

SINGLE EVENT LATCH-UP TEST REPORT ADRF5048

September 2025



Radiation Test Report

Product:	ADRF5048
Effective LET:	$\leq 58.0 \text{ MeV-cm}^2/\text{mg}$
Fluence:	$1\text{E}7 \text{ Ions/cm}^2$
Facilities:	LBNL, TAMU
Tested:	April 2024, May 2025

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SEL Test Report for the ADRF5048 – Non-Reflective SP4T Switch

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Test Dates:

LBNL: April 9th-11th, 2024

TAMU: May 22nd-27th, 2025

I. Introduction

The purpose of this test is to determine the Single-Event Latch-up (SEL) susceptibility of the ADRF5048, a nonreflective SP4T switch rated for 100MHz to 45GHz operation. Single Event Latchup (SEL) data was verified on April 9th – 11th 2024, at the LBNL heavy ion facility and on May 22nd – 27th 2025, at the TAMU heavy ion facility.

II. Device Under Test (DUT)

The ADRF5048 is a nonreflective SP4T switch operating in the range of 100MHz to 45GHz. The device contains enable and logic select controls to feature all off state and mirror port selection. The EVAL-ADRF5048 board was used to characterize the device. Four devices were tested.

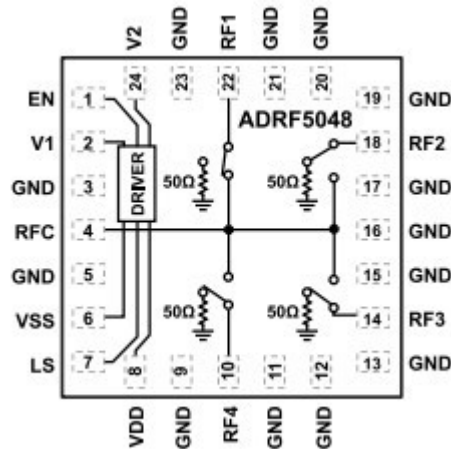


Figure 1. Functional block diagram.

Table 1
Part and test information.

Generic Part Number:	ADRF5048
Date of Test:	April 9th – 11th, 2024; May 22nd – May 27th, 2025
Manufacturer:	Analog Devices, Inc.
Die Rev:	ADRF5048_CS
Part Function:	Nonreflective SP4T Switch
Part Technology:	CMOS
Package Style:	24-terminal, 3 mm x 3 mm LGA
Interconnect:	Flip Chip
Die Thickness:	Thinned to 50 μ m

III. Test Facilities

The heavy-ion beam testing was carried out at the Lawrence Berkeley National Laboratory 88” Cyclotron Facility (LBNL) and Texas A&M University K500 (TAMU). The test setup was in an open-air environment.

Facility: LBNL, TAMU
Cocktail: 16 MeV/nuc; 24.8 MeV/nuc
Fluence: 1×10^7 cm⁻² (per run)
Ions: Shown in Table 2

Table 2.
Heavy-ion species, effective linear energy transfer (LET), and location tested.

Ion	Effective LET (MeV·cm²/mg)	Location
Xe	54.0	LBNL
Ag	58.0	TAMU

IV. Test Method

A. Test Setup

The DUTs were de-processed to expose the die and thinned to 50 μ m. The ADRF5048 was configured, as shown in Figure 2. The LTC5596 was attached to the output of the ADRF5048 to convert to a readable DC voltage on the PXIe-5172 oscilloscope. The supply current was monitored through the PXIe-4163 SMU on the PXIe-1095 Chassis. The supply voltages (± 3.3 V) were set to max rated (+10%) and the DUT was heated to high temperature (125°C).

Table 3
Test Instrumentation

Name	Configured Values	Equipment
V _{DD}	3.6 V	PXIe-4163
V _{SS}	-3.6 V	PXIe-4163
V _{CTRL}	0	PXIe-4163
V _{EN}	0	PXIe-4163
RFIN	1GHz, 2GHz; -5dBm, -10dBm	HMC-T2240
RFOUT	Measured	LTC5596 + PXIe-5172

