

Lab 4

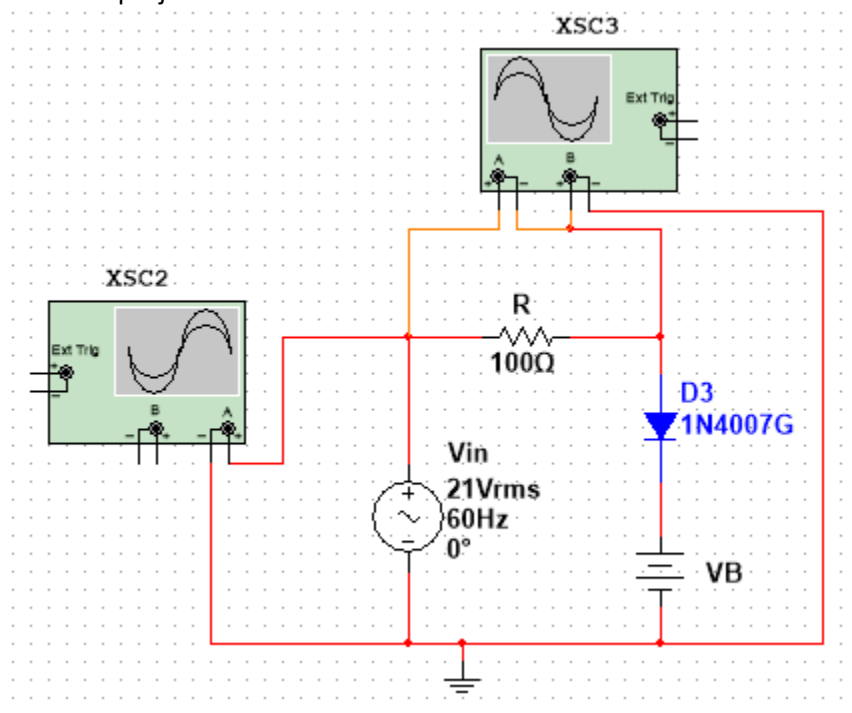
Diode Clipping Circuits & Half-Wave Rectifiers

Learning outcomes

- 1) Learn diode clipping circuits
- 2) Learn positive half wave rectifiers
- 3) Study the effect of small breakdown voltage

Experiment 1) Diode clipping

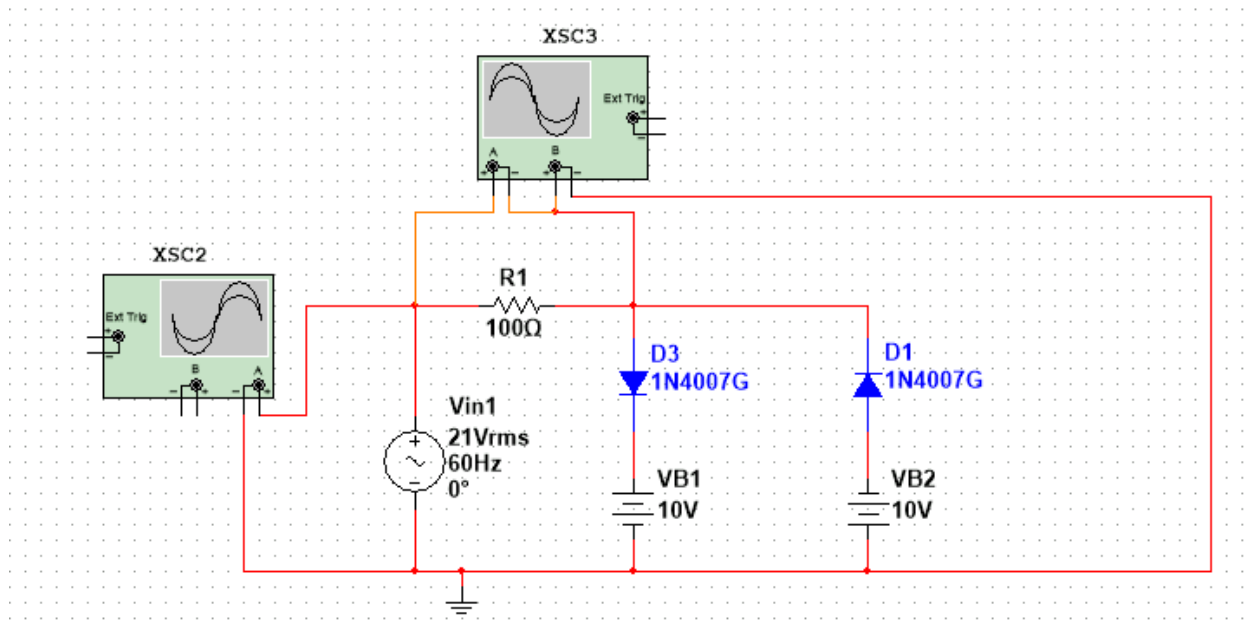
- A) Create a new Multisim project and construct the circuit shown



