Quiz 08 DC-DC Converter

總分 80/100

NCTU EELAB Fall

區段分數 0/0

Class *

- ○ DEE222
- ◉ DEE320

Student ID *

0710175

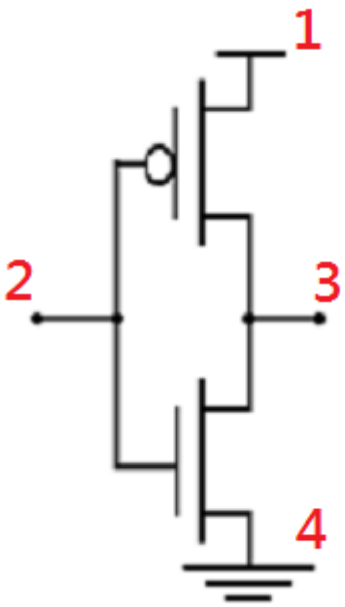
Name *

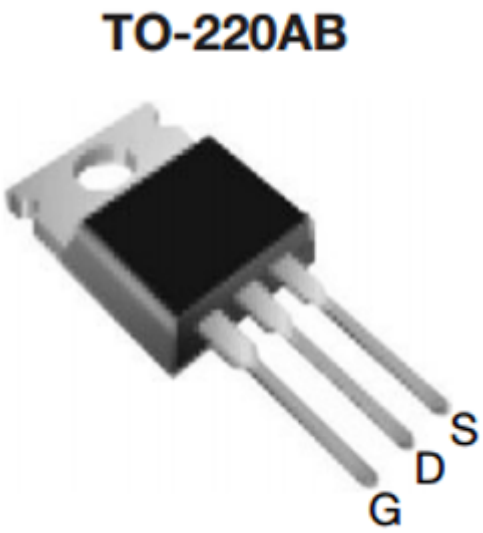
陳愉方

Q1. IRF-series MOSFET pinout.

區段分數 0/20

D=Drain, G=Gate, S=Source





✕ Match pins with correct numbers * 0/20

- (1,2,3,4) = (D, G, S, S) ✕
- (1,2,3,4) = (S, G, D, S)
- (1,2,3,4) = (G, D, D, S)
- (1,2,3,4) = (S, D, S, G)

正確答案

- (1,2,3,4) = (S, G, D, S)

Q2. Buck Converter.

區段分數 40/40

HINT

Known conditions and assumptions:

- The average current through a capacitor operating in periodic steady state is 0.

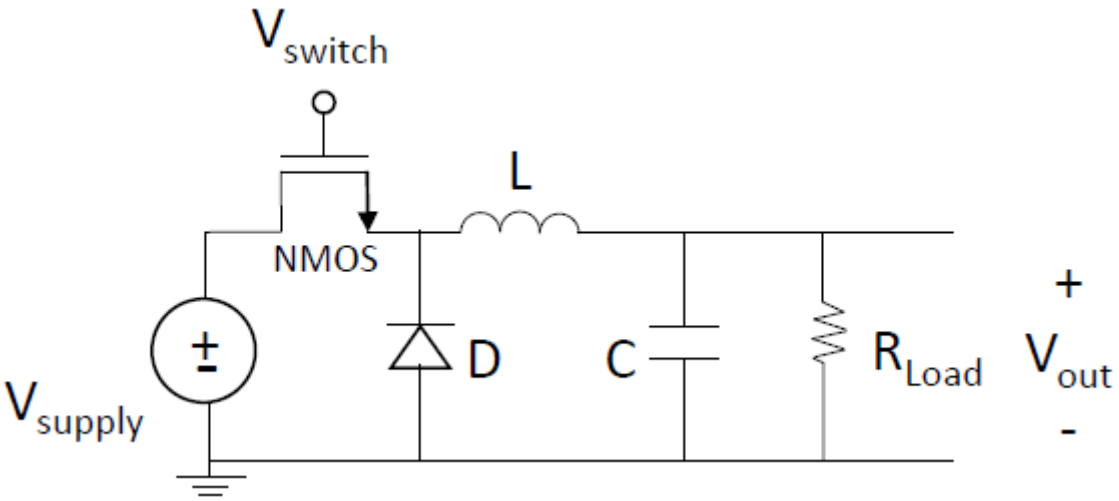
$$i_{C,average} = \frac{1}{T}\int_{t_0}^{t_0+T} i_c(t)dt = 0$$

- The average voltage through a inductor operating in periodic steady state is 0.

$$v_{L,average} = \frac{1}{T}\int_{t_0}^{t_0+T} v_L(t)dt = 0$$

- Assume large C so that V_{out} has very low ripple.
- Since V_{out} has very low ripple, then assume I_{out} has very low ripple.

