

UNISYS

DATE: March 15, 1995
 TO: J. Lohr/311
 FROM: K. Sahu/300.1 *KS*
 SUBJECT: Radiation Report on: 6N134
 Project: CASSINI/CIRS
 Control #: 11826
 Job #: EE56102
 Project part #: 5962-8102801EC

PPM-95-137

cc: E. Kidhardt/701.1
 A. Sharma/311.0
 OFA Library/300.1

A radiation evaluation was performed on 6N134 (Optocoupler) 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 ⁶⁰Co gamma ray source. During the radiation testing, four 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 5, 10, 20, 30, 50, 75 and 100 krad*. The dose rate was between 0.29 and 1.47 krad/hour, depending on the total dose level (see Table II for radiation schedule). After the 100 krad irradiation, the parts were annealed at 25°C for 168 hours. After each radiation exposure and annealing treatment, parts were electrically tested according to the test conditions and the specification limits** listed in Table III. These tests included three functional tests at 1 Mhz, with Vcc = 4.50 V, 5.00 V and 5.50 V.

All parts passed initial electrical measurements. All irradiated parts passed all parametric and functional tests throughout all irradiation and annealing steps.

Table IV provides a summary of the mean and standard deviation values for each parameter after different irradiation exposures and annealing step.

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(silicon). 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.

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TABLE I. Part Information

Generic Part Number:	6N134*
CASSINI/CIRS Part Number:	5962-8102801EC
CASSINI/CIRS Control Number:	11826
Charge Number:	EE56102
Manufacturer:	ILC
Lot Date Code:	9426
Quantity Tested:	5
Serial Number of Control Sample:	291
Serial Numbers of Radiation Samples:	292, 293, 294, 295
Part Function:	Optocoupler
Part Technology:	Bipolar
Package Style:	16-pin DIP
Test Equipment:	S-50
Test Engineer:	P. Srioudom

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

TABLE II. Radiation Schedule for 6N134

EVENTS	DATE
1) INITIAL ELECTRICAL MEASUREMENTS	02/01/95
2) 5 KRAD IRRADIATION (0.29 KRADS/HOUR)	02/01/95
POST-5 KRAD ELECTRICAL MEASUREMENT	02/02/95
3) 10 KRAD IRRADIATION (0.29 KRADS/HOUR)	02/02/95
POST-10 KRAD ELECTRICAL MEASUREMENT	02/03/95
4) 20 KRAD IRRADIATION (0.59 KRADS/HOUR)	02/06/95
POST-20 KRAD ELECTRICAL MEASUREMENT	02/07/95
5) 30 KRAD IRRADIATION (0.59 KRADS/HOUR)	02/07/95
POST-30-KRAD ELECTRICAL MEASUREMENT	02/08/95
6) 50 KRAD IRRADIATION (1.18 KRADS/HOUR)	02/08/95
POST-50-KRAD ELECTRICAL MEASUREMENT	02/09/95
10) 75 KRAD IRRADIATION (1.47 KRADS/HOUR)	02/09/95
POST-75-KRAD ELECTRICAL MEASUREMENT	02/10/95
11) 100 KRAD IRRADIATION (0.39 KRADS/HOUR)	02/10/95
POST-100-KRAD ELECTRICAL MEASUREMENT	02/13/95
12) 168-HOUR ANNEALING @25°C	02/13/95
POST-168 HOUR ANNEAL ELECTRICAL MEASUREMENT	02/21/95

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

Table III. Electrical Characteristics of 6N134

Test #	Parameter	Units	Conditions	Lower Limit	Upper Limit
1	Func1		V _{cc} =4.50V, V _{il} =0.00V, V _{ih} =3.30V, Freq.=1.00MHz		
2	Func2		V _{cc} =5.00V, V _{il} =0.00V, V _{ih} =3.30V, Freq.=1.00MHz		
3	Func3		V _{cc} =5.50V, V _{il} =0.00V, V _{ih} =3.30V, Freq.=1.00MHz		
4	IOH	μA	V _{cc} =5.50V, V _{il} =1.40V, V _{ih} =1.4V, V _{out} =5.50V, I _f =250μA	0.00	250
5	VOL	mV	V _{cc} =5.50V, V _{il} =0.00V, V _{ih} =3.30V, Load=10.0 mA	0.00	600
6	VF	V	V _{cc} =0.00V, V _{il} =0.00V, V _{ih} =5.10V, I _f =20mA	0.00	1.75
7	ICCH	mA	V _{cc} =5.50V, V _{il} =0.00V, V _{ih} =0.00V, I _f =0.00mA	0.00	28.0
8	ICCL	mA	V _{cc} =5.50V, V _{il} =5.10V, V _{ih} =5.10V, I _f =20.0mA	0.00	36.0
9	TPLH	ns	V _{cc} =5.00V, V _{il} =0.00V, V _{ih} =3.85V, Load=13mA	0.00	100
10	TPHL	ns	V _{cc} =5.00V, V _{il} =0.00V, V _{ih} =3.85V, Load=13mA	0.00	100

