Experiment #3 - Function Generator

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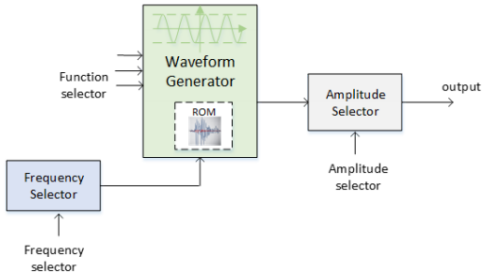
Abstract— In this lab we want to design a function generator for this goal we use clock divider of lab 1
To make clk a control frequency of signals
For design the function generator we use 3 part:



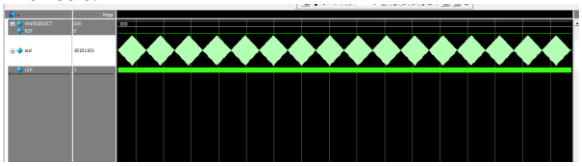
INTRODUCTION

We want make the signal that list below:

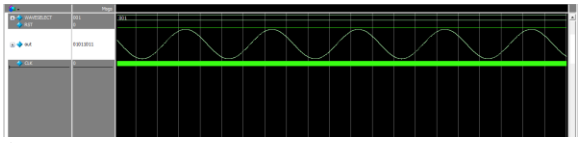
func[2:0]	Function
3'b000	Rhomboid
3'b001	Sine
3'b010	Square
3'b011	Reciprocal
3'b100	Saw-tooth
3'b101	Full-wave rectified
3'b110	Modulated square wave
3'b111	Arbitrary

Waveform Generator

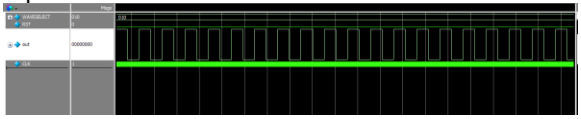
In this part we write a Verilog codes for generating signals:
This pictures are the simulation result:
Rhomboid:



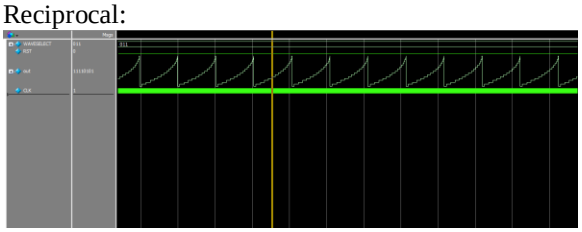
Sine:



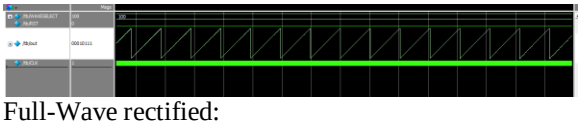
Square:



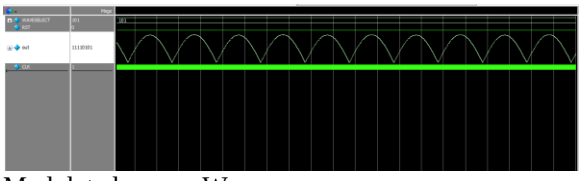
Reciprocal:



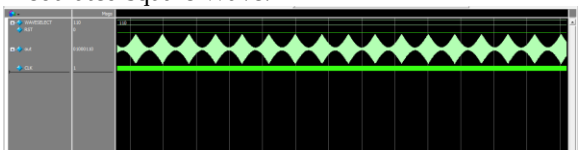
Saw_tooth:



Full-Wave rectified:



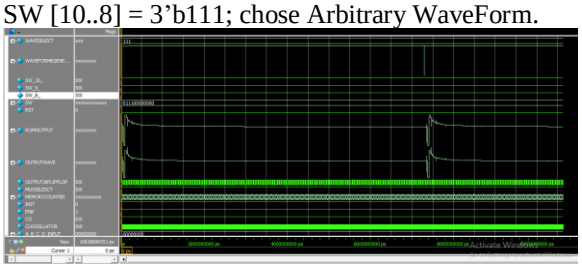
Modulated square Wave:



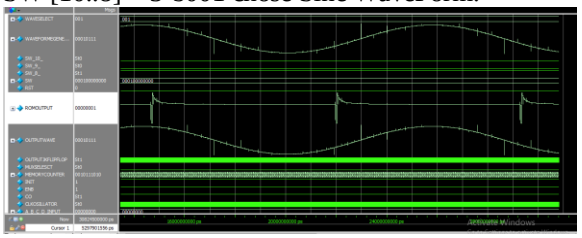
Arbitrary:

Use Quartus synthesis:

SW [10..8] = 3'b111; chose Arbitrary WaveForm.

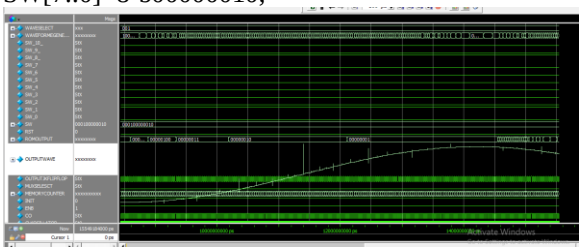


SW [10..8] = 3'b001 chose Sine WaveForm.

