

Total Dose Radiation Test Report

MSK119RH

Radiation Hardened High Performance Dual Comparator

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I. Introduction:

The total dose radiation test plan for the MSK119RH was developed to qualify the device as radiation tolerant up to 100 Krad(Si). The testing was performed beyond 100 Krad(Si) to show trends in device performance as a function of total dose. The test does not classify maximum radiation tolerance of the hybrid, but simply offers designers insight to the critical parameter-shifts beyond the specified total dose level.

MIL-STD-883 Method 1019.7 and ASTM F1892-06 were used as guidelines in the development and implementation of the total dose test plan for the MSK119RH.

II. Radiation Source:

Total dose was performed at the University of Massachusetts, Lowell, using a cobalt 60 radiation source. Dosimetry was performed prior to device irradiation and the dose rate was determined to be 139 rads(Si)/sec. The total dose schedule can be found in Table I.

III. Test Setup:

All test samples were subjected to Group A Electrical Test in accordance with the device data sheet. In addition, all devices received 320 hours of burn-in per MIL-STD-883 Method 1015 and were electrically tested prior to irradiation. For test platform verification, one control device was tested at 25°C.

The devices were vertically aligned with the radiation source and enclosed in a Pb/Al container during irradiation to minimize dose enhancement effects. Five devices were kept under bias during irradiation. Five devices had all leads grounded during irradiation for the unbiased condition.

After each irradiation, the device leads were shorted together and were transported to the MSK automatic electrical test platform and tested IAW MSK device data sheet. Testing was performed on irradiated devices, as well as the control device, at each total dose level. Electrical tests were completed within one hour of irradiation.

IV. Data:

All performance curves are averaged from the test results of the biased and unbiased devices respectively.

V. Summary:

Total dose irradiation and testing of the MSK119RH resulted in most test parameters showing very little change up to 100Krad(Si) and beyond. All parameters except Input Offset Current and Input Bias Current remained within pre-irradiation limits during testing.

The biased devices exhibited a significant shift for Input Offset Current. The increase in Input Offset Current continued throughout all irradiation levels. However, the devices with leads shorted to ground during irradiation did not exhibit the increased Input Offset Current.

Both biased and grounded devices demonstrated a notable increase in Input Bias Current at all dose levels.

