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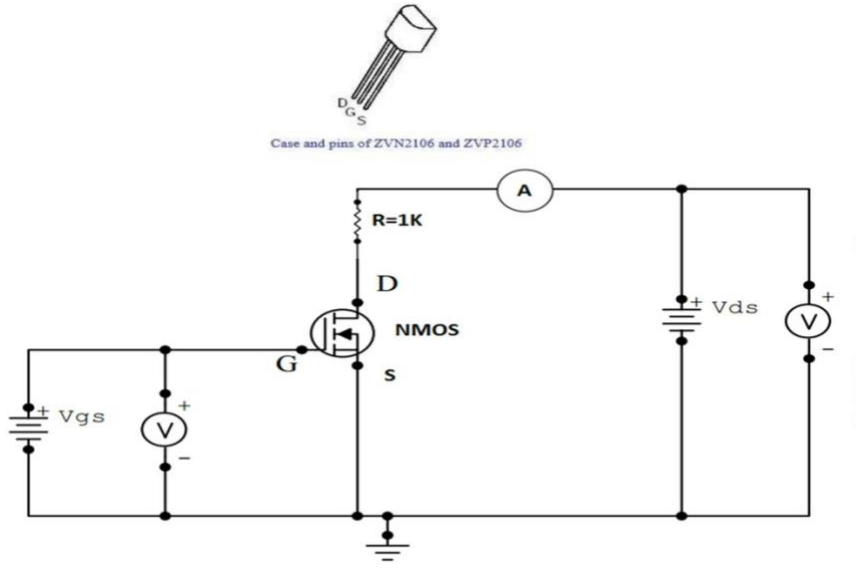
Lab1 Characteristics of the FET Transistor

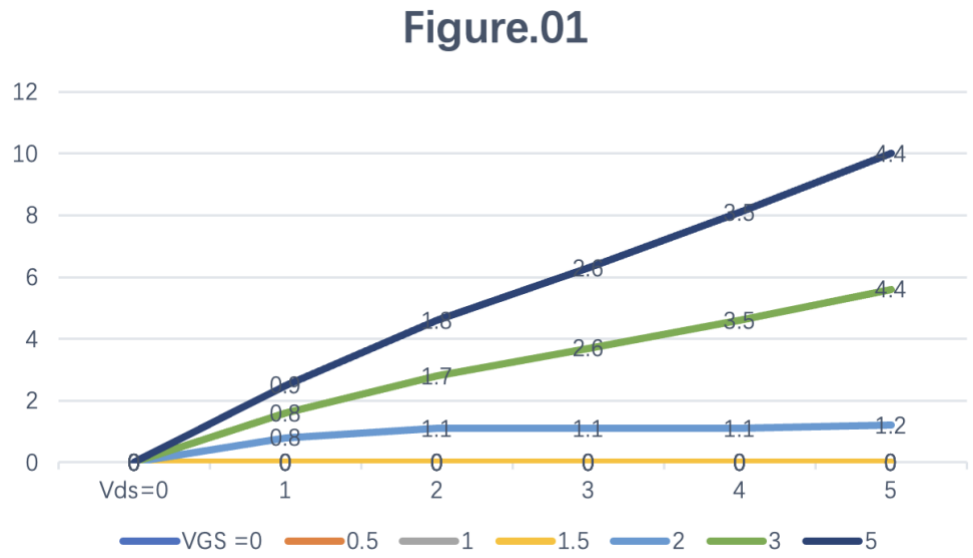


Part.1

Brief introduction: This module requires me to measure the current situation at different Vds and Vgs.

