

# MODULAR DEVICES, INC.

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## SINGLE EVENT UPSET (SEU) RADIATION TEST REPORT FOR MODEL 7107R-T15F (73536) DC-DC CONVERTER

**PREPARED BY:**  
MODULAR DEVICES, INC.  
ONE RONE D ROAD  
SHIRLEY, NY 11967

REVISION: NONE      DATE: 8-09-04

William Smith Jr.      8-09-04  
ORIGINATOR      DATE

\_\_\_\_\_  
APPROVED      DATE

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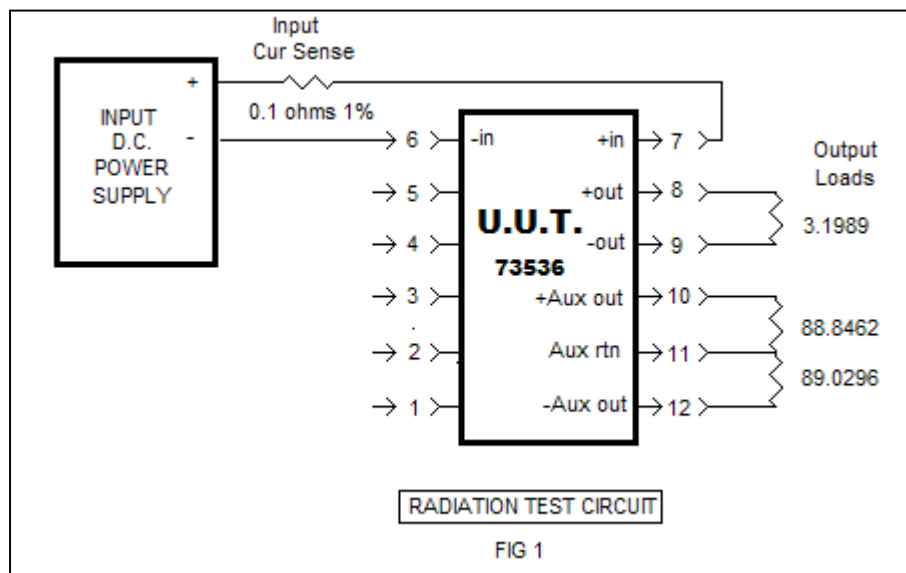
Modular Devices submitted for Radiation Testing MDI Model 7107R-T15F a triple output DC-DC Converter. This was done to establish the adequacy of using the converter design for Single Event Upset (SEU) environment. The resulting data obtained from the testing shows that the DC-DC Converter with the technology is radiation tolerant to at least a LET of 81.43 MeV·cm<sup>2</sup>/mg.

The sample DC-DC Converter was tested in four steps 26.79, 37.47, 59.72 and 81.43 MeV·cm<sup>2</sup>/mg using nickel(Ni-58), bromine(Br-81), iodine(I-127), and gold(Au-197) as source's at Brookhaven National Laboratories Tandem Van De Graaff, Building 901A in Brookhaven, N.Y. Performance was monitored using an storage oscilloscope which was set to trigger on the main output voltage if it went below approximately 80 percent of the rated output voltage.

