PPM 92-132

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PPM-92-132

DATE: April , 1992

TO: C. Kellenbenz/711.3

FROM: K. Sahu/7809 KS

SUBJECT: Radiation Report on ISTP/711-HYDRA
Part no.AD565ASH/883B (control no. 5569)

cc: S. Jung
A. Sharma/311
Library/311 ✓

A radiation evaluation was performed on the AD565 Digital-to-Analog Converter 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 IV and Figure 1.

The total dose testing was performed using a cobalt-60 gamma-ray source. During the radiation testing, four parts were irradiated under bias (see Figure 1 for bias configuration), and one part was used as a control sample. The total dose radiation steps were 5, 10, 20, 30, 50, 75 and 100 krads*. After 100 krads, parts were annealed at +25°C for 168 hours. After this annealing, the parts were irradiated to 200 and 300 krads total dose. The dose rate was between 0.14 and 4.5 krads/hour, depending on the total dose level (see Table II for radiation schedule). After each radiation exposure and annealing treatment, parts were electrically tested at +25°C according to the test conditions and the specification limits listed in Table III.

All parts passed all test throughout the radiation testing to 300 krads, as well as after annealing.

Table IV gives the mean and standard deviation values for each parameter after different irradiation exposures and annealing steps.

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

*The term rad as used here means rad(Si).

TABLE I. Part Information

Generic Part Number:	AD565
ISTP/HYDRA Part Number:	AD565ASH/883B
Control Number:	5569
Charge Number:	C23391
Manufacturer:	Analog Devices
Lot Date Code:	9130B
Quantity Tested:	5
Serial Numbers of Radiation Samples:	74, 75, 76, 77
Serial Number of Control Sample:	73
Part Function:	12-bit Digital-to-Analog Converter
Part Technology:	Bipolar
Package Style:	24-pin DIP
Test Engineer:	Ki Kim

TABLE II. Radiation Schedule for AD565

EVENTS	DATE
1) Initial (Pre-Irrad.) Electrical Measurements	12/31/91
2) 5-KRAD IRRADIATION (0.25 krads/hour)	02/26/92
POST-5-KRAD ELECTRICAL MEASUREMENT	02/27/92
3) 10-KRAD IRRADIATION (0.25 krads/hour)	02/27/92
POST-10-KRAD ELECTRICAL MEASUREMENT	02/28/92
4) 20-KRAD IRRADIATION (0.15 krads/hour)	02/28/92
POST-20-KRAD ELECTRICAL MEASUREMENT	03/02/92
5) 30-KRAD IRRADIATION (0.5 krads/hour)	03/02/92
POST-30-KRAD ELECTRICAL MEASUREMENT	03/03/92
6) 50-KRAD IRRADIATION (1 KRAD/HOUR)	03/03/92
POST-50-KRAD ELECTRICAL MEASUREMENT	03/04/92
7) 75-KRAD IRRADIATION (1.25 KRADS/HOUR)	03/04/92
POST-75-KRAD ELECTRICAL MEASUREMENT	03/05/92
8) 100-KRAD IRRADIATION (1.2 KRADS/HOUR)	03/05/92
POST-100-KRAD ELECTRICAL MEASUREMENT	03/06/92
9) 168 HOURS ANNEALING AT +25°C	03/06/92
POST-168-HOUR ELECTRICAL MEASUREMENTS	03/16/92
10) 200-KRAD IRRADIATION (4.5 KRADS/HOUR)	03/16/92
POST-200-KRAD ELECTRICAL MEASUREMENT	03/17/92
11) 300-KRAD IRRADIATION (4.5 KRADS/HOUR)	03/17/92
POST-300-KRAD ELECTRICAL MEASUREMENT	03/18/92

ALL ELECTRICAL MEASUREMENTS WERE PERFORMED AT +25°C.

ALL PARTS WERE IRRADIATED AND ANNEALED UNDER BIAS; SEE FIGURE 1.

