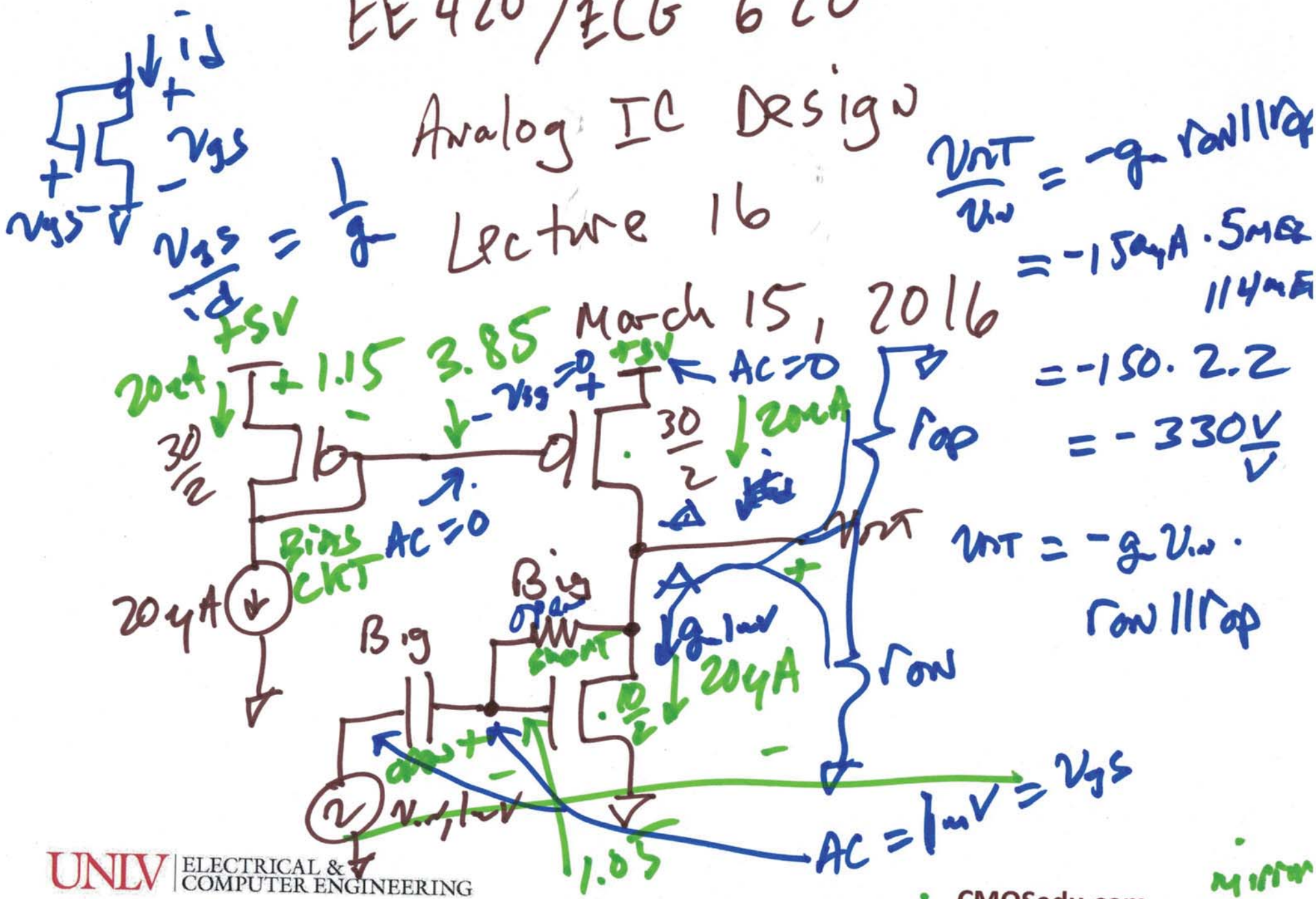