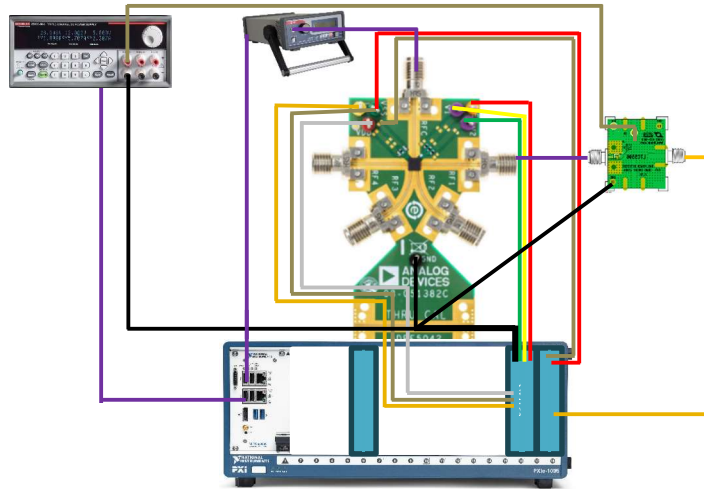


Figure 2. ADRF5048 test setup.

B. Irradiation procedure

1. The device was powered on and brought up to 125°C.
2. The software to monitor the supply voltages and currents was turned on.
3. The ion beam was turned on.
4. Once the 1e+07 fluence was reached, the beam was turned off and the software was terminated.

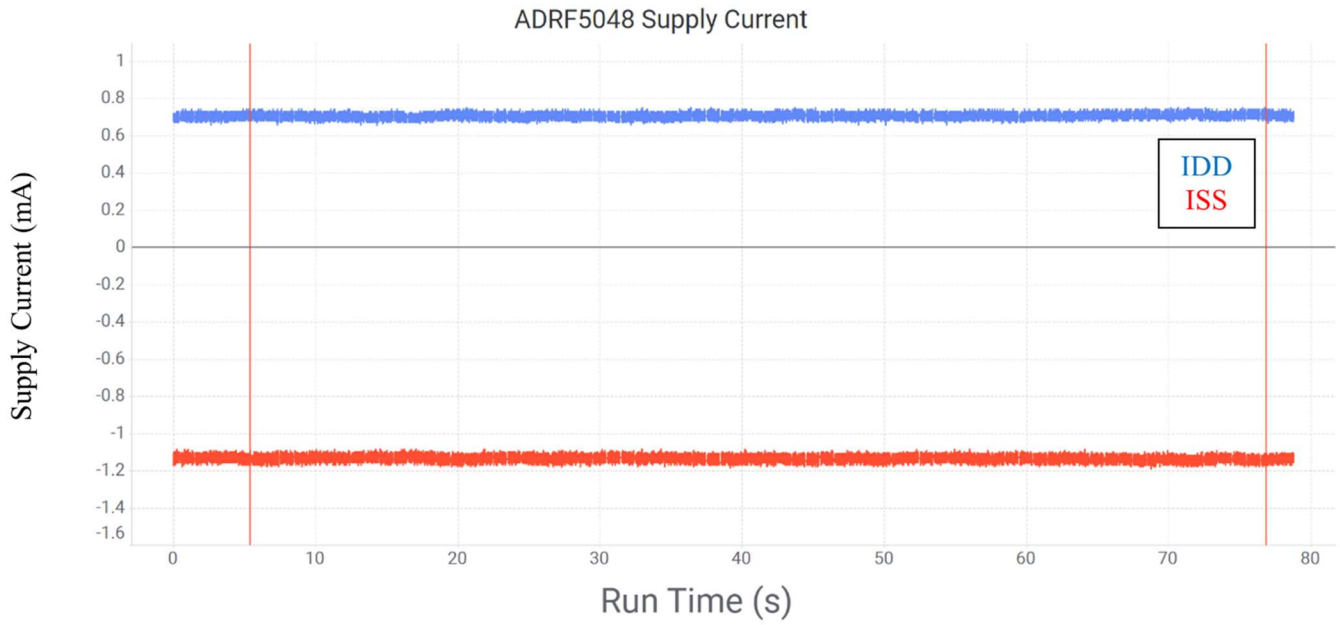
V. Results

SEL – No latch-up or destructive events were observed on the ADRF5048 to the highest effective LET tested at 81.6 MeV·cm²/mg at LBNL and 58.0 MeV·cm²/mg. Four devices were tested. The SEL plots are shown in the Appendix