TABLE IV: Summary of Electrical Measurements after Total Dose Exposures and Annealing for 6N134 /1

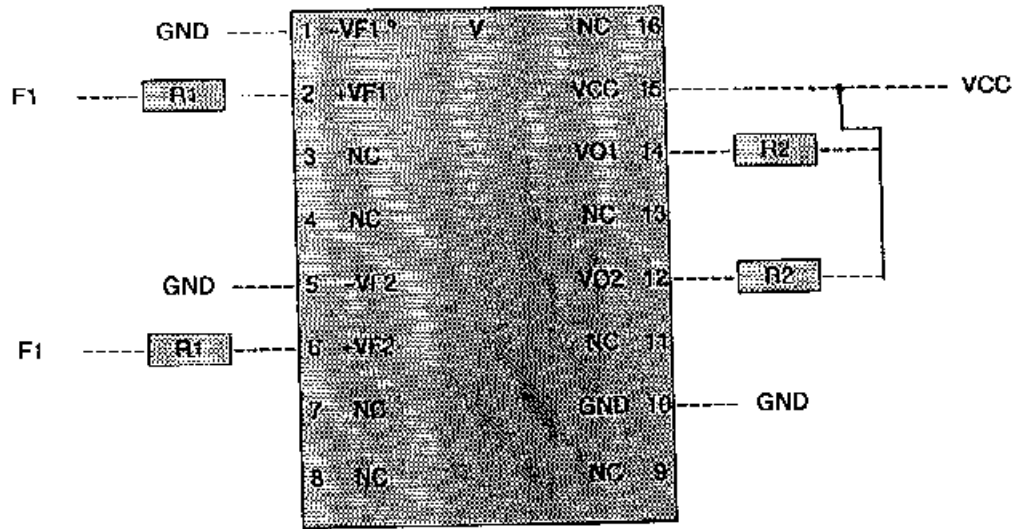
Test #	Parameters	Units	Spec. Lim./2 min	max	Total Dose Exposure (krads)																		Annealing	
					Initial		5		10		20		30		50		75		100		168 hrs @25°C			
					mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd		
1	Func1, Vcc=4.5 V, Freq.=1.0 MHz				P		P		P		P		P		P		P		P		P			
2	Func2, Vcc=5.0 V, Freq.=1.0 MHz				P		P		P		P		P		P		P		P		P			
3	Func3, Vcc=5.5 V, Freq.=1.0 MHz				P		P		P		P		P		P		P		P		P			
4	IOH	µA	0	250	1.76	1.0	1.87	1.1	1.87	1.0	1.89	1.0	1.95	1.1	1.95	1.1	2.07	1.2	2.15	1.2	9.62	1.2		
5	VOL	mV	0	600	287	7.3	286	7.6	286	7.7	286	7.8	287	7.6	288	8.0	287	8.0	289	8.1	288	8.5		
6	VF	V	0	1.75	1.58	.01	1.58	.01	1.57	.01	1.58	.01	1.57	.01	1.58	.01	1.57	.01	1.57	.01	1.57	.01		
7	ICCH	mA	0	28	12.1	.18	12.0	.15	12.1	.17	12.1	.15	12.1	.16	12.0	.14	12.0	.14	12.0	.14	12.0	.16		
8	ICCL	mA	0	36	15.3	.20	15.2	.19	15.2	.19	15.2	.22	15.2	.21	15.2	.20	15.2	.20	15.2	.21	15.2	.22		
9	TPLH	ns	0	100	51.4	.54	54.2	.47	54.3	.46	54.2	.51	54.4	.45	54.3	.46	54.7	.41	54.5	.39	54.4	.38		
10	TPHL	ns	0	100	50.5	.33	50.8	.37	50.9	.41	51.0	.38	51.0	.40	51.1	.37	51.4	.35	51.4	.38	51.5	.37		

Notes:

- 1/ The mean and standard deviation values were calculated over the four 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 pre-irradiation data sheet specification limits. No post-irradiation limits were provided by the manufacturer at the time the tests were performed.

Radiation-sensitive parameter: none.

Figure 1. Radiation Bias Circuit for 6N134

**NOTES:**

- (1) VCC = 5.00 Volts \pm 0.5V.
GND = 0.00 Volts
- (2) R1 = 350 OHMS, 1/4W Min. \pm 5%
R2 = 500 OHMS, 1/4W Min. \pm 5%
R3 = 10 OHMS, 1/4W Min. \pm 5%
- (3) F1 = 100KHz \pm 10%, 50% Duty Cycle, Square Wave
- (4) VIL = -0.3 Volts to +0.3 Volts
VIH = +2.4 Volts to VCC