

Total Dose Radiation Test Report

MSK 4304RH

3 - Phase Motor Drive Hybrid

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I. Introduction:

The total dose radiation test plan for the MSK 4304RH was developed to qualify the device as a radiation tolerant device to 300 Krad(Si). The testing was performed up to 450 Krad to show trends in device performance as a function of total dose.

MIL-STD-883 Method 1019.7 and ASTM F1892-98 were used as guidelines in the development and implementation of the total dose test plan for the MSK 4304RH.

II. Radiation Source:

Total dose was performed at the University of Massachusetts, Lowell, using a cobalt 60 radiation source. Alanine dosimetry was performed and the dose rate was determined to be 118 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 MSK4304RH Electrical Test Procedure 1702-12750 Rev -. 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 lead/aluminum container during irradiation. Four devices were kept under bias during irradiation. Four devices had all leads grounded during irradiation for the unbiased condition.

After each irradiation the device leads were held electrically common and the devices were transported to the MSK electrical test platform and tested IAW the MSK 4304RH Electrical Test Procedure 1702-12750 Rev -. 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:

Based on the test data recorded during radiation testing, the MSK 4304RH qualified as a 300 Krad(Si) radiation tolerant device. All test parameters stayed within specification up to and beyond 450 Krad(Si) TID.

Dosimetry Equipment:
Bruker Biospin #0141

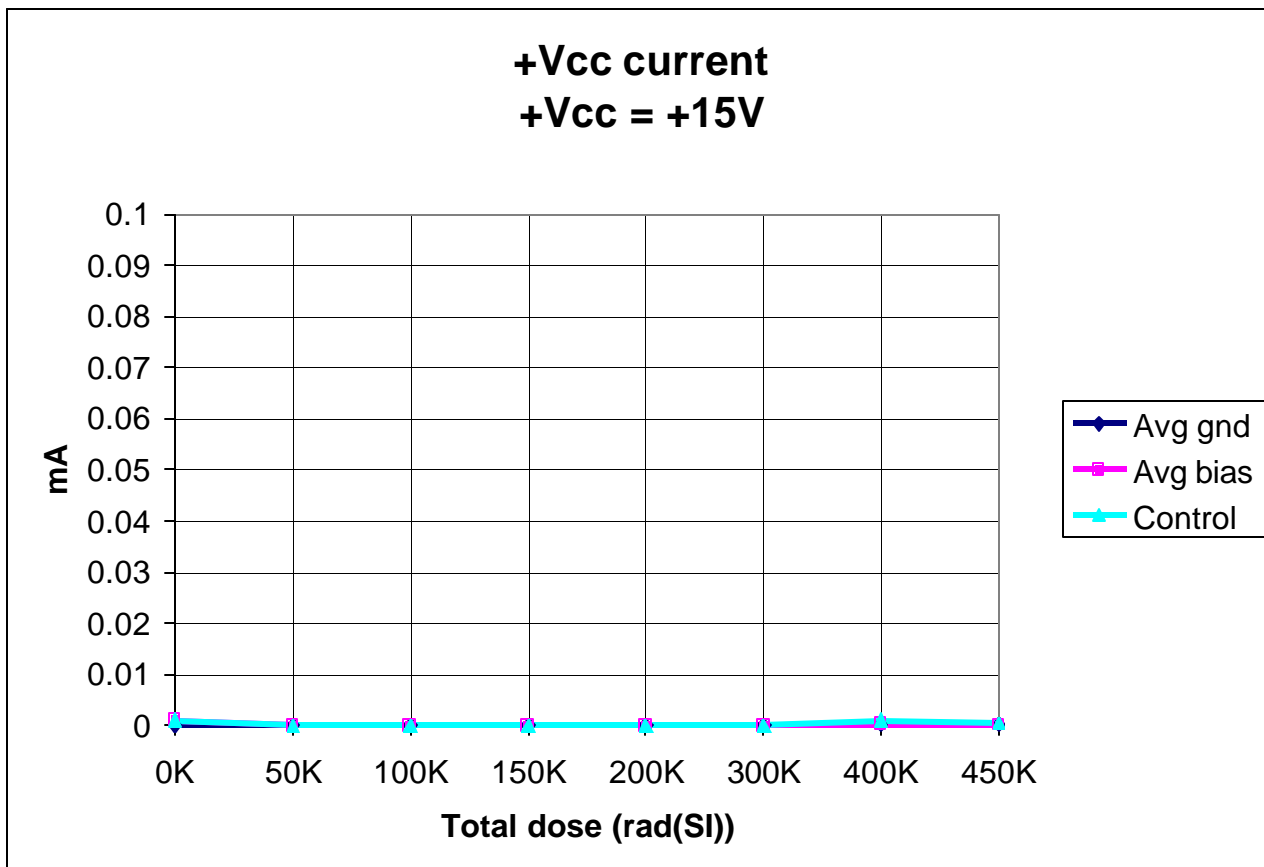
Dose Rate = 118 Rads(Si)/Sec
Device Date Code 0721

