

DC Power Supplies Practical No. 1

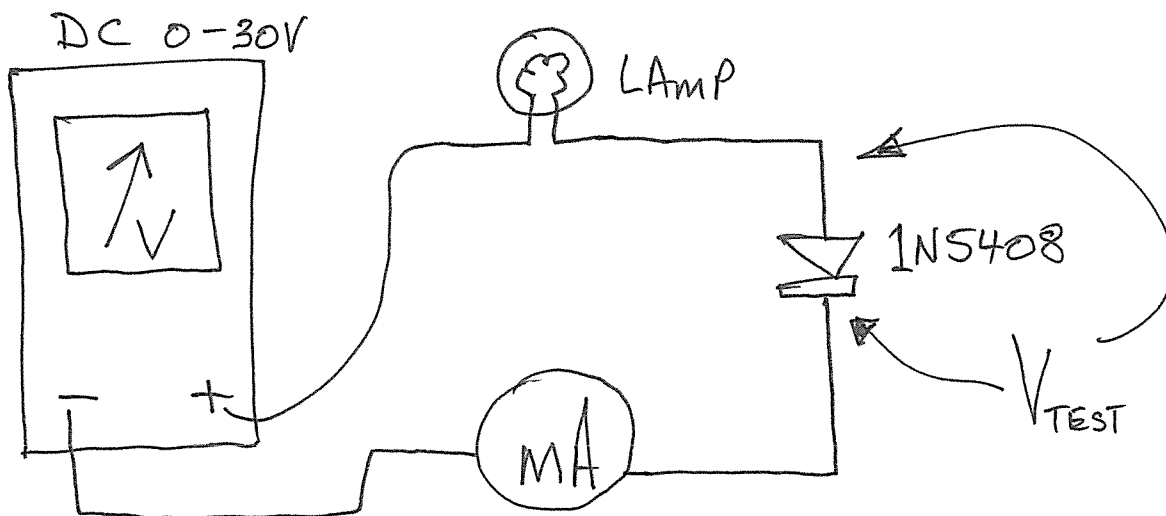
Aim

To evaluate and prove diode characteristics.

Part One

1. Construct the circuit as shown and prove that current only flows one way through the diode. You will reverse the diode several times, each time noting that the light either glows or does not.

circuit



2. Using the same circuit as above, alter the supply voltage as shown in the table with the diode forward biased and complete the blank spaces for each voltage.

Supply Voltage	Diode Current	Diode Voltage	Ambient Temperature
30V			22 Degrees
25V			22 Degrees
20V			22 Degrees
15V			22 Degrees
10V			22 Degrees
5V			22 Degrees

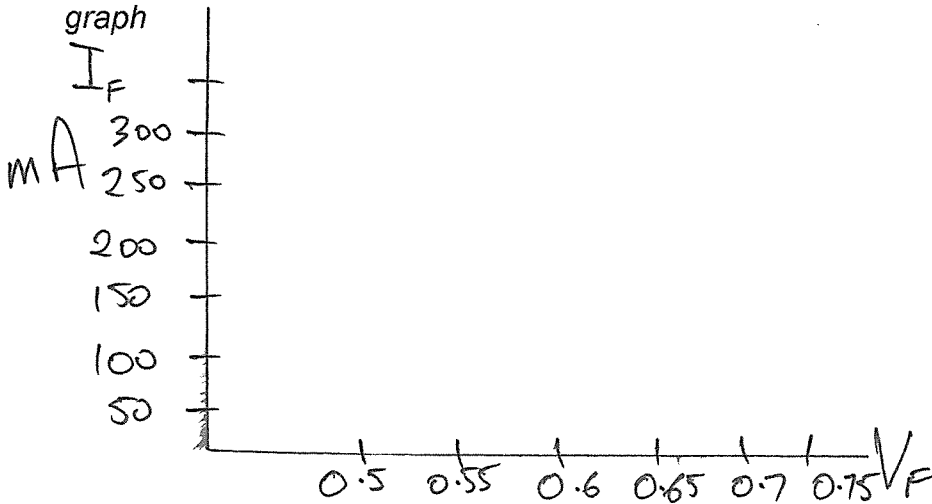
Why did the voltage across the diode change?

Using the chart of diode specifications on the next page, find the working voltage and maximum current for the 1N5408 diode.

specs

VRRM (Volts)	I _O , AVERAGE RECTIFIED FORWARD CURRENT (Amperes)					
	1.0	1.5	3.0		6.0	
	59-03 (DO-41) Plastic	59-04 Plastic	60-01 Metal	267-03 Plastic	267-02 Plastic	194-04 Plastic
50	†1N4001	**1N5391	1N4719	**MR500	1N5400	MR750
100	†1N4002	**1N5392	1N4720	**MR501	1N5401	MR751
200	†1N4003	1N5393 *MR5059	1N4721	**MR502	1N5402	MR752
400	†1N4004	1N5395 *MR5060	1N4722	**MR504	1N5404	MR754
600	†1N4005	1N5397 *MR5061	1N4723	**MR506	1N5406	MR756
800	†1N4006	1N5398	1N4724	MR508		MR758
1000	†1N4007	1N5399	1N4725	MR510		MR760
I _{FSM} (Amps)	30	50	300	100	200	400
T _A @ Rated I _O (°C)	75	T _L = 70	75	95	T _L = 105	60
T _C @ Rated I _O (°C)						
T _J (Max) (°C)	175	175	175	175	175	175

3. Complete the graph of diode current Vs diode voltage (V_f) for the 1N5408 from the table that you created on the previous page.

