EE203 LAB3 Biasing a FET Transistor

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□ EQUIPMENT :

A voltage source, voltmeters, a laboratory lead kit A signal generator and an oscilloscope.

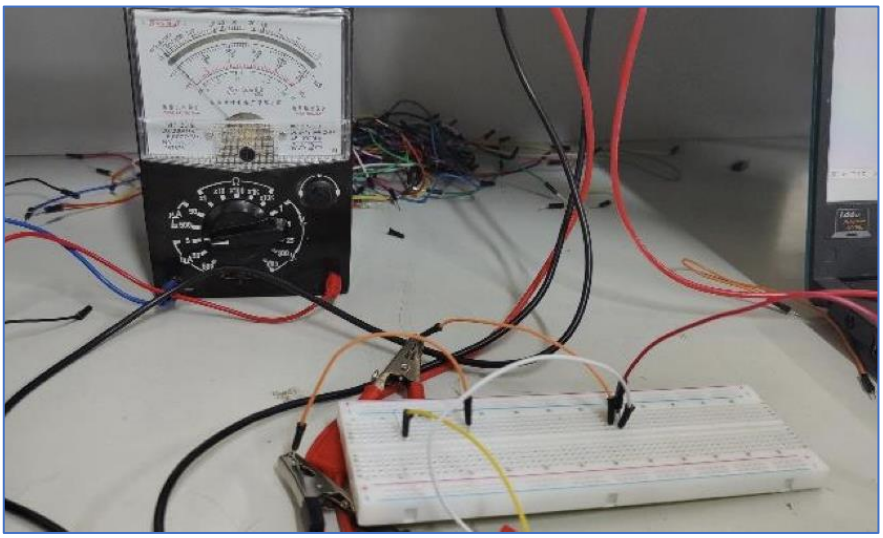
□ OBJECTIVE :

The purpose of this experiment is to demonstrate various biasing techniques for FET transistors

Part1

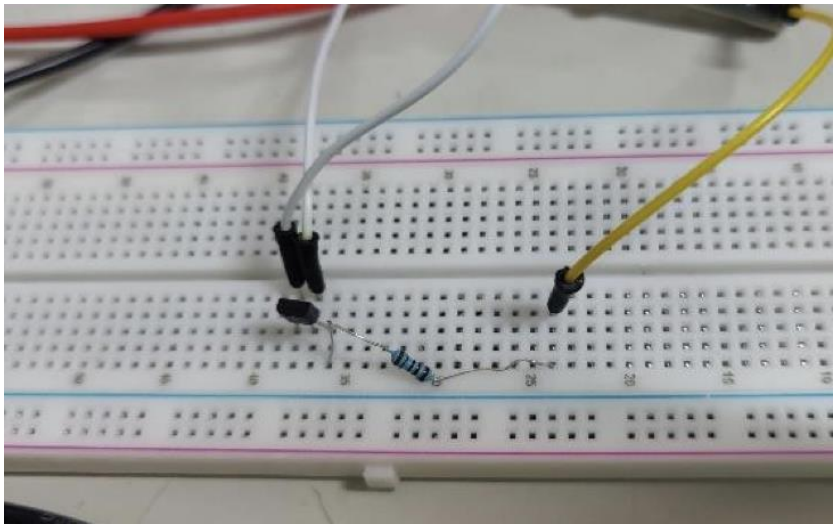
For PMOS, I measure that the Vin is 1.99V,

So that, Vt=Vgs=-Vsg=Vin-5=-3.01V



For NMOS, I measure that the Vin is 1.96V,

so Vt=Vg=Vin=1.96V



So PMOS Vt= -3.01V,

And NMOS Vt=1.96V

Part2

PMOS,

I measure that when the Vin is 1.59, the Vout is 2.5V

Vgs=-Vsg=Vin-5=-3.41V

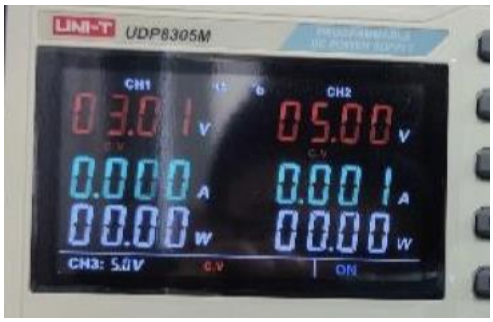
Vgs-Vt=-0.4V

So Vds = Vout-0 =2.5V

Vds> Vgs-Vt ,

This equation is true So it meets the formula, I verify it is in saturation.

