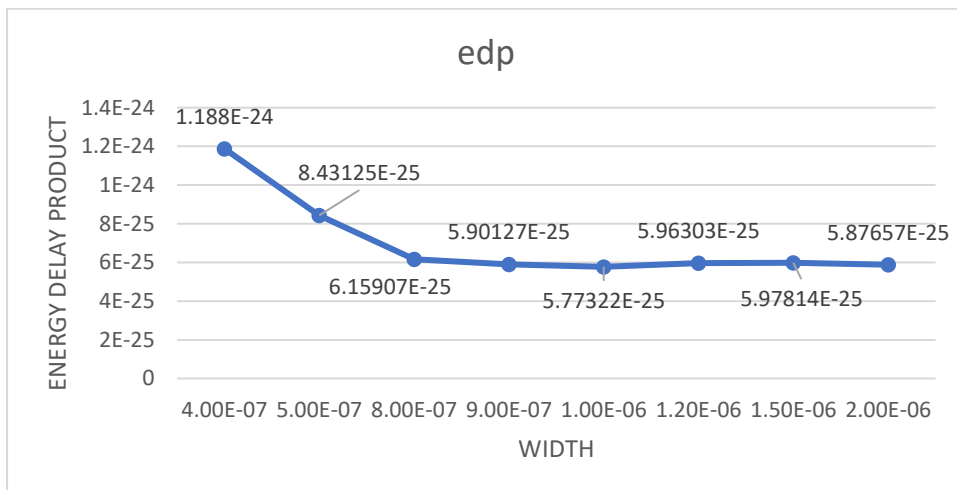


EFFICIENT HLFF DESIGN

OBSERVING RISE TRANSITION AT OUTPUT SIDE

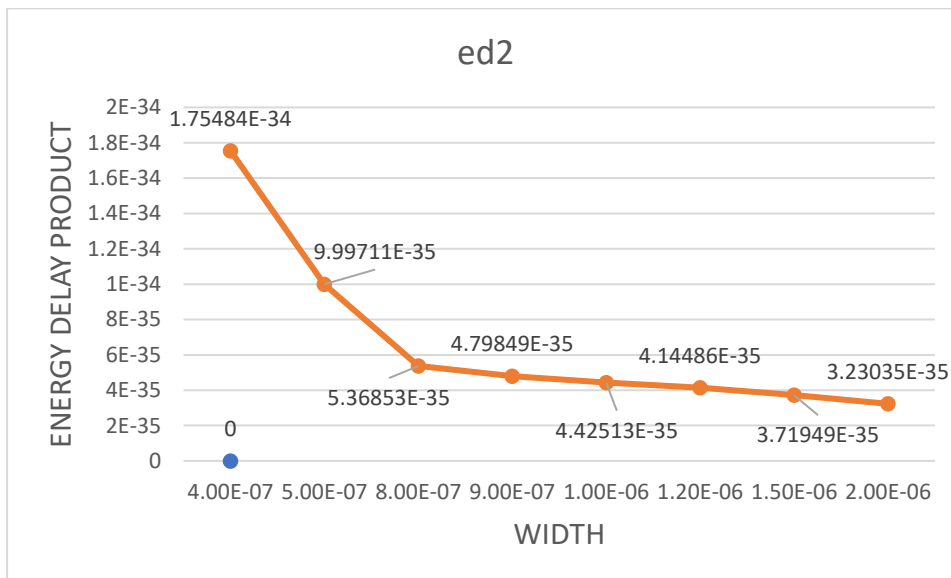
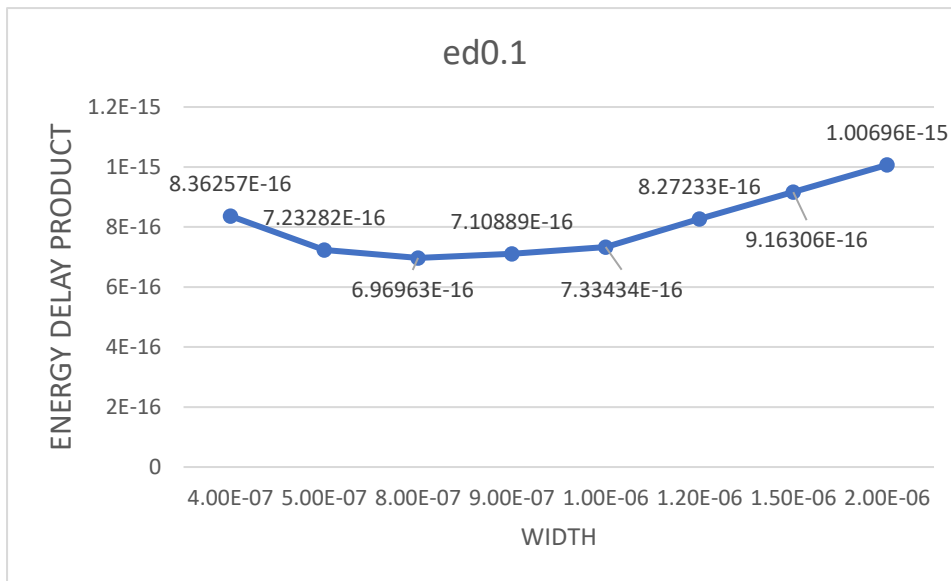
SETUP	CLK-Q	D-Q	power	width	edp
-6.00E-12	1.54E-10	1.48E-10	5.44E-05	4.00E-07	1.188E-24
-9.00E-12	1.28E-10	1.19E-10	6.00E-05	5.00E-07	8.43125E-25
-7.80E-12	9.50E-11	8.72E-11	8.11E-05	8.00E-07	6.15907E-25