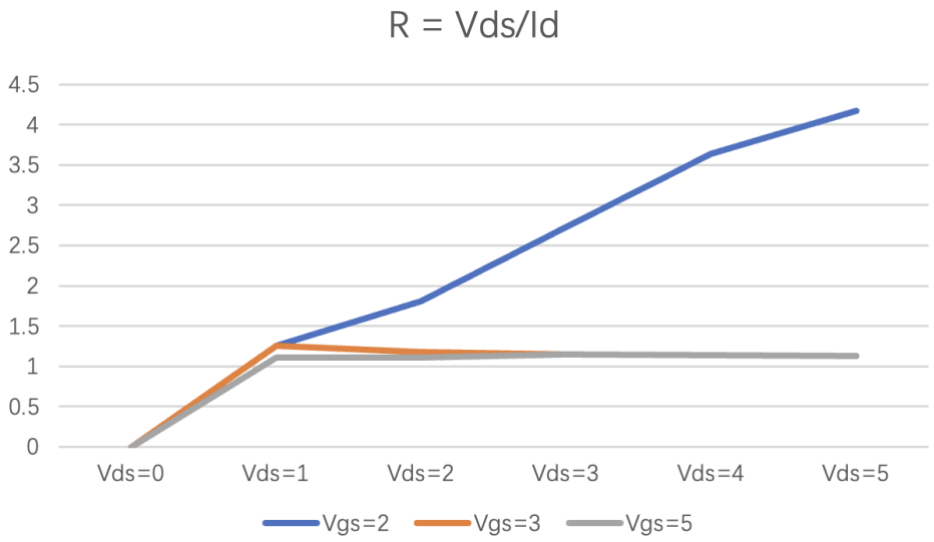
1、

	Vds=0V	Vds=1V	Vds=2V	Vds=3V	Vds=4V	Vds=5V
Vgs=0V	infinite	infinite	infinite	infinite	infinite	infinite
Vgs=0.5V	infinite	infinite	infinite	infinite	infinite	infinite
Vgs=1.0V	infinite	infinite	infinite	infinite	infinite	infinite
Vgs=1.5V	infinite	infinite	infinite	infinite	infinite	infinite
Vgs=2.0V	infinite	0.8	1.1	1.1	1.1	1.2
Vgs=3.0V	infinite	0.8	1.7	2.6	3.5	4.4
Vgs=5.0V	0	0.9	1.8	2.6	3.5	4.4



2、

R=Vds/Id	Vds=0	Vds=1	Vds=2	Vds=3	Vds=4	Vds=5
VGS =2	0Ω	1.25	1.81	2.73	3.64	4.17
VGS =3	0Ω	1.25	1.18	1.15	1.14	1.13
VGS =5	0Ω	1.11	1.11	1.15	1.14	1.13

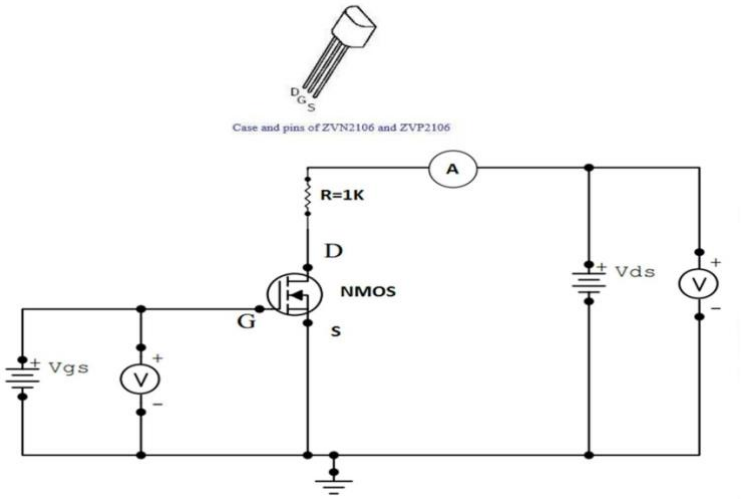


3、

Vth = 1.78V

Comment: In this module, I measured the resistance at different voltages by stepping 1.0 at each step. When the voltage was greater than the threshold value of 1.78, the current began to appear. Besides, I find that when Vgs=2, there will be a constant current zone.

Part2.