NMOS



I measure that when the Vin is 3.01, the Vout is 2.5V

Vgs=Vin=3.01V

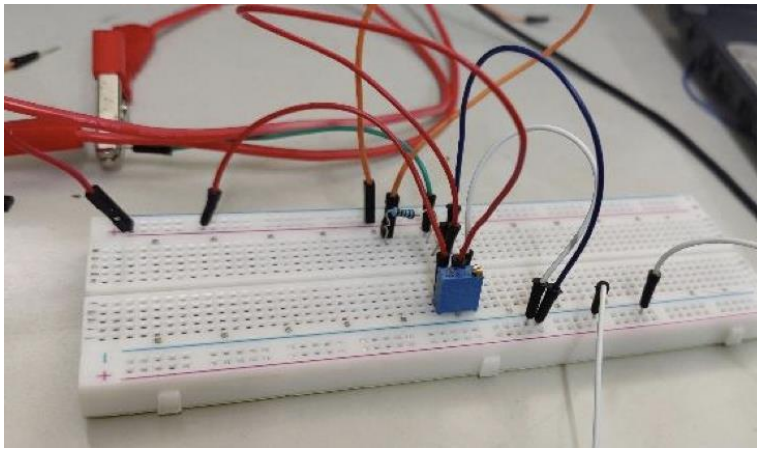
Vgs-Vt=1.05V

So Vds = Vout-0 =2.5V

Vds> Vgs-Vt,

This equation is true So it meets the formula, I verify it is in saturation.

PART3



I measure that when

Rbias1=831Ω

Rbias2=1212Ω,

I could make Vout=2.5V.

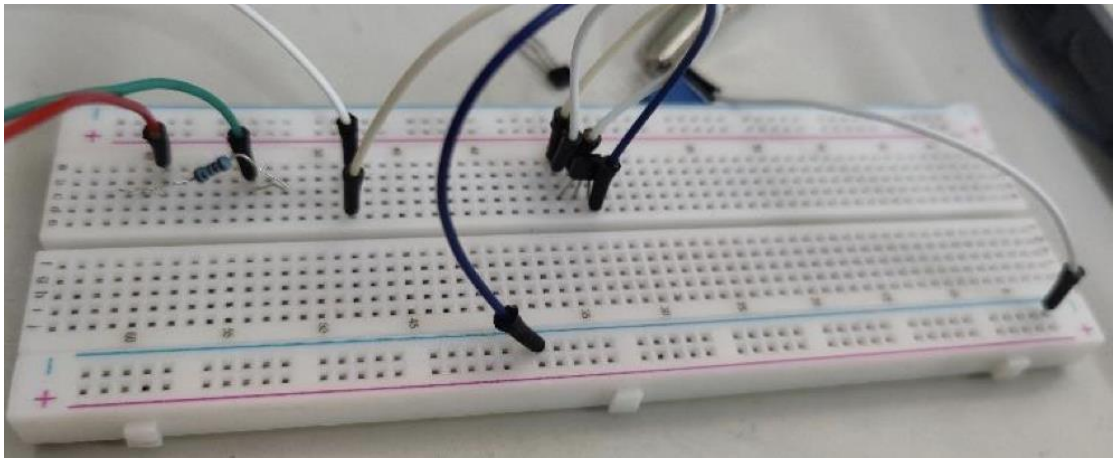
So the ratio of two resistances is Rbias1\Rbias2=1212Ω\831Ω=1.46

the ratio of divider resistance is 1.46

Would there be any benefit to going for very small resistors as compared to very big resistors?

Because the resistance betIen GS is not infinite actually, so I could use a small resistor. It would minims error.Gate resistance is small, switching device on and off fast, small switching loss; Otherwise, it is slow and the switching loss is large.

PART4



I measure that

Ids= 2.7mA

Vout=5V- Ids

R = 2.3V

And, Vds=Vout-0=2.3V

So the equivalent resistance of MOS is Vds/Ids= 851.85Ω

For this Drain-feedback biasing model. The voltage of THE VDD will be partially applied to the G terminal to achieve the effect of controlling the Vgs.

Summary

1. Firstly, I successfully construct the circuit, and measure values that I want.
2. Then I calculate the Vt of NMOS and PMOS.
3. Next, I also set two biasing approaches to finish the required tasks and use resistor divider correctly and get the ratio of two resistance.
4. Ultimately, I set Drain-feedback biasing model, I successfully get the equivalent resistance.

That’s all, thank you!

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