MOS Fundamental Amplifier Configurations (PMOS circuits are identical)

Common Source

\[ A_v = -g_m \left( r_o \parallel R'_L \right) \]

Common Gate

\[ A_v = g_m \left( r_o \parallel R'_L \right) \]

Common Source with RS

\[ A_v = \frac{g_m R'_L}{1 + g_m R_S + R'_L/r_o} \]

Common Drain/Source Follower

\[ A_v = \frac{g_m (r_o \parallel R'_L)}{1 + g_m (r_o \parallel R'_L)} \]

MOS Elementary R Forms (PMOS circuits are identical)

\[ r_o (1 + g_m R) + R \]

\[ \approx r_o (1 + g_m R) \]

\[ r_o + R \]

\[ \approx \frac{1}{g_m} + \frac{R}{g_m r_o} \]

\[ \frac{1}{g_m \parallel r_o} \approx \frac{1}{g_m} \]

Diode-connected Transistor

Always in saturation!

Above configurations are for Small Signal. Typically one or both grounds are connected to bias voltage sources to ensure that MOS is in saturation!