-7.00E-12	8.83E-11	8.13E-11	8.93E-05	9.00E-07	5.90127E-25
-7.00E-12	8.36E-11	7.66E-11	9.83E-05	1.00E-06	5.77322E-25
-7.00E-12	7.65E-11	6.95E-11	1.23E-04	1.20E-06	5.96303E-25
-6.80E-12	6.92E-11	6.22E-11	1.54E-04	1.50E-06	5.97814E-25
-6.80E-12	6.18E-11	5.50E-11	1.94E-04	2.00E-06	5.87657E-25

In minimum edp product the delay:76.6ps, Power: 9.83E-05



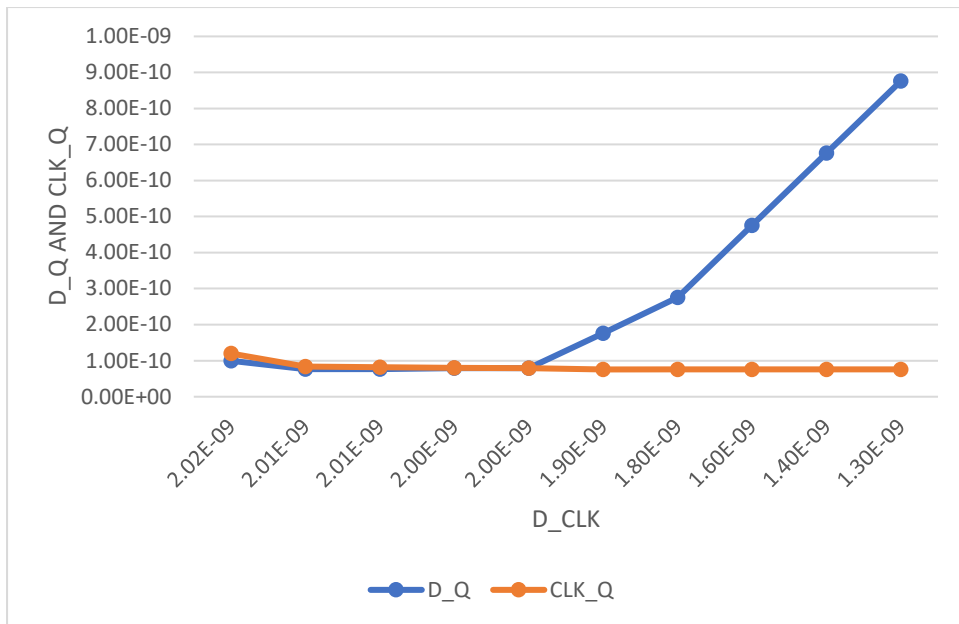
Other cost function graph:

edp	d0.1	Energy	ed0.1	d0.01	ed0.01	ed2
1.188E-24	0.103978127	8.04262E-15	8.36257E-16	0.797432991	6.41345E-15	1.75484E-34
8.43125E-25	0.101718103	7.11065E-15	7.23282E-16	0.795682534	5.65782E-15	9.99711E-35
6.15907E-25	0.098635667	7.06603E-15	6.96963E-16	0.793237795	5.60504E-15	5.36853E-35
5.90127E-25	0.097952596	7.25748E-15	7.10889E-16	0.792686743	5.75291E-15	4.79849E-35
5.77322E-25	0.097375744	7.532E-15	7.33434E-16	0.792218681	5.96699E-15	4.42513E-35
5.96303E-25	0.096428256	8.57874E-15	8.27233E-16	0.791444437	6.7896E-15	4.14486E-35
5.97814E-25	0.095365589	9.60835E-15	9.16306E-16	0.790567888	7.59605E-15	3.71949E-35
5.87657E-25	0.09419168	1.06905E-14	1.00696E-15	0.7895893	8.44111E-15	3.23035E-35

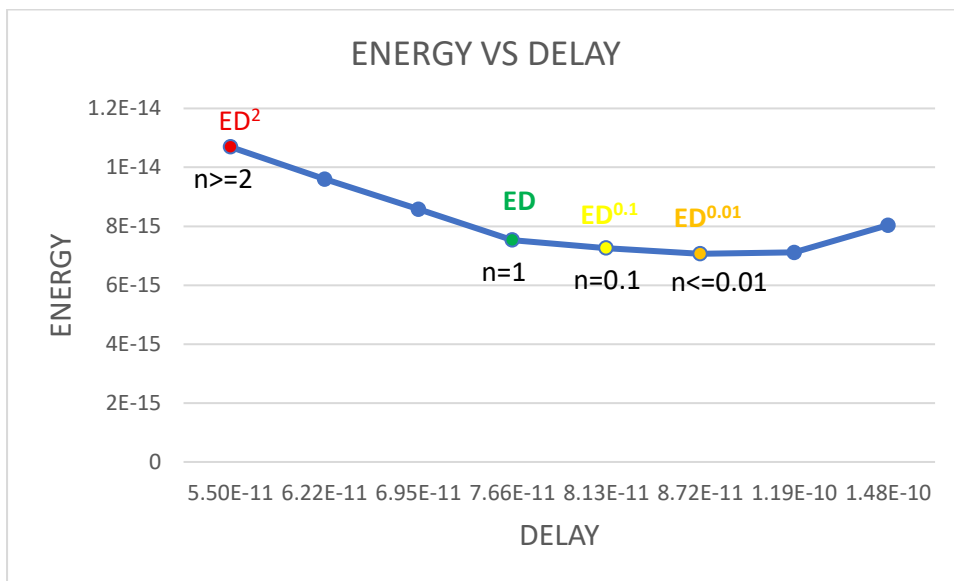


SETUP TIME CHARACTERIZATION:

RISE TIME SETUP CHARACTERISTICS				
	D_CLK	SETUP	CLK_Q	D_Q
	2.02E-09	-2.00E-11	1.20E-10	9.98E-11
	2.01E-09	-7.00E-12	8.36E-11	7.66E-11
	2.01E-09	-5.00E-12	8.16E-11	7.66E-11
	2.00E-09	-1.00E-12	8.02E-11	7.92E-11
	2.00E-09	0.00E+00	7.95E-11	7.95E-11
	1.90E-09	1.00E-10	7.60E-11	1.76E-10
	1.80E-09	2.00E-10	7.59E-11	2.76E-10
	1.60E-09	4.00E-10	7.59E-11	4.76E-10
	1.40E-09	6.00E-10	7.59E-11	6.76E-10
	1.30E-09	7.76E-10	7.59E-11	8.76E-10



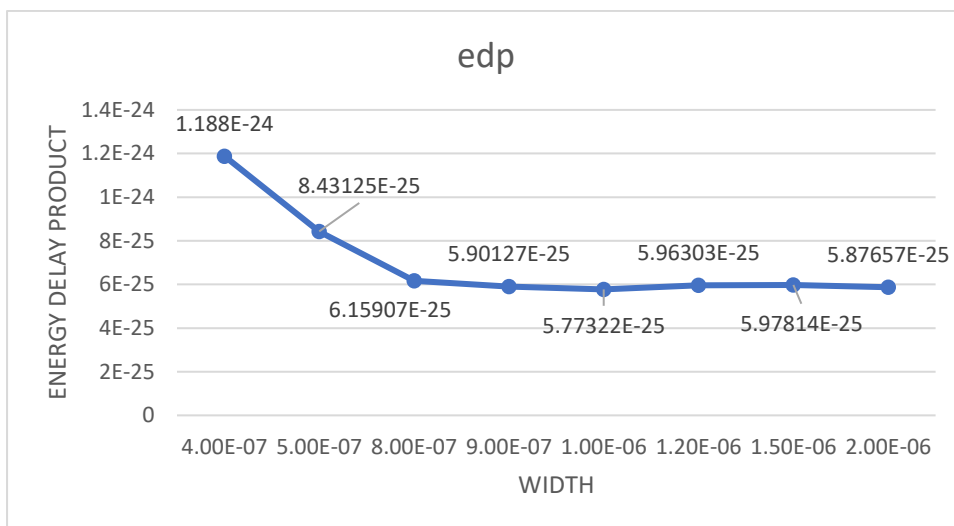
ENERGY wrt DELAY



OBSERVING FALL TRANSITION AT OUTPUT SIDE:

SETUP	CLK-Q	D-Q	power	EDP	width
1.90E-11	1.62E-10	1.81E-10	7.95E-05	2.60705E-24	4.50E-07
1.80E-11	1.52E-10	1.70E-10	8.24E-05	2.38995E-24	5.00E-07
1.60E-11	1.44E-10	1.60E-10	8.73E-05	2.22459E-24	5.80E-07
1.80E-11	1.32E-10	1.51E-10	9.51E-05	2.15824E-24	7.00E-07
1.80E-11	1.27E-10	1.45E-10	1.02E-04	2.15276E-24	8.00E-07
2.00E-11	1.22E-10	1.42E-10	1.08E-04	2.19359E-24	9.00E-07
2.10E-11	1.18E-10	1.40E-10	1.15E-04	2.25469E-24	1.00E-06
2.50E-11	1.12E-10	1.37E-10	1.29E-04	2.43913E-24	1.20E-06
2.70E-11	1.07E-10	1.34E-10	1.50E-04	2.69475E-24	1.50E-06
3.00E-11	1.03E-10	1.33E-10	1.84E-04	3.25394E-24	2.00E-06

