

# Lesson 10. Full – wave Rectifier

- Youtube: Lec. 11

- Textbook: 3.5.1

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# Before....

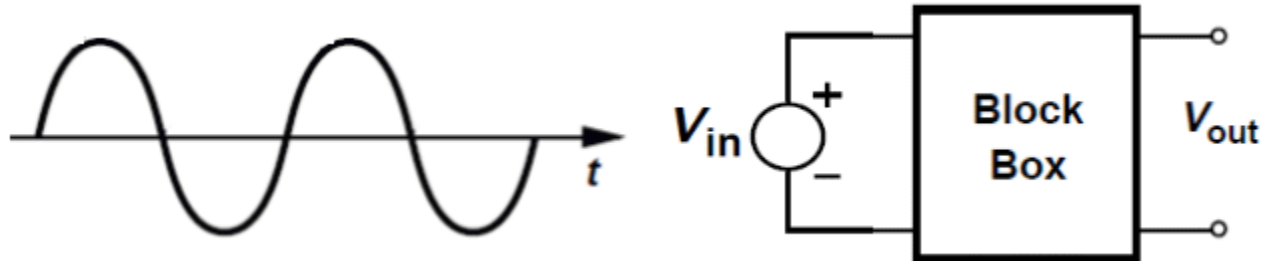
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- ▶ Half – wave Rectifier with Resistor
- ▶ Full – wave Rectifier with Resistor
  
- ▶ Half – wave Rectifier with Capacitor
- ▶ Full – wave Rectifier with Capacitor
  
- ▶ Half – wave Rectifier with Capacitor & Resistor
- ▶ Full – wave Rectifier with Capacitor & Resistor

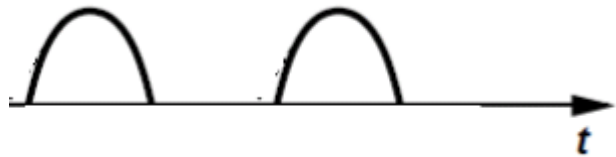


# Let's guess FWR with HWR

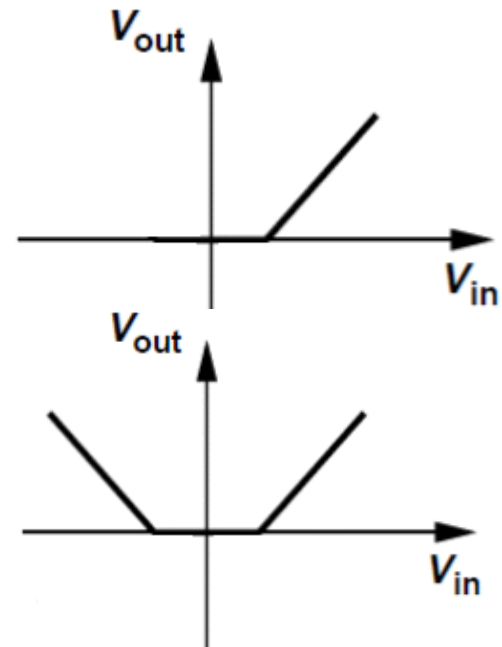
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- ▶ If Block Box is Half-wave Rectifier

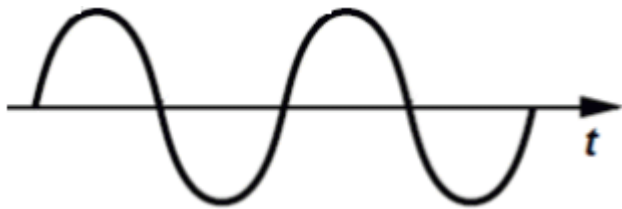


- ▶ If Block Box is Full-wave Rectifier

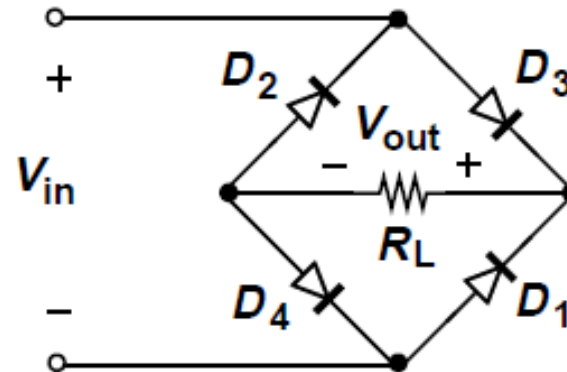


# Full – wave Rectifier with Resistor

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▶ <Input>

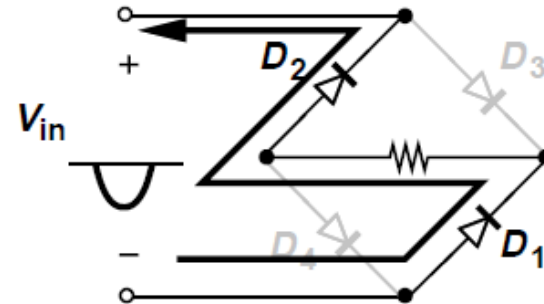
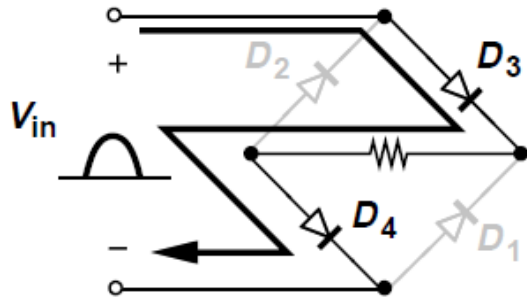


