Lab 4 Diode Applications

Equipment

- Bread board
- Dual power supply
- Handheld DMM
- Bench-top DMM
- Analog Discovery

Components
- $100\,\Omega$ resistor
- $470\,\Omega$ "
- $1K\,\Omega$ "
- $2.2K\,\Omega$ "
- $10K\,\Omega$ "
- $100K\,\Omega$ "
- $100\,\mu F$ Capacitor
- $1000\,\mu F$ "
- 1N94 diode
- 1N4001 rectifier diodes

Prelab
- Perform all calculations before lab
- Design challenge
- run multisim simulations of each circuit

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1) Half-wave Rectifier

Without Filter Capacitor				With Filter Capacitor		
computed	measured	Comp	Mea	measured		
$V_{w1(rms)}$	$V_{w1(rms)}$	$V_{out(p)}$	$V_{out(p)}$	$V_{out(DC)}$	$V_{RL(pp)}$	Ripple f
		4.67v				
7.07 V						

2) Full-Wave Rectifier

Without Filtering Cap | With Filter Cap
Comp | meas | Comp | meas

Without Filter Cap						With Filter Cap		
computed	measured	comp	meas	comp	meas	Measured		
$V_{w1(rms)}$	$V_{w1(rms)}$	$V_{w2(rms)}$	$V_{w2(rms)}$	$V_{out(p)}$	$V_{out(p)}$	$V_{out(DC)}$	$V_{RL(pp)}$	Ripple Hz
				4.675v				
7.07V		3.53v		5.15v				

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PROPRIETARY INFORMATION

TITLE **PROJECT**

3) Bridge Rectifier

Without Filter Cap				With filter cap		
Comp	meas	Comp	meas	Measured		
$V_{in(rms)}$	$V_{in(rms)}$	$V_{out(p)}$	$V_{out(p)}$	$V_{out(DC)}$	$V_{RL(pp)}$	Ripple Hz
7.07v		2.943v				

4) Diode Clipping Circuit

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5) Diode Clamping Circuit

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6) <u>Diode or Gate: Battery Backup</u>
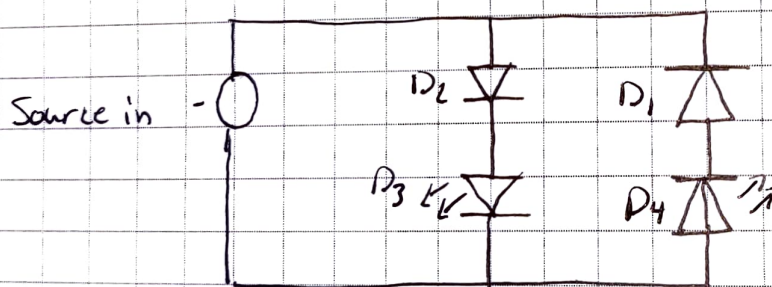
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7) Design Challenge

Design 1 of the following
- a) AC/DC polarity indicator —
b) Voltage level indicator
c) Led brightness control
d) Bi-Color LEDs
e) Peak detector
f) Voltage Multiplier
g) Inverting clipper
h) Non-inverting clipper

Source in

When D_3 is on, (+) polarity

When D_4 is on, (-) ~~polarity~~ polarity

- possible modifications
  - stack diodes to make simple voltage regulators
    so you don't overvolt the LEDs.
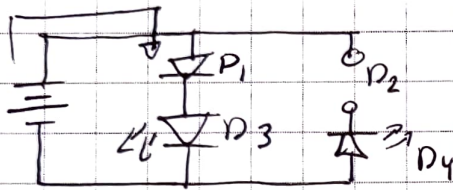
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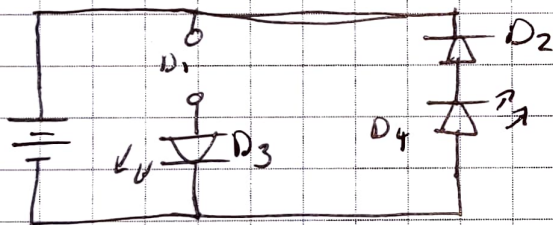Continued to pa

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Analysis of Circuit

- (+) polarity

- open circuit at D_3 disconnects D_4 from the rest of the circuit

- D_1 ideally acts as a short, supply voltage to D_3

- (−) polarity

- D_2 ideally acts like a short connecting D_4 to the (+) terminal of the supply

- D_1 is open removing D_3 from the circuit.

Construction / Verification / change(s)