

**Heavy ion Single Event Effects test of the
5W Ron SPST Switches ADG452
from Analog Devices**

Test Report

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1 Introduction

This report gives heavy ion SEE test data on the 5Ω Ron SPST Switches ADG452 from Analog Devices. This work has been performed in the frame of the ST5 project.

2 Tested Devices

The tested devices are described in Table 1.

Type	ADG452BD
Manufacturer	Analog Devices
Function	5 O Ron SPST switches
Package	SOIC16
Technology	LC2MOS
Date code	0129
Package marking	ADG452BR 0129 J46343
Previous SEE testing	No data available

Table 1: description of the tested devices.

3 Test description

3.1 Irradiation facility

The tests have been performed at the Brookhaven National Laboratories in December 2001. The ion beams used are described in Table 2.

Ion	Energy (MeV)	Average flux (#/cm2-s)	Range (mm)	LET (MeVcm²/mg)
I-127	322	~1E+04	31	59.7
Au-197	348	~5E+03	28	82.16

Table 2: Ions used at BNL.

3.2 Test set-up

The main objective of this test was to check the SEL sensitivity of this device. The nominal power supply supply current is less than 1 μA. The Device Under Test (DUT) supply current was monitored about every 10 ms during the irradiation. As soon as this current reaches a limit set 1 mA, the power supply is shutdown.

The output of one switch was also monitored with an oscilloscope to check for Single Event Transients (SET). Tests have been performed for both the switch on and off state.

The device has been biased to Vdd=+15V, Vss=-15V, V1=5V. The SET test bias conditions are shown in Fig 1.

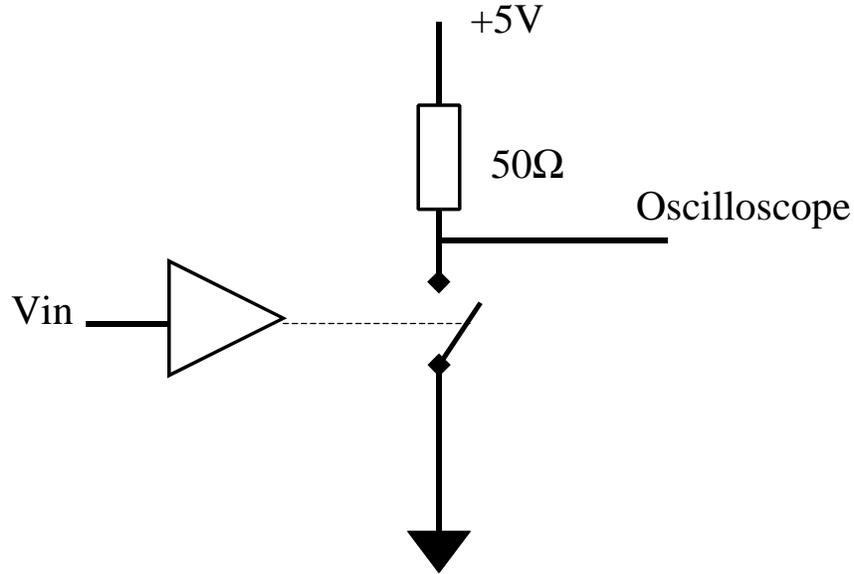


Fig 1: bias conditions for the SET test.

4 Test results

The test results are presented in Table 4.

Run #	Switch state	SN #	Ion	tilt	eff. LET (MeVcm ² /mg)	eff. Fluence (#/cm ²)	SEL	SET	X SEL (cm ² /dev)	X SET (cm ² /switch)
101	on	1	I	0	59.7	8.50E+06	0	30	<1.18E-07	3.53E-06
102	Off	1	I	0	59.7	1.00E+07	0	77	<1.00E-07	7.70E-06
103	Off	1	I	55	104.1	1.00E+07	0	2	<1.00E-07	2.00E-07
104	off	2	I	0	59.7	1.00E+07	0	102	<1.00E-07	1.02E-05
105	on	2	I	0	59.7	6.40E+06	0	17	<1.56E-07	2.66E-06
106	on	2	I	55	104.1	5.00E+06	0	0	<2.00E-07	<2.00E-07
107	on	2	Au	0	82.2	9.92E+06	0	27	<1.01E-07	2.72E-06
108	off	1	Au	0	82.2	1.00E+07	0	70	<1.00E-07	7.00E-06

Table 4: test results.

The device is not sensitive to SEL up to the maximum tested LET of 104 MeVcm²/mg.

The part has a low sensitivity to SET with a maximum SET cross section of 1E-5 cm²/switch. A typical transient when the switch is on is shown in Fig 2. In this condition, the SET have a small amplitude of about 0.5V and a duration of about 300 μs. A typical transient when the switch is off is shown in Fig 3. In this condition the SET have a large amplitude of 4.5V and a duration of about 500 μs.