<FWR with Resistor>

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# Full – wave Rectifier with Resistor



## ► By KVL

$$-V_{in} + V_{D.on} + V_{out} + V_{D.on} = 0$$

$$\therefore V_{out} = V_{in} - 2V_{D.on}$$

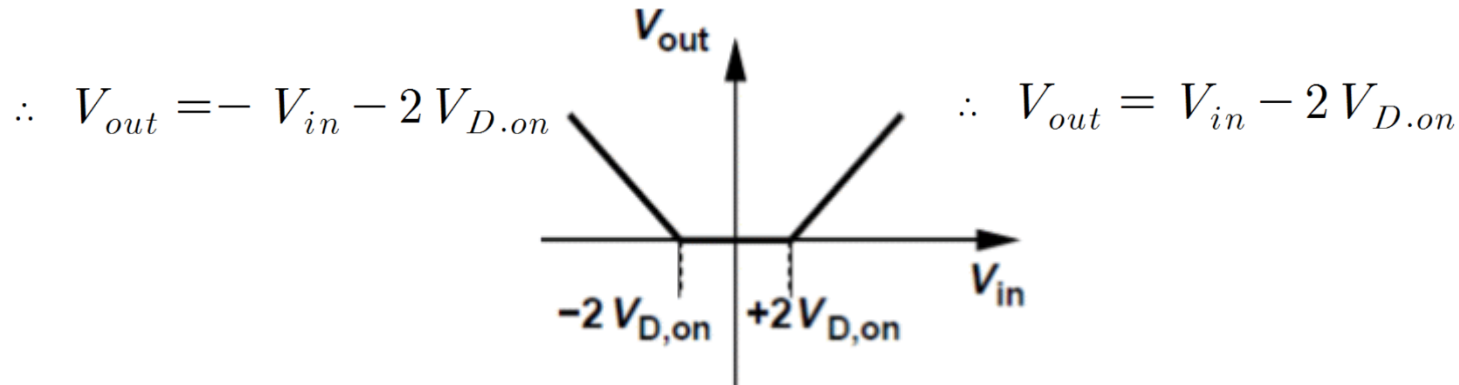
$$-V_{in} - V_{D.on} - V_{out} - V_{D.on} = 0$$

$$\therefore V_{out} = -V_{in} - 2V_{D.on}$$

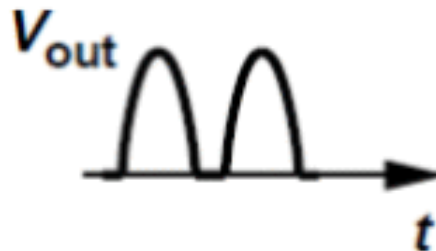


# Full – wave Rectifier with Resistor

## ▶ Input – Output Characteristics



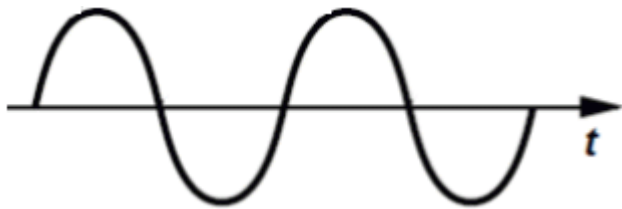
## ▶ Time Response



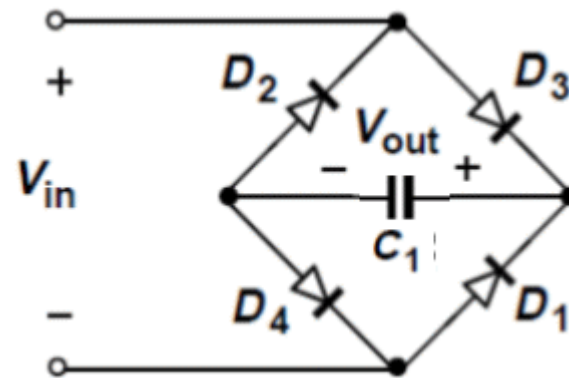
The difference between peak voltage of input and output is  $2V_{D,on}$

