Table 5: Binary Parallel-Prefix Adders with SkyWater 90nm Technology

Type	Bit	Area (um^2)	Delay (ns)	Power (uw)	Leakage (uw)	Energy (fJ)	EDP (fJ/GHz)
Designware	32	1516.0	**0.508**	49.9	0.642	**25.3**	**12.9**
Brent-Kung	32	1670.0	0.584	50.2	1.228	29.3	17.1
Han-Carlson	32	2094.0	0.551	65.9	1.594	36.3	20.0
Kogge-Stone	32	2523.0	0.542	75.4	1.842	40.9	22.1
Knowles	32	2527.0	0.543	77.5	1.860	42.1	22.9
Sklansky	32	1840.0	0.518	59.4	1.306	30.8	15.9
Ladner-Fischer	32	1755.0	0.536	57.2	1.280	30.7	16.4
Harris	32	1980.0	0.530	65.4	1.652	34.7	18.4
Ripple-carry	32	**1121.0**	1.794	**42.6**	**0.606**	76.4	137.1
Designware	64	3241.0	**0.598**	94.6	1.332	**56.6**	**33.8**
Brent-Kung	64	3210.0	0.689	89.0	2.235	61.3	42.2
Han-Carlson	64	4716.0	0.629	145.7	4.003	91.6	57.6
Kogge-Stone	64	6616.0	0.611	209.9	6.006	128.2	78.4
Knowles	64	6450.0	0.619	203.9	5.478	126.2	78.1
Sklansky	64	4034.0	0.599	128.2	2.790	76.8	46.0
Ladner-Fischer	64	3465.0	0.639	105.4	2.554	67.4	43.0
Harris	64	4821.0	0.621	152.4	4.239	94.6	58.8
Ripple-carry	64	**1908.0**	3.670	**76.9**	**0.901**	282.2	1035.8
Designware	128	6973.0	**0.676**	137.2	3.194	**92.7**	**62.7**
Brent-Kung	128	6145.0	0.840	114.2	4.065	95.9	80.6
Han-Carlson	128	10775.0	0.700	229.9	10.080	161.0	112.7
Kogge-Stone	128	16374.0	0.721	349.5	16.020	252.0	181.7
Knowles	128	15410.0	0.709	333.8	14.150	236.7	167.8
Sklansky	128	9047.0	0.696	191.3	6.222	133.2	92.7
Ladner-Fischer	128	7749.0	0.750	164.1	5.807	123.1	92.3
Harris	128	10827.0	0.767	205.8	10.390	157.9	121.1
Ripple-carry	128	**4167.0**	6.984	**95.0**	**2.298**	663.2	4631.6

Table 6: Binary Parallel-Prefix Ling Adders with SkyWater 90nm Technology

Type	Bit	Area (um^2)	Delay (ns)	Power (uw)	Leakage (uw)	Energy (fJ)	EDP (fJ/GHz)
Designware	32	1516.0	0.508	49.9	0.642	25.3	**12.9**
Ling_BK	32	1847.0	0.604	**39.9**	1.463	**24.1**	14.6
Ling_HC	32	2822.0	0.504	90.4	2.996	45.5	23.0
Ling_KS	32	3670.0	0.499	124.0	3.909	61.9	30.9
Ling_Kn	32	3513.0	**0.490**	116.6	3.668	57.1	28.0
Ling_SK	32	2320.0	0.495	69.8	2.189	34.5	17.1
Ling_LF	32	2303.0	0.517	65.1	2.199	33.7	17.4
Ling_DH	32	2454.0	0.522	71.1	2.440	37.1	19.4
Ripple-carry	32	**1121.0**	1.794	42.6	**0.606**	76.4	137.1
Designware	64	3241.0	0.598	94.6	1.332	56.6	**33.8**
Ling_BK	64	3651.0	0.699	78.9	2.980	**55.2**	38.6
Ling_HC	64	6034.0	0.602	185.4	6.604	111.6	67.2
Ling_KS	64	8174.0	0.598	261.6	8.964	156.4	93.5
Ling_Kn	64	7948.0	**0.578**	263.5	8.486	152.3	88.0
Ling_SK	64	5089.0	0.605	138.7	4.391	83.9	50.8
Ling_LF	64	4260.0	0.631	105.0	3.562	66.2	41.8
Ling_DH	64	5954.0	0.597	178.8	6.341	106.7	63.7
Ripple-carry	64	**1908.0**	3.670	**76.9**	**0.901**	282.2	1035.8
Designware	128	6973.0	0.676	137.2	3.194	92.7	**62.7**
Ling_BK	128	7495.0	0.803	115.1	5.930	**92.4**	74.2
Ling_HC	128	12587.0	0.696	247.6	12.600	172.4	120.0
Ling_KS	128	19344.0	0.684	411.6	22.190	281.5	192.6
Ling_Kn	128	18254.0	0.688	380.8	20.150	262.0	180.3
Ling_SK	128	10855.0	0.700	185.5	8.950	129.8	90.9
Ling_LF	128	8865.0	0.744	147.4	7.540	109.7	81.6
Ling_DH	128	13441.0	**0.675**	273.0	14.960	184.3	124.4
Ripple-carry	128	**4167.0**	6.984	**95.0**	**2.298**	663.2	4631.6