

**UNISYS**

DATE: March 3, 1995

PPM-95-135

TO: S. Hull/311

FROM: K. Sahu/300.1 *KS*

SUBJECT: Radiation Report on HST/PCP Part # 5962-9319301HXC

Control #: 11012

Job #: EE44603

Generic Part #: MFL2815

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A radiation evaluation was performed on MFL2815 (DC-DC Converter) 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  $^{60}\text{Co}$  gamma ray source. During the radiation testing, three 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, 15, 20 and 30 krad\*. The dose rate was between 0.15 and 0.63 krad/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 parts passed initial electrical measurements. All irradiated parts passed all electrical tests up to and including the 15-krad irradiation level. At the 20-krad level, S/N 178 marginally exceeded the maximum specification limit of 15.15 V for Pos. Vout Full, with a reading of 15.16 V and at the 30-krad level, S/N 178 read 15.172 V for Pos. Vout Full. Both of the other irradiated parts passed all other electrical tests. All irradiated parts passed all other electrical 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:	MFL2815*
HST/PCP Part Number:	5962-9319301HXC
HST/PCP Control Number:	11012
Charge Number:	EE44603
Manufacturer:	Interpoint
Lot Date Code:	9443
Quantity Tested:	4
Serial Number of Control Sample:	151
Serial Numbers of Radiation Samples:	155, 178, 185
Part Function:	DC-DC Converter
Part Technology:	Hybrid
Package Style:	12-pin Flatpack
Test Equipment:	Bench Test Setup
Test Engineer:	P. Srioudom

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

TABLE II. Radiation Schedule for MFL2815

EVENTS	DATE
1) INITIAL ELECTRICAL MEASUREMENTS	02/01/95
2) 2.5 KRAD IRRADIATION (0.15 KRADS/HOUR) POST-2.5 KRAD ELECTRICAL MEASUREMENT	02/08/95 02/15/95
3) 5 KRAD IRRADIATION (0.15 KRADS/HOUR) POST-5 KRAD ELECTRICAL MEASUREMENT	02/15/95 02/16/95
4) 10 KRAD IRRADIATION (0.33 KRADS/HOUR) POST-10 KRAD ELECTRICAL MEASUREMENT	02/16/95 02/17/95
5) 15 KRAD IRRADIATION ( 0.57 KRADS/HOUR) POST-15 KRAD ELECTRICAL MEASUREMENT	02/17/95 02/21/95
6) 20 KRAD IRRADIATION (0.32 KRADS/HOUR) POST-20 KRAD ELECTRICAL MEASUREMENT	02/21/95 02/22/95
7) 30 KRAD IRRADIATION (0.63 KRADS/HOUR) POST-30 KRAD ELECTRICAL MEASUREMENT	02/22/95 02/23/95

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

Table III. Electrical Characteristics of MFL2815

Test #	Parameters	Units	Conditions	Min	Max
1	Pos. Vout Full	V	Full Load	14.85	15.15
2	Neg. Vout Full	V	Full Load	-15.23	-14.77
3	Efficiency	%	Full Load	84	-
4	Iin No Load	mA	No Load	-	100
5	Pos. Load Reg.	mV	No Load to Full	-	150
6	Neg. Load Reg.	mV	No Load to Full	-	150
7	Pos. Line Reg.	mV	Full Load	-	100
8	Neg. Line Reg.	mV	Full Load	-	100
9	Pos. Output Rip.	mVp-p	Full Load	-	100
10	Neg. Output Rip.	mVp-p	Full Load	-	100

