2.0 - Diodes

About Diodes

Diodes are semiconductor components with unique circuit characteristics. Semiconductors can be made to act as either conductors or insulators, depending on their operating conditions (or bias). This capability to control current allows semiconductors to interact with other components. Diodes are the simplest semiconductors, and form the basis of all modern electronics.

Diode activity

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

2. Describe the two measurements that are necessary to test a diode, and explain their 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 voltage 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 voltage doubled in step 6, analyse:

   a) the amount by which the diode voltage changed

   b) the amount by which the resistor voltage changed

8. How does the diode voltage 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** E_{D1} = 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 voltage drop is affected by changes 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 connecting a diode in a circuit?