24 Fall ECEN 704: VLSI Circuit Design

Design Pre-lab Report

Lab8: Operational Transconductance Amplifiers

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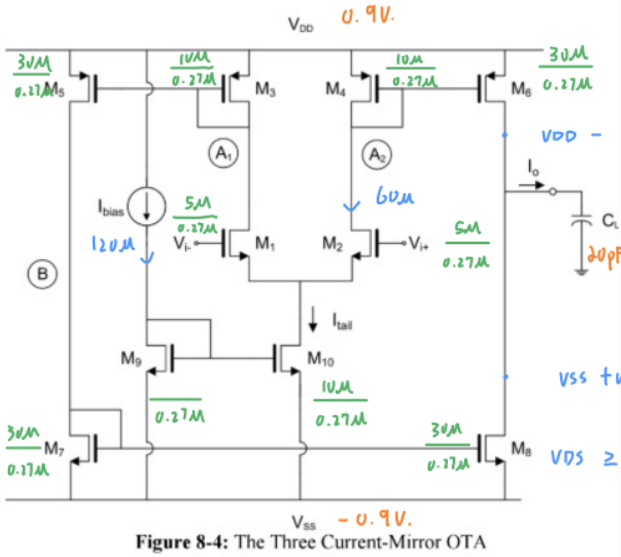

Figure 8-4: The Three Current-Mirror OTA

G_m	> 500 µA/V
Slew Rate	> 10 V/µs
Peak-to-Peak Output Swing	> 1 V
~~Load Capacitance~~	~~20 pF~~
Power	< 1 mW (not including bias current source)
~~Power Supply~~	~~$V_{DD} = -V_{SS} = 0.9$ V~~

$VSD \geq \sqrt{\frac{N\ 2ID}{KP_p\ (\frac{W}{L})_6}} = 0.2$

$VDD - 0.2 = 0.7V.$

Swing = 0.7 ~ -0.7 V.

$VSS + 0.2 = -0.7$

$VDS \geq \sqrt{\frac{N\ 2ID}{KP_p\ (\frac{W}{L})_8}} = 0.7$

$N = \frac{\frac{W}{L}_6}{\frac{W}{L}_4} = 3$

$Gm = Ngm2 = N\ C\ \sqrt{2ID\ \mu n C_{ox}\ \frac{W}{L}_2}\ ) > 500\ \mu\ A/V$

$= 3 \times 648.91\mu = 1.946\ m$

$SR = N\ \frac{Itail}{CL} = 3 \times \frac{120}{2up} = 18\ V/\mu s$

$Power = 1.8\ (N+1)\ Itail < 1mW.$

$1.8 \times 4 \times 120 = 0.864\ mW.$