National Semiconductor Corporation
Radiation Effects Laboratory
Santa Clara, California 95052

ANALOG TOTAL DOSE PRELIMINARY RADIATION REPORT

Customer: None(Preliminary Report – Commercial Part)

Part Type: ADC08D1000

Input Bias Circuit: 06417HR (Preliminary)

Dose Rate: 36.27 rad(Si)/sec.

Test Program Used: TFR18D1000VF_C0

Tester: Thang Trinh / Tom Santiago

Wafer Run Number: N/A

Wafer Number: N/A

Package Type: VNX128A – 128L LQFP Exposed Pad

Production Lot # N/A

IPI #: N/A

Disposition: 100k Rads.

Summary:

Passes Room Temp @: - Post 100k Rads (Commercial limits).

Part Out of Room Temp Spec @: N/A
Functional Failed @: N/A
Parameters over Limit: - None

Review By: Thang Trinh
Reviewed By QA: Mike Maher

Standard Test Flow Sheet For Rad Testing

Customer Special Attachment
Rad Hard Linear

NSID# ADC08D1000 **LOT#** N/A **IPI#** N/A

Test Program: TFR18D1000VF_C0

Machine: Tiger **Operator:** Thang Trinh/Tom Santiago **Bias Board:** 06845RE

Start Time__11_:_46_AM_ **Finish Time**__16_:_02_PM_

Start Date: 08/10/05 **Finish Date:** 08/10/05 **QA:** 12/08/05

Control Units s/n: #____1_____ #____2_____ #_____ #_____

Duts : #_____3_____ #____4____ #____5_____ #_____7_____ #_____

Duts : #_____ #_____ #_____ #_____ #_____

Duts : #_____ #_____ #_____ #_____ #_____

Duts : #_____ #_____ #_____ #_____ #_____

Location Step	Operation Mtd/Cond	Qty In	Qty Out	Var	Mech	Rej	FF
PASS	Pre - Rad Read/Rec. Tp1	4	4	0	0	0	0
	Irradiation *20k* *Level*	4	4	0	0	N/A	N/A
PASS	Post Rad Read/Rec. Tp2	4	4	0	0	0	0

Standard Test Flow Sheet For Rad Testing

Customer Special Attachment
Rad Hard Linear

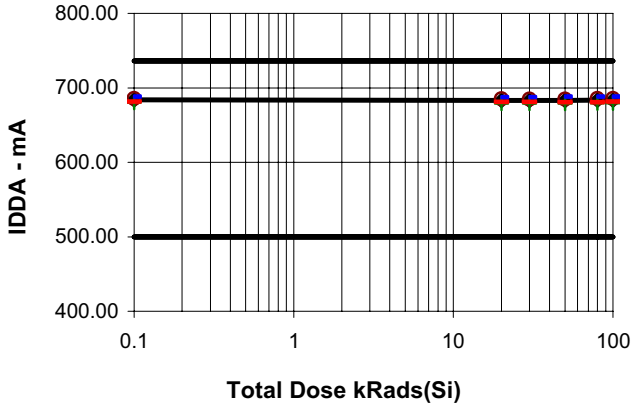
NSID# ADC08D1000 **LOT#** N/A **IPI#** N/A

Location Step	Operation Mtd/Cond	Qty In	Qty Out	Var	Mech	Rej	FF
	Irradiation 30k Level	4	4	0	0	N/A	N/A
PASS	**Post Rad Read/Rec. Tp3**	4	4	0	0	0	0
	Irradiation 50k Level	4	4	0	0	N/A	N/A
PASS	**Post Rad Read/Rec. Tp4**	4	4	0	0	0	0
	Irradiation 80k Level	4	4	0	0	N/A	N/A
PASS	**Post Rad Read/Rec. Tp5**	4	4	0	0	0	0
	Irradiation 100k Level	4	4	0	0	N/A	N/A
PASS	**Post Rad Read/Rec. Tp6**	4	4	0	0	0	0

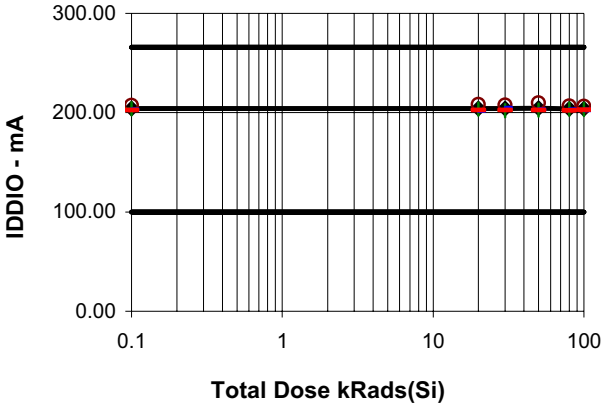
Note: All irradiations are done per (SC)RPI-3-217 and Method 1019.6 of Mil-Std-883

