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Power Point Presentation on

FULL WAVE RECTIFIERS

Presented by

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INTRODUCTION

Electric circuits that convert AC to DC are known as rectifiers. Rectifiers are classified into two types as Half Wave Rectifiers and Full Wave Rectifiers. Significant power is lost while using a half-wave rectifier and is not feasible for applications that need a smooth and steady supply. For a more smooth and steady supply, we use the full wave rectifiers.

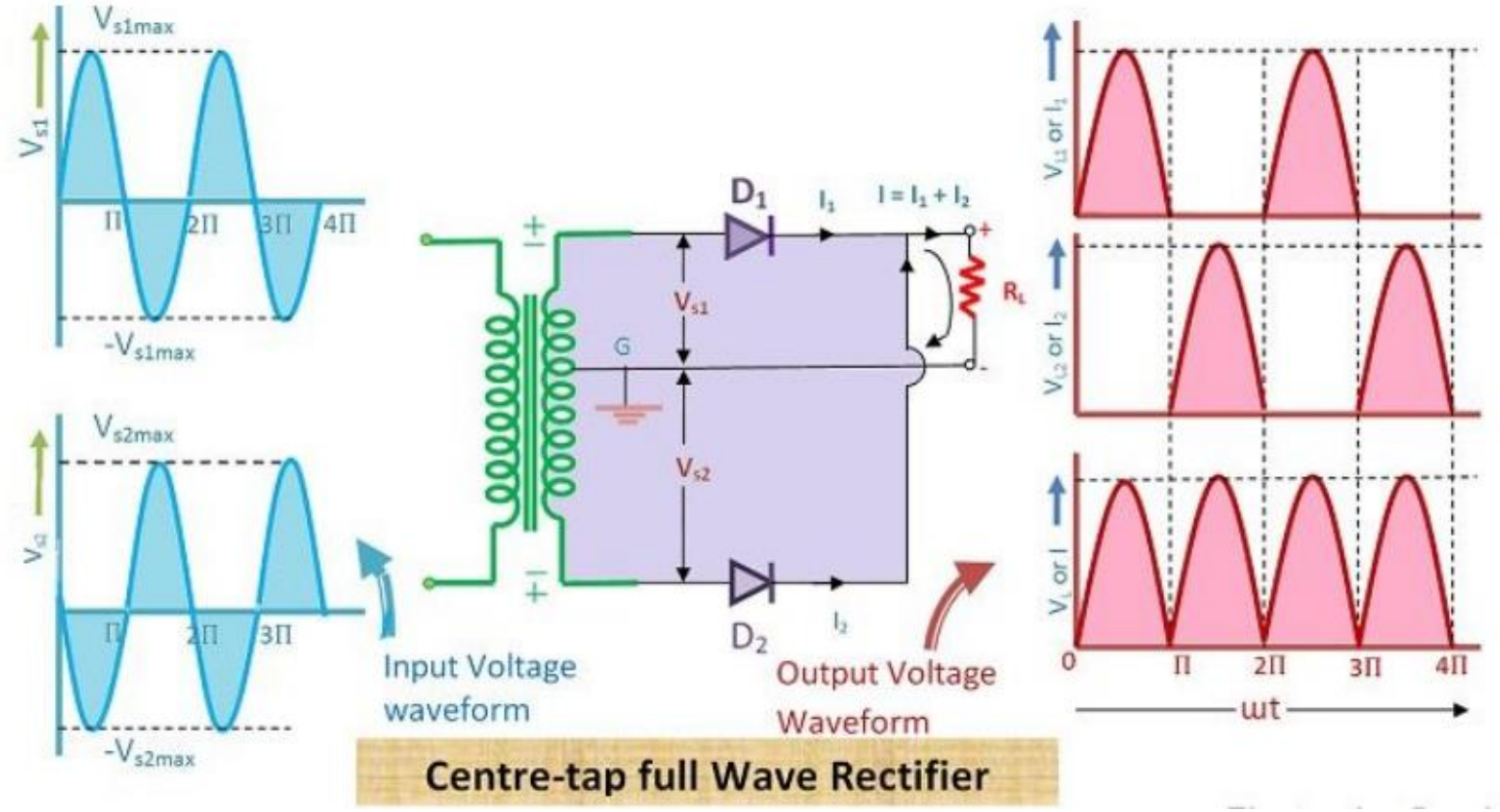
FULL WAVE RECTIFIER CIRCUIT

There are two type of full wave rectifier circuit.

