PPM-91-330

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UNISYS

(37)

Interoffice Memorandum

To
W. Beyah
Department
Code 300.1
From
K. Sahu
Department
7809
Subject
Radiation Report on ISTP
Non-Common Buy Part No. ADC0808MJB

PPM-91-330
Date
June 3, 1991
Location
Lanham
Telephone
731-8954
Location
Lanham
cc
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A radiation evaluation was performed on ADC0808MJB to determine the total dose tolerance of these parts. A brief summary of the test results is provided below. For detailed information, refer to Tables I through V and Figure 1.

The total dose testing was performed using a cobalt-60 gamma ray source. During the radiation testing, eight parts were irradiated under bias (see Figure 1 for bias configuration), and two parts were used as control samples. The total dose radiation steps were 2.5, 5, 10, 15, 20, 30, and 50 krads. After 50 krads, parts were annealed at 25°C for 24 and 168 hours. The dose rate was between 0.1 - 1.0 krad/hour, depending on the total dose level (see Table II for radiation schedule). After each radiation exposure and annealing treatment, parts were electrically tested according to the test conditions and the specification limits listed in Table III. For a detailed description of each test, refer to Appendix I.

All (8) parts passed all initial electrical measurements. Although all parts passed all test after 2.5 krads, a drift in offset and differential nonlinearity (Codewidth) was observed. After 5 krads, seven of the eight parts marginally failed the mid-scale active channel check (Test 2.X) and all parts failed the inactive channel check (Test 2.XX). In addition, some parts failed the following tests: CHN #7 Full Scale Convert, Missing Codes, CHN #3 Offset Error and Codewidth tests. After 10 krads, all parts failed the above tests except for two parts (SNs 2 and 6) which passed the Codewidth Tests. After 15 krads, only SNs 4 and 5 exhibited fully functional input multiplexors. The remaining devices had at least one "dead" channel. Gain and Offset errors continued to degrade on these two parts. One part, Sn 6, exhibited a non-functional EOC output, while three parts (SNs 1, 2 and 6) failed other digital output tests.

After additional cumulative exposures to 20 and 30 krads, all parts had continued to degrade to the point where they could be considered non-operational. The parts ceased responding to inputs after 50 krads, and no significant recovery was observed in any of the above parameters on annealing the parts for 24 and 168 hours. Table IV provides the mean and standard deviation values for each parameter after different radiation exposures and annealing treatments. It also provides a summary of functional test results after each radiation/annealing step. Table V is a listing of the electrical measurement data on SN#3 for all tests performed over the following radiation steps: Initial Electrical Measurements, Post 5krad EMs, Post 10krad EMs and Post 20krad EMs. See Appendix I for a description of each test performed.

Any further details about this evaluation can be obtained upon request. If you have any questions, please call me at 301-731-8954.

TABLE I. Part Information

Generic Part Number:	ADC0808
ISTP Non-Common Buy Part Number:	ADC0808MJB
ISTP Non-Common Buy Control Number:	1994
Charge Number:	C14024
Manufacturer:	Texas Instruments
Quantity Procured:	74
Lot Date Code:	9033
Quantity Tested:	10
Serial Numbers of Radiation Samples:	1, 2, 3, 4 5, 6, 7, 8
Serial Numbers of Control Samples:	9, 10
Part Function:	A/D Converter
Part Technology:	CMOS
Package Style:	24-Pin DIP
Test Engineer:	A. Karygiannis

TABLE II. Radiation Schedule

EVENTS	DATE
1) Initial Electrical Measurements	02/26/91
2) 2.5 krads irradiation @ 125 rads/hr	02/26/91
Post 2.5 krads Electrical Measurements	02/27/91
3) 5 krads irradiation @ 125 rads/hr	02/27/91
Post 5 krads Electrical Measurements	02/28/91
4) 10 krads irradiation @ 250 rads/hr	02/28/91
Post 10 krads Electrical Measurements	03/01/91
5) 15 krads irradiation @ 250 rads/hr	03/01/91
Post 15 krads Electrical Measurements	03/02/91
6) 20 krads irradiation @ 250 rads/hr	03/02/91
Post 20 krads Electrical Measurements	03/03/91
7) 30 krads irradiation @ 500 rads/hr	03/03/91
Post 30 krads Electrical Measurements	03/04/91
8) 50 krads irradiation @ 1000 rads/hr	03/04/91
Post 50 krads Electrical Measurements	03/05/91
9) 24 hrs annealing	03/05/91
Post 24 hr Electrical Measurements	03/06/91
10) 168 hrs annealing	03/06/91
Post 168 hr Electrical Measurements	03/12/91

