EE203 LAB3 Biasing a FET Transistor

NAME:	ZHENG LI(李政)	JIAQI HU(胡家齐)
FZU:	832002125	832002130
MCU:	20123302	20122560

EQUIPMENT :

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

OBJECTIVE :

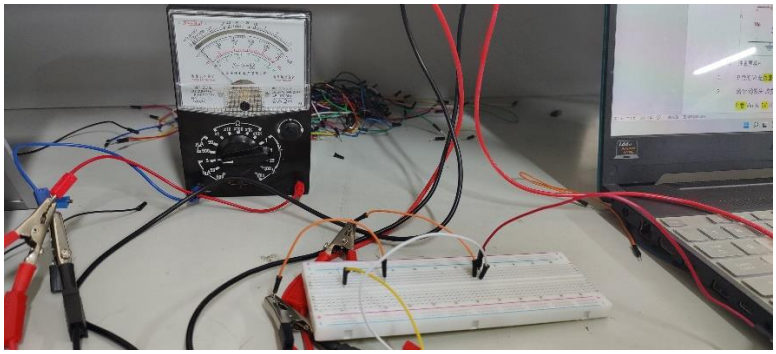
The purpose of this experiment is to demonstrate various biasing techniques for FET transistors

Part1

For PMOS

We measure that Vin is 1.99V,

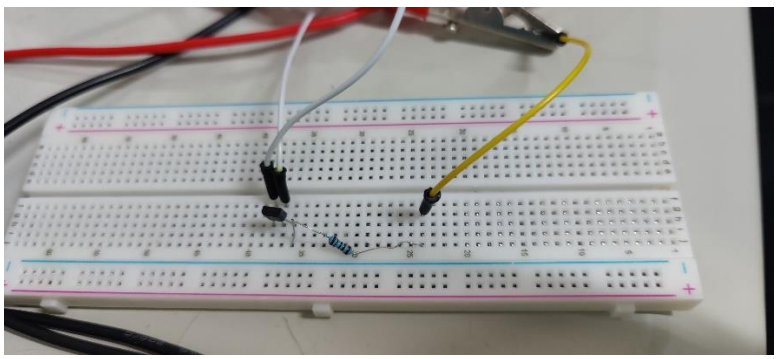
so Vt=Vgs=-Vsg=Vin-5=-3.01V



For NMOS

We measure that Vin is 1.96V,

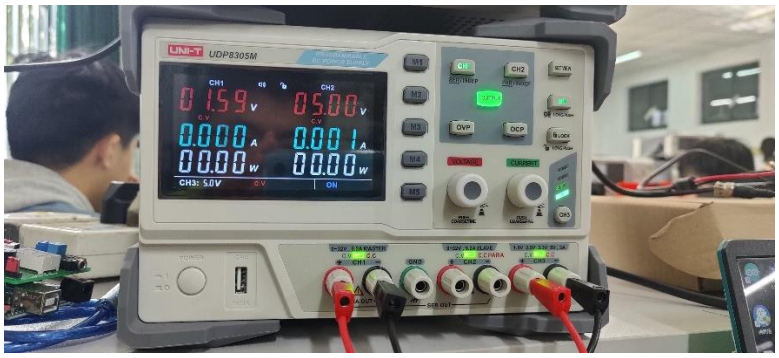
so Vt=Vg=Vin=1.96V



∴PMOS Vt= -3.01V, NMOS Vt=1.96V

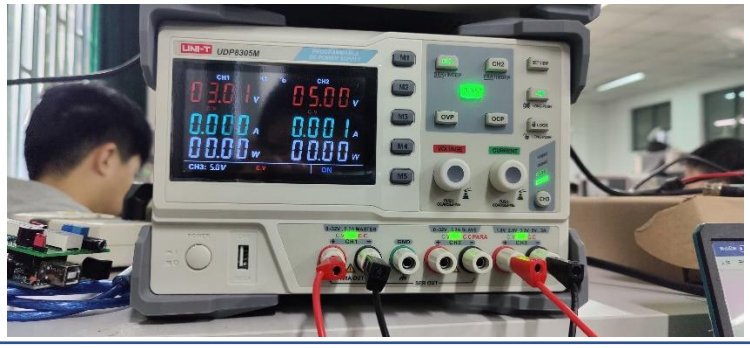
Part2

For PMOS



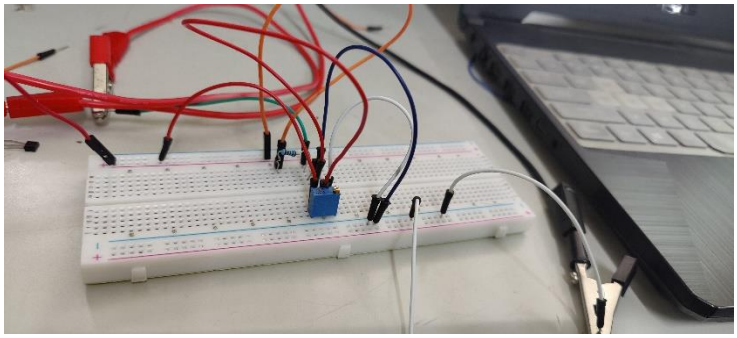
We measure that when Vin is 1.59, the Vout is 2.5V
Vgs=-Vsg=Vin-5=-3.41V
Vgs-Vt=-0.4V
So
Vds = Vout-0 =2.5V
Vds> Vgs-Vt , This equation is true
So it meets the formula, we verify it is in saturation

For NMOS



We measure that when 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, we verify it is in saturation

PART3



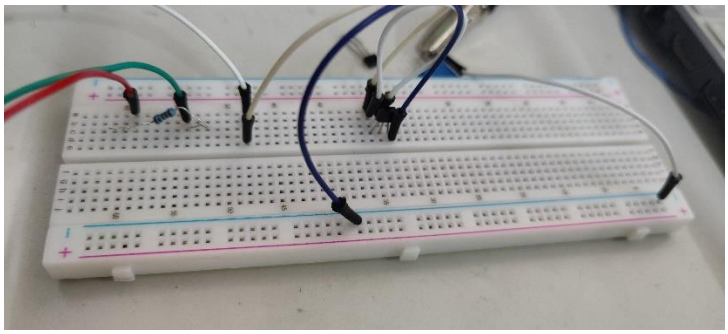
We measure that when Rbias1=831Ω，Rbias2=1212Ω, we could make Vout=2.5V.
So the ratio of two resistances is Rbias1\Rbias2=1212Ω\831Ω=1.46

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 between GS is not infinite actually, so we 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



We measure Ids= 2.7mA
Vout=5V- Ids R = 2.3V
then，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

We successfully construct the circuit, and measure values that we want. Then we calculate the Vt of NMOS and PMOS.

We also set two biasing approaches to finish the required tasks:

We use resistor divider correctly and get the ratio of two resistance.

We set Drain-feedback biasing model, we successfully get the equivalent resistance.