

**UNISYS**

DATE: October 17, 1996  
TO: G. Kramer/311 *K. Sahu*  
FROM: K. Sahu/300.1  
SUBJECT: Radiation Report on: IN5314  
Project: HST/BIK  
Control #: 15396  
Job #: ER61240

PPM-97-002

cc: S. Hull/311  
A. Sharma/311  
OFA Library/300.1

A radiation evaluation was performed on IN5314 (Diode) to determine the total dose tolerance of these parts. A brief summary of the test results is provided below. For detailed information, refer to Figure 1 and Tables I through IV.

The total dose testing was performed using a Co<sup>60</sup> 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 levels were 2.5, 5, 10, 20, 40, 60 and 100 krads. The dose rate was between 0.04 and 1.18 krads/hour (see Table II for radiation schedule). After each radiation exposure, parts were electrically tested according to the test conditions and the specification limits<sup>\*\*</sup> listed in Table III.

All parts passed all initial electrical tests. Both irradiated parts passed all electrical tests throughout all irradiation steps with no significant change in either test parameter, VF or IF soak.

Table IV provides mean and standard deviation values for each parameter initially and after each irradiation exposure.

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(SiO<sub>2</sub>). All radiation levels cited are cumulative.

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

---

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 conditional 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.

Figure 1. Radiation Bias Circuit for IN5314

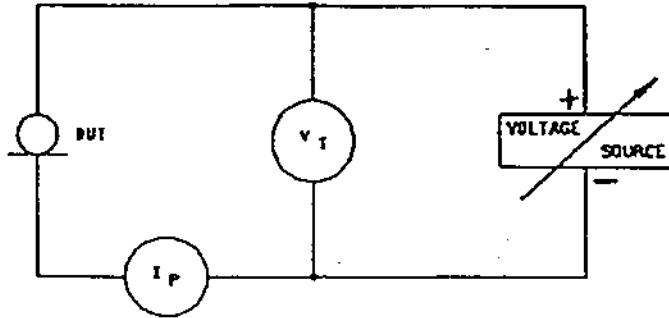


TABLE I. Part Information

Generic Part Numbers:	1N5314
HST/BIK Part Number	1N5314
HST/BIK Control Number:	15396
Charge Number:	ER61240
Manufacturer:	Motorola
Lot Date Code (LDC):	9106
Quantity Tested:	6
Serial Number of Control Sample:	172
Serial Numbers of Radiation Samples:	181, 190, 259, 263, 288
Part Function:	Diode
Part Technology:	Bipolar
Package Style:	Axial leads
Test Equipment:	Bench test setup
Engineer:	A. Duvalsaint

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

TABLE II. Radiation Schedule for 1N5314

EVENT.....	DATE
1) INITIAL ELECTRICAL MEASUREMENTS.....	09/05/96
2) 2.5 KRAD IRRADIATION* (0.15 KRADS/HOUR).....	09/19/96
POST-2.5 KRAD ELECTRICAL MEASUREMENT.....	09/20/96
3) 5 KRAD IRRADIATION (0.04 KRADS/HOUR).....	09/20/96
POST-5 KRAD ELECTRICAL MEASUREMENT.....	09/23/96
4) 10 KRAD IRRADIATION (0.27 KRADS/HOUR).....	09/23/96
POST-10 KRAD ELECTRICAL MEASUREMENT.....	09/24/96
5) 20 KRAD IRRADIATION (0.59 KRADS/HOUR).....	09/24/96
POST-20 KRAD ELECTRICAL MEASUREMENT.....	09/25/96
6) 40 KRAD IRRADIATION (1.18 KRADS/HOUR).....	09/25/96
POST-40 KRAD ELECTRICAL MEASUREMENT.....	09/26/96
7. 60 KRAD IRRADIATION (1.00 KRADS/HOUR).....	09/26/96
POST-60 KRAD ELECTRICAL MEASUREMENT.....	09/27/96
8. 100 KRAD IRRADIATION (0.62 KRADS/HOUR).....	09/27/96
POST-100 KRAD ELECTRICAL MEASUREMENT.....	09/30/96

---

\* PARTS WERE IRRADIATED AND ANNEALED UNDER BIAS; SEE FIGURE 1.

Table III. Electrical Characteristics of 1N5314

Test	Conditions	Limits		Units
		Min	Max	
VF	$I_L = 3.38\text{mA}$		2.9	VDC
IF soak	$V_S = 100\text{ VDC}$ , $t = 90\text{ sec.}$ , or thermal equilibrium	4.23	5.17	mA

**TABLE IV: Summary of Electrical Measurements after Total Dose Exposures for 1N5314**

Parameter	Units	Spec. Lim./2		Initial		Total Dose Exposure (TDE) (krads)													
		min	max	mean	sd	2.5		5		10		20		40		60		100	
						mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
V <sub>F</sub>	V	0.00	2.90	2.29	0.1	2.19	0.1	2.15	0.1	2.17	0.1	2.10	0.1	2.18	0.1	2.15	0.1	2.13	0.1
I <sub>F</sub> soak	mA	4.23	5.17	4.81	0.1	4.88	0.1	4.95	0.1	4.91	0.1	4.89	0.1	4.90	0.1	4.93	0.1	4.91	0.1

Notes:

- 1/ The mean and standard deviation values were calculated over the five parts irradiated in this testing. The control sample remained constant throughout the testing and is not included in this table.
- 2/ These are manufacturer's non-irradiated data sheet specification limits. No post-irradiation limits were provided by the manufacturer at the time the tests were performed.

**Radiation-sensitive parameters: None**