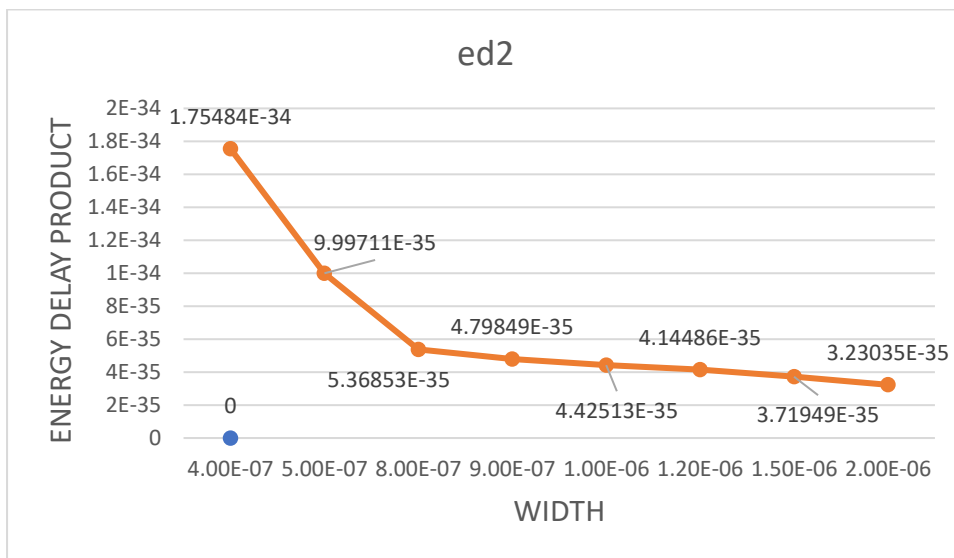
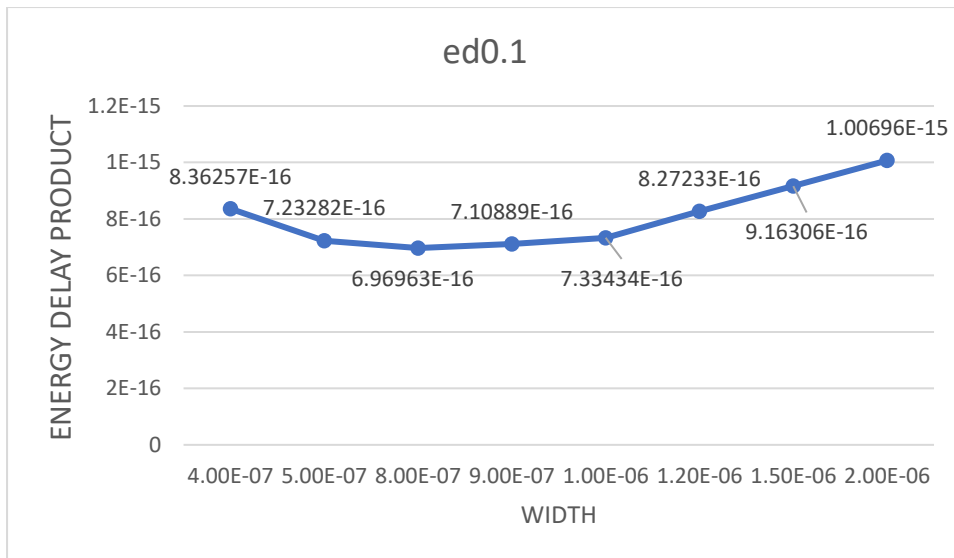
ENERGY DELAY PRODUCT GRAPH