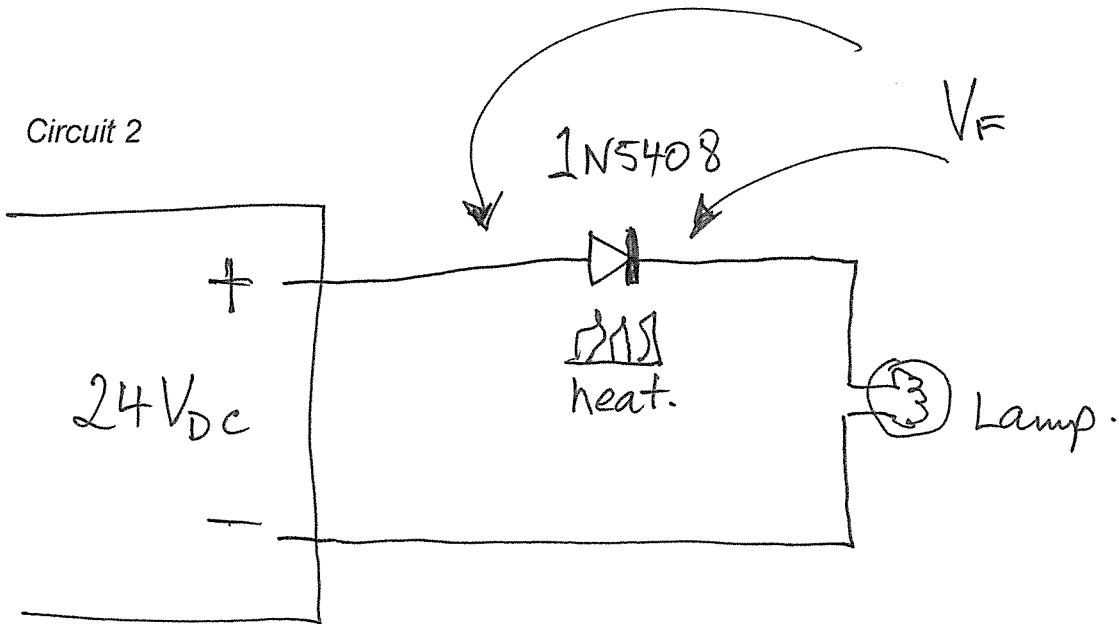


What would you call the region of the curve below 0.6Volts?

What would you call the region of the curve between 0.6X and 0.7X Volts?

4. Temperature effect. Build the circuit as shown overpage. With 24 Volts DC applied to the diode and light bulb series circuit, measure the forward voltage drop across the diode and record it in the table below:

Forward Voltage Ambient Temperature	
Forward Voltage 100 Degrees C.	



Apply a soldering iron tip to the case of the diode while measuring the diode voltage. After 1 minute, record the new forward voltage drop of the diode.

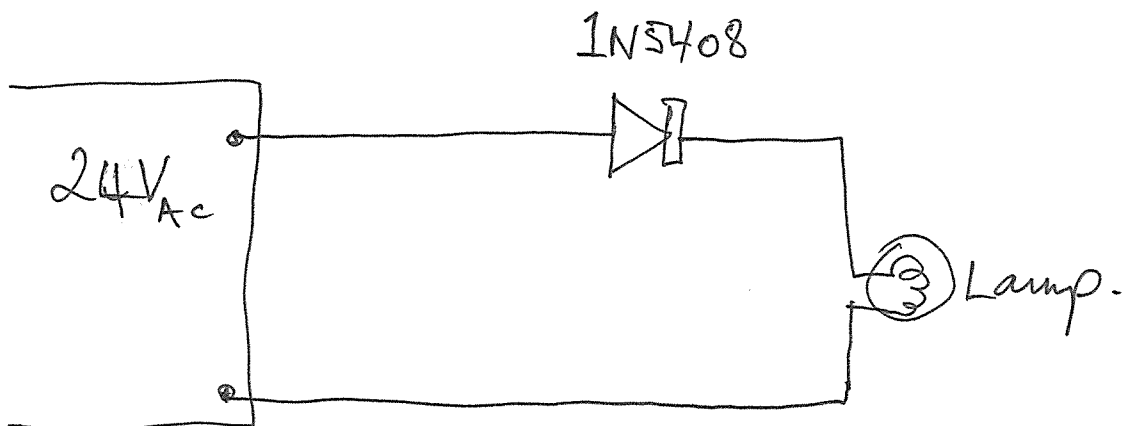
Does this approximate 2.2 mV / degree celcius?