## DC-DC Converter's

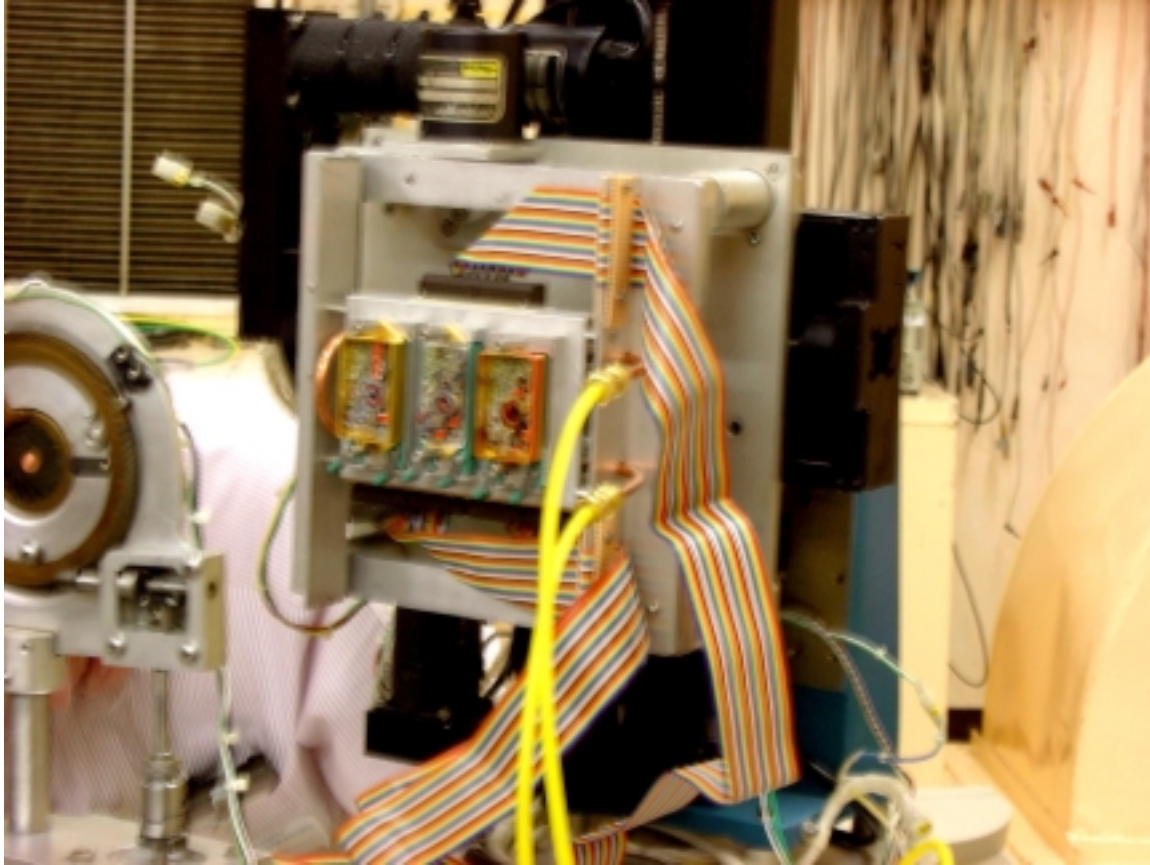
The energy was centered on the power switching transistor with the 7107R-T15F DC-DC Converter, SN 8178, operating with 100% rated load on all three outputs. The input voltage to the converter was 50vdc. The unit did not exhibit any output voltage dropout or latch-up during the testing.

Fig 1 is the test set-up. The measured variables were the input current to the converters and the Main Output voltage was monitored at the load.