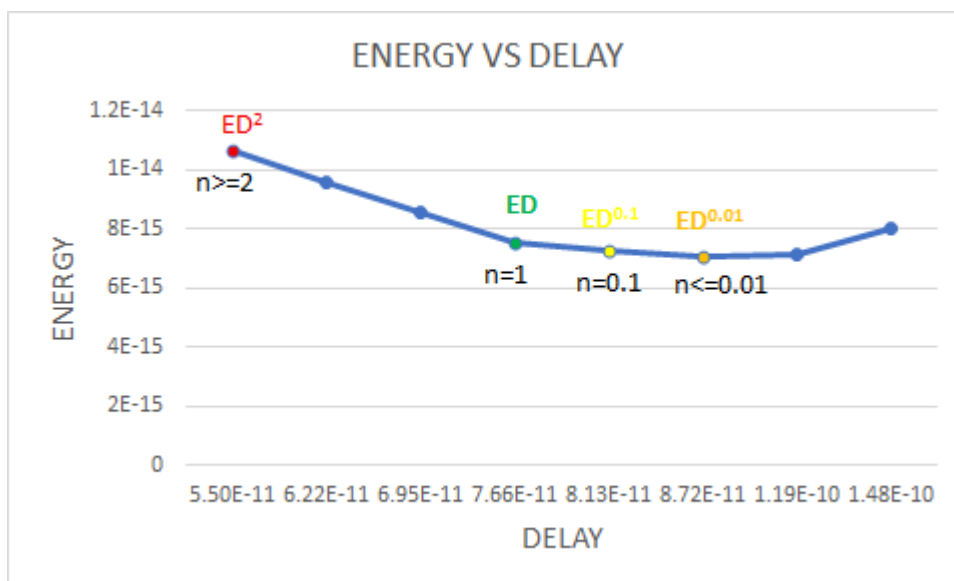
In minimum edp product the delay:145ps, Power:1.02E-04

Other cost function graph:

edp	d0.1	Energy	ed0.1	d0.01	ed0.01	ed2
1.188E-24	0.103978127	8.04262E-15	8.36257E-16	0.797432991	6.41345E-15	1.75484E-34
8.43125E-25	0.101718103	7.11065E-15	7.23282E-16	0.795682534	5.65782E-15	9.99711E-35
6.15907E-25	0.098635667	7.06603E-15	6.96963E-16	0.793237795	5.60504E-15	5.36853E-35
5.90127E-25	0.097952596	7.25748E-15	7.10889E-16	0.792686743	5.75291E-15	4.79849E-35
5.77322E-25	0.097375744	7.532E-15	7.33434E-16	0.792218681	5.96699E-15	4.42513E-35
5.96303E-25	0.096428256	8.57874E-15	8.27233E-16	0.791444437	6.7896E-15	4.14486E-35
5.97814E-25	0.095365589	9.60835E-15	9.16306E-16	0.790567888	7.59605E-15	3.71949E-35
5.87657E-25	0.09419168	1.06905E-14	1.00696E-15	0.7895893	8.44111E-15	3.23035E-35