Testing Performed:
6/12/2007

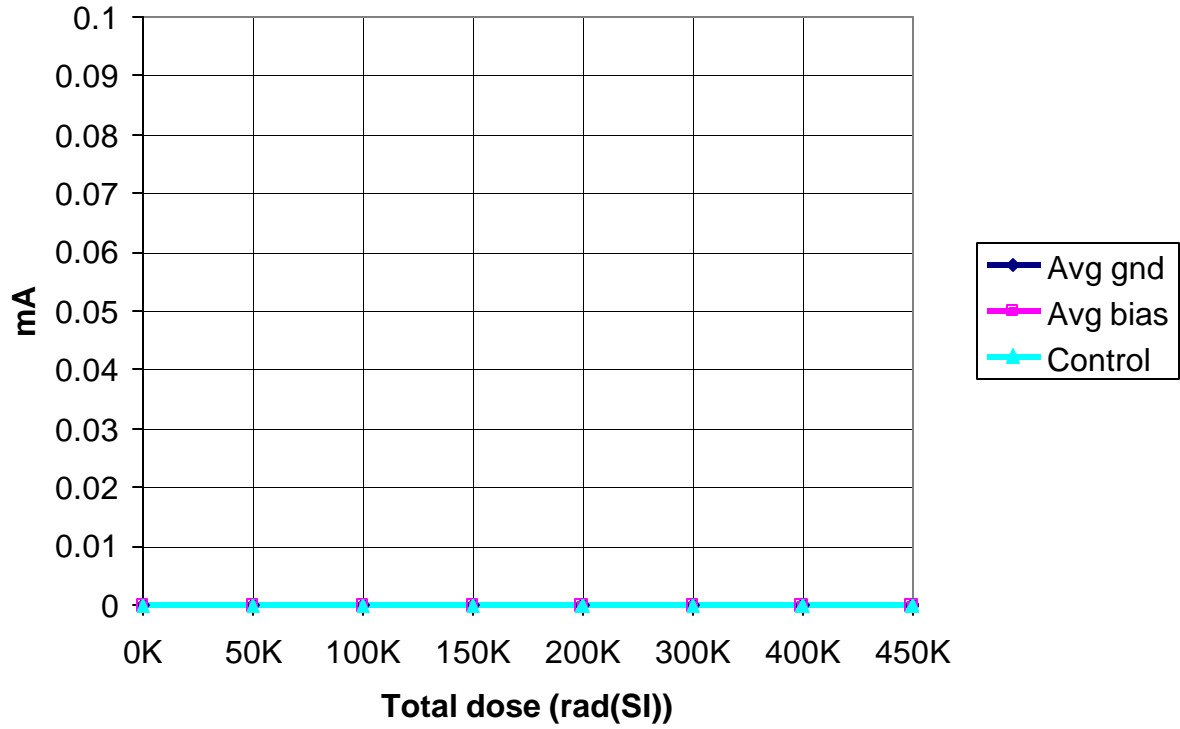
Board Identification MSK 4304 GND		
Exposure Length (min:sec)	Incremental Dose Rads(Si)	Cumulative Dose Rads(Si)
07:17	51,556	51,556
07:17	51,556	103,132
07:17	51,556	154,698
07:17	51,556	206,264
14:33	103,014	309,278
14:33	103,014	412,292
14:33	103,014	515,306
Serial #'s: 3645, 3646, 3647 & 3648		

Board Identification 4304 BIAS		
Exposure Length (min:sec)	Incremental Dose Rads(Si)	Cumulative Dose Rads(Si)
07:17	51,556	51,556
07:17	51,556	103,132
07:17	51,556	154,698
07:17	51,556	206,264
14:33	103,014	309,278
14:33	103,014	412,292
14:33	103,014	515,306
Serial #'s: 3650, 3651, 3652 & 3654		

