

**UNISYS**

DATE: February 9, 1995

TO: S. Hull/311

FROM: K. Sahu/300.1 *KS*

SUBJECT: Radiation Report on HST/PCP  
Part No. MFL2812S  
Control No. 11010

PPM-95-128

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A radiation evaluation was performed on MFL2812S (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 control sample. The total dose radiation levels were 2.5, 5, 10, 15, 20, 30 and 50 krad\*. The dose rate was between 0.04 and 0.29 krad/hour, depending on the total dose level (see Table II for radiation schedule). After the 50 krad irradiation, 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.

All parts passed initial electrical measurements. All parts passed all electrical tests up to and including the 20 krad irradiation level. At the 30 krad irradiation level, S/N 24 and S/N 29 marginally exceeded the maximum specification limit of 12.12V for Vout Full Load with a reading of 12.15V. All other irradiated parts passed all electrical measurements. At the 50 krad irradiation level, the same parts continued to exceed the specification limit for Vout Full load with readings of 12.13V and 12.14V.

After annealing for 168 hours at 25°C, all parts passed all electrical measurements.

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:	MFL2812S*
HST/PCP Part Number:	5962-9316201HXC
HST/PCP Control Number:	11010
Charge Number:	EE44605
Manufacturer:	Interpoint
Lot Date Code:	9442
Quantity Tested:	4
Serial Number of Control Sample:	20
Serial Numbers of Radiation Samples:	24, 28, 29
Part Function:	DC-DC Converter
Part Technology:	Hybrid
Package Style:	12 pin metal sealed
Test Equipment:	A540
Test Engineer:	P. Srioudom

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

TABLE II. Radiation Schedule for MLS2812S

EVENTS	DATE
1) INITIAL ELECTRICAL MEASUREMENTS	01/05/95
2) 2.5 KRAD IRRADIATION (0.15 KRADS/HOUR) POST-2.5 KRAD ELECTRICAL MEASUREMENT	01/05/95 01/06/95
3) 5 KRAD IRRADIATION (0.04 KRADS/HOUR) POST-5 KRAD ELECTRICAL MEASUREMENT	01/06/95 01/09/95
4) 10 KRAD IRRADIATION (0.16 KRADS/HOUR) POST-10 KRAD ELECTRICAL MEASUREMENT	01/09/95 01/10/95
5) 15 KRAD IRRADIATION (0.29 KRADS/HOUR) POST-15 KRAD ELECTRICAL MEASUREMENT	01/10/95 01/11/95
6) 20 KRAD IRRADIATION (0.29 KRADS/HOUR) POST-20 KRAD ELECTRICAL MEASUREMENT	01/11/95 01/12/95
7) 30 KRAD IRRADIATION (0.29 KRADS/HOUR) POST-30 KRAD ELECTRICAL MEASUREMENT	01/12/95 01/13/95
8) 50 KRAD IRRADIATION (0.23 KRADS/HOUR) POST-50 KRAD ELECTRICAL MEASUREMENT	01/17/95 01/18/95
9) 168-HOUR ANNEALING @25°C POST-168 HOUR ANNEAL ELECTRICAL MEASUREMENT	01/18/95 01/25/95

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

Table III. Electrical Characteristics of MFL2812S

Test #	Parameters	Units	Conditions	Min	Max
1	Vout Full load	V	Full Load	11.880	12.120
2	Efficiency	%	Full Load	83	-
3	Iin No Load	A	No Load	-	80
4	Load Reg	V	No Load to Full	-	20
5	Ln Reg	V	Full Load	-	20
6	Output Ripple	Vp-p	Full Load	-	75

**TABLE IV: Summary of Electrical Measurements after Total Dose Exposures and Annealing for MLS2812S /1**

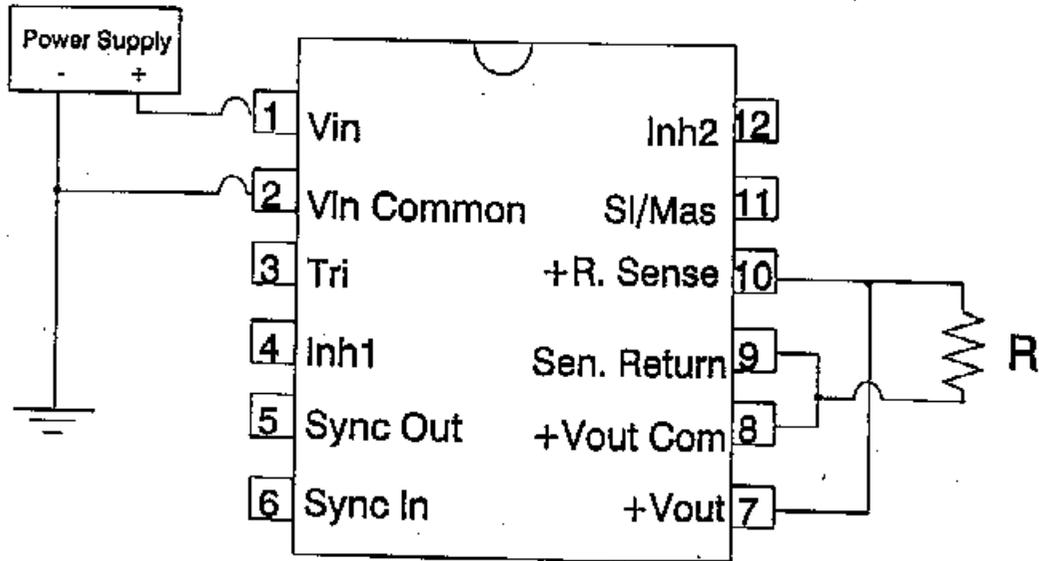
Test #	Parameters	Spec. Lim./2	Total Dose Exposure (krads)																		Annealing	
			Initial		2.5		5		10		15		20		30		50		168 hrs @25°C			
			min	max	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd		
1	Vout Full Load	V	11.88	12.12	12.04	0.03	12.0	0.07	12.02	0.03	12.06	0.04	12.07	0.05	12.07	0.05	12.12	0.04	12.10	0.04	12.06	0.05
2	Efficiency	%	83	-	85.6	0.05	85.3	0.05	85.1	0.05	85.2	0.04	85.1	0.09	85.2	0.12	85.3	0.12	85.1	0.05	85.4	0.05
3	Iin	mA	-	80	61.1	0.82	60.8	1.57	60.1	1.41	59.3	0.47	62.0	0.82	61.3	0.94	61.0	1.41	58.0	0.82	56.8	0.28
4	Load Reg	mV	-	20	0.17	.20	0.21	.10	0.17	.13	0.17	.12	0.20	.18	0.01	.26	0.20	.18	0.26	.18	0.20	.09
5	Ln Reg	mV	-	20	0.03	.31	0.25	.26	0.20	.30	0.25	.21	0.53	.33	0.49	.39	0.96	.46	0.72	.40	0.52	.05
6	Output Ripple	mVp-p	-	75	16.3	0.47	16.6	0.47	15.8	0.19	16.0	0.24	20.7	0.55	21.3	0.47	19.9	0.08	28.0	0.23	25.6	0.38

## Notes:

- 1/ The mean and standard deviation values were calculated over the three parts irradiated in this testing. The control sample remained constant throughout the testing and are 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 MFL2812S



$V_{in} = 28V$

MFL2812S  $R = 25 \text{ ohms}$