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**UNISYS**

## Interoffice Memorandum

PPM-91-709

Date

November 29, 1991

Location

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731-8954

Location

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Subject  
 Radiation Report on  
 SMEX/CB Part No. 2298855-2  
 Control No. 2939

A radiation evaluation was performed on 2298855-2 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, five parts were irradiated and one part was used as a control sample. The first six total dose radiation steps were 10, 20, 30, 50, 75 and 100 krads. After 100 krads, parts were annealed at +25°C for 24 and 168 hours under bias. After 168 hours annealing, parts were irradiated to 200 krads and 300 krads total accumulated dose. The dose rate was between 0.2 and 5.0 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 five parts passed all tests on irradiation to 300 krads, without any significant changes in any of the electrical parameters. Table IV provides 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.

TABLE I. Part Information

Generic Part Number:	2298855-2
SMEX/CB Part Number:	2298855-2
SMEX/CB Control Number:	2939
Charge Number:	C90433
Manufacturer:	Teledyne
Lot Date Code:	9126
Quantity Tested:	6
Serial Numbers of Radiation Samples:	6, 12, 13, 15, 21
Serial Number of Control Sample:	4
Part Function:	DC/DC Converter
Part Technology:	Hybrid
Package Style:	Non-Standard 10-Pin DIP Can
Test Engineer:	C. Nguyen

TABLE II. Radiation Schedule for 2298855-2

EVENTS	DATE
1) Initial Electrical Measurements	10/08/91
2) 10-KRAD IRRADIATION (0.5 KRADS/HOUR) POST-10-KRAD ELECTRICAL MEASUREMENT	10/08/91 10/09/91
3) 20-KRAD IRRADIATION (0.5 KRADS/HOUR) POST-20-KRAD ELECTRICAL MEASUREMENT	10/09/91 10/10/91
4) 30-KRAD IRRADIATION (0.5 KRADS/HOUR) POST-30-KRAD ELECTRICAL MEASUREMENT	10/10/91 10/11/91
5) 50-KRAD IRRADIATION (0.2 KRADS/HOUR) POST-50-KRAD ELECTRICAL MEASUREMENT	10/11/91 10/15/91
6) 75-KRAD IRRADIATION (1.25 KRADS/HOUR) POST-75-KRAD ELECTRICAL MEASUREMENT	10/15/91 10/16/91
7) 100-KRAD IRRADIATION (1.25 KRADS/HOUR) POST-100-KRAD ELECTRICAL MEASUREMENT	10/16/91 10/17/91
8) 24-HOUR ANNEALING POST-24-HOUR ANNEAL ELECTRICAL MEASUREMENT	10/17/91 10/18/91
9) 168-HOUR ANNEALING POST-168-HOUR ANNEAL ELECTRICAL MEASUREMENT	10/17/91 10/24/91
10) 200-KRAD IRRADIATION (5 KRADS/HOUR) POST-200-KRAD ELECTRICAL MEASUREMENT	10/24/91 10/25/91
11) 300-KRAD IRRADIATION (1.5 KRADS/HOUR) POST-300-KRAD ELECTRICAL MEASUREMENT	10/25/91 10/28/91

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 2298855-2 1,2

<u>TEST NAME</u>	<u>TEST CONDITIONS</u>	<u>LIMITS</u>
Minimum load = 1/3 maximum load.		
Input current	Vin= 28V, Min load	<1000mA
Output Voltage	Vin= 28V, Po=15W	+5V > 4.75V < 5.15V Dual >14.25V <15.75V
Output Current	Vin= 28V, Po=15W	+5V > 800mA < 2.6A Dual > 15mA < 68mA
Output Power	Vin= 28V	+5V > 0W < 13.2W Dual > 0W < 1.1W
Efficiency	Po = 15W	> 65%
Line Regulation	Vin=16V to 36V Po = 15W	+5V < +/-0.15V Dual < +/-0.75V
Load Regulation	Vin = 28V Load= min to max	+5V < +/-0.15V Dual < +/-0.75V
Output ripple Voltage	Vin = 28V Po = 15W	+5V < 150mV p-p Dual < 300mV p-p

**COMMENTS AND EXCEPTIONS:**

- 1 - Input Voltage performed Go/NoGo throughout the test.
- 2 - The Power rating of the whole device package and each individual output are given by Peter Rebello of Teledyne through telephone conversation.

