Parameters for noise measurement:

- 10.5 mV per threshold DAC count.
- 6250 electrons per fC.
- Average unbonded gain $\approx$ 200 mV/fC.
- Average bonded gain $\approx$ 190 mV/fC.

h1-13 (backward HDI), $Q_n = 2$, Unbonded

Chip	Noise, t = 100 ns (counts)	Noise, t = 100 ns (electrons)	Noise, t = 400 ns (counts)	Noise, t = 400 ns (electrons)
0	1.11	370.	0.94	310.
1	1.78	580.	1.37	450.
2	1.19	390.	1.01	330.
3	1.08	350.	0.94	310.
4	1.05	340.	0.94	310.
5	1.12	370.	0.95	310.
6	1.18	390.	1.04	340.
7	1.28	420.	0.91	300.
8	1.26	410.	0.89	290.
9	1.15	380.	1.59	520.
10	1.24	410.	0.95	310.
11	1.38	450.	1.07	350.
12	1.18	390.	0.96	310.
13	1.23	400.	0.92	300.

h1-13 (backward HDI), $Q_n = 2$, Bonded

Chip	Noise, t = 100 ns (counts)	Noise, t = 100 ns (electrons)	Noise, t = 400 ns (counts)	Noise, t = 400 ns (electrons)
0	3.48	1200.	3.08	1060.
1	5.54	1910.	4.69	1610.
2	4.03	1390.	3.24	1120.
3	dead	dead	dead	dead
4	3.37	1160.	2.91	1000.
5	3.54	1220.	3.03	1040.
6	3.71	1270.	3.17	1090.
7	2.72	930.	2.16	740.
8	2.82	970.	2.22	760.
9	2.41	830.	1.79	610.
10	3.26	1120.	2.51	860.
11	3.15	1080.	2.68	920.
12	3.57	1230.	2.75	950.
13	3.74	1290.	2.78	950.

h1-13 (backward HDI), $Q_n = 3$, Unbonded

Chip	Noise, t = 100 ns		Noise, t = 400 ns	
	(counts)	(electrons)	(counts)	(electrons)
0	1.22	400.	0.99	320.
1	1.88	620.	1.59	520.
2	1.24	410.	1.02	330.
3	1.21	400.	0.97	320.
4	1.22	400.	0.96	320.
5	1.21	400.	0.95	310.
6	1.23	400.	1.02	340.
7	1.55	510.	0.90	300.
8	1.47	480.	0.92	300.
9	1.56	510.	1.17	390.
10	1.47	480.	0.93	300.
11	1.57	510.	1.04	340.
12	1.34	440.	0.95	310.
13	1.40	460.	0.94	310.

h1-13 (backward HDI), $Q_n = 3$, Bonded

Chip	Noise, t = 100 ns		Noise, t = 400 ns	
	(counts)	(electrons)	(counts)	(electrons)
0	4.20	1440.	3.30	1140.
1	6.20	2140.	5.32	1830.
2	4.34	1490.	3.31	1140.
3	dead	dead	dead	dead
4	3.78	1300.	3.03	1040.
5	3.95	1360.	3.15	1080.
6	4.06	1400.	3.21	1100.
7	2.88	990.	2.16	740.
8	2.99	1030.	2.21	760.
9	3.46	1190.	2.70	930.
10	3.32	1140.	2.48	850.
11	3.58	1230.	2.64	910.
12	3.68	1270.	2.78	960.
13	3.78	1300.	2.77	950.

h1-13 (backward HDI), $Q_n = 4$, Unbonded

Chip	Noise, t = 100 ns (counts)	Noise, t = 100 ns (electrons)	Noise, t = 400 ns (counts)	Noise, t = 400 ns (electrons)
0	1.43	470.	0.98	320.
1	2.19	720.	1.53	500.
2	1.49	490.	1.01	330.
3	1.27	420.	0.95	310.
4	1.26	410.	0.96	310.
5	1.37	450.	0.98	320.
6	1.53	500.	1.02	330.
7	1.67	550.	0.91	300.
8	1.69	550.	0.92	300.
9	1.73	570.	1.12	370.
10	1.66	540.	0.94	310.
11	1.65	540.	1.06	350.
12	1.50	490.	0.94	310.
13	1.54	510.	0.91	300.

