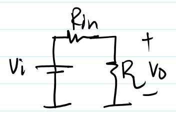
LDO Analysis



$V_o = \dfrac{V_i R_L}{R_L + R_{in}}$

$R_L \to \infty \quad V_o = V_i$

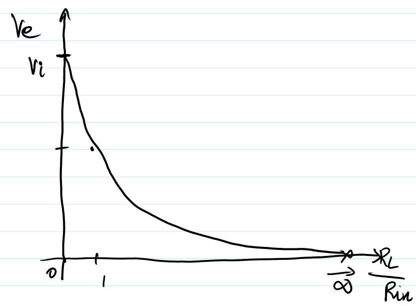
$V_{oc} = V_i \; (R_L \to \infty)$

If plug R_L

V_o initiall V_i
drops to $\dfrac{V_i R_L}{R_L + R_{in}}$

$V_e = V_i - \dfrac{V_i R_L}{R_L + R_{in}} \Rightarrow V_i \left(\dfrac{R_{in}}{R_L + R_{in}} \right)$

$V_e = \dfrac{V_i \cancel{R_{in}}}{\cancel{R_{in}} \left(1 + \frac{R_L}{R_{in}} \right)} \Rightarrow V_e = \dfrac{V_i}{\left(1 + \frac{R_L}{R_{in}} \right)}$

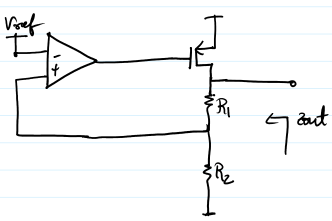


Now Device should check if R_L/R_{in} diminshes it should adjust R_{in} accordingly to get high R_L/R_{in} ratio

$R_{in} = K R_L$
$K \to 0$

LDO → voltage Controlled voltage Source

$Z_{in} = \infty$, $Z_{out} = 0$



$Z_{out} = r_{ds_{pass}} \| R_1 + R_2$

$Z_{out} \cong r_{ds_{pass}}$ (for $R_L = \infty$, $R_1 + R_2 \gg r_{ds_{pass}}$)

But Ideally $Z_{out} = 0$

For -ve f.B

$$V_{FB} = \frac{V_{reg} R_2}{R_1 + R_2} = V_{ref}$$

$V_{FB} - V_{ref} = \Delta V$

Error Amplifier $A \to \infty$
then $\Delta V \to 0$

<u>Pass transistor</u> :-