

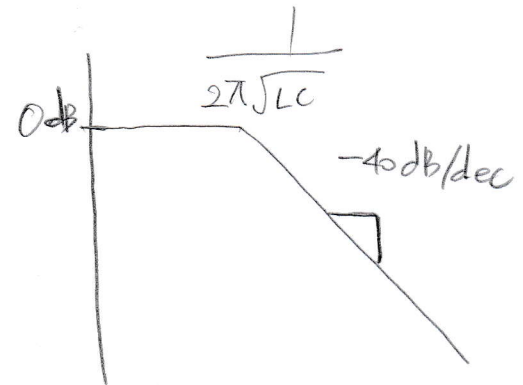
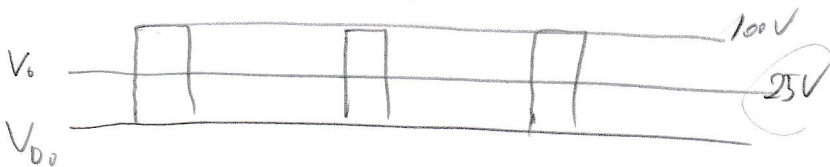
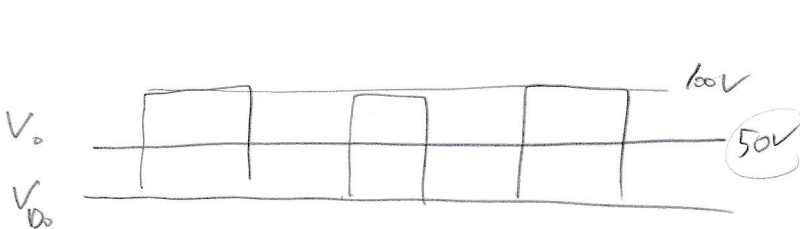
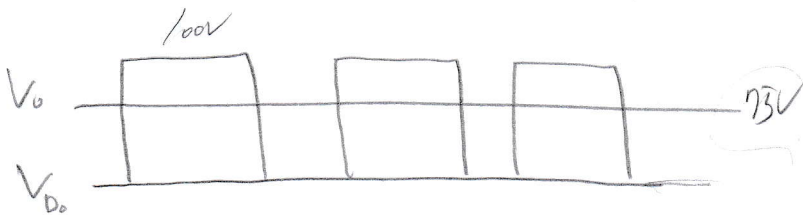
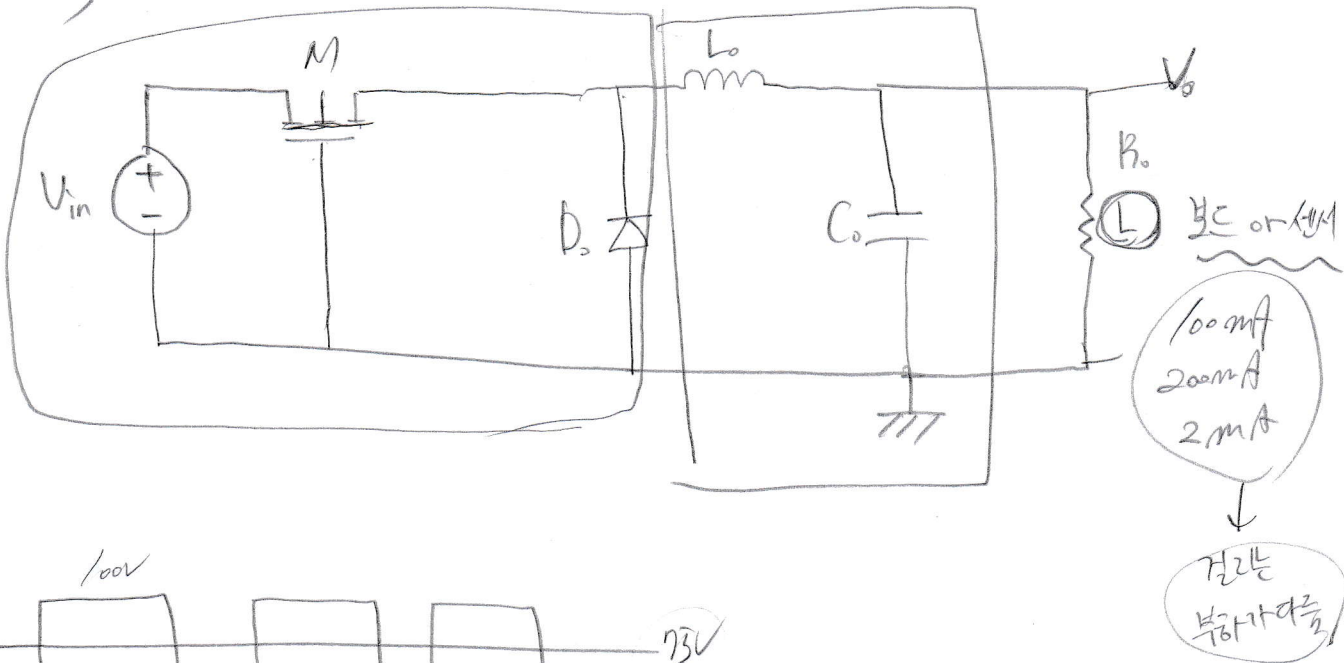
# o Buck Converter I

