



$$r_o = \frac{1}{\lambda I_D}$$

$$A_{N_2} = -g_{m5} (r_{o5} \parallel r_{o6})$$

if  $r_{o5} = r_{o6}$

$$A_{N_2} = -g_{m5} \frac{r_{o5}}{2}$$

$$g_m = 2\sqrt{K_5 I_{D5}}$$

$$A_{N_2} = -\frac{1}{\lambda} \sqrt{\frac{K_5}{I_D}}$$

STAGE 2

DESIGN FOR  $A_{V_2} = -50$

$$50 = \sqrt{\frac{K_5}{I_D}}$$

$$V_{SG_5} = 3 = \sqrt{\frac{I_D}{K}} + |V_{TP}|$$

$$K = \frac{A_P}{2} \frac{W}{L}$$

$$\text{Let } I_D = 100 \mu A \quad K = \frac{I_D}{(V_{SG} - |V_{TP}|)^2}$$

$$K_5 = \frac{100 \mu A}{(3-1)^2} = 25 \mu A/V^2$$

$$\left(\frac{W}{L}\right)_5 = \frac{2K}{A_P} = \frac{2(25 \mu)}{25 n} = 2$$

$$L = 10 \mu m$$

$$W = 20 \mu m$$

$$A_{TOTAL} = A_{V_1} A_{V_2} = (50)(-50) = -2500$$

$k_m'$   
 $V_{TN}$   
 $\lambda$

PSPICE  
KP  
VTO ( $>0$ )  
LAMBDA  
N

KP  $k_p'$   
VTO ( $<0$ )  
LAMBDA  
P