

ADVISORY ON THE USE OF THIS DOCUMENT

The information contained in this document has been developed solely for the purpose of providing general guidance to employees of the Goddard Space Flight Center (GSFC). This document may be distributed outside GSFC only as a courtesy to other government agencies and contractors. Any distribution of this document, or application or use of the information contained herein, is expressly conditioned upon, and is subject to, the following understandings and limitations:

- (a) The information was developed for general guidance only and is subject to change at any time;
- (b) The information was developed under unique GSFC laboratory conditions which may differ substantially from outside conditions;
- (c) GSFC does not warrant the accuracy of the information when applied or used under other than unique GSFC laboratory conditions;
- (d) The information should not be construed as a representation of product performance by either GSFC or the manufacturer;
- (e) Neither the United States government nor any person acting on behalf of the United States government assumes any liability resulting from the application or use of the information.

PPM-91-246

Date April 5, 1991

Location Lanham

Telephone 731-8954

Location Lanham

- cc G. Krishnan/311
- V. Edson
- S. Esmacher
- D. Krus
- R. Woodward
- F. Grena/692
- J. Scudder/692

To M. DiPreto

Department Code 300.1

From K. Sahu ks

Department 7809

Subject Radiation Report on ISTP
Non-Common Buy Part No. JTXV1N3595

A radiation evaluation was performed on JTXV1N3595 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 24 and 168 hours, and then the irradiation was continued to 200 and 300 krads (cumulative). The dose rate was between 1-6 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 (8) parts passed all VF tests up to 300 krads and passed IR testing up to 50 krads. After 75 krads exposure, all parts failed to meet the 1.0nA IR specification limit. After 100 krads exposure, two parts (SNs 56 and 57) recovered to pass IR while all other parts continued to fail. After 24 hours of annealing, three parts (SNs 54, 56 and 57) passed IR while all other parts continued to fail. After 168 hours of annealing, all parts except one (SN 59) passed. After 200 and 300 krads, all parts failed to meet the IR specification limit. 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:	1N3595
ISTP Non-Common Buy Part Number:	JTXV1N3595 (MIL-S-19500/241E)
ISTP Non-Common Buy Control Number:	2071
Manufacturer:	National Semiconductor Corp.
Quantity Procured:	30
Lot Date Code:	8712
Quantity Tested:	10
Serial Numbers of Radiation Samples:	52, 53, 54, 55 56, 57, 58, 59
Serial Numbers of Control Samples:	50, 51
Part Function:	Diode
Part Technology:	Bipolar
Package Style:	DO-7

TABLE II. Radiation Schedule

EVENTS	DATE
1) Initial Electrical Measurements	03/04/91
2) 25 krads irradiation @ 1250 rads/hr	03/05/91
Post 25 krads Electrical Measurements	03/06/91
3) 50 krads irradiation @ 1040 rads/hr	03/06/91
Post 50 krads Electrical Measurements	03/07/91
4) 75 krads irradiation @ 1560 rads/hr	03/07/91
Post 75 krads Electrical Measurements	03/08/91
5) 100 krads irradiation @ 1250 rads/hr	03/08/91
Post 100 krads Electrical Measurements	03/09/91
6) 24 hrs annealing	03/09/91
Post 24 hr Electrical Measurements	03/10/91
7) 168 hrs annealing	03/10/91
Post 168 hr Electrical Measurements	03/15/91
8) 200 krads irradiation @ 5550 rads/hr	03/15/91
Post 200 krads Electrical Measurements	03/16/91
9) 300 krads irradiation @ 5550 rads/hr	03/16/91
Post 300 krads Electrical Measurements	03/17/91

Notes:

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

Table III. Electrical Characteristics of JTXV1N3595

<u>Test</u>	<u>Conditions</u>	<u>MIN</u>	<u>MAX</u>
V _{F1}	I _F = 200mA _{dc}	0.83V	1.0V
V _{F2}	I _F = 100mA _{dc}	0.79V	0.92V
V _{F3}	I _F = 50mA _{dc}	0.74V	0.88V
V _{F4}	I _F = 10mA _{dc}	0.65V	0.80V
V _{F5}	I _F = 5mA _{dc}	0.60V	0.75V
V _{F6}	I _F = 1mA _{dc}	0.52V	0.68V
I _R	V _R = 125V _{dc}	--	1.0nA

TABLE IV: Summary of Electrical Measurements after
Total Dose Exposures and Annealing for JTXV1N3595

1/ 2/

Parameters		Spec. Limits min max		Initials mean sd		Total Dose Exposure (krads)								Anneal		Total Dose (krads)			
						25		50		75		100		168 hrs		200		300	
						mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
VF1	V	0.83	1.0	0.95	.01	0.96	.01	0.96	.01	0.96	.01	0.96	.01	0.96	.01	0.95	.01	0.96	.01
VF2	V	0.79	0.92	0.90	0	0.90	.01	0.90	.01	0.90	.01	0.90	.01	0.90	.01	0.86	.01	0.86	0
VF3	V	0.74	0.88	0.85	0	0.86	0	0.86	.01	0.86	.01	0.86	.01	0.86	0	0.86	.01	0.86	0
VF4	V	0.65	0.80	0.77	0	0.77	0	0.77	.01	0.77	.01	0.77	.01	0.77	.01	0.77	.01	0.77	0
VF5	V	0.60	0.75	0.74	.01	0.74	.01	0.74	0	0.74	.01	0.74	.01	0.74	.01	0.66	0	0.66	0
VF6	V	0.52	0.68	0.65	0	0.66	.01	0.66	0	0.66	.01	0.66	0	0.66	.01	0.65	0	0.65	0
IR	nA	-	1.0	0.54	.05	0.51	.06	0.43	0.1	1.16	0.14	1.13	0.16	0.93	.08	1.75	0.26	2.00	0.37

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 24-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 JTXV1N3595

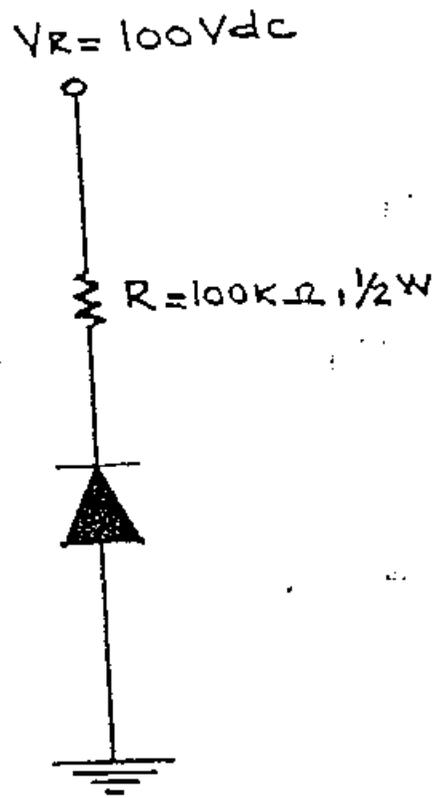


FIG. 1