Lab-03

Particular Logic Gates

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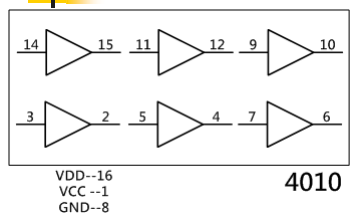
Objectives

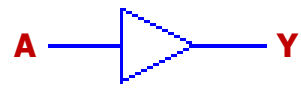
- Understand particular logic gates, Buffer, Tristate-Buffer, Tristate-NOT, Schimitt-trigger NOT, and Schimitt-trigger NAND and their truth tables.
- Understand Buffer with open collector and its truth tables.
- Measure the transfer voltage of a logic, *Vf*.
- Understand a signal whether is passed or not by controlling the gate.

What are for Particular Gates

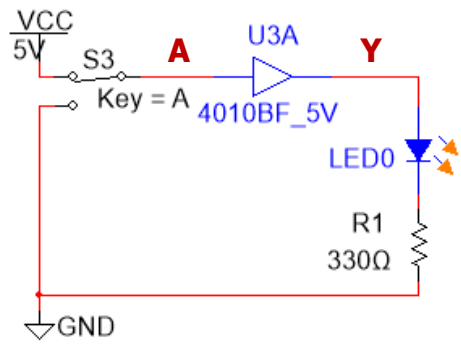
- **Besides those Basic Logic Gates NOT, AND, OR, NAND, NOR, and XOR, the Particular gates are:**
  Buffer, Tristate Buffer, Tristate NOT
  Schmitt-Trigger NOT, and
  Schmitt-Trigger NAND.