ADG452, switch on, typical SET

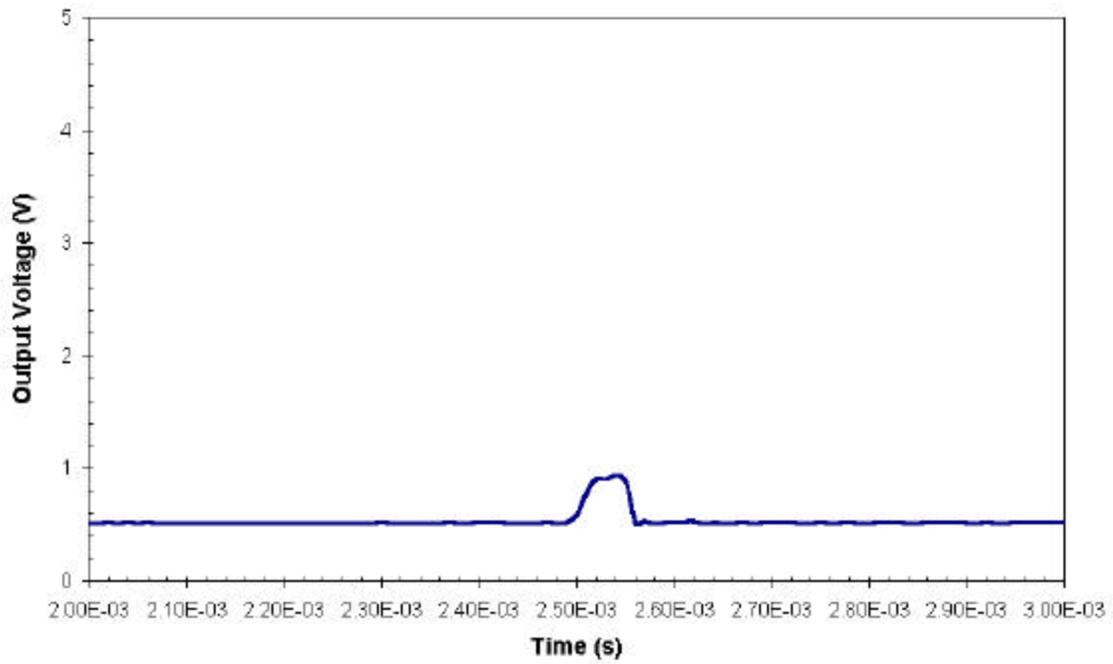


Fig 2: typical transient when the switch is on.

ADG452, switch off, typical SET

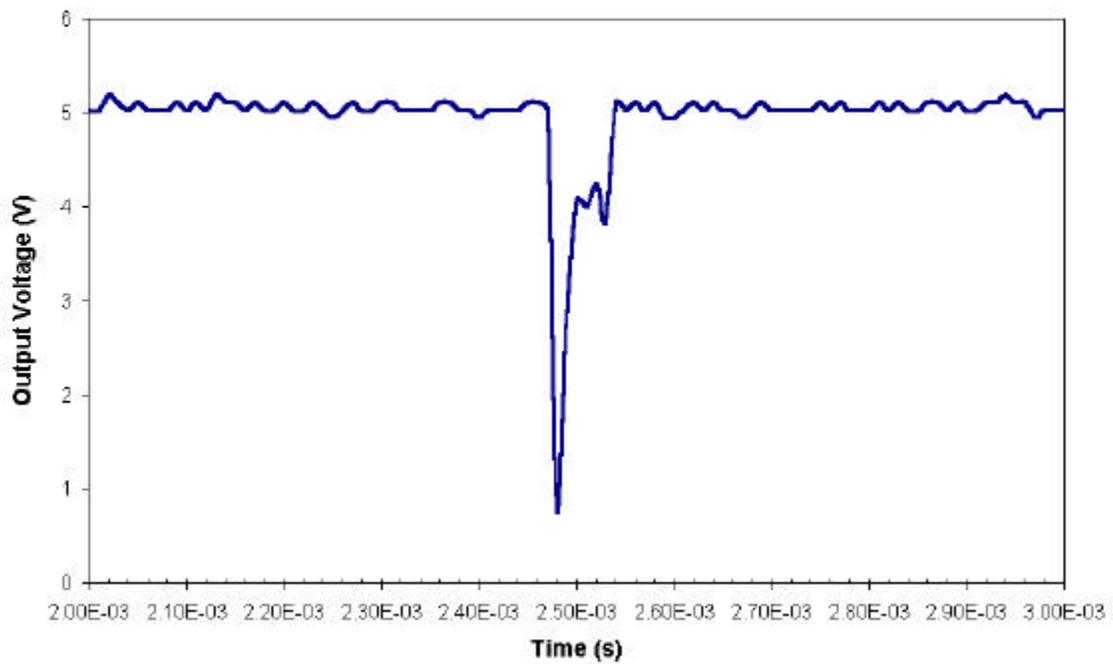


Fig 3: typical transient when the switch is off.

5 Conclusions

The test results show that the ADG452 is not sensitive to heavy ion induced SEL for space application. The ADG452 has a small SET sensitivity, and the event rate on ST5 will be negligible. When the switch is off the SET amplitude may be large and have a significant duration of about 500 μ s.