$$* \text{Gain (dB)} = 20 \log \frac{V_{out}}{V_{in}}$$

$$\text{ex) gain} = -20 \text{ dB} = 20(-1)$$

$$\log \frac{V_{out}}{V_{in}} = -1 \Rightarrow \frac{V_{out}}{V_{in}} = \frac{1}{10}$$

$$\therefore V_{in} = 10 V_{out}$$



$$L = 1\text{mH}, C = 1\text{mF}$$

$$f_c = 159\text{Hz}$$

# o Buck Converter 2

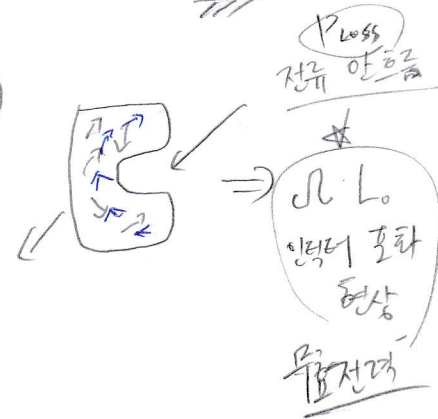
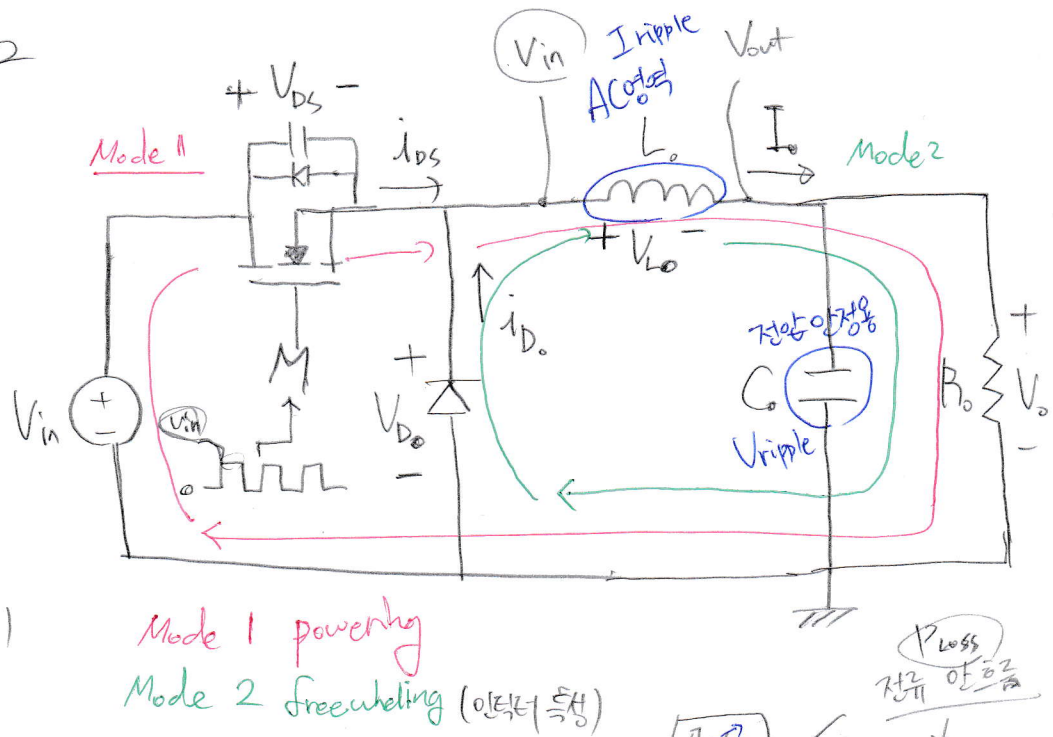
① 가정