Buffer CMOS IC-4010



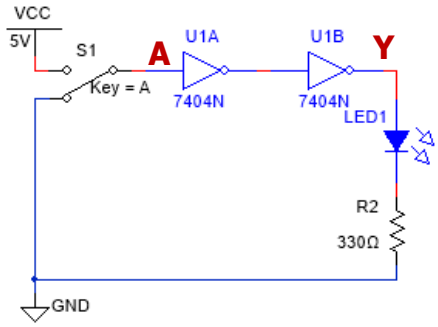


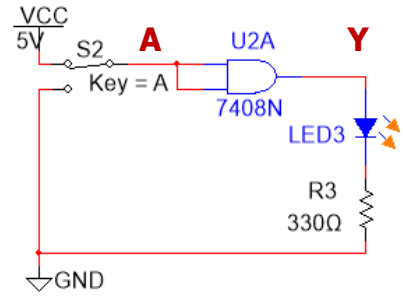
A	Y=A
0	0
1	1



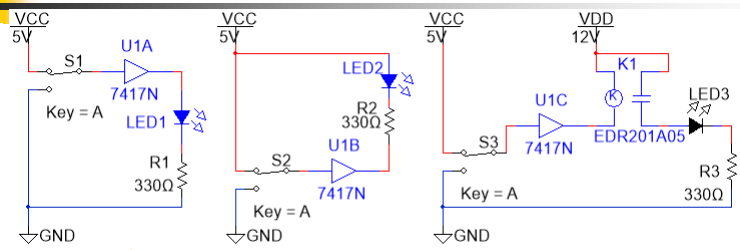
Equivalent Buffer

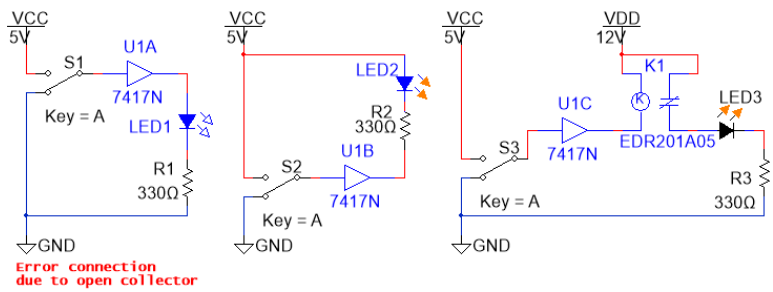
A	Y=A
0	0
1	1



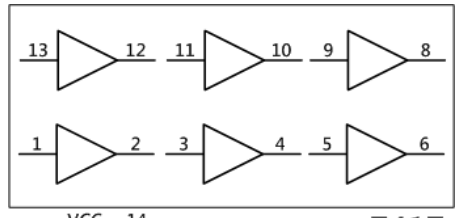


Buffer with Open Collector





Buffer with Open Collector



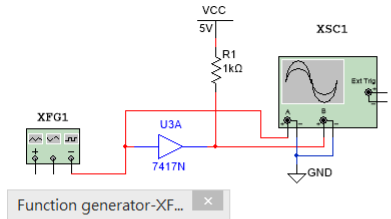
A	Y=A
0	0
1	1

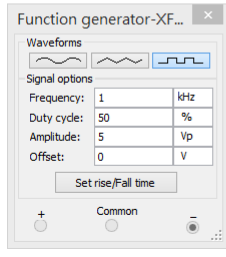
A	Y=A
0V	0.15V
5V	4.41V
⎍	⎍

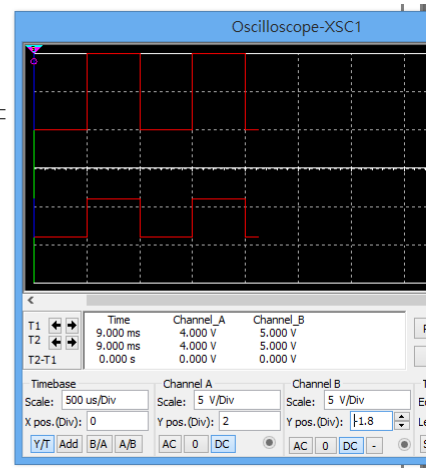
7417 needs power supply
VCC pin-14 +5V
GND pin-7 0V
Output connects a loading (e.g. 1kohm) to +5V

Buffer with open collector

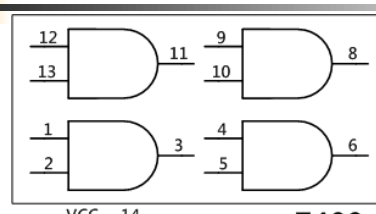
A	Y=A
0V	0.15V
5V	4.41V
⎍	⎍





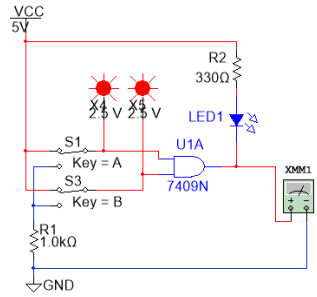


AND with Open Collector



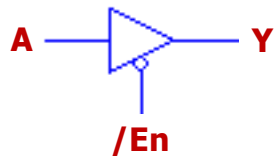
A	B	Y=AB
0	0	0
0	1	0
1	0	0
1	1	1

Output connects a 1kohm to +5V

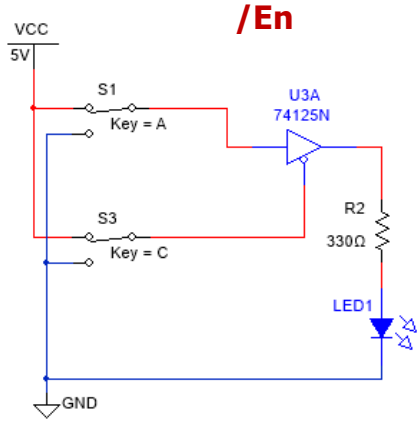


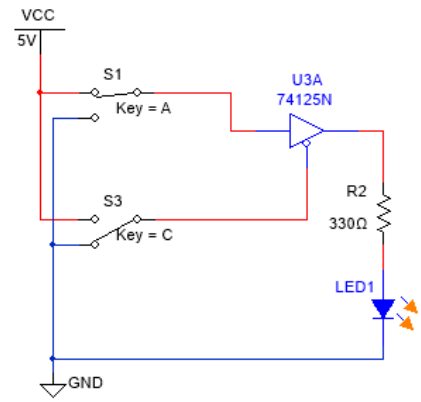
A	B	Y=AB
0V	0V	0.15V
0V	5V	0.15V
5V	0V	0.15V
5V	5V	4.55V

Tristate Buffer

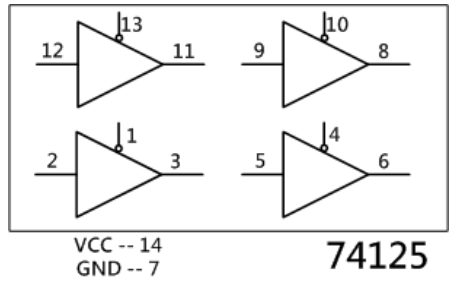


/En	A	Y=A
0	0	0
0	1	1
1	0	X (open)
1	1	X (open)





Tristate Buffer



/En	A	Y=A
0	0	0
0	1	1
1	0	X (open)
1	1	X (open)

