

EXPERIMENT NO: 11

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Date: March 15, 2016

Aim of the Experiment:

Analysis of Multiplexer using eSim.

Theory:

The multiplexer, shortened to MUX or MPX, is a combinational logic circuit designed to switch one of several input lines through to a single common output line by the application of a control signal. Multiplexers operate like very fast acting multiple position rotary switches connecting or controlling multiple input lines called channels one at a time to the output.

MUXs, can be either digital circuits made from high speed logic gates used to switch digital or binary data or they can be analogue types using transistors, MOSFETs or relays to switch one of the voltage or current inputs through to a single output.

Procedure:

1. Create the schematic of the Multiplexer as shown in Figure-1.
2. Annotate the schematic.
3. Test Electric rules.
4. Generate the netlist.
5. Insert analysis for transient analysis from 0 to 100 ms with a step time of 10 us.
6. Insert Source Details.
7. Insert values for Ngspice Models.
8. Convert KiCad netlist to Ngspice netlist.
9. Simulate the Ngspice netlist using Ngspice simulator.

Source Parameters:

Following are the Pulse input parameters for V1:

1. Enter Initial Value - 0
2. Enter Pulsed Value - 5
3. Enter Delay Time - 0
4. Enter Rise Time - 0
5. Enter Fall Time - 0
6. Enter Pulse Width - 50m
7. Enter Period - 100m

Following are the Pulse input parameters for V2:

1. Enter Initial Value - 0
2. Enter Pulsed Value - 5
3. Enter Delay Time - 0
4. Enter Rise Time - 0
5. Enter Fall Time - 0
6. Enter Pulse Width - 20m
7. Enter Period - 40m

Following are the Pwl parameters for Select Input V3:

1. Enter Value (t1 v1 t2 v2 ..) = 0m 0 0.5m 5 50m 5 50.5m 0 100m 0

Schematic Diagram:

The circuit schematic of multiplexer in eSim is as shown below:

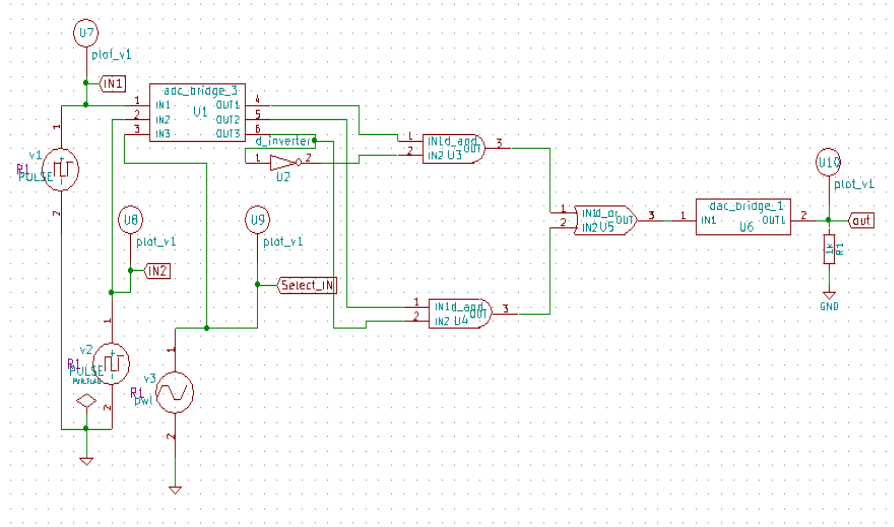


Figure 1: Multiplexer

Simulation Results:

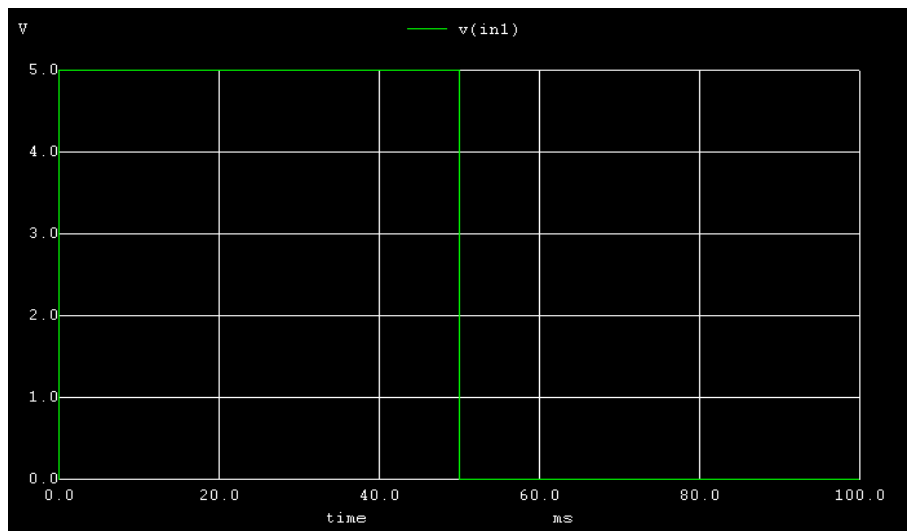


Figure 2: Ngspice Input-1 Plot

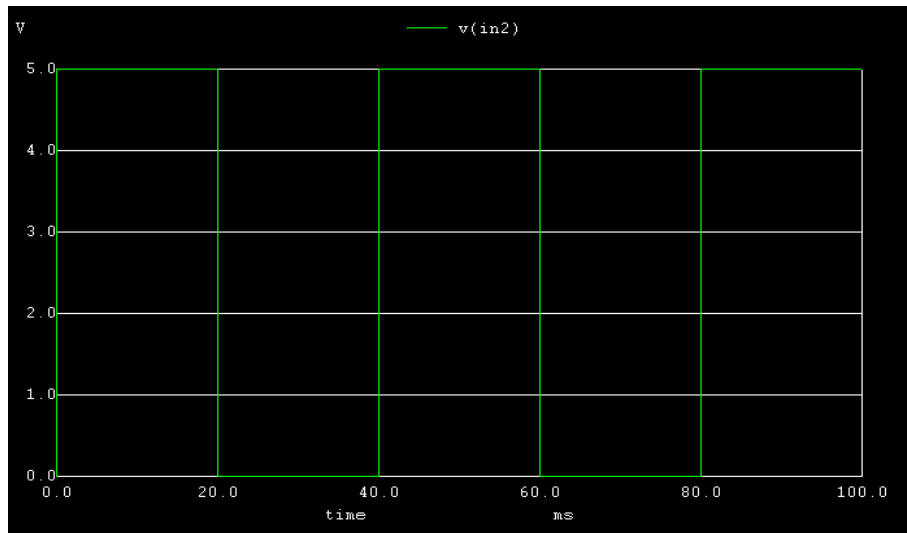


Figure 3: Ngspice Input-2 Plot

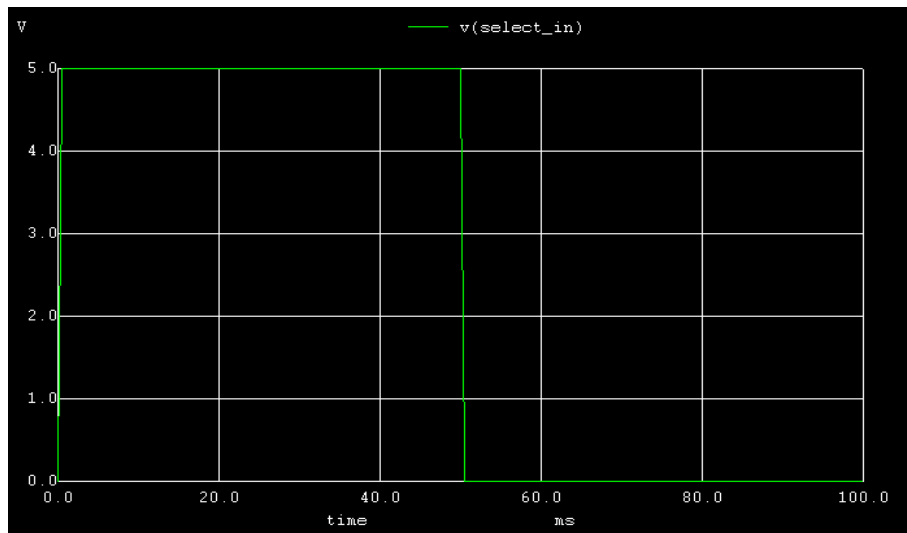


Figure 4: Ngspice Select Input Plot

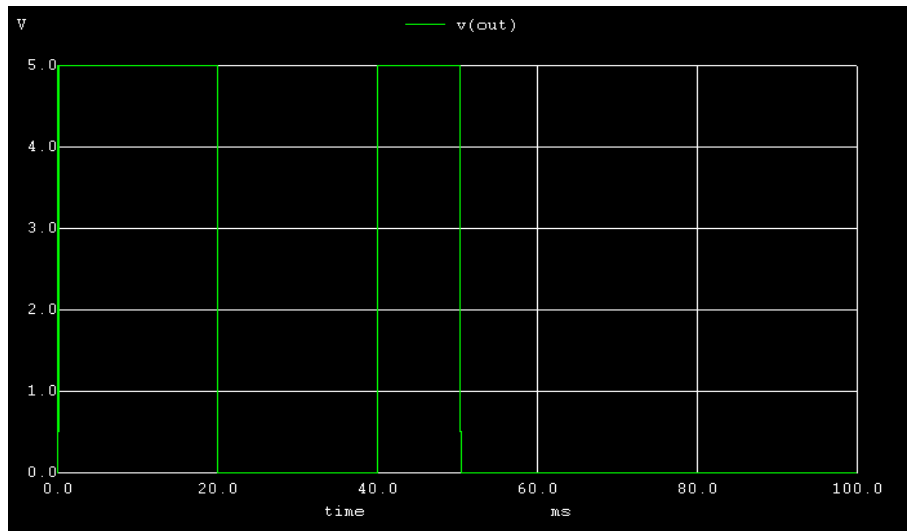


Figure 5: Ngspice Output Plot

Conclusion:

Thus, we have studied the multiplexer circuit using eSim and we get the appropriate waveforms.

References:

<http://www.electronics-tutorials.ws/combination/comb-2.html>