ECE 2200L
Introduction to Microelectronics Circuits Laboratory

Experiment 9
MOSFET and BJT Logic Inverters

Report

Choi Tim Antony Yung

November 4, 2020

Objective

To study the applications of MOSFET and BJT devices to digital logic circuits. A MOSFET gate inverter and a BJT base inverter will be investigated.

Result

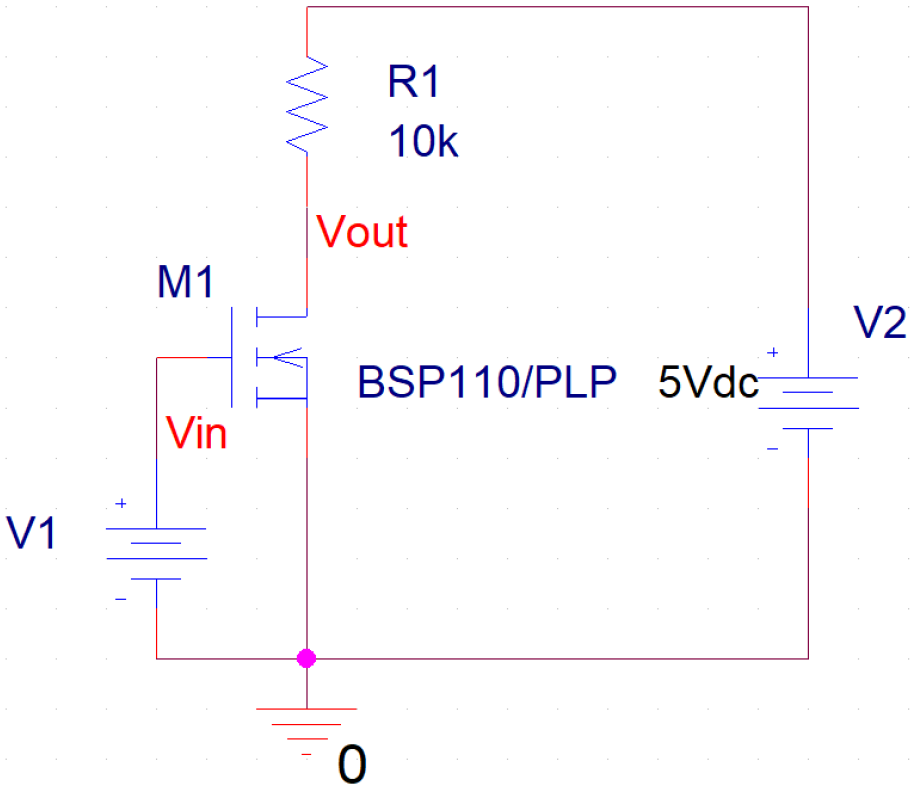

Figure 1: PSpice simulation of MOSFET inverter circuit

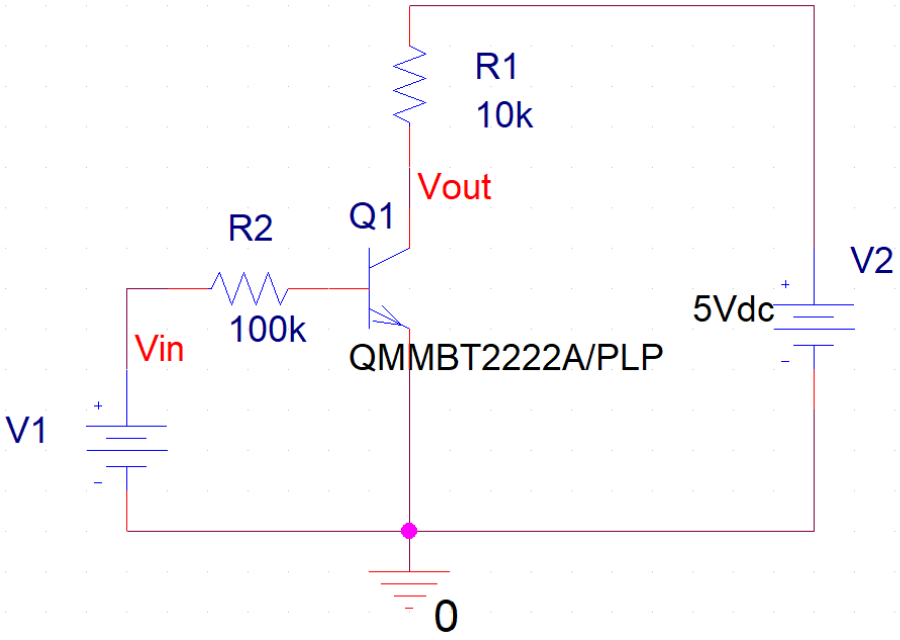

Figure 2: PSpice simulation of BJT inverter circuit

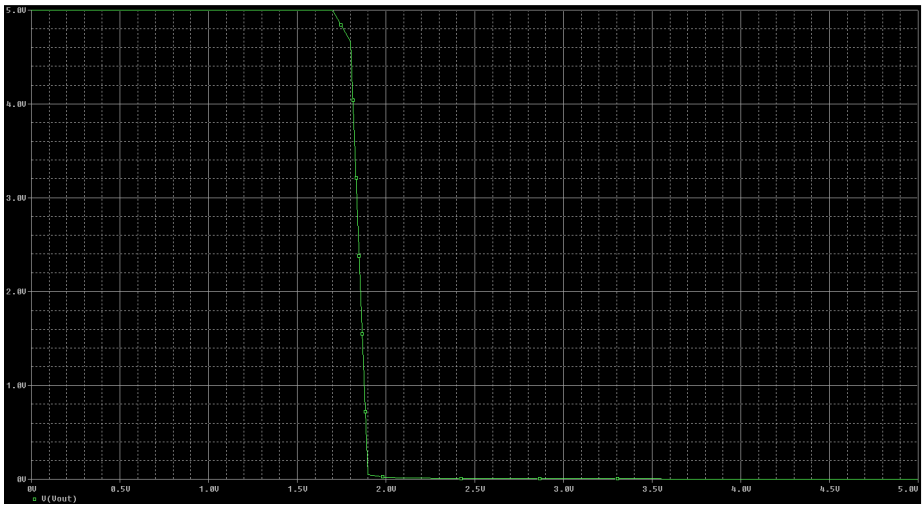