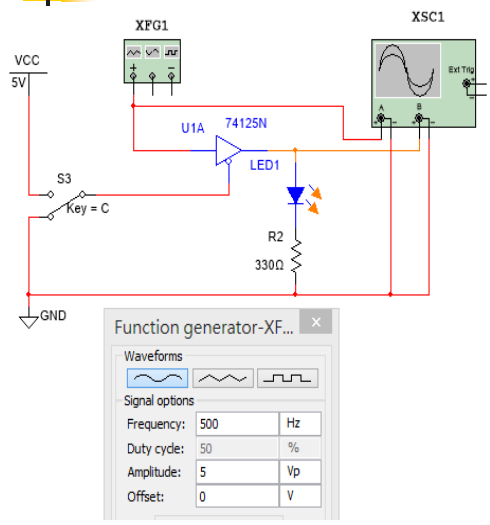
/En	A	Y
0V	0	0.15V
0V	1	4.41V
0V	⎍	⎍
5V	0	X (open)
5V	1	X (open)
5V	⎍	X (open)

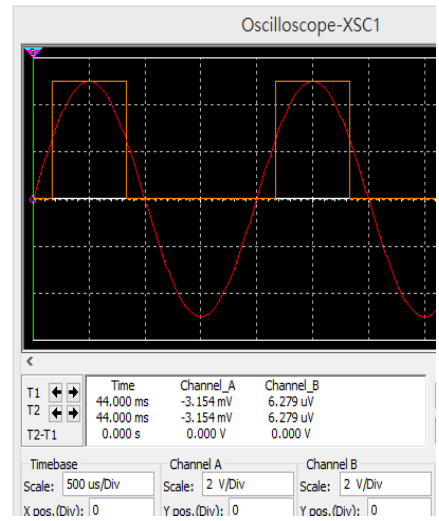
The IC needs power supply

VCC pin-14 +5V

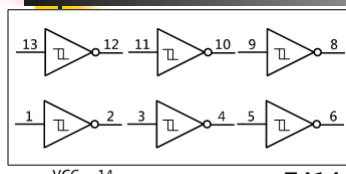
GND pin-7 0V

Signal Pass by Tristate Buffer



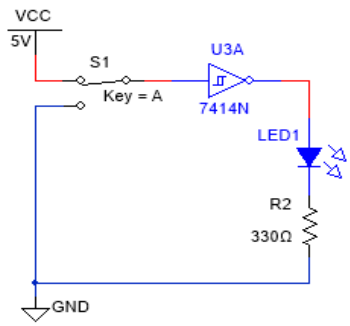


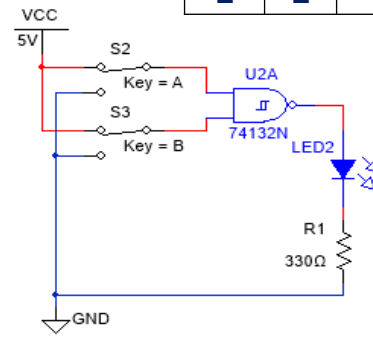
Schmitt-Trigger Gates



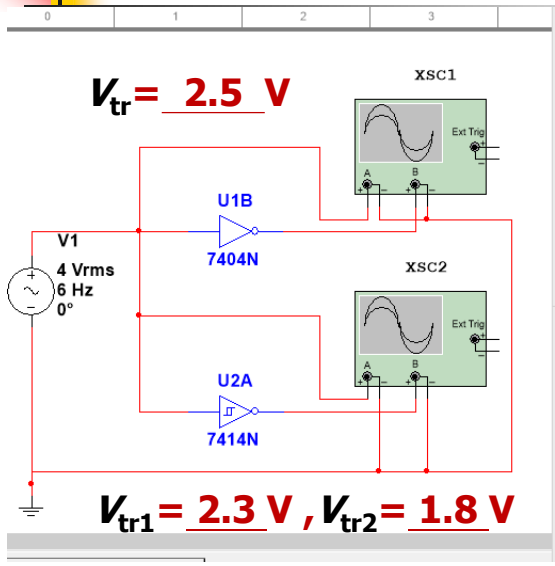
A	Y=/A
0	1
1	0

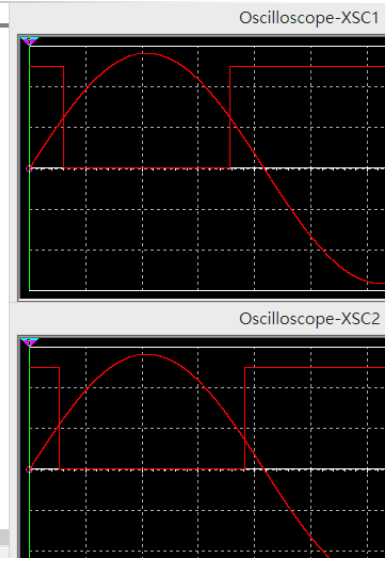
A	B	Y=/(AB)
0	0	1
0	1	1
1	0	1
1	1	0