# Full – wave Rectifier with Capacitor

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▶ <Input>



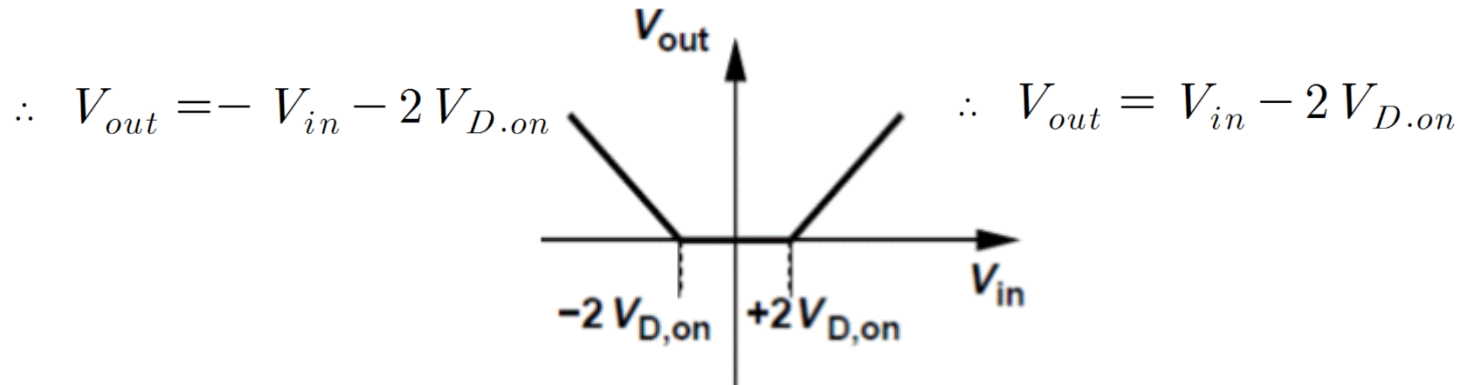
<FWR with Capacitor>

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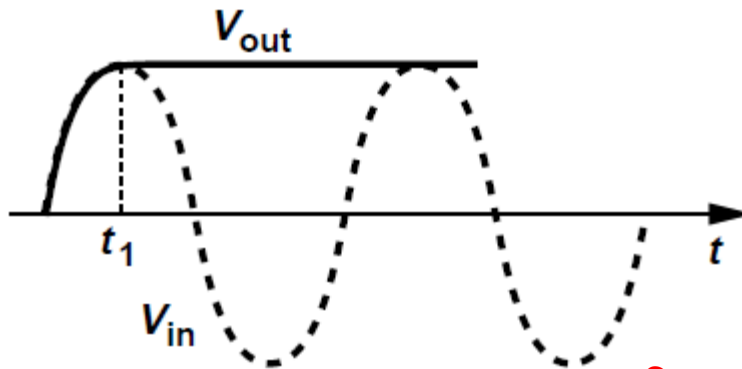


# Full – wave Rectifier with Capacitor

## ▶ Input – Output Characteristics



## ▶ Time Response



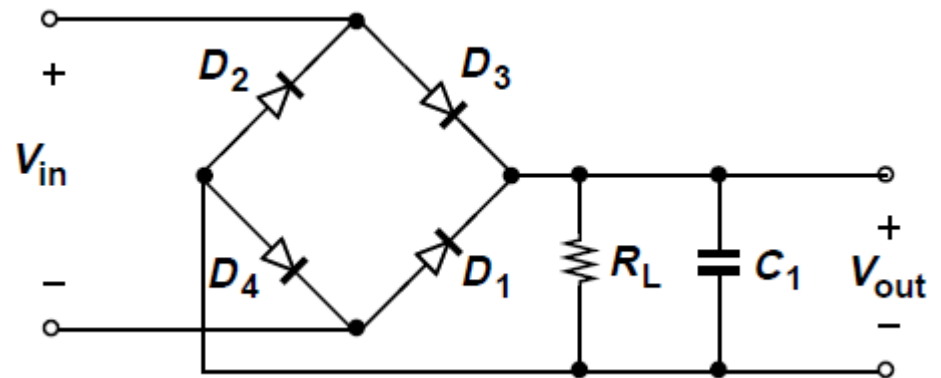
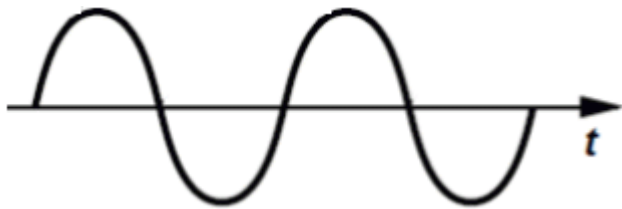
The difference between peak voltage of input and output is  $2V_{D,on}$

Same as Half-wave Rectifier with Capacitor



# FWR with Capacitor & Resistor

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▶ <Input>

<FWR with Capacitor & Resistor>

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# FWR with Capacitor & Resistor

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## ▶ Time Response



## ▶ Ripple Amplitude

$$\left( \frac{V_{peak} - V_{D.on}}{R_1 C_1} \right) T_{in}$$

For HWR

$$\left( \frac{V_{peak} - 2V_{D.on}}{R_1 C_1} \right) \frac{T_{in}}{2}$$

For FWR

FWR's ripple is approximately equal to half of the HWR's ripple.

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