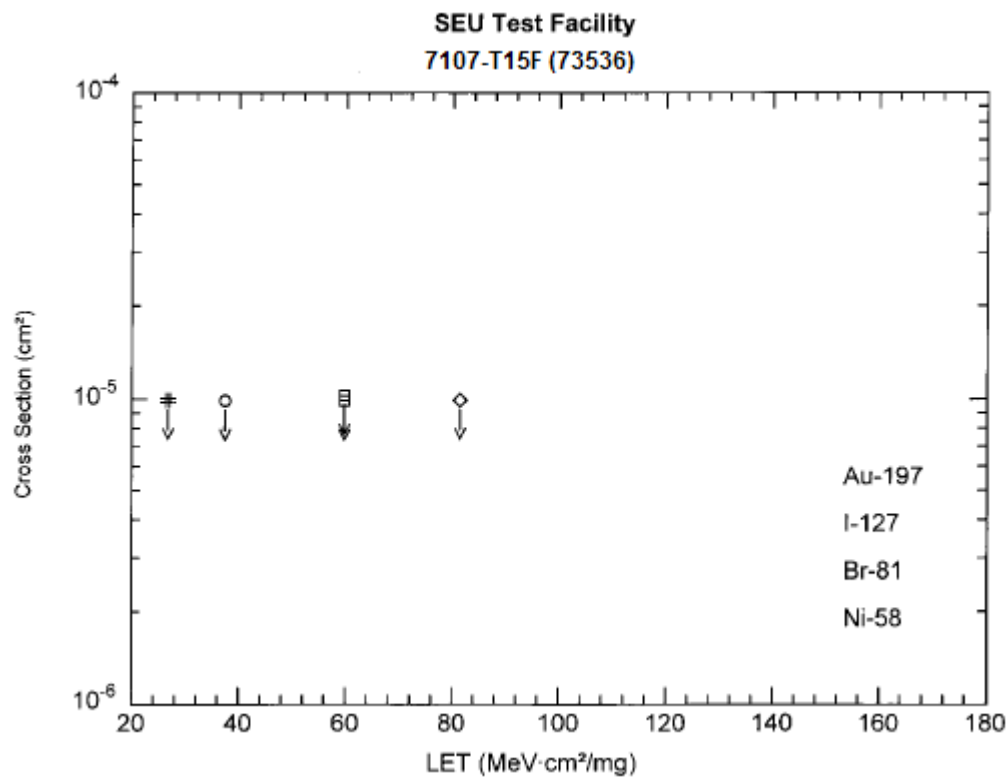


The following figure is a picture of the set-up at Brookhaven.

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The following figure is a graph of the LET measured at Brookhaven.



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The following chart is the official run data as provided by Brookhaven National Laboratory.

## 7107R-T15F (73536) SEU Test Facility

Run #	Date	Time	DeviceID	Ion	Energy MeV	Range um	LET(Si) MeV.cm2/mg	Tilt deg	Roll deg	Time sec	#/cm2/sec	Fluence #/cm2	Dose RAD(Si)	TotalDose RAD(Si)	Upsets
0	5-Aug-04	15:10	Flux	Ni-58	257.6	41.01	26.79	0	0	10	5.315E+03	5.385E+04	0.000E+00	0.000E+00	0
0	5-Aug-04	15:11	Flux	Ni-58	257.6	41.01	26.79	0	0	10	4.599E+03	4.651E+04	0.000E+00	0.000E+00	0
1	5-Aug-04	15:11	73536	Ni-58	257.6	41.01	26.79	0	0	18	5.715E+03	1.009E+05	4.348E+01	4.348E+01	0
0	5-Aug-04	15:51	Flux	Br-81	278	35.98	37.47	0	0	10	6.958E+03	7.040E+04	0.000E+00	0.000E+00	0
8	5-Aug-04	15:54	73536	Br-81	278	35.98	37.47	0	0	14	7.414E+03	1.010E+05	6.091E+01	1.044E+02	0
9	5-Aug-04	15:54	73536	Br-81	278	35.98	37.47	0	0	13	7.636E+03	1.017E+05	6.134E+01	1.657E+02	0
0	5-Aug-04	16:08	Flux	I-127	320	30.97	59.72	0	0	10	7.603E+03	7.683E+04	0.000E+00	0.000E+00	0
15	5-Aug-04	16:11	73536	I-127	320	30.97	59.72	0	0	13	7.549E+03	1.014E+05	9.748E+01	2.632E+02	0
16	5-Aug-04	16:12	73536	I-127	320	30.97	59.72	0	0	14	7.350E+03	1.014E+05	9.744E+01	3.606E+02	0
17	5-Aug-04	16:12	73536	I-127	320	30.97	59.72	0	0	14	7.530E+03	1.016E+05	9.758E+01	4.582E+02	0
0	5-Aug-04	16:28	Flux	Au-197	332.9	27.53	81.43	0	0	10	7.345E+03	7.423E+04	0.000E+00	0.000E+00	0
24	5-Aug-04	16:32	73536	Au-197	332.9	27.53	81.43	0	0	16	6.222E+03	1.014E+05	1.328E+02	5.911E+02	0
25	5-Aug-04	16:32	73536	Au-197	332.9	27.53	81.43	0	0	17	5.912E+03	1.012E+05	1.326E+02	7.236E+02	0
26	5-Aug-04	16:33	73536	Au-197	332.9	27.53	81.43	0	0	17	5.904E+03	1.013E+05	1.327E+02	8.563E+02	0

NOTE: Two other models were tested simultaneously. The run numbers shown are for this model only.

The 7107R-T15F DC-DC converter has successfully performed throughout the Single Event Upset (SEU) radiation testing to a LET(Si) of 81Mev.cm/mg without any perturbations on its outputs.