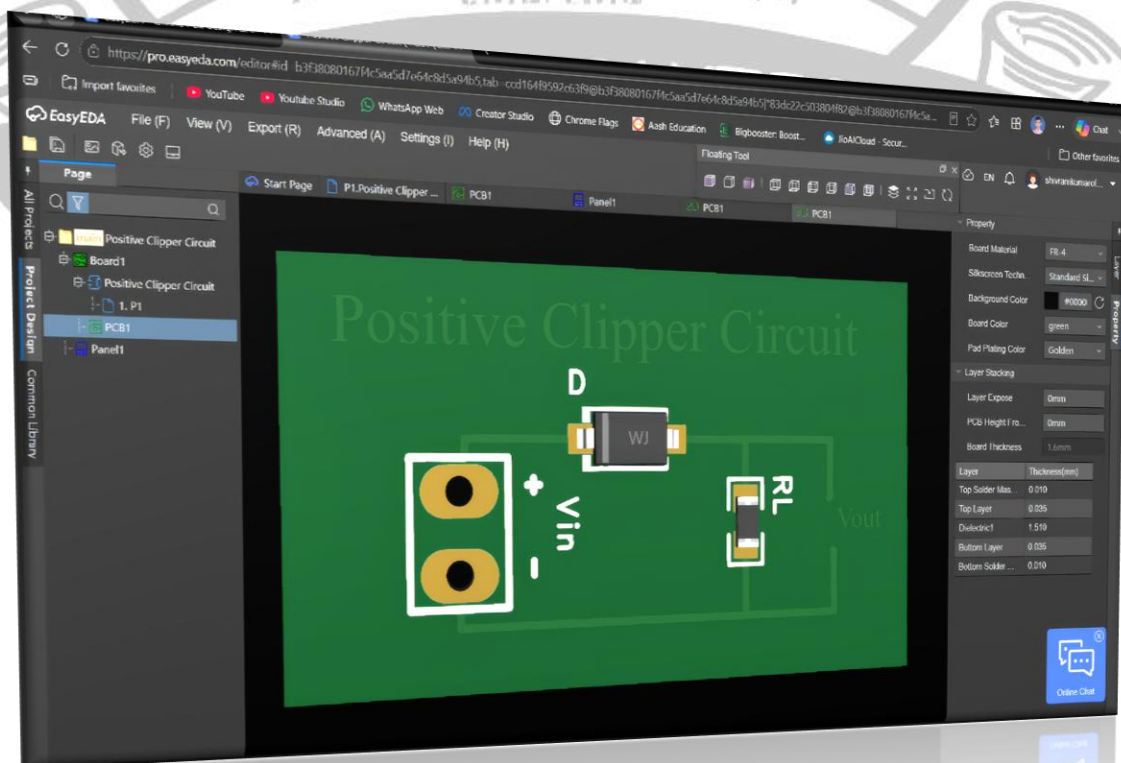


- Diode is reverse biased.
- Output equals input.
- During negative half-cycle:
 - Diode becomes forward biased.
 - Output becomes approximately 0 V.
 - Negative half-cycle is clipped.

