2.1 - Diode Rectifiers

About Diode Rectifiers

Diode rectifiers are circuits that convert AC to DC. A single diode can be used as a simple half-wave rectifier, although four diodes arranged as a full-wave bridge rectifier make a much more efficient design because it can pass the load current during both the positive and negative half-cycles of the AC wave.

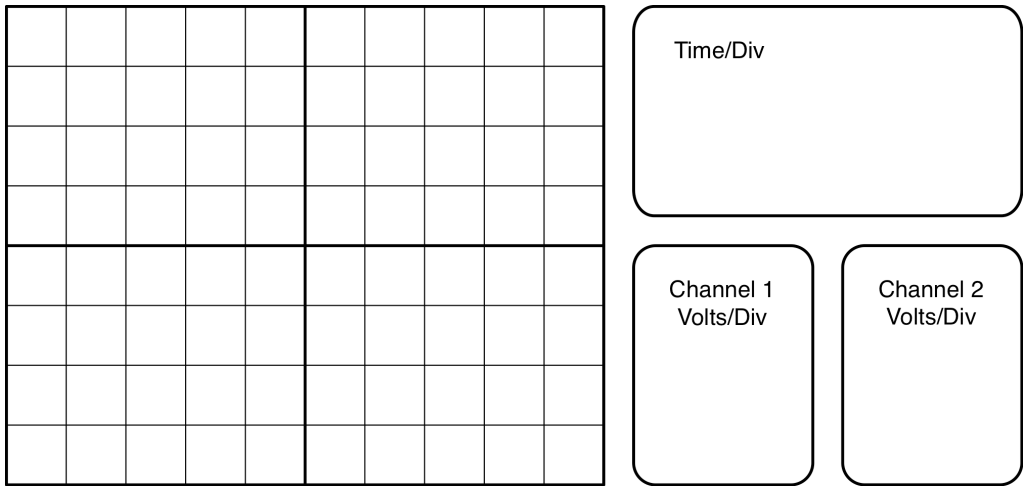
Diode rectifier activity

1. Draw a schematic diagram of a singe diode half-wave rectifier connected in series with a series resistor and LED. Choose a resistor value that will limit the LED current to 10 mA at 20 V.

2. Obtain an AC output wall adapter. Record the rated output voltage of the adapter, and then measure the output voltage using a multimeter.

   V_{RATED} = V_{AC} =

3. Using an oscilloscope, measure and record the output voltage waveform of the AC adapter. Record the oscilloscope settings in the diagram as well. What is the peak potential?



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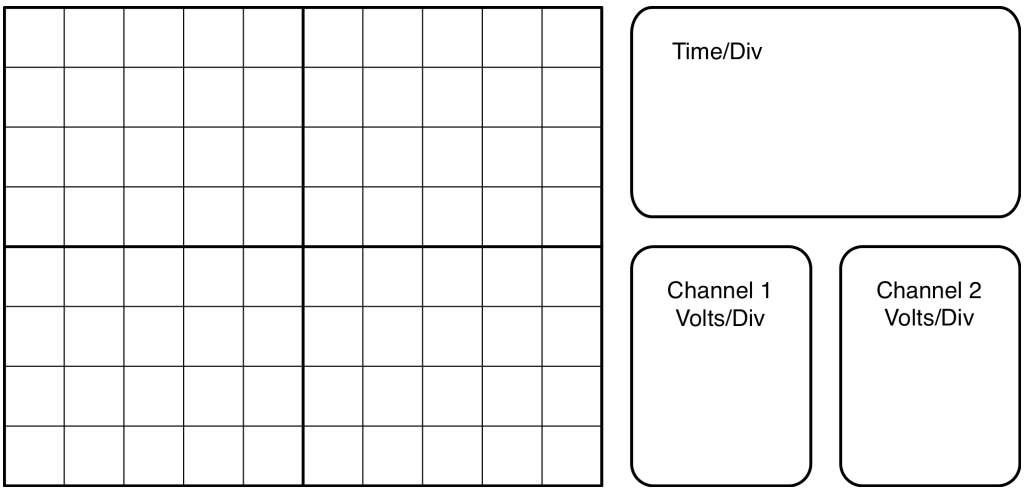
4. Next, connect the AC adapter to your diode rectifier circuit. Use the oscilloscope to measure the waveform across the load (resistor and LED), and draw it on into the diagram, above. What do you notice about the rectified wave?

5. Draw a schematic diagram of a bridge rectifier in series with your resistor and LED. Label the AC inputs and the positive (+) and negative (-) DC outputs.

6. Next, connect the AC adapter to the bridge rectifier circuit and use the oscilloscope to measure the pulsing DC output of the rectifier. Draw the output wave into the diagram, below:



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Rectifier Analysis

7. Explain how the rectified waves in steps 3 and 6 differ in both shape and in peak potential.

8. How did the rated and measured potentials in steps 2 and 3 compare? Explain:

9. The positive side of the bridge rectifier is internally connected to two of the diodes. Which side of the diodes is it connected to, anode (+) or cathode (-)? Why?