

EXPERIMENT 2. NAND Gates

Equipment and parts required:

1 TTL Quad NAND (7400)
1 Power Supply
1 Digital Voltmeter
1 Function Generator
1 Digital Oscilloscope

1. Find data sheet and specifications

Find I/O pin numbers and specifications of 7400 from data sheet downloaded from the web (ECE labs)

Pin numbers: Vcc, ground, input and outputs of all NAND gates.

Absolute maximum voltages: Vcc and voltages at input pins.

Normal operating voltages: V_{IL} , V_{IH} , V_{OL} , V_{OH}

2. Connect power supply

Adjust power supply at 5 Volts and set the current limit to maximum. Then connect the power supply to Vcc and Gnd bus. Do not connect the power to the integrated circuit at this time.

3. Measure input and output characteristics

Connect the output pin of a NAND gate to a digital voltmeter, and measure the output voltage for the two levels of input voltages. Before the measurement, connect Gnd and Vcc pins to the power buses of the breadboard.

Input 1	Input 2	Output (V)
0 Volts	0 Volts	
0 Volts	5 Volts	
5 Volts	0 Volts	
5 Volts	5 Volts	

4. Observe the input and output waveforms

Generate 1 KHz square wave with two levels at 0 and 5 volts, and connect the signal into the input of a NAND gate. Using a digital oscilloscope, observe input and output waveforms. Repeat the above experiment after connecting one input pin to Vcc (the other input pin to function generator). Print the observed signals and submit it with your report.

5. Voltage transfer characteristics

Tie two inputs of a NAND gate, and connect it to a variable power supply. While changing input voltage from 0 to 5 volts, measure output voltage. Then plot the voltage transfer characteristics on graph paper. Compare your results with values given in the specifications.