ADC08D1000CIYB
Total Dose Radiation Test Characteristics

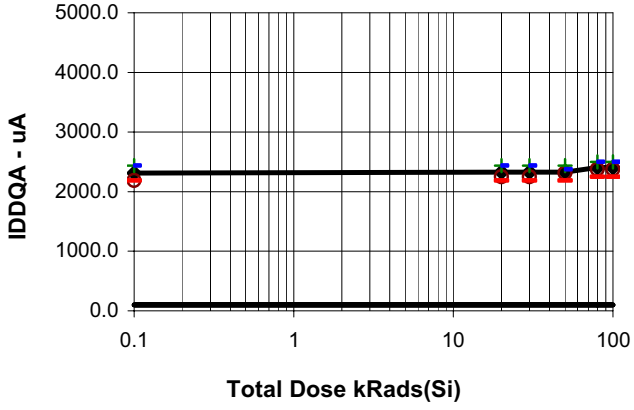
Analog Supply Current vs Total Dose



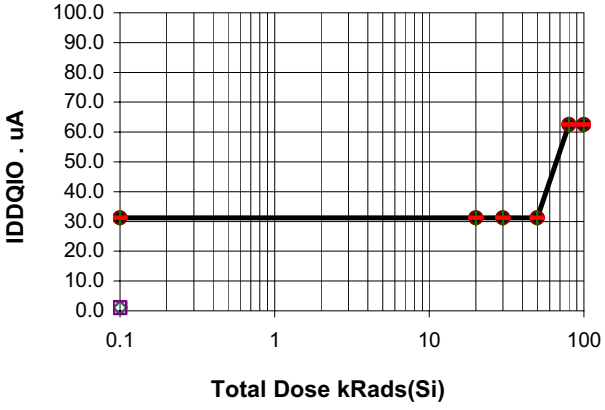
I/O Supply Current vs Total Dose



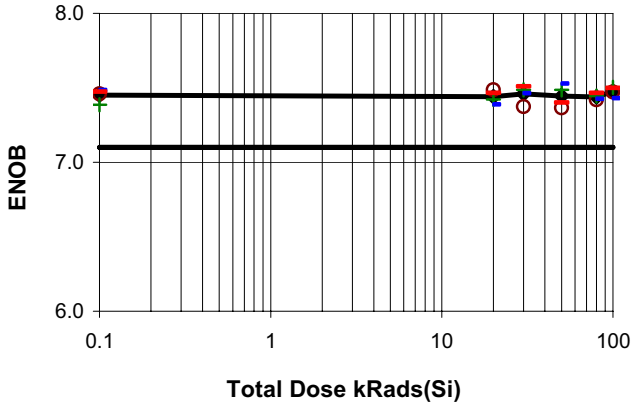
Analog Quiescent Current vs Total Dose



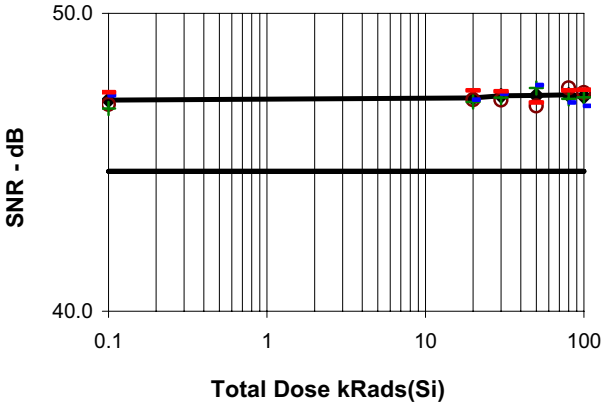
I/O Quiescent Current vs Total Dose



Effective Number of Bits vs Total Dose



Signal To Noise Ratio vs Total Dose



Note 1 : Solid lines indicate minimum and maximum limits of the Commercial Final Test Limits

Note 2 : Conditions for tests VDDA = VDDIO = 1.9V, Fclk = 1GHz, Fin = 498MHz

ADC08D1000CIYB
Total Dose Radiation Test Characteristics

Analog Supply Current
vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail[1]
0.1	683.719	680.094	687.938	3.617	0
20	683.157	678.844	687.438	3.875	0
30	683.047	678.906	687.188	3.717	0
50	683.094	678.906	687.938	4.087	0
80	683.500	679.500	688.250	4.088	0
100	683.625	679.500	688.250	3.982	0

