

Voltage Multipliers Using Diodes and Capacitors

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To increase peak rectified voltages, voltage multipliers use clamping action without increasing input transformer's rating.

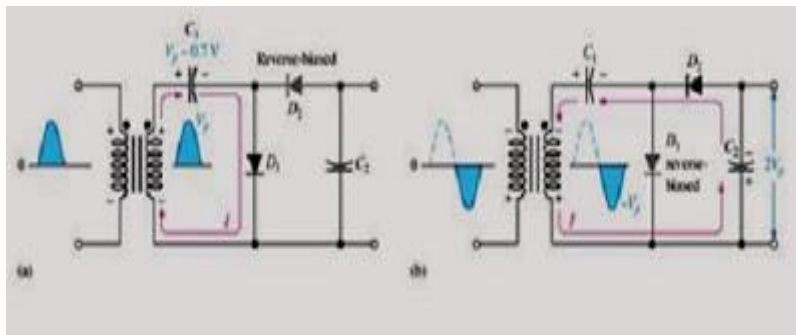
The commonly used multiplication factors of 2, 3, and 4.

Voltage multipliers are generally used in high-voltage, low-current applications.

i) Voltage doubler.

–There are mainly two types of voltage doublers:

1) Half-wave doubler:



During the positive half-cycle of the applied secondary voltage at the input side, diode D1 is forward-biased and D2 is reverse-biased.

The Capacitor C1 is charged to the peak (Maximum) of the secondary voltage (V_p) less diode drop

During the negative half-cycle of the input voltage, diode D2 is forward-biased and D1 is reverse-biased.

At this time, C1 cannot discharge.

So, C1's voltage adds to the applied input secondary voltage for charging C2 to

approximately $2V_p$.

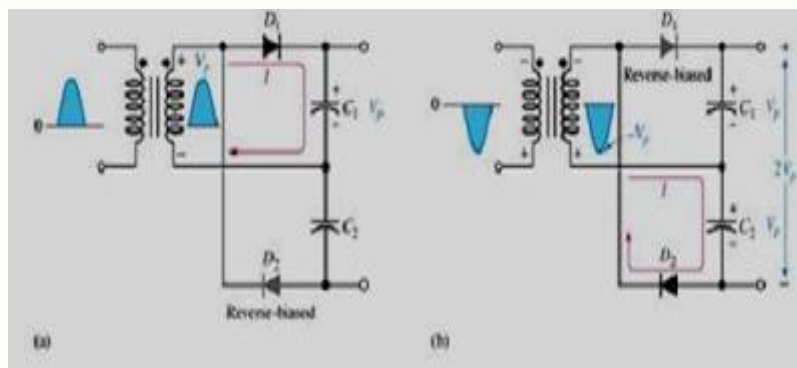
Under zero-load conditions, the capacitor C_2 remains charged.

If a load is added, then the capacitor C_2 will discharge through the load on the next positive half-cycle. Only recharged in the following negative half-cycle.

Obtained wave form is a half-wave, capacitor-filtered voltage.

The Peak Inverse Voltage (PIV) across each diode is $2V_p$.

2) Full-wave doubler:



– When the applied input secondary voltage is positive, the diode D_1 is forward biased and C_1 charges to approximately V_p .

– During the negative half-cycle, the diode D_2 is forward biased (FB) and C_2 charges to approximately V_p .

- Output voltage can be taken across the two capacitors which is in series connection.

3) Voltage tripler:

The circuit diagram for voltage tripler is exactly same as the half-wave doubler, but another diode-capacitor pair is added to the circuit.

Source:

<http://www.electronicsandcommunications.com/2013/04/voltage-multipliers-using-diodes.html>