

Exp.2: Half Wave Rectifier

1-Objectives:

- To calculate and draw the DC output voltages of half-wave rectifiers.
- Without smoothing capacitor and with smoothing capacitor.

2-Circuit elements:

Instruments

AC power supply or Function Generator

2 Voltmeters

Oscilloscope

Components

Diode: Silicon D1N4007

Resistors: $10\text{ k}\Omega$,

Capacitor :($0.47\text{ }\mu\text{F}$)

Capacitor :($4.7\text{ }\mu\text{F}$)

Electrolytic Capacitor $100\text{ }\mu\text{F}$

3-Circuit Diagram:

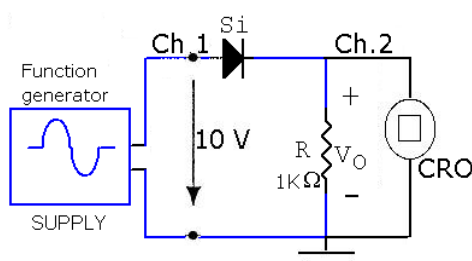


Fig.1

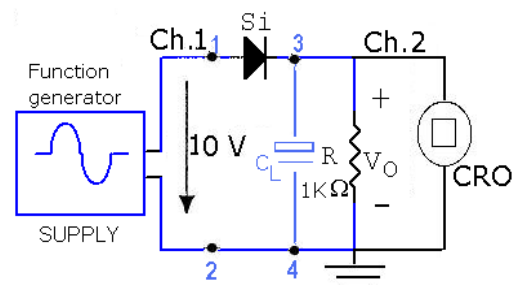


Fig.2

4-Procedure:

1. Connect the circuit as shown in Fig.1, adjust the power supply at 10 V.
2. Measure the input voltage V_1 and the output voltage V_2 using both the voltmeter and the oscilloscope.

	V (input) (Volt)	V (output) (Volt)
With voltmeter	10 V _{a.c}	V _{d.c}
With oscilloscope	V _{p-p}	V _{P-P}

3. Draw the input waveform, V_i , and the output waveform, V_o
4. Calculate: 1) Maximum voltage of the input signal

$$V = \frac{V_{P-P}}{2}$$

- 2) the effective value of the input voltage

$$V = \frac{V_m}{\sqrt{2}}$$

- 3) the average value of the output voltage

$$V_{av} = V_{dc} = 0.318V_m$$

5. Comment on the results you obtained.

Smoothing and filtering

6. Connect the circuit as shown in Fig.2.
7. Measure V_{out} with voltmeter as a function of the capacitance value of the smoothing capacitor $C_L=0.47\mu F, 4.7\mu F, 100\mu F$ and at the same time measure the ripple voltage V_{P-P} using C.R.O.

C_L (μF)	V_o (voltmeter) (Volts)	V_{p-p} (CRO) (Volts)	T (m sec)	$F = 1/T$ (Hz)
0.47				
4.7				
100				

8. Draw the output signal voltage each time of C_L values with true scale.

9. Calculate the ripple factor r using the following equation

$$r = \frac{1}{2\sqrt{3}} \left(\frac{1}{F R_L C_L} \right)$$

Comment on the results you obtained.