I/O Supply Current
vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail[1]
0.1	204.250	202.750	207.250	2.072	0
20	204.110	202.000	208.250	2.828	0
30	204.235	202.000	207.688	2.529	0
50	204.563	202.750	209.750	3.460	0
80	203.891	202.281	206.781	1.988	0
100	203.750	202.469	206.469	1.843	0

Analog Quiescent Current
vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail[1]
0.1	2312.500	2187.500	2437.500	144.338	0
20	2328.125	2187.500	2437.500	128.847	0
30	2328.125	2187.500	2437.500	128.847	0
50	2328.125	2187.500	2437.500	106.739	0
80	2406.250	2250.000	2500.000	119.678	0
100	2406.250	2250.000	2500.000	119.678	0

I/O Quiescent Current
vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail[1]
0.1	31.250	31.250	31.250	0.000	0
20	31.250	31.250	31.250	0.000	0
30	31.250	31.250	31.250	0.000	0
50	31.250	31.250	31.250	0.000	0
80	62.500	62.500	62.500	0.000	0
100	62.500	62.500	62.500	0.000	0

Effective Number of Bits
vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail[1]
0.1	7.451	7.386	7.484	0.044	0
20	7.440	7.388	7.487	0.044	0
30	7.459	7.375	7.509	0.059	0
50	7.445	7.365	7.527	0.075	0
80	7.439	7.420	7.465	0.020	0
100	7.476	7.430	7.504	0.034	0

Signal To Noise Ratio
vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail[1]
0.1	47.087	46.805	47.353	0.256	0
20	47.157	47.026	47.413	0.174	0
30	47.232	47.090	47.375	0.128	0
50	47.243	46.885	47.586	0.348	0
80	47.260	47.003	47.490	0.230	0
100	47.211	46.892	47.430	0.235	0

Note 1 : Conditions for tests VDDA = VDDIO = 1.9V, Fclk = 1GHz, Fin = 498MHz

ADC08D1000CIYB
Total Dose Radiation Test Characteristics

Analog Supply Current
vs Total Dose

Dose	D3	D4	D5	D7
0.1	685.4380	680.0940	687.9380	681.4060
20	685.1880	678.8440	687.4380	681.1560
30	684.9380	678.9060	687.1880	681.1560
50	684.8750	678.9060	687.9380	680.6560
80	685.5000	679.5000	688.2500	680.7500
100	685.5000	679.5000	688.2500	681.2500

I/O Supply Current
vs Total Dose

Dose	D3	D4	D5	D7
0.1	207.2500	204.0000	203.0000	202.7500
20	208.2500	203.5000	202.0000	202.6880
30	207.6880	202.0000	204.5000	202.7500
50	209.7500	202.7500	203.0000	202.7500
80	206.7810	203.4690	203.0310	202.2810
100	206.4690	203.2810	202.4690	202.7810

Analog Quiescent Current
vs Total Dose

Dose	D3	D4	D5	D7
0.1	2187.5000	2437.5000	2437.5000	2187.5000
20	2250.0000	2437.5000	2437.5000	2187.5000
30	2250.0000	2437.5000	2437.5000	2187.5000
50	2312.5000	2437.5000	2375.0000	2187.5000
80	2375.0000	2500.0000	2500.0000	2250.0000
100	2375.0000	2500.0000	2500.0000	2250.0000

I/O Quiescent Current
vs Total Dose

Dose	D3	D4	D5	D7
0.1	31.2500	31.2500	31.2500	31.2500
20	31.2500	31.2500	31.2500	31.2500
30	31.2500	31.2500	31.2500	31.2500
50	31.2500	31.2500	31.2500	31.2500
80	62.5000	62.5000	62.5000	62.5000
100	62.5000	62.5000	62.5000	62.5000

Effective Number of Bits
vs Total Dose

Dose	D3	D4	D5	D7
0.1	7.4591	7.3861	7.4838	7.4739
20	7.4868	7.4207	7.3884	7.4659
30	7.3747	7.4874	7.4645	7.5092
50	7.3646	7.4870	7.5274	7.4005
80	7.4198	7.4448	7.4269	7.4653
100	7.4720	7.5040	7.4296	7.4982

