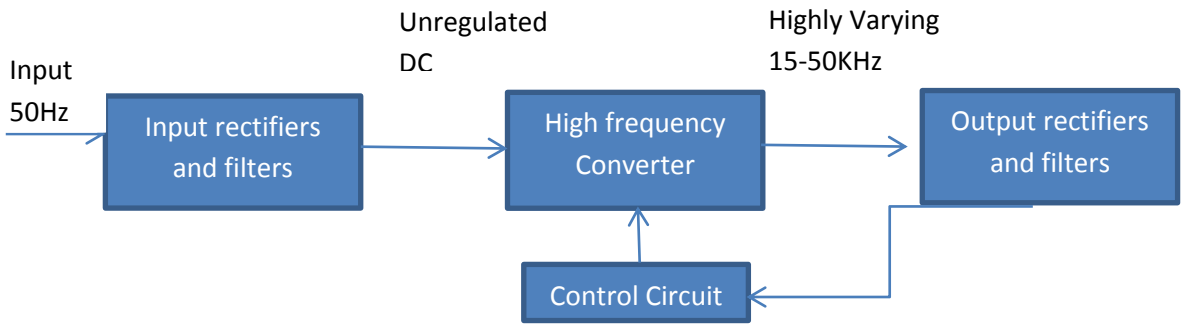
SMPS (Switched Mode Power Supply)

Need:

The linear power supply is less efficient. It requires large value capacitors to reduce ripples and costly transformers .Hence instead of linear power supply we use switched mode power supply.

Simplified block diagram

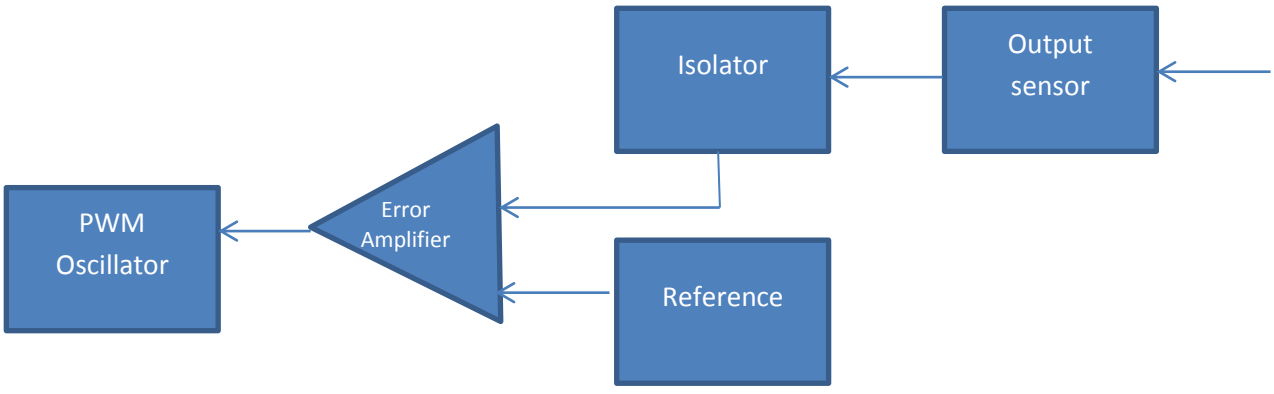


Input section - consists of input rectifiers and filter which produce unregulated dc supply.

Switching section - MOSFET switches are usually used. Switching section produces a highly varying output in the frequency range 15- 50 KHz. This is fed to the primary of a high frequency transformer. These transformers are much smaller and lighter ones and much efficient. And they have high power conversion ratio.

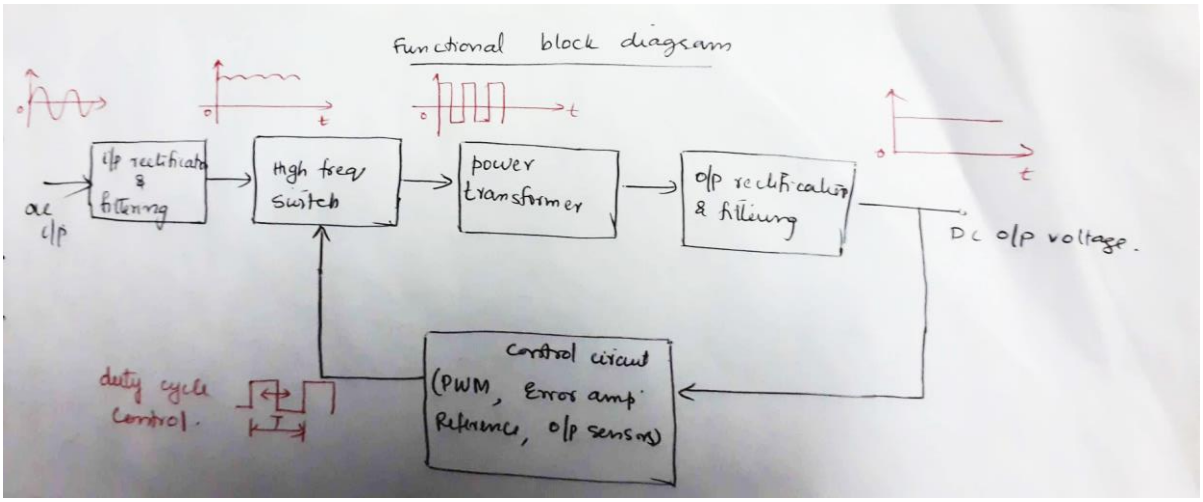
Output section - The signal from switching section is again rectified and filtered to get the required DC voltage. This is a regulated output voltage and is given to control circuit.

Control circuit – simplified block diagram



Isolator is to avoid sudden spikes fed back to the circuit. The final voltage is maintained by controlling the chopping frequency. The error amplifier decides the chopping frequency through a Pulse width modulation technique.

The detailed functional block diagram is as below:



SMPS efficiency is high because instead of dissipating excess power as heat it continuously switches its input to control the output.

Advantages:

- Efficieny 80-90 %
- Less heat generated, less power wastage
- Compact and small size
- Reduced manufacturing cost

Disadvantages:

- Complex circuit
- Produces electromagnetic interference
- Noise is present due to high frequency switching

Applications:

Used in mobile phone chargers, battery chargers, laptops, security systems etc.