Notes:

- All parts were radiated under bias at the cobalt-60 gamma ray facility at GSFC.
- All electrical measurements were performed off-site at 25°C.
- Annealing performed at 25°C under bias.

Table III. Electrical Characteristics of ADC0808MJB *

Test#	Description	Min	Max
1	+5V Supply Current	-0.1mA	3mA
2.X	CHN X active, check active CHN	125 code	130 code
2.XY	CHN X active, Y inactive CHN chk	0 code	10 code
3	Channel #7 Fullscale Convert	255 code	255 code
4	Data out HI drive @ -360uA	4.6V	5.1V
5	Tri-state Leakage Current	-3uA	3uA
6	Input Line loading @ 0V	-1uA	1uA
7	Channel #7 Convert to 0's	0 code	0 code
8	Data out LOW drive @ 1.6mA	0V	0.45V
9	Missing codes test Channel #7	0	0
1X.1	Channel X Offset Error	-1 LSB	1 LSB
1X.2	Channel X Gain Error	-1 LSB	1 LSB
1X.3	Channel X Linearity 1	-0.6 LSB	0.6 LSB
1X.4	Channel X Code Width 1	0.4 LSB	1.6 LSB
1X.5	Channel X Linearity 2	-0.6 LSB	0.6 LSB
1X.6	Channel X Code Width 2	0.4 LSB	1.6 LSB
1X.7	Major Transition	1.0	1.0
18	Tconv	90us	116us

* For more details, see Appendix I and Table V.

Table IV. Summary of Electrical Measurements after Total Dose Exposures and Annealing for ADC0808MJB

Test		Spec. Limits		Initials		Total Dose Exposure (krads)											
						2.5		5		10		15		20		50	
No.	Parameters	min	max	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
2.X	CHN X Active	125	130	128	0	127.7	0.6	124.2	2.0	119.3	1.3	110	30	142	9	**	
2.XY	Inact.CH. chk	0	10	9.1	0.4	9.7	0.6	12.1	0.8	21.0	1.3	35.8	.8	46.5	2.8	**	
3	CHN#7 FS	255	255	255	0	255	0	254.6	0.5	252.0	0.5	223	77	220	57	**	
7	CHN#7 0 conv	0	0	0	0	0	0	0.9	1.5	8.1	1.4	105	121	117	117	**	
1	IS mA	-0.1	3.0	0.7	0	0.6	0	0.5	0	0.3	0	.22	.01	0.1	0.1	**	
4.05	Dout High V	4.6	5.1	4.8	0	4.8	0	4.8	0	4.8	0	4.2	1.0	4.2	4.0	**	
5.01	IZ @ 0V uA	-3.0	3.0	-0.1	0.3	-0.2	0.1	-0.2	0.2	-0.1	0.3	.32	.13	-0.1	0.4	**	
6.01	Input load uA	-1.0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	**	
8.01	Dout Low V	0	0.45	0.1	0	0.1	0	0.8	5.0	0.8	5.0	3.6	2.4	0.8	5.0	**	
9	Missing Codes	0	0	0	0	0	0	0.7	0.5	9.5	1.4	21.5	.7	36.8	2.6	**	
13.1	OFS Error LSB	-1	1	.10	.18	.31	.65	-1.5	2.5	-17.7	2.2	-30.5	0	-40.8	0	**	
13.4	Codewdth1 LSB	0.4	1.6	.99	.01	.91	.14	.50	.35	.47	.44	.78	0	8.3	0	**	
13.6	Codewdth2 LSB	0.4	1.6	1.05	.01	1.17	.39	1.04	.04	11.7	11.4	1.03	0	**		**	
18	Tconv us	90	116	95.0	1.0	95.7	1.0	95.3	1.0	95.7	1.0	95.6	.3	**		**	

<Notes on next page>

Notes for Table IV

1/ The mean and standard deviation values were calculated over the eight parts irradiated in this testing. The control samples remained constant throughout the testing and are not included in this table.

