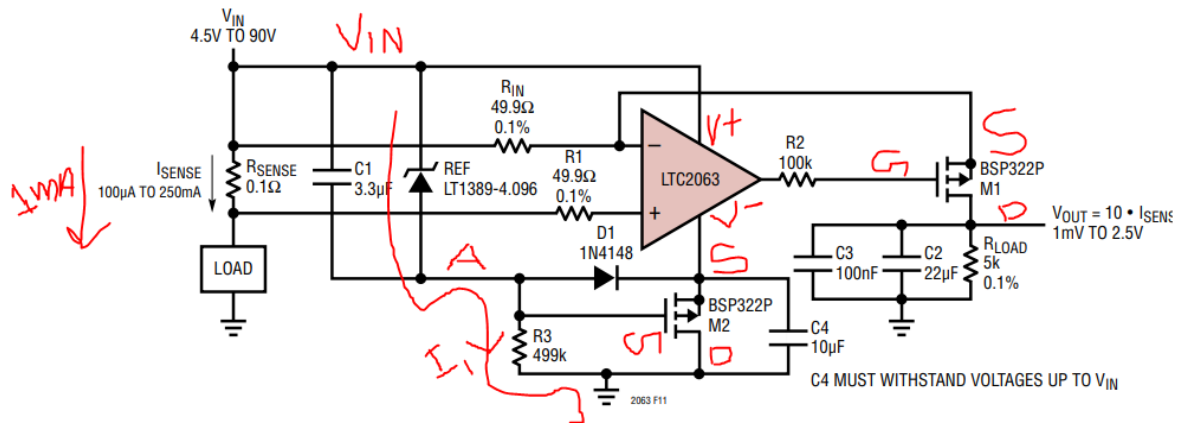


Hi I am trying to do the DC analysis of High Side Current Sensing circuit to find each node voltages. I am sure which will help me to understand more. Expecting your valuable suggestions.

Let $V_{IN}=4.5V$ and $I_{SENSE} = 1mA$



Let me analyze the “REF”-“R3” path first

$$V_{IN} = V_{REF} + I_1 R_3$$

$$I_1 = (V_{IN} - V_{REF}) / R_3$$

$$= (4.5 - 4.096) / 499000$$

$$= 0.8 \mu A$$

(According to the datasheet REF needs 1uA current. Please check my analysis is fine or not). Assuming V_{REF} is on and going ahead.

Voltage developed across Node “A” that is voltage developed across R_3 is equal to V_{R3}

$$V_{R3} = (0.8 \mu A) * (499K)$$

$$=0.404V.$$

The same V_{R3} is applied to the gate of M2 and anode of D1. The forward voltage of D1 is 1V so it won't conduct. That means M2 source is not floating since M2 source is connected to the Negative supply of OPAMP it is also floating.

For M2 to conduct the condition is " $\text{Mod}(V_{DS}) \geq \text{Mod}(V_{GS} - V_t)$ " and " $\text{Mod}(V_{GS}) \geq \text{Mod}(V_t)$ ". *May I know when this condition will be satisfied in this circuit.*

If D1 and M2 are not conducting means OPAMP negative terminal is floating –Please correct me if I am wrong.

When the op-amp negative terminal will get the ground connection.

May I know during steady state (Lets us say $V_{IN}=4.5V$ and $I_{SENSE} = 1mA$) what is the voltage in the gate of M1. My intention is to check the saturation condition using the equations ($\text{Mod}(V_{DS}) \geq \text{Mod}(V_{GS} - V_t)$ and " $\text{Mod}(V_{GS}) \geq \text{Mod}(V_t)$ ").

May I know how to decide the value of C3 and C2, what should be the cut off frequency.