



DATE: April 30, 1997  
 TO: J.Lohr/311  
 FROM: K. Sahu/300.1 *KS*  
 SUBJECT: Radiation Report on: AD580UH883B  
           Project: MAP-POWER  
           Job #: EE71415  
           Project part #: AD580UH

PPM-97-016

cc: T. Miccolis/311  
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A radiation evaluation was performed on AD580UH (AD580UH883B) 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 Co<sup>60</sup> 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 levels were 5.0, 10.0, 15.0, 20.0, 30.0, and 50.0 kRads.\* The dose rate was between 0.06 and 0.50 kRads/hour (see Table II for radiation schedule). After the 50.0 kRad exposure, the parts were annealed for 168 hours at 25°C. After each radiation exposure and annealing treatment, parts were electrically tested according to the test conditions and the specification limits\*\* listed in Table III.

Initial electrical measurements were made on 10 samples. Eight samples (SN's 72, 73, 74, 75, 76, 77, 78, and 79) were used as radiation samples while SN's 70 and 71 were used as control samples. All parts passed all tests during initial electrical measurements.

All parts passed all tests upon irradiation to 50.0 kRads. No significant degradation was noted in any of the parts.

After annealing the parts for 168 hours at 25°C, the parts did not show any significant change. All parts continued to pass all tests.

Table IV provides a summary of the test results with the mean and standard deviation values for each parameter after each irradiation exposure and annealing step.

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 Rads, as used in this document, means Rads(silicon). All radiation levels cited are cumulative.

\*\* These are manufacturer's pre-irradiation data specification limits. The manufacturer provided no post-irradiation limits at the time these tests were performed.

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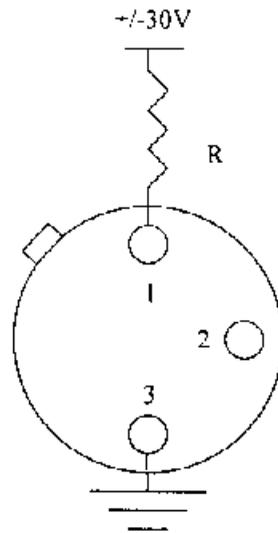
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Figure 1. Radiation Bias Circuit for AD580UH



Note: Use 20 pin LCC to 16 pin DIP socket adapters with 16 pin DIP radiation bias boards.

TABLE I. Part Information

Generic Part Number:	AD580UH
MAP-POWER Part Number	AD580UH883B
Charge Number:	EE71415
Manufacturer:	Analog Devices
Lot Date Code (LDC):	96261
Quantity Tested:	10
Serial Number of Control Samples:	70, 71
Serial Numbers of Radiation Samples:	72, 73, 74, 75, 76, 77, 78, 79
Part Function:	2.5V IC Reference
Part Technology:	Voltage Reference
Package Style:	T-05
Test Equipment:	A540
Test Engineer:	A. Naji

- No radiation tolerance/hardness was guaranteed by the manufacturer for this part.

TABLE II. Radiation Schedule for AD580UH

EVENT .....	DATE
1) INITIAL ELECTRICAL MEASUREMENTS .....	04/01/97
2) 5.0 KRAD IRRADIATION (0.062 KRADS/HOUR) .....	04/04/97
POST-5.0 KRAD ELECTRICAL MEASUREMENT .....	04/07/97
2) 10.0 KRAD IRRADIATION (0.125 KRADS/HOUR) .....	04/07/97
POST-10.0 KRAD ELECTRICAL MEASUREMENT .....	04/09/97
3) 15.0 KRAD IRRADIATION (0.125 KRADS/HOUR) .....	04/09/97
POST-15.0 KRAD ELECTRICAL MEASUREMENT .....	04/11/97
4) 20.0 KRAD IRRADIATION (0.125 KRADS/HOUR) .....	04/11/97
POST-20.0 KRAD ELECTRICAL MEASUREMENT .....	04/14/97
5) 30.0 KRAD IRRADIATION (0.250 KRADS/HOUR) .....	04/14/97
POST-30.0 KRAD ELECTRICAL MEASUREMENT .....	04/16/97
6) 50.0 KRAD IRRADIATION (0.500 KRADS/HOUR) .....	04/16/97
POST-50.0 KRAD ELECTRICAL MEASUREMENT .....	04/18/97
7) 168 HOUR ANNEALING @25°C .....	04/18/97
POST-168 HOUR ANNEAL ELECTRICAL MEASUREMENT .....	04/25/97

Effective Dose Rate = 50,000 RADS/25 DAYS = 83.3 RADS/HOUR=0.023 RADS/SEC

PARTS WERE IRRADIATED AND ANNEALED UNDER BIAS, SEE FIGURE 1.

Table III. Electrical Characteristics of AD580UH /1

Test #	Parameters /1	Units	Test Conditions	Spec. Lim.	
				min	max
1	ICC	mA			1.5
2	V <sub>Out</sub>	V		2.475	2.525
3	V <sub>Line 1</sub>	mV	V <sub>cc</sub> = 7V to 30V	-6.0	6.0
4	V <sub>Line 2</sub>	mV	V <sub>cc</sub> = 4.5V to 7V	-3.0	3.0
5	V <sub>Load 1</sub>	mV	I <sub>L</sub> = 0mA to 10mA	-10.0	10.0

Notes:

1/ These are the manufacturer's non-irradiated data sheet specification limits. No post-irradiation limits were provided by the manufacturer at the time the tests were performed

**TABLE IV: Summary of Electrical Measurements after  
Total Dose Exposures and Annealing for AD580UH /1**

Test #	Parameters	Units	Spec. Lim. /2		Total Dose Exposure (kRads)						Rad level		Rad level		Rad level		Annealing		
			min	max	Initial	5.0	10.0	15.0	20.0	30.0	50.0	mean	sd	mean	sd	mean	sd	mean	sd
1	ICC	mA		1.5	0.93	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.02
2	V_Out	V	2.475	2.525	2.500	2.500	2.483	2.483	2.499	2.499	2.499	2.499	2.499	2.499	2.499	2.499	2.499	2.499	0.001
3	V_Line_1	mV	-6.0	6.0	0.52	0.50	0.37	0.39	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.53	0.53	0.07
4	V_Line_2	mV	-3.0	3.0	0.08	0.09	-0.08	-0.06	0.07	0.10	0.10	0.07	0.07	0.07	0.07	0.07	0.10	0.10	0.01
5	V_Load_1	mV	-10.0	10.0	-0.8	-0.8	-0.6	-0.6	-1.2	0.06	0.14	-0.6	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	0.11

## Notes:

- 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/ These are manufacturer's pre-irradiation data sheet specification limits. No post-irradiation limits were provided by the manufacturer at the time the tests were performed.

**Radiation-sensitive parameters: None.**