2.0 - Diodes

About Diodes

While resistors are passive devices which predictably limit current, diodes are active semiconductor devices and act to control their current. Semiconductors can be made to act as either conductors or insulators, depending on the circuit conditions (known as bias). Diodes are the simplest of the semiconductors and form the basis of all modern electronics.

Diode activity

1. What is a diode? What, specifically, does a diodes do?

2. Describe the two measurements that are necessary to test a diode, and explain the expected results.

3. Obtain a 1N4148 diode from your kit of CHRP parts. Measure the forward and reverse voltage drops of the diode using the diode test function of the multimeter.

    $V_{FWD} =$ $V_{REV} =$

4. Draw a schematic diagram showing a diode connected in series with a 2.2 kΩ resistor and a 6 V power supply. Ensure that the diode is connected in forward bias.

5. Build the circuit that you drew, above, on a breadboard.

6. Connect the circuit to a power supply. Measure the potential drop across the diode as well as the resistor. Then, increase the potential and repeat the measurements to complete the chart.

    $E_T =$ **6 V** $E_{D1} =$ $E_{R1} =$

    $E_T =$ **12 V** $E_{D1} =$ $E_{R1} =$

    $E_T =$ **24 V** $E_{D1} =$ $E_{R1} =$

7. As the power supply potential doubled in step 6, analyse:

   a) the amount by which the diode potential drop changed

   b) the amount by which the resistor potential drop changed

8. How does the diode potential in step 6 relate to the forward voltage drop measured in step 3?

9. Reset the power supply to produce a 6 V output. Reverse the power supply leads to the circuit and measure the diode and resistor potentials again. What do you notice?

   $E_T = $ **6 V** $\qquad\qquad E_{D1} = \qquad\qquad\qquad E_{R1} = $

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Diode analysis

10. In as simple as way possible, explain the conditions under which a diode will conduct current.

11. In simple terms, summarize how a diode's potential drop is affected when the potential applied to the diode circuit changes.

12. Using any one of the resistor potentials in step 6, calculate the total circuit current.

    $I_T = $

13. Using the calculated current, above, calculate the equivalent resistance of the diode.

    $R_{DIODE} = $

14. Does the diode have a high or low resistance? What precaution do you need to take when you connect a diode in a circuit?