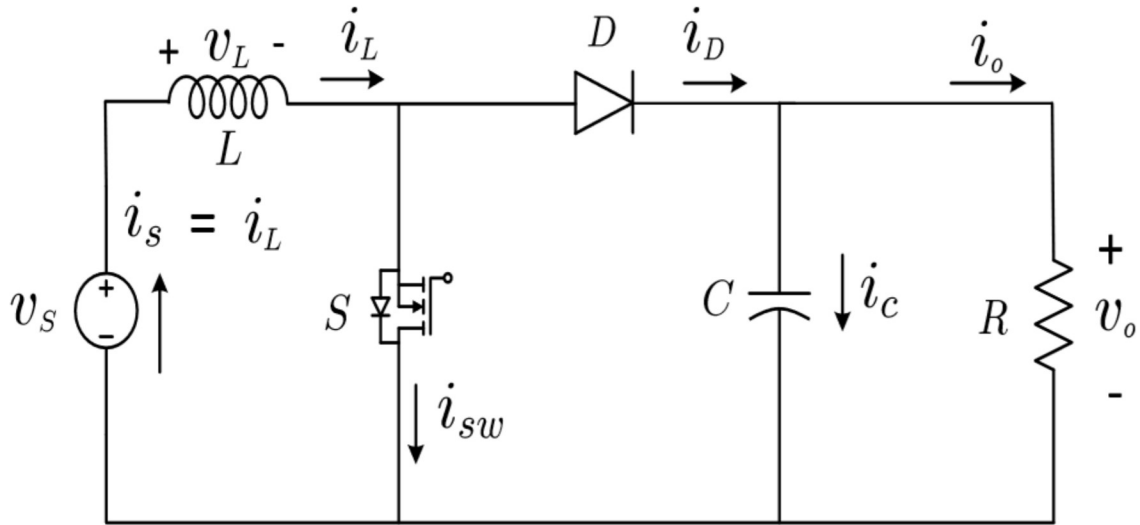


BOOST CONVERTER

Definition: Boost converter or stepup converter is a converter which step up the output voltage compared to input source voltage.

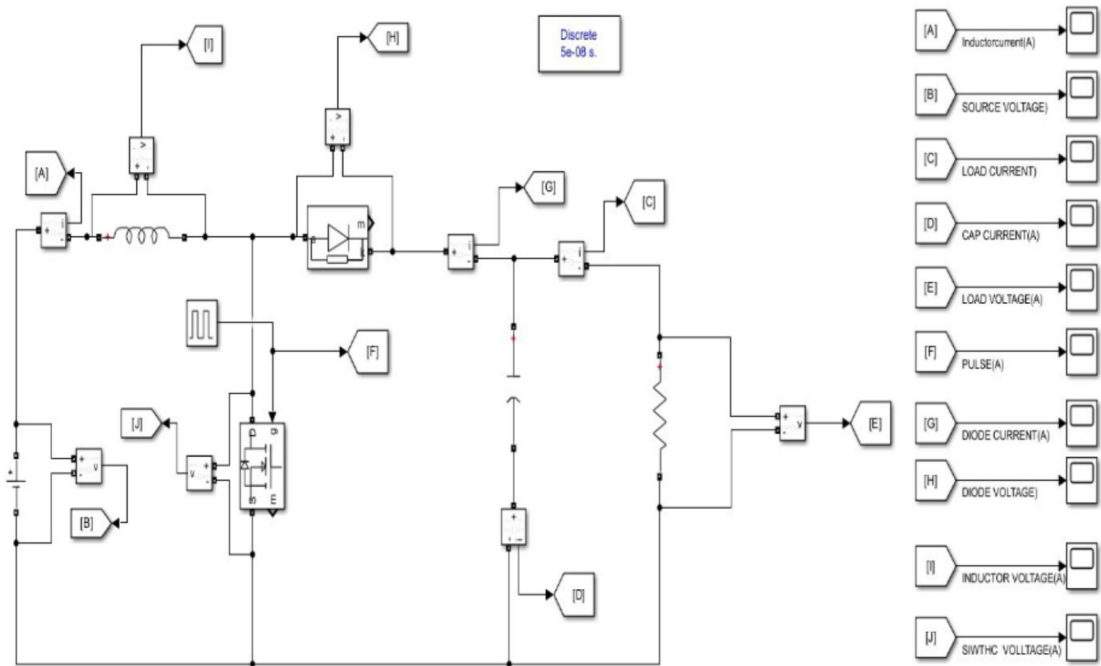
Circuit Diagram:



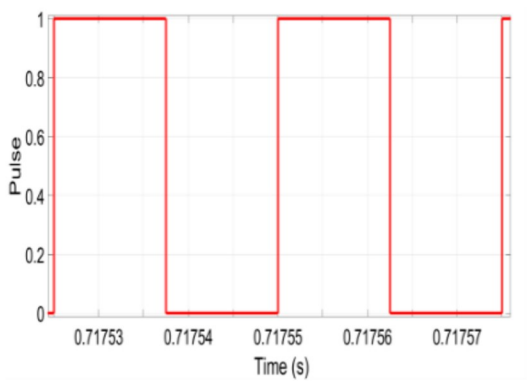
Designed Circuit Parameters:

Parameters	Values
V_s	24 V
D	0.5
L	97.5 mH
C	5.2 mF
R	23 Ω
V_o	48 V
f	40 kHz

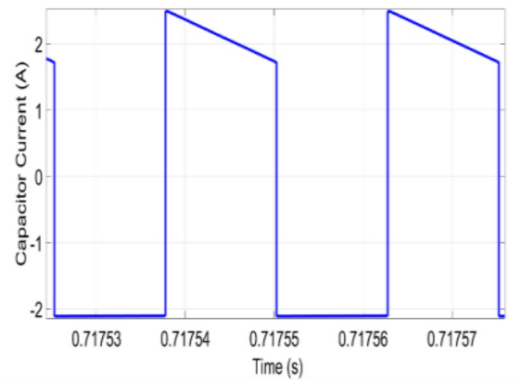
Simulated Circuit:



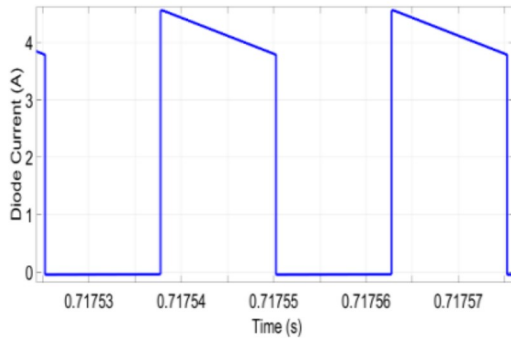
Simulated Output Results:



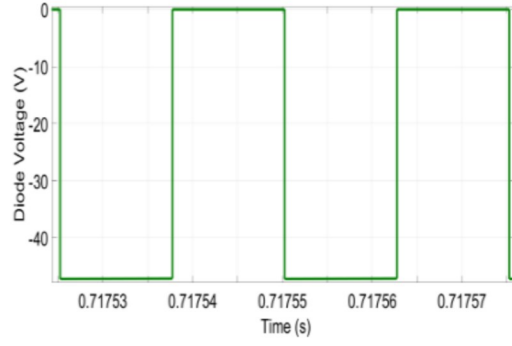
(a) figure 1



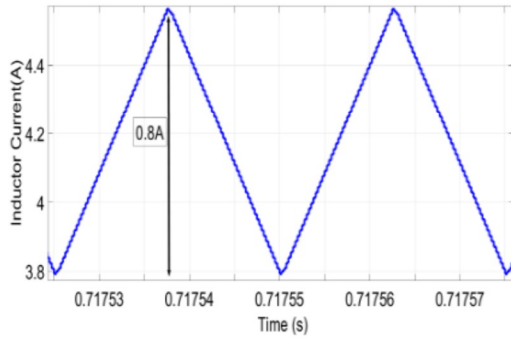
(b) figure 2



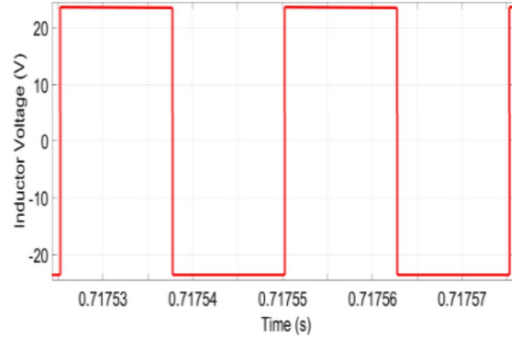
(a) figure 3



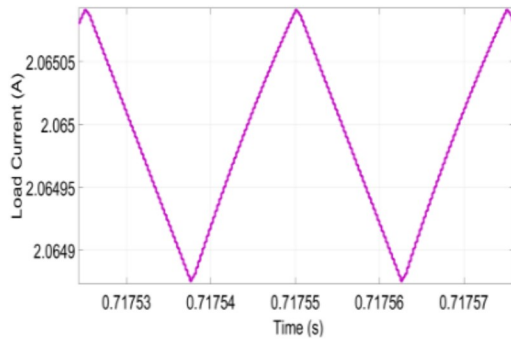
(b) figure 4



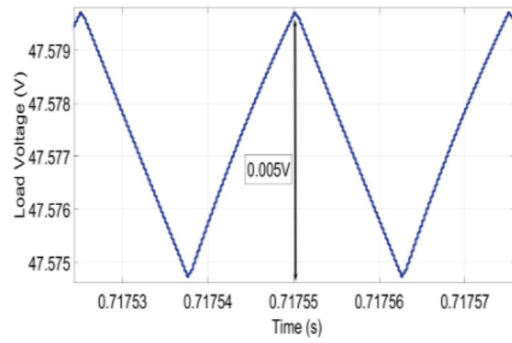
(c) figure 5



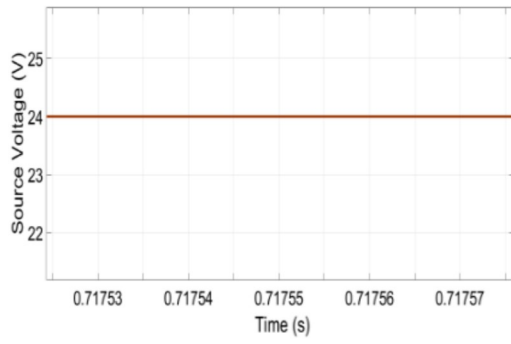
(d) figure 6



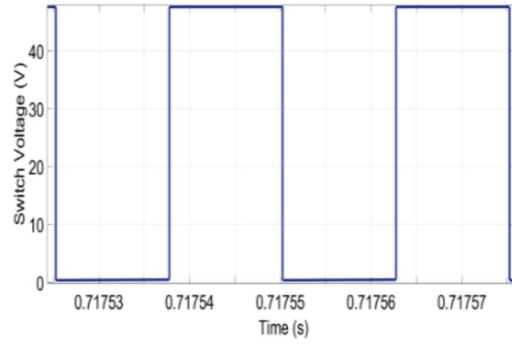
(e) figure 7



(f) figure 8

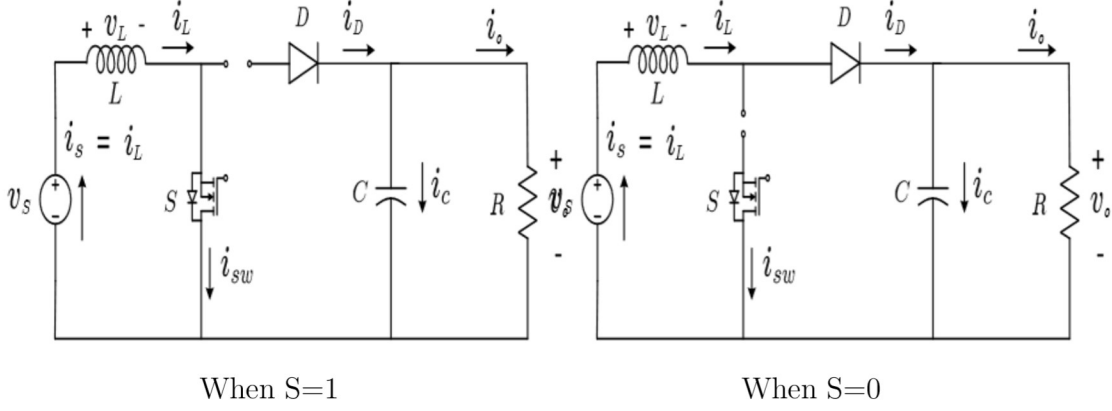


(g) figure 9



(h) figure 10

Calculations:



• KVL

$$-V_{in} + V_L = 0 \quad (8)$$

$$L * \frac{\Delta I}{DT} = V_{in} \quad (9)$$

Assumed $\Delta I = 0.8A$

$$L * \frac{0.8 * 40k}{0.5} = 24 \quad (10)$$

$$L = 0.375 \text{ mH}$$

• KVL

$$-V_{in} + V_L + V_o = 0 \quad (11)$$

$$L * \frac{\Delta I}{(1-D)T} = V_{in} - V_o \quad (12)$$

Assumed $\Delta I = 0.8A$

$$L * \frac{2.8846 * 40K}{1 - 0.5} = 24 - 48 \quad (13)$$

$$L = 0.375 \text{ mH}$$

• For C

$$I_o * D * T = Q = c * (\Delta V) \quad (14)$$

Assumed $\Delta V = 0.005V$

$$C = \frac{2.0869 * 0.5}{40K * 0.005} \quad (15)$$

$$C = 5.2085 \text{ mF}$$