h1-13 (backward HDI), $Q_n = 4$, Bonded

Chip	Noise, t = 100 ns (counts)	Noise, t = 100 ns (electrons)	Noise, t = 400 ns (counts)	Noise, t = 400 ns (electrons)
0	4.37	1500.	3.37	1160.
1	6.61	2280.	5.11	1760.
2	4.44	1530.	3.34	1150.
3	dead	dead	dead	dead
4	3.94	1360.	3.10	1070.
5	4.18	1440.	3.15	1080.
6	4.36	1500.	3.25	1120.
7	2.93	1010.	2.17	740.
8	3.05	1050.	2.22	760.
9	3.48	1200.	2.53	870.
10	3.44	1180.	2.49	850.
11	3.80	1310.	2.60	890.
12	3.70	1270.	2.72	930.
13	3.82	1310.	2.80	960.

h1-29 (forward HDI), $Q_n = 2$, Unbonded

Chip	Noise, t = 100 ns		Noise, t = 400 ns	
	(counts)	(electrons)	(counts)	(electrons)
0	1.11	360.	0.94	310.
1	1.03	340.	1.00	330.
2	1.13	370.	0.99	330.
3	1.19	390.	0.99	330.
4	1.07	350.	0.96	320.
5	1.19	390.	1.01	330.
6	1.20	390.	1.01	330.
7	1.35	440.	1.00	330.
8	1.65	540.	1.42	460.
9	1.82	600.	1.63	530.
10	dead	dead	dead	dead
11	1.33	430.	0.98	320.
12	1.16	380.	0.91	300.
13	dead	dead	dead	dead

h1-29 (forward HDI), $Q_n = 2$, Bonded

Chip	Noise, t = 100 ns		Noise, t = 400 ns	
	(counts)	(electrons)	(counts)	(electrons)
0	3.32	1140.	2.88	990.
1	2.50	860.	2.66	910.
2	3.78	1300.	3.21	1100.
3	3.99	1370.	3.14	1080.
4	3.57	1230.	3.12	1070.
5	3.74	1290.	3.14	1080.
6	3.73	1280.	3.20	1100.
7	2.90	1000.	2.26	780.
8	3.05	1050.	2.35	810.
9	2.57	880.	2.14	740.
10	dead	dead	dead	dead
11	3.21	1100.	2.66	910.
12	3.06	1050.	2.28	780.
13	dead	dead	dead	dead

h1-29 (forward HDI), $Q_n = 3$, Unbonded

Chip	Noise, t = 100 ns (counts)	Noise, t = 100 ns (electrons)	Noise, t = 400 ns (counts)	Noise, t = 400 ns (electrons)
0	1.20	390.	0.95	310.
1	1.21	400.	0.96	310.
2	1.27	420.	1.02	330.
3	1.25	410.	1.02	330.
4	1.18	390.	0.98	320.
5	1.27	420.	1.00	330.
6	1.30	430.	1.00	330.
7	1.45	480.	1.02	330.
8	1.79	590.	1.10	360.
9	1.92	630.	1.13	370.
10	dead	dead	dead	dead
11	1.43	470.	1.00	330.
12	1.30	430.	0.91	300.
13	dead	dead	dead	dead

h1-29 (forward HDI), $Q_n = 3$, Bonded

Chip	Noise, t = 100 ns (counts)	Noise, t = 100 ns (electrons)	Noise, t = 400 ns (counts)	Noise, t = 400 ns (electrons)
0	3.77	1300.	2.98	1020.
1	3.82	1310.	3.04	1040.
2	4.18	1440.	3.24	1120.
3	4.12	1420.	3.16	1090.
4	4.12	1420.	3.20	1100.
5	4.28	1470.	3.34	1150.
6	4.49	1540.	3.41	1170.
7	2.90	1000.	2.33	800.
8	3.31	1140.	2.51	860.
9	3.16	1080.	2.33	800.
10	dead	dead	dead	dead
11	3.61	1240.	2.77	950.
12	3.14	1080.	2.13	730.
13	dead	dead	dead	dead

