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To
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Department
Code 310.1
From
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7809
Subject
Radiation Report on
ISTP University of Maryland AD96687TQ/883B

PPM-91-097
Date
February 13, 1991
Location
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731-8954
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A radiation evaluation was performed on AD96687TQ/883B 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, two 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 2, 5, 10, 30, 50, 75 and 100 krads. After 100 krads, parts were annealed at 25°C for 24 and 168 hours, and then the irradiation was continued to 200 and 300 krads (cumulative). The dose rate was between 0.1 - 5.0 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 according to the test conditions and the specification limits listed in Table III. The electrical tests included four functional tests at 1 and 10 MHz (refer to Table III for details on functional test conditions).

All (2) parts passed all tests on irradiation up to 300 krads, and on annealing 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.

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

TABLE I. Part Information

Generic Part Number:	AD96687TQ/883B
ISTP Common Buy Part Number:	AD96687TQ/883B
ISTP Common Buy Control Number:	3846
Manufacturer:	Analog Devices
Quantity Procured:	25
Lot Date Code:	8746
Quantity Tested:	3
Serial Numbers of Radiation Samples:	68, 69
Serial Numbers of Control Samples:	71
Part Function:	Ultra Fast Dual Comparator
Part Technology:	Bipolar
Package Style:	16-Pin DIP

TABLE II. Radiation Schedule

EVENTS	DATE
1) Initial Electrical Measurements	01/03/91
2) 2 krads irradiation @ 100 rads/hr Post 2 krads Electrical Measurements	01/07/91 01/08/91
3) 5 krads irradiation @ 150 rads/hr Post 5 krads Electrical Measurements	01/08/91 01/09/91
4) 10 krads irradiation @ 250 rads/hr Post 10 krads Electrical Measurements	01/09/91 01/10/91
5) 30 krads irradiation @ 250 rads/hr Post 30 krads Electrical Measurements	01/10/91 01/14/91
6) 50 krads irradiation @ 1000 rads/hr Post 50 krads Electrical Measurements	01/14/91 01/15/91
7) 75 krads irradiation @ 1250 rads/hr Post 75 krads Electrical Measurements	01/15/91 01/16/91
8) 100 krads irradiation @ 1250 rads/hr Post 100 krads Electrical Measurements	01/16/91 01/17/91
9) 24 hrs annealing Post 24 hr Electrical Measurements	01/18/91
10) 168 hrs annealing Post 168 hr Electrical Measurements	01/24/91
11) 200 krads irradiation @ 5000 rads/hr Post 200 krads Electrical Measurements	01/24/91 01/25/91
12) 300 krads irradiation @ 5000 rads/hr Post 300 krads Electrical Measurements	01/25/91 01/28/91

Notes:

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

Table III. Electrical Characteristics of AD96687TQ/883B

FUNCTIONAL TESTS							
PARAMETER	VS+	VS-	VIL	VIH	CONDITIONS	PINS	LIMITS AT +25C
FUNCT # 1	5.0V	-5.2V	-1.5V	-1.1V	FREQ=1.00MHz	ALL I/O	VOL<-1.2V,VOH>-1.2V
FUNCT # 2	5.0V	-5.2V	-2.5V	0.0V	FREQ=1.00MHz	ALL I/O	VOL<-1.2V,VOH>-1.2V
FUNCT # 3	5.0V	-5.2V	-1.5V	-1.1V	FREQ=10.0MHz	ALL I/O	VOL<-1.2V,VOH>-1.2V
FUNCT # 4	5.0V	-5.2V	-2.5V	0.0V	FREQ=10.0MHz	ALL I/O	VOL<-1.2V,VOH>-1.2V
DC PARAMETRIC TESTS							
PARAMETER	VS+	VS-	VIL	VIH	CONDITIONS	PINS	LIMITS AT +25C
VOH	5.0V	-5.2V	-1.5V	-1.1V	LOAD= -18MA	OUTS	>-1.1V , < 0.0V
VOL	5.0V	-5.2V	-1.5V	-1.1V	LOAD= -10MA	OUTS	>-3.5V , < -1.5V
IOH	5.0V	-5.2V	-2.0V	-0.8V	VOUT= -0.9V	OUTS	>-30MA , < +30MA*
IOL	5.0V	-5.2V	-1.5V	-1.1V	VOUT= -1.8V	OUTS	>-30MA , < +30MA*
AI11	5.0V	-5.2V	0.0V	+5.0V	VIN= +4.9V	A-INS	> 0.0A , < +30UA*
AI12	5.0V	-5.2V	-4.0V	0.0V	VIN= -3.9V	A-INS	> 0.0A , < +30UA*
ITH	5.0V	-5.2V	-2.0V	-0.8V	VIN= -0.8V	D-INS	> 0.0A , < +40UA
	5.0V	-5.2V	-2.0V	-0.8V	VIN= -1.9V	D-INS	> 0.0A , < +5UA
ICC-	5.0V	-5.2V	-1.5V	-1.1V	Q=1 , Q_=0	VS+	> 0.0A , < +18.0MA
	5.0V	-5.2V	-1.5V	-1.1V	Q=1 , Q_=0	VS-	>-36.0MA , < 0.0A
COMMENTS/EXCEPTIONS							
(1) FUNCTIONAL TESTS ARE PERFORMED WITH "ECL" LOGIC LEVELS ON ANALOG INPUTS.							
(2) DUE TO THE LIMITATION ON ATE (S-50), NO OFFSET MEASUREMENTS ARE MADE.							
(3) VIL & VIH (ON DIGITAL INPUTS (LE,LE_) WERE TESTED DURING FUNCTIONAL TESTS AS GO/NOGO.							
(4) TESTS NOT PERFORMED : - VIos, IIos, Ir, Ic, CMRR, Idos, VI range, tS, tH, tPD, tPW.							
(5) * LIMITS FOR AI11, AI12, IOH, AND IOL TESTS WERE SELECTED ARBITRARILY (NOT IN SPECS).							
(6) THE AI11 TEST MEASURES THE CURRENT OF THE NON-INVERTING INPUT PINS WHEN VIN+ = 5.0V AND VIN- = 0.0V. THE AI12 TEST MEASURES THE CURRENT OF THE INVERTING INPUT PINS WHEN VIN+ = 0.0V AND VIN- = -4.0V (S-50 CANNOT DRIVE -5V).							

TABLE IV: Summary of Electrical Measurements after Total Dose Exposures and Annealing for AD96687TQ/883B 1/1, 2/

