

# Study of CLIPPER and its Applications

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**Abstract-** It controls the shape of the output waveform by removing or clipping a portion of the applied wave. Half wave rectifier is the simplest example. It is also referred as voltage limiters/ amplitude selectors/ slicers.

**KeyWords-** Clippers, Diodes.

## Types of Clipper Circuit

1. Series- Diode is in series with the source

2. Parallel- Diode is in parallel with the source.

• Clipper circuit which uses a DC battery is called a biased clipper.

## SERIES CLIPPER:

Assumption- diode is ideal in characteristics

Analysis

+ve Half Cycle:



Diode is on because of forward biasing condition. Since no voltage drop across the diode the output voltage becomes

$$V_O = V_R = V_X - V_i$$

## Ve Half Cycle:

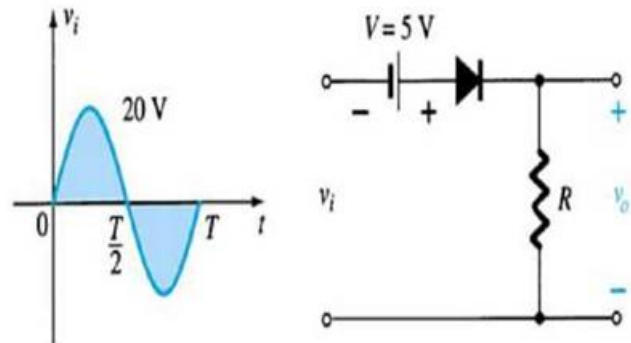
Diode is off because of reverse biasing condition. Since no current flows through the circuit the output voltage  $V_O = 0$ .

Figure shows the output waveform of a simple series clipper with input as square and triangular waveform. Since the negative half cycle is clipped off in the output it is called as a negative clipper circuit.

## Biased Series Clipper:

Assumption- diode is ideal in characteristics

## Analysis



Since the diode is on because of the 5v battery

The transition of the diode from one state to another can be found out to be at  $V_i = -5v$  above which the diode is ON and below which the diode is OFF.

## + ve Half Cycle:

Since the diode is on the output voltage will be (Applying KVL)

$$V_i + 5 = V_R$$

$$V_O = V_i + 5$$

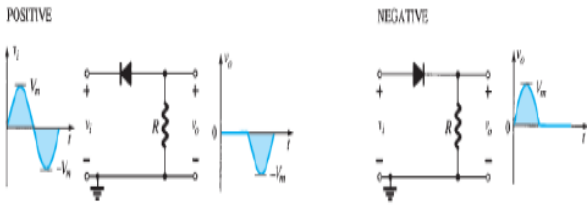
-ve Half Cycle:

Since the diode is off  $V_O = 0$ .

Figure Shows the input and output waveform.

Example of Other Series Clipper Circuits:

Simple Series Clippers (Ideal Diodes)



Biased Series Clippers (Ideal Diodes)

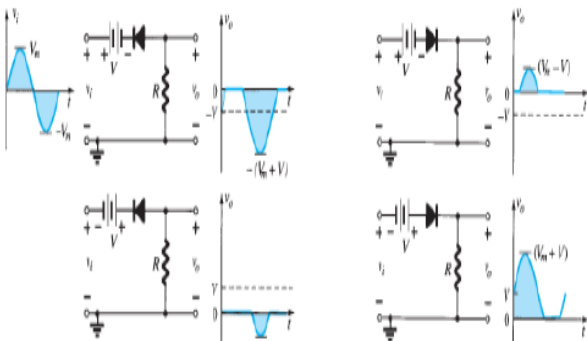
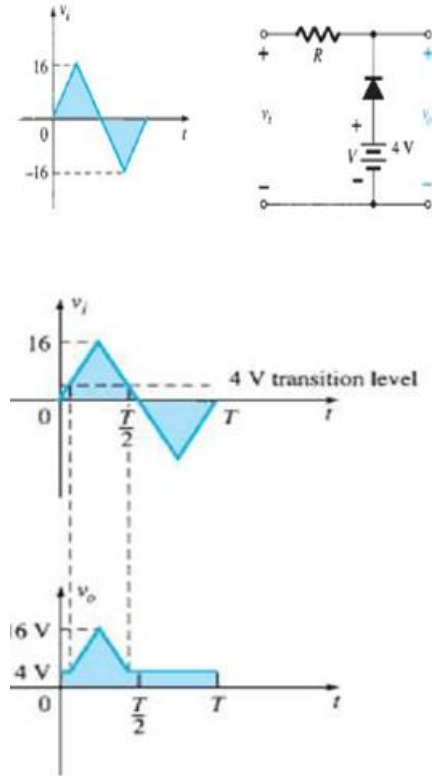


Figure shows the output waveform of a simple parallel clipper with input as square and triangular waveform. Since the positive half cycle is clipped off in the output it is called as a positive clipper circuit.

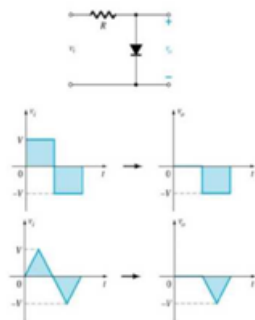
Biased parallel Clipper:



**PARALLEL CLIPPER:**

Assumption- diode is ideal in characteristics

Analysis



**+ve Half Cycle:**

Diode is on because of forward biasing condition.

Since no voltage drop across the diode the output

voltage becomes

$$V_o = V_d = 0$$

**-ve Half Cycle:**

Diode is off because of reverse biasing condition.

Since no current flows through the circuit the output voltage  $V_o = V_i$ .

Assumption- diode is ideal in characteristics

Analysis

The transition of the diode from one state to

another can be found out to be at  $V_i = 4V$  above which the diode is OFF and below which the diode is ON.

**+ve Half Cycle:**

Since the diode is OFF (above 4v) the output voltage will be (Applying KVL)

$$V_i = V_o$$

**-ve Half Cycle:**

Since the diode is ON (below 4v)

$$V_o = 4V.$$

Figure Shows the input and output waveform.

Example of other parallel clipper circuits:

**Applications:**

- In radio receivers for communication circuits.
- In radars, digital computers and other electronic systems.
- Generation for different waveforms such as trapezoidal, or square waves. Helps in processing the picture signals in television transmitters.
- In television receivers for separating the synchronizing signals from composite picture signals

**References**

- [1]. <https://www.elprocus.com/types-of-clipper-and-clamper-circuits-and-applications/>
- [2]. <https://www.electronicshub.org/diode-clippers-and-clampers/>
- [3]. <https://www.gopracticals.com/electronics/basic-electronics/to-study-clipper-circuit/>
- [4]. <https://www.electronics-tutorials.ws/diode/diode-clipping-circuits.html>