2/ Table IV provides radiation characteristics of parts at selected total dose exposures and annealing treatments. The data at other radiation exposures and annealing treatments is available and can be obtained upon request.

3/ Note that Table IV does not contain information on all tests listed in Table III. In addition, for tests 4, 5, 6, 8 and 13, the mean and standard deviation values were calculated over a selected channel (eg. Channel 5 for test 4.0). The data obtained for the tests not shown in Table IV, showed similiar degradation characteristics.

** Beginning at 15 krads, the end of conversion (EOC) output was no longer functioning for some parts. The mean at 15 krads, shown in Table IV, was calculated from the seven parts for which an EOC output was detected.

TABLE V. Electrical Measurement Data 1,2

Tst#	Test Name	Initial	5 krad	10 krad	20 krad
1	+5V SUPPLY CURRENT	0.76MA	0.50MA	0.35MA	0.15MA
*2	CHN#0 ACTIVE CHECK CHN#0	128.00CODE	125.00CODE	119.00CODE	132.00CODE
2.01	CHN#0 ACTIVE CHECK CHN#1	8.00CODE	12.00CODE	19.00CODE	132.00CODE
2.02	CHN#0 ACTIVE CHECK CHN#2	3.00CODE	6.00CODE	14.00CODE	132.00CODE
2.03	CHN#0 ACTIVE CHECK CHN#3	2.00CODE	6.00CODE	13.00CODE	132.00CODE
2.04	CHN#0 ACTIVE CHECK CHN#4	1.00CODE	6.00CODE	14.00CODE	36.00CODE
2.05	CHN#0 ACTIVE CHECK CHN#5	1.00CODE	5.00CODE	13.00CODE	36.00CODE
2.06	CHN#0 ACTIVE CHECK CHN#6	1.00CODE	6.00CODE	14.00CODE	36.00CODE
2.07	CHN#0 ACTIVE CHECK CHN#7	3.00CODE	5.00CODE	14.00CODE	26.00CODE
2.1-	CHN#1 ACTIVE CHECK CHN#1	128.00CODE	125.00CODE	119.00CODE	132.00CODE
2.11	CHN#1 ACTIVE CHECK CHN#2	10.00CODE	12.00CODE	21.00CODE	132.00CODE
2.12	CHN#1 ACTIVE CHECK CHN#3	2.00CODE	6.00CODE	14.00CODE	132.00CODE
2.13	CHN#1 ACTIVE CHECK CHN#4	3.00CODE	5.00CODE	15.00CODE	37.00CODE
2.14	CHN#1 ACTIVE CHECK CHN#5	4.00CODE	5.00CODE	14.00CODE	37.00CODE
2.15	CHN#1 ACTIVE CHECK CHN#6	1.00CODE	5.00CODE	15.00CODE	37.00CODE