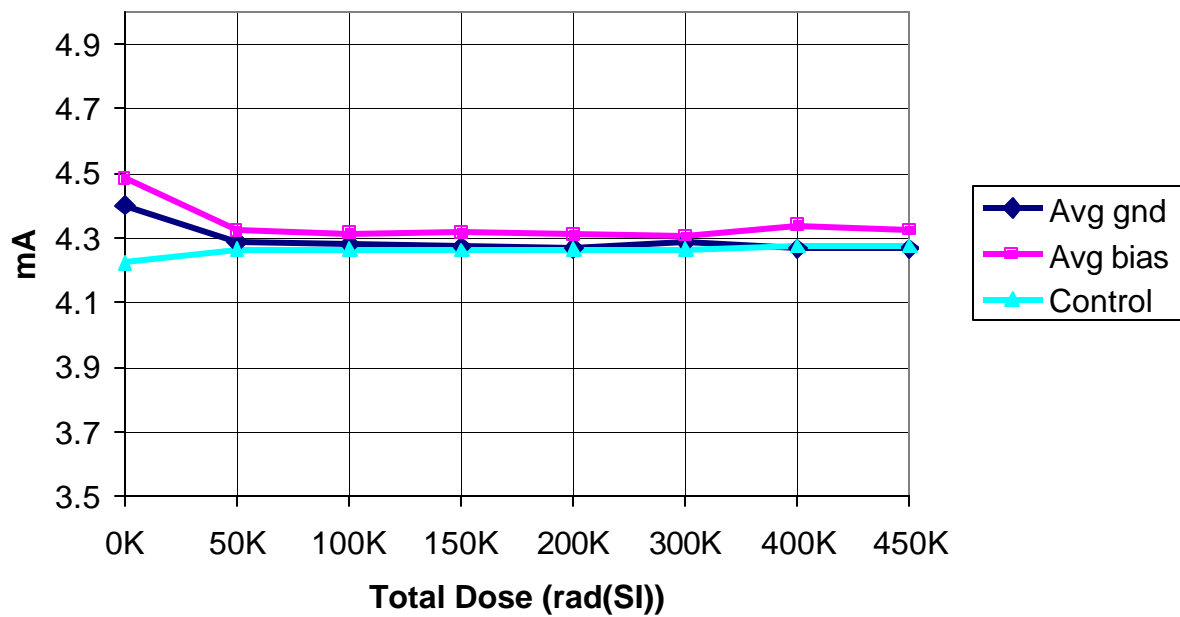
Table I
Dose Time, Incremental Dose and Total Cumulative Dos