- Center tap full wave rectifier.
- Full wave bridge rectifier.

The circuit of the full wave rectifier can be constructed in two ways. The first method uses a centre tapped transformer and two diodes. This arrangement is known as a centre tapped full wave rectifier. The second method uses a standard transformer with four diodes arranged as a bridge. This is known as a bridge rectifier.

CENTER TAP FULL WAVE RECTIFIER



The circuit of the full wave rectifier consists of a step-down transformer and two diodes that are connected and center tapped. The output voltage is obtained across the connected load resistor.

WORKING:

- The input AC supplied to the full wave rectifier is very high. The step-down transformer in the rectifier circuit converts the high voltage AC into low voltage AC. The anode of the center tapped diodes is connected to the transformer's secondary winding and connected to the load resistor. During the positive half cycle of the alternating current, the top half of the secondary winding becomes positive while the second half of the secondary winding becomes negative.

- During the positive half cycle, diode D1 is forward biased as it is connected to the top of the secondary winding while diode D2 is reverse biased as it is connected to the bottom of the secondary winding. Due to this, diode D1 will conduct acting as a short circuit and D2 will not conduct acting as an open circuit

- During the negative half cycle, the diode D1 is reverse biased and the diode D2 is forward biased because the top half of the secondary circuit becomes negative and the bottom half of the circuit becomes positive. Thus in a full wave rectifiers, DC voltage is obtained for both positive and negative half cycle

Peak Inverse Voltage (PIV):

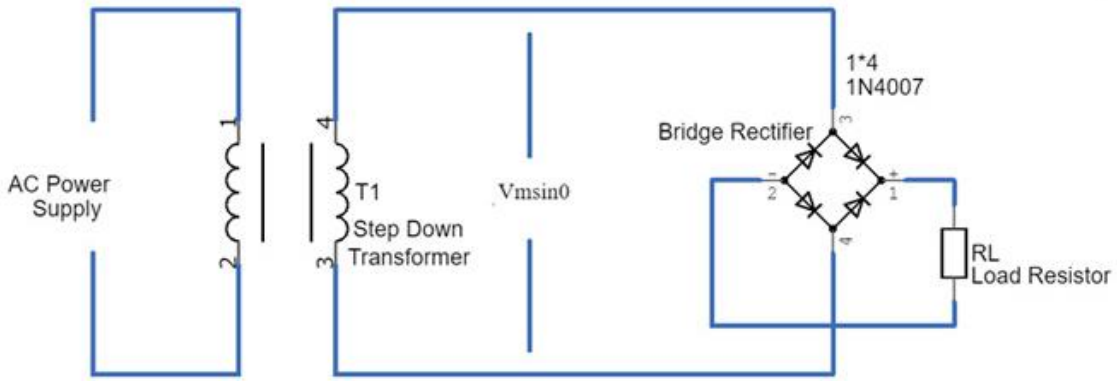
Peak inverse voltage is the maximum voltage a diode can withstand in the reverse-biased direction before breakdown. The peak inverse voltage of the full-wave rectifier is double that of a half-wave rectifier. The PIV across D1 and D2 is 2Vmax.