2.16	CHN#1 ACTIVE CHECK CHN#7	3.00CODE	5.00CODE	16.00CODE	28.00CODE
2.2	CHN#2 ACTIVE CHECK CHN#2	128.00CODE	125.00CODE	123.00CODE	132.00CODE
2.21	CHN#2 ACTIVE CHECK CHN#3	10.00CODE	12.00CODE	21.00CODE	36.00CODE
2.22	CHN#2 ACTIVE CHECK CHN#4	2.00CODE	6.00CODE	16.00CODE	36.00CODE
2.23	CHN#2 ACTIVE CHECK CHN#5	3.00CODE	5.00CODE	13.00CODE	36.00CODE
2.24	CHN#2 ACTIVE CHECK CHN#6	3.00CODE	5.00CODE	16.00CODE	36.00CODE
2.25	CHN#2 ACTIVE CHECK CHN#7	3.00CODE	6.00CODE	14.00CODE	36.00CODE
2.3	CHN#3 ACTIVE CHECK CHN#3	128.00CODE	125.00CODE	120.00CODE	133.00CODE
2.31	CHN#3 ACTIVE CHECK CHN#4	8.00CODE	12.00CODE	20.00CODE	133.00CODE
2.32	CHN#3 ACTIVE CHECK CHN#5	3.00CODE	7.00CODE	15.00CODE	36.00CODE
2.33	CHN#3 ACTIVE CHECK CHN#6	4.00CODE	6.00CODE	16.00CODE	30.00CODE
2.34	CHN#3 ACTIVE CHECK CHN#7	1.00CODE	5.00CODE	15.00CODE	32.00CODE
2.4	CHN#4 ACTIVE CHECK CHN#4	128.00CODE	125.00CODE	119.00CODE	133.00CODE
2.41	CHN#4 ACTIVE CHECK CHN#5	10.00CODE	12.00CODE	22.00CODE	133.00CODE
2.42	CHN#4 ACTIVE CHECK CHN#6	2.00CODE	6.00CODE	16.00CODE	133.00CODE
2.43	CHN#4 ACTIVE CHECK CHN#7	3.00CODE	6.00CODE	15.00CODE	36.00CODE
2.5	CHN#5 ACTIVE CHECK CHN#5	128.00CODE	125.00CODE	119.00CODE	118.00CODE
2.51	CHN#5 ACTIVE CHECK CHN#6	10.00CODE	12.00CODE	22.00CODE	37.00CODE
2.52	CHN#5 ACTIVE CHECK CHN#7	4.00CODE	6.00CODE	16.00CODE	29.00CODE
2.6	CHN#6 ACTIVE CHECK CHN#6	128.00CODE	125.00CODE	123.00CODE	29.00CODE
2.61	CHN#6 ACTIVE CHECK CHN#7	8.00CODE	12.00CODE	21.00CODE	29.00CODE
2.7	CHN#7 ACTIVE CHECK CHN#7	128.00CODE	125.00CODE	120.00CODE	133.00CODE
3	CHN#7 FULLSCALE CONVERT	255.00CODE	255.00CODE	252.00CODE	251.00CODE
4.01	DATA OUT HI @ -360UA	4.83V	4.82V	-0.03V	4.80V
4.02	DATA OUT HI @ -360UA	4.83V	4.82V	-0.03V	4.80V
4.03	DATA OUT HI @ -360UA	4.83V	4.82V	4.82V	-0.03V
4.04	DATA OUT HI @ -360UA	4.83V	4.82V	4.82V	4.80V
4.05	DATA OUT HI @ -360UA	4.83V	4.82V	4.82V	4.80V