Table III. Electrical Characteristics of AD565

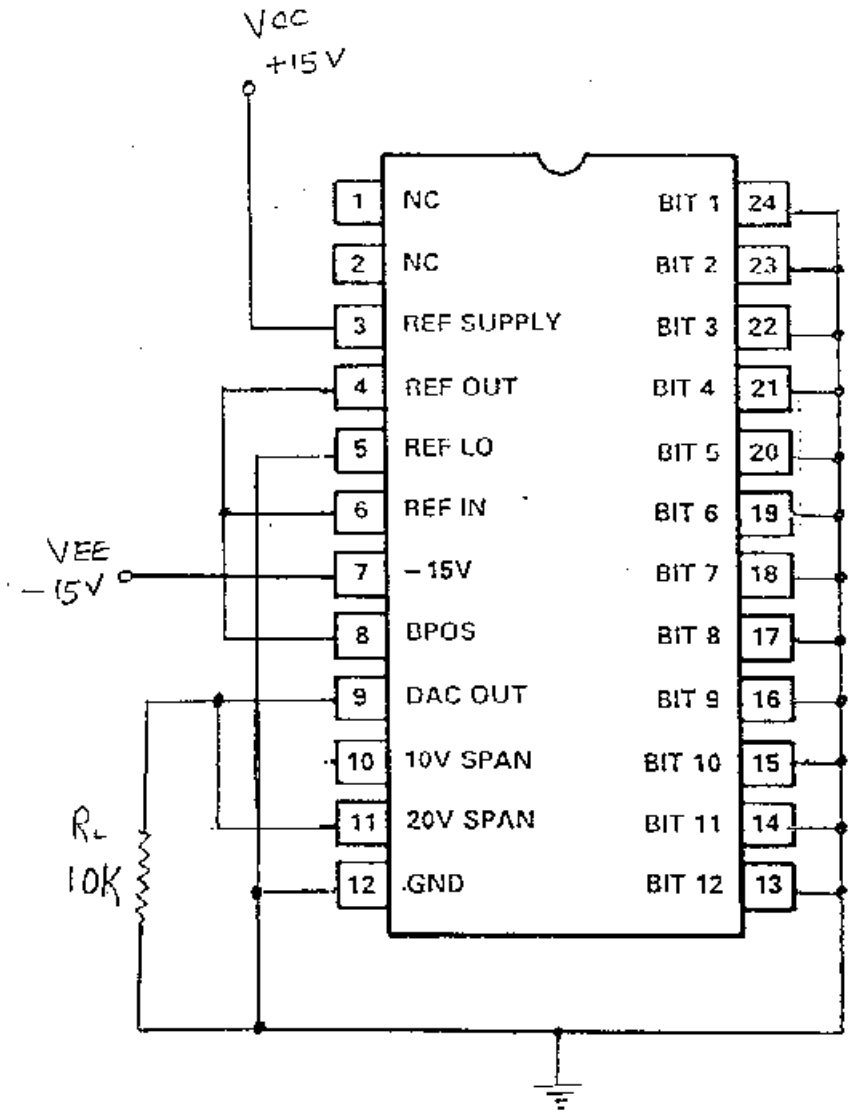
Test#	Parameter	Units	Mimimum	Maximum
1.	+ICC1	mA	0	5.00
2.	-ICC1	mA	0	18.0
3.	VREF	V	9.9	10.1
4.	ZERO1	m%FS	-150	150
5.	GAIN1	m%FS	-250	250
6.	ZERO2	m%FS	-150	150
7.	GAIN2	m%FS	-250	250
8.	ZERO3	m%FS	-50	50
9.	GAIN3	m%FS	-250	250
10.	ZERO4	m%FS	-50	50
11.	GAIN4	m%FS	-20	20
12.	Lin	m%FS	0	12.0
13.	D Lin	m%FS	0	18.0
14.	dFS1+	m%FS	0	35.7
15.	dFS1-	m%FS	0	89.2

TABLE IV: Summary of Electrical Measurements After Total Dose Exposures and Annealing for AD565 1/

