

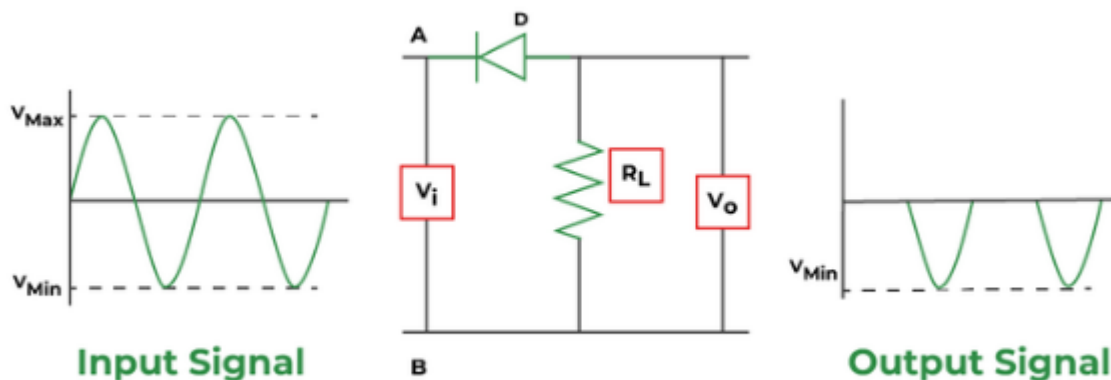
Experiment No:01

Experiment Name: Implementation of Positive and Negative Diode Clipper Circuits.

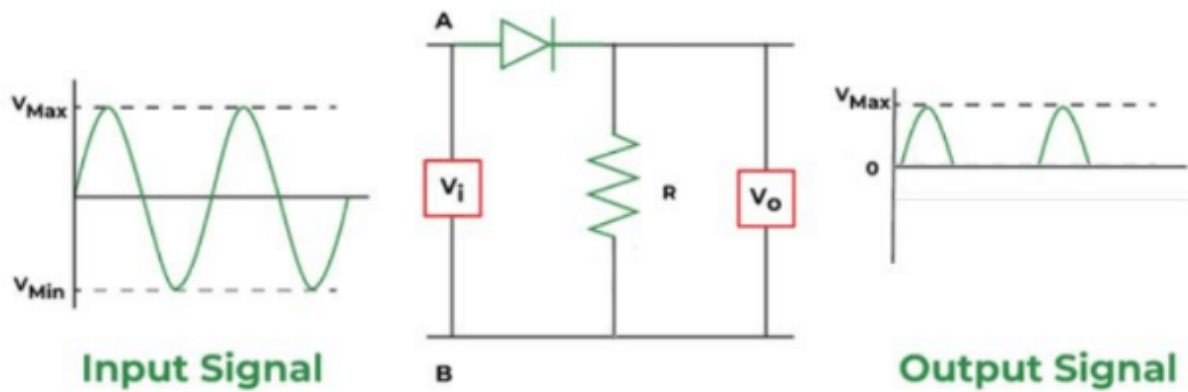
Objective: To design, implement, and analyze positive and negative clipper circuits using diodes and observe the waveform clipping on an oscilloscope using Tinkercad.

Theory: Clipper circuits are the circuits that clip off or removes a portion of an input signal, without causing any distortion to the remaining part of the waveform. These are also known as clippers, clipping circuits, limiters, slicers etc.

Positive Clipper: It removes the positive half-cycle (or portion) of the input AC signal. The diode is connected in series or parallel in such a way that it becomes forward-biased during the positive half, effectively "clipping" it.



Negative Clipper: It removes the negative half-cycle (or portion) of the input AC signal. The diode is connected in the opposite direction to allow the positive half-cycle while clipping the negative.