What is the danger of allowing diodes to become hot in circuits?

Part 2

AC Voltage and the Diode.

5. Construct the circuit below using a ²⁴ Volt AC transformer. Power up the circuit and note if the light bulb glows.



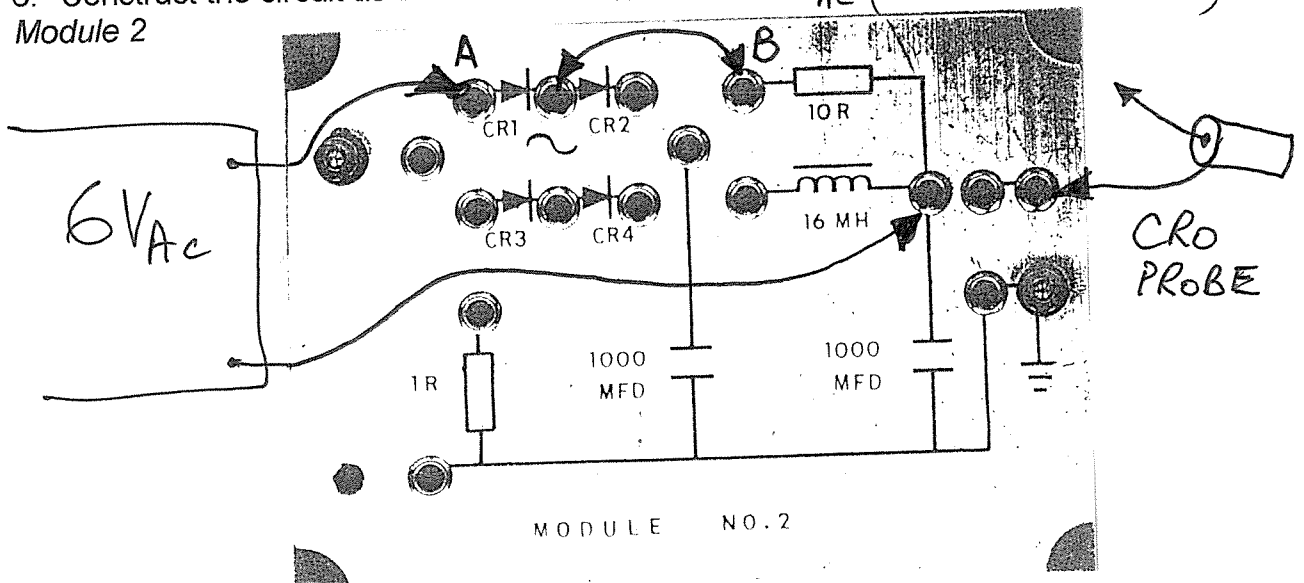
Change the polarity of the diode and note if the light bulb still glows. Why is this so?

Does the light bulb glow as bright as if it had 20 Volts DC applied to it?

Short the diode and note the increase in lamp brightness.

Calculate the effective voltage across the light bulb with the diode in circuit and record it here.

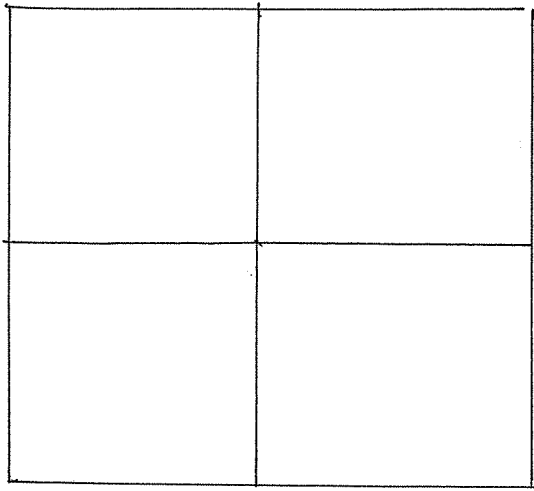
6. Construct the circuit as shown below. * NOTE $6V_{AC}$ (ADJUST TRANSFORMER)
Module 2



Calculate the PP voltage that 6 VAC is equivalent to and record that here.

Using the oscilloscope, measure the PP voltage at point A on the circuit and record that here. Does it agree with the calculated figure above?

Measure the voltage waveform at point B on the circuit with the oscilloscope on DC coupling and draw the results below.
Cro screen



What is the peak voltage measured?

Explain why this is so low compared to the PP voltage going into the circuit.

Reverse the diode and remeasure the voltage waveform at point B using the oscilloscope. Note what has happened to the voltage and explain below.

Pack up all of the equipment.