* The data on tests 2 to 3 is summarized under the functional test in Table IV. F[illegible] example, in test 2, if the parts read between 125 - 130 code, they are [illegible]ing functionally. If a reading was outside this range, it was considered a functional failure. Similarly, for test 2.01, the functional passing range is 0 to 10 code, and any reading beyond this range is considered a functional failure.

TABLE V. (continued)

Tst#	Test Name	Initial	5 krad	10 krad	20 krad
4.06	DATA OUT HI @ -360UA	4.83V	4.82V	4.82V	4.80V
4.07	DATA OUT HI @ -360UA	4.83V	4.82V	4.82V	4.80V
4.08	DATA OUT HI @ -360UA	4.83V	4.82V	4.81V	4.80V
5.01	TRI-STATE CURRENT @ 0V	-0.39UA	-0.04UA	-0.09UA	-0.21UA
5.02	TRI-STATE CURRENT @ 0V	-0.16UA	-0.08UA	0.00UA	-0.17UA
5.03	TRI-STATE CURRENT @ 0V	-0.34UA	0.05UA	0.09UA	-0.17UA
5.04	TRI-STATE CURRENT @ 0V	0.02UA	-0.04UA	0.05UA	-0.03UA
5.05	TRI-STATE CURRENT @ 0V	-0.25UA	0.01UA	0.05UA	-0.26UA
5.06	TRI-STATE CURRENT @ 0V	-0.16UA	0.01UA	-0.04UA	0.01UA
5.07	TRI-STATE CURRENT @ 0V	-0.43UA	0.05UA	0.00UA	-0.48UA
5.08	TRI-STATE CURRENT @ 0V	0.02UA	-0.04UA	-0.13UA	-0.26UA
6.01	INPUT LINE LOADING @ 0V	0.00UA	0.00UA	-0.00UA	0.00UA
6.02	INPUT LINE LOADING @ 0V	0.00UA	0.00UA	0.00UA	0.00UA
6.03	INPUT LINE LOADING @ 0V	0.00UA	0.00UA	-0.00UA	0.00UA
6.04	INPUT LINE LOADING @ 0V	0.00UA	0.00UA	0.00UA	0.00UA
6.05	INPUT LINE LOADING @ 0V	-0.00UA	0.00UA	-0.00UA	-0.00UA
6.06	INPUT LINE LOADING @ 0V	0.00UA	0.00UA	0.00UA	0.00UA
7	CHN#7 CONVERT TO 0'S	0.00CODE	2.00CODE	8.00CODE	16.00CODE
8.01	DATA OUTPUT LOW @ 1.6MA	0.11V	0.12V	0.13V	0.15V
8.02	DATA OUTPUT LOW @ 1.6MA	0.11V	5.59V	0.12V	0.15V
8.03	DATA OUTPUT LOW @ 1.6MA	0.11V	0.12V	0.13V	0.15V
8.04	DATA OUTPUT LOW @ 1.6MA	0.16V	0.17V	5.60V	0.20V
8.05	DATA OUTPUT LOW @ 1.6MA	0.11V	0.12V	0.12V	5.61V
8.06	DATA OUTPUT LOW @ 1.6MA	0.11V	0.12V	0.13V	0.15V
8.07	DATA OUTPUT LOW @ 1.6MA	0.12V	0.12V	0.13V	0.16V
8.08	DATA OUTPUT LOW @ 1.6MA	0.12V	0.12V	0.13V	0.16V
10.1	CHAN#0 OFFSET ERROR	0.09LSB	-5.11LSB	-16.79LSB	231.20LSB
10.2	CHAN#0 GAIN ERROR	0.25LSB	0.26LSB	0.28LSB	0.13LSB
10.3	NON-LIN CODE 62	0.53LSB	4.08LSB	7.94LSB	12.94LSB
10.4	CODE WIDTH (DNL) CODE 62	1.00LSB	1.01LSB	0.22LSB	0.00LSB
10.5	NON-LIN CODE 241	-0.17LSB	-1.03LSB	-1.47LSB	-184.58LSB
10.6	CODE WIDTH (DNL) CODE 241	1.04LSB	1.00LSB	1.07LSB	174.97LSB
10.7	MAJOR TRANS'S +-3 (LST) FINIS	1.00	1.00	1.00	1.00
11.1	CHAN#1 OFFSET ERROR	0.19LSB	-3.11LSB	-17.72LSB	7.60LSB
11.2	CHAN#1 GAIN ERROR	0.25LSB	0.26LSB	0.28LSB	0.36LSB
11.3	NON-LIN CODE 63	0.48LSB	3.36LSB	8.30LSB	13.76LSB
11.4	CODE WIDTH (DNL) CODE 63	0.51LSB	0.36LSB	0.50LSB	3.45LSB
11.5	NON-LIN CODE 241	-0.17LSB	-1.20LSB	-1.48LSB	-59.83LSB
11.6	CODE WIDTH (DNL) CODE 241	1.04LSB	1.00LSB	1.11LSB	74.59LSB
11.7	MAJOR TRANS'S +-3 (LST) FINIS	1.00	1.00	1.00	1.00
12.1	CHAN#2 OFFSET ERROR	0.09LSB	-4.11LSB	-17.00LSB	-42.21LSB
12.2	CHAN#2 GAIN ERROR	0.25LSB	0.26LSB	0.28LSB	0.30LSB
12.3	NON-LIN CODE 62	0.53LSB	3.82LSB	8.14LSB	13.27LSB
12.4	CODE WIDTH (DNL) CODE 62	1.00LSB	0.96LSB	0.92LSB	0.55LSB
12.5	NON-LIN CODE 241	-0.18LSB	-1.12LSB	-1.33LSB	-1.94LSB
12.6	CODE WIDTH (DNL) CODE 241	1.01LSB	1.00LSB	1.01LSB	1.35LSB
12.7	MAJOR TRANS'S +-3 (LST) FINIS	1.00	1.00	1.00	1.00

