MONOLITHIC SWITCHING REGULATORS - FEATURES

(i) Step – Down Switching Regulator:

- $C_T$ is the timing capacitor which decides the switching frequency.
- $R_{sc}$ is the current sensing resistance. Its value is given by

$$R_{sc} = \frac{330mV}{DesiredPeakCurrent}$$

- The Non-inverting terminal of the internal op-amp(pin9) is connected to the 1.3V reference (pin8).
- Resistances $R_1$ & $R_2$ from a potential divider, across the output voltage $V_o$. Their value should be such that the potential at the inverting input of the op-amp should be equal to 1.3V ref when $V_o$ is at its desired level.

$$V_{(0)} = 1.3V = \frac{R_2}{R_1 + R_2} \cdot V_o$$

The output capacitance $C_o$ is used for reducing the ripple contents in the output voltage. It acts as a filter along with the inductor $L$.

- The inductor $L$ is a part of filter connected on the output side, to reduce the ripple percentage.
- The 0.1μF capacitor connected between pin8 & ground bypasses any noise voltage coupled to the reference (pin8).
(ii) Step – Up Switching Regulator:

- Note that inductor is connected between the collectors of Q1 & Q2.
- When Q1 is ON, the output is shorted & the collector current of Q1 flows through L.
- The diode D1 is reverse biased & Co supplies the load current.
- The inductor stores the energy. When the Q1 is turned OFF, there is a self induced emf that appears across the inductor with polarities.
- The output voltage is given by,

  \[ V_o = V_{in} + V_L \]

- Hence it will be always higher than Vin & step up operation is achieved.
(iii) Inverting Switching Regulator:
Inverting switching regulator converts a positive input voltage into a negative output voltage which is higher in magnitude.