MSK119RH Biased/Unbiased Dose Rate
Schedule

Dosimetry Equipment
Bruker Biospin # 0141

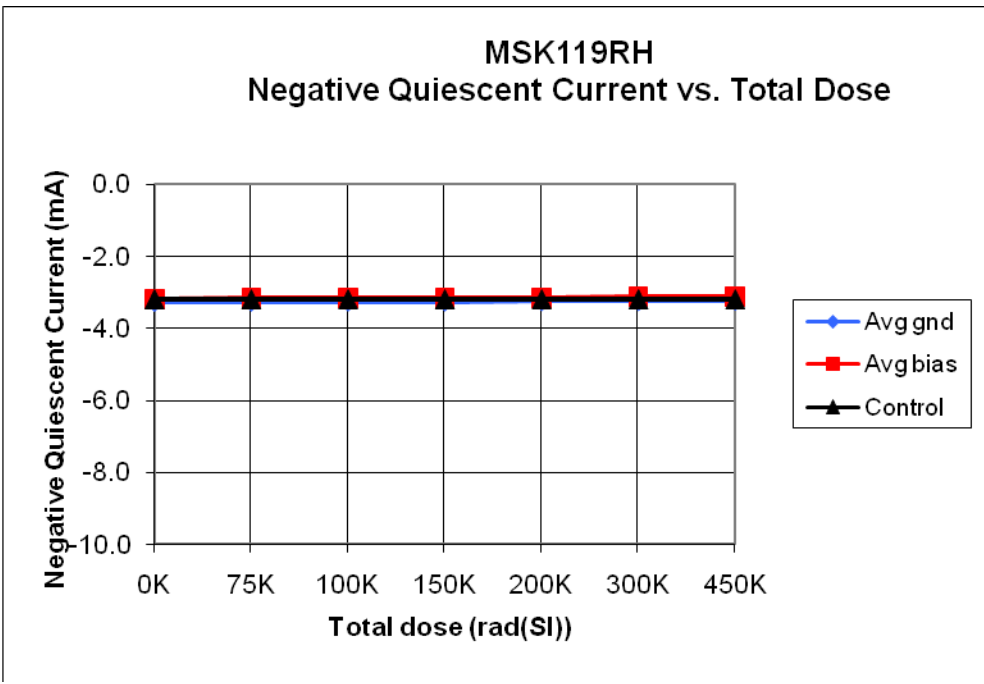
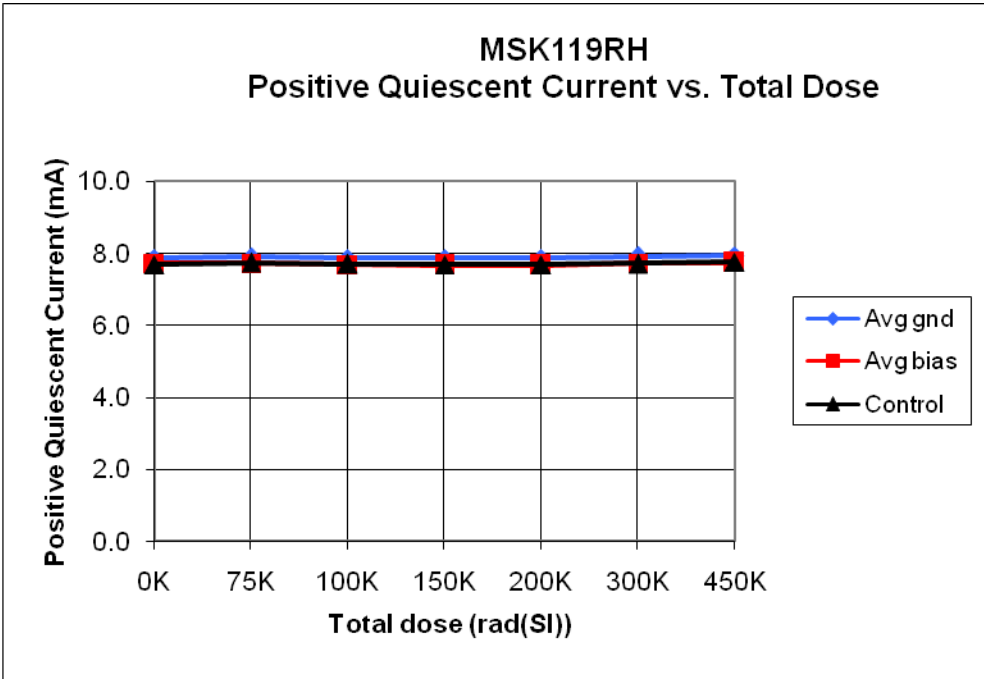
Irradiation Date
5/21/2010

Exposure Length (min:sec)	Incremental Dose rads(Si)	Cumulative Dose rads(Si)
9:39	80,481	80,481
2:42	22,518	102,999
6:11	51,569	154,568
6:11	51,569	206,137
12:22	103,138	309,275
18:33	154,707	463,982

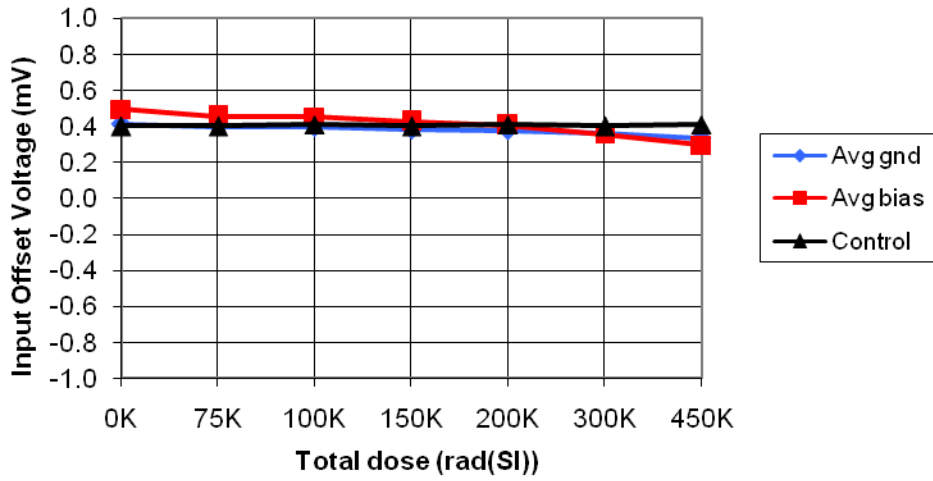
Biased S/N – 1010, 1022, 1023, 1034, 1056

