2:1 Multiplexer using Transmission Gate

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Abstract

In this world where digital communication and low power design are considered for communication. Multiplexer is a circuit which requires less hardware than normal circuit. It also saves the channel bandwidth required for communication. Multiplexer is a type of combinational circuit which selects one of its input as output according to the selection line.Depending upon the number of inputs number of select line depends but any multiplexer consists of only one output .Multiplexer can be designed using CMOS,pass transistor logic,transmission gate,etc. Here Transmission gate is being used for making 2x1 multiplexer.

1 Circuit Details

Multiplexer can be formed from transmission gate,pass transistor logic,CMOS logic but transmission gate is used because of less resistance is being offered at both the input level. Transmission gate is being used here for making 2x1 multiplexer.One transmission gate requires one nmos and one pmos transistor .Select line is being connected to the nmos of upper Transmission gate and Select line bar is being connected to the pmos of upper transmission gate similarly for the lower transmission gate Select line is being connected to the pmos of lower Transmission gate and Select line bar is being connected to the nmos of lower transmission gate. As shown in the circuit diagram we need two transmission gate that is two nmos and two pmos and one nmos,one pmos for inverter for our select line. So in total 6 mos transistor is being used in making this circuit and one inverter is being used here for producing our select bar signal. For a 2x1 multiplexer we need only one control or select line which will control our output.For Select line equals to 0 output is connected directly to the first input that is A because the upper transmission gate gets on and lower transmission gate turns off and the input A gets connected to the output .For Select line equals to 1 output is connected directly to the input B because lower transmission gets on and upper transmission gate turns off now and output gets connected to input B as shown in circuit diagram.

2 Implemented Circuit

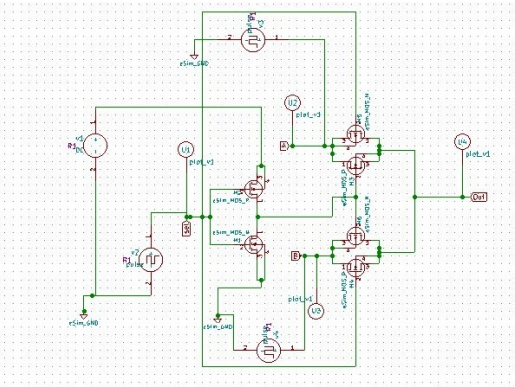

Figure 1: Implemented circuit diagram.

3 Implemented Waveforms

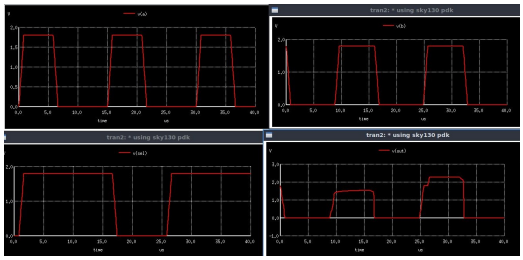

Figure 2: Implemented waveform.

References

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