

ECE 320: Handout #4

Semiconductors

1) Why does the resistance of semiconductors go down as temperature goes up?

2) A thermistor has a resistance of

$$R = 1000 \exp\left(\frac{3905}{T+273} - \frac{3905}{298}\right) \Omega$$

What is the resistance at

- 0C?
- 20C?
- 100C?

3) If the resistance is 500 Ohms, what is the temperature?

ECE 320 Handout Solution

Lecture #4: Semiconductors

1) Why does the resistance of semiconductors go down as temperature goes up?

As temperature goes up, you get more and more thermal electrons (and corresponding hole)

More electrons and holes means more charge carriers

More charge carriers means lower resistance

2) A thermistor has a resistance of

$$R = 1000 \exp\left(\frac{3905}{T+273} - \frac{3905}{298}\right) \Omega$$

What is the resistance at

- 0C? 3320.13 Ohms
- 20C? 1250.59 Ohms
- 100C? 71.73 Ohms

3) If the resistance is 500 Ohms, what is the temperature?

Solve backwards

$$T = 41.64 \text{ C}$$