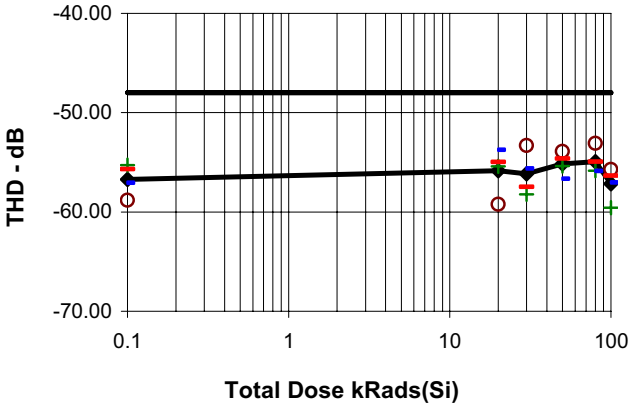
Signal To Noise Ratio
vs Total Dose

Dose	D3	D4	D5	D7
0.1	46.9419	46.8050	47.2475	47.3525
20	47.0933	47.0255	47.0962	47.4134
30	47.0901	47.1666	47.2977	47.3753
50	46.8849	47.4937	47.5862	47.0082
80	47.4897	47.1321	47.0034	47.4161
100	47.3367	47.1837	46.8924	47.4299

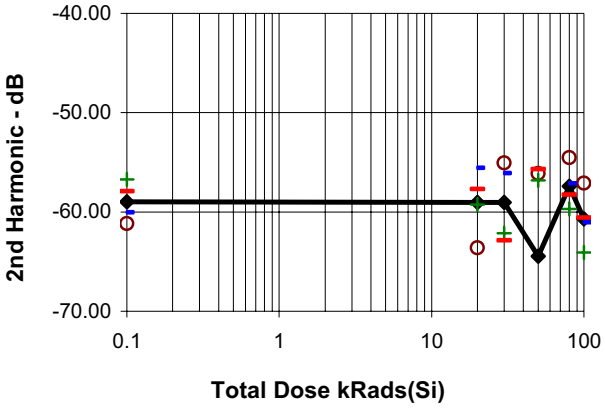
Note 1 : Conditions for tests VDDA = VDDIO = 1.9V, Fclk = 1GHz, Fin = 498MHz

ADC08D1000CIYB
Total Dose Radiation Test Characteristics

Total Harmonic Distortion vs Total Dose



2nd Harmonic vs Total Dose



Note 1 : Solid lines indicate minimum and maximum limits of the Commercial Final Test Limits

Note 2 : Conditions for tests VDDA = VDDIO = 1.9V, Fclk = 1GHz, Fin = 498MHz

ADC08D1000CIYB
Total Dose Radiation Test Characteristics

Total Harmonic Distortion
vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail[1]
0.1	-56.722	-58.830	-55.291	1.600	0
20	-55.837	-59.235	-53.732	2.374	0
30	-56.163	-58.234	-53.315	2.193	0
50	-55.149	-56.671	-53.919	1.175	0
80	-54.935	-55.889	-53.087	1.309	0
100	-57.162	-59.564	-55.709	1.691	0

2nd Harmonic
vs Total Dose

Dose	Avg.	Min.	Max.	S. Dev.	Fail[1]
0.1	-58.966	-61.173	-56.720	2.017	0
20	-59.033	-63.608	-55.557	3.408	0
30	-59.045	-62.871	-55.060	4.030	0
50	-64.466	-89.253	-55.678	16.531	0
80	-57.405	-59.696	-54.534	2.181	0
100	-60.702	-64.081	-57.097	2.861	0

Note 1 : Conditions for tests VDDA = VDDIO = 1.9V, Fclk = 1GHz, Fin = 498MHz

ADC08D1000CIYB
Total Dose Radiation Test Characteristics

Total Harmonic Distortion
vs Total Dose

Dose	D1	D2	D3	D4
0.1	-58.8299	-55.2907	-57.0771	-55.6914
20	-59.2345	-55.4181	-53.7318	-54.9645
30	-53.3148	-58.2343	-55.6211	-57.4813
50	-53.9192	-55.3671	-56.6712	-54.6371
80	-53.0870	-55.8378	-55.8891	-54.9263
100	-55.7088	-59.5643	-57.0397	-56.3362

2nd Harmonic
vs Total Dose

Dose	D1	D2	D3	D4
0.1	-61.1732	-56.7197	-60.0550	-57.9176
20	-63.6084	-59.2649	-55.5571	-57.7017
30	-55.0601	-62.1410	-56.1089	-62.8706
50	-56.1156	-56.8187	-89.2532	-55.6776
80	-54.5338	-59.6955	-57.1414	-58.2478
100	-57.0966	-64.0812	-61.0478	-60.5832

Note 1 : Conditions for tests VDDA = VDDIO = 1.9V, Fclk = 1GHz, Fin = 498MHz