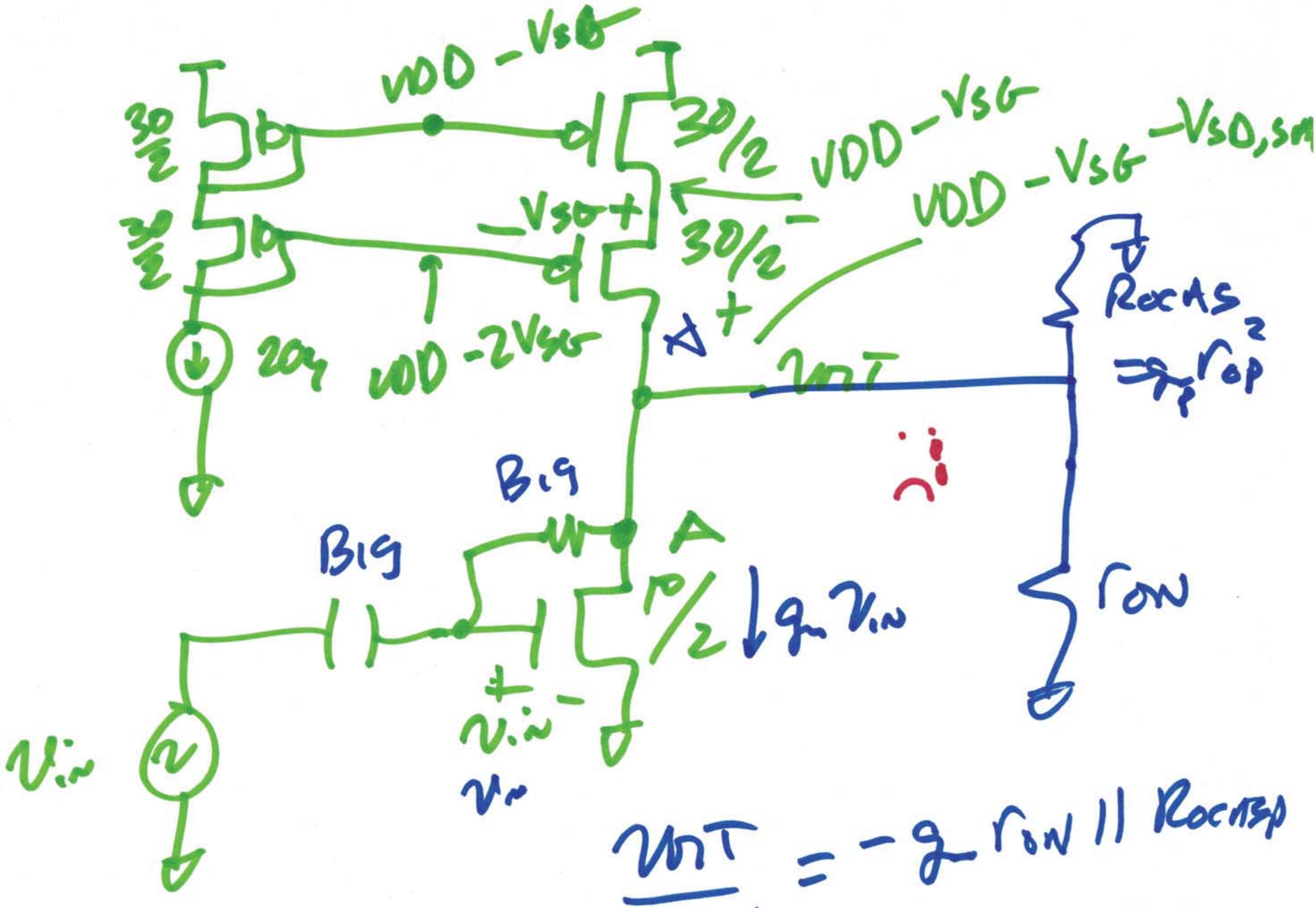
EE 420/ECG 620