$V_o$  : 상수

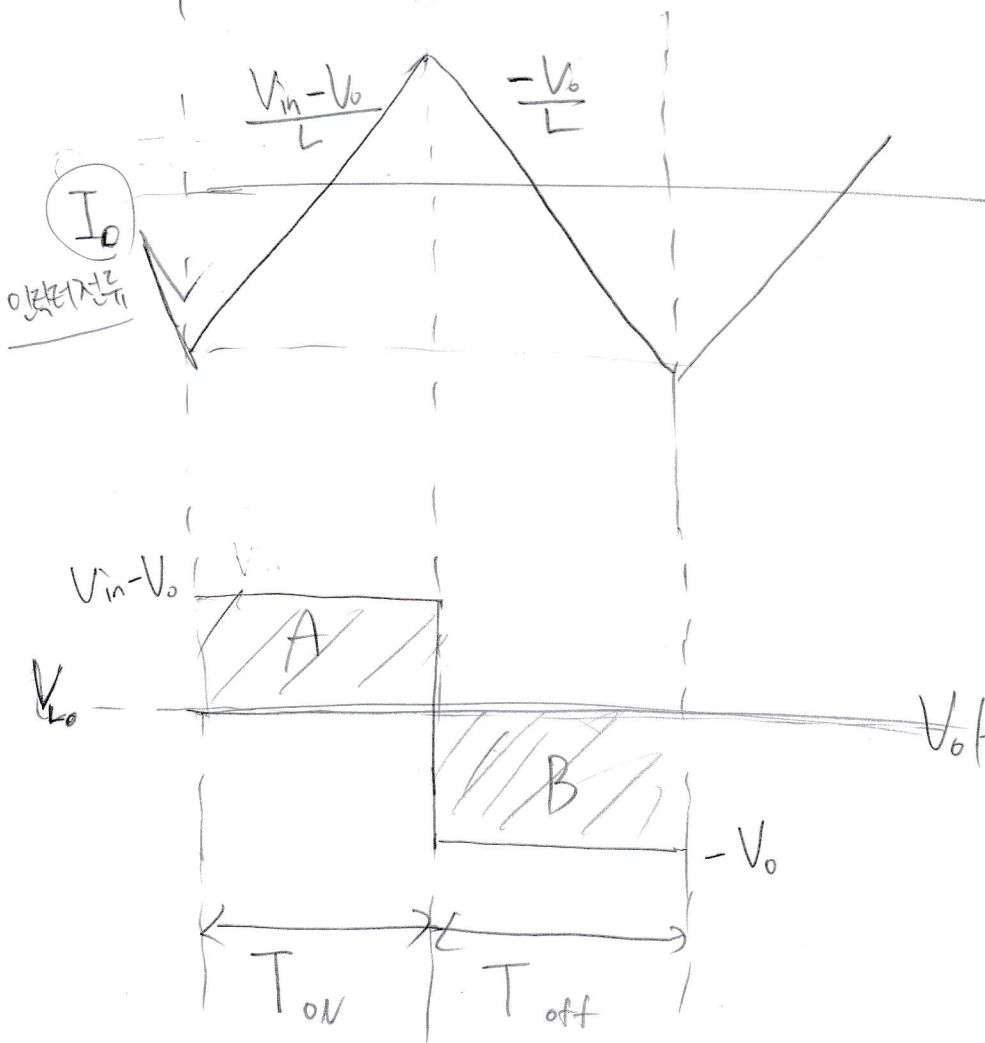
$I_o$  : 상수 ( $\frac{V_o}{R_o}$ )