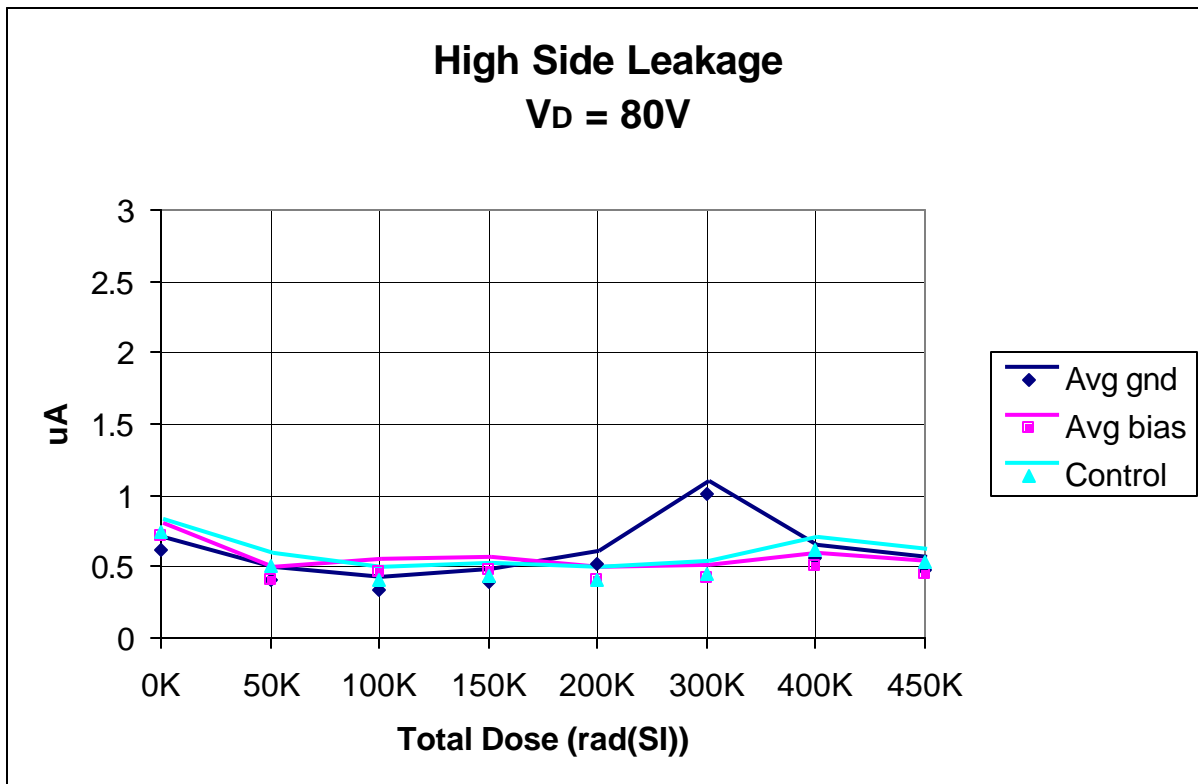
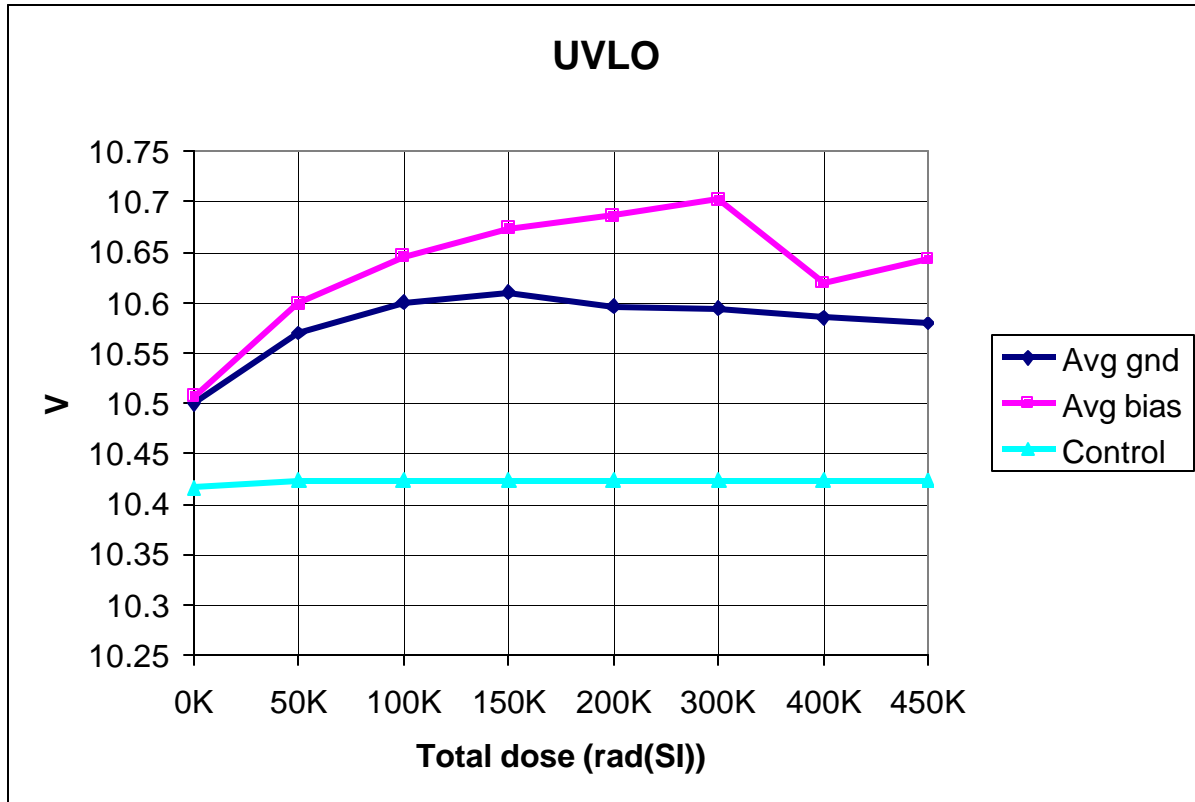


