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Radiation Report on
ISTP Non-Common Buy Part No. IDT7203L65DB

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A radiation evaluation was performed on IDT7203L65DB 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, three 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, 5, 7.5, 8.2, 15, 20, 30, 50 and 70 krads. After 70 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.

All parts passed all tests on irradiation up to 20 krads. However, after 30 krads and above, all parts failed functional tests and showed significant degradation in VOH levels. No significant degradation was observed in any other parameter. On annealing the parts for 24 and 168 hours, two parts passed functional tests. However, parts continued to fail VOH tests even after annealing. Table IV provides the mean and standard deviation values for each parameter after different radiation exposures and annealing treatments.

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:	IDT7203L65DB
ISTP Common Buy Part Number:	*
ISTP Common Buy Control Number:	*
Manufacturer:	IDT
Quantity Procured:	4
Lot Date Code:	8930
Quantity Tested:	4
Serial Numbers of Radiation Samples:	52,53,54
Serial Numbers of Control Samples:	50
Part Function:	2k x 9 FIFO
Part Technology:	CMOS
Package Style:	28-Pin DIP

* These parts were not procured as ISTP Non-Common Buy parts. Four parts were provided by a GSFC designer to characterize the radiation tolerance of these parts in order to determine their suitability for the ISTP/WAVES project.

TABLE II. Radiation Schedule

EVENTS	DATE
1) Initial Electrical Measurements	03/10/90
2) 2.5 krads irradiation @ 125 rads/hr Post 2.5 krads Electrical Measurements	03/12/90 03/13/90
3) 5 krads irradiation @ 125 rads/hr Post 5 krads Electrical Measurements	03/13/90 03/14/90
4) 7.5 krads irradiation @ 125 rads/hr Post 7.5 krads Electrical Measurements	03/14/90 03/15/90
*5) 8.2 krads irradiation @ 125 rads/hr Post 8.2 krads Electrical Measurements	03/15/90 03/16/90
6) 15 krads irradiation @ 100 rads/hr Post 15 krads Electrical Measurements	03/16/90 03/19/90
7) 20 krads irradiation @ 250 rads/hr Post 20 krads Electrical Measurements	03/19/90 03/20/90
8) 30 krads irradiation @ 500 rads/hr Post 30 krads Electrical Measurements	03/20/90 03/21/90
9) 50 krads irradiation @ 1 krad/hr Post 50 krads Electrical Measurements	03/21/90 03/22/90
10) 70 krads irradiation @ 1 krad/hr Post 70 krads Electrical Measurements	03/22/90 03/23/90
11) 24 hrs annealing Post 24 hr Electrical Measurements	03/24/90
12) 168 hrs annealing Post 168 hr Electrical Measurements	03/30/90

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.

*Anomalous Event: Due to an alarm in the radiation facility, the dose was reduced from 10 to 8.2 krads. The remaining 1.8 krads were compensated for at 15 krads by increasing the dose rate.

Table III. Electrical Characteristics of IDT7203L65DB

Functional Tests 1/

Test	Frequency	VCC	VIL	VIH
Func1	1.000 MHz	4.5 V	0.0 V	4.5 V
Func2	1.000 MHz	5.5 V	0.0 V	5.5 V

DC Parameters

Parameter	Symbol	min	max	Units
Output Voltage, Logic High	VOH	2.4	-	V
Output Voltage, Logic Low	VOL	-	0.4	V
Input Leakage Current	I _{IH} /I _{IL}	-10	10	μA
High Impedance Output Current	I _{OZH} / I _{OZL}	-10	10	μA
Average VCC Power Supply Current	ICC1 *	-	120	mA
Average Standby Current	ICC2	-	12	mA
Power Down Current	ICC3	-	2	mA

Notes:

1/ Each functional test comprised of writing and reading, checkerboard, half-full, and full flag checks.

* ICC1 test was performed during a retransmit operation rather than during a read operation. This may have lead to the very small values of ICC1, as recorded in Table IV. However, the radiation characteristics of ICC1 are expected to be similar to ICC2. Refer to Table IV for more details on ICC1 and ICC2 radiation characteristics.

TABLE IV: Summary of Electrical Measurements after Total Dose Exposures and Annealing for IDT7203L65DB 1/, 2/.