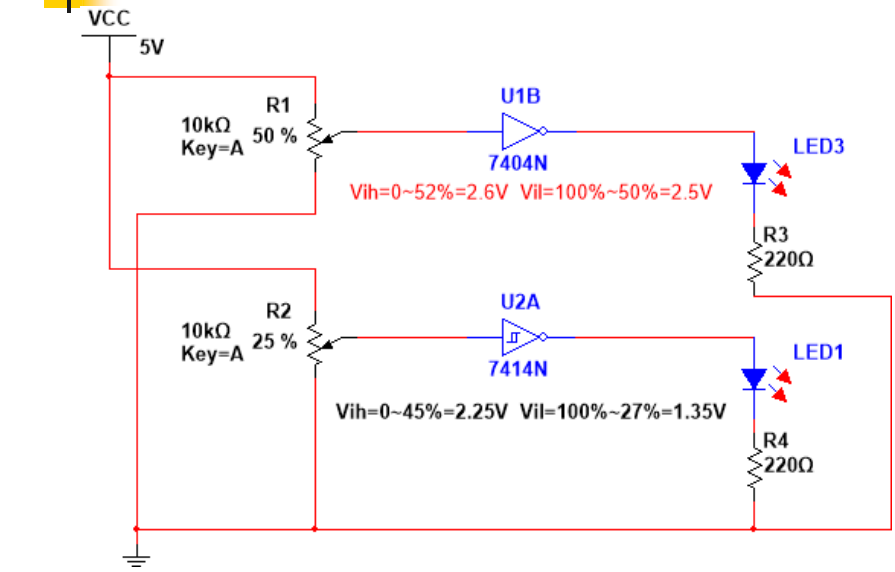


Different Transfer Voltages

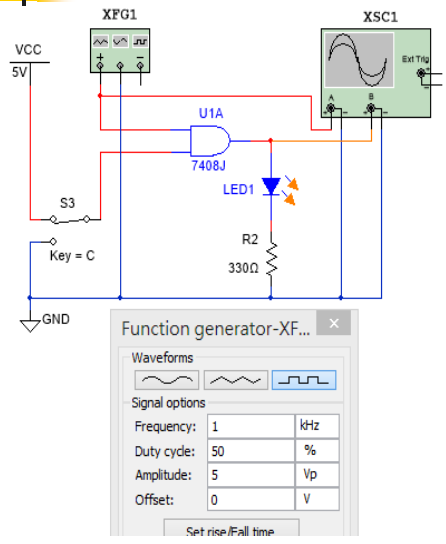


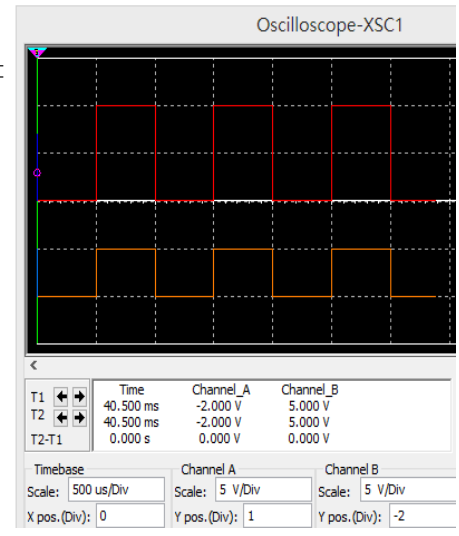


Different Transfer Voltages

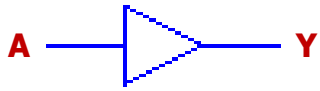


Signal Pass by AND Gate

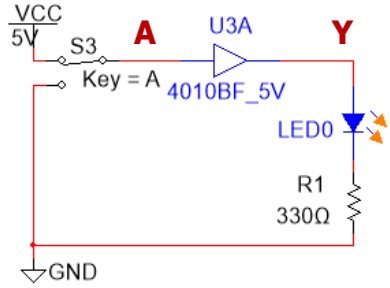


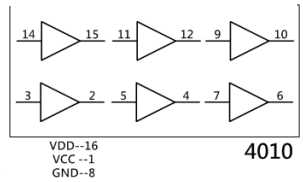


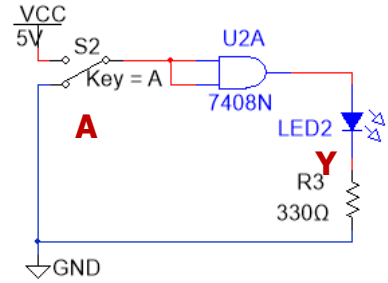
Experiment-1 Buffer

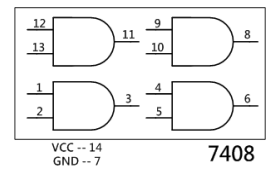


A	LED ON/OFF
0V	
5V	

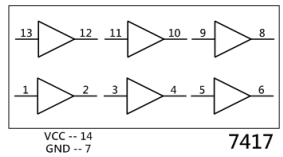




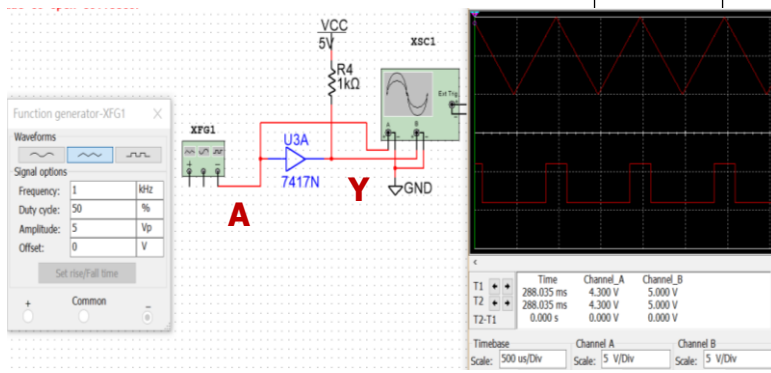