② duty 주기

$$D = \frac{T_{on}}{T_s}, 0 \leq D \leq 1$$



switching 방식

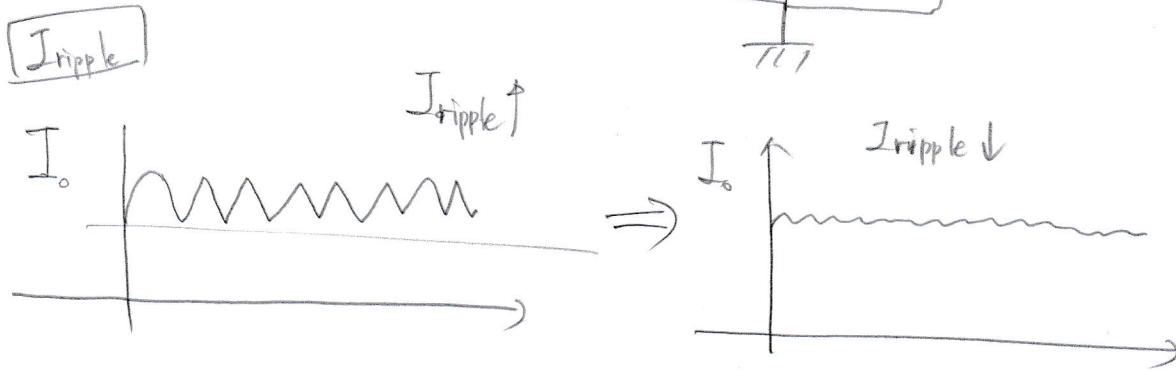
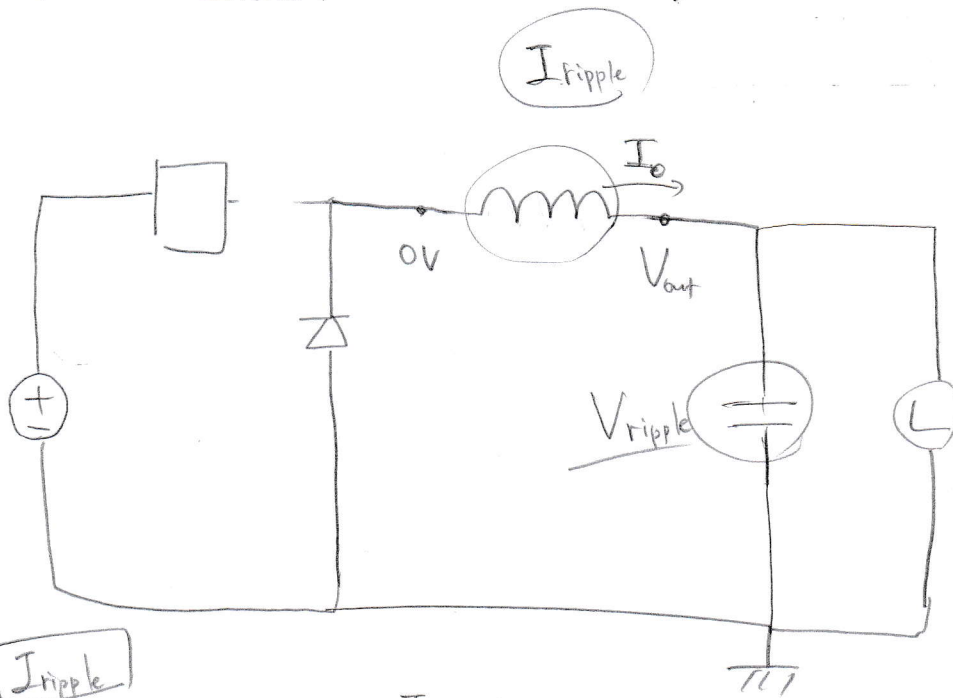


