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UNISYS

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Interoffice Memorandum

PPM-91-154

Date
March 8, 1991

Location
Lanham

Telephone
731-8954

Location
Lanham

To
M. DiPretoro

Department
Code 310.1

From
K. Sahu KS

Department
7809

Subject
Radiation Report on ISTP
Non-Common Buy Part No. JTXV1N3600

cc
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A radiation evaluation was performed on JTXV1N3600 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, 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 25, 50, 75 and 100 krads. After 100 krads, parts were annealed at 25°C for 68 and 168 hours, and then the irradiation was continued to 200 and 300 krads (cumulative). The dose rate was between 1-5 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 according to the test conditions and the specification limits listed in Table III.

All parts passed all tests on irradiation up to 300 krads, without any significant degradation in any of the electrical parameters.

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:	1N3600
ISTP Non-Common Buy Part Number:	JTXV1N3600 (MIL-S-19500/231D)
ISTP Non-Common Buy Control Number:	2072
Manufacturer:	National Semiconductor Corp.
Quantity Procured:	106
Lot Date Code:	9009
Quantity Tested:	10
Serial Numbers of Radiation Samples:	152,153,154,155 156,157,158,159
Serial Numbers of Control Samples:	150,151
Part Function:	Diode
Part Technology:	Bipolar
Package Style:	DO-35

TABLE II. Radiation Schedule

EVENTS	DATE
1) Initial Electrical Measurements	01/17/91
2) 25 krads irradiation @ 1250 rads/hr	02/04/91
Post 25 krads Electrical Measurements	02/05/91
3) 50 krads irradiation @ 1250 rads/hr	02/05/91
Post 50 krads Electrical Measurements	02/06/91
4) 75 krads irradiation @ 1250 rads/hr	02/06/91
Post 75 krads Electrical Measurements	02/07/91
5) 100 krads irradiation @ 1250 rads/hr	02/07/91
Post 100 krads Electrical Measurements	02/08/91
6) 68 hrs annealing	02/08/91
Post 68 hr Electrical Measurements	02/11/91
7) 168 hrs annealing	02/11/91
Post 168 hr Electrical Measurements	02/15/91
8) 200 krads irradiation @ 1087 rads/hr	02/15/91
Post 200 krads Electrical Measurements	02/19/91
9) 300 krads irradiation @ 5000 rads/hr	02/19/91
Post 300 krads Electrical Measurements	02/20/91

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 JTXV1N3600

Test	Conditions	MIN	MAX
I_R	V_R = 50V	--	100nA
V_{F1}	I_F = 1mA	0.54V	0.62V
V_{F2}	I_F = 10mA	0.66V	0.74V
V_{F3}	I_F = 50mA, pulsed*	0.76V	0.86V
V_{F4}	I_F = 100mA, pulsed*	0.82V	0.92V
V_{F5}	I_F = 200mA, pulsed*	0.87V	1.0V

* PULSED: t_{PULSE} = 800 us, duty cycle = 1% - 2%

TABLE IV: Summary of Electrical Measurements after Total Dose Exposures and Annealing for JTXV1N3600 1/, 2/

Parameters		Spec. Limits min	Spec. Limits max	Initials mean	Initials sd	Total Dose Exposure (krads) 25 mean	25 sd	50 mean	50 sd	75 mean	75 sd	100 mean	100 sd	Anneal 168 hrs mean	Anneal 168 hrs sd	Total Dose (krads) 200 mean	200 sd	300 mean	300 sd
IR	nA	-	100	25.6	3.0	21.3	4.0	15.0	1.0	16.2	1.3	14.9	1.2	18.0	2.0	23.1	3.0	17.3	1.3
VF1	V	0.54	0.62	0.58	.01	0.58	.01	0.58	0	0.58	0	0.58	0	0.58	0	0.57	.02	0.58	0
VF2	V	0.66	0.74	0.69	.01	0.69	.01	0.70	0	0.70	0	0.70	0	0.70	.01	0.69	.02	0.69	0
VF3	V	0.76	0.86	0.79	.01	0.79	.01	0.80	0	0.80	.01	0.80	0	0.80	.03	0.79	.02	0.80	0
VF4	V	0.82	0.92	0.86	.01	0.86	.01	0.86	.01	0.86	.02	0.86	.05	0.86	.05	0.85	.01	0.85	0
VF5	V	0.87	1.0	0.94	.01	0.94	.01	0.94	.05	0.94	.05	0.94	.07	0.94	.07	0.94	.06	0.94	0

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/ Post 68-hour anneal electrical measurements are not provided in this table. This data is available and can be obtained upon request.

Figure 1. Radiation Bias Circuit for JTXV1N3600