+VB Current +VB = +15V



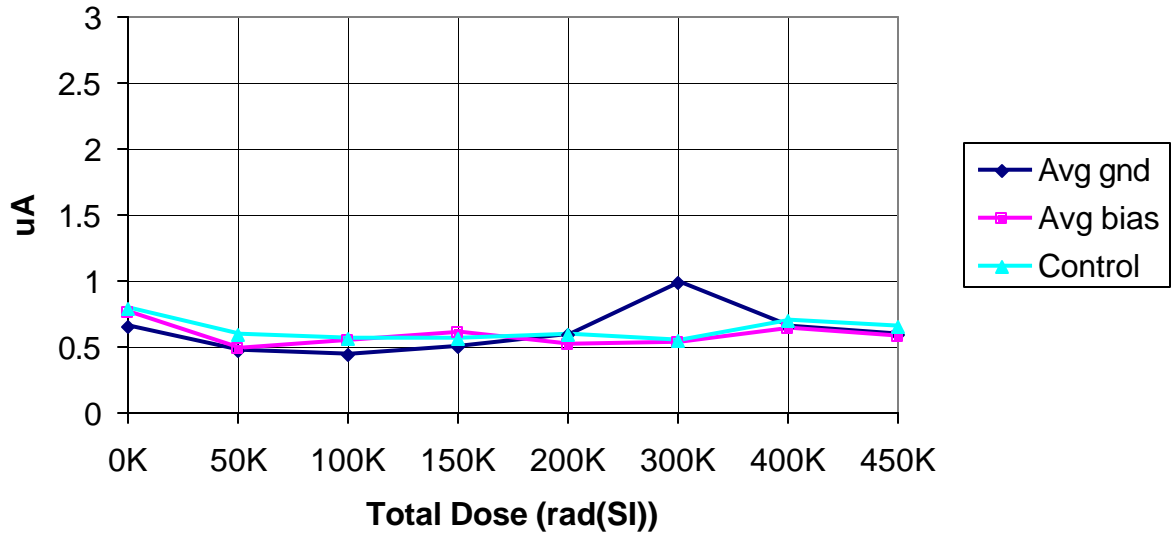
+VDD Current +VDD = +15V





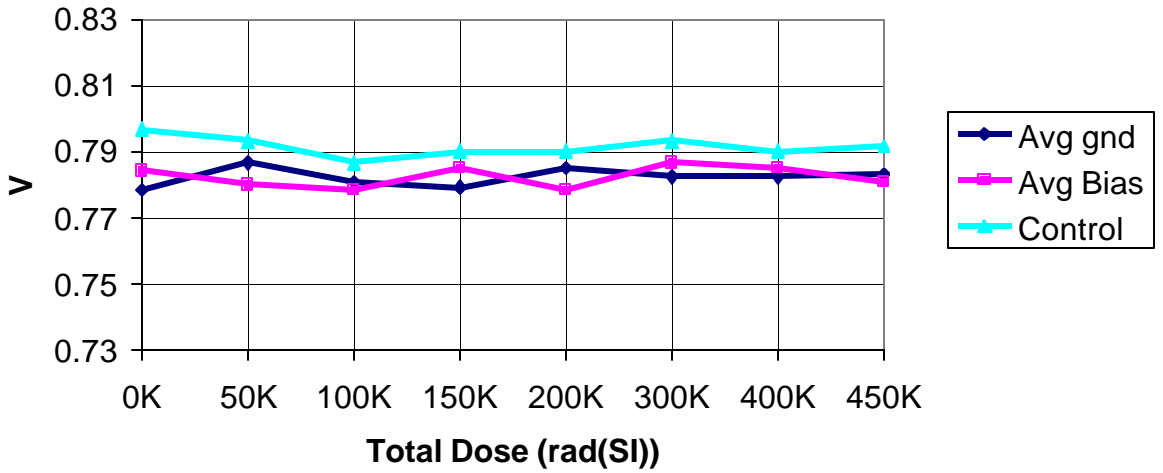
Low Side Leakage

$V_D = 80V$

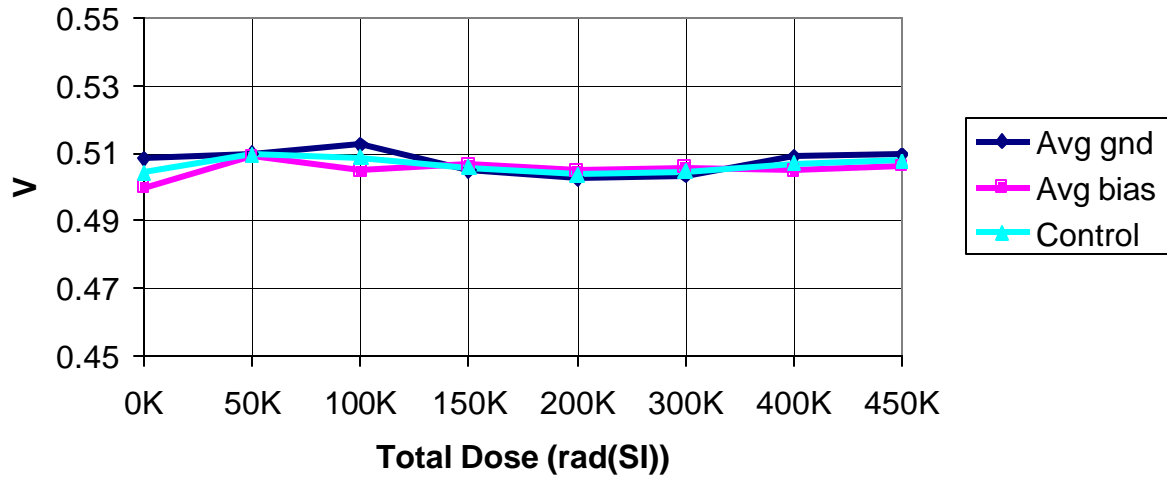


High Side VDS(on)