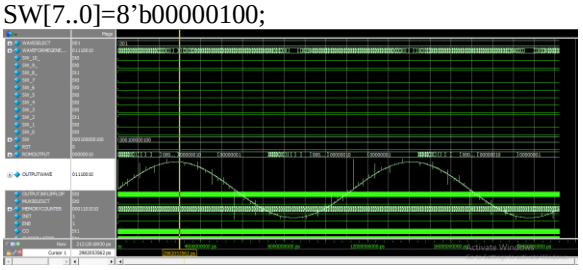


Frequency Selector

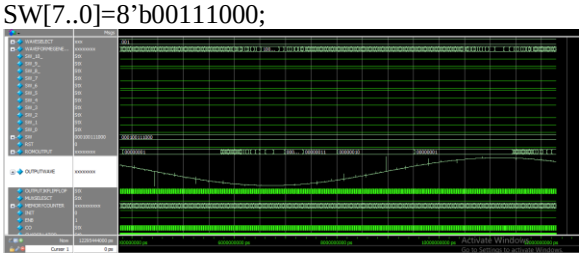
SW[7..0]=8’b00000010;



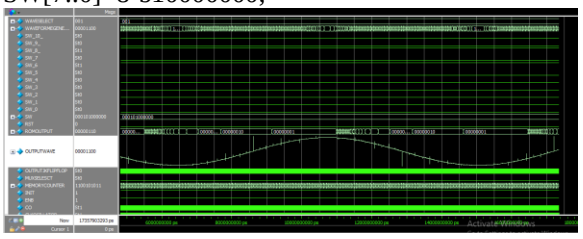
SW[7..0]=8’b00000100;



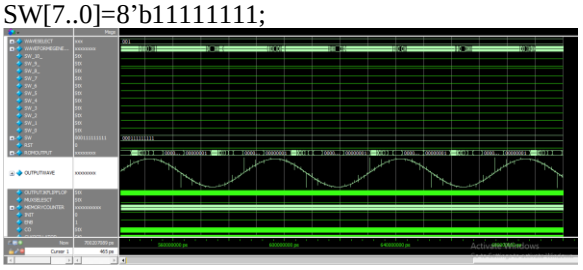
SW[7..0]=8’b00111000;



SW[7..0]=8’b10000000;



SW[7..0]=8’b11111111;

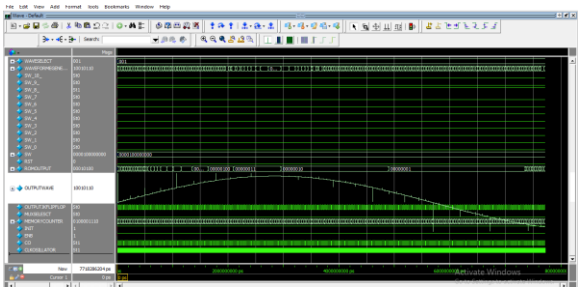


Amplitude Selector

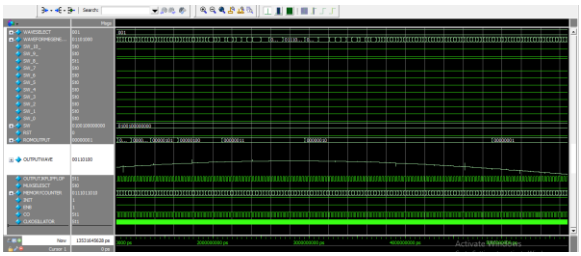
Table 2: Amplitude selection

SW[12:11]	Amplitude
2'b00	1
2'b01	2
2'b10	4
2'b11	8

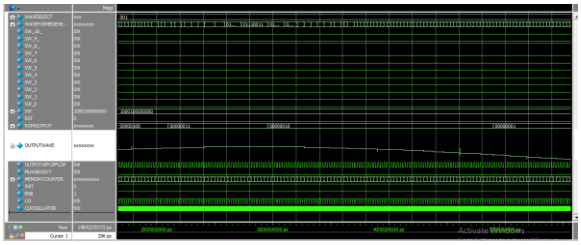
SW[12..11] = 2’b 00;



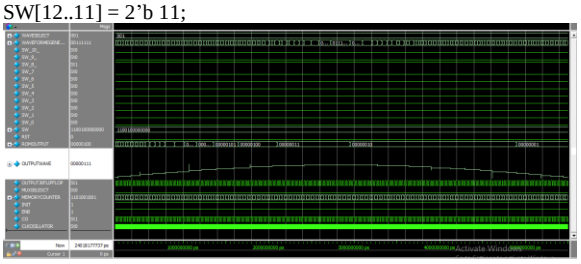
SW[12..11] = 2’b 01;



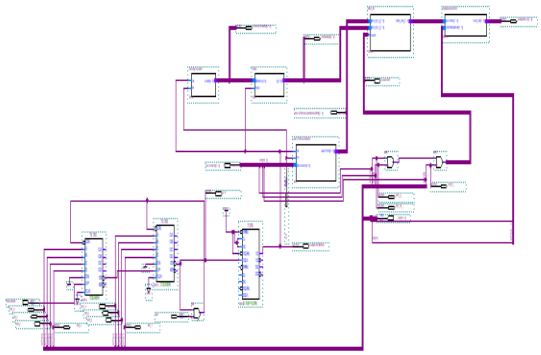
SW[12..11] = 2’b10;



SW[12..11] = 2’b 11;



Final Quartus file:



CONCLUSIONS

We conclude that we can made a function generator that have several waveform and we can select frequency and amplitude of this waveform.