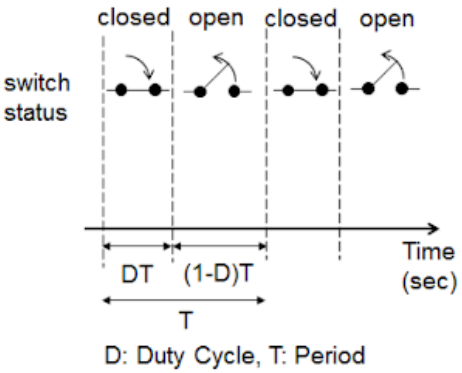
✓ Choose the possible combinations about parameters. 20/20
*Multi-choice *

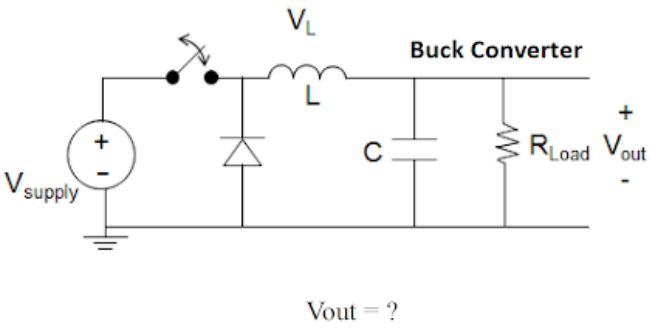


- [x] Vswitch = HIGH, NMOS = on, D = off, IL direction = → ✓
- [ ] Vswitch = HIGH, NMOS = off, D = on, IL direction = ←
- [ ] Vswitch = HIGH, NMOS = on, D = on, IL direction = →
- [ ] Vswitch = LOW, NMOS = off, D = off, IL direction = →
- [x] Vswitch = LOW, NMOS = off, D = on, IL direction = → ✓
- [ ] Vswitch = LOW, NMOS = on, D = off, IL direction = ←

✓ Choose the right answer about Vout and Vsupply relationship. *

20/20





$$\frac{V_{supply}}{D}$$

○ 選項 1

$$\frac{V_{supply}}{1-D}$$

○ 選項 2

$$D \times V_{supply}$$

◉ 選項 3 ✓

$$(1-D) \times V_{supply}$$

○ 選項 4

Q3. Boost Converter.

區段分數 40/40

HINT

Known conditions and assumptions:

- The average current through a capacitor operating in periodic steady state is 0.

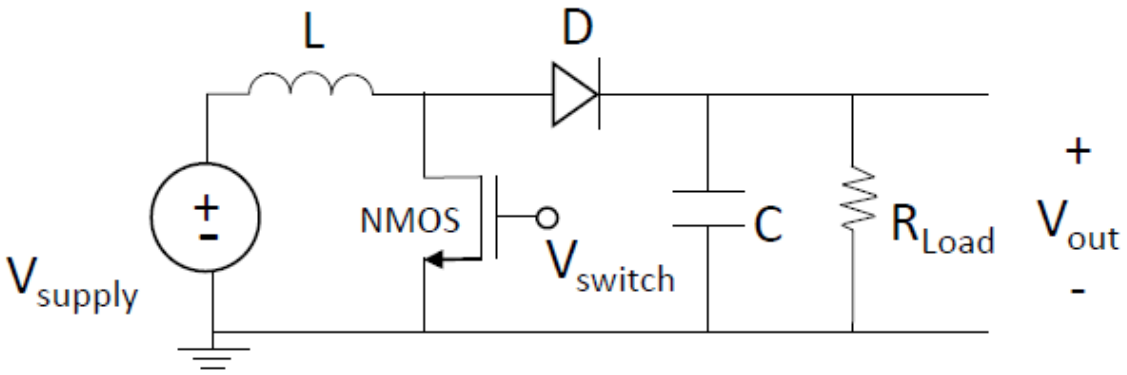
$$i_{C,average} = \frac{1}{T}\int_{t_0}^{t_0+T} i_c(t)dt = 0$$

- The average voltage through a inductor operating in periodic steady state is 0.

$$v_{L,average} = \frac{1}{T}\int_{t_0}^{t_0+T} v_L(t)dt = 0$$

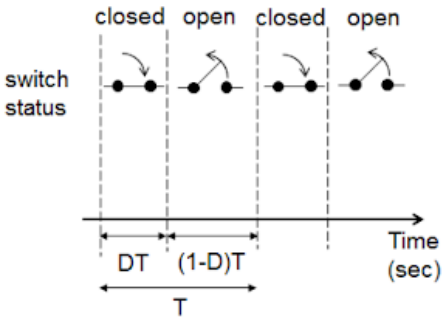
- Assume large C so that V_{out} has very low ripple.
- Since V_{out} has very low ripple, then assume I_{out} has very low ripple.

✓ Choose the possible combinations about parameters. 20/20
*Multi-choice *

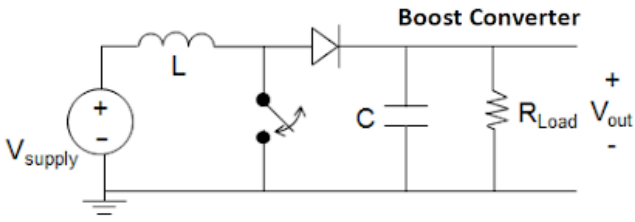


- [x] Vswitch = HIGH, NMOS = on, D = off, IL direction = → ✓
- [ ] Vswitch = HIGH, NMOS = off, D = on, IL direction = ←
- [ ] Vswitch = HIGH, NMOS = on, D = on, IL direction = →
- [ ] Vswitch = LOW, NMOS = off, D = off, IL direction = →
- [x] Vswitch = LOW, NMOS = off, D = on, IL direction = → ✓
- [ ] Vswitch = LOW, NMOS = on, D = off, IL direction = ←

✓ Choose the right answer about Vout and Vsupply relationship. * 20/20



D: Duty Cycle, T: Period



Vout = ?

$$\frac{V_{supply}}{D}$$

○ 選項 1

$$\frac{V_{supply}}{1-D}$$

◉ 選項 2 ✓

$$D \times V_{supply}$$

○ 選項 3

$$(1-D) \times V_{supply}$$

○ 選項 4