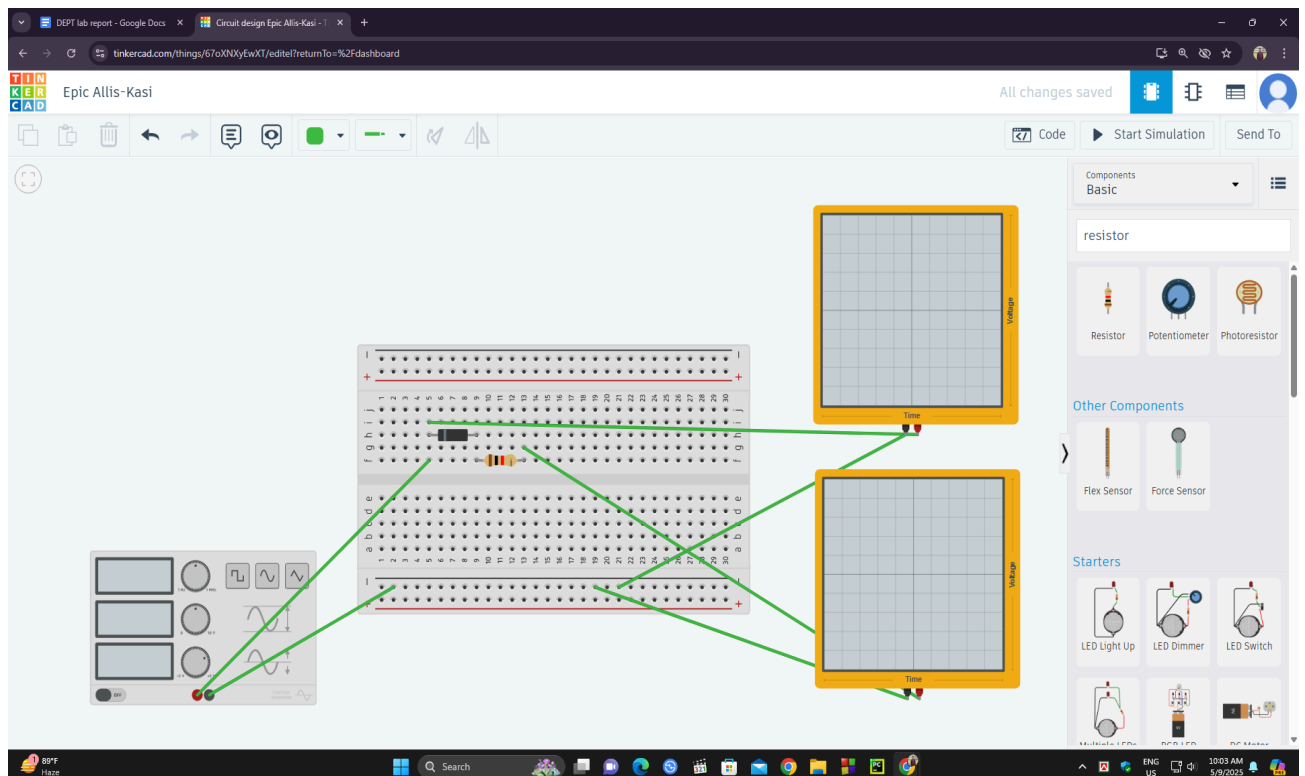
Apparatus and Components Required:

1. Diodes (1N4148 or 1N4007)
2. Function Generator
3. Oscilloscope
4. Breadboard
5. Resistors ($1k\Omega$)
6. Connecting Wires