Procedure :-

Part A: Positive Clipper

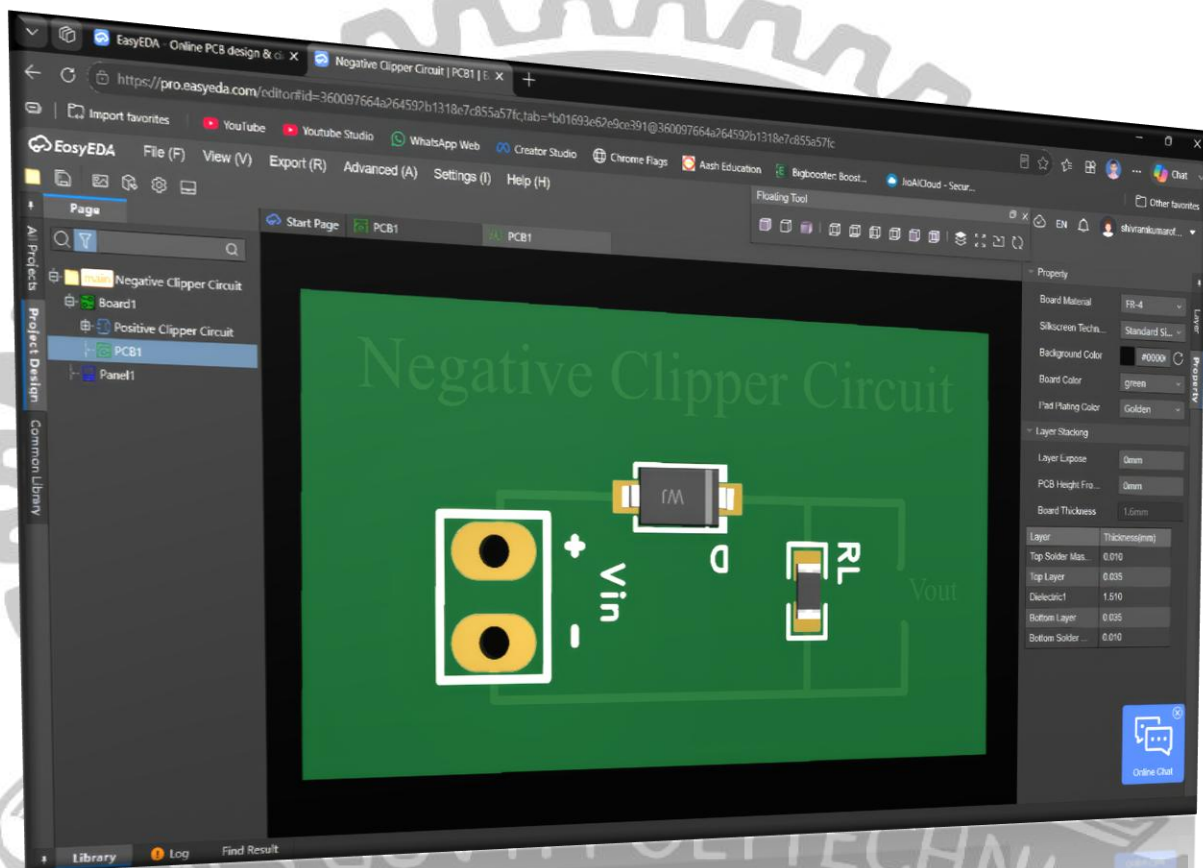
1. Open **EASYEDA Pro**.
2. Create a new schematic.
3. Place the following components:
 - AC Voltage Source
 - 1N4148 Diode
 - 1 k Ω Resistor
 - Ground
 - Oscilloscope
4. Connect the circuit according to the positive clipper configuration.
5. Set the input voltage to:
 - Sine Wave
 - Peak Voltage = 10 V
 - Frequency = 1 kHz
6. Select **Transient Simulation**.
7. Run the simulation.
8. Observe both input and output waveforms.
9. Save the waveform.





Part B: Negative Clipper

1. Reverse the diode direction.
2. Keep all component values unchanged.
3. Run the transient simulation.
4. Observe the output waveform.
5. Compare it with the positive clipper.



Precautions:-

1. Ensure proper diode orientation.
2. Verify all component connections before simulation.
3. Use the correct input voltage and frequency.
4. Connect the ground terminal properly.
5. Select transient analysis for waveform observation.
6. Use an appropriate simulation time to display complete waveforms.



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Result:-

The **Positive Clipper Circuit** and **Negative Clipper Circuit** were successfully designed and simulated using **EASYEDA Pro**. The simulation results verified that:

- The **Positive Clipper** effectively removed the positive half-cycle of the input waveform while allowing the negative half-cycle to pass.
- The **Negative Clipper** effectively removed the negative half-cycle while allowing the positive half-cycle to pass.
- The observed output waveforms matched the expected theoretical behavior, confirming the correct functionality of both clipper circuits.