h1-29 (forward HDI), $Q_n = 4$, Unbonded

Chip	Noise, t = 100 ns (counts)	Noise, t = 100 ns (electrons)	Noise, t = 400 ns (counts)	Noise, t = 400 ns (electrons)
0	1.49	490.	0.96	320.
1	1.27	420.	1.00	330.
2	1.33	440.	1.00	330.
3	1.52	500.	1.00	330.
4	1.29	420.	0.98	320.
5	1.42	470.	0.99	330.
6	1.61	530.	1.05	340.
7	1.60	520.	1.00	330.
8	1.91	630.	1.07	350.
9	2.28	750.	1.10	360.
10	dead	dead	dead	dead
11	1.60	530.	1.00	330.
12	1.56	510.	0.93	310.
13	dead	dead	dead	dead

h1-29 (forward HDI), $Q_n = 4$, Bonded

Chip	Noise, t = 100 ns (counts)	Noise, t = 100 ns (electrons)	Noise, t = 400 ns (counts)	Noise, t = 400 ns (electrons)
0	3.95	1360.	2.96	1020.
1	4.05	1390.	3.15	1080.
2	4.17	1430.	3.04	1050.
3	4.10	1410.	3.27	1130.
4	4.01	1380.	2.92	1000.
5	4.12	1420.	2.97	1020.
6	4.27	1470.	3.11	1070.
7	3.03	1040.	2.37	810.
8	3.22	1110.	2.59	890.
9	3.32	1140.	2.54	870.
10	dead	dead	dead	dead
11	3.69	1270.	2.86	980.
12	3.55	1220.	2.43	830.
13	dead	dead	dead	dead

Average Noise

Note: Chips 1 and 9 from h1-13 and chips 9, 10, and 13 from h1-29 were excluded from the averages due to abnormal behavior. The conversion from counts to electrons above assumes an average gain of 200 mV/fC before bonding to the silicon and 190 mV/fC after bonding to the silicon.

$Q_n = 2$, $Q_p = 61$

HDI	n-side				p-side			
	Unbonded		Bonded		Unbonded		Bonded	
	100 ns	400 ns	100 ns	400 ns	100 ns	400 ns	100 ns	400 ns
h1-13 (counts)	1.11	0.96	3.63	3.09	1.26	0.94	3.19	2.50
h1-29 (counts)	1.15	0.99	3.72	3.11	1.35	0.99	3.06	2.36
h1-13 (ele)	360	315	1250	1065	410	310	1100	860
h1-29 (ele)	375	325	1300	1075	445	325	1055	815

$Q_n = 3$, $Q_P = 60$

HDI	n-side				p-side			
	Unbonded		Bonded		Unbonded		Bonded	
	100 ns	400 ns	100 ns	400 ns	100 ns	400 ns	100 ns	400 ns
h1-13 (counts)	1.22	0.98	4.08	3.20	1.47	0.94	3.35	2.51
h1-29 (counts)	1.25	1.00	4.17	3.23	1.50	1.02	3.22	2.40
h1-13 (ele)	400	320	1410	1105	480	325	1155	865
h1-29 (ele)	410	345	1440	1115	490	350	1110	830

$Q_n = 4$, $Q_p = 59$

HDI	n-side				p-side			
	Unbonded		Bonded		Unbonded		Bonded	
	100 ns	400 ns	100 ns	400 ns	100 ns	400 ns	100 ns	400 ns
h1-13 (counts)	1.37	0.98	4.28	3.26	1.62	0.94	3.44	2.49
h1-29 (counts)	1.45	1.00	4.11	3.03	1.67	1.00	3.38	2.86
h1-13 (ele)	450	320	1480	1125	530	310	1190	860
h1-29 (ele)	475	330	1420	1050	550	330	1170	990