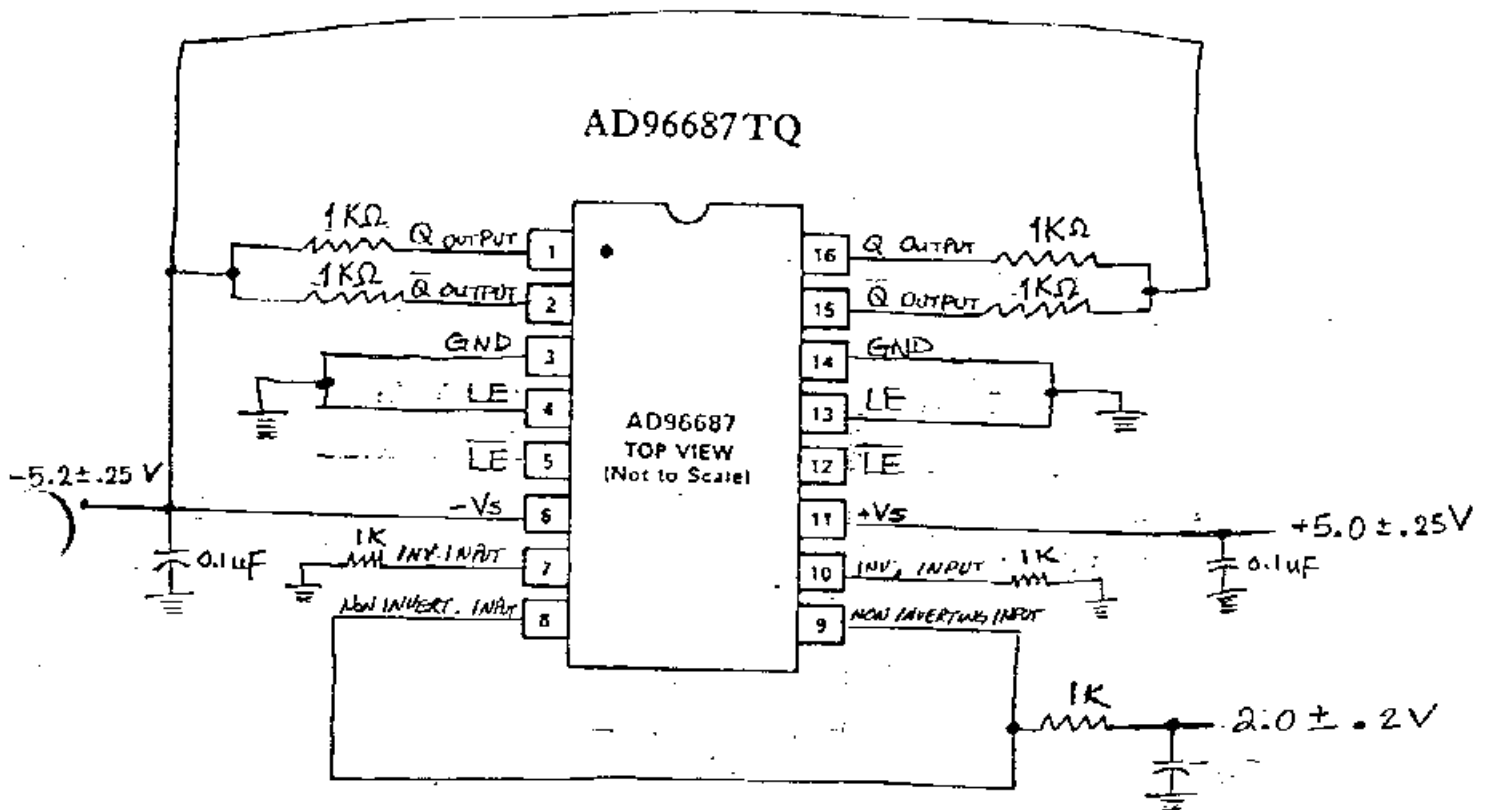
Parameters	Spec. Limits	min	max	Initials	Total Dose Exposure (krads)																				
					30			50			75			100			168 hrs			200			300		
					mean	sd	Pass	mean	sd	Pass	mean	sd	Pass	mean	sd	Pass	mean	sd	Pass	mean	sd	Pass	mean	sd	Pass
Func1, 1MHZ				Pass				Pass				Pass				Pass			Pass			Pass			
Func2, 1MHZ				Pass				Pass				Pass				Pass			Pass			Pass			
Func3, 10MHZ				Pass				Pass				Pass				Pass			Pass			Pass			
Func4, 10MHZ				Pass				Pass				Pass				Pass			Pass			Pass			
VOH V	-2.1	0.0			-0.9	0			-0.8	0			-0.8	5			-0.9	0		-0.9	0			-0.9	0
VOL V	-3.5	-1.5			-1.8	0			-1.8	0			-1.8	0			-1.8	0		-1.8	0			-1.8	0
IOH mA	-30.0	30.0			-26.0	0.4			-27.8	0.2			-27.6	0.5			-25.2	0.4		-25.5	0.9			-25.8	0.4
IOL mA	-30.0	30.0			-13.1	2.2			-13.7	2.2			-13.3	2.2			-13.6	2.2		-13.8	2.6			-14.5	2.1
AI11 uA	0.0	30.0			7.8	0.1			7.8	0.1			8.0	0.1			8.3	0.1		8.6	0.1			8.6	0.1
AI12 uA	0.0	30.0			5.5	0.1			5.4	0.1			5.5	0.1			5.7	0.1		5.3	0.3			6.9	0.1
AI1H uA	0.0	40.0			5.1	0			5.1	0.5			5.2	0.5			7.2	0.2		6.9	0.2			8.1	0.2
AI1L uA	-5.0	5.0			0				0				0												
ICC+ mA	0.0	18.0			15.3	0.1			15.4	0.1			15.2	0.1			15.2	0.1		15.2	0.1			15.8	0.1
ICC- mA	-36.0	0.0			-31.6	0.2			-31.5	0.2			-31.4	0.2			-31.4	0.2		-31.2	0			-33.4	0.2

Notes:

- 1/ The mean and standard deviation values were calculated over the two parts irradiated in this testing. The control sample remained constant throughout the testing and is 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.