1、

When Vgs=3,

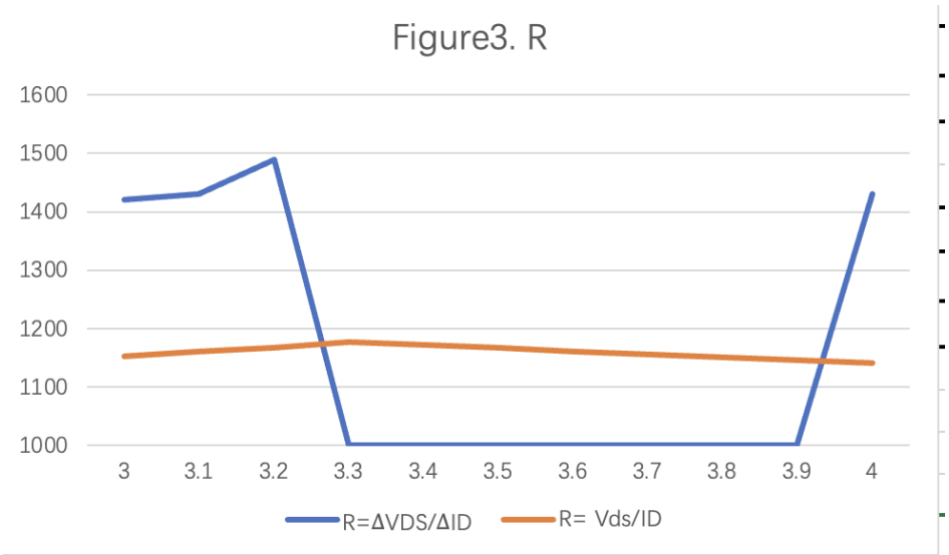
Vds(V)	0.1	0.2	0.3	4	5	6	7	8	9	1.0

Id(mA)	0.09	0.15	0.22	0.30	0.40	0.50	0.60	0.70	0.78	0.85

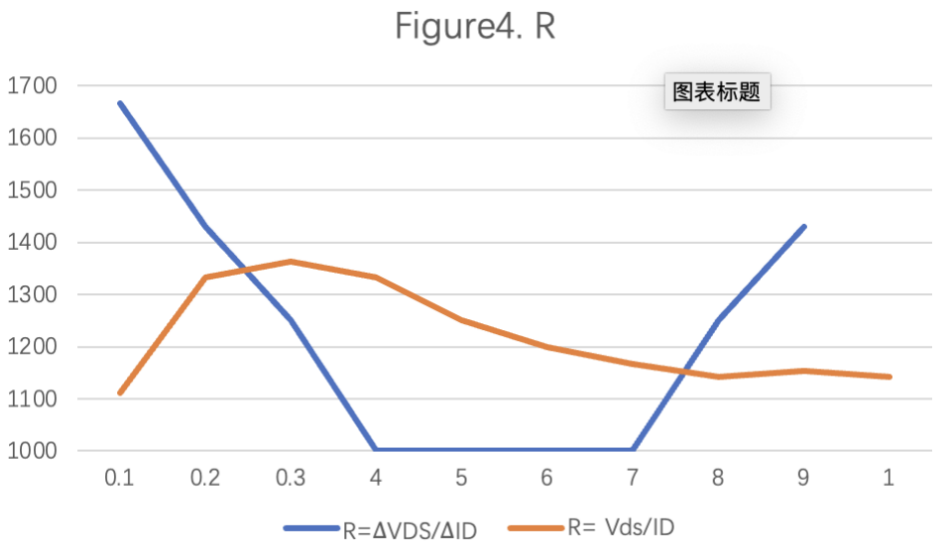
Vds(V)	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
Id(mA)	2.6	2.72	2.75	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5

2、

	Vds=0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	/
Vgs=3	I_D	0.09	0.15	0.22	0.3	0.4	0.5	0.6	0.7	0.78	0.85	/
Vgs=3	$R=\Delta V_{DS}/\Delta_{ID}$	1667	1429	1250	1000	1000	1000	1000	1250	1429	/	/
Vgs=3	$R= Vds/I_D$	1111	1333	1363	1333	1250	1200	1167	1143	1153	1142	/
	Vds=0	3. 0	3. 1	3. 2	3. 3	3. 4	3. 5	3. 6	3. 7	3. 8	3. 9	4. 0
Vgs=3	I_D	2.6	2.67	2.74	2.8	2.9	3	3.1	3.2	3.3	3.4	3.5
Vgs=3	$R=\Delta V_{DS}/\Delta_{ID}$	1420	1430	1490	1000	1000	1000	1000	1000	1000	1000	1430
Vgs=3	$R= Vds/I_D$	1153	1161	1167	1178	1172	1167	1161	1156	1151	1147	1142



This is the line chart of the Vds from 3 to 4, step by 0.1



This is the line chart of the Vds from 0 to 1, step by 0.1

Comment: In the second module, I measured the change of the resistance from 0 to 1 and from 3 to 4 with the method of 0.1 per step. I found that the resistance calculated by using the potential difference was different from the resistance calculated by dividing the total voltage drop by the total flow current.

Lab1 Summary:

In this experiment, I first completed the circuit connection, and then used the ammeter and voltmeter to measure the data I needed, and then made the calculation.

Through this experiment, I had a deeper understanding of the three regions of FET. During the experiment, I found that certain errors may occur in data reading and calculation, and wrong circuit connection may lead to short circuit, which requires my further attention.

Conclusion: When Vgs < Vth, cut-off area. When Vgs > Vth and Vds < VGs-VTH, the variable resistance region. When Vgs > Vth and Vds > VGs-VTH, the saturated region (constant current region).

That's all, thank you!

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