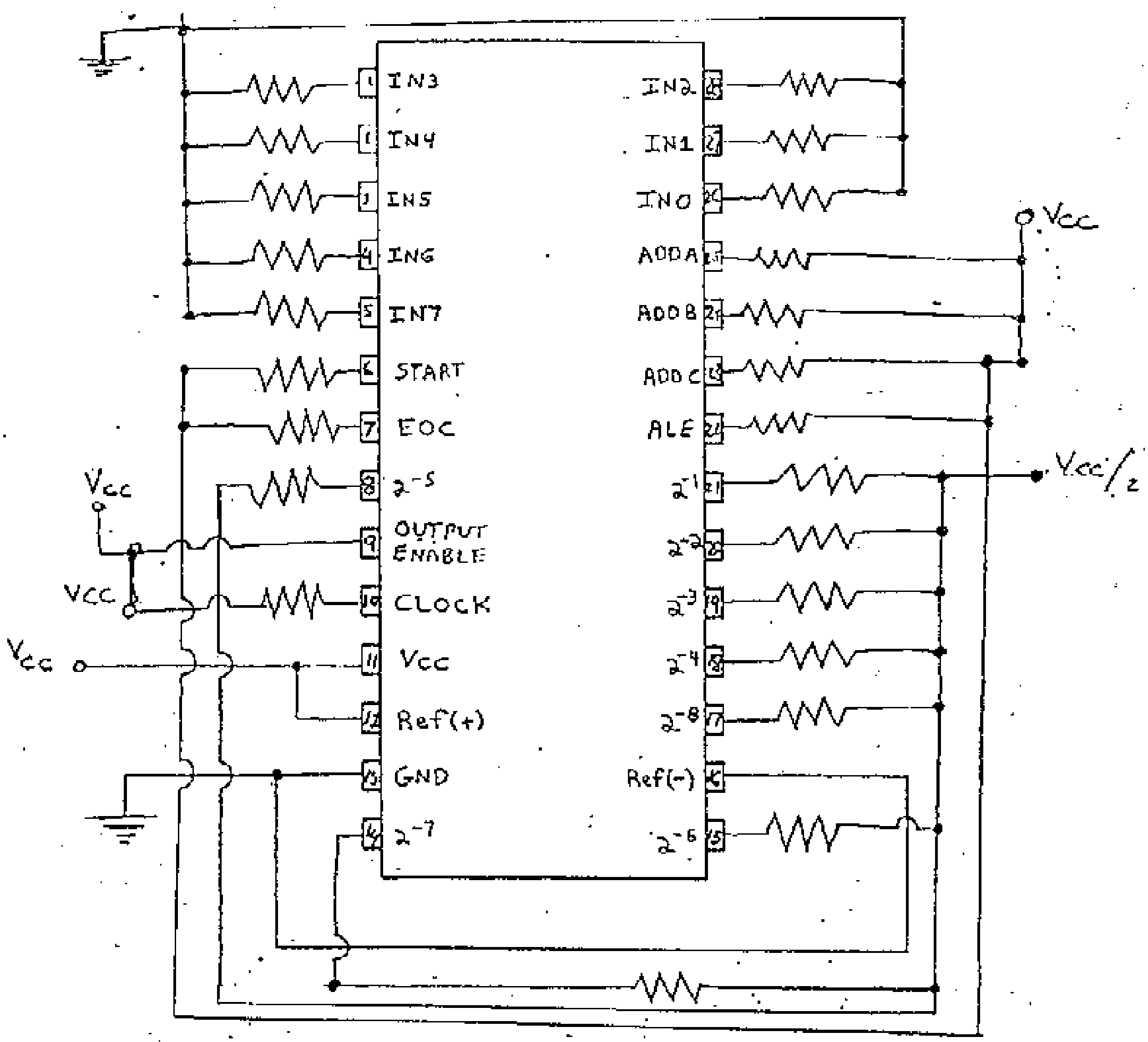
TABLE V. (continued)