Unbiased S/N – 1057, 1058, 1059, 1064, 1072

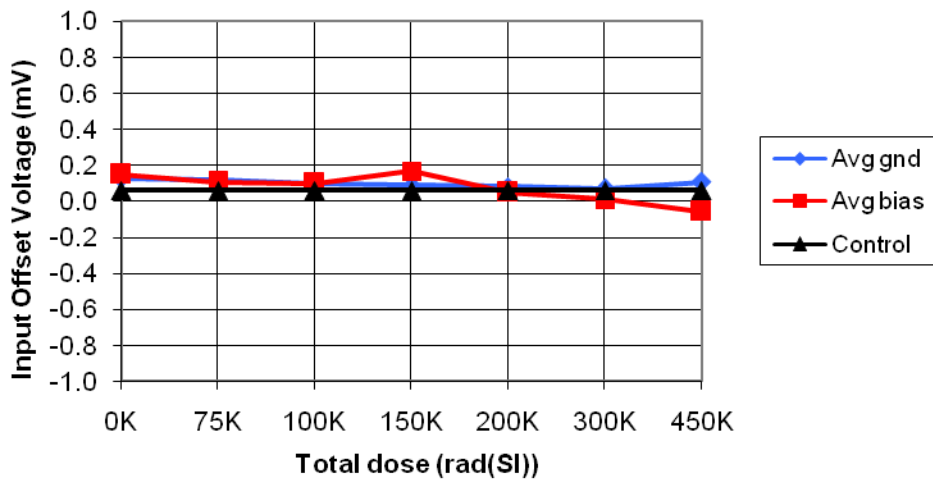
Table 1
Dose Time, Incremental Dose and Total Cumulative Dose