Analog IC Design

Lecture 16

March 15, 2016



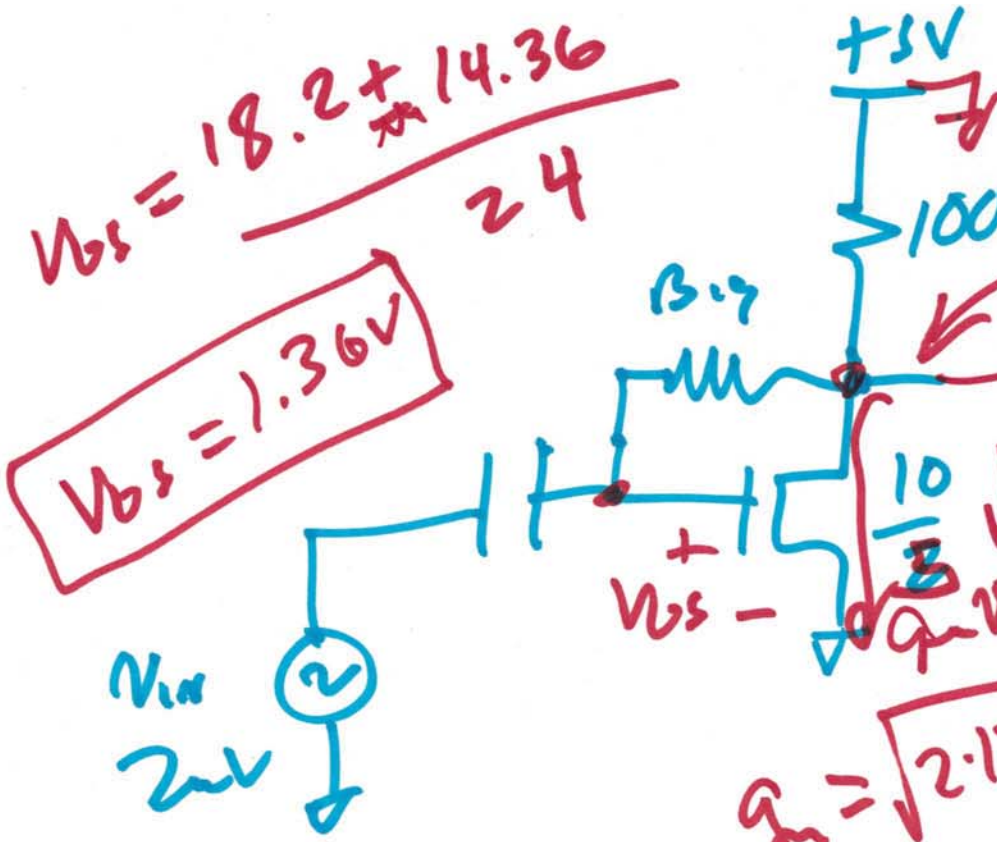


$$\frac{v_{OT}}{v_N} = -g_m r_{ON} \,||\, R_{OCASP}$$

$$\simeq -g_m r_{ON}$$

$V_{GS} = \frac{18.2 \pm 14.36}{24}$

$V_{GS} = 1.36V$



12

$A_{VT} = ?$ $\frac{v_{out}}{v_{in}} = -g_m(r_{OW} \| 100K)$

$\frac{5 - V_{GS}}{100K} = \frac{120\mu A/V^2 \cdot 10}{2} (V_{GS} - V_{TH})^2$

$g_m = \sqrt{2 \cdot 120\mu \cdot \frac{10}{5} \cdot 360\mu}$ $10^5 \cdot 120 \cdot 10^{-6}$ $V_{TH} = 0.8$