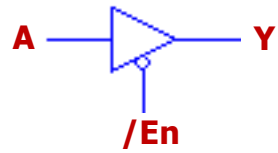
Experiment-2
Buffer with Open Collector

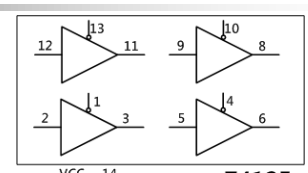


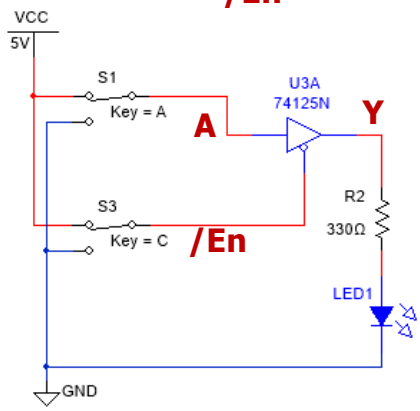
A	Y (Scope)
0V	
5V	
waves	



Experiment-3 Tristate Buffer



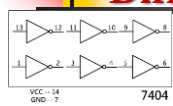




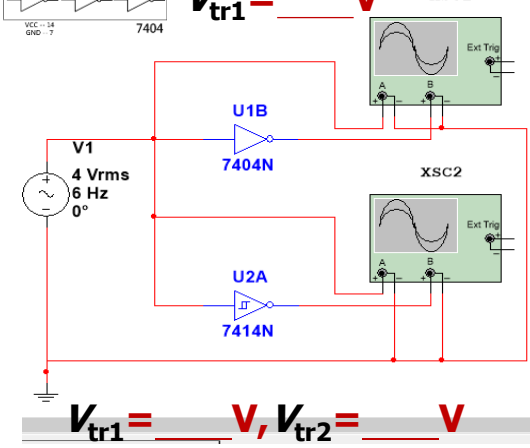
/En	A	Y (LED1)
0V	0V	
0V	5V	
0V	wave	
5V	0	
5V	1	
5V	wave	

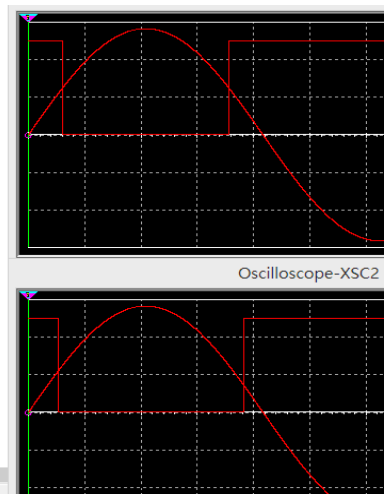
Wave: Square 10Hz/5V

Experiment-4
Different Transfer Voltages



V_{tr1}= ____ V





V_{tr1}= ____ V, V_{tr2}= ____ V