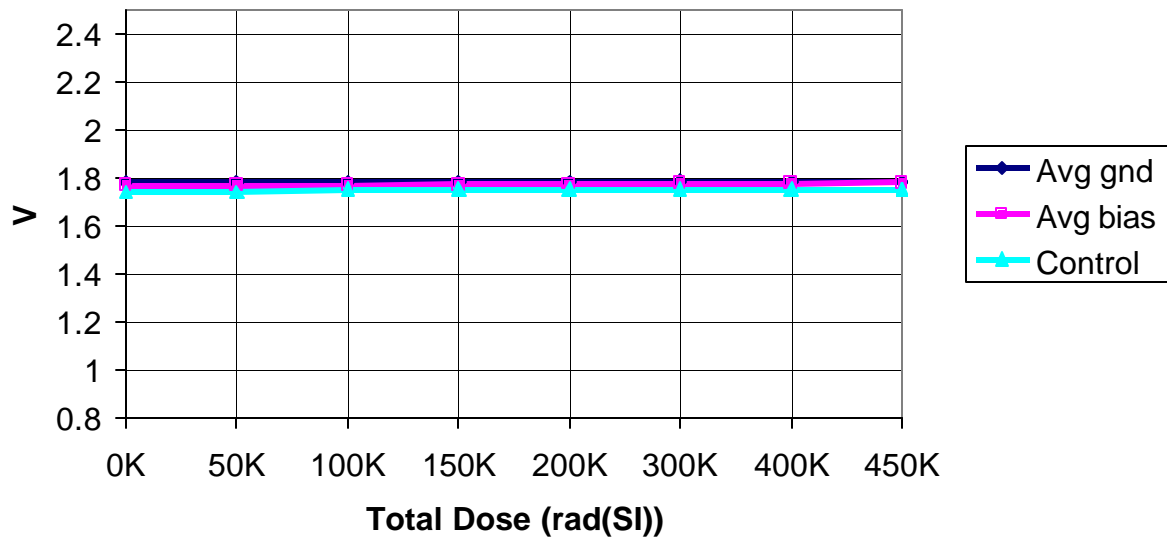
$I_{DS} = 10A$



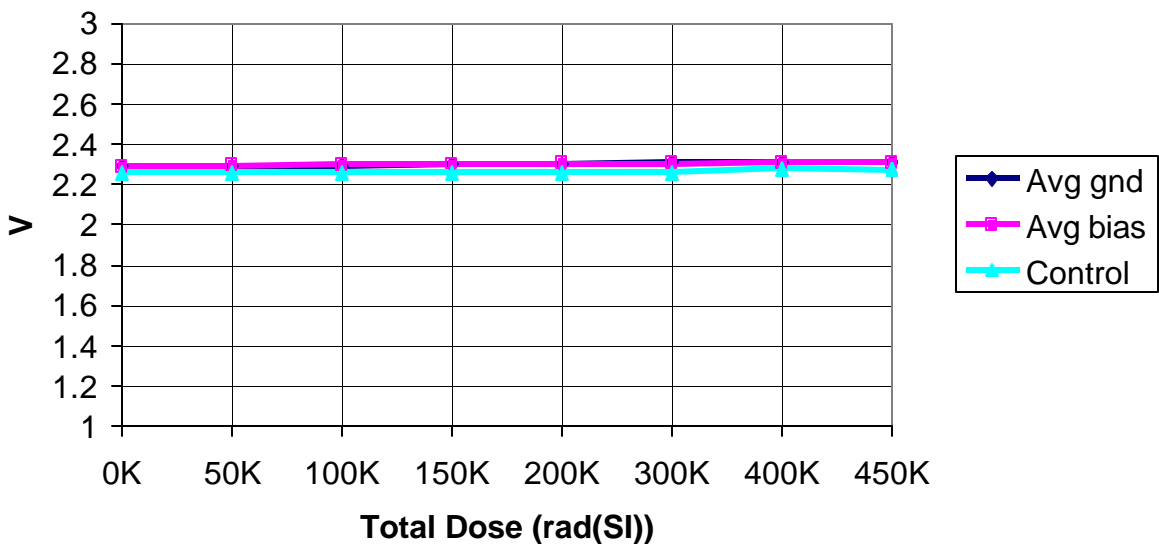
Low Side VDS(on) IDS = 10A



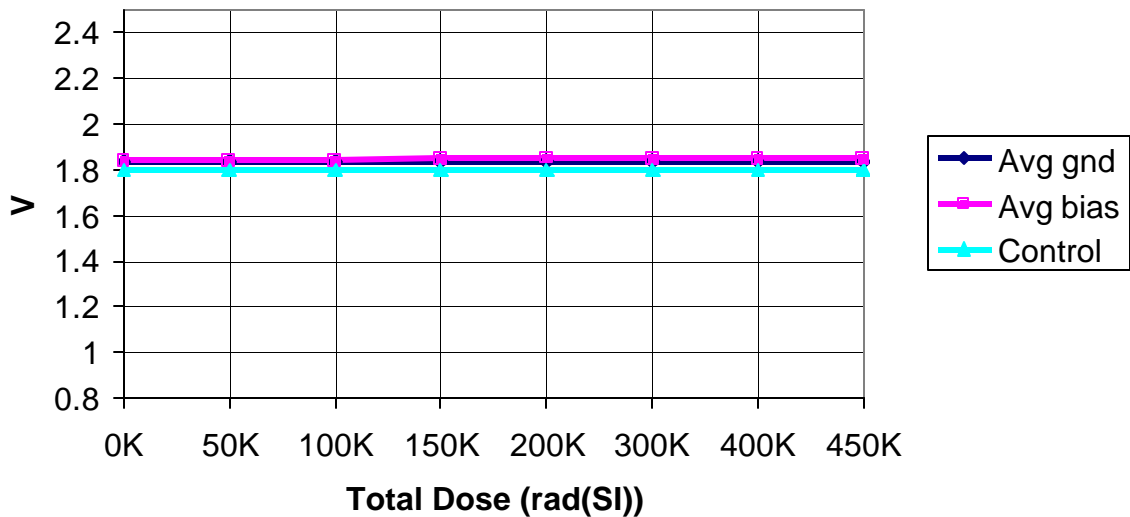
High Side Logic Low Input Threshold