$\frac{5 - V_{GS}}{100K} = 12(V_{GS}^2 - 1.6V_{GS} + .64)$

$V_{GS} = \frac{18.2 \pm \sqrt{(18.2)^2 - 4 \cdot 12 \cdot 2.6}}{24}$

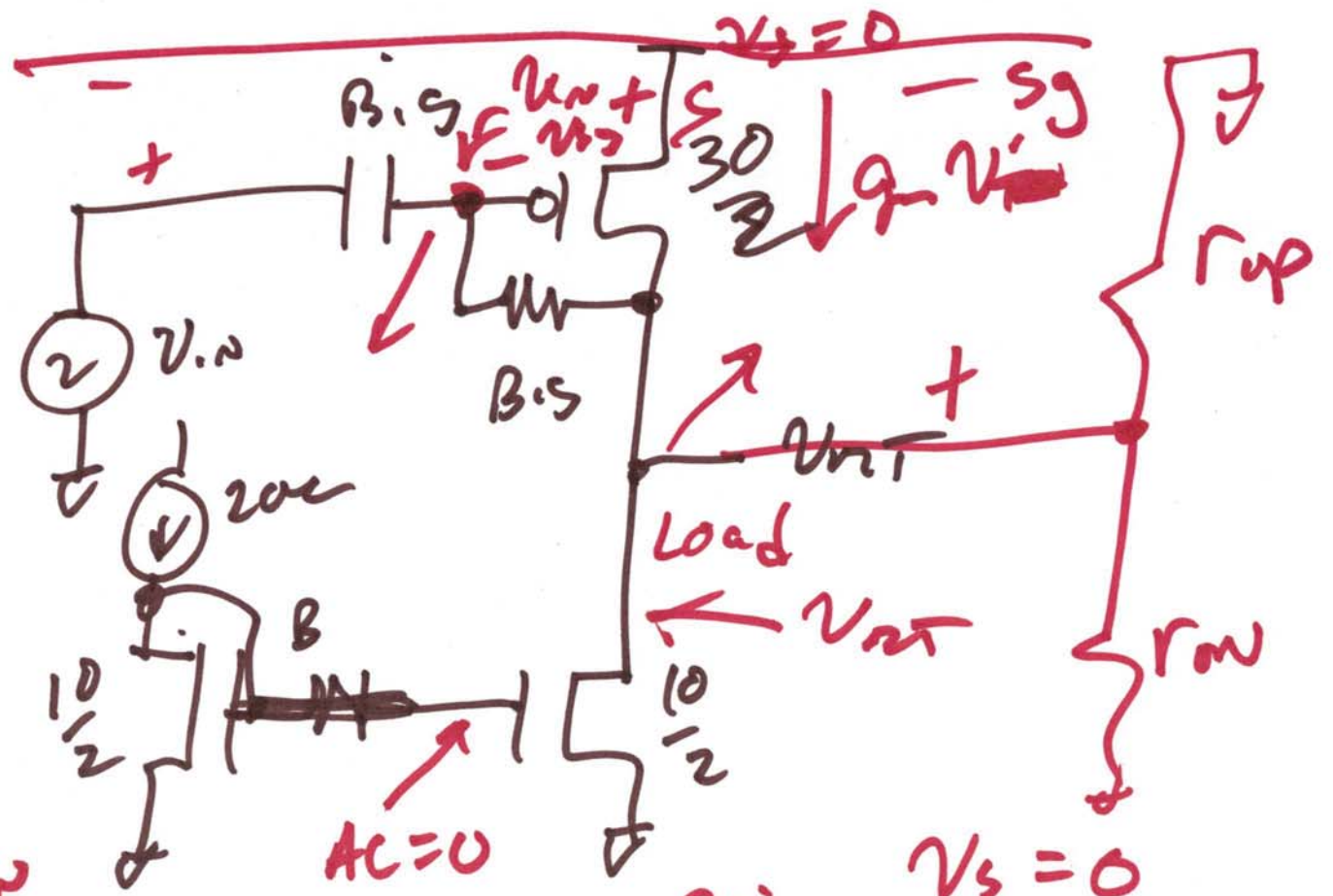
$0 = V_{GS} - 5 + 12V_{GS}^2 - 19.2V_{GS} + 7.6$

$= 12V_{GS}^2 - 18.2V_{GS} + 2.6$

$I_D = \frac{5 - 1.36}{100K} = 36.4\mu A = I_D$

3)

C.S.



$V_{sg} = 0 - V_{in}$

$= -V_{in}$

$V_{out} = g_m V_{sg} \cdot r_{op} \| r_{ON}$

$\frac{V_{out}}{V_{in}} = -g_m \cdot r_{op} \| r_{ON}$