			Total Dose Exposure (TDE) (krads)																Anneal		TDE (krads)			
			0		5		10		20		30		50		75		100		168 hrs @ 25°C		200		300	
Parameters	Spec. min	Lim. max	(Pre-Rad) mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
+ICC1 mA	0	5	3.5	.01	3.4	.01	3.5	.01	3.5	.01	3.5	.01	3.5	.01	3.5	.01	3.5	.01	3.5	.01	3.5	.01	3.5	.01
-ICC1 mA	0	18	14.2	0.2	14.2	0.1	14.1	0.1	14.1	0.1	14.2	0.1	14.1	0.2	14.1	0.2	14.1	0.1	14.1	0.2	14.0	0.1	14.0	0.1
VREF V	9.9	10.1	9.9	0	10.0	0	10.0	0	10.0	0	10.0	0	10.0	0	10.0	0	10.0	0	10.0	0	10.0	0	10.0	0
ZERO1 m%FS	-150	150	56.3	7.1	52.0	7.4	57.4	20	45.9	8.2	45.6	9.9	39.9	8.7	28.5	7.6	28.5	14	21.4	7.2	16.4	6	18.2	6.4
GAIN1 m%FS	-250	250	-24.0	24	40.5	7.2	39.8	5.4	32.4	7.4	29.4	10	28.1	7.7	37.8	7.8	10.2	8	0.24	6.6	28.5	12	2.7	19
ZERO2 m%FS	-150	150	56.7	7.1	52.9	7.4	58.2	20	46.5	8.2	46.2	9.9	40.4	8.8	28.8	7.7	29.0	14	21.8	7.2	16.3	6.5	17.6	6.6
GAIN2 m%FS	-250	250	7.1	13	57.7	7.9	56.0	5.7	49.0	8.6	70.0	11	44.5	9.4	53.7	10	26.2	11	16.1	9.3	44.7	14	17.4	22
ZERO3 m%FS	-50	50	15.3	0.9	14.7	1.4	25.8	14	17.6	1.3	22.3	4.7	24.3	1.9	15.5	0.4	17.3	8.5	3.0	8.2	18.4	1.9	21.2	2.0
GAIN3 m%FS	-250	250	13.8	9.2	60.6	7.9	59.1	6.0	51.4	8.5	63.4	12	46.6	9.3	56.2	10	28.9	11	18.2	9.5	47.0	14	18.9	22
ZERO4 m%FS	-50	50	14.1	0.7	20.9	2.0	20.7	14	15.9	1.5	17.5	4.5	13.1	2.0	18.4	0.4	37.2	9.7	44.5	3.6	16.5	1.9	21.7	2.4
GAIN4 m%FS	-20	20	8.2	0.5	8.3	0.5	8.3	0.5	8.3	0.6	8.3	0.5	8.3	0.5	8.3	0.5	8.2	0.5	8.2	0.5	8.3	0.5	8.2	0.5
Lin m%FS	0	12.0	3.8	0.5	4.3	0.7	5.0	0.6	4.8	0.6	4.7	0.8	5.3	0.7	5.2	0.7	5.3	0.8	5.1	0.7	5.6	0.4	8.5	1.3
D Lin m%FS	0	18.0	2.7	0.7	3.2	0.5	4.0	0.6	3.9	0.6	4.1	0.6	4.5	0.5	4.2	0.6	4.2	1.0	4.2	0.8	4.0	0.5	4.9	0.5
DSF1+ m%FS	0	35.7	1.5	1.0	2.0	0.9	1.9	1.1	2.1	1.0	2.6	1.0	2.5	0.9	2.1	1.0	2.5	1.7	2.3	0.6	2.8	2.6	4.5	3.8
DSF1- m%FS	0	89.2	1.1	0.6	0.8	0.6	1.1	0.6	1.0	0.7	0.8	0.9	0.9	1.1	1.0	0.7	1.1	0.6	1.0	1.0	3.3	1.4	9.1	12.6

Notes:
1/ The mean and standard deviation values were calculated over the four parts irradiated in this testing. The control sample remained constant throughout the testing and is not included in this table.

Figure 1. Radiation Bias Circuit for AD565



$V_{CC} = +15V \pm 0.5V$

$V_{EE} = -15V \pm 0.5V$

$R_L = 10K\Omega \pm 10\%, \frac{1}{4}W$

$T_A = 25°C$