**TABLE IV: Summary of Electrical Measurements after Total Dose Exposures and Annealing for MFL2815 /1**

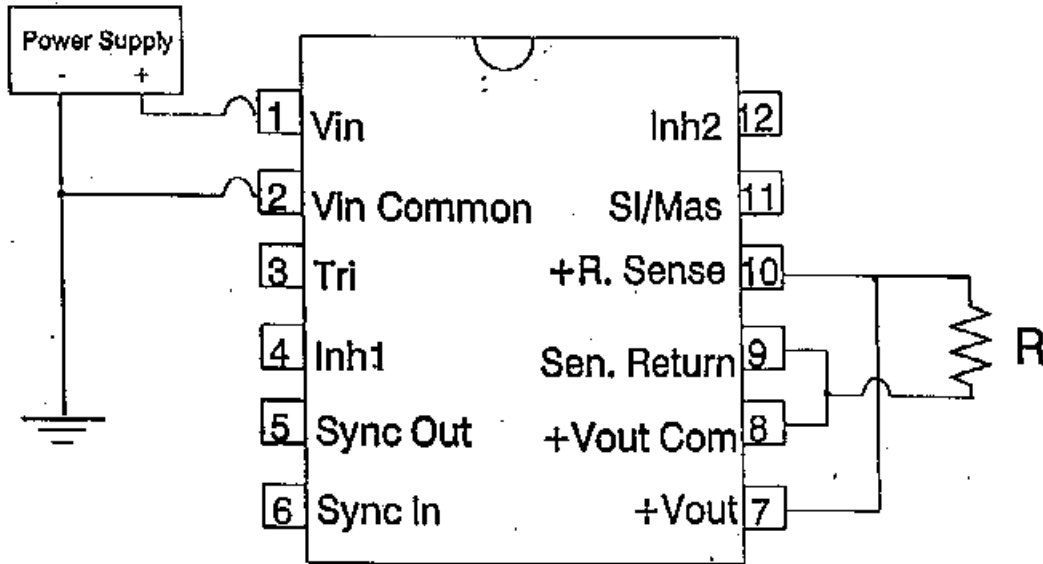
Test #	Parameters	Units	Spec. Lim/2 min max		Total Dose Exposure (krads)													
					Initial		2.5		5		10		15		20		30	
					mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd
1	Pos. Vout Full	V	14.85	15.15	15.04	.08	15.04	.08	15.05	.09	15.06	.09	15.08	.09	15.06	.12	15.06	.12
2	Neg. Vout Full	V	-15.23	-14.77	-15.00	.08	-15.01	.07	-15.01	.08	-15.02	.09	-15.04	.09	-15.03	.11	-15.03	.12
3	Efficiency	%	84	-	86.3	.13	86.0	.16	86.2	.19	85.9	.10	86.1	.26	86.0	.27	85.8	.25
4	Iin No Load	mA	-	100	56.2	1.1	52.6	2.2	51.8	1.8	52.8	1.1	52.8	1.5	52.6	1.5	52.3	1.1
5	Pos. Load Reg.	mV	-	150	7.90	2.9	6.95	2.8	7.73	3.0	6.66	2.6	6.29	2.4	6.82	3.5	5.96	3.7
6	Neg. Load Reg.	mV	-	150	36.2	9.8	32.3	5.1	32.6	12	32.5	13	34.8	12	35.1	11	33.9	9.6
7	Pos. Line Reg.	mV	-	100	-0.31	1.2	-0.10	1.3	-0.44	1.5	0.18	1.1	0.73	.34	0	1.3	0.18	1.2
8	Neg. Line Reg.	mV	-	100	20.2	1.7	19.3	.85	20.0	2.0	20.1	1.8	20.0	1.4	19.8	1.7	19.7	1.7
9	Pos. Output Rip.	mVp-p	-	100	61.0	6.9	78.1	6.9	80.9	8.7	79.1	7.5	77.8	7.2	79.2	7.8	80.5	8.1
10	Neg. Output Rip.	mVp-p	-	100	55.5	6.1	72.6	7.6	76.0	9.3	75.8	8.6	74.8	8.3	76.2	8.7	77.5	8.5

## Notes:

- 1/ The mean and standard deviation values were calculated over the three parts irradiated in this testing. The con 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: Pos. Vout Full.**

Figure 1. Radiation Bias Circuit for MFL2815



Vin = 28 V  
R = 25 Ω