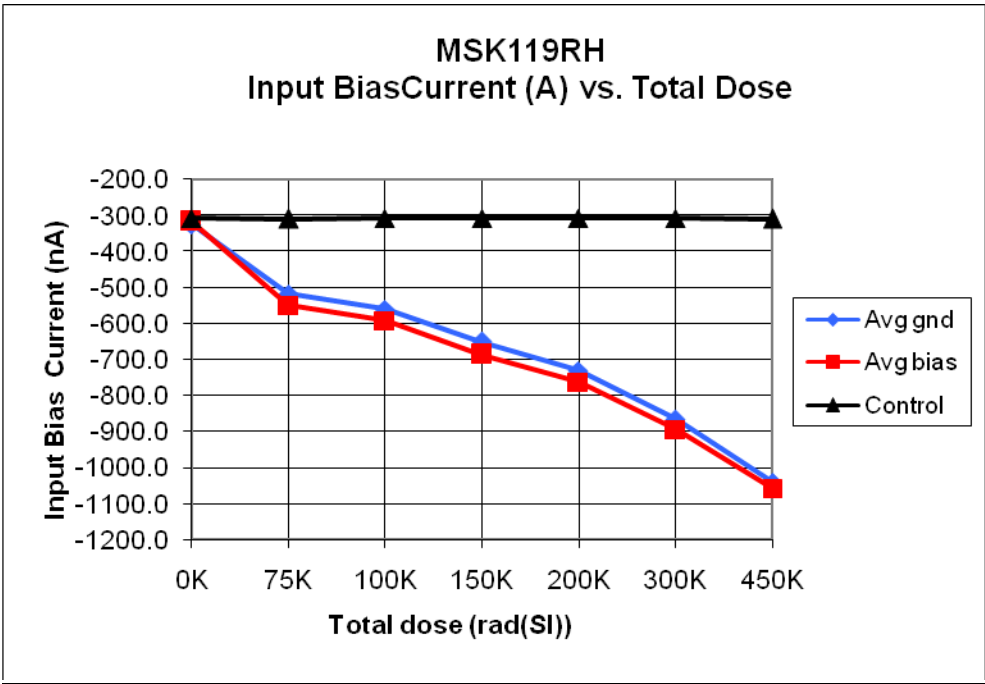
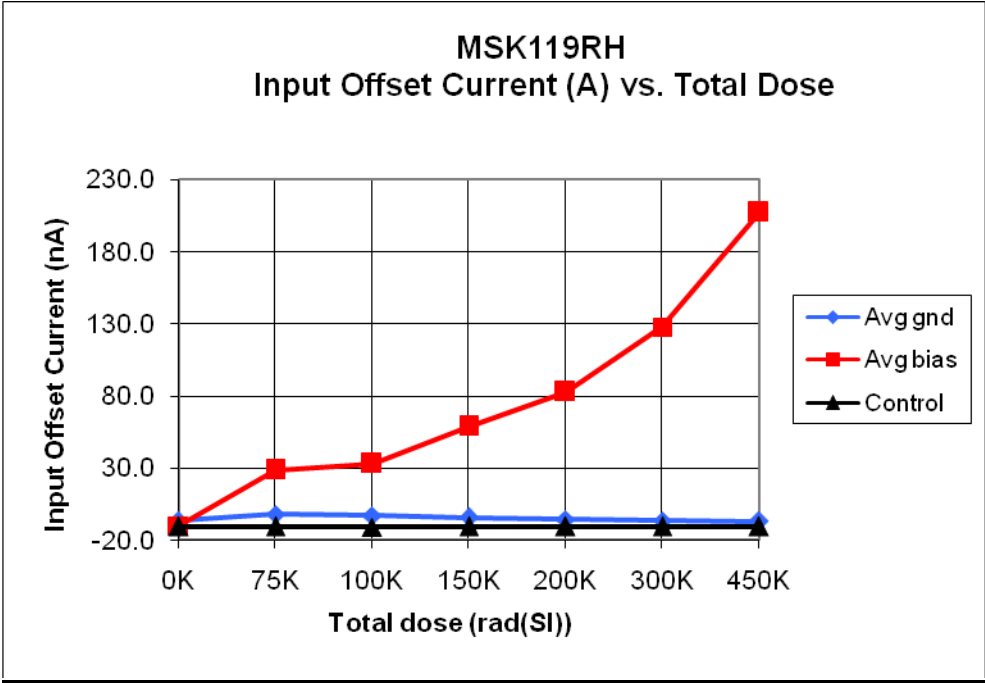


