Paramax Systems
Corporation

4700 Boston Way
Lanham MD 20706

Memorandum

PARAMAX
A Unisys Company

PPM-93-070

DATE: July 13, 1993
TO: B. Fafaul/311.1
FROM: K. Sahu/300.1
SUBJECT: Radiation Report on SWAS/MUE
Part No. OMH3075SA

cc: T. Miccolis/300.1
A. Sharma/311.0
Library/311

A radiation evaluation was performed on OMH3075S (Hall Effect Sensor (Latch)) to determine the total dose tolerance of these parts. 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 levels were 5, 10, 20, 40, and 60 krads*. The dose rate was between 0.07 and 1.00 krads/hour, depending on the total dose level (see Table II for radiation schedule). After 60 krads, parts were annealed at 25°C for 168 hours, after which the parts were irradiated to a total dose of 100 krads (cumulative). After the 100-krad irradiation, the parts were annealed at 100°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.

All parts passed initial electrical measurements. All eight irradiated parts passed all electrical tests throughout all irradiation and annealing steps. No significant sensitivity to radiation was observed in any test parameters.

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

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.

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.

TABLE I. Part Information

Generic Part Number:	OMH3075S
Part Number:	OMH3075S*
Control Number:	7343
Charge Number:	C33580
Manufacturer:	Optek
Lot Date Code:	9217
Quantity Tested:	5
Serial Numbers of Radiation Samples:	254, 275, 293, 709, 722, 750, 771, 792
Serial Numbers of Control Samples:	213, 223
Part Function:	Hall Effect Sensor (Latch)
Part Technology:	CMOS
Package Style:	3-pin Ceramic
Test Equipment:	Sentry S-50
Test Engineer:	T. Mondy

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

TABLE II. Radiation Schedule for OMH3075S

EVENTS	DATE
1) INITIAL ELECTRICAL MEASUREMENTS	05/27/93
2) 5 KRAD IRRADIATION (0.24 KRADS/HOUR)	06/03/93
POST-5 KRAD ELECTRICAL MEASUREMENT	06/04/93
3) 10 KRAD IRRADIATION (0.07 KRADS/HOUR)	06/04/93
POST-10 KRAD ELECTRICAL MEASUREMENT	06/07/93
4) 20 KRAD IRRADIATION (0.50 KRADS/HOUR)	06/07/93
POST-20 KRAD ELECTRICAL MEASUREMENT	06/08/93
5) 40 KRAD IRRADIATION (1.00 KRADS/HOUR)	06/08/93
POST-40 KRAD ELECTRICAL MEASUREMENT	06/09/93
6) 60 KRAD IRRADIATION (1.00 KRADS/HOUR)	06/09/93
POST-60 KRAD ELECTRICAL MEASUREMENT	06/10/93
7) 168 HOUR ANNEALING @25°C	06/10/93
POST-168 HOUR ANNEAL ELECTRICAL MEASUREMENT	06/18/93
8) 100 KRAD IRRADIATION (0.56 KRADS/HOUR)	06/18/93
POST-100 KRAD ELECTRICAL MEASUREMENT	06/22/93
9) 168 HOUR ANNEALING @100°C*	06/22/93
POST-168 HOUR ANNEAL ELECTRICAL MEASUREMENT	07/07/93

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

*High temperature annealing is performed to accelerate long term time dependent effects (TDE), namely, the "rebound" effect due to the growth of interface states after the radiation exposure. For more information on the need to perform this test, refer to MIL-STD-883D, Method 1019, Para. 3.10.1.

Table III. Electrical Characteristics of OMH3075S

TEST	CONDITIONS	LIMITS		UNITS
		MIN	MAX	
ICC	VCC = 24V, B < 250G	0	7.0	mA
BOP1	VCC = 4.5V	50	250	G
BOP2	VCC = 24V	50	250	G
BRP1	VCC = 4.5V	-250	-50	G
BRP2	VCC = 24V	-250	-50	G
BHYS1	VCC = 4.5V, BHYS = BOP - BRP	100	500	G
BHYS2	VCC = 24V, BHYS = BOP - BRP	100	500	G
VSAT	VCC = 4.5V, B > 250G, IOUT = 20mA	0	400	mV
IOH	VCC = 24V, VOUT = 24V, B < 250G	0	1.0	μA

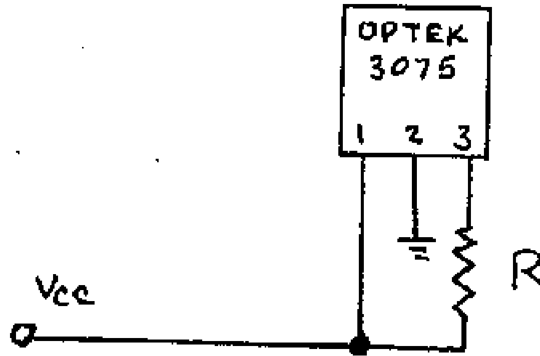
Table IV: Summary of Electrical Measurements After Total Dose Exposures and Annealing for OMH3075S 1/

Parameters	Spec. Lim./2 min	Spec. Lim./2 max	Initial 0 mean	Initial 0 sd	Total Dose Exposure (TDE) (krads) 5 mean	5 sd	10 mean	10 sd	20 mean	20 sd	40 mean	40 sd	60 mean	60 sd	Anneal 168 Hrs @25°C mean	sd	TDE 100 krads mean	sd	Anneal 168 Hrs @100°C mean	sd
ICC, mA	0	7.0	4.42	.11	4.41	.11	4.40	.11	4.34	.11	4.27	.11	4.25	.11	4.29	.11	4.21	.11	4.30	.12
BOP1, G	50	250	164	31	174	32	170	21	175	27	179	30	181	26	170	27	181	27	166	34
BOP2, G	50	250	170	35	182	37	176	25	182	28	183	34	191	30	180	29	191	29	174	36
BRP1, G	-250	-50	-121	40	-132	48	-132	48	-137	48	-140	49	-141	50	-131	45	-140	52	-124	39
BRP2, G	-250	-50	-124	48	-135	58	-134	57	-140	56	-145	58	-148	60	-139	54	-148	60	-130	48
BHYS1, G	100	500	289	37	312	58	306	47	317	44	326	49	330	50	310	43	336	45	297	36
BHYS2, G	100	500	299	38	322	57	315	45	327	44	340	50	347	50	328	45	345	47	311	37
VSAT, mV	0	400	147	4.7	165	40	167	30	168	29	165	7.6	166	7.6	169	25	176	13	169	21
IOH, µA	0	1.0	0.01	0	0.01	0	0.03	0	0.01	0	0.01	0	0.02	0	0.01	0	0.02	0	0.01	0

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/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.

Figure 1. Radiation Bias Circuit for OMH3075S 1/, 2/



1/ Vcc = 24.0 V ±0.5 V

2/ R = 5.1 KΩ, ¼W