



Study of Clippers and Clamper circuits and its applications

Minakshi

Assistant professor, Govt college Narnaund (Hisar)

Abstract : Clippers and clampers may be characterised as clippers that apply AC input signals to the specified voltage range in order to safeguard electronic circuits. Depending on the required voltage range, it will either remove the positive half or the negative half of the AC, or both the positive and negative halves. The DC level of any electronic circuit may be adjusted by clamper circuits regardless of the applied signal's form. A capacitor is used in the circuits to do this. Therefore, clippers and clampers play a critical function in electrical circuits.

Key Words : Clippers, Clampers, Diodes.

Types of Clipper Circuit

A clipper's circuitry comprises of resistors and diodes, both of which are linear devices. However, there is no energy storage mechanism like a capacitor in it. Semiwave rectifiers are a great example of clippers at work. In this case, just one half of the AC cycle may run through the circuit at a time. Many of these clippers are used to restrict the output power of electronic devices. “Additionally, they are known as slicers.

Clippers are generally classified into three major categories.

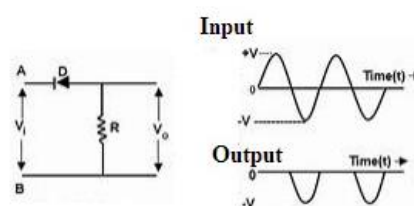
1. Series- Diode is in series with the source
2. Parallel- Diode is in parallel with the source.
3. Shunt Clippers

Series Clippers

Further, these series type clippers are categorized as positive as well as negative clippers.

Series Positive Clipper

The positive cycle of the signal is clipped in the type of clipper. This circuit consists of a diode-connected in such a way that the arrow is pointing towards the input. It is connected along with series to the output load. The resistor is considered as load.



Series Positive Clippers



For the positive duration of the cycle, the connected diode will be reversely biased resulting in no current flow is evident. Hence the positive cycle is eliminated from the circuit. But when the negative cycle is supplied the diode-connected is maintained in forwarding bias mode. This results in the flow of the negative cycle of the diode.

PARALLEL CLIPPER:

Assumption- diode is ideal in characteristics

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:

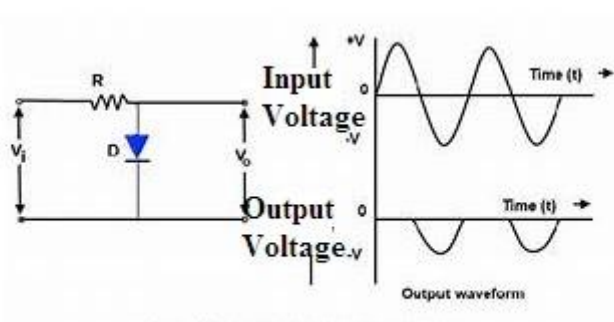
Clipper circuit which uses a DC battery is called a biased clipper.

Shunt Clippers

In this type of circuit, the diode should be connected to the load in a parallel manner. The principle of operating is the opposite of the series clippers.

Shunt Positive Clippers

This type of clipper allows the applied input signal to pass to the load when the diode remains to reverse biased and the signals are blocked when the diode gets forward biased.



Shunt Positive Clippers

Shunt Positive Clippers with Positive Bias

For the positive duration of the cycle, the diode tends to conduct and the output has appeared as the positive value of reference voltage and for the negative cycle, the value of output generated is the same as that of the applied input signal.

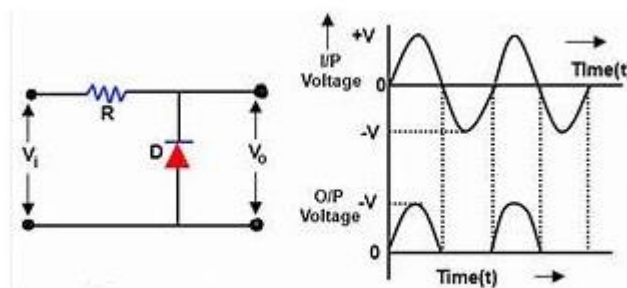


Shunt Positive Clippers with Negative Bias

The positive duration of the cycle basing on the negative voltage of reference connected in terms of series along the diode will be the output. But for the negative cycle, the connected diode will conduct until the value of the input voltage will be greater than the value of the negative voltage of reference.

Shunt Negative Clippers

For the positive duration of the cycle, the exact input signal can be obtained as the output and for the negative duration of the cycle, there is no output generated.



Shunt Negative Clippers

Shunt Negative Clipper with Positive Bias

A positive voltage of reference is connected to the diode in series. For the positive cycle, the value of output can be generated as the applied input but for the negative duration of the cycle, the positive value of the reference will be generated as the output.

Shunt Negative Clipper with Negative Bias

The functionality of the circuit is the same but the only difference is a negative voltage of reference is connected in terms of series to the diode.

Clamper Circuit

The clampers are also known as DC Restorers. Basing on the amount that is defined by the voltage source the applied input signal can be shifted.

Working of Clamper Circuit

An independent voltage source, a resistor, a capacitor, and a diode make up a clamper circuit. The DC level at the output is maintained by the presence of capacitors and resistors in the



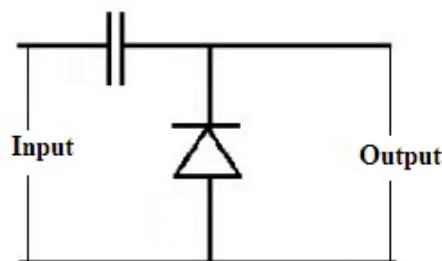
circuit. When the input signal is multiplied by the positive dc component, the signal is shifted to the positive. It's analogous to adding the negative component of dc that shifts the signal in that direction.

Types of Clampers

Clamper circuits are of three types. They are positive, negative, and biased clampers.

Positive Clampers

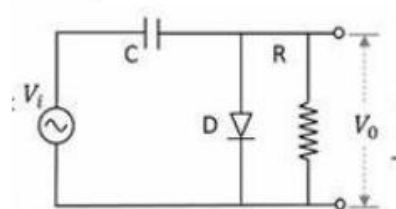
The voltage source, resistor, capacitor, and diode are all linked in series with the load in a positive clamper. The applied input signal is transferred to the load if the diode is biased in the reverse direction; otherwise, the signal is blocked if the diode is biased in the forward direction. It is reverse-biased in the positive clammers for the positive length of the cycle, and forward-biased in the negative clampers for the negative duration of the cycle.



Positive Clamper

Negative Clampers

During the positive portion of the cycle, the polarity of the diode makes it forward biased, and during the negative portion, the diode is reverse biased, allowing the signal to be generated.



Negative Clamper

The applications of clampers are:



- To remove the distortions and to identify the polarity of circuits the clampers are used.
- To improve the ‘Reverse Recovery Time’ clamping circuits are used.
- To mold the waveforms to the desired shape and the ranges clampers are used.
- SONAR systems and the testing equipment consists of clamping circuits.

Applications of Clippers:

- 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”

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