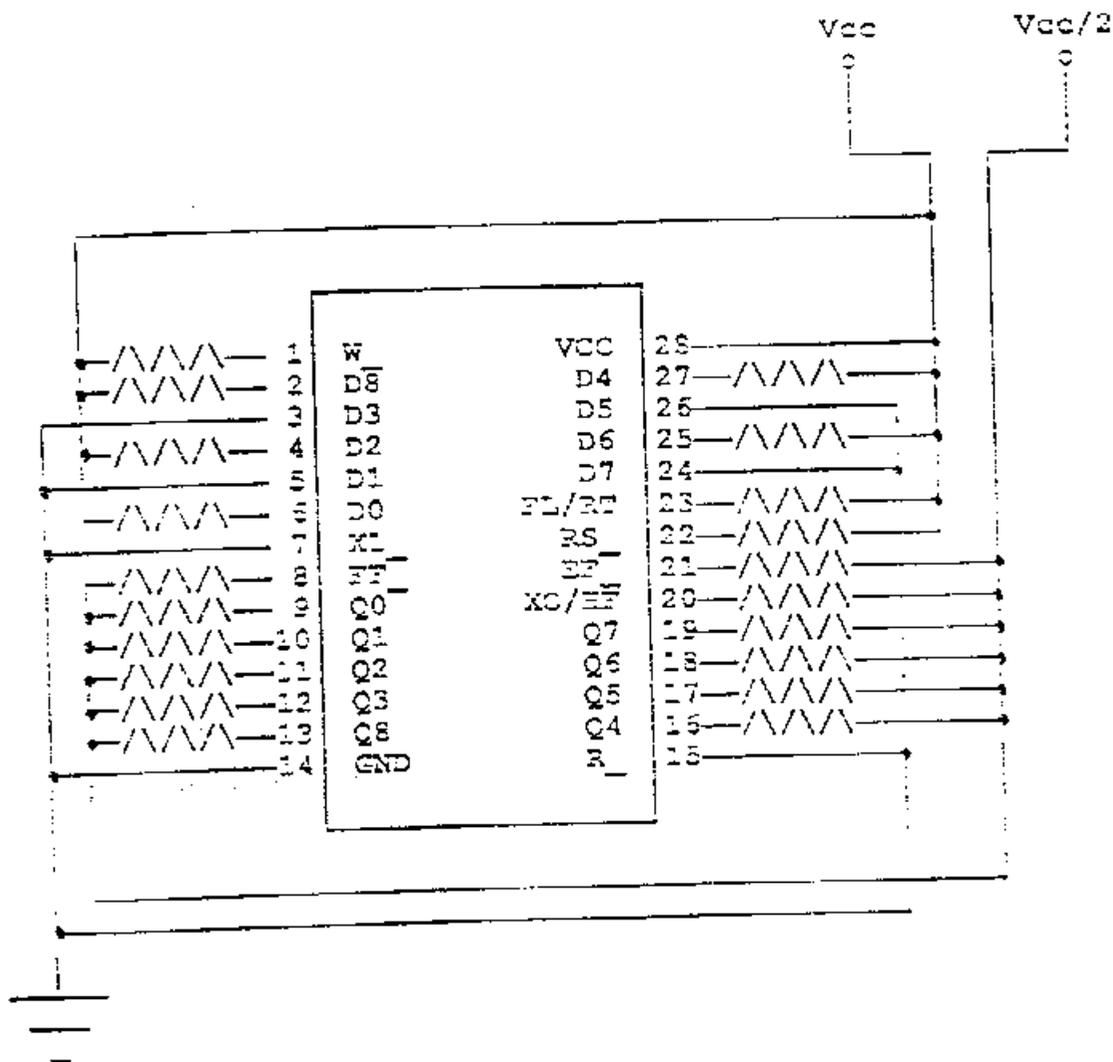
Parameters	Spec. Limits min max	Initials mean sd	Total Dose Exposure (krads)												Annealing				
			7.5		15		20		30		50		70		168 hrs.				
			mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd			
Func1 @ 4.5V		Pass		Pass		Pass		Pass		Fail		Fail		Fail		2P/1F			
Func2 @ 5.5V		Pass		Pass		Pass		Pass		Fail		Fail		Fail		2P/1F			
VOH	V	2.4	5.5	3.53	.01	3.52	.02	3.53	.01	3.53	.01	1.39	1.7	1.69	1.8	0.9	1.5	1.35	1.7
VOL	mV	0	400	223	11	240	36	232	17	237	18	257	33	281	68	240	20	242	21
I _{IH}	nA	0	1E4	0.8	2.8	1.4	3.6	0.5	1.6	0.5	2.0	0.5	1.6	0	NA	0	NA	0.1	0.9
I _{IL}	nA	-1E4	0	0	NA	0	NA	0	NA										
IOZH	nA	0	1E4	1.0	3.4	1.8	5.3	0.7	2.1	1.0	2.7	0.8	2.3	0.2	1.1	0.7	1.9	0	NA
IOZL	nA	-1E4	0	0	NA	-0.4	1.6	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
ICC1	mA	0	120	0	NA	0	NA	0	NA	.02	.03	0	NA	0	NA	.02	.03	0	NA
ICC2	mA	0	12	3.5	0.1	3.4	0.1	3.4	0.1	3.3	0.1	3.3	0.1	3.1	.04	3.0	0.1	3.0	0.1
ICC3	mA	0	2	0	NA	0	NA	.02	.02	.05	.01	.04	.01	.04	.01	.03	0	0	.01

Notes:

1/ The mean and standard deviation values were calculated over the three 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. The data at other radiation exposures is available and can be obtained upon request.

Figure 1. Radiation Bias Circuit for IDT7203



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