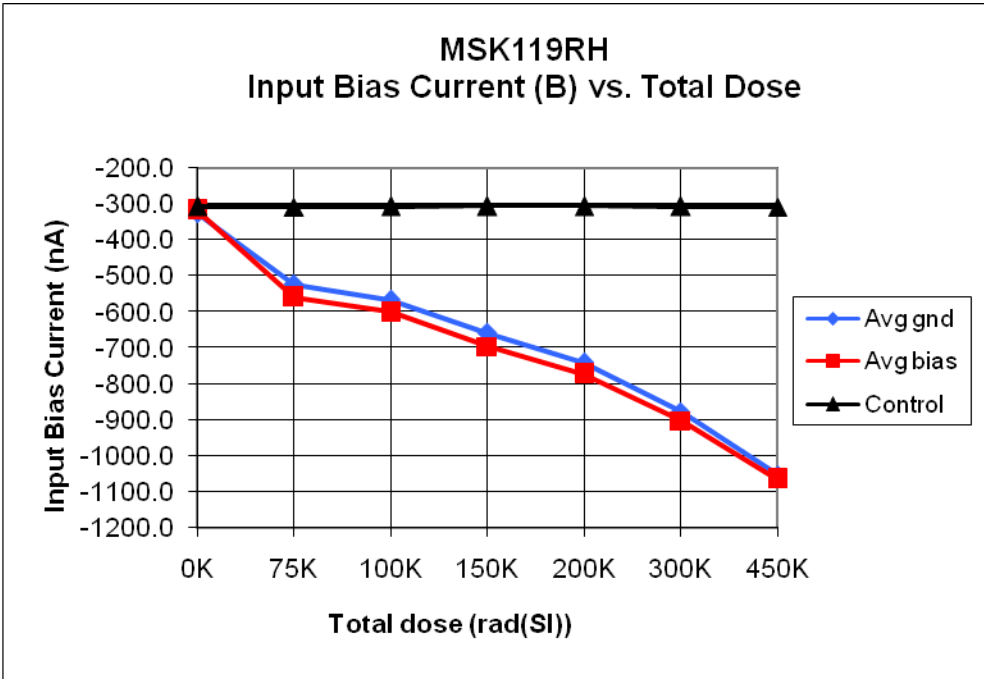
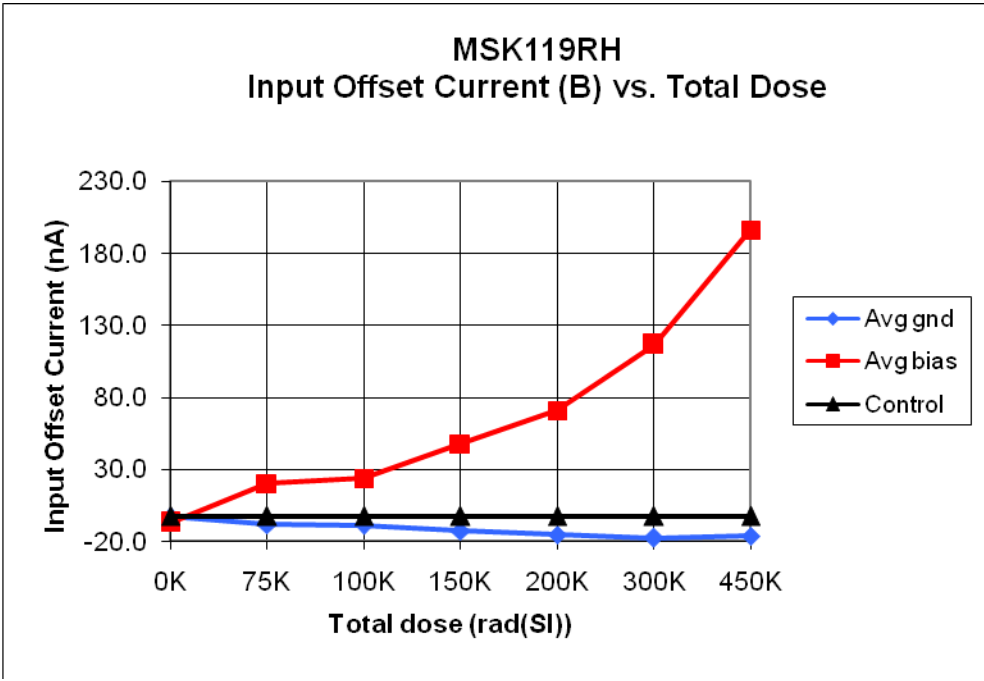
MSK119RH
Input Offset Voltage (A) vs. Total Dose



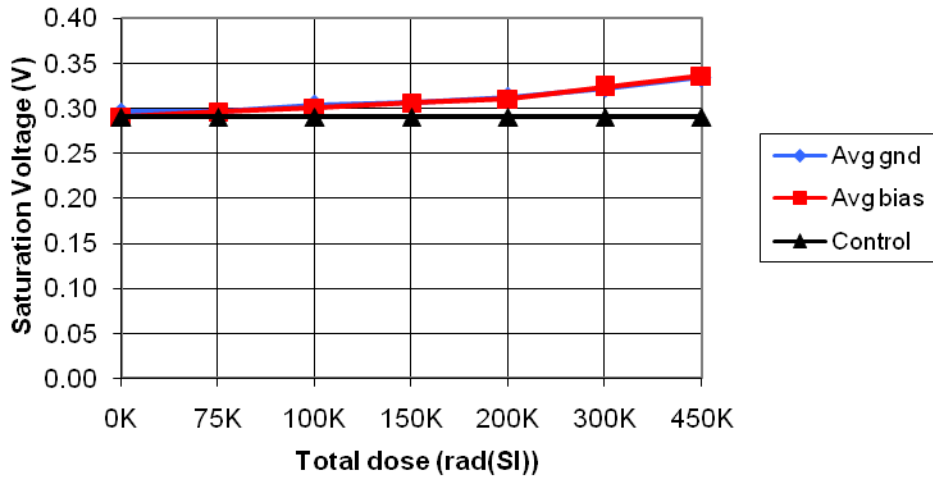
MSK119RH
Input Offset Voltage (B) vs. Total Dose



