

ST 589-01 Lab 3

Operation and characteristics of rectifier circuits

One important application of diodes is in the design of rectifier circuits. A diode rectifier forms the first stage of a dc power supply as shown in Figure 1. A dc power supply is required to bias ALL electronic circuits. The output voltage (Vout1(t) – Vout2(t)) will usually be in the range of 3 – 24 V depending on the particular electronics application.

Rectification is the process of converting an alternating (ac) voltage into one that is limited to one polarity. The diode is useful for this function because of its nonlinear characteristics, that is, current exits for one voltage polarity, but is essentially zero for the opposite polarity. Rectification is classified as HALF-WAVE or FULL-WAVE, with half-wave being the simpler and full-wave being more efficient.

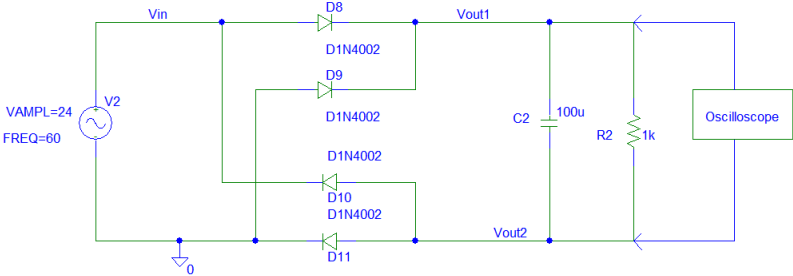


Figure 1. A full-wave rectifier circuit

The full-wave rectifier inverts the negative portions of the sine wave so that a uniplolar output signal is generated during both halves of the input sinusoid. The input of a rectifier consists of a power transformer, in which the input is normally a 120 V, 60 Hz ac signal. If a capacitor is added in parallel with the load resistor of a half-wave rectifier, we can begin to transform the half-wave sinusoidal output into a dc voltage.

Questions

What output voltage (voltage across the load resistor) do you measure without resistor?

What output voltage do you measure when you add an output capacitor of ~100 μf – 500 μf?