Tst#	Test Name	Initial	5 krad	10 krad	20 krad
13.1	CHAN#3 OFFSET ERROR	0.22LSB	-2.41LSB	-17.39LSB	3.61LSB
13.2	CHAN#3 GAIN ERROR	0.25LSB	0.26LSB	0.28LSB	0.36LSB
13.3	NON-LIN CODE 63	0.47LSB	3.28LSB	8.08LSB	13.66LSB
13.4	CODE WIDTH (DNL) CODE 63	0.98LSB	0.24LSB	0.98LSB	2.94LSB
13.5	NON-LIN CODE 241	-0.21LSB	-1.15LSB	-18.41LSB	-59.12LSB
13.6	CODE WIDTH (DNL) CODE 241	1.03LSB	1.00LSB	22.83LSB	73.79LSB
13.7	MAJOR TRANS'S +-3 (LST) FINIS	1.00	1.00	1.00	1.00
14.1	CHAN#4 OFFSET ERROR	0.19LSB	-2.63LSB	-18.00LSB	-44.96LSB
14.2	CHAN#4 GAIN ERROR	0.25LSB	0.26LSB	0.28LSB	0.31LSB
14.3	NON-LIN CODE 63	0.47LSB	3.31LSB	8.45LSB	12.94LSB
14.4	CODE WIDTH (DNL) CODE 63	1.00LSB	0.25LSB	0.73LSB	0.00LSB
14.5	NON-LIN CODE 241	-0.20LSB	-1.27LSB	-18.10LSB	-2.01LSB
14.6	CODE WIDTH (DNL) CODE 241	1.03LSB	1.02LSB	22.86LSB	3.36LSB
14.7	MAJOR TRANS'S +-3 (LST) FINIS	1.00	1.00	1.00	1.00
15.1	CHAN#5 OFFSET ERROR	0.19LSB	-4.44LSB	-17.48LSB	-45.33LSB
15.2	CHAN#5 GAIN ERROR	0.25LSB	0.26LSB	0.28LSB	0.30LSB
15.3	NON-LIN CODE 63	0.47LSB	4.06LSB	8.30LSB	13.08LSB
15.4	CODE WIDTH (DNL) CODE 63	1.00LSB	0.19LSB	0.23LSB	0.00LSB
'5.5	NON-LIN CODE 241	-0.18LSB	-1.19LSB	-18.36LSB	-1.53LSB
5.6	CODE WIDTH (DNL) CODE 241	1.01LSB	1.01LSB	22.78LSB	15.62LSB
15.7	MAJOR TRANS'S +-3 (LST) FINIS	1.00	1.00	1.00	1.00
16.1	CHAN#6 OFFSET ERROR	0.13LSB	-2.41LSB	-18.00LSB	-46.90LSB
16.2	CHAN#6 GAIN ERROR	0.25LSB	0.26LSB	0.28LSB	0.31LSB
16.3	NON-LIN CODE 63	0.50LSB	3.25LSB	8.45LSB	13.16LSB
16.4	CODE WIDTH (DNL) CODE 63	1.00LSB	0.19LSB	0.85LSB	0.00LSB
16.5	NON-LIN CODE 242	-0.17LSB	-1.32LSB	-18.10LSB	-2.00LSB
16.6	CODE WIDTH (DNL) CODE 242	1.04LSB	1.03LSB	22.51LSB	4.81LSB
16.7	MAJOR TRANS'S +-3 (LST) FINIS	1.00	1.00	1.00	1.00
17.1	CHAN#7 OFFSET ERROR	0.09LSB	-2.41LSB	-17.94LSB	-44.84LSB
17.2	CHAN#7 GAIN ERROR	0.25LSB	0.26LSB	0.28LSB	0.30LSB
17.3	NON-LIN CODE 63	0.53LSB	3.19LSB	8.18LSB	13.17LSB
17.4	CODE WIDTH (DNL) CODE 63	1.00LSB	0.19LSB	0.01LSB	0.12LSB
17.5	NON-LIN CODE 243	-0.17LSB	-1.47LSB	-18.14LSB	-13.89LSB
17.6	CODE WIDTH (DNL) CODE 243	1.00LSB	1.09LSB	22.57LSB	28.06LSB
17.7	MAJOR TRANS'S +-3 (LST) FINIS	1.00	1.00	1.00	1.00
18	CONVERSION TIME	95.62US	96.94US	96.94US	9999.00US
9	Missing Codes	1	2	11	35

1/ The detailed data for Test #9, Missing Codes, is not included in Table V, but is available upon request. The test equipment logged each code that was missing. From this data, the total number of missing codes at each radiation step was determined and is provided here.