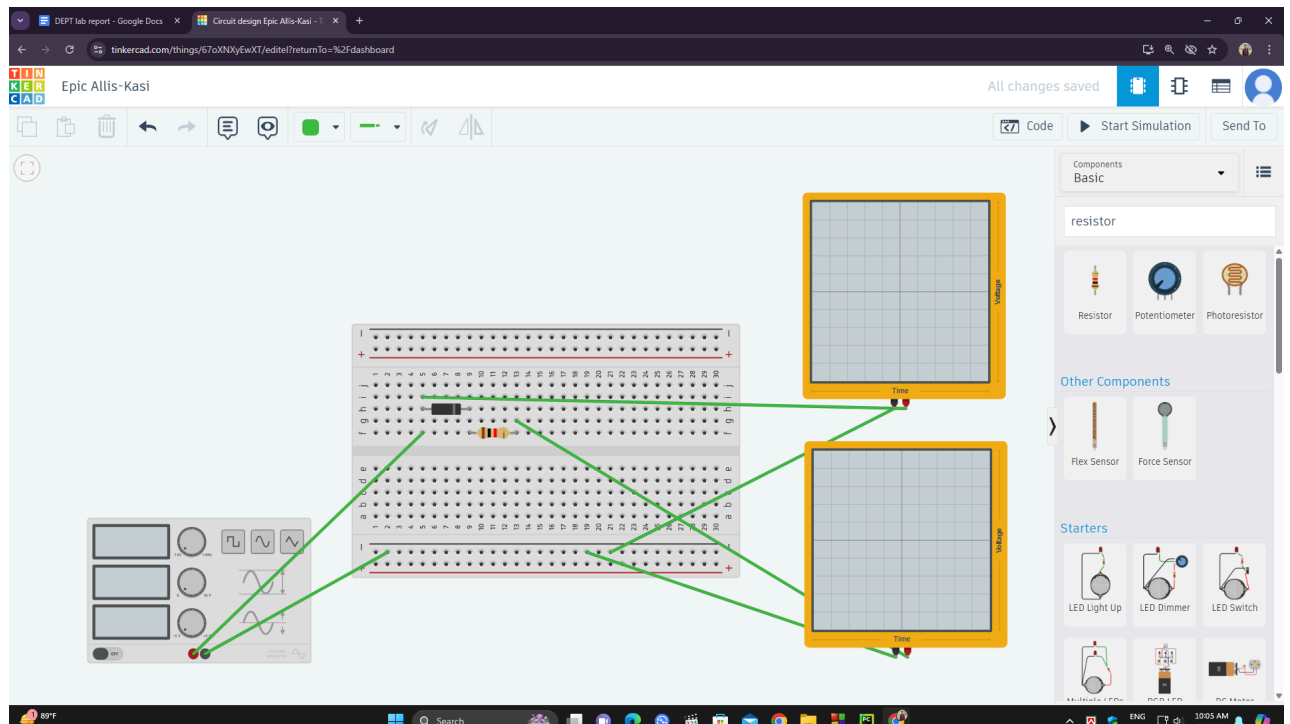
Experimental Setup:

1. Open Tinkercad and create a new circuit.
2. Place an AC voltage source, a resistor, and a diode.
3. Build the positive clipper circuit first.
4. Connect an oscilloscope probe at the output to observe waveforms.
5. Simulate the circuit .
6. Repeat the same steps for the negative clipper circuit.

Positive Clipper Circuit:

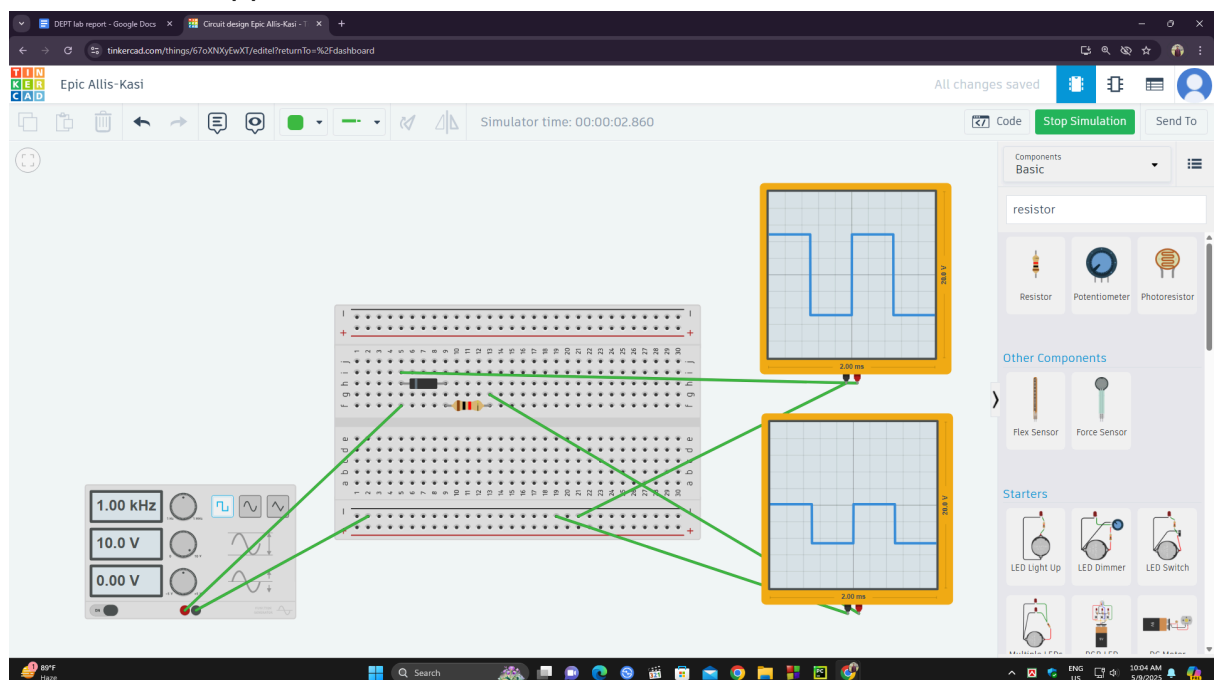


Negative Clipper Circuit:



