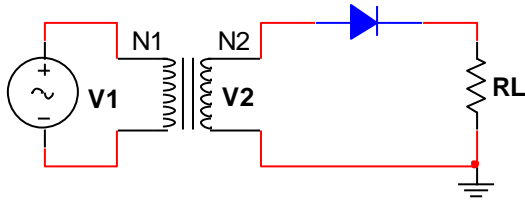


## Half-wave rectifier



$$\frac{V_2}{V_1} = \frac{N_2}{N_1} = \frac{I_1}{I_2}, N_1 = N_2 \left( \frac{V_1}{V_2} \right), V_1 = V_2 \left( \frac{N_1}{N_2} \right)$$

$$V_2 = V_1 \left( \frac{N_2}{N_1} \right), I_1 = I_2 \left( \frac{N_2}{N_1} \right), I_1 = I_2 \left( \frac{V_2}{V_1} \right)$$

$$V_{(RMS)} \cong 0.707V_{(pk)}$$

$$V_{L(pk)} = V_{2(pk)} - V_D$$

$$I_{L(pk)} = I_{D(pk)} = I_{2(pk)} = \frac{V_{L(pk)}}{R_L}$$

$$V_{L(AVG)} = \frac{V_{L(pk)}}{\pi} \cong 0.318V_{L(pk)}$$

$$I_{L(AVG)} = \frac{V_{L(AVG)}}{R_L} \cong 0.318I_{L(pk)}$$

$$V_{L(RMS)} \cong 0.382V_{L(pk)}$$

$$I_{L(RMS)} \cong 0.382I_{L(pk)}$$

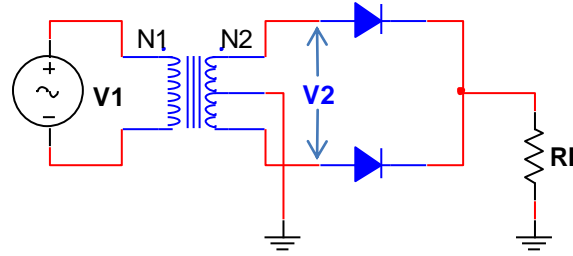
$$I_L = I_2$$

$$PIV = V_{2(pk)}$$

$$PIV = V_{L(pk)} + V_D$$

$$f_{OUT} = f_{IN}$$

## Full-wave rectifier (center tap)



$$\frac{V_2}{V_1} = \frac{N_2}{N_1} = \frac{I_1}{I_2}$$

$$V_1 = V_2 \left( \frac{N_1}{N_2} \right), V_2 = V_1 \left( \frac{N_2}{N_1} \right), N_1 = N_2 \left( \frac{V_1}{V_2} \right)$$

$$V_{(RMS)} \cong 0.707V_{(pk)}$$

$$V_{L(pk)} = \frac{V_{2(pk)}}{2} - V_D$$

$$I_{L(pk)} = I_{D(pk)} = \frac{V_{L(pk)}}{R_L}$$

$$V_{L(AVG)} = \frac{2V_{L(pk)}}{\pi} \cong 0.637V_{L(pk)}$$

$$I_{L(AVG)} = \frac{V_{L(AVG)}}{R_L} \cong 0.637I_{L(pk)}$$

$$V_{L(RMS)} \cong 0.318V_{L(pk)}$$

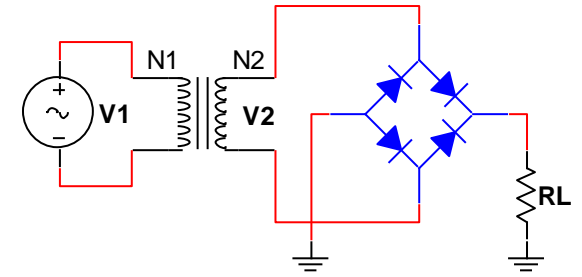
$$I_{L(RMS)} \cong 0.318I_{L(pk)}$$

$$PIV = V_{2(pk)} - V_D$$

$$PIV = 2V_{L(pk)} + V_D$$

$$f_{OUT} = 2 \times f_{IN}$$

## Full-wave bridge rectifier



$$\frac{V_2}{V_1} = \frac{N_2}{N_1} = \frac{I_1}{I_2}, N_1 = N_2 \left( \frac{V_1}{V_2} \right), V_1 = V_2 \left( \frac{N_1}{N_2} \right)$$

$$V_2 = V_1 \left( \frac{N_2}{N_1} \right), I_1 = I_2 \left( \frac{N_2}{N_1} \right), I_1 = I_2 \left( \frac{V_2}{V_1} \right)$$

$$V_{(RMS)} \cong 0.707V_{(pk)}$$

$$V_{L(pk)} = V_{2(pk)} - 2V_D$$

$$I_{L(pk)} = I_{D(pk)} = I_{2(pk)} = \frac{V_{L(pk)}}{R_L}$$

$$V_{L(AVG)} = \frac{2V_{L(pk)}}{\pi} \cong 0.637V_{L(pk)}$$

$$I_{L(AVG)} = \frac{V_{L(AVG)}}{R_L} \cong 0.637I_{L(pk)}$$

$$V_{L(RMS)} \cong 0.318V_{L(pk)}$$

$$I_{L(RMS)} \cong 0.318I_{L(pk)}$$

$$I_L = I_2$$

$$PIV = V_{2(pk)} - V_D$$

$$PIV = V_{L(pk)} + V_D$$

$$f_{OUT} = 2 \times f_{IN}$$

**Hint:**  $V_{AVG} = V_{DC}$ ,  $I_{AVG} = I_{DC}$