Lab Assignment 4

Floating Point Multiplier

Behavioral Simulations:

Test 1

Multiplicand: "0 11001111 101010101010"

exponent: 11001111 (207), significant: 10101010101010 (10922)

Multiplier: "1 00000000 0000000000000"

value:- 0

Result: -0; Sign: 1 Zero: 1 Overflow: 0 Underflow: 0

Test 2

Multiplicand: "1 00000000 0000000000000"

value:- 0

Multiplier: "0 11001111 101010101010"

exponent: 11001111 (207), significant: 10101010101010 (10922)

Result: -0 Sign: 1 Zero: 1 Overflow: 0 Underflow: 0



Test 3

Multiplicand: "0 11001111 101010101010"

exponent: 11001111 (207), significant: 10101010101010

Multiplier: "1 10000011 0000000000111"

exponent: 10000011 (131), significant: 0000000000111

Result: "1 11010011 10101010110101"

exponent: 11010011 (211 = 207 +131 -127) significant: 10101010110101

Sign: 1 Zero: 0 Overflow: 0 Underflow: 0

Test 4

Multiplicand: "0 11001111 101010101010"

exponent: 11001111 (207), significant: 10101010101010

Multiplier: "1 11001111 00000000000111"

exponent: 11001111 (206), significant: 0000000000111

Result: "1 00011110 10101010110101"

exponent: 00011110 (30 = 207 +206 -127-256(overflow))

significant: 10101010110101

Sign: 1 Zero: 0 Overflow: 1 Underflow: 0

Test 5

Multiplicand: "1 00000111 0000000000111"

exponent: 00000111 (7), significant: 0000000000111

Multiplier: "1 00000111 0000000000111"

exponent: 00000111 (7), significant: 0000000000111

Result: "0 10001111 0000000001110"

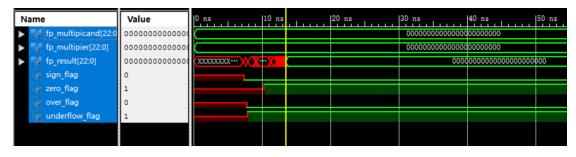
exponent: 10001111 (143 = 7 + 7 -127 + 256(underflow))

significant: 0000000001110

Sign: 0 Zero: 0 Overflow: 0 Underflow: 1



Timing Simulations:



Name	Value		100 ns	150 ns	200 ns	250 ns	300 r	15	350 ns	400 ns 45
▶ 📆 fp_multipicand[22:0	0110011111010:	00	01100111110	01010101010	1000000000	00000000000		(1100111110101010	01010
▶ 🌃 fp_multipier[22:0]	11000001100000	00	100000000000	00000000000	01100111110	01010101010		1000001100	00000000111	111001110000000000
	1110100111011:	0000-	·)(100000000	00000000000000		- XX	1110100	110101010110101	X100011110101010
Vo sign_flag	1									
Vo zero_flag	0									
U over_flag	0									
Underflow_flag	0									

Name	Value	_,	350 ns	400 ns	450 ns	50	0 ns	550 ns	600 ns	650 ns
fp_multipicand[22:0	10000011100000		011001	111010101010101010		Х		100000111	00000000000111	
▶ ■ fp_multipier[22:0]	10000011100000	11000	0011000000000000	111001110000	00000000111	X		100000111	00000000000111	
▶ ■ fp_result[22:0]	00001111010101	11101	00111010101010110…	100011110	10101010110101	Б		010001	1100000000001110	
lo sign_flag	1					П				
Vo zero_flag	0									
lo over_flag	0					П				
Underflow_flag	0									

Number of 4 input LUTs: 516

Timing Summary: -----Speed Grade: -5 Minimum period: No path found Minimum input arrival time before clock: No path found Maximum output required time after clock: No path found Maximum combinational path delay: 20.355ns Timing Detail: All values displayed in nanoseconds (ns) _____ Timing constraint: Default path analysis Total number of paths / destination ports: 996949 / 27 ______ 20.355ns (Levels of Logic = 29) Delay: Source: fp_multipier<3> (PAD) Destination: fp result<21> (PAD)

Critical path delay: 20.355ns
Maximum Frequency: 49.13 MHz