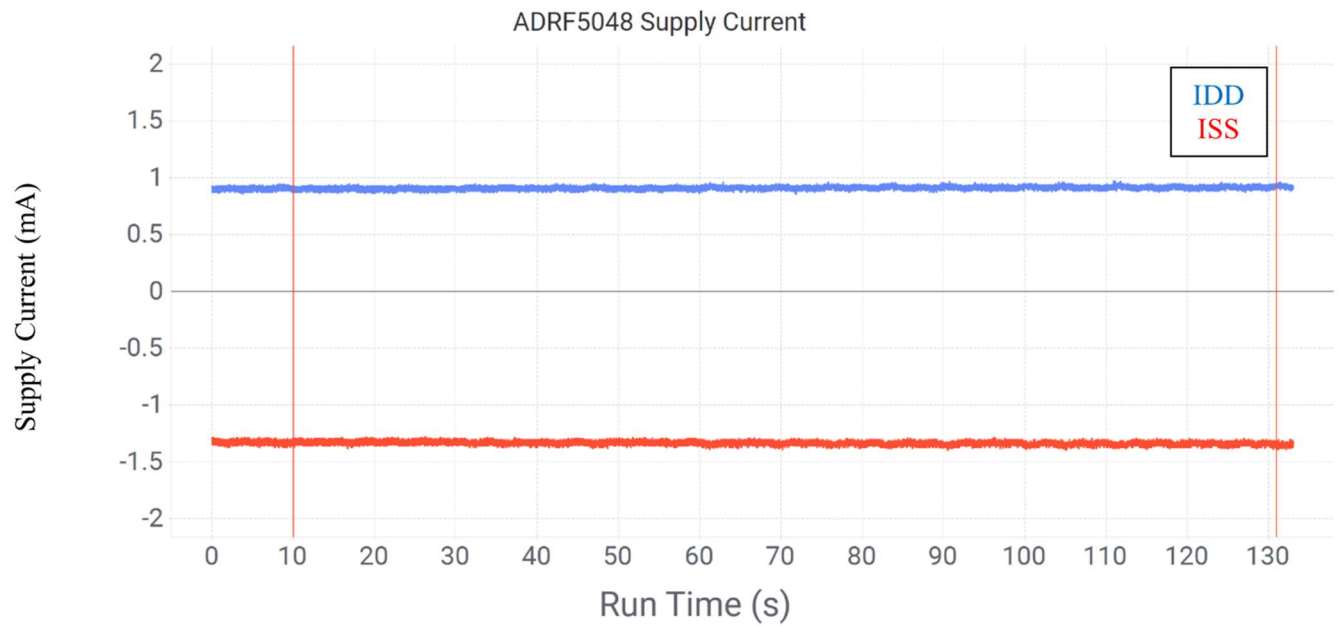
Table 4
SEL Test Runs

Run	Board Serial Number	Ion	Effective LET	Angle	Flux	Fluence
#			<i>MeV·cm²/mg</i>	<i>Degrees</i>	<i>Ions/s</i>	<i>Total Ions</i>
50	1	Xe	81.6	45	1.429E+05	1.000E+07
51	4	Xe	81.6	45	8.696E+04	1.000E+07
186	8	Ag	58.0	0	1.158E+05	1.005E+07
187	15	Ag	58.0	0	1.158E+05	9.954E+06

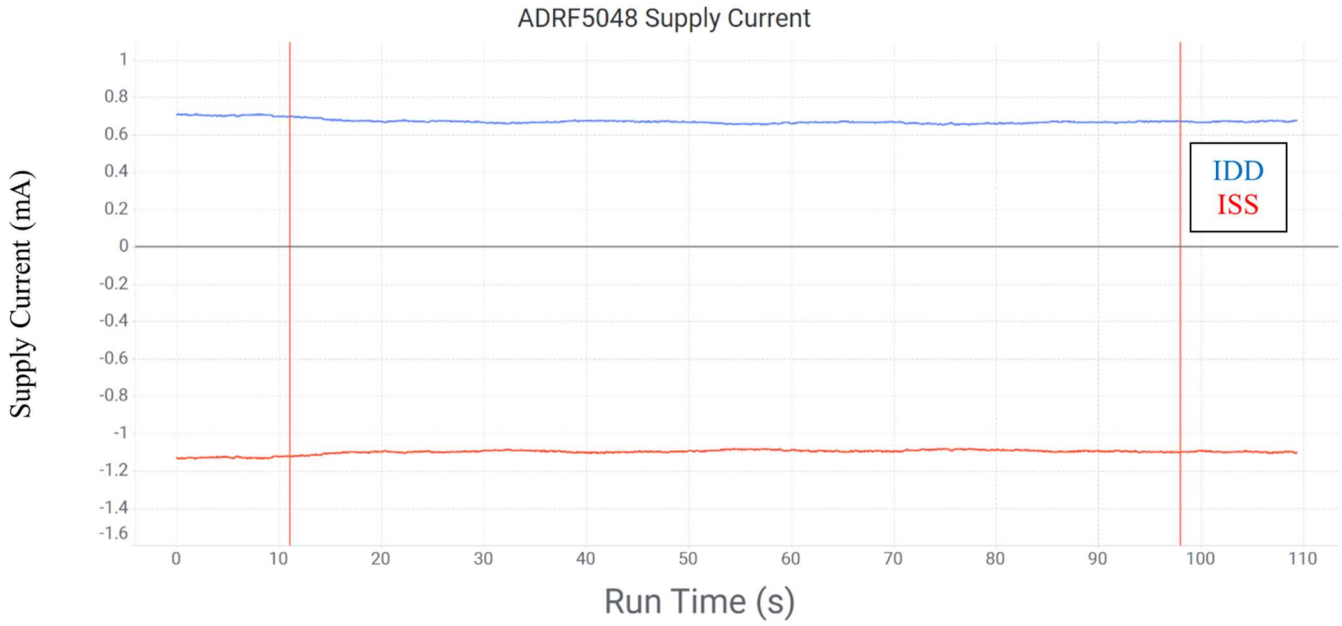
Appendix:



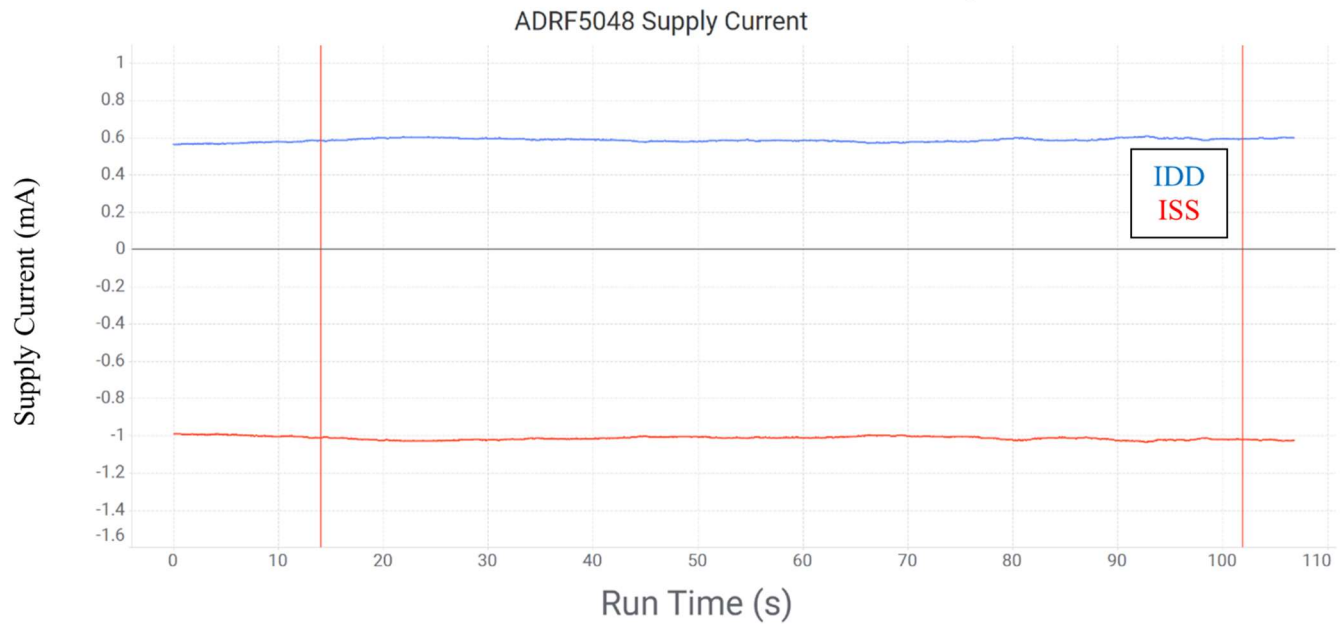
Run 50, Board 1, LET = 81.60 MeV·cm²/mg



Run 51, Board 4, LET = 81.60 MeV·cm²/mg



Run 186, Board 8, LET = 58.0 MeV·cm²/mg



Run 187, Board 15, LET = 58.0 MeV·cm²/mg