Po total =15W  
 Max Io at +5V=2.6A  
 Max Io at +/-15V=1A

Line Regulation, Load Regulation, Output Ripple Voltage, I/O isolation limits are taken from Teledyne test data table.

TABLE IV: Summary of Electrical Measurements After  
Total Dose Exposures and Annealing for 2298855-2

1/ 2/

Parameters	Spec. Limits min max	Total Dose Exposure (TDE) (krads)								Anneal		TDE (krads)			
		(Pre-Rad)		20		50		100		168 hrs		200		300	
		mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
IIN mA	0 1000	286	2	280	11	283	6	275	13	286	4	280	7	284	3
VOJT +5V V	4.75 5.15	4.96	.01	4.96	.01	4.95	.02	4.95	.02	4.96	.02	4.95	.02	4.95	.02
VOJT -15V -V	14.25 15.75	15.6	.03	15.6	.03	15.6	.04	15.6	.05	15.6	.03	15.6	.04	15.6	.04
VOJT +15V V	14.25 15.75	15.5	.01	15.5	.02	15.5	.04	15.5	.05	15.5	.04	15.5	.05	15.5	.05
ICJT +5V A	0.8 2.6	2.48	0	2.48	0	2.47	.01	2.47	.01	2.48	.01	2.47	.01	2.48	.01
ICJT -15V -A	.015 .068	.068	0	.068	0	.068	0	.068	0	.068	0	.068	0	.068	0
ICJT +15V A	.015 .068	.068	0	.067	0	.067	0	.067	0	.068	0	.067	0	.067	0
PCUT +5V W	0 13.2	12.3	.03	12.3	.05	12.3	0.1	12.3	0.1	12.3	.07	12.2	.05	12.2	.05
PCUT -15V W	0 1.1	1.06	0	1.07	.01	1.06	.01	1.06	0	1.06	.01	1.06	.01	1.06	.01
PCUT +15V W	0 1.1	1.05	0	1.05	.01	1.04	.01	1.04	.01	1.05	.01	1.05	.01	1.05	.01
EFF %	65 -	70	0.4	71	0.5	70	0.8	71	0.8	70	0.9	71	0.5	71	.03
LINEREG +5V V	-.15 .15	.04	.01	.05	.01	.05	.01	.05	.01	.05	.01	.05	.01	.05	.03
LINEREG-15V V	-.75 .75	-.22	.02	-.24	.02	-.24	.02	-.25	.02	-.23	.02	-.24	.01	-.23	.02
LINEREG+15V V	-.75 .75	.21	.02	.23	.02	.23	.02	.24	.02	.23	.02	.23	.02	.22	.02
LOADREG +5V V	-.15 .15	.10	.01	.10	0	.10	0	.10	0	.10	0	.10	0	.10	.03
LOADREG-15V V	-.75 .75	.58	.04	.57	.04	.56	.03	.55	.03	.59	.03	.56	.02	.57	.02
LOADREG+15V V	-.75 .75	-.47	.04	-.46	.04	-.45	.03	-.44	.03	-.48	.04	-.44	.02	-.46	.02
VOr 5V mVp-p	0 150	65	5	56	4	48	3	50	5	62	5	64	2	60	3
VOr-15V mVp-p	0 300	58	8	57	2	53	4	42	1	28	3	29	2	29	3
VOr 15V mVp-p	0 300	34	7	29	2	39	8	38	2	61	2	65	2	59	3

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/ Table IV provides radiation characteristics of parts at selected total dose exposures and annealing treatments. The data at other radiation exposures and annealing treatments is available and can be obtained upon request.

Figure 1. Radiation Bias Circuit for 2298855-2