- B) Simulate the circuit using Seep analysis as follows:
1. Check XSC2 to check the input voltage
 2. Set V_B at 10, 0, & -10 and each time
 - I. Check XSC3 channel A (voltage on R) and channel B (voltage on both diode and V_B)
 - II. What do you notice, at what value the clipping happens each time
 - III. Measure the maximum voltage on R
 - IV. Add the two voltages together (A & B) what do you notice in regard to V_{in}

Experiment 2) 2-Way Diode clipping

- A) Create a new Multisim project and construct the circuit shown

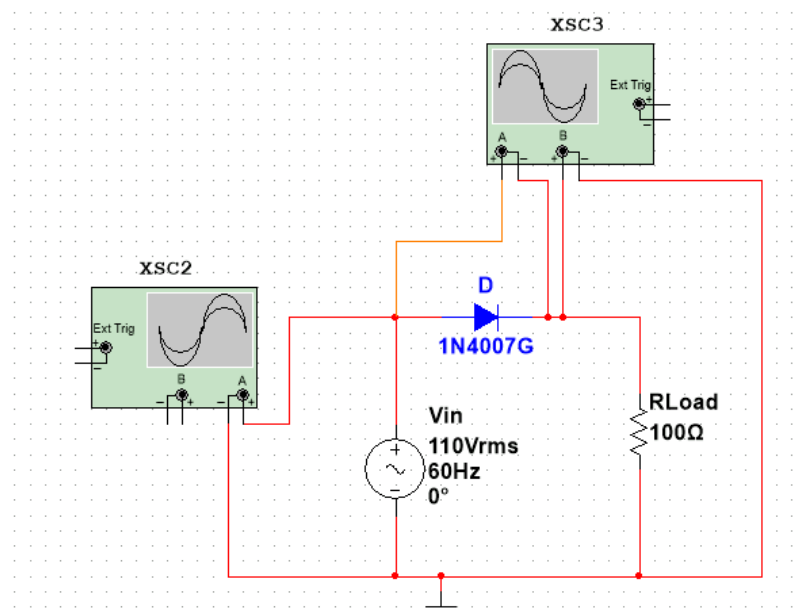


B) Simulate the circuit using Seep analysis as follows:

1. Check XSC2 to check the input voltage
2. Set VB1=VB2 at 10 and
 - V. Check XSC3 channel A (voltage on R) and channel B (voltage on both diode and VB)
 - VI. What do you notice, at what value the clipping happens
 - VII. Measure the maximum voltage on the R1
 - VIII. Add the two signals together (A (voltage on R1) & B (output voltage)). What do you notice in regard to Vin

Experiment 3) Positive Half-Wave Rectifier

A) Create a new Multisim project and construct the circuit shown



B) Simulate the circuit using Seep analysis as follows:

1. Check XSC2 to check the input voltage
2. Check XSC3 what do you notice at VLoad (voltage on RLoad – channel B)
3. What is the max negative voltage the diode experience
4. Add the two signals together. What do you notice in regard to Vin
5. Measure the diode clipping voltage
6. Measure the maximum output voltage

C) Change the breakdown voltage of the diode to 100

1. Right-click on the diode and choose “Properties”
2. Click on “Edit model”
3. Locate “Reverse breakdown knee voltage” and change it to 100
4. Rerun the simulation and record the output, what do you notice? Is it still Half-Wave Rectifier?
5. Measure the maximum negative voltage on RLoad and the negative clipping voltage on the diode