$$(*) I_{ripple} = I_o \cdot 2\% \text{ Fix}$$

$$V_{ripple} = V_o \cdot 5\% \text{ Fix}$$

Voltage second Balance

# Buck Converter 3

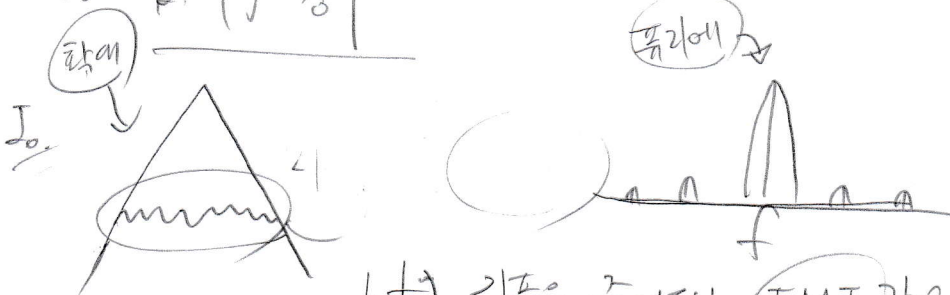


①  $I_{ripple}$ 을 줄이기 위해서

1) 주파수  $\uparrow$

2)  $L$  값  $\uparrow$

1) 주파수  $\uparrow$  경우



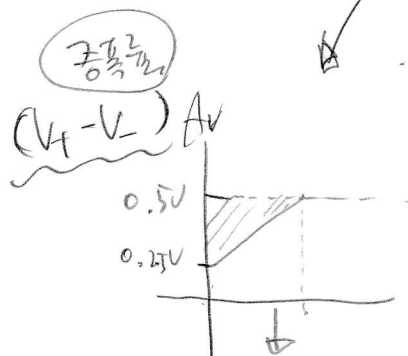
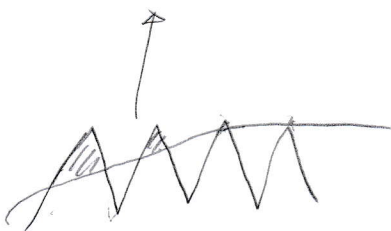
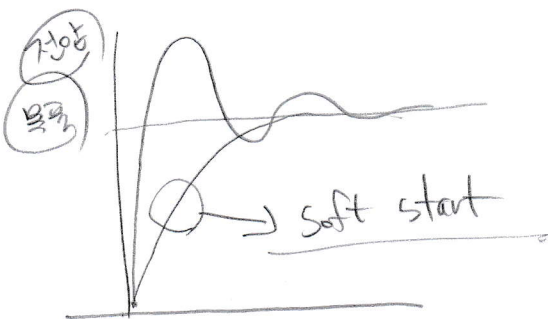
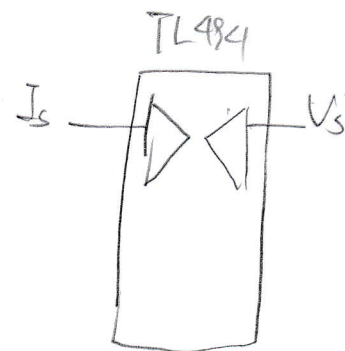
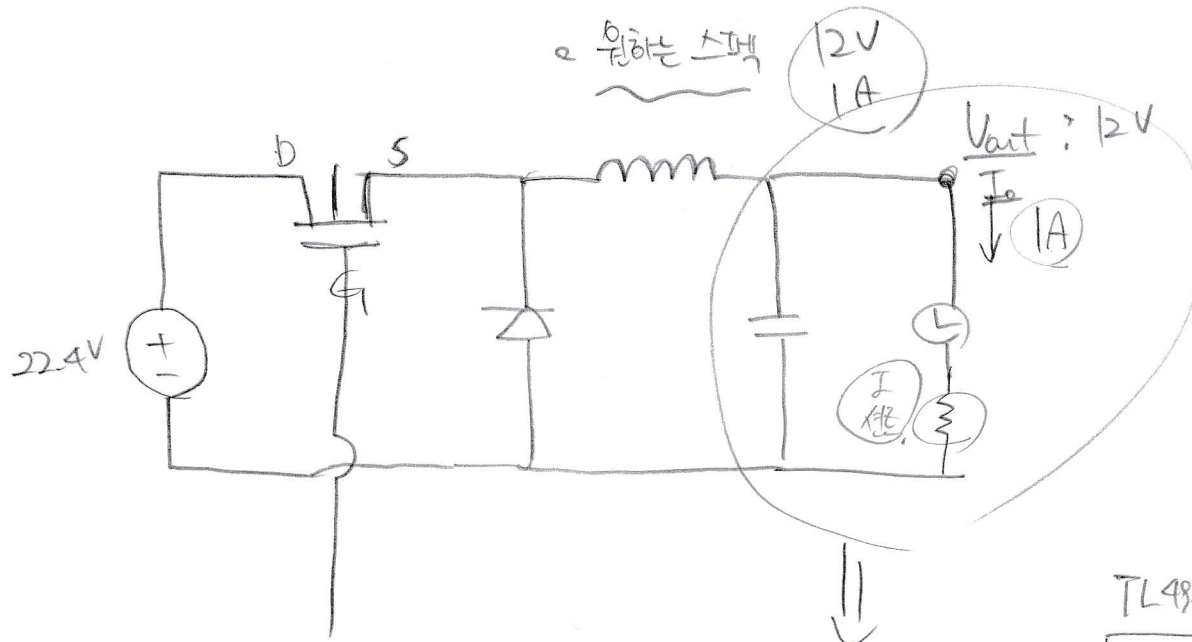
but) 리플은 줄어든다, EMI 같은 문제가 생긴다.