* These measurements were corrupted due to some problems with the Automatic Tester.

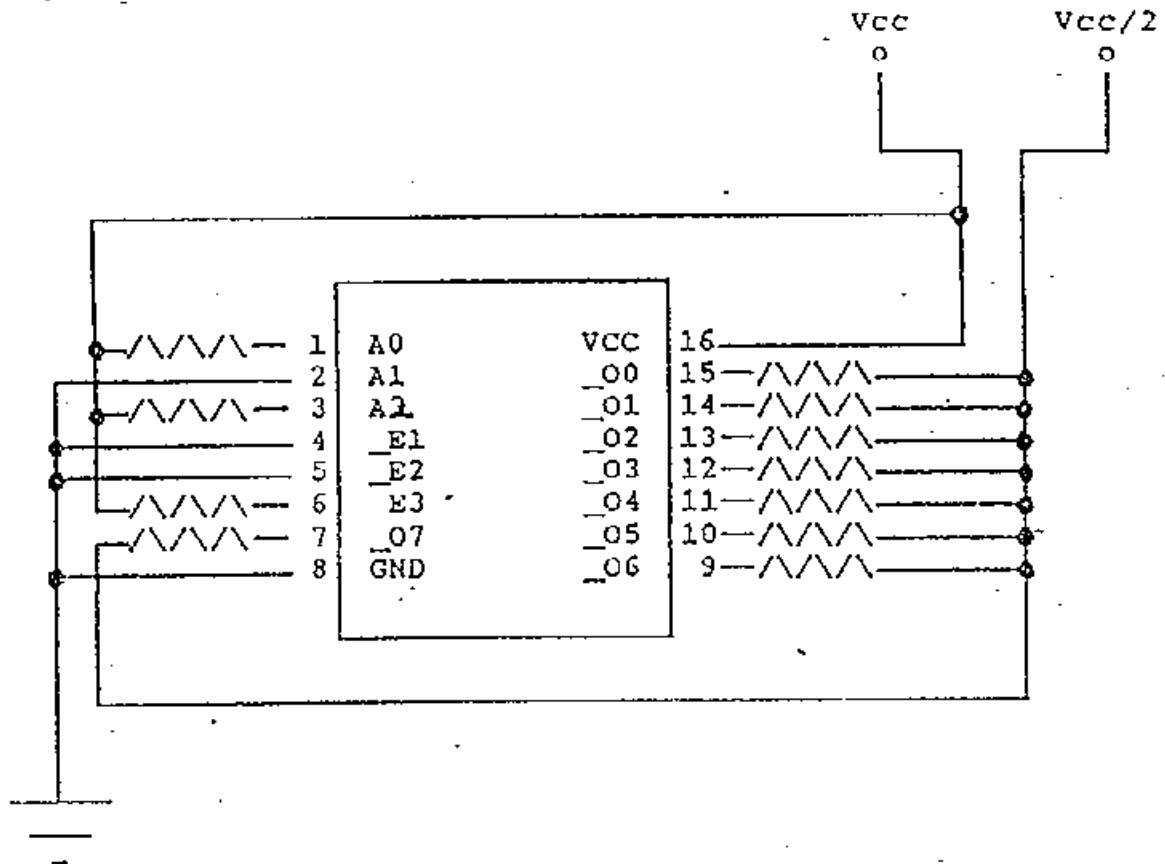
Figure 1. Radiation Bias Circuit for AD96687TQ/883B



* All resistors tolerance = 5%, $\frac{1}{2}$ W

* \overline{LE} is left floating

Figure 1. Radiation Bias Circuit for 54AC138



1. $V_{cc} = 5.0 \pm 0.5$ Volts
2. $V_{cc}/2 = 2.5 \pm 0.25$ Volts
3. All Resistors are 1k Ohms, 1/4 watts