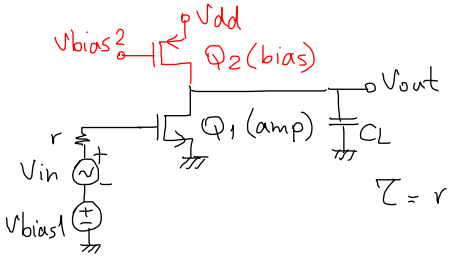
* Common Source Amplifier:



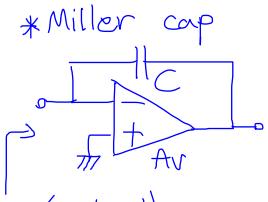
$$W_{3dB} = \frac{1}{\tau_1+\tau_2+\tau_3} = \frac{1}{\tau_{in}+\tau_{out}}$$

$\tau_{in} = R_{in} \cdot C_{in}$? $\quad \tau_{out} = R_{out} \cdot C_{out}$?

$R_{in} = r$ $\quad R_{out} = r_{ds1} \| r_{ds2}$

$$\tau = r\underbrace{\left[C_{gs1} + \left(1+g_{m1}(r_{ds1}\|r_{ds2})\right)C_{gd1}\right]}_{C_{in}} + (r_{ds1}\|r_{ds2})\underbrace{\left[C_{gd1}+C_{db1}+C_{gd2}+C_{db2}+C_L\right]}_{C_{out}}$$

* Miller cap

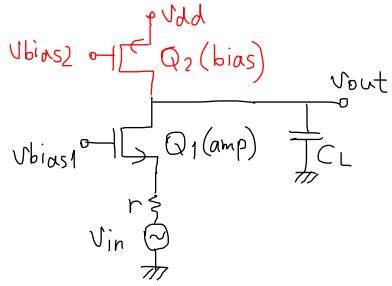


$C(1+|A_V|)$

$$\omega_z = +\frac{g_{m1}}{C_{gd1}} \quad \text{Right hand Zero}$$

* Common Gate Amplifier:

$$W_{3dB} = \frac{1}{\tau_1+\tau_2} = \frac{1}{\tau_{in}+\tau_{out}}$$



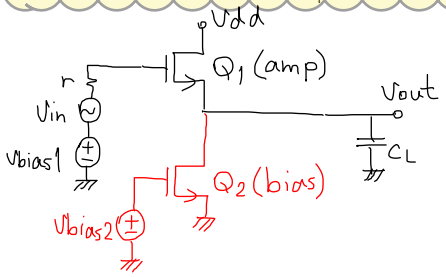
$$\tau_{in} = \left[r \| \frac{r_{ds1}+r_{ds2}}{1+g_{m1}r_{ds1}}\right]\left[C_{gs1}+C_{sb1}\right]$$

$$\tau_{out} = \left[r_{ds2} \| \left(r+r_{ds1}+g_{m1}r_{ds1}\cdot r\right)\right]\left[C_{db1}+C_{gd1}+C_{gd2}+C_{db2}+C_L\right]$$

$$A_{v0} = g_{m1}(r_{ds1}\|r_{ds2})$$

* Common Drain Amplifier:

$$W_{3dB} = \frac{1}{\tau_1+\tau_2+\tau_3} = \frac{1}{\tau_{in}+\tau_{out}}$$

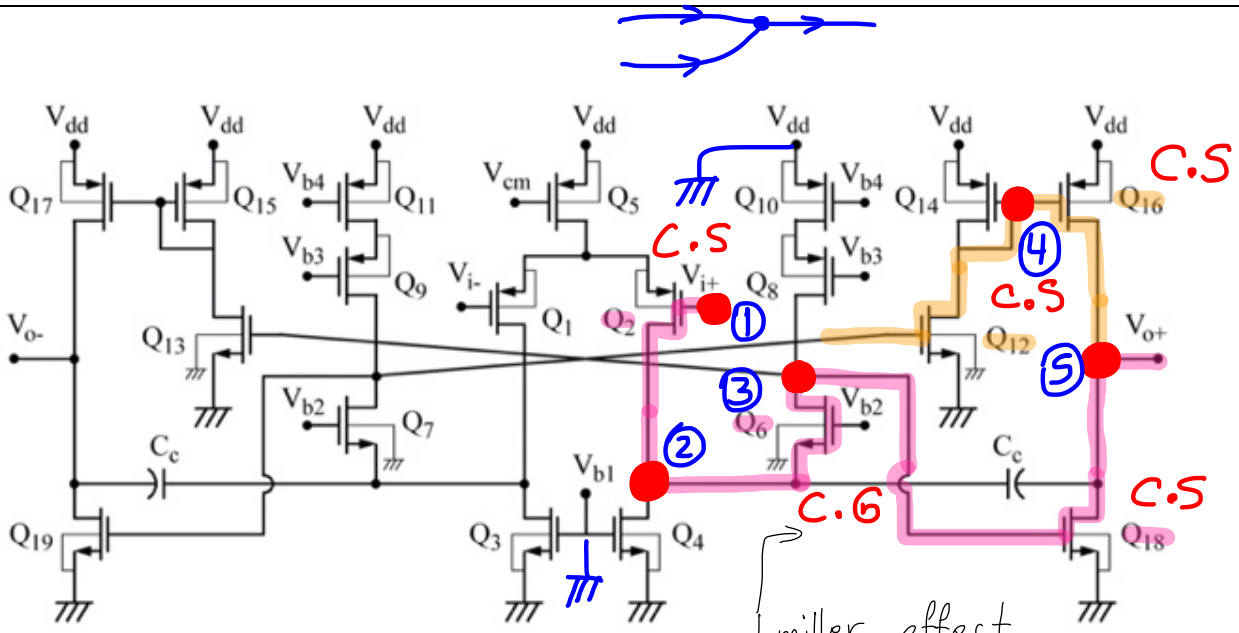


$$\tau_{in} = r\left[C_{gd1} + \frac{C_{gs1}}{1+g_{m1}(r_{ds1}\|r_{ds2})}\right]$$

$$\tau_{out} = \left(r_{ds1} \| \frac{1}{g_{m1}} \| r_{ds2}\right)\left[C_{gs1}+C_{sb1}+C_{gd2}+C_{db2}+C_L\right]$$

$$A_{v0} \approx 1$$

$$\omega_z = \frac{-g_{m1}}{C_{gs1}} \quad \text{Left hand zero}$$



$$\omega_{p1} \Rightarrow AC \Rightarrow \frac{1}{\tau_1+\tau_2+\tau_3+\tau_4+\tau_5}$$

$$C_2 = C_{db2}+C_{gd2}+C_{db4}+C_{gd4}+C_{sb6}+C_{gs6}+C_c\left[1+|A_{v6}\cdot A_{v18}|\right]$$

$$A_{v6} = g_{m6}\left(r_{ds6} \parallel g_{m8} r_{ds6} r_{ds10}\right)$$

$$A_{v18} = -g_{m18}\left(r_{ds18} \parallel r_{ds16}\right)$$

$$R_2 = r_{ds4} \parallel r_{ds2} \parallel \frac{1}{g_{m6}}$$