2)  $L$  값  $\uparrow$

리플은 줄어든다, 인덕터 포화현상과 동전압이 길어지므로 안정성에 문제가 생긴다.

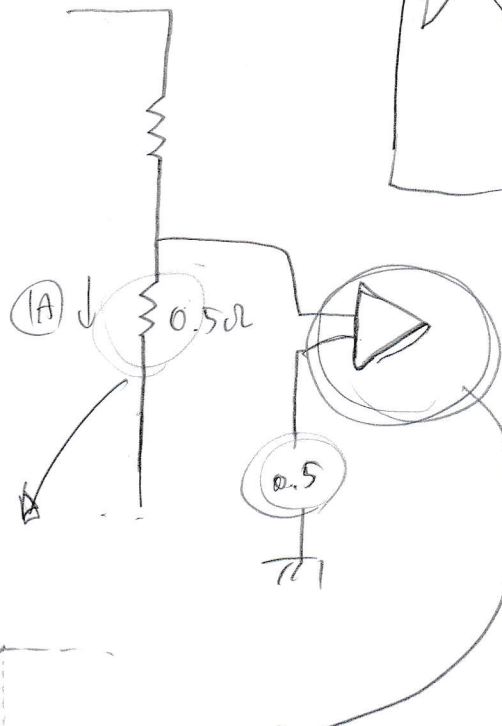
∴ 적정한 설계가 필요하다.

# Buck Converter 4



전류 0.1A →  $V_- = 0.05$   
 0.5A →  $V_- = 0.25V$

↓  
 1A



1A일때 5V 1A와 같이  
 출력 전압이 낮아져서  
 전압폭장이 어려울 때 공통해결.

연산기



\* 추가 사항

MOSFET: IRF3205

\* IR2110

$H_{in}$ ,  $L_{in}$

dead time 고려해서 설계