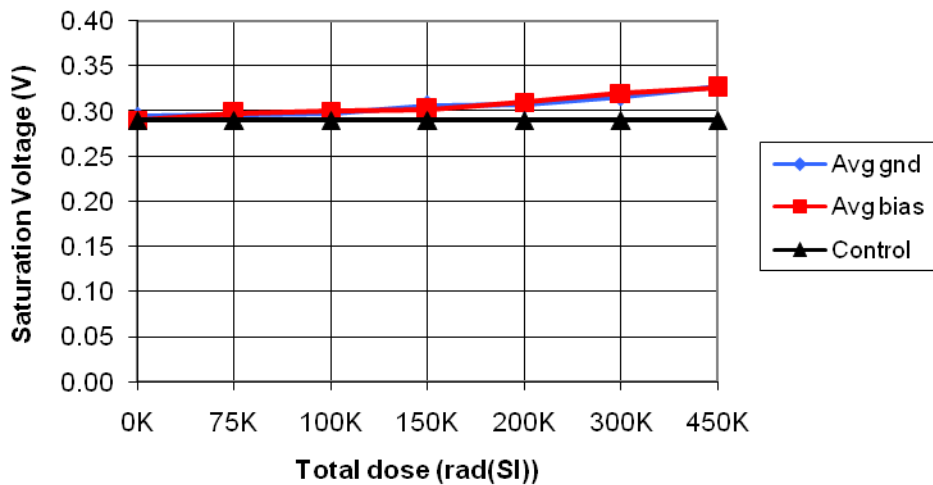




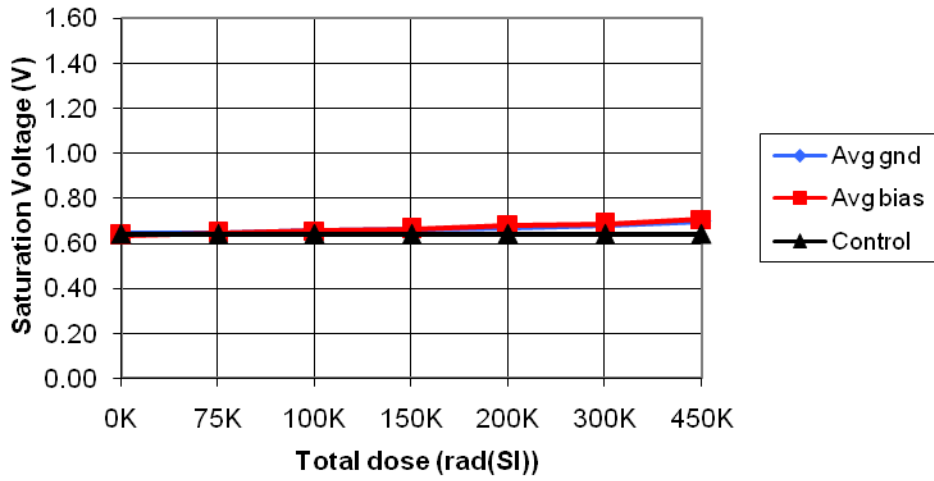
MSK119RH
Saturation Voltage $I_{sink} = 3\text{mA}$ (A) vs. Total Dose



MSK119RH
Saturation Voltage $I_{sink} = 3\text{mA}$ (B) vs. Total Dose



MSK119RH
Saturation Voltage $I_{sink} = 25mA$ (A) vs. Total Dose



MSK119RH
Saturation Voltage $I_{sink} = 25mA$ (B) vs. Total Dose