2/ Table V lists the test data for SN 3 only, but is representative of data on all irradiated parts. For mean and standard deviation values on all irradiated parts, refer to Table IV.

Figure 1. Radiation Bias Circuit for ADC0808MJB



• Vcc = +5V ± 5%

• All resistors 2KΩ ±10%, 1/4 W

Appendix I

Test# 1 +5V Supply Current 3ma Max

VSA is set to 5V and connected to VCC (pin 11). Current is measured through VSA.

Test# 2.X Channel X Active, check Active Channel 125-130 code

The main DAC (0 to 10V unipolar range) on the the family board is set to force 5 volts. The DAC output is sent through a voltage divider (by 2) resulting in 2.5V at the MUX (Z2) input. Channel 0 (pin 26) is selected and the output code is read. A code between 125 and 130 indicates a functional channel. This is done for all 8 analog input channels.

Test# 2.X1 CHN X Active, check Inactive Channels 0 code

Similar to last test, except all channels not active are selected one at a time and their respective output codes are read. A 0 code indicates that the channel is inactive. All channels are checked against the 8 active channels.

Test# 3 Channel #7 Fullscale Convert 255 code

The main DAC is set to 10V/2 = 5V (fullscale) and channel 7 selected. The output code is read.

Test# 4 Data Out HI @ -360ua 4.6V Min

DUT is set to fullscale convert (output all 1's) and EOC is high. V/I source is set to force -360ua and connected sequentially to the digital outputs (T#4.01=LSB,T#4.08=MSB). The output voltage is measured through the V/I.

Test# 5 Tri-state Leakage Current (OE=low) 3ua Max

Output enable (OE) is set low. All digital outputs should be in the high impedance state. The V/I is connected to each output (T#5.01=LSB, T#5.08=MSB) and the current measured.

Test# 6 Input Line Loading @ 0V 1ua Max

Set V/I to force 0V and connect one at a time to the digital input lines (T#6.01 to 6.06 = pins 25,24,23,22,10,9). Current is measured through V/I source.

Test# 7 Channel #7 Convert to 0's 0 code

The main DAC is set to 0V and sent to channel 7. The output code is read.

Test# 8 Data Out LOW @ 1.6ma 0.45V Max

With all output low from last test, V/I is set to force 1.6ma. V/I is connected to each digital output (T#8.01=LSB) one at a time and the voltage measured through the V/I.

Test# 9 Missing Codes Test, Channel 7

Channel 7 is selected and is connected to the main DAC. The Slave Processor takes control of the main DAC and runs through the entire analog input in search of each code from 0 to full-scale in sequence. Any missing codes will be datalogged.

Test# 1X.1 Channel X Offset Error 1 LSB Max

The transition voltage for LST (Low Side Transition) of code 1 (V1) is located and remembered as offset (V3=1) from the ideal voltage of 9.75 mv (V2). All 8 channels are tested in this way.

Test# 1X.2 Channel X Gain Error 1 LSB Max

The transition voltage for LST of code 255 (V1) is located and remembered as gain (V3=2) from the ideal voltage of 4.9805V (V2). All 8 channels are tested in this way.

Test# 1X.3 Channel X Linearity

All of the major transition codes, +/- 3 codes are tested (V2=4,V3=3) with 5 averages (NUM=5). The Integral Non-Linearity limit is initially set to +/- 0.6 LSB (INL=0.6) and the Differential Non-Linearity is initially set to +/-0.6 LSB(DNL=0.6) and a GOSUB 21000 (Linearity Subroutine) is performed. All 8 channels are tested in this way. Values tested will be on the worst case INL code (V1=8).

Test# 18 Conversion Time 110us Max

A conversion is initiated and the pulse width of XOR gate Z6 is measured. This pulse is the result of START going low to EOC going HIGH.