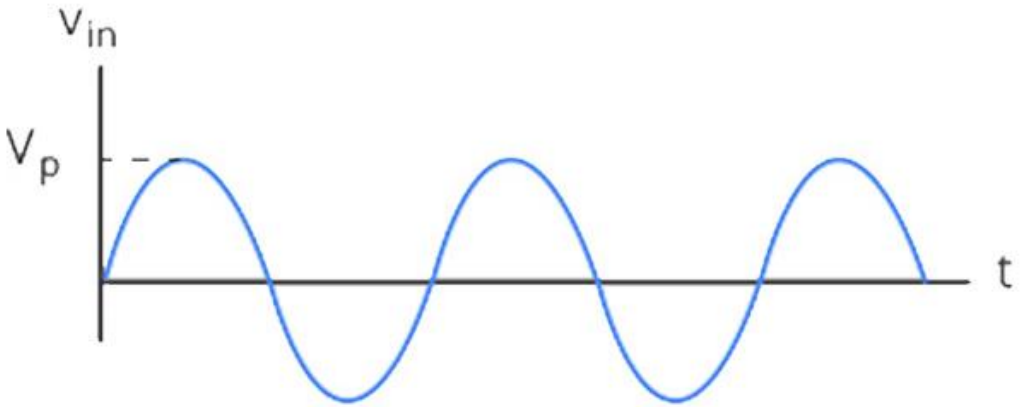
RMS Value of Current: $I(rms)=Im/\sqrt{2}$

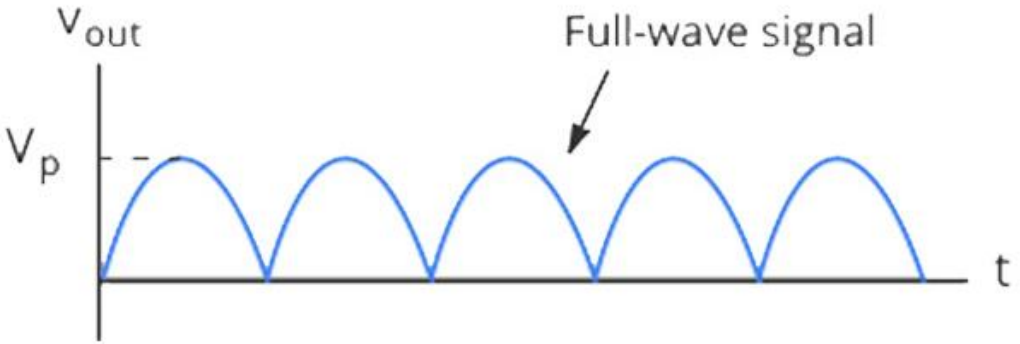
Form Factor: $K_f=1.11$

Peak Factor: $K_p=\sqrt{2}$

FULL WAVE BRIDGE RECTIFIER







WORKING:

- The full-wave bridge rectifier is divided into two steps before applying to the load. The first step is to step down the incoming AC power signal to reduce the voltage to a certain level. The transformer is used to step down the voltage level.
- The next step is the bridge rectifier that uses four diodes in series, during the positive half cycle the two diodes D1 and D3 conduct
- During the negative half cycle diodes, D2 and D4 conduct, and a converted direct current power output signal are provided to the load.

Peak Inverse Voltage (PIV):

Peak inverse voltage is the maximum voltage a diode can withstand in the reverse-biased direction before breakdown. The peak inverse voltage of the full-wave bridge rectifier is same that of a half-wave rectifier. The PIV across each diode is Vmax.

RMS Value of Current: $I(rms)=Im/\sqrt{2}$

Form Factor: $K_f=1.11$

Peak Factor: $K_p=\sqrt{2}$

CONCLUSION

Though both circuits can be used as a full wave rectifier, bridge circuit has its own advantages over centre tapped circuit . A full wave bridge rectifier eliminates the need for the use of centre tapped transformer. Thus, transformers may or may not be used in the circuit . Also in case of a full wave bridge rectifier , PIV is one-half of the PIV in a Centre tapped full wave rectifier.

REFERENCES

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2. Robert L. Boylestad & Louis Nashelsky, Electronic Devices and Circuit Theory , Pearson/PHI, New Delhi., 2014

THANK YOU