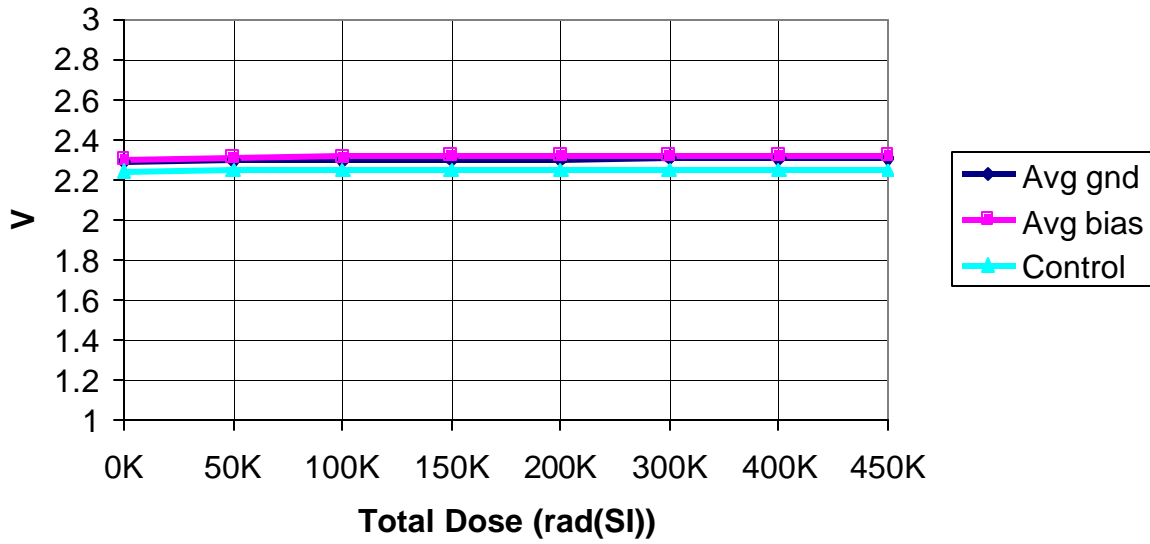
High Side Logic High Input Threshold



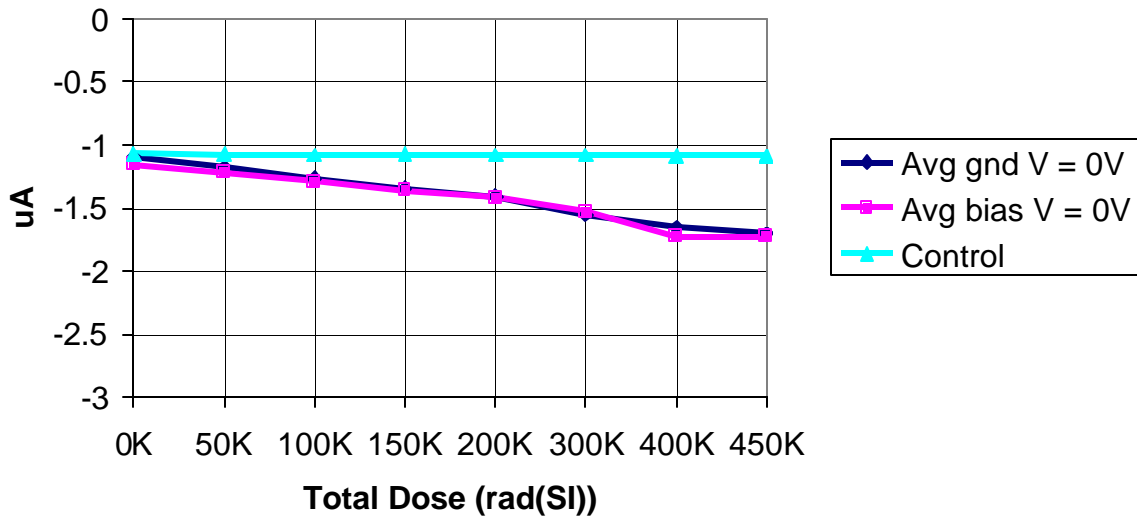
Low Side Logic Low Input Threshold



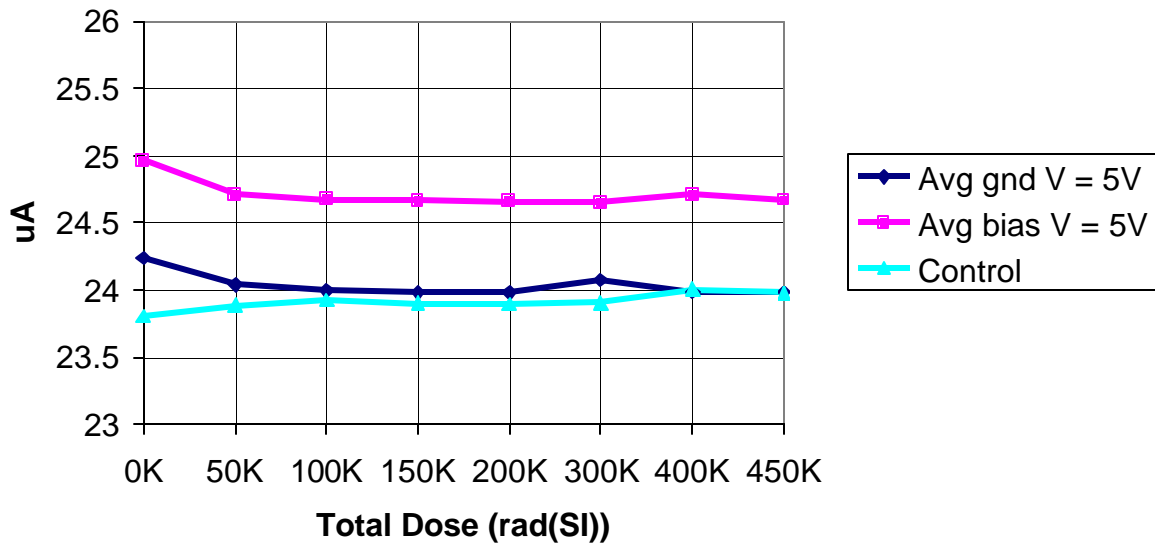
Low Side Logic High Input Threshold