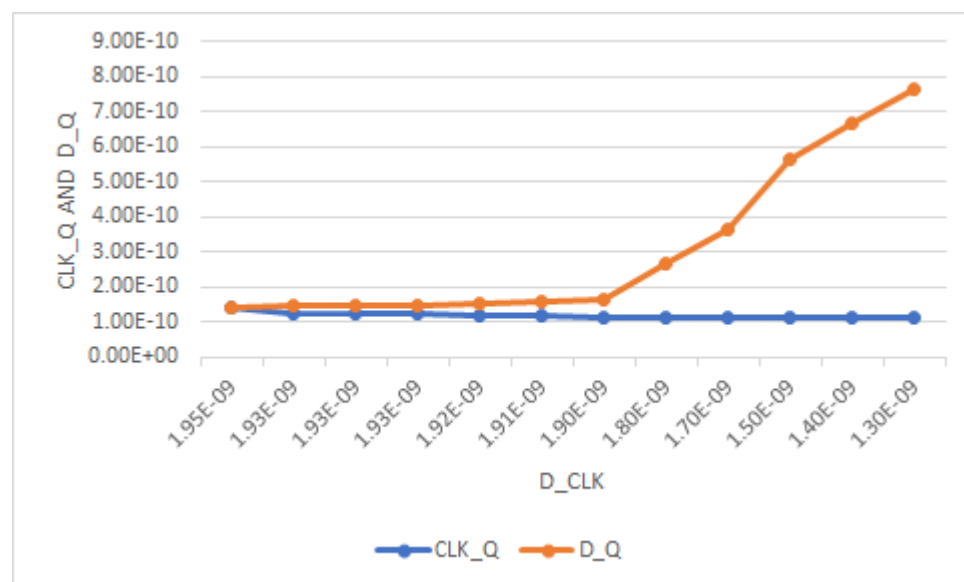


ENERGY WRT DELAY



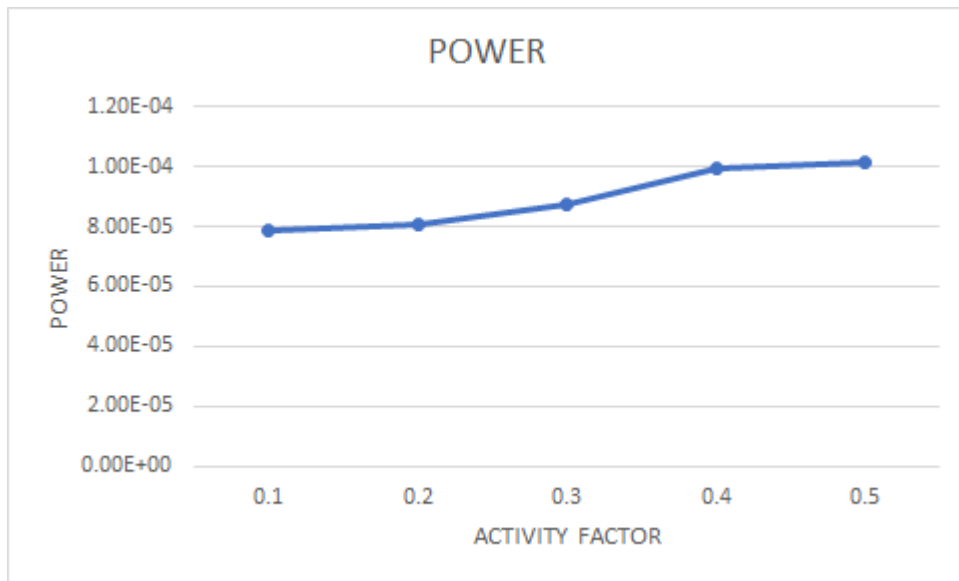
SETUP TIME CHARACTERIZATION FOR FALL

FALL SETUP TIME CHARACTERISTICS				
	D_CLK	SETUP	CLK_Q	D_Q
	1.95E-09	0.00E+00	1.43E-10	1.43E-10
	1.93E-09	1.80E-11	1.27E-10	1.45E-10
	1.93E-09	2.00E-11	1.26E-10	1.46E-10
	1.93E-09	2.50E-11	1.23E-10	1.48E-10
	1.92E-09	3.00E-11	1.21E-10	1.51E-10
	1.91E-09	4.00E-11	1.18E-10	1.58E-10
	1.90E-09	5.00E-11	1.16E-10	1.66E-10
	1.80E-09	1.50E-10	1.15E-10	2.65E-10
	1.70E-09	2.50E-10	1.15E-10	3.65E-10
	1.50E-09	4.50E-10	1.15E-10	5.65E-10
	1.40E-09	5.50E-10	1.15E-10	6.65E-10
	1.30E-09	6.50E-10	1.15E-10	7.65E-10