Figure 3: V_{out} vs V_{in} plot of MOSFET inverter circuit PSpice simulation

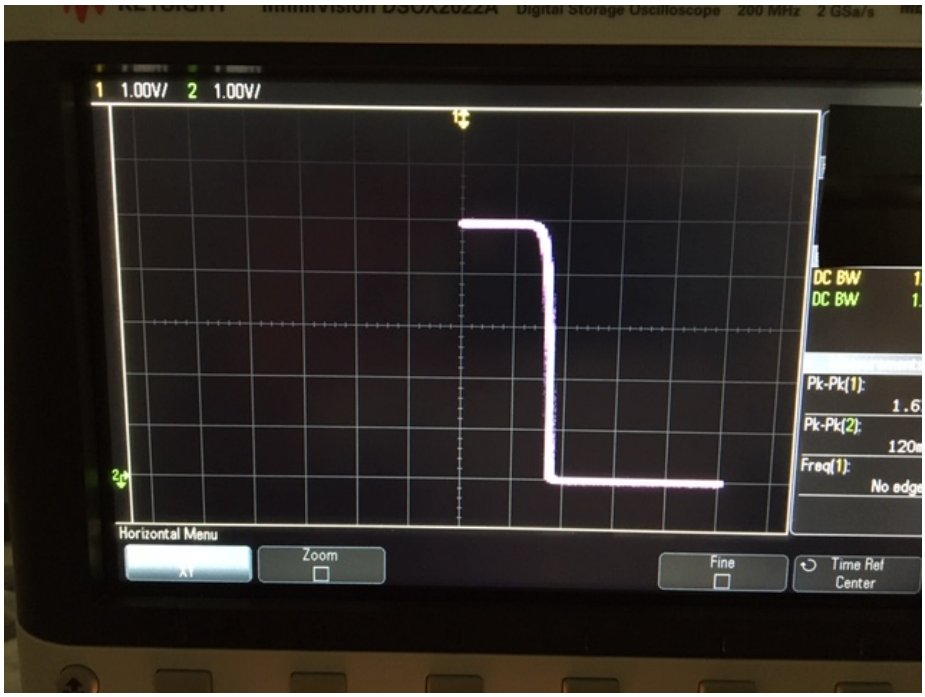

Figure 4: Oscilloscope V_{out} vs V_{in} plot of MOSFET inverter circuit

Figure 5: V_{out} vs V_{in} plot of BJT inverter circuit PSpice simulation

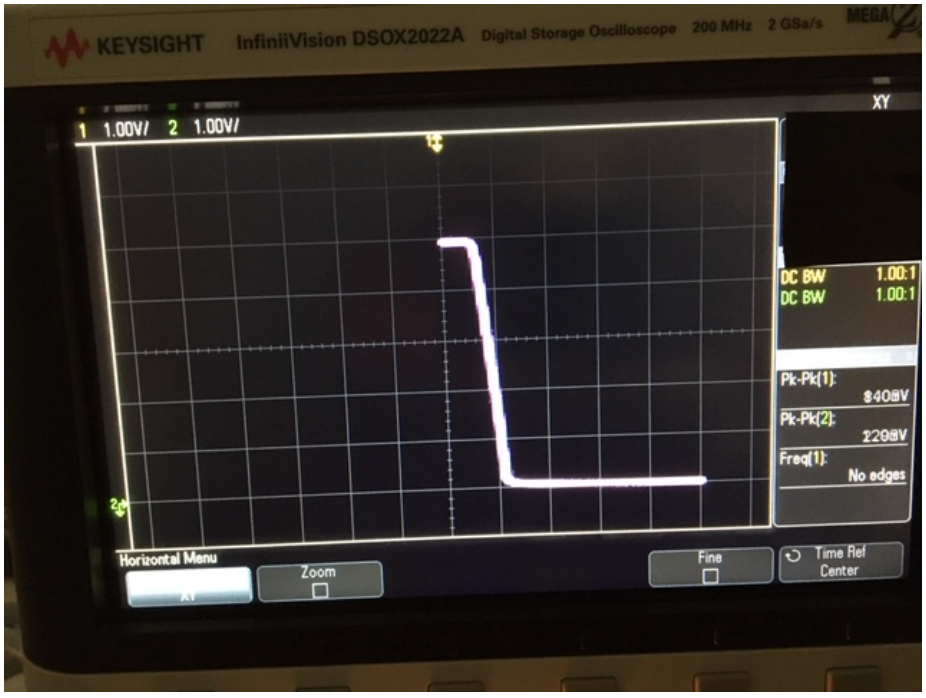

Figure 6: Oscilloscope V_{out} vs V_{in} plot of BJT inverter circuit

Conclusion

As demonstrated above, the BJT inverter PSpice simulation V_{out} vs V_{in} plot shifts slightly to the left of the scope output, which could be the result of a different BJT characteristics, and the logic low voltage is higher than as shown by oscilloscope, which could be a result of low precision in oscilloscope output, but otherwise the V_{out} vs V_{in} plots from simulation and oscilloscope are similar for either MOSFET or BJT inverter circuit. As can be seen in the chart, the MOSFET have a larger range of V_{in} values for V_{out} to stigh, ay at logic hwhich is advantageous as it provide a larger tolerance to the fluctuation of input voltage levels that register as logic low from noise.