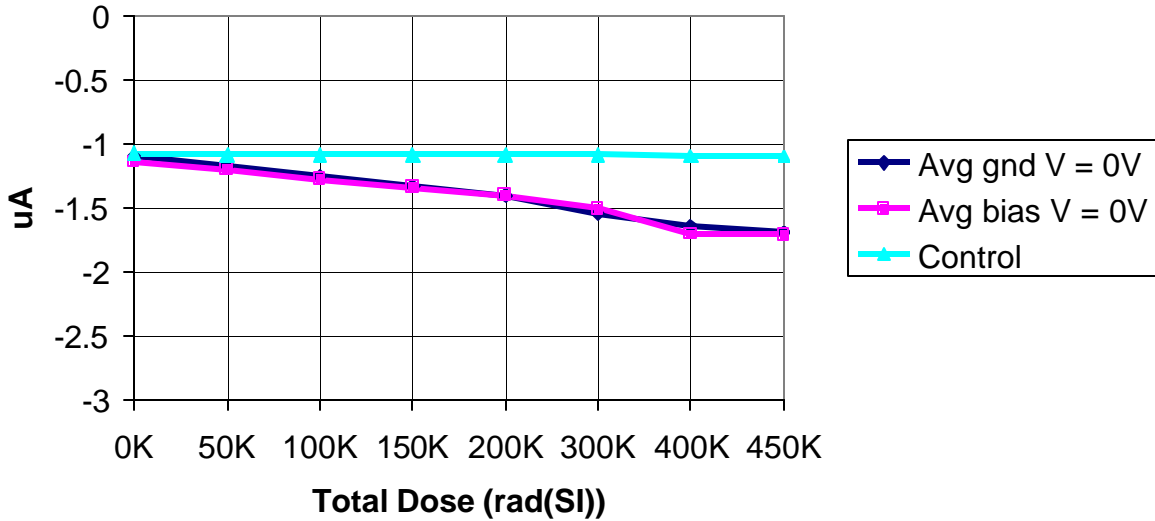
High Side Logic Input Current $V_{in} = 0V$



High Side Logic Input Current Vin = 5V



Low Side Logic Input Current Vin = 0V



Low Side Logic Input Current Vin = 5V