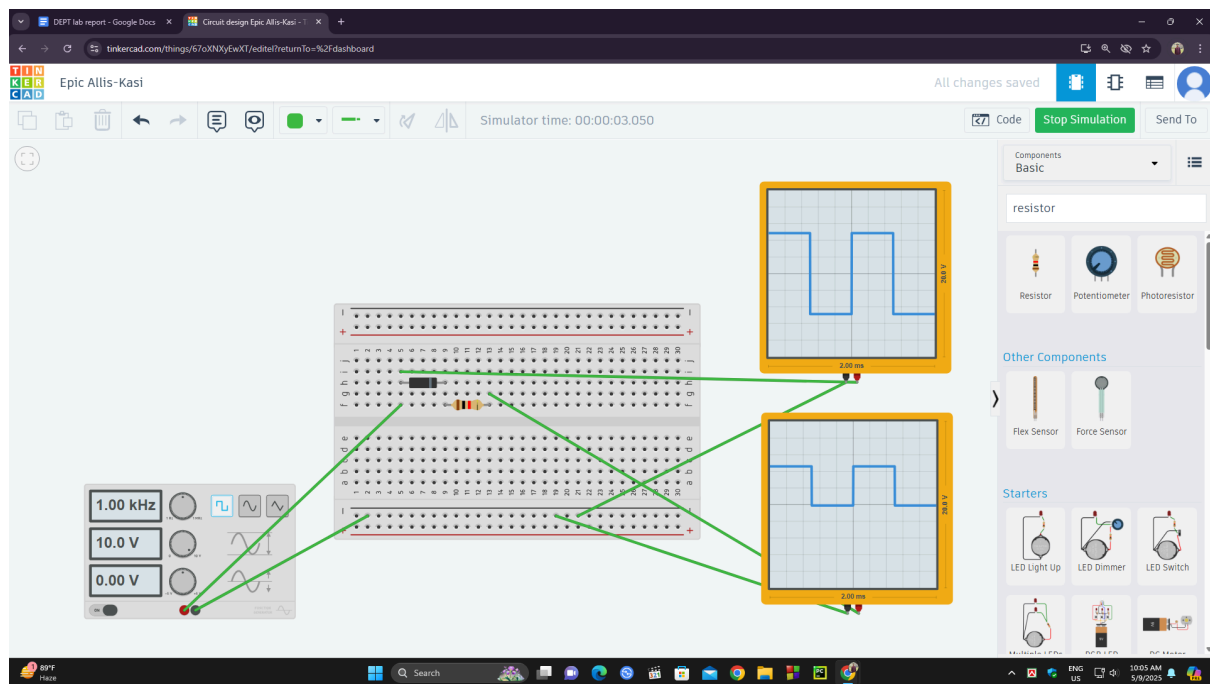
Results and Analysis:

For Positive clipper:



Output waveform: The positive half-cycle is clipped off and Only the negative portion of the waveform appears at the output.

For Negative Clipper:



Output waveform: The negative half-cycle is clipped off and Only the positive portion of the waveform appears at the output.

Applications of Clipper Circuits:

1. Used in analog and digital systems to limit the amplitude of signals to desired levels.
2. Ensures that voltage levels remain within logic thresholds by clipping excess voltages.
3. Used as over-voltage protection or to shape the output of rectifiers.

Conclusion

In this experiment, we successfully designed and simulated positive and negative clipper circuits using diodes and resistors in Tinkercad. The simulation results validated the theoretical behavior of clippers — selectively removing either the positive or negative half-cycles of an AC signal.

The positive clipper blocked the positive portion of the waveform, while the negative clipper blocked the negative portion. This behavior is governed by the direction of the diode and its threshold voltage. The waveforms observed on the oscilloscope matched expectations.

These results demonstrate how simple diode circuits can be used to shape waveforms, limit voltage levels, and protect sensitive components in analog electronic systems. Understanding clipper behavior is crucial in designing circuits for signal conditioning, data communication, and analog-to-digital conversion.