POWER CONSUMPTION FOR DIFFERENT ACTIVITY FACTOR

ACTIVITY FACTOR	
ACTIVITY FACTOR	POWER
0.1	7.90E-05
0.2	8.07E-05
0.3	8.70E-05
0.4	9.93E-05
0.5	1.02E-04



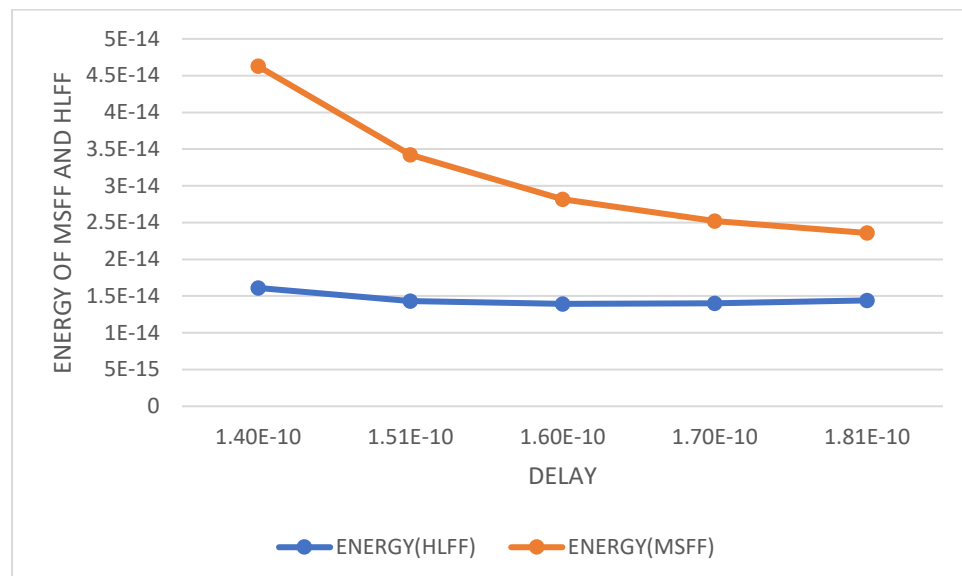
POWER CONSUMPTION FOR DIFFERENT ACTIVITY FACTOR

POWER		
STATIC POWER CALCULATION		
	CLK:DATA	STATIC POWER
	00:00	5.43E-08
	00:01	6.43E-08
	01:00	7.70E-08
	01:01	2.38E-08
	AVG	5.48E-08
DATA SWITCHING POWER		
	CLK	POWER
	0	1.53E-05
	1	1.13E-05
	AVG	1.33E-05
CLOCK SWITCHING POWER		
	DATA	POWER
	0	1.01E-04
	1	4.75E-05
	AVG	7.41E-05
	TOTAL POWER	1.02E-04
	DYNAMIC POWER	1.02E-04
	REGISTER SWITCH	8.85E-05

comparison of HLFF AND MSFF ENERGY

MSFF					
SETUP	CLK_Q	D_Q	POWER	ENERGY(MSFF)	
8.09E-11	5.91E-11	1.40E-10	3.30E-04	4.62756E-14	
7.63E-11	5.30E-11	1.40E-10	2.28E-04	3.42175E-14	
8.00E-11	8.30E-11	1.63E-10	1.73E-04	2.81615E-14	
7.93E-11	8.96E-11	1.69E-10	1.49E-04	2.52183E-14	
8.50E-11	9.36E-11	1.79E-10	1.32E-04	2.35821E-14	

HLFF					
SETUP	CLK_Q	D_Q	POWER	ENERGY(HLFF)	
2.10E-11	1.18E-10	1.40E-10	1.15E-04	1.61E-14	
1.80E-11	1.32E-10	1.51E-10	9.51E-05	1.43282E-14	
1.60E-11	1.44E-10	1.60E-10	8.73E-05	1.39355E-14	
1.80E-11	1.52E-10	1.70E-10	8.24E-05	1.40297E-14	
1.90E-11	1.62E-10	1.81E-10	7.95E-05	1.43951E-14	



MSFF AND HLFF POWER COMPARISON FOR DIFFERENT ACTIVITY FACTOR

ACTIVITY FACTOR	POWER(HLFF)	POWER(MSFF)
0	1.01E-04	6.38E-05
0.1	7.90E-05	7.74E-05
0.2	8.07E-05	9.37E-05
0.3	8.70E-05	1.06E-04
0.4	9.93E-05	1.24E-04
0.5	1.02E-04	1.49E-04

