

# LAB #04-A

## Objectives

1. To calculate and measure the output voltages of clipper circuits.

## Theory

### Clippers

**Clipper** is a device designed to prevent the output of a circuit from exceeding a predetermined voltage level without distorting the remaining part of the applied waveform.

A clipping circuit consists of linear elements like resistors and non-linear elements like junction diodes or transistors, but it does not contain energy-storage elements like capacitors. Clipping circuits are used to select for purposes of transmission, that part of a signal wave form which lies above or below a certain reference voltage level.

Thus a clipper circuit can remove certain portions of an arbitrary waveform near the positive or negative peaks. Clipping may be achieved either at one level or two levels. Usually under the section of clipping, there is a change brought about in the wave shape of the signal.

Clipping Circuits are also called as *Slicers, amplitude selectors or limiters*.

### **Series Clippers**

The series configuration is defined as one where the diode is in series with the load. A half-wave rectifier is the simplest form of diode -clipper-one resistor and diode.

### **Parallel Clippers**

The parallel configuration has the diode in a branch parallel to the load.

## Preparatory Exercise

Q1) How does the series clipper differ from the parallel clipper?

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Q2) Mention any other name of clipper.

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Q5) Mention any application of clippers.

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## Requirement

### Instruments

1. DC power supply
2. Digital Multimeter (DMM)
3. Function Generator
4. Oscilloscope

### Components

1. Diode : Silicon (D1N4002)
2. Resistors: 2.2k $\Omega$ , 3.3k $\Omega$

## Procedure

### Part A: Parallel Clippers

1. Construct the circuit in Fig. 4.1. The input signal is an 8 V p-p square wave at frequency of 1000 Hz. Record the measured resistance value.
2. Set the oscilloscope in DC mode.
3. Put the oscilloscope probes at function generator and sketch the input waveform obtained.

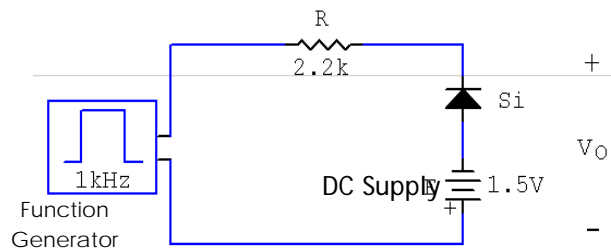
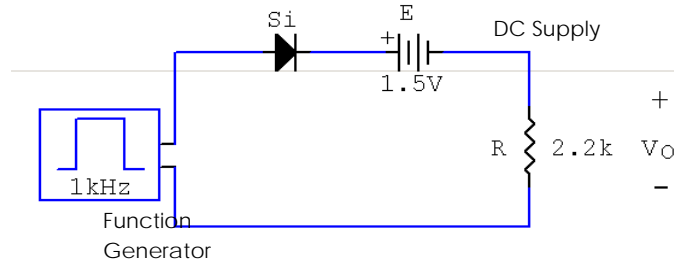


Fig. 4.1

4. Sketch the output waveform obtained from the oscilloscope.
5. Reverse the battery of the circuit and sketch the output waveform.
6. How do the waveforms differ? What is the function of the battery in the circuit?
7. Change the input signal of the circuit of Fig. 4.1 to an 8 V p-p sinusoidal signal with the same frequency of 1000 Hz. Repeat step 3 and 4 for this circuit.

**Part B: Series Clippers**

1. Construct the circuit in *Fig. 4.2*. The input signal is an 8 V p-p square wave at frequency of 1000 Hz. Record the measured resistance value.
2. Set the oscilloscope in DC mode.
3. Put the oscilloscope probes at function generator and sketch the input waveform obtained.

*Fig. 4.2*

4. Sketch the output waveform obtained from the oscilloscope.
5. Reverse the battery of the circuit and sketch the output waveform.
6. Change the input signal of the circuit of *Fig. 4.2* to an 8 V p-p sinusoidal signal with the same frequency of 1000 Hz. Repeat step 3 and 4 for this circuit.

**Observation****Results and Calculations****Part A ( $V_{in}$  square-wave)**

1. R (measured) = \_\_\_\_\_

2. Input waveform :



## 3. Output waveform

Part A ( $V_{in}$  square-wave, battery reversed)

## 4. Output waveform

Part A ( $V_{in}$  sine-wave)

## 5. Input waveform



## 6. Output waveform



Part A ( $V_{in}$  sine-wave, battery reversed)

Output waveform

Part B ( $v_{in}$  square-wave)

1. R (measured) = \_\_\_\_\_

2. Input waveform



3. Output waveform

Part B ( $v_{in}$  square-wave, battery reversed)

4. Output waveform



Part B ( $v_{in}$  sine-wave)

## 5. Input waveform



## 6. Output waveform

Part B ( $v_{in}$  sine-wave, battery reversed)

## 7. Output waveform

